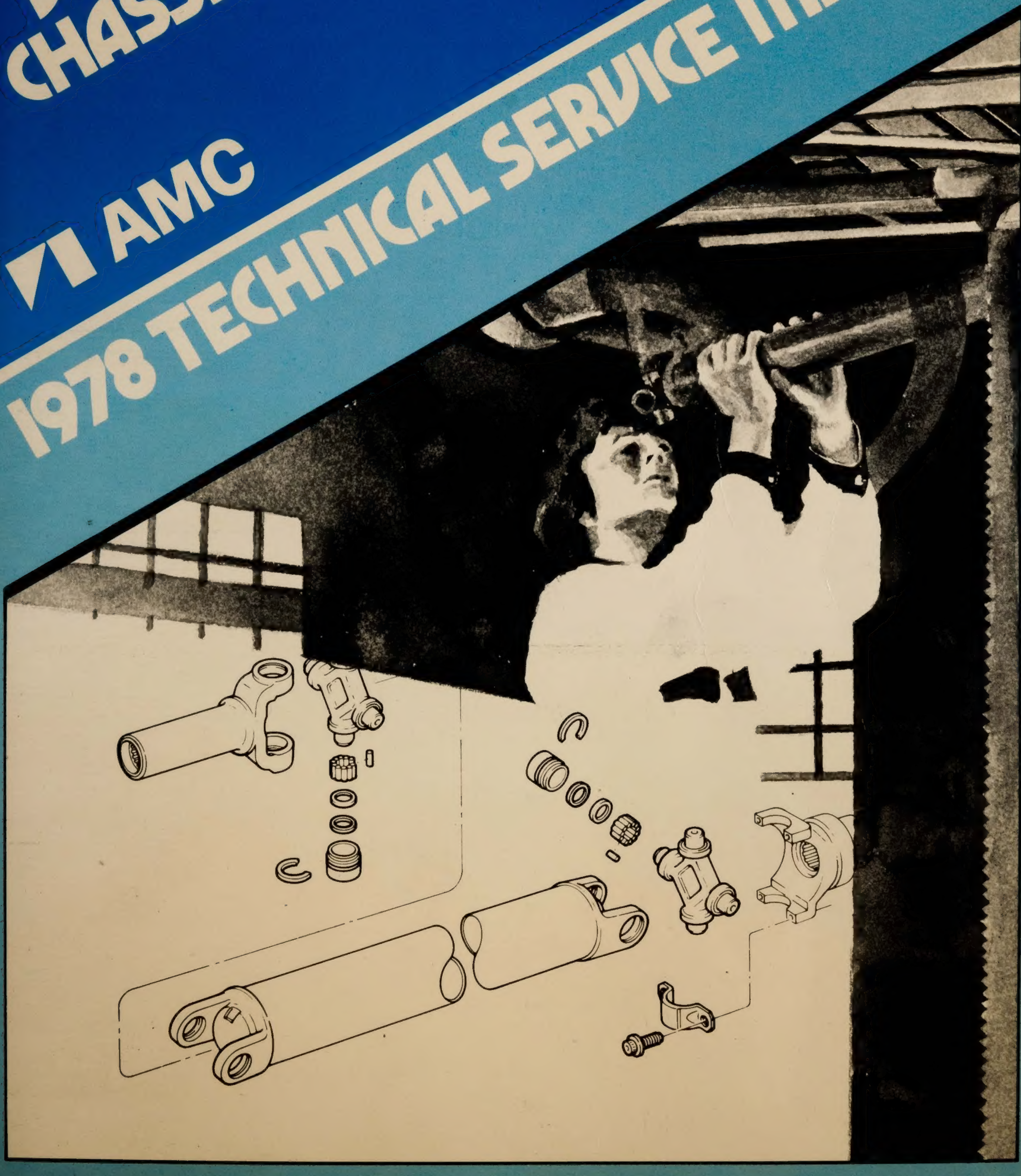
VOLUME 2
CHASSIS

AMC

1978 TECHNICAL SERVICE MANUAL



FOREWORD

This manual is one of three volumes which together comprise the 1978 American Motors Corporation Technical Service Manual. The three volumes are Volume 1—Power Plant, Volume 2—Chassis and Volume 3—Body. All three volumes provide a systems approach to servicing 1978 AMC cars, and each volume contains diagnosis and repair procedures, specifications and torque references for the system described.

The Chapter Index on the opposite page allows you to quickly locate any desired chapter. On the first page of each chapter there is a black tab in a position corresponding to the tab on the Chapter Index page. To locate a chapter, simply fold back the manual slightly to expose the outside edges of the pages. Find the tab that aligns with the index tab and open to that page. At the beginning of each chapter is an index of major subjects. An alphabetical index of major subjects within this volume is included in the back of this manual.

All information and specifications in this manual are based on the latest data available at the time of publication. American Motors Corporation reserves the right to discontinue models and change specifications or design without notice or incurring obligation.

Brand names mentioned in this manual are for convenience only and are not intended as a recommendation to use a specific brand of product. They are indicative of a class or type and may be substituted by their equivalent.

1978 TECHNICAL SERVICE MANUAL

VOLUME 2 CHASSIS

Pacer........... 60 Series
Gremlin......... 40 Series
Concord & AMX 01 Series
Matador..... 10-80 Series

Chapter Index

American Motors Sales Corporation
Service Department

GENERAL INFORMATION

A

SECTION INDEX

HOW TO USE THIS MANUAL

Organization

The first page of each chapter contains a black tab in a position corresponding to the tab on the chapter index page. To locate a desired chapter, simply fold back the manual slightly so that the outside edges of the pages are exposed. Find the black tab that aligns with the tab in the chapter index page and open to the desired chapter.

Each chapter begins with an alphabetical index of subjects. Locate the desired subject and turn to the appropriate page. If the subject is broad, the chapter is divided into sections and a subject index of each section is also included. An alphabetical index of all subjects is included at the back of this manual.

Each chapter ends with specifications, torque charts, and special tools pertinent to that chapter.

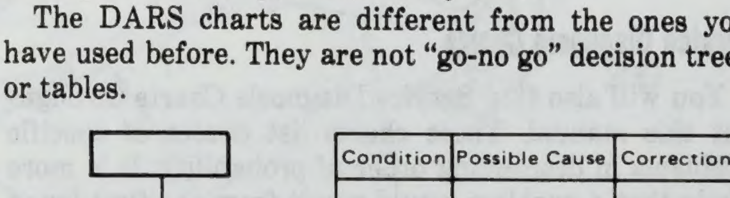
Warnings and Cautions

Detailed descriptions of standard workshop safety procedures are not included in this manual. This manual does contain WARNINGS for some service procedures that could cause personal injury, and CAUTIONS for some procedures that could damage the vehicle or its components. Please understand that these WARNINGS and CAUTIONS do not cover all conceivable ways which service might be done or all possible hazardous consequences of each conceivable way. Anyone using service procedures or tools (whether or not recommended by American Motors) must satisfy himself that neither personal nor vehicle safety will be jeopardized by the procedures or tools selected.

DARS Charts

In several places throughout this manual, Diagnosis and Repair Simplification (DARS) charts provide a graphic method of diagnosis and troubleshooting through the use of pictures and symbols.

The DARS charts are different from the ones you have used before. They are not "go-no go" decision trees or tables.



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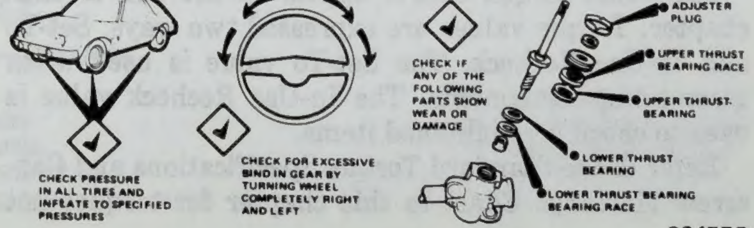
Instead, the new DARS charts use pictures plus a few words to help you solve a problem. . .



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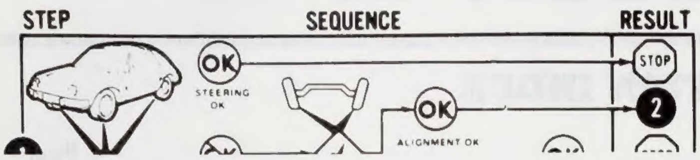
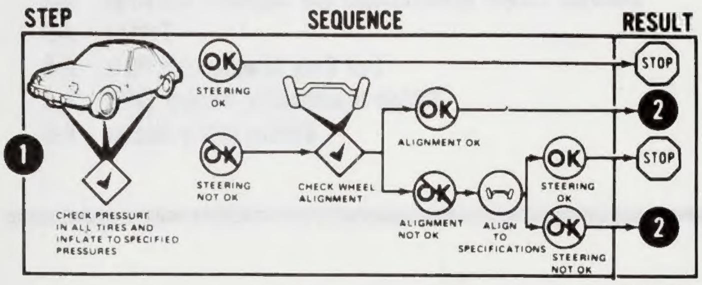
and symbols and words help guide you through each step. . .

80477C

The charts are divided into three sections: **step, sequence** and **result.**



Always start at the first step and go through the complete sequence from left to right.



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A sequence could be checking pressure in all tires and inflating to specified pressures. If the problem is solved, the symbol OK will send you to STOP. If the problem is not solved, the symbol OK will send you through another sequence of checks which ends with a result and tells you the next step to go to.

Work through each step of the DARS charts until the system is repaired STOP.

Service Diagnosis Charts

You will also find Service Diagnosis Charts throughout this manual. These charts list causes of specific problems in descending order of probability. It is more likely that a problem would result from the first listed "possible cause" than the fourth, for instance. Visual inspection often leads directly to the correct solution. All service procedures should begin with a careful visual inspection of any suspected part or assembly.

Torque Information

Individual torque charts appear at the end of each chapter. Torque values are expressed two ways, Set-To and In-Use Recheck. The Set-To value is used when assembling components. The In-Use Recheck value is used to check pre-tightened items.

Refer to the Standard Torque Specifications and Capscrew Markings Chart in this chapter for torques not listed in individual torque charts. Note that torque specifications given in this chart are based on the use of clean and dry threads. Reduce torque by 10 percent when threads are lubricated with engine oil and by 20 percent if new plated capscrews are used.

Torx-Head Fasteners

Various sizes of internal and external hex-lobular (Torx) head fasteners are used as attaching hardware on numerous components and assemblies in 1978 AMC cars. Due to the ever-changing usage and application of automotive fasterners, Torx-head fasteners may not be identified as such throughout this manual. However, these fasteners may be removed or installed using Tool Set J-25359-02.

Service Manual Improvements

You are encouraged to report errors, omissions, or recommendations for improving this publication. A form is provided for this purpose at the end of this chapter.

GENERAL INFORMATION—VOLUME TWO

This manual (Volume Two) covers the various chassis components used in 1978 Pacer, Gremlin, Concord, AMX and Matador AMC cars. It provides diagnosis methods, repair procedures and specifications needed to service clutch, manual transmission, automatic transmission, propeller shaft and U-joint, axles, brakes, wheels and tires, and suspension and steering components.

Chapters A, B and C contain general information related to vehicle identification, body styles, available power teams, general maintenance and fleet equipment.

Chapters 2A through 2N contain service procedures and specifications for the components outlined in a particular chapter.

To improve convenience, five new chapters are included to present steering and suspension systems as individual chapters.

NEW CHASSIS FEATURES FOR 1978

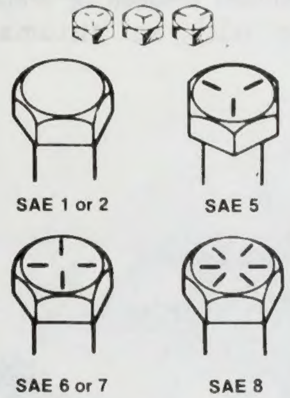
New chassis features for Pacer, Gremlin, AMX and Concord models include a floor-shift 4-speed transmissions available with all six- and four-cylinder engines. All automatic transmissions are available with a floor shift.

Redesigned spring mounting clamps and bushings improve ride and quietness. Recalibrated shock absorbers smoothen the ride.

Urethane styled wheels have been replaced by new Noryl styled wheels.

Standard Torque Specifications and Capscrew Markings Chart

CAPSCREW HEAD MARKINGS	CAPSCREW BODY SIZE Inches — Thread	SAE GRADE 1 or 2 (Used Infrequently) Torque		SAE GRADE 5 (Used Frequently) Torque		SAE GRADE 6 or 7 (Used at Times) Torque		SAE GRADE 8 (Used Frequently) Torque	
		Ft-Lb	Nm	Ft-Lb	Nm	Ft-Lb	Nm	Ft-Lb	Nm
Manufacturer's marks may vary. Three-line markings on heads shown below, for example, indicate SAE Grade 5.	1/4-20 -28	5 6	6.7791 8.1349	8 10	10.8465 13.5582	10	13.5582	12 14	16.2698 18.9815
	5/16-18 -24	11 13	14.9140 17.6256	17 19	23.0489 25.7605	19	25.7605	24 27	32.5396 36 6071
	3/8-16 -24	18 20	24.4047 27.1164	31 35	42.0304 47.4536	34	46.0978	44 49	59.6560 66.4351
	7/16-14 -20	28 30	37.9629 40.6745	49 55	66.4351 74.5700	55	74.5700	70 78	94.9073 105.7538
	1/2-13 -20	39 41	52.8769 55.5885	75 85	101.6863 115.2445	85	115.2445	105 120	142.3609 162.6960
	9/16-12 -18	51 55	69.1467 74.5700	110 120	149.1380 162.6960	120	162.6960	155 170	210.1490 230.4860
	5/8-11 -18	83 95	112.5329 128.8027	150 170	203.3700 230.4860	167	226.4186	210 240	284.7180 325.3920
	3/4-10 -16	105 115	142.3609 155.9170	270 295	366.0660 399.9610	280	379.6240	375 420	508.4250 569.4360
	7/8- 9 -14	160 175	216.9280 237.2650	395 435	535.5410 589.7730	440	596.5520	605 675	820.2590 915.1650
	1- 8 -14	235 250	318.6130 338.9500	590 660	799.9220 894.8280	660	894.8280	910 990	1233.7780 1342.2420



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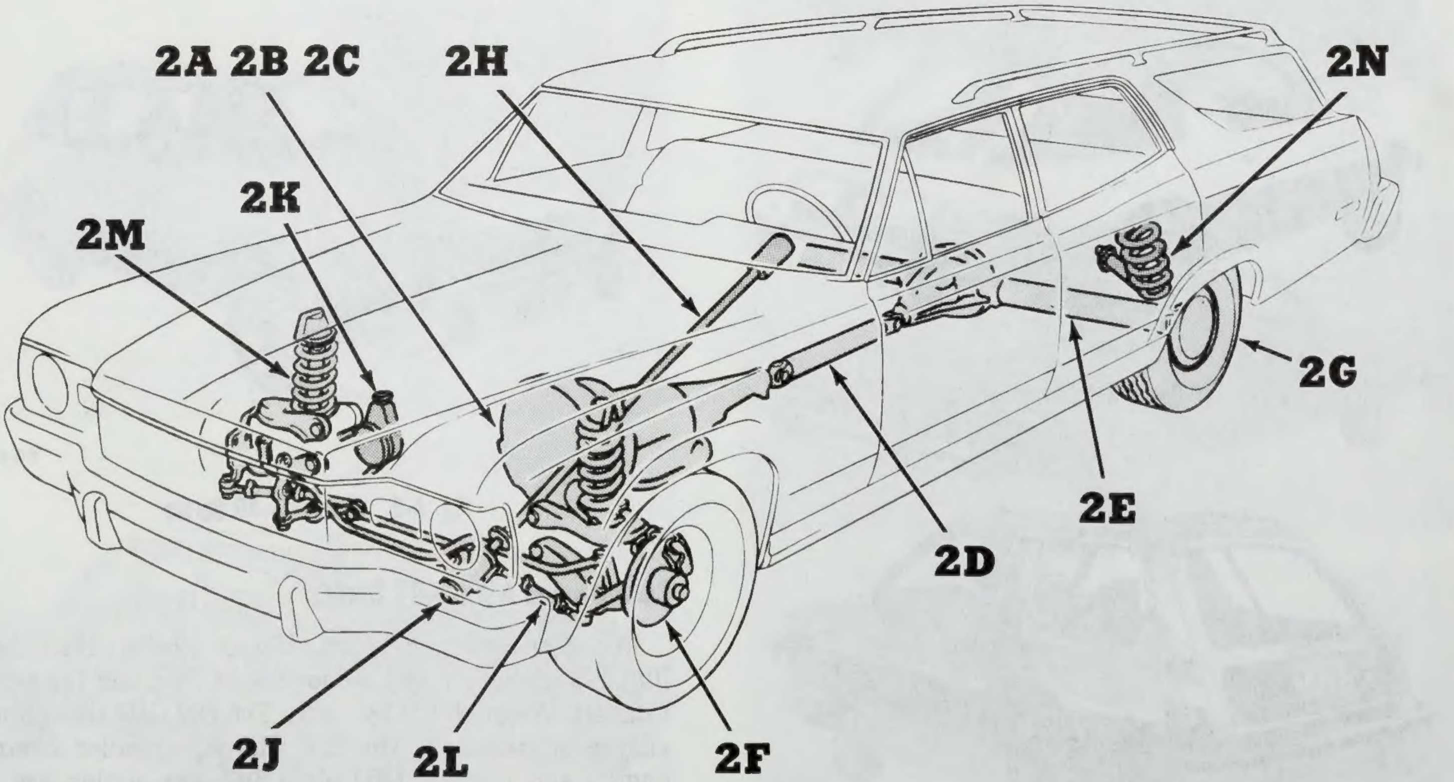

Volume Two—Chassis

2A CLUTCH
2B MANUAL TRANSMISSION
2C AUTOMATIC TRANSMISSION
2D PROPELLER SHAFT
2E AXLE
2F BRAKES
2G WHEELS AND TIRES
2H STEERING COLUMNS
2J MANUAL STEERING GEAR
2K POWER STEERING GEAR AND PUMP
2L STEERING LINKAGE
2M FRONT SUSPENSION
2N REAR SUSPENSION

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1978 AMC CARS

Pacer—60 Series

Two Pacer models are offered: 2-door Hatchback [66] and 2-door Station Wagon [68] (fig. A-1). The 232 CID six-cylinder engine is standard. The 258 CID six-cylinder 2-barrel engine is optional. The six-cylinder engines may be teamed with a fully synchronized 3-speed or 4-speed manual transmission, or with an automatic transmission.

Pacer Hatchback

Pacer Wagon

80485

Fig. A-1 Pacer—60 Series

Gremlin—40 Series

Three Gremlin models are offered: a base six-cylinder model [46-5], a custom four-cylinder model [46-4], and a custom six-cylinder model [46-7] (fig. A-2). The 232 CID six-cylinder engine is standard on the model 46-5 and -7. The 2-liter four-cylinder engine is standard on the 46-4. The 258 CID six-cylinder 2-barrel engine is optional on models 46-5 and 46-7. These engines may be teamed with a fully synchronized 3-speed or 4-speed manual transmission, or with an automatic transmission.

80486

Fig. A-2 Gremlin—40 Series

Concord and AMX—01 Series

Four Concord models are offered: 2-door Hatchback [03], 2-door Sedan [06], 4-door Sedan [05], and the 4-door Concord Wagon [08] (fig. A-3). The 232 CID six-cylinder engine is standard. The 258 CID six-cylinder 2-barrel engine and the 304 CID eight-cylinder engine are optional. The six-cylinder engines may be teamed with a fully synchronized 3-speed or 4-speed manual transmission, or with an automatic transmission. The eight-cylinder engine is available with automatic transmission only.

The AMX is available in one 2-door Hatchback model

[03-9]. The 258 CID six-cylinder with 2-barrel carburetor is standard. (The 258 CID six-cylinder with 1-barrel is standard in Cailifornia and high altitude cars.) The 304 CID eight-cylinder engine is optional. The six-cylinder engine is available with either a 4-speed manual transmission or an automatic transmission. The 304 CID engine is available only with an automatic transmission.

AMX 80487

Concord Hatchback

Concord Sedan

Concord Wagon 80487

Fig. A-3 Concord and AMX—01 Series

Matador—10-80 Series

Three Matador models are offered: 2-door Coupe [16], 4-door Sedan [85], and 4-door Station Wagon [88], (fig. A-4). The 258 CID six-cylinder engine with 2-barrel carburetor is standard for Sedans and Coupes. Optional engine for these models is the 360 CID 2-barrel eight-cylinder. The 360 CID eight-cylinder is standard for all Station Wagons.

Matador Coupe

Matador Sedan 80488

Fig. A-4 Matador—10-80 Series

VEHICLE IDENTIFICATION NUMBER (VIN)

A thirteen-digit Vehicle Identification Number is embossed on a metal plate which is riveted to the upper corner of the instrument panel (between the left windshield wiper pivot and the left A-pillar). It can easily be seen by looking through the windshield. The VIN is decoded as shown in the VIN Decoding Chart.

EMISSION CONTROL MAINTENANCE INFORMATION LABEL

A nonremovable federal emission control information label is located in the engine compartment of all 1978 AMC models. This sticker identifies the engine family determined by certification and outlines some basic tune-up specifications (fig. A-5).

A different label is used for all cars built for sale in the state of California. This sticker replaces the federal sticker on California cars and reflects quarterly audit figures (fig. A-6).

VEHICLE SAFETY STICKER

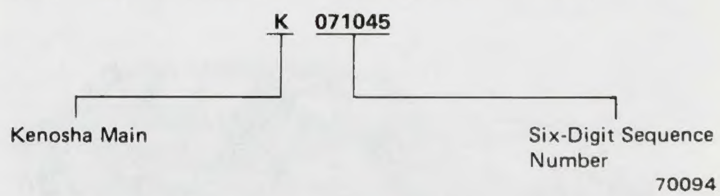
A nonremovable safety sticker is affixed to the edge of the left front door. It lists the month and year built, a safety compliance statement and the vehicle identification number. Some consumer information is included on the label, such as: vehicle class, acceleration and passing figures, tire reserve load and stopping distance. All operating information represents average figures for AMC cars (fig. A-7).

UNIT BODY IDENTIFICATION PLATE

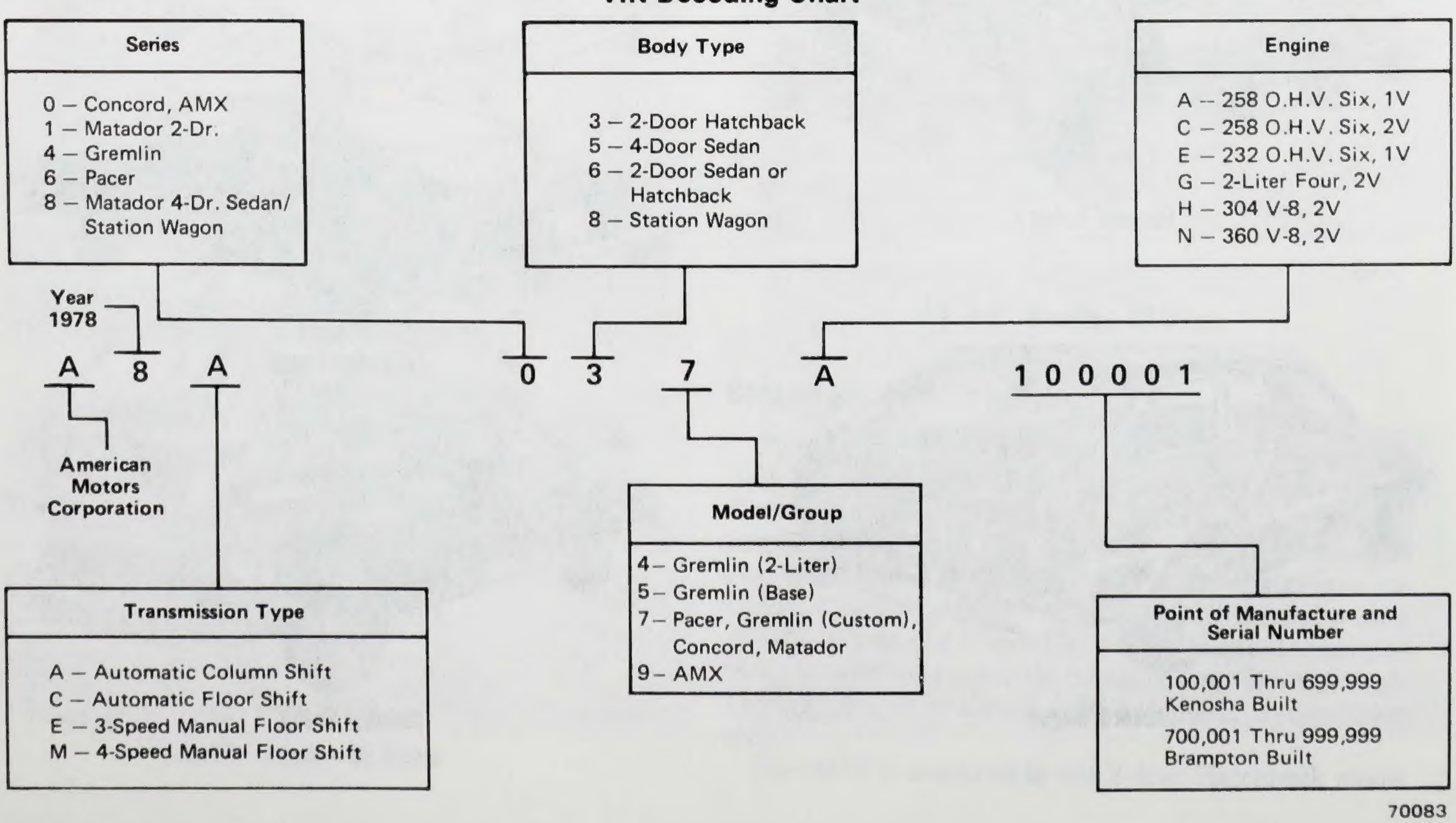
A unit body identification plate is riveted to the edge of the left front door (fig. A-7). This plate includes a statement of compliance with federal safety standards and a statement of construction. Embossed on it are the vehicle body number, model number, trim number, paint code number and the vehicle build sequence number.

Body Number

The body number identifies the location where the body was built and the body sequence number.



VIN Decoding Chart



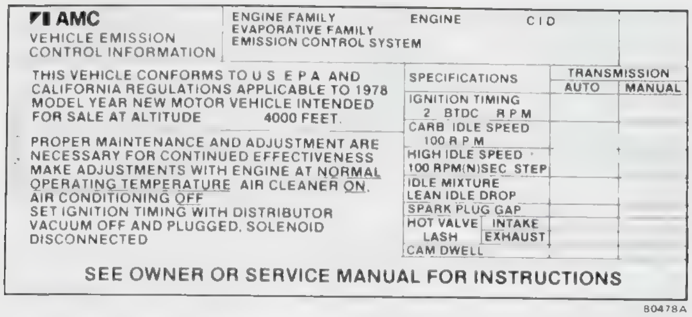


Fig. A-5 Federal Emission Control Maintenance Information Label

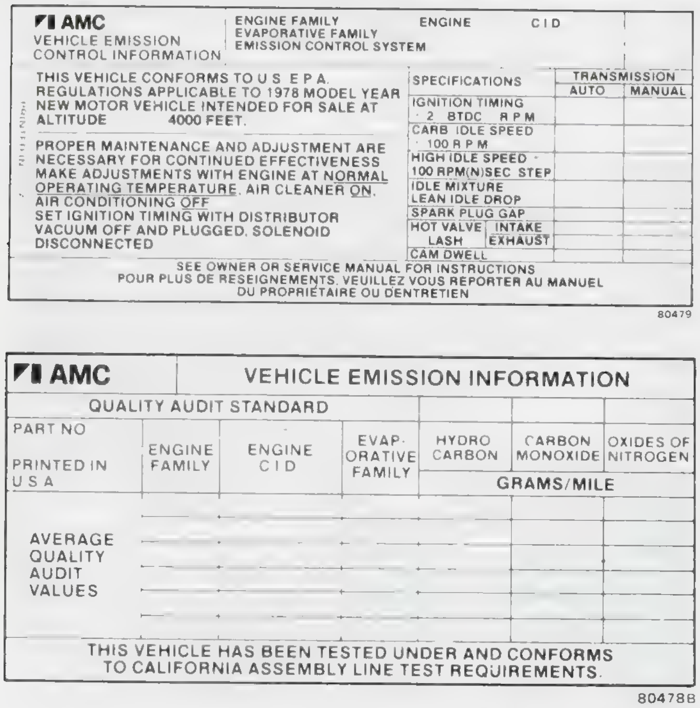


Fig. A-6 California Emission Control Maintenance Information Label

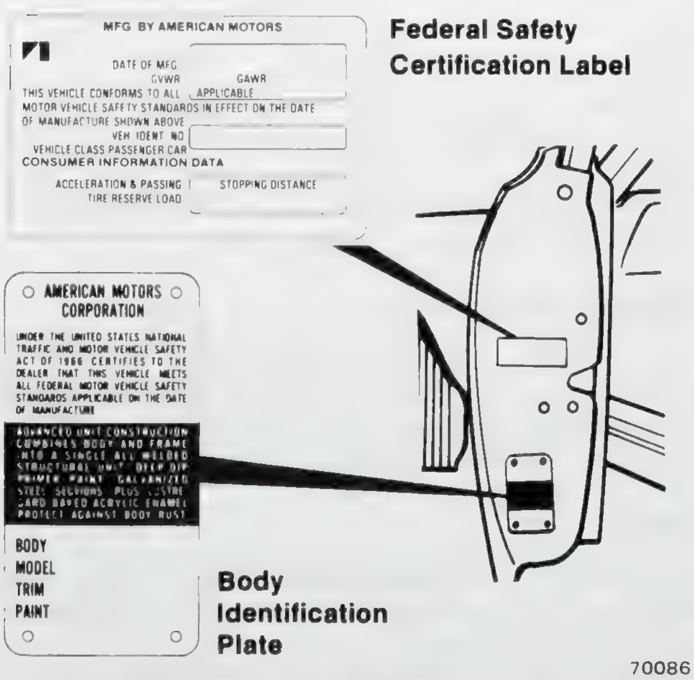
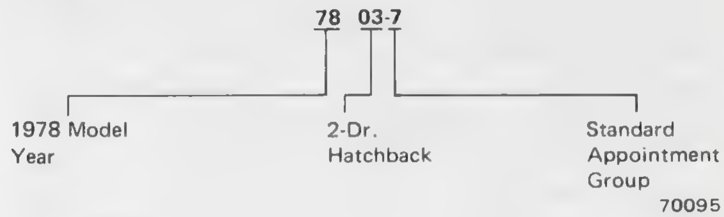


Fig. A-7 Safety Sticker and Unit Body ID Plate Location

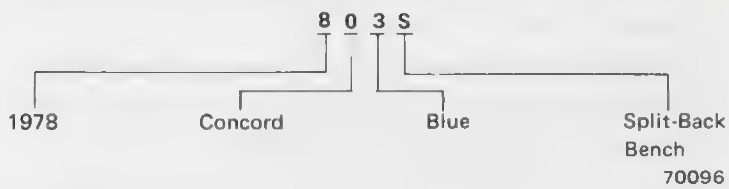
Model Number

The model number identifies the model year, body style, and body standard or custom appointment group number.



Trim Number

The trim number identifies the car trim and fabric color and type of seats.



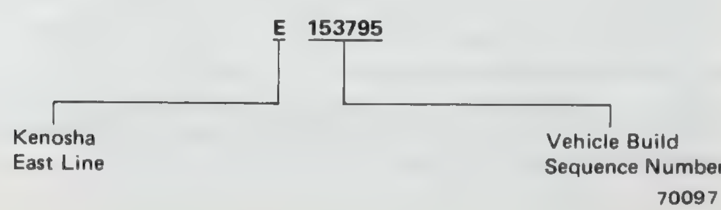
Paint Code Number

Colors corresponding to the paint code number on the unit body identification plate are as follows:

- P1—Black
- G7—Alpine White
- 6D—Sand Tan
- 6P—Firecracker Red
- 6V—Sunshine Yellow
- 7B—Mocha Brown Metallic
- 7C—Autumn Red Metallic
- 7D—Powder Blue
- 7K—Midnight Blue Metallic
- 7L—Loden Green Metallic
- 7M—Golden Ginger Metallic
- 7Z—Sun Orange
- 8A—Khaki
- 8B—British Bronze Metallic
- 8C—Quick Silver Metallic
- 8D—Claret Metallic

Vehicle Build Sequence Number

The vehicle build sequence number (embossed at the bottom of the plate) lists the production line and number of the vehicle in the sequence in which it was built (sequence starts at 000,001).



KEYS AND LOCKS

Four keys (two square-headed and two oval-headed) are provided with each vehicle. The square-headed key (code K) operates the ignition switch, front door locks and wagon tailgate (liftgate on Pacer, Gremlin, Concord Wagon, and Hatchback). The oval-headed key (code L) operates the glove box, console box, trunk and wagon hidden compartment locks. The keys have a code number stamped on the knockout plug. In the event a key is lost, a new key can be made by converting the key code number to a key bitting number. Key bitting numbers can be obtained from a key cutting machine manufacturer's cross-reference or by contacting your zone office.

NOTE: *The template shown in Figure A-8 may be used to determine the key bitting code of a key for which the key code number is unknown.*

If a key is lost and the key code number is unknown, the correct number can be obtained by the zone office from the vehicle identification number (VIN).

If the ignition key is lost and the key code number is not available, a new key can be made by removing a door lock and taking it to a locksmith. The locksmith can determine the key bitting by inserting a blank key into the lock cylinder and cutting the blank to match the tumblers.

If the ignition switch lock is defective and the key is available, the cylinder and individual tumblers can be ordered and matched to the existing key. To determine the tumbler arrangement, place the key over the template (fig. A-8). Starting with the number 1 position read across the visible line and record the first digit of the key code, continue this process for subsequent positions 2 through 5.

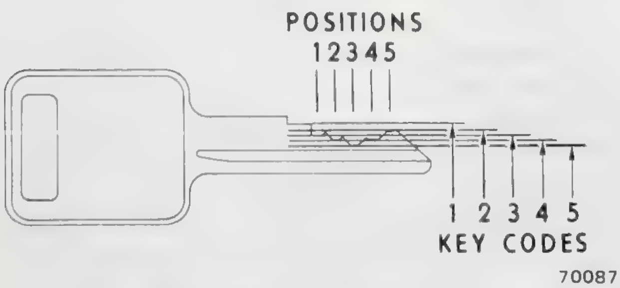


Fig. A-8 Key Coding Template

LIFT POINTS

Lift points are provided for lifting all AMC cars with either a floor jack or a frame contact-type lift.

CAUTION: *When lifting the car, be sure the floor jack or frame contact-type lift does not damage any fuel lines or brake lines (figs. A-9 and A-10).*

NOTE: *Refer to Chapter B—Maintenance for lift point illustrations on all models.*

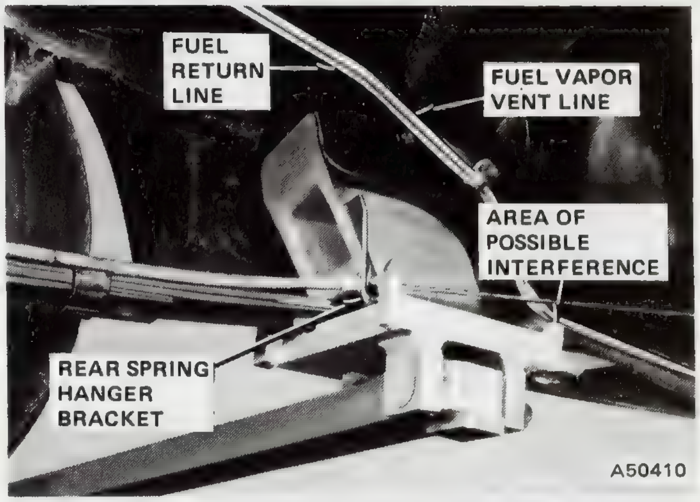


Fig. A-9 Left Rear Lift Point—Pacer Shown

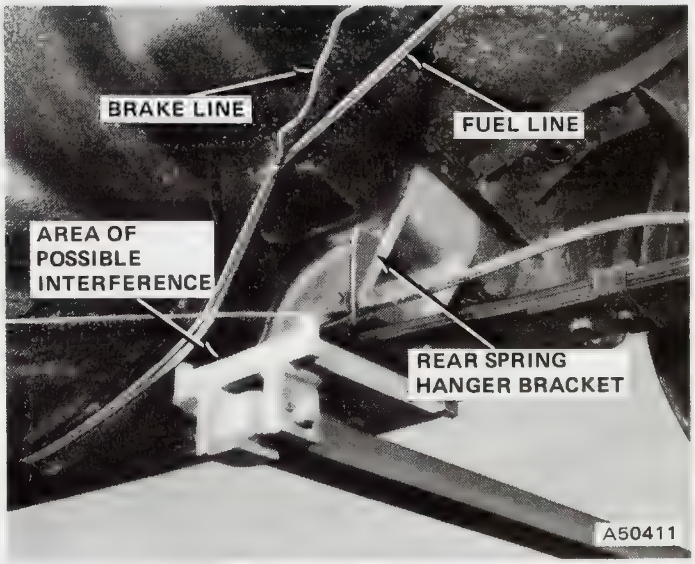


Fig. A-10 Right Rear Lift Point—Pacer Shown

Pacer

The rear lift points are located ahead of the rear wheels at the rear spring hanger brackets (figs. A-9 and A-10).

The front lift points are located just to the rear of the dash panel at the front wheelhouse sills.

Gremlin, Concord and AMX

The rear lift points are located ahead of the rear wheels just forward of the rear spring hanger brackets.

The front lift points are located just to the rear of the strut rod-to-sill mounting brackets on the sills.

Matador

The rear lift points are located ahead of the rear wheels on the sills adjacent to the rear suspension lower control arm mountings.

The front lift points are located just to the rear of the strut rod-to-sill mounting brackets on the sills.

TOWING

General

A conventional towing sling is recommended for use on all AMC cars because of its stability and reduced likelihood of damage. The following instructions apply only to this device. When using other than sling-type towing equipment, be sure to follow the manufacturer's instructions.

A safety chain system that is completely independent of the lifting and towing attachment must be used. Be careful when installing safety chains so that they do not damage the car.

If additional ground clearance is required, a towing dolly may be used. The end of the car to be placed on the dolly should be lifted with the same equipment as when towing.

In some applications, auxiliary spacer blocks may be required to prevent damage to the car. Spacer blocks can be fabricated as shown in fig. A-11.

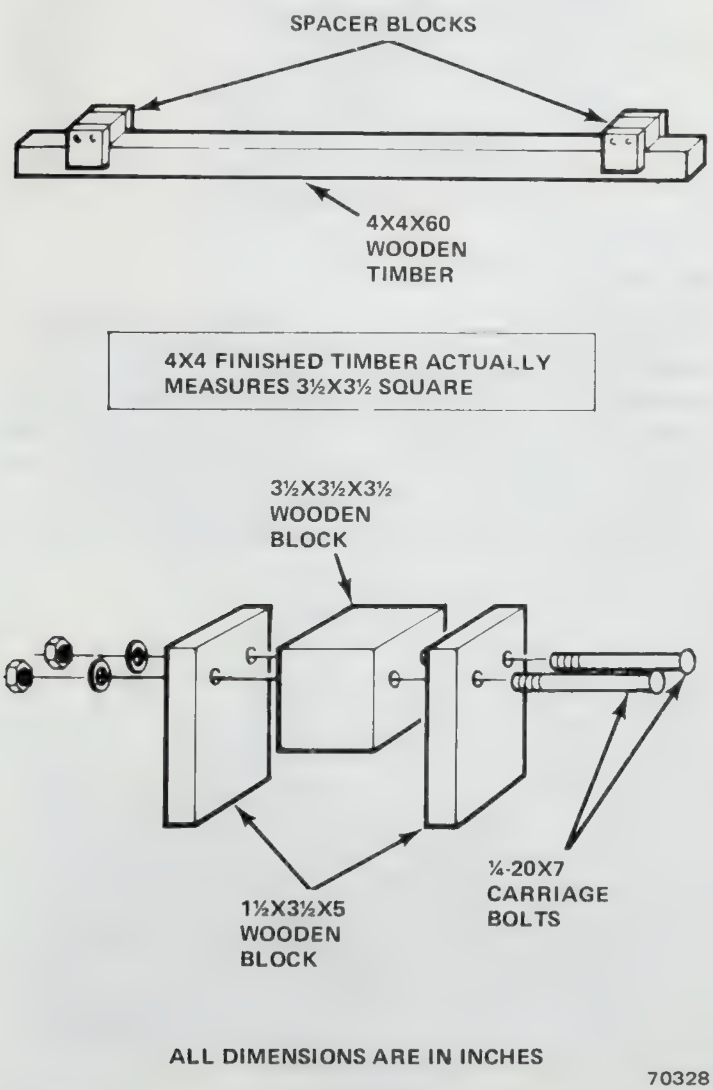


Fig. A-11 Spacer Block Construction

Front Towing

If ignition key is available, turn ignition off (to unlock transmission and steering column), place gearshift or selector lever in neutral. Be sure parking brake is released. The car may then be towed for a distance of 15 miles (24 km/h) and at speeds not to exceed 30 mph (48 km/h). If a distance of 15 miles (24 km/h) or a speed 30 mph (48 km/h) must be exceeded, the propeller shaft must be disconnected or the rear wheels placed on a dolly.

If ignition key is not available, disconnect propeller shaft or place rear wheels on a dolly.

CAUTION: *Transmission and rear axle must be in an operable condition and transmission must be filled to the proper level. If not, rear wheels must be placed on a dolly.*

NOTE: *If the propeller shaft must be disconnected, the transmission extension housing seal should be capped to prevent leakage when the car is lifted.*

Rear Towing

If ignition key is available, turn ignition off (to unlock transmission and steering column), place gearshift or selector lever in neutral and clamp the steering wheel in the straight-ahead position. Do not use the steering column lock as a substitute for a clamping device.

If ignition key is not available, place front wheels on a dolly.

Safety Precautions

- Whenever possible, tow the car from the rear to prevent damage to the transmission or rear axle.
- Secure loose or protruding parts of a damaged car.
- The end of the car being towed should be lifted a minimum of four inches off the ground. Check opposite end for adequate ground clearance.
- Always use a safety chain system that is independent of the lifting and towing attachment.
- Do not allow any of the towing equipment to bear on the fuel tank.
- Do not go under the car while it is lifted by the towing equipment.
- Do not allow passengers to ride in a towed car.
- Always observe all state and local laws regarding such items as warning signals, night illumination, speed, etc.
- Do not attempt a towing operation which could jeopardize the operator, any bystanders or other motorists.

Pacer

Front Towing

Position tow bar under front bumper. Wrap chains once around energy absorbers and secure in grab hooks at ends of sling lower bar. Insert padding between bumper and sling. Wrap separate safety chains around frame rails ahead of stabilizer bar (fig. A-12).

CAUTION: *Tow bar must be parallel with ground after lifting.*

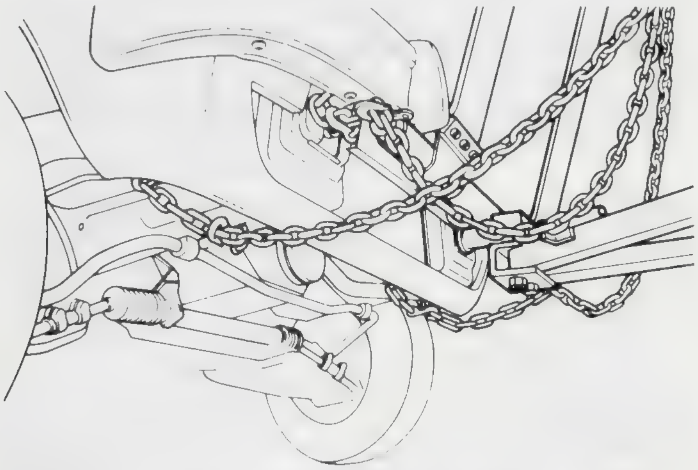


Fig. A-12. Front Towing—Pacer

Rear Towing

Position tow bar under rear bumper. Wrap chains once around energy absorbers and secure in grab hooks at ends of sling lower bar. Insert padding between bumper and sling. Wrap separate safety chains around rear spring shackles (fig. A-13).

CAUTION: *Tow bar must be parallel with ground after lifting.*

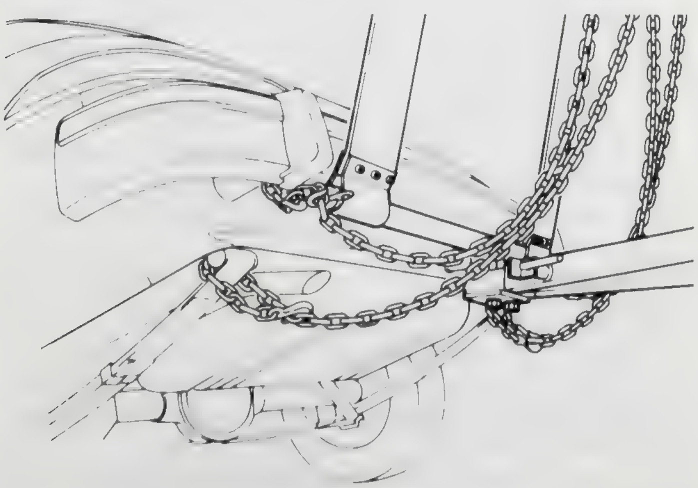


Fig. A-13 Rear Towing—Pacer

Gremlin

Front Towing

Attach J-hooks on the rear of the front crossmember near the lower control arms. Position the wood spacer block across sling chains with blocks contacting frame rails directly behind the radiator. Position the sling tow bar directly ahead of spacer.

Attach separate chains around outboard end of lower control arms (fig. A-14).

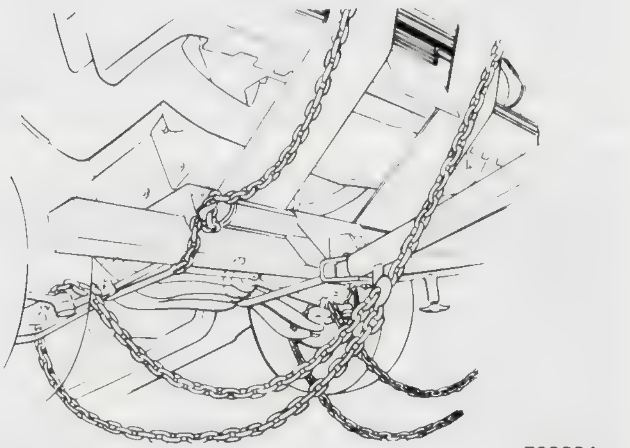


Fig. A-14 Front Towing—Gremlin

Rear Towing

Attach J-hooks on rear axle tubes between the shock absorber mounting bracket and wheel. Use caution to avoid damage to brake line on top of axle tubes.

A wood spacer block is not required. Be certain hooks are off the spring leaf to prevent shifting after the vehicle is lifted.

Attach separate safety chains around spring shackles (fig. A-15).

Fig. A-15 Rear Towing—Gremlin

Concord

Front Towing

Attach J-hooks on the rear of the front crossmember near the lower control arms. Position the wood spacer block against the front wheels with blocks contacting ends of frame horns. Position sling tow bar six to eight inches behind the bumper.

Attach separate safety chains around outboard end of lower control arms (fig. A-16).

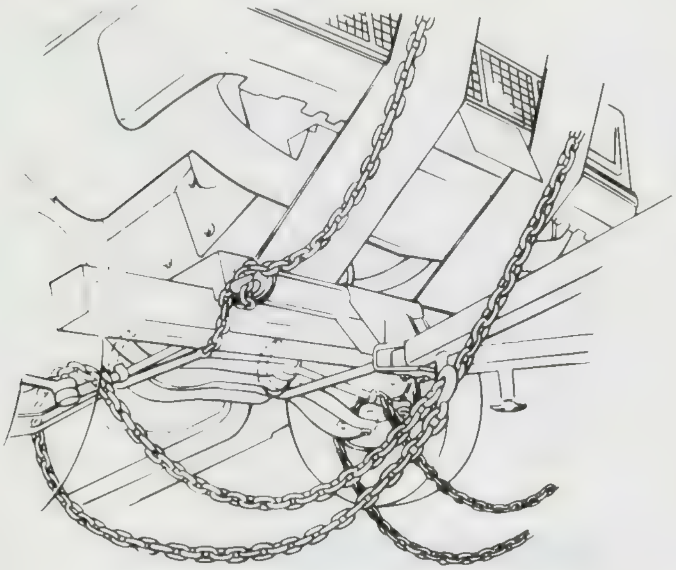


Fig. A-16 Front Towing—Concord

Rear Towing

Attach J-hooks on rear axle tubes between the springs and wheel. Use caution to avoid damage to brake line on top of axle tubes. Position the wood spacer block across sling chains with blocks contacting springs six to eight inches ahead of rear shackles. Position sling tow bar directly in front of spacer (fig. A-17).

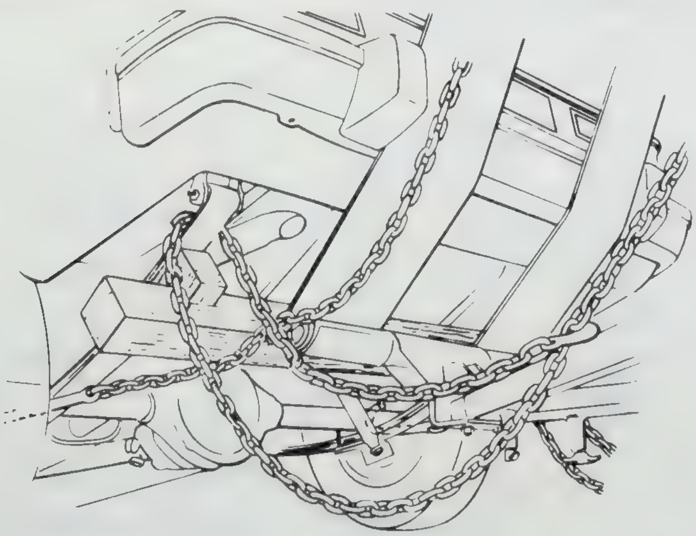


Fig. A-17 Rear Towing—Concord

AMX

Front Towing

Attach J-hooks on rear of front crossmember near lower control arm pivot bolts. Position a 4-inch by 4-inch by 60-inch long wood spacer block under front bumper. Position sling tow bar 16 to 20 inches behind bumper.

Attach safety chains around energy absorber frame mounts (fig. A-18).

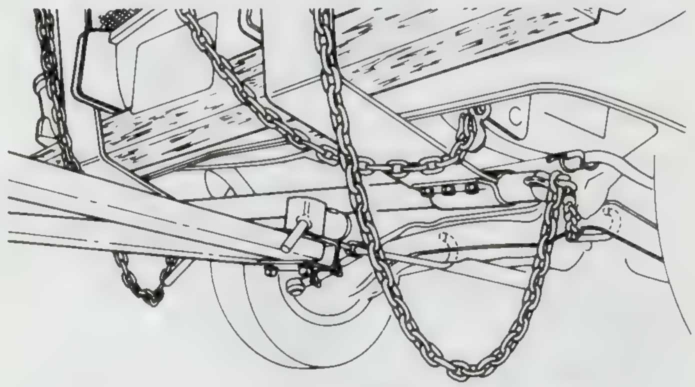


Fig. A-18 Front Towing—AMX

Rear Towing

Attach J-hooks on rear axle tubes between the springs and wheels. Position a 4-inch by 4-inch by 60-inch long wood spacer block across sling chains with blocks contacting springs 6 to 8 inches ahead of rear shackles.

Attach safety chains around spring shackles (fig. A-19).

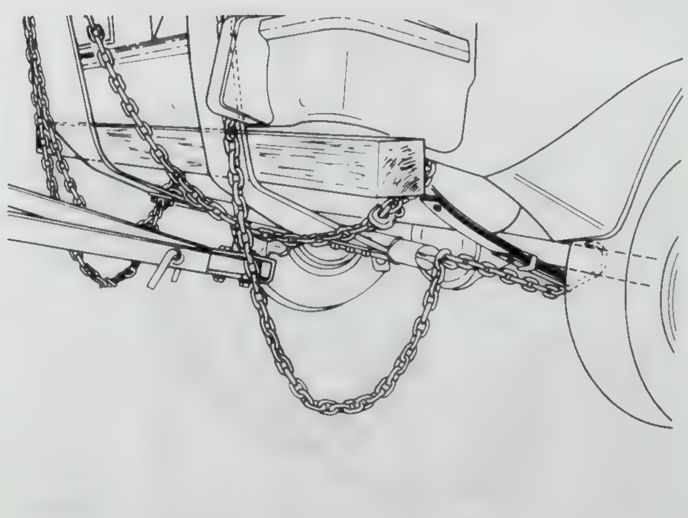


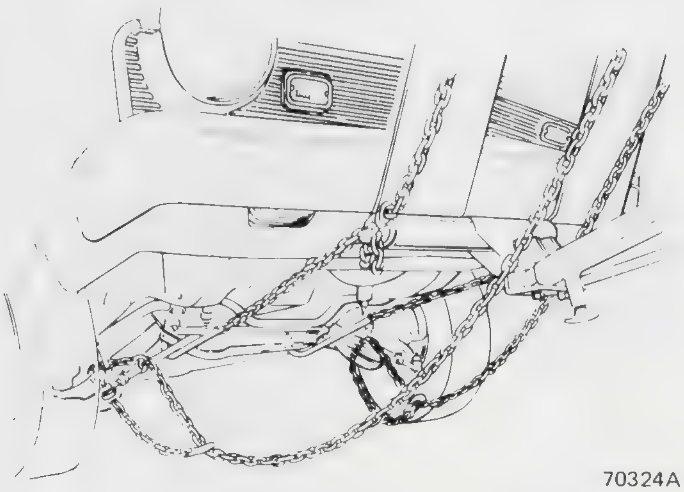
Fig. A-19 Rear Towing—AMX

Matador—2-Door Coupe

Front Towing

Attach J-hooks on the rear of the front crossmember at pivot pins. Position sling tow bar directly under the front bumper.

Attach separate safety chains around outboard end of lower control arms (fig. A-20).



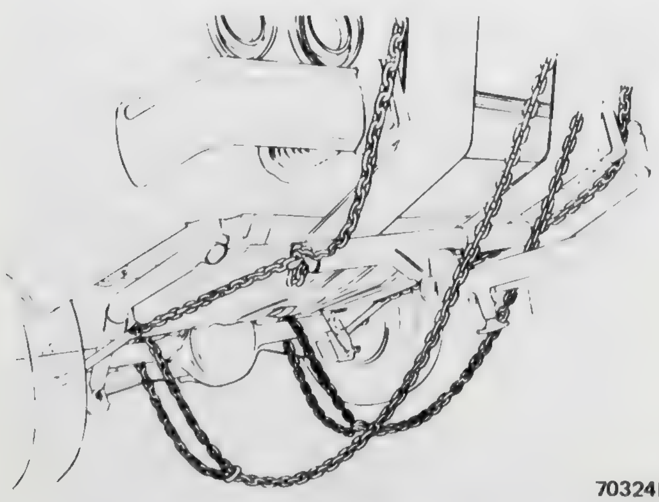
70324A

Fig. A-20 Front Towing—Matador 2-Door

Rear Towing

Attach J-hooks on rear axle tubes between the shock absorber mounting bracket and wheel. Use caution to avoid damage to brake line on top of axle tubes. Position sling tow bar directly under the rear crossmember.

Attach separate safety chains around center portion of axle tubes (fig. A-21).



70324B

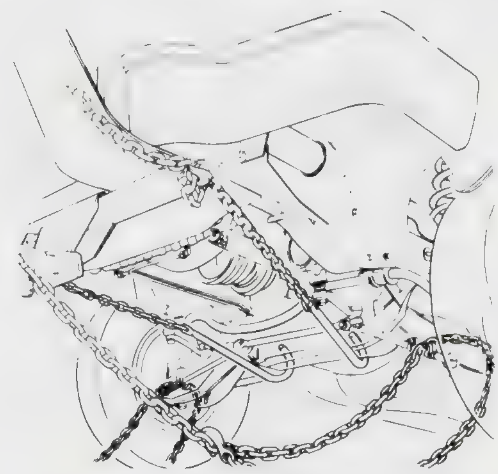
Fig. A-21 Rear Towing—Matador 2-Door

Matador—4-Door

Front Towing

Attach J-hooks on the rear of the front crossmember inside the motor mounts. Position sling tow bar two to three inches behind the front bumper.

Attach separate safety chains around outboard end of lower control arms (fig. A-22).



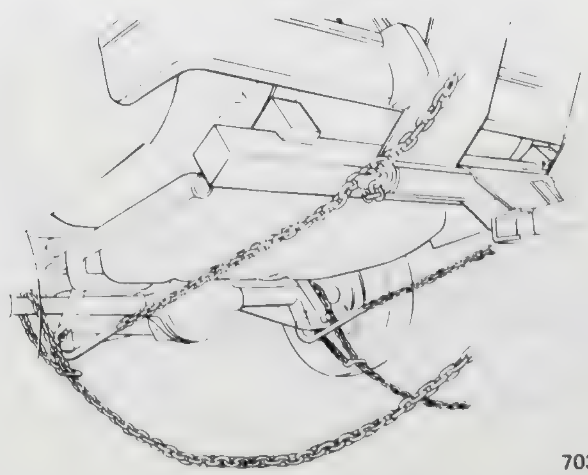
70325A

Fig. A-22 Front Towing—Matador 4-Door

Rear Towing

Attach J-hooks to the rear shock absorber mounting brackets on rear axle tubes. Position the wood spacer block across sling chains with blocks contacting angle brace at end of each side frame channel. Position the sling tow bar directly in front of the spacer.

Attach separate safety chains around ends of rear axle tubes. Use caution to avoid damage to brake line on top of axle tubes (fig. A-23).



70325B

Fig. A-23 Rear Towing—Matador 4-Door

Matador—Station Wagon

Front Towing

Attach J-hooks on the rear of the front crossmember inside the motor mounts. Position sling tow bar two to three inches behind the front bumper.

Attach separate safety chains around outboard end of lower control arms (fig. A-24).

Rear Towing

Attach J-hooks on rear axle tube between the shock absorber mounting bracket and wheel. Use caution to avoid damage to brake line on top of axle tubes. Position the wood spacer block across sling chains with blocks contacting angle brace at end of each side frame channel. Position the sling tow bar directly in front of the spacer (fig. A-25).

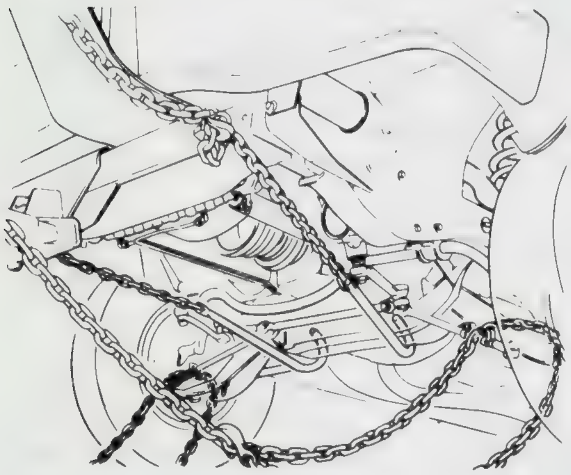
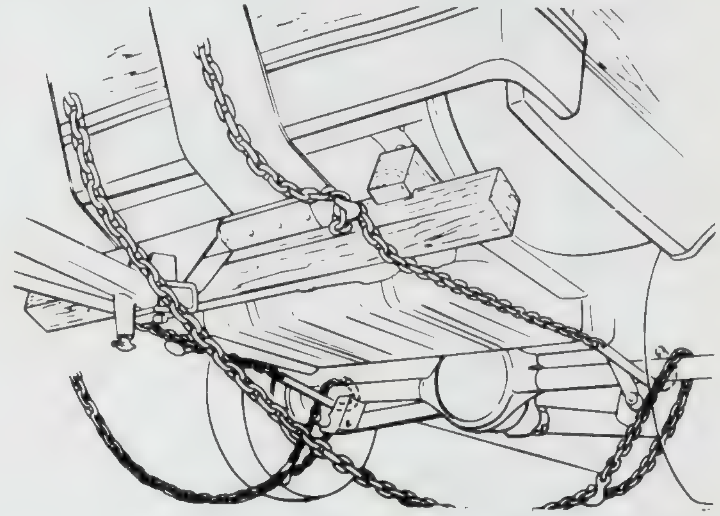


Fig. A-24 Front Towing—Matador Station Wagon



70326B

Fig. A-25 Rear Towing—Matador Station Wagon

General Dimensions (Inches)

	Pacer Hatchback	Pacer Wagon	Gremlin	Concord 2-Dr.	Concord 4-Dr.	Concord Hatchback and AMX	Concord Wagon	Matador Coupe	Matador Sedan	Matador Wagon
Exterior										
Wheelbase	100.0	100.0	96.0	108.0	108.0	108.0	108.0	114.0	118.0	118.0
Length	172.1	177.0	166.6	183.6	183.6	183.6	183.6	209.9	218.3	219.3
Width	77.0	77.0	70.6	71.0	71.0	71.0	71.0	77.4	77.3	77.2
Height	52.8	53.2	51.5	51.7	51.3	51.7	51.3	51.6	53.9	56.0
Overhang: Front	33.3	33.3	34.7	34.7	34.7	34.7	34.7	46.2	44.3	44.3
Rear	38.8	43.7	35.9	40.9	40.9	40.9	40.9	49.8	56.0	56.9
Tread: Front	61.5	61.5	58.4	58.4	58.4	57.9	57.9	58.1	58.1	58.1
Rear	60.0	60.0	57.5	57.5	57.5	57.1	57.1	60.6	60.6	60.6
Interior										
Head Room: Front	38.3	38.5	38.1	38.1	38.1	38.1	38.1	37.6	39.6	39.9
Rear	37.0	38.4	36.5	37.5	37.9	36.7	37.9	36.0	37.5	38.5
Leg Room: Front	40.7	40.7	40.8	40.8	40.8	40.8	40.8	43.0	42.8	42.8
Rear	34.9	34.9	27.8	35.7	36.1	31.1	36.1	33.3	39.6	39.6
Hip Room: Front	55.8	55.8	54.8	54.3	54.4	54.3	54.4	57.1	59.9	59.9
Rear	42.2	44.2	42.6	52.5	53.6	51.7	53.6	51.0	59.8	59.8
Shoulder Room: Front	57.3	57.3	54.9	54.0	54.0	54.0	54.0	59.8	59.7	59.7
Rear	51.2	51.2	53.0	53.2	53.4	52.4	53.4	59.0	60.0	60.0
Luggage Capacity (cu. ft.)	31.1	50.4	26.5	10.8	10.8	31.7	59.4	14.3	19.7	87.4

70088

Metric System— SI

The International System of Units (Systeme International d'Unites) officially abbreviated "SI" in all languages – the modern metric system

QUANTITY	EXAMPLES OF APPLICATIONS	METRIC UNIT	SYMBOL
Length	Dimensions Tire rolling circumference Turning circle/radius Braking distance	meter	m
	Greater than 999 meter	kilometer	km
	Dimensions	millimeter	mm
	Depth of surface finish	micrometer	um
Area	Glass & Fabrics Brake & Clutch linings Radiator area etc.	square centimeter	cm^2
	Small areas	square millimeter	mm^2
Volume	Car Luggage Capacity	cubic meter	m^3
	Engine Capacity	liter	l
	Vehicle fluid capacity	cubic centimeter	cm^3
Volume Flow	Gas & Liquid	liter per second	l/s
Time Interval	Measurement of elapsed time	second minute hour day	s min h d
Velocity	General use Road speed	meter per second kilometer per hour	m/s km/h
Acceleration & Deceleration	General use	meter per second squared	m/s^2
Frequency	Electronics	hertz kilohertz megahertz	Hz kHz mHz
Rotational Speed	General use	revolution per minute revolution per second	rpm rps
Mass	Vehicle mass Legal load rating	megagram	t
	General use Small masses	kilogram gram milligram	kg g mg
Density	General use	kilogram per cubic meter gram per cubic centimetre kilogram per liter	kg/m^3 g/cm^3 kg/l
Force	Pedal effort Clutch spring force Handbrake lever effort etc.	newton	N
Moment of Force (Torque)	Torque	newton meter	N-m
Power, Heat Flow Rate	General use Bulbs Alternator output Engine performance Starter performance	watt kilowatt	W kW
Celsius Temperature	General use	degree Celsius	^{o}C
Thermodynamic Temperature	General use	kelvin	k
Electric Current	General use	ampere milliampere microampere	A mA μA
Potential Difference (Electromotive Force)	General use	kilovolt volt millivolt microvolt	kV V mV μV
Electric Resistance	General use	megohm kilohm ohm	MΩ kΩ Ω
Electric Capacitance	General use	farad microfarad picofarad	F μF pF
Fuel Consumption	Vehicle performance	liter per 100 kilometer	l/100 km
Oil Consumption	Vehicle performance	liter per 1000 kilometer	l/1000 km
Stiffness	Linear stiffness	kilonewton meter	kN/m
Tire Revolutions	Tire Data	revolution per kilometer	rev/km
Pressure	Tire Coolant Lubricating oil Fuel pump delivery Engine compression Manifold Brake line (hydraulic) Car heating & ventilation Barometric pressure	kilopascal	kPa
Luminous Intensity	Bulbs	candela	cd
Accumulator Storage Rating	Battery	ampere hour	A-h

U.S.A./METRIC COMPARISON

QUANTITY	USA	METRIC – SYMBOL	
Length	Inch-Foot-Mile	Meter	m
Weight (mass)	Ounce-Pound	Kilogram	Kg
Area	Square inch/Foot	Square Meter	m^2
Volume-Dry	Cubic inch/Foot	Cubic Meter	m^3
-Liquid	Ounce-Pint-Quart-Gallon	Liter	l
Velocity	Feet Per Second	Meter per Second	m/s
Road Speed	Miles Per Hour	Kilometer per Hour	km/h
Force	Pound-Force	Newton	N
Torque	Foot-Pounds	Newton meter	N-m
Power	Horsepower	Kilowatt	kW
Pressure	Pounds Per Square Inch	Kilopascal	kPa
Temperature	Degrees Fahrenheit	Degrees Kelvin and Celsius	K ^{o}C

70091

Decimal Equivalents

MILLIMETER, DECIMAL, FRACTION AND DRILL SIZE

Milli-meter	Decimal	Fraction	Drill Size	Milli-meter	Decimal	Fraction	Drill Size	Milli-meter	Decimal	Fraction	Drill Size	Milli-meter	Decimal	Fraction	Drill Size	Milli meter	Decimal	Fraction
.1	0039			1.75	.0689				.1570		22	6.8	.2677			10.72	.4219	27/64
.15	.0059				.0700		50	4.0	.1575			6.9	.2716			11.0	.4330	
2	.0079			1.8	.0709				.1590		21		.2720		I	11.11	.4375	7/16
.25	.0098			1.85	.0728				.1610		20	7.0	.2756			11.5	.4528	
.3	.0118				.0730		49	4.1	.1614				.2770		J	11.51	.4531	29/64
	.0135		80	1.9	.0748			4.2	.1654			7.1	.2795			11.91	.4687	15/32
.35	.0138				.0760		48		.1660		19		.2811		K	12.0	.4724	
	.0145		79	1.95	.0767			4.25	.1673			7.14	.2812	9/32		12.30	.4843	31/64
.39	.0156	1/64		1.98	.0781	5/64		4.3	.1693			7.2	.2835			12.5	.4921	
.4	.0157				.0785		47		.1695		18	7.25	.2854			12.7	.5000	1/2
	.0160		78	2.0	.0787			4.37	.1719	11/64		7.3	.2874			13.0	.5118	
.45	.0177			2.05	.0807				.1730		17		.2900		L	13 10	.5156	33/64
	.0180		77		.0810		46	4.4	.1732			7.4	.2913			13.49	.5312	17/32
.5	.0197				.0820		45		.1770		16		.2950		M	13.5	.5315	
	.0200		76	2.1	.0827			4.5	.1771			7.5	.2953			13.89	.5469	35/64
	.0210		75	2.15	.0846				.1800		15	7.54	.2968	19/64		14.0	.5512	
.55	.0217				.0860		44	4.6	.1811			7.6	.2992			14.29	.5625	9/16
	.0225		74	2.2	.0866				.1820		14		.3020		N	14.5	.5709	
.6	.0236			2.25	.0885			4.7	.1850		13	7.7	.3031			14.68	.5781	37/64
	.0240		73		.0890		43	4.75	.1870			7.75	.3051			15.0	.5906	
	.0250		72	2.3	.0905			4.76	.1875	3/16		7.8	.3071			15.08	.5937	19/32
.65	.0256			2.35	.0925			4.8	.1890		12	7.9	.3110			15.48	.6094	39/64
	.0260		71		.0935		42		.1910		11	7.94	.3125	5/16		15.5	.6102	
	.0280		70	2.38	.0937	3/32		4.9	.1929			8.0	.3150			15.88	.6250	5/8
.7	.0276			2.4	.0945				.1935		10		.3160		O	16.0	.6299	
	.0292		69		.0960		41		.1960		9	8.1	.3189			16.27	.6406	41/64
.75	.0295			2.45	.0964			5.0	.1968			8.2	.3228			16.5	.6496	
	.0310		68		.0980		40		.1990		8		.3230		P	16.67	.6562	21/32
.79	.0312	1/32		2.5	.0984			5.1	.2008			8.25	.3248			17.0	.6693	
.8	.0315				.0995		39		.2010		7	8.3	.3268			17.06	.6719	43/64
	.0320		67		.1015		38	5.16	.2031	13/64		8.33	.3281	21/64		17.46	.6875	11/16
	.0330		66	2.6	.1024				.2040		6	8.4	.3307			17.5	.6890	
.85	.0335				.1040		37	5.2	.2047				.3320		Q	17.86	.7031	45/64
	.0350		65	2.7	.1063				.2055		5	8.5	.3346			18.0	.7087	
.9	.0354				.1065		36	5.25	.2067			8.6	.3386			18.26	.7187	23/32
	.0360		64	2.75	.1082			5.3	.2086				.3390		R	18.5	.7283	
	.0370		63	2.78	.1094	7/64			.2090		4	8.7	.3425			18.65	.7344	47/64
.95	.0374				.1100		35	5.4	.2126			8.73	.3437	11/32		19.0	.7480	
	.0380		62	2.8	.1102				.2130		3	8.75	.3445			19.05	.7500	3/4
	.0390		61		.1110		34	5.5	.2165			8.8	.3465			19.45	.7656	49/64
1.0	.0394				.1130		33	5.56	.2187	7/32			.3480		S	19.5	.7677	
	.0400		60	2.9	.1141			5.6	.2205			8.9	.3504			19.84	.7812	25/32
	.0410		59		.1160		32		.2210		2	9.0	.3543			20.0	.7874	
1.05	.0413			3.0	.1181			5.7	.2244				.3580		T	20.24	.7969	51/64
	.0420		58		.1200		31	5.75	.2263			9.1	.3583			20.5	.8071	
	.0430		57	3.1	.1220				.2280		1	9.13	.3594	23/64		20.64	.8125	13/16
1.1	.0433			3.18	.1250	1/8		5.8	.2283			9.2	.3622			21.0	.8268	
1.15	.0452			3.2	.1260			5.9	.2323			9.25	.3641			21.03	.8281	53/64
	.0465		56	3.25	.1279				.2340		A	9.3	.3661			21.43	.8437	27/32
1.19	.0469	3/64			.1285		30	5.95	.2344	15/64			.3680		U	21.5	.8465	
1.2	.0472			3.3	.1299			6.0	.2362			9.4	.3701			21.83	.8594	55/64
1.25	.0492			3.4	.1338				.2380		B	9.5	.3740			22.0	.8661	
1.3	.0512				.1360		29	6.1	.2401			9.53	.3750	3/8		22.23	.8750	7/8
	.0520		55	3.5	.1378				.2420		C		.3770		V	22.5	.8858	
1.35	.0531				.1405		28	6.2	.2441			9.6	.3780			22.62	.8906	57/64
	.0550		54	3.57	.1406	9/64		6.25	.2460		D	9.7	.3819			23.0	.9055	
1.4	.0551			3.6	.1417			6.3	.2480			9.75	.3838			23.02	.9062	29/32
1.45	.0570				.1440		27	6.35	.2500	1/4	E	9.8	.3858			23.42	.9219	59/64
1.5	.0591			3.7	.1457			6.4	.2520				.3860		W	23.5	.9252	
	.0595		53		.1470		26	6.5	.2559			9.9	.3898			23.81	.9375	15/16
1.55	.0610			3.75	.1476				.2570		F	9.92	.3906	25/64		24.0	.9449	
1.59	.0625	1/16			.1495		25	6.6	.2598			10.0	.3937			24.21	.9531	61/64
1.6	.0629			3.8	.1496				.2610		G		.3970		X	24.5	.9646	
	.0635		52		.1520		24	6.7	.2638				.4040		Y	24.61	.9687	31/32
1.65	.0649			3.9	.1535			6.75	.2657	17/64		10.32	.4062	13/32		25.0	.9843	
1.7	.0669				.1540		23	6.75	.2657				.4130		Z	25.03	.9844	63/64
	.0670		51	3.97	.1562	5/32			.2660		H	10.5	.4134			25.4	1.0000	1

80280

FOOT-POUNDS TO NEWTON-METERS CONVERSION CHART

FT-LB	NEWTON-METER	FT-LB	NEWTON-METER	FT-LB	NEWTON-METER	FT-LB	NEWTON-METER
1	1.36	51	69.15	101	136.94	151	204.73
2	2.71	52	70.50	102	138.29	152	206.08
3	4.07	53	71.86	103	139.65	153	207.44
4	5.42	54	73.21	104	141.01	154	208.80
5	6.78	55	74.57	105	142.36	155	210.15
6	8.13	56	75.93	106	143.72	156	211.51
7	9.49	57	77.28	107	145.07	157	212.86
8	10.85	58	78.64	108	146.43	158	214.22
9	12.20	59	79.99	109	147.78	159	215.58
10	13.56	60	81.35	110	149.14	160	216.93
11	14.91	61	82.70	111	150.50	161	218.29
12	16.27	62	84.06	112	151.85	162	219.64
13	17.63	63	85.42	113	153.21	163	221.00
14	18.98	64	86.77	114	154.56	164	222.35
15	20.34	65	88.13	115	155.92	165	223.71
16	21.69	66	89.48	116	157.27	166	225.07
17	23.05	67	90.84	117	158.63	167	226.42
18	24.40	68	92.20	118	159.99	168	227.78
19	25.76	69	93.55	119	161.34	169	229.13
20	27.12	70	94.91	120	162.70	170	230.49
21	28.47	71	96.26	121	164.05	171	231.84
22	29.83	72	97.62	122	165.41	172	233.20
23	31.18	73	98.97	123	166.77	173	234.56
24	32.54	74	100.33	124	168.12	174	235.91
25	33.90	75	101.69	125	169.48	175	237.27
26	35.25	76	103.04	126	170.83	176	238.62
27	36.61	77	104.40	127	172.19	177	239.98
28	37.96	78	105.75	128	173.54	178	241.34
29	39.32	79	107.11	129	174.90	179	242.69
30	40.67	80	108.47	130	176.26	180	244.05
31	42.03	81	109.82	131	177.61	181	245.40
32	43.39	82	111.18	132	178.97	182	246.76
33	44.74	83	112.53	133	180.32	183	248.11
34	46.10	84	113.89	134	181.68	184	249.47
35	47.45	85	115.24	135	183.04	185	250.83
36	48.81	86	116.60	136	184.39	186	252.18
37	50.17	87	117.96	137	185.75	187	253.54
38	51.52	88	119.31	138	187.10	188	254.89
39	52.88	89	120.67	139	188.46	189	256.25
40	54.23	90	122.02	140	189.81	190	257.61
41	55.59	91	123.38	141	191.17	191	258.96
42	56.94	92	124.74	142	192.53	192	260.32
43	58.30	93	126.09	143	193.88	193	261.67
44	59.66	94	127.45	144	195.24	194	263.03
45	61.01	95	128.80	145	196.59	195	264.38
46	62.37	96	130.16	146	197.95	196	265.74
47	63.72	97	131.51	147	199.31	197	267.10
48	65.08	98	132.87	148	200.66	198	268.45
49	66.44	99	134.23	149	202.02	199	269.81
50	67.79	100	135.58	150	203.37	200	271.16

80750

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READER'S COMMENTS
1978 AMC Technical Service Manual
Volume—II Chassis

American Motors Corporation needs user feedback — your critical evaluation of this manual. Your comments and suggestions will help us in our continuous effort to improve the quality and usefulness of our service manual.

What is your general reaction to this manual? In your judgment is it complete, accurate, well organized, well written? Is it easy to use? ____________________

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What features are most useful? ____________________

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What faults do you find with the manual? ____________________

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Does this manual satisfy your needs? ________ Why? ____________________

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MAINTENANCE B

SECTION INDEX

GENERAL

This section describes the service procedures required by the 1978 Four-Cylinder and Six- and Eight-Cylinder Maintenance Schedules to keep AMC cars in good running condition. These services are based on changes in driving conditions, accumulated odometer mileage or time intervals, whichever comes first, or are unscheduled as required by changes in usage, handling or performance. The section is subdivided into three parts: (1) Services Required by Conditions or Time, (2) Services Scheduled by Accumulated Mileage and (3) Unscheduled Maintenance.

Maintenance Schedule

Two maintenance schedules are listed: one for cars with four-cylinder engines, and one for cars with six- or eight-cylinder engines. Each schedule is followed by detailed service charts. Be sure to refer to the correct maintenance schedule or chart for the car being serviced.

The services listed are those which experience and testing have indicated are the most likely needed at the mileage or time interval shown. When a car operates under the conditions listed, perform the maintenance described under "Required Services." Refer to the service charts for the list of maintenance items, and use the information in this section for service procedures.

Canadian Fuel and Maintenance Requirements

Cars equipped with six-cylinder engine and single-barrel carburetor may use regular, low-lead or unleaded fuels. All other models should use unleaded fuel only.

All service requirements in the Maintenance Schedules apply to cars sold in Canada. Canadian cars should receive the following additional maintenance services:

- All cars equipped with six- or eight-cylinder engine, lubricate exhaust heat valve at each oil change—every 7 months or 7,500 miles (12,000 km), whichever comes first.
- All cars equipped with six-cylinder engine and one-barrel carburetor, perform an engine tune-up every 15 months or 15,000 miles (24,000 km), whichever comes first.

1978 AMC FOUR-CYLINDER MAINTENANCE SCHEDULE

OWNER RESPONSIBILITY	It is the owner's responsibility to determine driving conditions, to have the car serviced according to the Maintenance Schedule, and to pay for necessary parts and labor.
INSTRUCTIONS	Read "CONDITIONS" and determine which apply to your driving situation. Under the conditions listed, perform the maintenance described under "REQUIRED SERVICES."
CONDITIONS	**REQUIRED SERVICES**
SHORT-TRIP DRIVING	For proper engine protection, check engine oil level every 500 to 600 miles (800 to 960 km). Change oil and filter every 5,000 miles (8,000 km) or 5 months, whichever comes first. When most driving involves trips of less than 6 miles (10 km), change oil once between scheduled oil and filter changes.
HEAVY-DUTY DRIVING	In police, taxi, commercial load-carrying or delivery use, change automatic transmission fluid and filter, and adjust bands every 15,000 miles (24,000 km) or 15 months, whichever comes first. For standard duty, no automatic transmission maintenance is required except regular fluid level checks.
START OF WINTER	Inspect battery condition and clean battery cables. Change engine coolant (antifreeze/water mixture) after 25,000 miles (40,000 km) or 25 months, whichever comes first, and then at the start of every winter season.
ACCUMULATED MILEAGE OR KILOMETERS	At each mileage interval shown, perform the service checked below. Four charts follow that list the maintenance items for each service.

km	MILES	CHART 1 • OIL CHANGE SERVICE • EMISSION CONTROL INSPECTION	CHART 2 • OIL CHANGE SERVICE • ENGINE DRIVE BELT INSPECTION	CHART 3 • OIL CHANGE SERVICE • ENGINE MAINTENANCE • BRAKE AND CHASSIS INSPECTION • BODY LUBRICATION	CHART 4 • OIL CHANGE SERVICE • ENGINE TUNE-UP • BRAKE AND CHASSIS INSPECTION • CHASSIS LUBRICATION • BODY LUBRICATION
8,000	5,000	✓			
16,000	10,000		✓		
24,000	15,000			✓	
32,000	20,000		✓		
40,000	25,000		✓		
48,000	30,000				✓
56,000	35,000		✓		
64,000	40,000		✓		
72,000	45,000			✓	
80,000	50,000		✓		
88,000	55,000		✓		
96,000	60,000				✓
104,000	65,000		✓		
112,000	70,000		✓		
120,000	75,000			✓	
128,000	80,000		✓		
136,000	85,000		✓		
144,000	90,000				✓

80258

CHART 1 — FOUR-CYLINDER
• OIL CHANGE SERVICE
• EMISSION CONTROL INSPECTION

- **OIL CHANGE SERVICE**

Drain engine oil, replace oil filter and refill engine.
Check fluid levels:

engine coolant	manual transmission
brake master cylinder	automatic transmission
manual steering gear	rear axle differential
power steering pump	windshield washer reservoir

Clean windshield wiper blade elements.

- **EMISSION CONTROL INSPECTION**

Retorque cylinder head bolts.
Adjust engine valves.
Check condition and tension of fan/alternator, power steering and air pump drive belts, and adjust if necessary.
Check and adjust curb and high idle speeds.

80258A

CHART 2 — FOUR-CYLINDER
• OIL CHANGE SERVICE
• ENGINE DRIVE BELT INSPECTION

- **OIL CHANGE SERVICE**

Drain engine oil, replace oil filter and refill engine.
Check fluid levels:

engine coolant	automatic transmission
brake master cylinder	rear axle differential
power steering pump	windshield washer reservoir
manual transmission	

Clean windshield wiper blade elements.

- **ENGINE DRIVE BELT INSPECTION**

Check condition and tension of fan/alternator, power steering and air pump drive belts, and adjust if necessary.

80258B

CHART 3 — FOUR-CYLINDER
• OIL CHANGE SERVICE
• ENGINE MAINTENANCE
• BRAKE AND CHASSIS INSPECTION
• BODY LUBRICATION

- **OIL CHANGE SERVICE**

Drain engine oil, replace oil filter and refill engine.
Check fluid levels:

battery	manual transmission
engine coolant	automatic transmission
brake master cylinder	rear axle differential
power steering pump	windshield washer reservoir

Clean windshield wiper blade elements.

- **ENGINE MAINTENANCE**

Retorque cylinder head bolts.
Adjust engine valves.
Check condition and tension of fan/alternator, power steering and air pump drive belts, and adjust if necessary.
Replace fuel filter, ignition points and condenser.
Check and adjust ignition timing.

- **BRAKE AND CHASSIS INSPECTION**

Inspect the following items as indicated. Correct to specifications as necessary:

Brakes

Front and rear brake linings for wear.
Rear brake self-adjusting mechanism for proper operation.
Master cylinder, calipers, wheel cylinders and differential warning valve for leaks.
Brake lines, fittings, hoses and other parts for condition and leaks.
Parking brake for proper operation.
Overall brake condition and action.

Steering/Suspension

Manual or power steering gear and linkage for leaks, looseness or wear.
Springs, shock absorbers and bushings for leaks, looseness or wear.
Tire condition.
Overall steering/suspension condition and action.

Also:

Lubricate front disc brake caliper abutment surfaces.
Adjust parking brake, if necessary.
Adjust tire pressures to specifications.
Adjust manual transmission clutch free play, if necessary.

- **BODY LUBRICATION**

Lubricate the following items with the recommended lubricant:
  ashtray slides
  door, hood and liftgate latches
  door, hood and liftgate hinges
  door, window and liftgate weather seals
  key lock cylinders

80258C

CHART 4 — FOUR-CYLINDER

- OIL CHANGE SERVICE
- ENGINE TUNE-UP
- BRAKE AND CHASSIS INSPECTION
- CHASSIS LUBRICATION
- BODY LUBRICATION

• OIL CHANGE SERVICE

Drain engine oil, replace oil filter and refill engine.

Check fluid levels:

battery	automatic transmission
engine coolant	manual transmission
brake master cylinder	rear axle differential
manual steering gear	windshield washer reservoir
power steering pump	

Clean windshield wiper blade elements.

• ENGINE TUNE-UP

Examine the components listed under each system for proper assembly, condition and operation. Correct, adjust or service to specifications as necessary.

Engine Mechanical Systems

Inspect:
- Air Guard system hoses
- condition and tension of fan/alternator, power steering and air pump drive belts
- vacuum lines and fittings, Exhaust Gas Recirculation lines, hoses and connections

Also:

Retorque cylinder head bolts.
Adjust engine valves.
Adjust drive belts, if necessary.

Ignition System

Inspect:
- coil and spark plug wires
- distributor — cap and rotor, vacuum and centrifugal advance mechanisms, distributor shaft and cam lobes
- transmission controlled spark system (TCS), if equipped

Replace ignition points, condenser and spark plugs.

Fuel System

Inspect:
- fuel tank, cap, lines and connections
- air cleaner thermostatic control system (TAC)
- choke linkage for free movement
- PCV system hoses and solenoid (solenoid on manual transmission only)

Clean PCV filter in air cleaner.
Replace PCV valve, fuel filter, air filter element and charcoal canister air inlet filter.

Final Adjustment

Ignition timing
Idle mixture
Curb and high idle speeds

• BRAKE AND CHASSIS INSPECTION

Inspect the following items as indicated. Correct to specifications as necessary:

Brakes

Front and rear brakelinings for wear.
Rear brake self-adjusting mechanism for proper operation.
Master cylinder, calipers, wheel cylinders and differential warning valve for leaks.
Brake lines, fittings, hoses and other parts for condition and leaks.
Parking brake for proper operation.
Overall brake condition and action.

Steering/Suspension

Manual or power steering gear and linkage for leaks, looseness or wear.
Springs, shock absorbers and bushings for leaks, looseness or wear.
Tire condition.
Overall steering/suspension condition and action.

Also:

Lubricate front disc brake caliper abutment surfaces.
Adjust parking brake, if necessary.
Adjust tire pressure to specifications.
Adjust manual transmission clutch free play, if necessary.

• CHASSIS LUBRICATION

Replace torn or ruptured grease seals and/or damaged steering/suspension components, and lubricate the following:
- clutch lever and linkage
- front ball joints (4)
- turning stops (2 places)
- tie rod inner ball joints (2)

Also:

Repack front wheel bearings.
Drain and refill rear axle lubricant.

Note: U-joints and rear wheel bearings do not require periodic or scheduled lubrication.

• BODY LUBRICATION

Lubricate the following items with the recommended lubricant:
- ashtray slides
- door, hood and liftgate latches
- door, hood and liftgate hinges
- door, window and liftgate weather seals
- key lock cylinders

80258D

1978 AMC SIX- AND EIGHT-CYLINDER MAINTENANCE SCHEDULE

OWNER RESPONSIBILITY	It is the owner's responsibility to determine driving conditions, to have the car serviced according to the Maintenance Schedule, and to pay for necessary parts and labor.
INSTRUCTIONS	Read "CONDITIONS" and determine which apply to your driving situation. Under the conditions listed, perform the maintenance described under "REQUIRED SERVICES."
CONDITIONS	**REQUIRED SERVICES**
SHORT-TRIP DRIVING	For proper engine protection, check engine oil level every 500 to 600 miles (800 to 960 km). Change oil and filter every 7,500 miles (12,000 km) or 7 months, whichever comes first. When most driving involves trips of less than 6 miles (10 km), change oil once between scheduled oil and filter changes.
HEAVY-DUTY DRIVING	In police, taxi, commercial load-carrying or delivery use, change automatic transmission fluid and filter, and adjust bands every 15,000 miles (24,000 km) or 15 months, whichever comes first. For standard duty, no automatic transmission maintenance is required except regular fluid level checks.
START OF WINTER	Inspect battery condition and clean cables. Change engine coolant (antifreeze/water mixture) after 25,000 miles (40,000 km) or 25 months, whichever comes first, and then at the start of every winter season.
ACCUMULATED MILEAGE OR KILOMETERS	At each mileage interval shown, perform the service checked below. Four charts follow that list the maintenance items for each service.

km	MILES	CHART 1 • EMISSION CONTROL INSPECTION	CHART 2 • OIL CHANGE SERVICE *	CHART 3 • OIL CHANGE SERVICE * • ENGINE MAINTENANCE * • BRAKE AND CHASSIS INSPECTION • BODY LUBRICATION	CHART 4 • OIL CHANGE SERVICE * • ENGINE TUNE-UP * • BRAKE AND CHASSIS INSPECTION • CHASSIS LUBRICATION • BODY LUBRICATION
8,000	5,000	√			
12,000	7,500		√		
24,000	15,000			√	
36,000	22,500		√		
48,000	30,000				√
60,000	37,500		√		
72,000	45,000			√	
84,000	52,500		√		
96,000	60,000				√
108,000	67,500		√		
120,000	75,000			√	
132,000	82,500		√		
144,000	90,000				√

*For cars sold in Canada, refer to Canadian Fuel and Maintenance Requirements.

80259

CHART 1 — SIX- AND EIGHT-CYLINDER
• EMISSION CONTROL INSPECTION

Check and adjust fan/alternator, power steering, air pump and air conditioning drive belts.
Check and adjust curb and high idle speeds.

80259A

CHART 2 — SIX- AND EIGHT-CYLINDER
• OIL CHANGE SERVICE

Drain engine oil, replace oil filter and refill engine.
Check fluid levels:

engine coolant	manual transmission
brake master cylinder	automatic transmission
manual steering gear*	rear axle differential
power steering pump	windshield washer reservoir

Check pressure on compact spare tire (if equipped).
Clean windshield wiper blade elements.

*Check at first service, at 30,000 miles, then every 30,000 miles.

80259B

CHART 3 — SIX- AND EIGHT-CYLINDER
• OIL CHANGE SERVICE
• ENGINE MAINTENANCE
• BRAKE AND CHASSIS INSPECTION
• BODY LUBRICATION

- **OIL CHANGE SERVICE**

Drain engine oil, replace oil filter and refill engine.
Check fluid levels:

battery	manual transmission
engine coolant	automatic transmission
brake master cylinder	rear axle differential
power steering pump	windshield washer reservoir

Check pressure on compact spare tire (if equipped).
Clean windshield wiper blade elements.

- **ENGINE MAINTENANCE**

Check and adjust fan/alternator, power steering, air pump and air conditioning drive belts.
Replace fuel filter.

Note: On Pacer, Concord, AMX with eight-cylinder engine, also perform the following services. Correct as necessary.

Inspect:
choke linkage for free movement
vacuum fittings, Exhaust Gas Recirculation lines, hoses and connections
Check idle mixture.
Check curb and high idle speeds.
Check ignition timing.

- **BRAKE AND CHASSIS INSPECTION**

Inspect the following items as indicated. Correct to specifications as necessary:

Brakes

Front and rear brakelinings for wear.
Rear brake self-adjusting mechanism for proper operation.
Master cylinder, calipers, wheel cylinders and differential warning valve for leaks.
Brake lines, fittings, hoses and other parts for condition and leaks.
Parking brake for proper operation.
Overall brake condition and action.

Steering/Suspension

Manual or power steering gear and linkage for leaks, looseness or wear.
Springs, shock absorbers and bushings for leaks, looseness or wear.
Tire condition
Overall steering/suspension condition and action.

Also:

Lubricate front disc brake caliper abutment surfaces.
Adjust parking brake, if necessary.
Adjust tire pressures to specifications.
Adjust manual transmission clutch free play, if necessary.

- **BODY LUBRICATION**

Lubricate the following items with the recommended lubricant:
ashtray slides
door, hood, trunk tailgate and liftgate latches
door, hood, trunk, tailgate and liftgate hinges
door, window, trunk, tailgate and liftgate weather seals
key lock cylinders

80259C

CHART 4 — SIX- AND EIGHT-CYLINDER

- OIL CHANGE SERVICE
- ENGINE TUNE-UP
- BRAKE AND CHASSIS INSPECTION
- CHASSIS LUBRICATION
- BODY LUBRICATION

• OIL CHANGE SERVICE

Drain engine oil, replace oil filter and refill engine.

Check fluid levels:

battery	automatic transmission
engine coolant	manual transmission
brake master cylinder	rear axle differential
manual steering gear	windshield washer reservoir
power steering pump	

Check pressure on compact spare tire (if equipped).
Clean windshield wiper blade elements.

• ENGINE TUNE-UP

Examine the components listed under each system for proper assembly, condition and operation. Correct, adjust or service to specifications as necessary.

Engine Mechanical Systems

Inspect:
- Air Guard system hoses
- condition and tension of fan/alternator, power steering, air pump and air conditioning drive belts
- vacuum lines and fittings, Exhaust Gas Recirculation lines, hoses and connections

Also:

Adjust drive belts, if necessary.*
Lubricate exhaust heat valve.

Ignition System

Inspect:
- coil and spark plug wires
- distributor — cap and rotor, vacuum and centrifugal advance mechanisms
- transmission controlled spark system (TCS), if equipped

Replace spark plugs.

Fuel System

Inspect:
- fuel tank, cap, lines and connections
- air cleaner thermostatic control system (TAC)
- choke linkage for free movement
- PCV system hoses

Clean PCV filter (6-cylinder in air cleaner, V-8 in oil filler cap).
Replace PCV valve, fuel filter, air cleaner element and charcoal canister air inlet filter.

Final Adjustment

Ignition timing
Idle mixture
Curb and high idle speeds

*During extended high temperature and extensive air conditioner operation, the drive belts may require more frequent inspection and adjustment.

• BRAKE AND CHASSIS INSPECTION

Inspect the following items as indicated.
Correct to specifications as necessary.

Brakes

Front and rear brakelinings for wear.
Rear brake self-adjusting mechanism for proper operation.
Master cylinder, calipers, wheel cylinders and differential warning valve for leaks.
Brake lines, fittings, hoses and other parts for condition and leaks.
Parking brake for proper operation.
Overall brake condition and action.

Steering/Suspension

Manual or power steering gear and linkage, for leaks, looseness or wear.
Springs, shock absorbers and bushings for leaks, looseness or wear.
Tire condition.
Overall steering/suspension condition and action.

Also:

Lubricate front disc brake caliper abutment surfaces.
Adjust parking brake, if necessary.
Adjust manual transmission clutch free play, if necessary.

• CHASSIS LUBRICATION

Replace torn or ruptured grease seals and/or damaged steering/suspension components, and lubricate the following:
- clutch lever and linkage
- front ball joints (4)
- turning stops (2 places)
- tie rod inner ball joints (2)

Also:

Repack front wheel bearings.
Drain and refill rear axle lubricant.

Note: U-joints and rear wheel bearings do not require periodic or scheduled lubrication.

• BODY LUBRICATION

Lubricate the following items with the recommended lubricant:
- ashtray slides
- door, hood, trunk, tailgate and liftgate latches
- door, hood, trunk, tailgate and liftgate hinges
- door, window, trunk, tailgate and liftgate weather seals
- key lock cylinders

80259D

SERVICES SCHEDULED BY CONDITIONS OR TIME

SHORT-TRIP DRIVING

When most driving involves trips of less than six miles (10 km), change engine oil once between scheduled oil and filter changes. Replace oil filter every other oil change.

HEAVY-DUTY DRIVING

Heavy-duty driving refers to fleet or police use and commercial delivery or load-carrying. For cars in heavy-duty use, change automatic transmission fluid and filter and adjust bands every 15,000 miles (24,000 km) or 15 months, whichever comes first. Owners should also arrange for service upon signs of changing shift patterns.

NOTE: *The automatic transmission torque converter has no drain plug.*

For commercial load-carrying applications, owners should be careful not to overload or operate the car in a manner that would cause brake, engine, axle, steering, suspension or other failure.

AT START OF WINTER

Perform the following maintenance services at the start of every winter season:

Battery Service

WARNING: *Do not service the battery without wearing safety glasses, rubber gloves and protective clothing. Battery electrolyte contains sulfuric acid and must be kept away from skin, eyes, clothing and painted surfaces. If acid contacts any of these,* **flush immediately with large amounts of water. Get medical attention.** *Don't smoke while checking or servicing the battery and keep open flames or sparks away from battery filler caps since explosive gas is always present.*

(1) Disconnect battery negative cable and then the positive cable.

(2) Clean the cables and terminal posts with a wire brush terminal cleaner.

(3) Check the battery fluid level and replenish if necessary (fig. B-1).

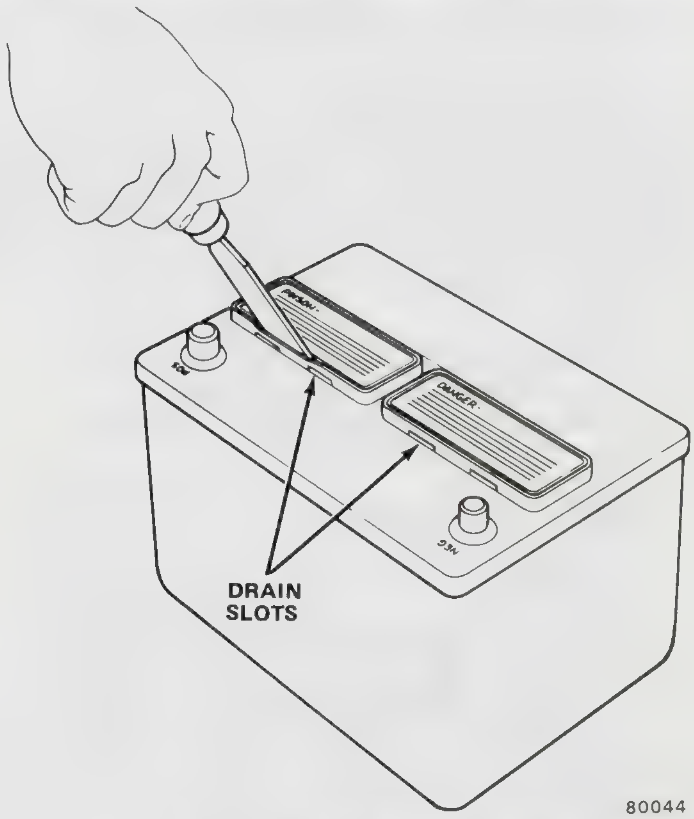

Fig. B-1 Removing Battery Filler Caps

(4) Remove the battery holddown and clean the battery and battery box, if necessary, with a solution of baking soda and water, then rinse thoroughly.

(5) Tip the battery slightly to drain dirty water through the slots provided.

(6) Fasten the battery holddown, but do not overtighten.

(7) Attach positive cable and then the negative cable.

(8) Apply a small amount of grease or protective coating to the cable ends to minimize corrosion.

Engine Coolant

Change engine coolant after the first 25,000 miles or 25 months, whichever comes first, and then at the start of every winter season. Refer to Chapter 1C—Cooling Systems, Volume 1—Power Plant for draining and refilling procedures.

SERVICES SCHEDULED BY ACCUMULATED MILEAGE

BODY LUBRICATION

Lubricate the items listed using the product specified in the Recommended Fluids and Lubricants Chart at the end of this section. When lubricating weather seals, apply the lubricant to a rag and wipe it on the seal to prevent dust-collecting overspray which can soil passenger clothing.

BRAKE AND CHASSIS INSPECTION

Brakes

Inspect linings for wear, cracks, charred surfaces or broken rivets, and for contamination by brake fluid, axle lubricant or other contaminants.

Front Brakelinings

Check both ends of the outboard lining by looking in at each end of the caliper (fig. B-2). These are the points at which the highest rate of wear normally occurs. At the same time, check the lining thickness of the inboard shoe to make sure that it has not worn prematurely. Look through the inspection port to view the inboard shoe and lining. Whenever the thickness of any lining is worn to the approximate thickness of the metal shoe, all shoe and lining assemblies on both brakes should be replaced.

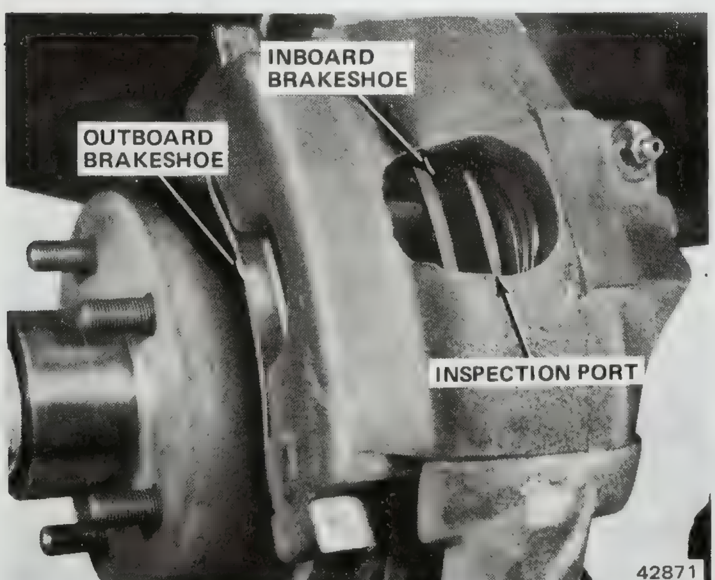

Fig. B-2 Disc Brake Inspection Port

Rear Brakelinings

Replace linings worn to within 1/32-inch (0.8 mm) of rivet head.

Rear Self-Adjusting Mechanism

Operate the adjuster cable and check for ease of operation of the adjuster screw assembly. Check condition of the adjuster components for bending, frayed cables, loose or overheated springs, or binding.

Master Cylinder

Inspect the cap bail for proper tension and fit. The cap should maintain a tight seal. Check the rubber diaphragm seal for cracks, cuts or distortion. Check fittings and housing for signs of leakage. If internal leaks are suspected, or if fluid loss occurs but a leak is not evident, check for leaks at the rear of the master cylinder. Correct as required.

Disc Brake Calipers

Check dust boot for correct installation, tears or signs of leakage. Check caliper abutment surfaces for binding or corrosion. Apply recommended lubricant to caliper abutment surfaces.

Rear Wheel Cylinders

Pull the dust boot back and inspect for leaks. Check the condition of the pistons and cylinder bores.

Differential Warning Valve

Check the valve and housing for signs of leaks, kinked lines or loose fittings.

Brake Lines, Fittings and Hoses

Check for cracks, swelling, kinks, distortion or leaks. Also check position to be sure no lines are rubbing against exhaust system parts or other components.

Parking Brake

Operate the parking brake pedal and brake release and check for smooth operation and brake holding ability. Inspect cables for binds, kinks or frays. With the brake released, the rear wheels should turn freely. Adjust the parking brake, if necessary, as described in Chapter 2—Brakes, Volume 2—Chassis.

Overall Brake Condition and Action

Check for improper brake action, performance complaints or signs of overheating, dragging or pulling. Correct as required.

Steering/Suspension

Inspect condition and functioning of car front suspension and steering system components. The inspection procedure should consist of a visual and manual (hands-on) check of all parts followed by a road test to verify steering action and response. Do not check or correct front suspension alignment angles unless an inspection and road test indicate adjustment may be necessary.

Visual and Manual Inspections

A visual-manual inspection should include these items:

- Upper and lower control arms
- Steering linkage and tie rod ends
- Strut rods and brackets
- Ball joint nuts and cotter keys
- Sway stabilizer-to-lower control arm links
- Shock absorbers and mounting hardware
- Steering arms
- Pitman arm
- Steering gear box
- Steering shafts and flex coupling
- Power steering pump belt and hoses
- Wheels and tires

During the visual-manual inspection, check for:

- Loose attaching bolts and nuts
- Worn or loose bushings (control arms, sway stabilizer, idler arm, strut rods)
- Bent control arms or tie rods
- Leaking shock absorbers, power steering pump or hoses, and steering gear
- Broken coil springs
- Frayed or torn power steering pump drive belt
- Bent or cracked wheels
- Prematurely or abnormally worn tires
- Incorrect tire pressures
- Mismatched tire types or sizes

Road Test

Prior to road testing, check and correct tire inflation pressures. Refer to glove box sticker or Chapter 2G—Wheels and Tires,. Volume Two—Chassis for recommended pressures. Then, check for any of the following conditions:

- Wander or erratic steering
- Hard Steering
- Improper steering recovery (return from center) on turns
- Bind when turning steering wheel from lock to lock while car is at a standstill (cars with power steering only)

NOTE: *Transmission in Neutral or Park, parking brake applied, foot brake released and engine running.*

- Any abnormal noises that may indicate loose or worn suspension or steering components

Correct any problems that show up as a result of the visual-manual inspection and road test.

Manual Transmission Clutch Inspection and Adjustment

Inspect clutch by driving vehicle and checking for clutch chatter, grabbing, slippage, and incomplete release. Check clutch pedal free play: four-cylinder engine 1/2 to 1-inch (12.7 to 25.4 mm); six-cylinder engine 7/8 to 1-1/8 inches (22.2 to 28.6 mm). Correct or adjust as required. Refer to Chapter 2A—Clutch, Volume Two—Chassis for detailed procedures.

CHASSIS LUBRICATION

Inspect suspension grease seals for leaks or tears, and replace if necessary. Also inspect steering/suspension components for damage that requires replacement. Lubricate the following components every 30,000 miles (48,000 km), every 15,000 miles (24,000 km) for components (as determined by inspection) affected by abnormally wet or dusty driving conditions.

NOTE: *Universal joints and rear wheel bearings do not require periodic or scheduled lubrication.*

Always clean lube fittings before applying lubricant to prevent dirt from entering the unit. For types and grades of lubricants, refer to Recommended Fluids and Lubricants chart.

Six-Cylinder Clutch Bellcrank Pivot

On cars with six-cylinder engine and manual transmission, lubricate the clutch bellcrank pivot ball studs using AMC All-Purpose lubricant, or Multi-Purpose Chassis Lubricant (lithium base) or equivalent (fig. B-3). The bellcrank assembly must be disassembled for access to the ball studs. Refer to Chapter 2A—Clutch, Volume Two—Chassis for procedure.

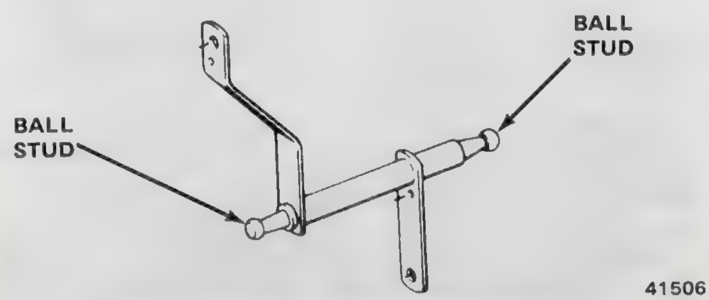

Fig. B-3 Six-Cylinder Clutch Bellcrank Pivot Ball Studs

Front Suspension Ball Joints

Remove lube plugs (fig. B-4 and B-5) and temporarily install lube fittings. Lubricate using Manual Lubrication Gun Tool J-9670 with lithium-base cartridge lubricant. The manual lube gun is designed to deliver lubricant at low pressure (6 to 8 psi) to avoid damaging the ball joint lube seals.

CAUTION: *Use of guns which deliver lube at high pressure could rupture ball joint seals. Apply lube slowly. There should be no visual evidence of lube escaping past seals.*

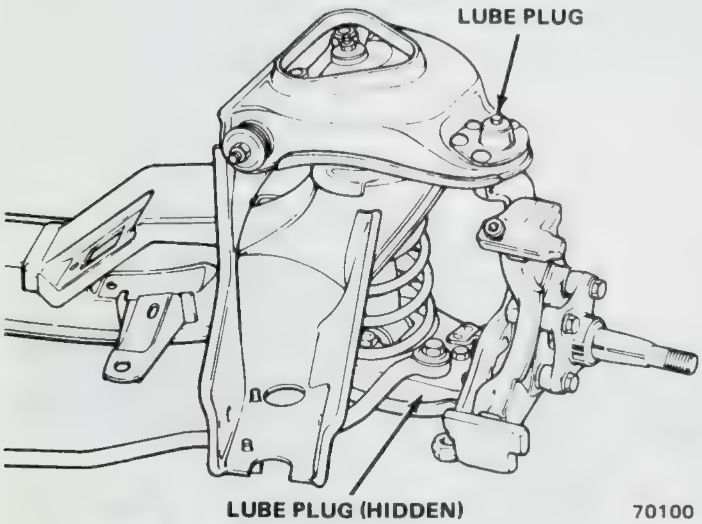

Fig. B-4 Ball Joint Lube Plugs—Pacer

When lubrication is completed, remove lube fittings and install lube plugs.

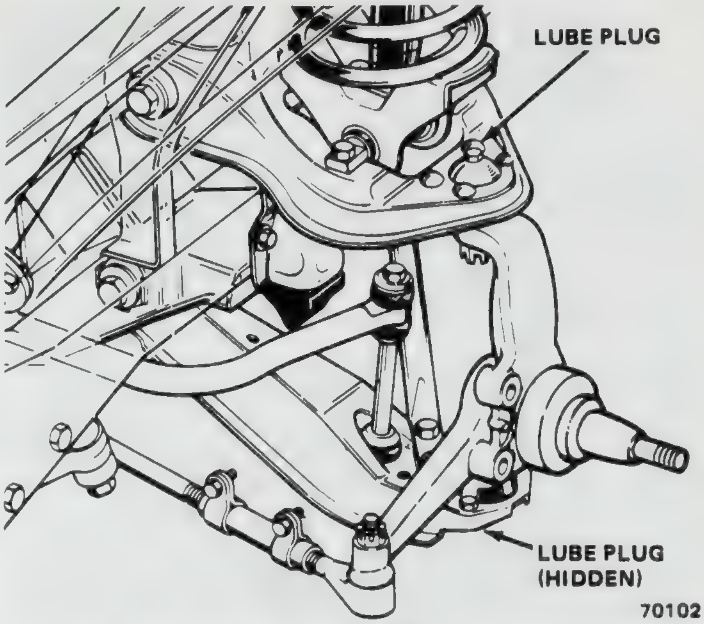

Fig. B-5 Ball Joint Lube Plugs—Gremlin-Concord-AMX-Matador

Tie Rod Inner Ball Joints

Remove lube plugs (fig. B-6 and B-7) and temporarily install lube fittings. Lubricate with lithium base lubricant. Remove lube fittings and install lube plugs.

Turning Radius (Steering Arm) Stops

The turning radius of the front wheels is controlled by a steering stop on Gremlin, Concord, AMX and Matador models. On full turns the steering stop contacts the strut rod, resulting in a creaking sound. To eliminate this noise apply a daub of Multi-Purpose Chassis Lubricant to the stop (fig. B-8).

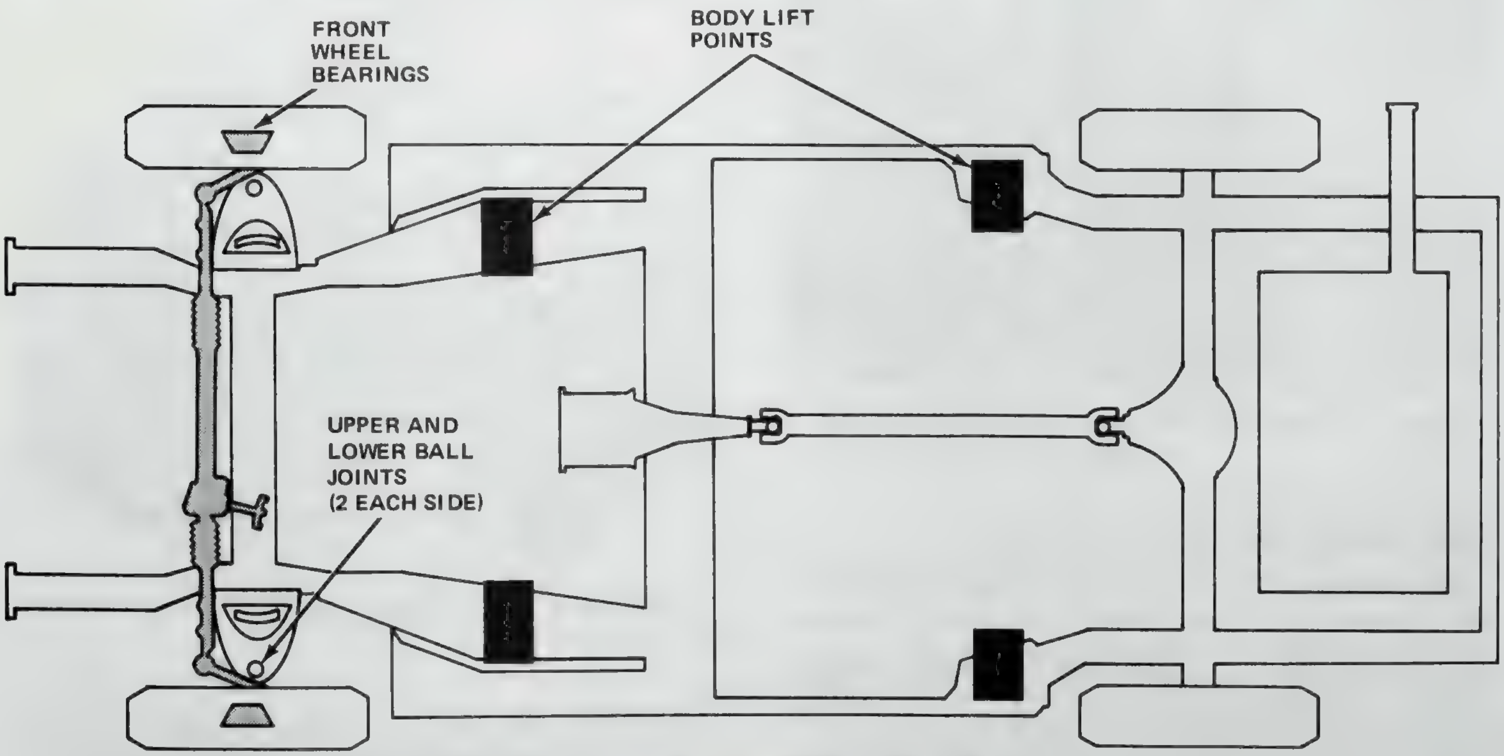

Fig. B-6 Chassis Lubrication Points—Pacer

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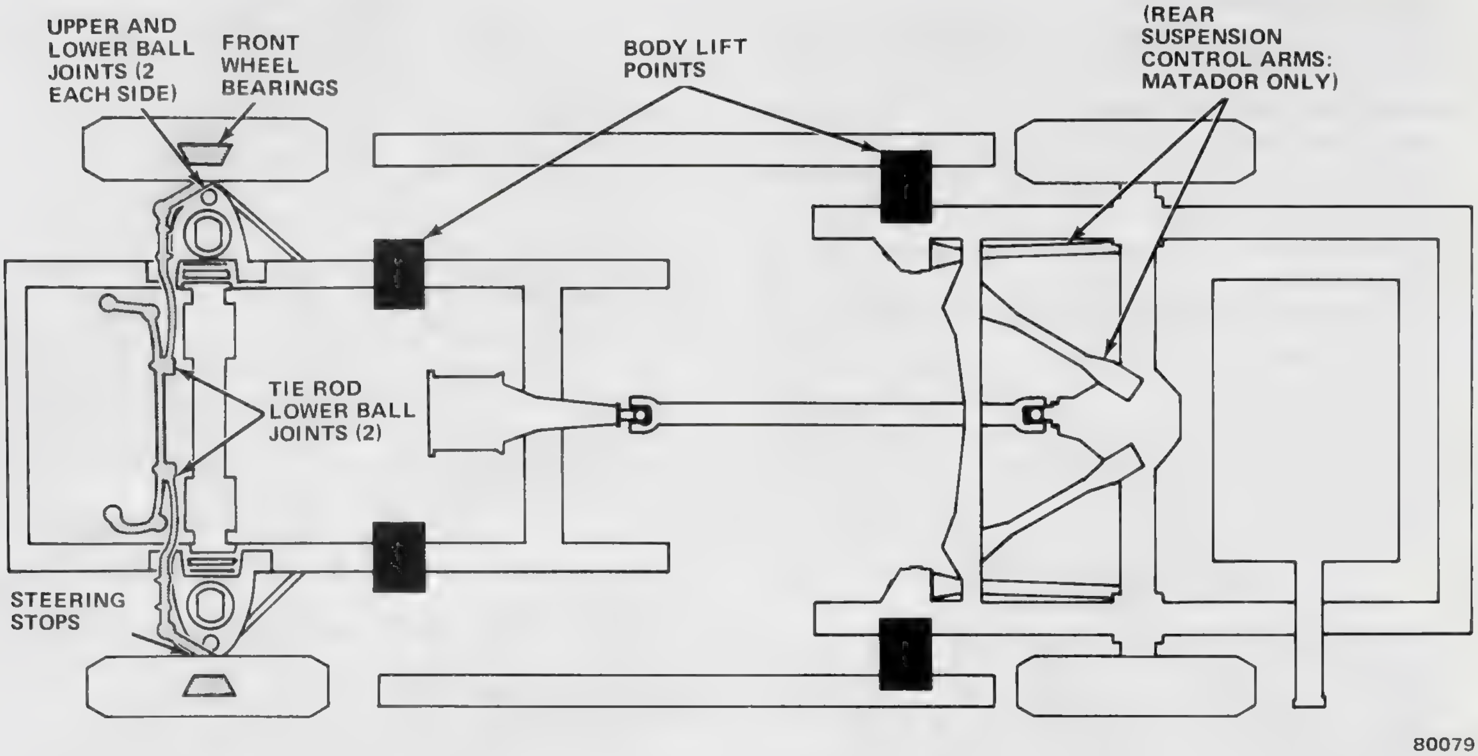


Fig. B-7 Chassis Lubrication Points—Gremlin-Concord-AMX-Matador

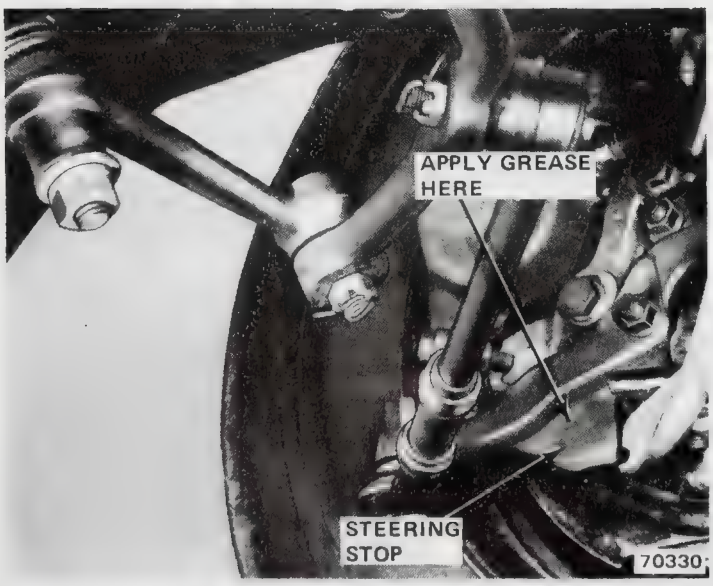


Fig. B-8 Turning Radius Stop—Gremlin-Concord-AMX-Matador

Front Wheel Bearings

The front wheel bearings are the tapered roller bearing type (fig. B-9). Clean all parts in a suitable solvent. Inspect bearings and cups for signs of excessive wear, pitting, brinelling or overheating, and replace if necessary. Lubricate the bearings with exteme-pressure (EP), lithium-base, waterproof, wheel bearing grease. Be sure to force grease between rollers.

NOTE: *The bearings are designed to fit closely on the spindle, but loose enough to creep so bearing rollers do not always wear in one spot. Polish the spindle with fine crocus cloth if necessary for proper fit. Always wipe the spindle clean and apply a small amount of grease for lubrication and to prevent rust.*

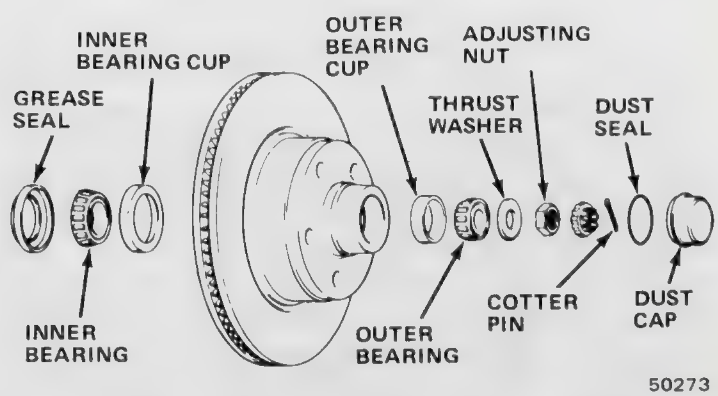


Fig B-9 Typical Front Wheel Bearing Assembly

Wipe the wheel hub clean and apply a small amount of grease inside the hub.

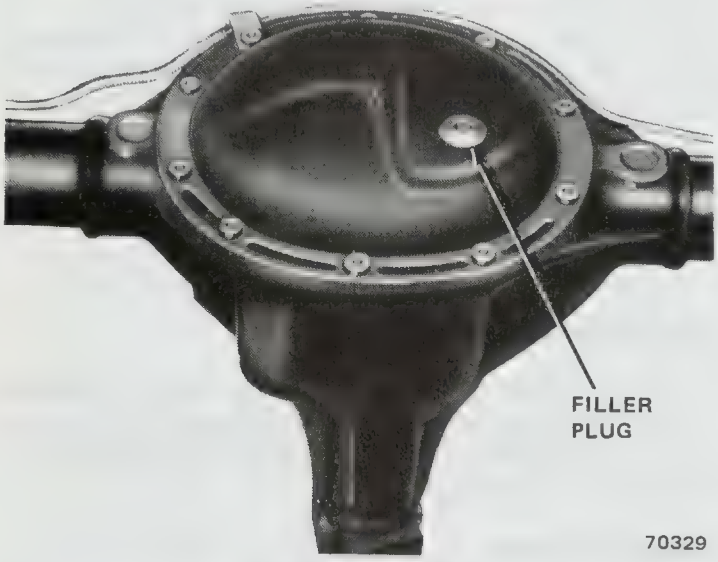
CAUTION: *Do not overfill the wheel hub. Too much grease can cause overheating and bearing damage, and it can leak and contaminate brakelinings.*

Install the inner bearing and a replacement grease seal. Assemble the hub assembly and adjust bearings as described in Chapter 2G—Wheels and Tires, Volume 2—Chassis. Inspect bearings, and clean and repack if necessary, when they are removed for other services.

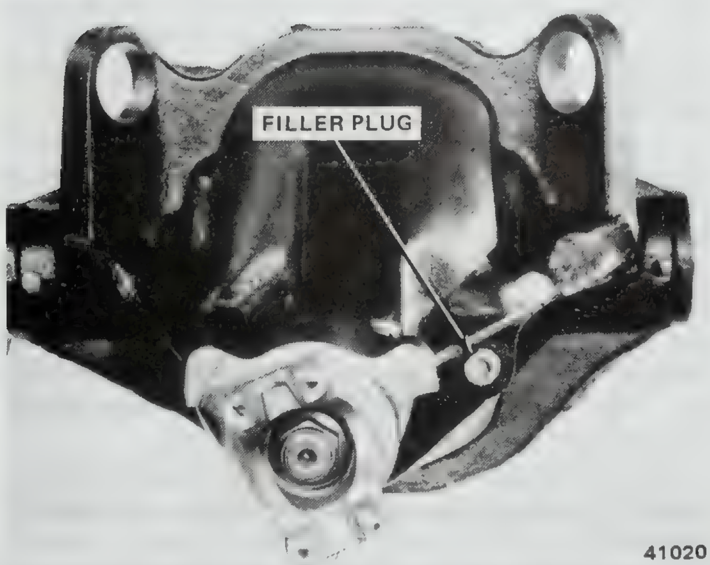
Rear Axle Fluid Change

Change the rear axle fluid at 30,000-mile (48,000 km) intervals. To drain the fluid, remove the rear axle housing cover. Use a new gasket when installing the housing cover.

Fill to level of fill plug (fig. B-10) with AMC Rear Axle Lubricant or SAE 80W-90 Gear Lubricant of API GL-5 quality, or equivalent. For Twin-Grip rear axle, use AMC Rear Axle lubricant or SAE 80W-90 Limited Slip Gear Lubricant of API GL-5 quality, or equivalent.



7-9/16 Inch Rear Axle



8-7/8 Inch Rear Axle

Fig. B-10 Rear Axle Filler Plugs

EMISSION CONTROL INSPECTION

Four-Cylinder Engine

After the first 5,000 miles (8,000 km) of operation, retorque cylinder head bolts and adjust engine valves. Refer to Chapter 1B—Engines, Volume One—Power Plant for procedures. Also do the following.

Drive Belts

Check belts driving fan, air pump, alternator, power steering pump, and air conditioning compressor for cracks, fraying, wear, and general condition. Use Tension Gauge J-23600 to check drive belt tension. Compare reading obtained against the tension specified for used belts in the following chart. If installing a new belt, use the new belt setting shown in the chart. Refer to Chapter 1C—Cooling, Volume One—Power Plant for replacement or adjustment procedures.

Drive Belts Tension

	Initial Newtons New Belt	Reset Newtons Used Belt	Initial Pounds New Belt	Reset Pounds Used Belt
Air Conditioner				
Four-Cylinder	556-689	400-512	125-155	90-115
Six-Cylinder	556-689	400-512	125-155	90-115
Eight-Cylinder	556-689	400-512	125-155	90-115
Air Pump				
Four-Cylinder	178-267	118-267	40-60	40-60
Six-Cylinder w/PS	289-334	267-311	65-75	60-70
Other Six-Cylinder and all Eight-Cylinder	556-689	400-512	125-155	90-115
Fan — All Engines	556-689	400-512	125-155	90-115
Power Steering — All Engines	556-689	400-512	125-155	90-115

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Engine Idle Speeds

Check curb idle speed and mixture and fast idle speed using equipment known to be accurate. For curb idle speed and mixture, refer to Tune-Up Specifications (On Car) chart in Chapter 1A—General Service and Diagnosis, Volume One—Power Plant. For fast idle speed, refer to Carburetor Service Specifications chart in Chapter 1J—Fuel Systems, Volume One—Power Plant.

Six- and Eight-Cylinder Engines

After the first 5,000 miles (8,000 km) of operation, perform a Drive Belts inspection and check Engine Idle Speeds and adjust if necessary, as described above.

ENGINE DRIVE BELT INSPECTION

On models with four-cylinder engines, check condition and tension of engine drive belts every 5,000 miles (8,000 km) as described above under Drive Belts.

ENGINE MAINTENANCE

Four-Cylinder Engine

Retorque cylinder head bolts, adjust engine valves and inspect engine Drive Belts as described above under Emission Control Inspection. Also perform the following services.

Fuel Filter

Replace the fuel filter at the carburetor. Be sure to position the fuel return line at the top of the filter (fig. B-11).

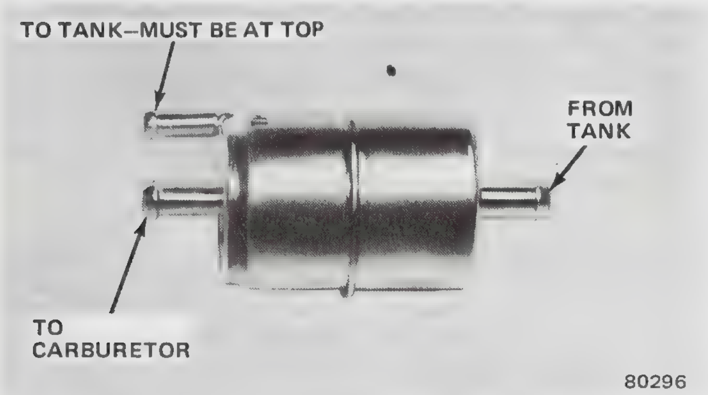

Fig. B-11 Correct Fuel Filter Installation

Ignition System

Replace ignition points and condenser, then check and adjust ignition timing if necessary. Refer to Chapter 1A—General Service and Diagnosis, Volume One—Power Plant, for service procedures and specifications.

Six- and Eight-Cylinder Engines

On all models, perform a Drive Belt inspection as described above and also replace the fuel filter at the carburetor. Be sure to position fuel return line at the top of the filter (fig. B-11).

On Pacer, Concord and AMX models with eight-cylinder engines, perform an engine Drive Belt Inspection and replace the Fuel Filter as described above, and also do the following.

Choke Linkage

Open the carburetor to part throttle position and move the choke valve by hand from fully close to fully open. The choke mechanism should move freely. Correct as required.

Vacuum Connections

Inspect vacuum fittings, exhaust gas recirculation lines, hoses and connections for integrity and correct assembly. Replace or repair as required.

Idle Speeds

Check carburetor idle mixture and adjust if necessary. Also check curb idle and high idle speeds, adjust if required. Refer to Chapter 1A—General Service and Diagnosis, Volume One—Power Plant for procedures and specifications.

Ignition Timing

Check ignition timing and adjust if necessary as described in Chapter 1A—General Service and Diagnosis, Volume One—Power Plant.

ENGINE TUNE-UP

Perform a complete precision tune-up at the scheduled interval. Perform a precision electronic diagnosis whenever questionable engine performance occurs between scheduled tune-ups.

Refer to Chart 4 of the 1978 Four-Cylinder or Six- and Eight-Cylinder Maintenance Schedules for a complete listing of items requiring attention during the tune-up. Refer to Chapter 1A—General Service and Diagnosis, Volume One—Power Plant for detailed procedures and specifications. Procedures for air cleaner servicing and fuel filter replacement are located in Chapter 1J—Fuel Systems, Volume One—Power Plant.

OIL CHANGE SERVICE

The Oil Change Service is a complete service including oil and filter change, fluid level checks and other important maintenance items. Read the details and perform the services as follows.

Engine Oil Change

On four-cylinder engines, change engine oil after the first 5,000 miles (8,000 km) and every 5,000 miles (8,000 km) thereafter. For six- and eight-cylinder engines, change engine oil after the first 7,500 miles (12,000 km) and every 7,500 miles (12,000 km) thereafter.

As periods for oil changes are affected by a variety of conditions, no single mileage figure applies for all types of driving. Five-thousand miles (8,000 km) is the maximum amount of miles that should elapse between changes for four-cylinder engines (7,500 miles or 12,000 km for six- and eight-cylinder engines); more frequent changes are beneficial, and for this reason, oil should be changed every 5 months even though 5,000 miles (8,000 km) may not have elapsed on the car odometer (7 months for six- and eight-cylinder engines).

Drain crankcase only after engine has reached normal operating temperature to ensure complete drainage of used oil.

For maximum engine protection under all driving conditions, fill crankcase only with engine oil meeting API Engine Oil Service Classification "SE." These letters must appear on the oil container singly or in combination with other letters. SE engine oils protect against oil oxidation, high-temperature engine deposits, rust and corrosion.

Single viscosity or multi-viscosity oils are equally acceptable. Oil viscosity number, however, should be determined by the lowest anticipated temperature before the next oil change.

Engine Oil Viscosity

Lowest Temperature Anticipated	. Recommended Single Viscosity	Recommended Multi-Viscosity
Above + 40° F + 5° C	SAE 30 or SAE 40	SAE 10W-30, 20W-40, or 10W-40
Above 0° F −18° C	SAE 20W-20	SAE 10W-30 or 10W-40
Below 0° F −18° C	SAE 10W*	SAE 5W-20 or 5W-30
*Sustained high speeds (above 55 mph, 88 km/h) should be avoided when using SAE 10W engine oil since oil consumption may be greater under this condition.		

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Crankcase capacity is 3.5 quarts (3.4 l) for four-cylinder engines, and 4 quarts (3.8 l) for six- and eight-cylinder engines. Add an additional 0.5 quart (0.5 l) when the filter is changed on four-cylinder engines, 1 full quart (0.96 l) for six- and eight-cylinder engines.

Oil Filter Change

Change the oil filter every 5,000 miles (8,000 km) or every 5 months, whichever comes first, with four-cylinder engines, every 7,500 miles (12,000 km) or every 7 months whichever comes first for six- and eight-cylinder engines.

A full-flow oil filter is mounted on the lower center right side of six-cylinder engines and on the lower right side on four- and eight-cylinder engines.

Remove the throwaway filter unit from the adapter with Oil Filter Removal Tool J-22700, or equivalent. To install, turn the replacement unit by hand until the gasket contacts the seat and then tighten an additional one-half turn.

CAUTION: *Four-cylinder oil filters have a built-in bypass valve to permit oil flow if the filter should clog. Failure to use the correct filter can result in engine damage.*

NOTE: *Long and short oil filter elements are currently being used on six- and eight-cylinder engines. When the short element is used, a slight overfill condition is indicated on the dipstick on some engines. This does not affect engine operation.*

Fluid Level Checks—All Models

Battery

Check electrolyte level every 15,000 miles (24,000 km) under normal operation, or every 10,000 miles (16,000 km) when operated in hot climates, and always before every winter season. Lift the battery cell caps and check the fluid level in each filler well. Add distilled water, if necessary, to bring level to bottom of ring in filler wells (fig. B-1).

Engine Coolant

Check coolant level when the engine is cold. Fluid level should be approximately 1-1/2 to 2 inches (38.1 to 50.8 mm) below the filler neck when cold, or 1/2 to 1 inch (12.7 to 25.4 mm) when hot. Add a 50/50 mixture of ethylene glycol antifreeze and pure water. In an emergency, water alone may be used. Check the freeze protection at the earliest opportunity, as the addition of water will reduce the antifreeze and corrosion protection of the coolant mixture. Do not overfill, as loss of coolant—due to expansion—will result.

Brake Master Cylinder

Fluid level in the brake master cylinder should be just below the reservoir top rim (fig. B-12). Use AMC Brake Fluid, or equivalent, conforming to SAE Standard J1703 and FMVSS No. 116, DOT 3 Brake Fluid,

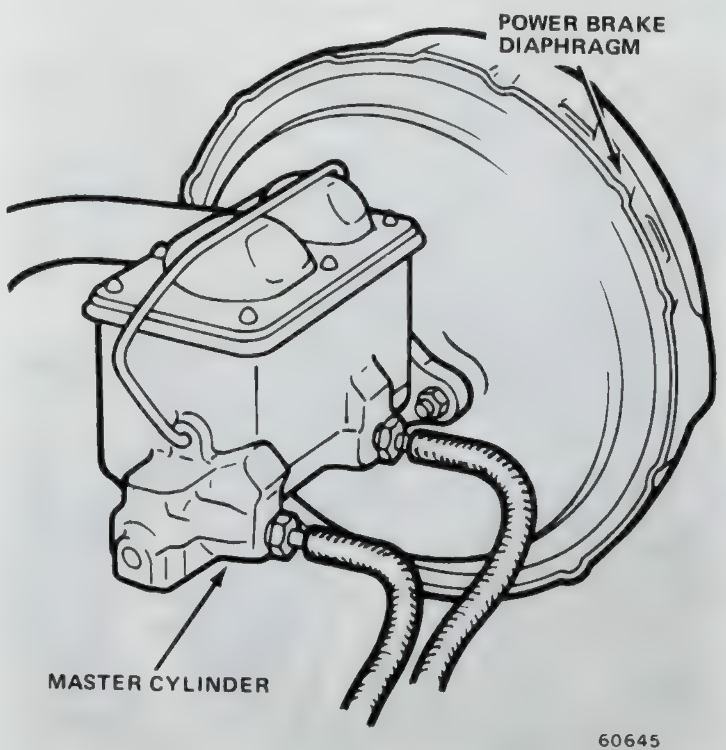


Fig. B-12 Brake Master Cylinder

Manual Steering Gear

Check manual steering gear fluid level at the first oil change service, then at 30,000 miles (48,000 km) and every 30,000 miles (48,000 km) thereafter. Remove the side cover bolt opposite the adjuster screw (fig. B-13). Lubricant should be to level of bolt hole. If not, add make-up fluid such as AM All-Purpose Lubricant or Multi-Purpose Chassis Lubricant (Lithium Base).

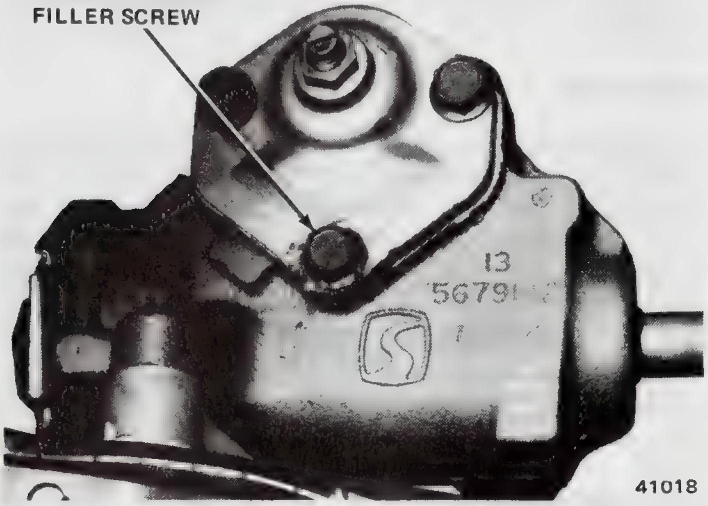


Fig. B-13 Manual Steering Gear Fill Hole Location

Power Steering Pump

Lubricant level can be checked with fluid either hot or cold. If below the FULL HOT or FULL COLD marking on the dipstick attached to the reservoir cap (fig. B-14), add AMC/Jeep Power Steering Fluid or equivalent.

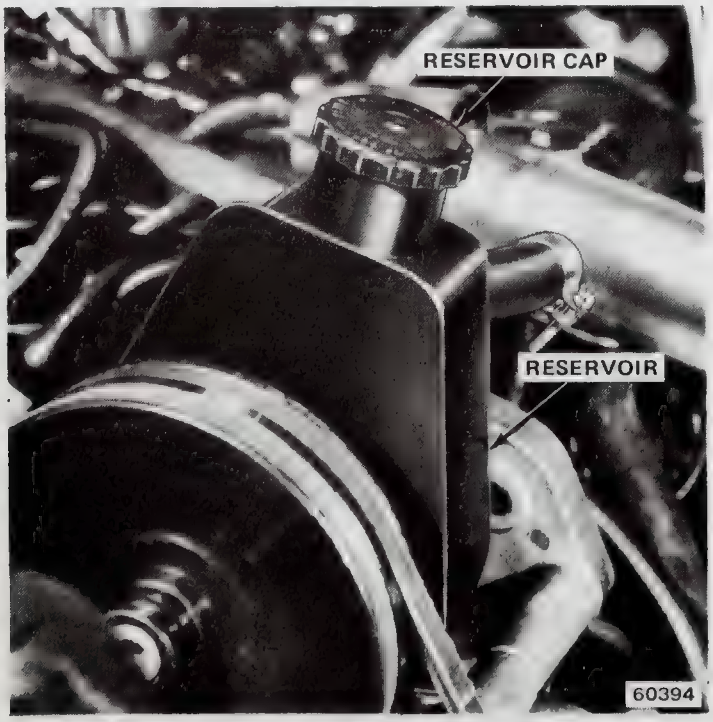


Fig. B-14 Power Steering Pump Dipstick Location

Automatic Transmission

To make an accurate fluid level check perform the following steps:

(1) Bring transmission up to normal operating temperature.

(2) Place car on level surface.

(3) Have engine running at idle speed at normal operating temperature.

(4) Apply parking brake.

(5) Move gearshift lever through all gears, leaving it in Neutral.

(6) Remove dipstick, located in fill tube at right rear of engine near dash panel, and wipe clean.

(7) Insert dipstick until cap seats.

(8) Remove dipstick and note reading. The fluid level should be between the ADD and FULL marks. If at or below the ADD mark, add sufficient fluid to raise level to FULL mark.

Use AMC Automatic Transmission Fluid, Dexron®, Dexron II®, or equivalent.

CAUTION: *Do not overfill. Overfilling can cause foaming which can lead to overheating, fluid oxidation, or varnish formation. These conditions can cause interference with normal valve, clutch, and servo operation. Foaming can also cause fluid to escape from the transmission vent where it may be mistaken for a leak.*

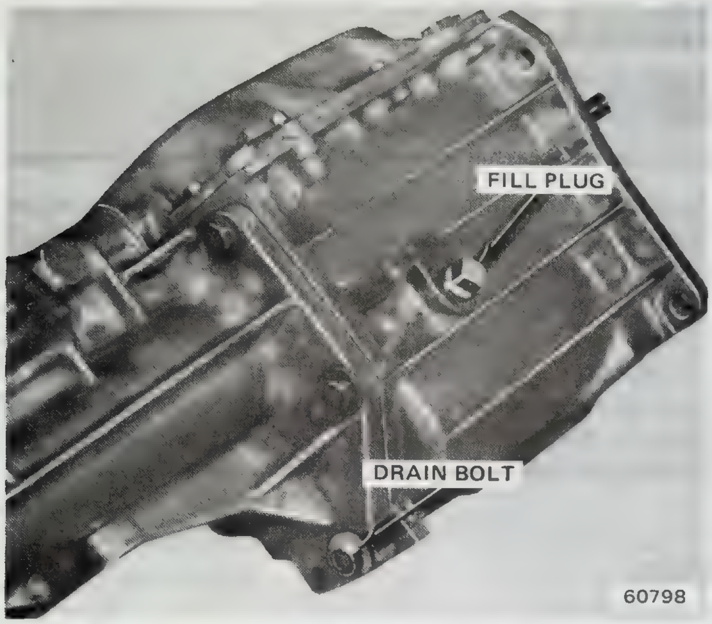
When checking fluid level, also check fluid condition. If fluid smells burned or is full of metal or friction material particles, a complete transmission overhaul may be needed. Examine the fluid closely. If doubtful about its condition, drain out a sample for a doublecheck.

Manual Transmission

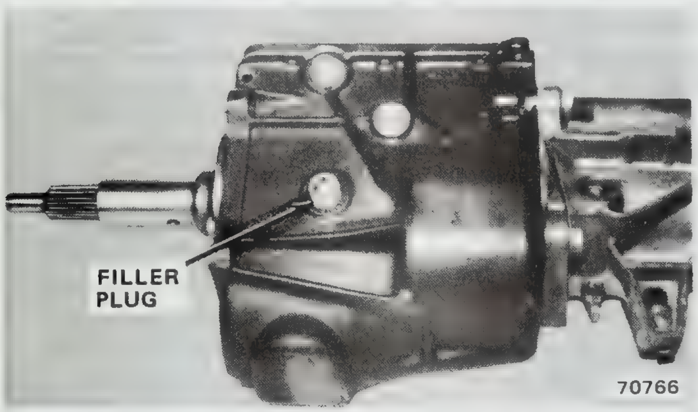
To check lubricant level, remove the fill plug located on the right side of transmission (fig. B-15). Lubricant should be level with fill plug hole. If not, raise level with lubricant and install fill plug. Refer to Recommended Fluids and Lubricants chart and Fluid Capacities chart at the end of this section.

Rear Axle Differential

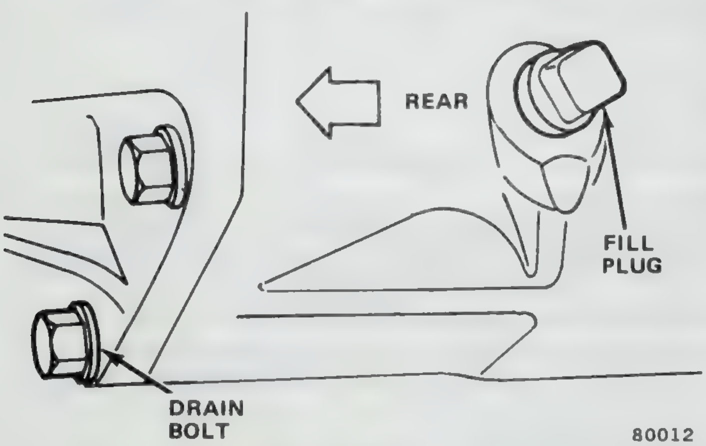
The lubricant level should be at the level of the fill hole (fig. B-10). If not, bring to level by adding the recommended lubricant.



SR4—4-Speed with six-cylinder engine



HR-1—4-Speed with four-cylinder engine



150T—3-Speed

Fig. B-15 Manual Transmission Filler Plugs

Windshield Washer Solution

The use of washer solvent mixed with water is recommended year-round. In addition to the ice inhibitor, it contains detergent effective in removing road film. Do not use engine antifreeze or other solutions that can damage the paint.

Windshield and Wiper Blade Elements

Dry windshield glass accumulates road film which will result in hazing and/or smearing when the wipers are first turned on. This film is not readily washed with water. For this reason, it is important that both the glass as well as the wiper blade rubber element is washed with mild detergent solution regularly.

Compact Spare Tire Pressure

On models equipped with a compact spare tire, check tire pressure at every Oil Change Service. Tire pressure should be 60 psi (413 kPa) when cold. Be sure to use a pressure gauge large enough to indicate 60 psi (413 kPa).

WARNING: *Do not confuse the compact spare tire with the collapsible spare tire. The compact spare tire is stored inflated. The collapsible spare is deflated when stored and requires use of a special inflator can.*

Fig. B-16 Compact Spare Tire

WARNING: *Add air only in small amounts and check tire pressure frequently until 60 psi (413 kPa) is reached. Tire pressure rises quickly with only a small amount of air added.*

UNSCHEDULED MAINTENANCE

GENERAL

Services detailed in this subsection are not listed in the Maintenance Schedule for performance at a specified interval. They are to be performed as required to restore car to original specifications. Unscheduled maintenance services include such items as fuel system cleaning, engine carbon deposit removal, retightening loose parts and connections, replacement of manual transmission clutch components, brakelinings, shock absorbers, light bulbs, wiper blades, belts, hoses, soft trim, bright metal trim, painted parts, other appearance items plus other rubber and rubber-like parts. Need for these unscheduled services is usually indicated by a change in performance, handling, or the appearance of the car or a particular component. Owners, users and service mechanics should be alert for indications that service or replacement is needed.

Fluid Capacities

REFILL CAPACITIES — APPROXIMATE (U.S. Measure/Imperial Measure/SI Metric Measure)

Item	Pacer & Pacer Wagon	Gremlin	All Concord & AMX Models	Matador 2-Dr Coupe	Matador 4-Dr Sedan & Wagon
Fuel Tank (gal/gal/liters)	20.0/16.6/76	21.0/17.5/80① 15.0/12.5/57②	22.0/18.3/83	25.0/20.8/95	25.0/20.8/95③ 21.0/17.5/80④
Engine Oil (qt./qts/liters)					
4 cyl - includes 0.5/0.4/0.5 for filter	—	4.0/3.4/3.8	—	—	—
6 & 8 cyl - includes 1.0/0.8/0.9 for filter	5.0/4.2/4.7	5.0/4.2/4.7	5.0/4.2/4.7	5.0/4.2/4.7	5.0/4.2/4.7
Cooling Systems (qts/qts/liters)					
4 cyl	—	6.5/5.5/6.1	—	—	—
6 cyl					
Without AC	14.0/11.6/13.2	11.0/9.2/10.3	11.0/9.2/10.3	13.5/11.2/12.7	11.5/9.6/10.8
With AC	14.0/11.6/13.2	14.0/11.6/13.2	14.0/11.7/13.2	13.5/11.2/12.7	11.5/9.6/10.8
304 CID V-8 All	18.0/15.0/17.0	—	18.0/15.0/17.0	—	—
360 CID V-8 All	—	—	—	17.5/14.6/16.5	15.5/12.9/14.6⑤
Transmissions					
Manual (pts/pts/liters)					
3 speed	3.0/2.5/1.4	3.0/2.5/1.4	3.0/2.5/1.4	—	—
4 speed (w/4 cyl)	—	2.4/2.0/1.1	—	—	—
4 speed (w/6 cyl)	3.3/2.8/1.6	3.3/2.8/1.6	3.3/2.8/1.6	—	—
Automatic (qts/qts/liters)					
4 cyl	—	7.1/6.0/6.7	—	—	—
6 cyl and 304 CID V-8	8.5/7.1/8.0	8.5/7.1/8.0	8.5/7.1/8.0	8.5/7.1/8.0	8.5/7.1/8.0
360 CID V-8	—	—	—	8.2/6.2/7.7	8.2/6.9/7.7
Rear Axle (pts/pts/liters)					
4 & 6 cyl	3.0/2.5/1.4	3.0/2.5/1.4	3.0/2.5/1.4	4.0/3.3/1.9	4.0/3.3/1.9
8 cyl	4.0/3.3/1.9	—	4.0/3.3/1.9	4.0/3.3/1.9	4.0/3.3/1.9

① W/6 cyl engine ② W/4-cyl. engine auto.trans. W/4-cyl. engine man.trans., 13.0/10.8/49.2 ③ 4-Dr sedan ④ Wagon ⑤ Add 2 quarts with coolant recovery

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Recommended Fluids and Lubricants

POWER PLANT	
COMPONENT	**SPECIFICATION**
Distributor cam lobes (4 cyl. only)	Molydisulfide grease.
Distributor rotor tip (6 and 8 cyl. only)*	AMC Silicone Dielectric Compound or equivalent.
Engine coolant	High quality ethylene glycol (permanent antifreeze) and clean water in 50/50 mixture.
Engine oil	API classification "SE." Refer to oil viscosity chart for correct SAE grade.
Exhaust manifold heat valve	AMC Heat Valve Lubricant or equivalent.

CHASSIS	
COMPONENT	**SPECIFICATION**
Automatic transmission	AMC Automatic Transmission Fluid or equivalent labeled Dexron® or Dexron II®.
Brake master cylinder*	AMC Brake Fluid or equivalent marked FMVSS No. 116, DOT- 3 and SAE J-1703. CAUTION: Use only recommended brake fluids.
Clutch lever and linkage	Multi-Purpose chassis lubricant.
Conventional rear axle	AMC Rear Axle Lubricant or gear lubricant of SAE 80W-90 (API-GL5) quality.
Disc brake caliper abutment surfaces	AMC Brake Support Plate Lubricant or equivalent molydisulfide lubricant.
Drum brake support plate ledges*	AMC Brake Support Plate Lubricant or equivalent molydisulfide lubricant.
Front suspension ball joints, tie rod inner ball joints, turning stop plate and bracket	AMC All-Purpose Lubricant or equivalent lithium base chassis lubricant.
Front wheel bearings	Wheel Bearing Lubricant EP lithium base.
Gearshift linkage*	Multi-Purpose chassis lubricant.
Manual steering gear*	AMC All-Purpose Lubricant or equivalent lithium base chassis lubricant.
Manual transmission*	SAE 80W-90 gear lubricant (API-GL5).
Parking brake cables*	Multi-Purpose chassis lubricant.
Parking brake pedal mechanism	AMC Lubriplate or equivalent.
Power steering pump and gear*	AMC Power Steering Fluid or equivalent.
Twin Grip rear axle	AMC Rear Axle Lubricant or limited slip gear lubricant of SAE 80W-90 (API-GL5) quality.

BODY	
COMPONENT	**SPECIFICATION**
Ashtray slides	AMC Lubriplate or equivalent.
Front seat tracks*	AMC Lubriplate or equivalent.
Hinges: door, hood, trunk, liftgate, tailgate	AMC Motor Oil or equivalent.
Key lock cylinders	Powdered graphite, AMC Silicone Lubricant Spray or light oil.
Latches: door, hood, trunk, liftgate, tailgate	AMC Lubriplate or equivalent.
Weather seals: door, window, trunk, liftgate, tailgate	AMC Silicone Lubricant Spray or equivalent.

*No routine drain and refill or application of lubricant is required. Specification is for maintaining fluid levels or reassembling components. Refer to the Maintenance Schedule for intervals.

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NOTES

FLEET EQUIPMENT C

SECTION INDEX

GENERAL

This chapter describes the optional chassis equipment available on fleet cars. The chapter is divided into sections titled to correspond with the main chapters in this volume. Each section contains the latest information available at the time of publication on these components.

Unless outlined in this chapter, service procedures for fleet equipment are the same as for corresponding regular production AMC cars.

CLUTCH

A diaphragm-type clutch cover and single dry-disc driven plate is also used in fleet cars with manual transmission. Service procedures are the same as standard production models. Refer to Chapter 2A.

MANUAL TRANSMISSION

Service procedures for fleet manual transmissions remain as outlined in Chapter 2B.

AUTOMATIC TRANSMISSION

A heavy-duty version of the model 727 automatic transmission is offered on certain fleet cars. It is available with 360 CID eight-cylinder engines in Matador models. Service procedures are the same as standard production models. Refer to Chapter 2C.

PROPELLER SHAFT

Service procedures for these components are outlined in Chapter 2D.

AXLE

Service procedures for fleet axles are outlined in Chapter 2E.

BRAKES

Heavy-duty brakelining and heat resistant rear drum brake components are available on fleet cars. Service procedures are the same as standard production models. Refer to Chapter 2F.

WHEELS AND TIRES

Fifteen inch wheels and higher ply rated tires are available on fleet cars. Mud and snow tires are also available in a variety of sizes. Refer to the tire inflation pressure sticker affixed to the glove box door for recommended reduced and full load inflation pressures. Refer to Chapter 2G for information on wheel and tire maintenance and care.

STEERING AND SUSPENSION

Heavy-duty springs and extra heavy-duty shock absorbers are available on fleet cars. The steering components for all fleet cars are the same as standard production.

Suspension components for Pacer, Gremlin and Concord models are the same as regular production. All fleet Matador models are equipped with the following heavy-duty suspension components:

Front Suspension Upper Control Arm—has a reinforcement plate welded to the forward corner near the control arm bushing. The control arm is identified by a sticker attached to the front side which bears the part number and side application (fig. C-1).

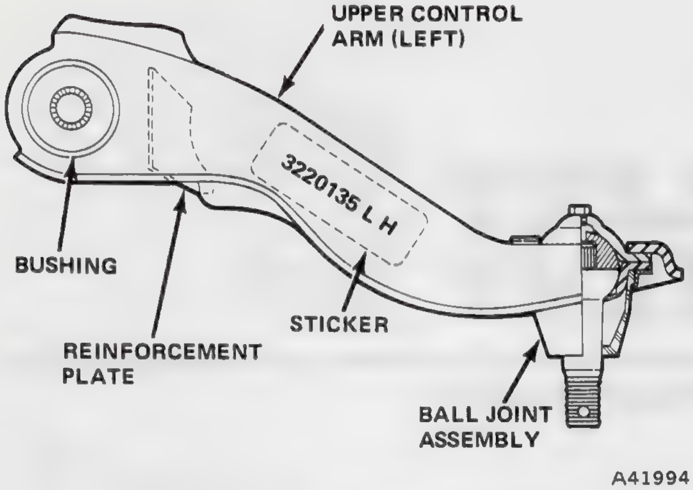

Fig. C-1 Upper Control Arm (Front)

Front Suspension Lower Control Arm—has a heavy-duty bushing (identified by blue paint) and a reinforcement plate welded to the arm on one side at the bushing end (fig. C-2).

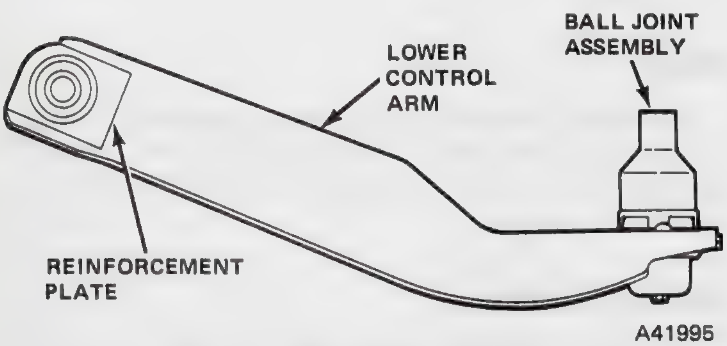

Fig. C-2 Lower Control Arm (Front)

Strut Rod Bushing—is a two-piece component in fleet cars. The rear half is the same as standard production but the front half of the bushing is made of a harder rubber for heavy-duty use. This bushing is identified by a nylon washer attached to the strut rod, forward of the bushing assembly.

Heat Shield—is provided to protect the left strut rod bushing from excessive exhaust heat (fig. C-3).

Rear Suspension Upper Control Arm—has a reinforcement washer welded to the inside rail to protect the rear bushing. Part of the washer extends beyond the rear end of the control arm. The arm is identified by a sticker bearing part number and right or left side application (fig. C-4).

Rear Suspension Lower Control Arm—has a heavy-duty bushing installed at each end. The arm is the same as standard production arms. The metal outer sleeve of the bushing has four notches in the outer diameter instead of three as found on standard part (fig. C-5).

Refer to Chapters 2H through 2N for all steering and suspension service procedures.

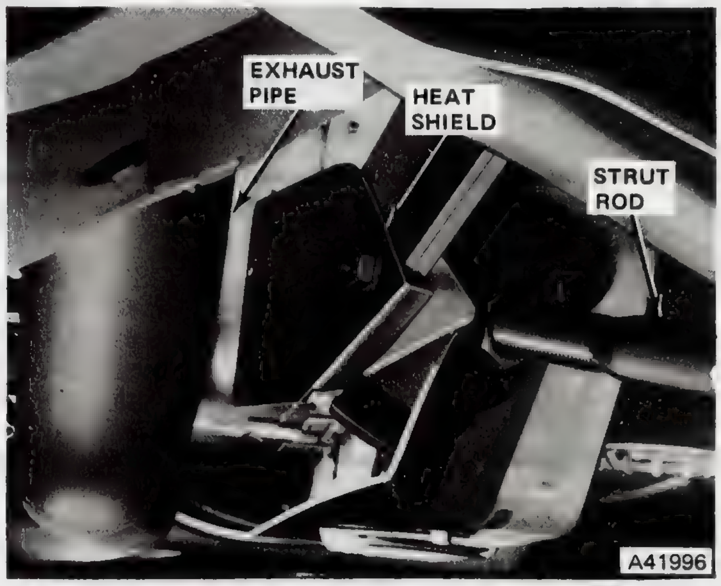

Fig. C-3 Strut Rod Bushing Heat Shield

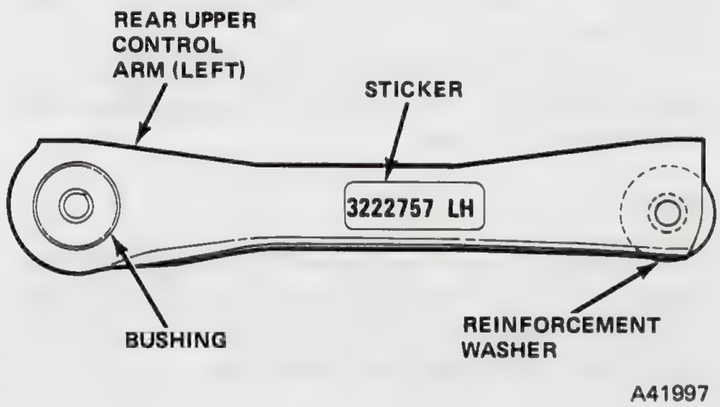

Fig. C-4 Upper Control Arm (Rear)

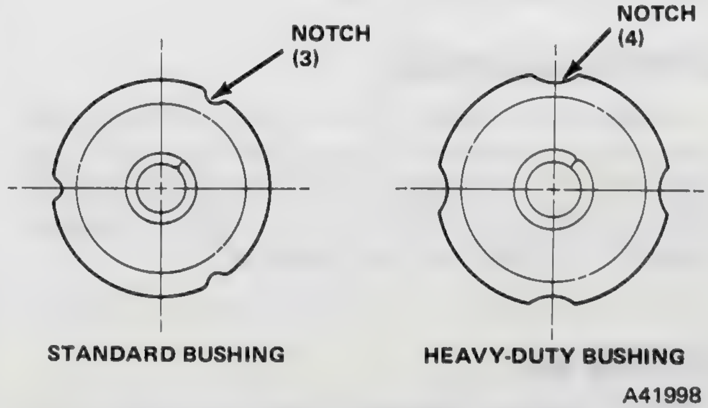

Fig. C-5 Lower Control Arm Bushing (Rear)

CLUTCH 2A

SECTION INDEX

GENERAL INFORMATION

GENERAL

The clutch assembly used in AMC cars equipped with manual transmission consists of a single dry-disc driven plate and a diaphragm-type clutch cover.

The clutch cover consists of a pressure plate, a cover, and a one-piece diaphragm spring with integral release fingers. The driven plate consists of a steel hub with integral cushion springs and the friction material which is riveted to the hub.

On cars with a six-cylinder engine, the clutch is operated by a mechanical linkage system. On cars with a four-cylinder engine, the clutch is operated by a cable mechanism.

Clutch Cover Application

Three different clutch cover and driven plate assemblies are used.

Cars equipped with a six-cylinder engine and the Model 150T 3-Speed Manual Transmission use a 24.130 centimeter (9.500) clutch cover that requires six mounting bolts (fig. 2A-1).

Cars equipped with a six-cylinder engine and the Model SR-4 4-Speed Manual Transmission use a 24.130 centimeter (9.500 inch) clutch cover that requires only three mounting bolts (fig. 2A-2).

Cars equipped with a four-cylinder engine and the Model HR-1 4-Speed Manual Transmission use a 22.860 centimeter (9.000 inch) clutch cover that requires six mounting bolts (fig. 2A-3). In addition, this clutch cover is unique in that it is positioned on the engine flywheel by the use of dowels located in the flywheel face.

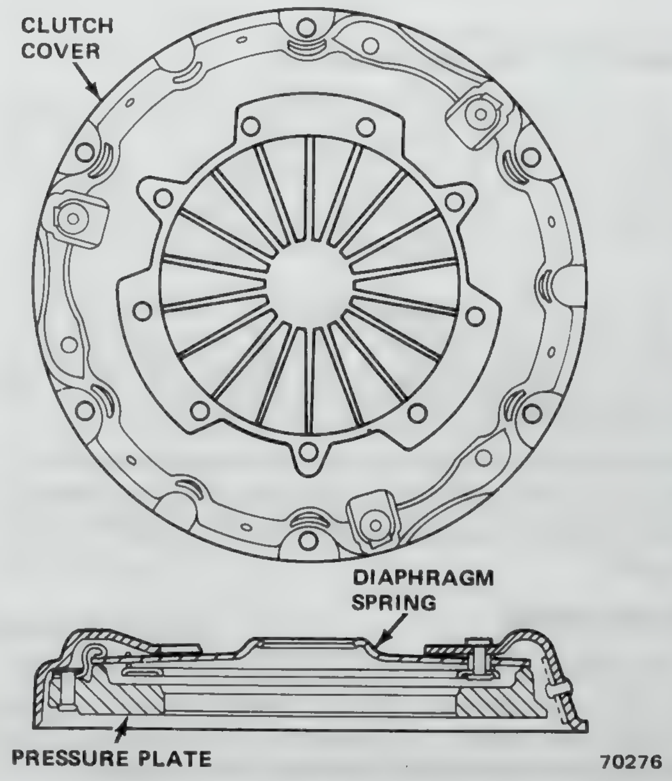

Fig. 2A-1 Clutch Cover—150T Transmission

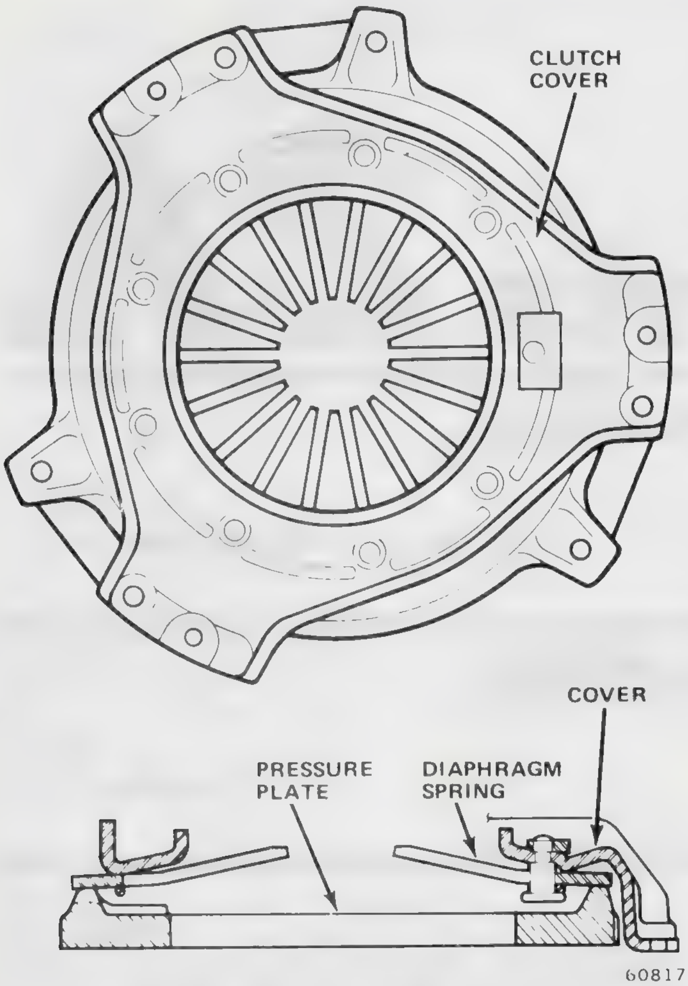

Fig. 2A-2 Clutch Cover—SR4 Transmission

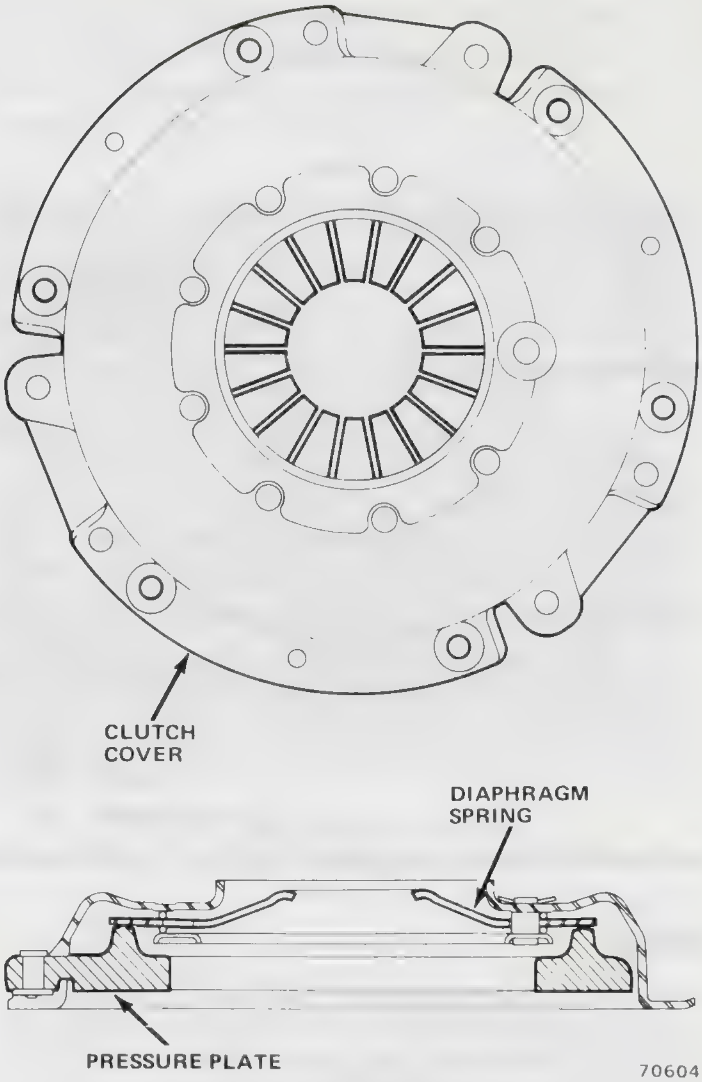

Fig. 2A-3 Clutch Cover—HR1 Transmission

Clutch Driven Plate Application

Two different clutch driven plates are used on AMC cars. Six-cylinder models equipped with either the Model 150-T 3-Speed or SR-4 4-Speed Manual Transmission use a 23.178 centimeter (9.125 inch) driven plate. This driven plate has six cushion springs in the hub (fig. 2A-4).

The clutch driven plate used with the four-cylinder engine and Model HR-1 4-Speed Manual Transmission has four cushion springs in the hub and is 21.590 centimeters (8.500-inches) in diameter (fig. 2A-5).

CAUTION: *Do not attempt to interchange any of these clutch components. Mixing components will result in clutch chatter and slippage, or incomplete clutch release.*

Throwout Bearing

Two different throwout bearings are used. Although the two bearings are similar in design for both six and four-cylinder engine applications, the method of connecting the bearing to the throwout lever differs.

The throwout bearing used with 150-T and SR-4 transmissions is connected to the throwout lever by retaining

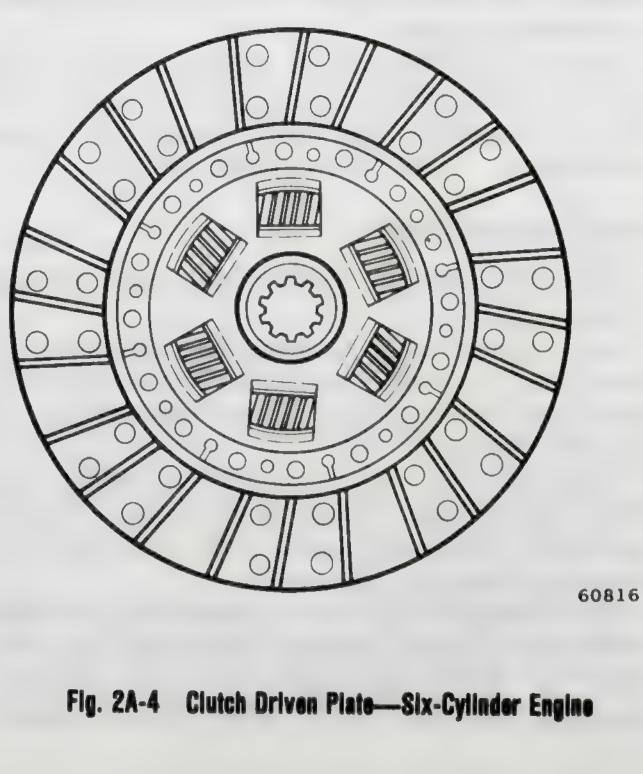

Fig. 2A-4 Clutch Driven Plate—Six-Cylinder Engine springs which are riveted to the support and sleeve portion of the bearing (fig. 2A-6).

The throwout bearing used with the HR-1 transmission is mounted directly in the throwout lever and is retained by guide springs located in the lever (Fig. 2A-7).

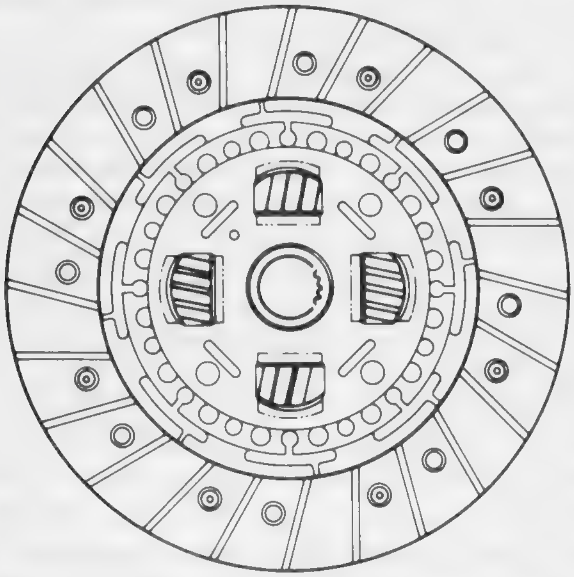

Fig. 2A-5 Clutch Driven Plate—Four-Cylinder Engine

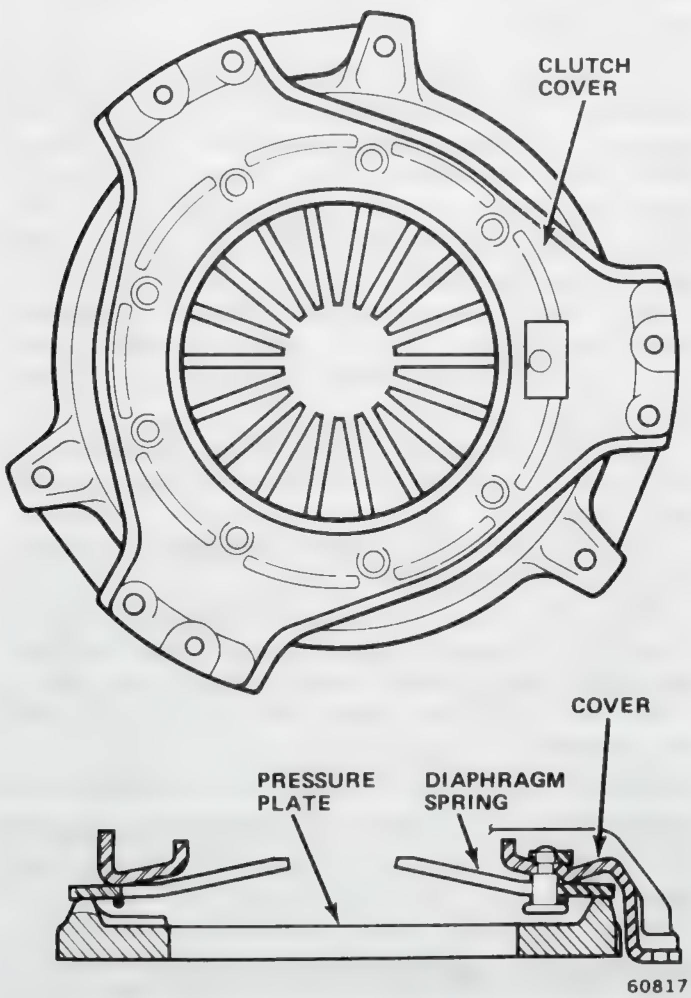

Fig. 2A-6 Throwout Bearing—Six-Cylinder Engine

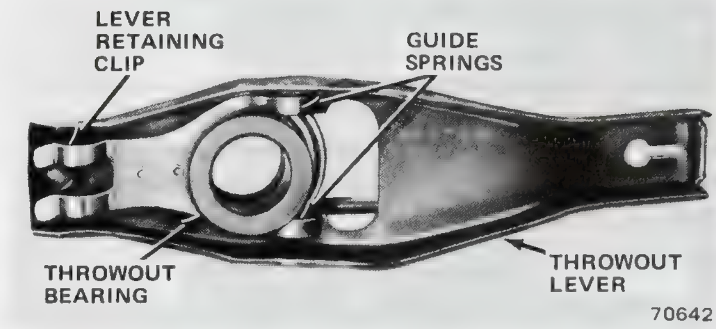

Fig. 2A-7 Throwout Bearing—Four-Cylinder Engine

Crankshaft Pilot Bushing and Bearing

On six-cylinder models, a bushing is used in the crankshaft bore to support the transmission clutch shaft. On four-cylinder models, a roller-type bearing is used for this purpose.

The lubrication requirements for the bushing and bearing are different. When servicing an original or replacement bushing or bearing, lubricate the part as follows: Use engine oil only to lubricate a bushing and use an EP-type chassis grease only to lubricate the roller bearing.

Clutch Operation

On six-cylinder models, a mechanical linkage system is used to engage and disengage the clutch. The linkage consists of a bellcrank and two actuating rods which interconnect the clutch pedal and throwout lever. The bellcrank pivots on integral ball studs which are mounted in nylon bushings. Clutch adjustment is performed by varying the length of the rod which connects the bellcrank to the throwout lever. Refer to the Clutch Service—Six-Cylinder Engine section for additional linkage information.

On four-cylinder models, a cable is used to engage and disengage the clutch. The cable upper end is connected to a lever mounted on the clutch pedal pivot shaft. The cable lower end is connected directly to the throwout lever. Clutch adjustment is determined by increasing or decreasing cable travel. Adjustment is performed at the cable-to-throwout connection. Refer to the Clutch Service—Four-Cylinder Engine section for additional cable information.

SERVICE DIAGNOSIS

General

Clutch problems can generally be assigned to one of the following categories defined as:

- Clutch chatter

- Clutch slippage or inadequate clutch free play
- Clutch drag or inadequate clutch release
- Clutch pedal pulsation
- Clutch-related vibration
- Clutch area noises

Each category is described in common complaint language and followed by a common-sense approach to repairing the problem.

NOTE: *Before performing any of the following diagnosis and repair procedures, first check for complete return of the clutch pedal to its stop and adjust clutch free play if necessary.*

Clutch Chatter

Clutch chatter can be described as a shaking or shuddering sensation that is felt throughout the car. Chatter usually develops when the clutch cover pressure plate makes initial contact with the driven plate and ceases when the clutch is fully engaged (clutch pedal released).

Check clutch operation as follows:

WARNING: *The following test requires clutch engagement to a point where car movement may occur. Do not permit anyone to stand in front of the car during this test.*

(1) Start engine, depress clutch pedal completely and shift transmission into first gear.

(2) Increase engine speed to 1200 to 1500 rpm and slowly release clutch pedal. When clutch cover pressure plate makes initial contact with driven plate, note clutch operation. Depress clutch pedal and reduce engine speed.

(3) Shift transmission into reverse and repeat procedure outlined in step (2).

(4) If clutch chatter does not develop, increase engine speed to 1700 to 2200 rpm and repeat steps (2) and (3).

(5) If clutch chatter does not develop after performing tests outlined in steps (1) through (4), problem may be improper operation by owner. However, if clutch chatter does develop, proceed to next step.

(6) Raise car on hoist.

(7) Check for loose or broken front or rear engine support cushions. Tighten or replace cushions as necessary.

(8) Check for loose clutch-housing-to-engine and clutch-housing-to-transmission attaching bolts. Tighten as necessary. Refer to torque specifications in this chapter.

(9) Check for binding, worn, bent, or broken clutch linkage or clutch cable components. Lubricate or replace components as necessary.

(10) If components inspected were in good condition, proceed to next step. If one or more problems were discovered and corrected, lower car and repeat step (1). If chatter is still evident, proceed to next step.

(11) Remove transmission and clutch components as outlined in this chapter.

(12) On six-cylinder cars, remove pilot bushing lubricating wick and soak wick in engine oil. Install wick before assembly.

(13) Check for oil or grease contamination of driven plate. If contaminated, correct cause of contamination and replace driven plate.

(14) Check clutch cover for broken or collapsed diaphragm spring and inspect surface of pressure plate for deep scoring, cracks and heat checking. Also check for warped pressure plate surface using straightedge. Replace clutch cover if it exhibits any of these conditions. If clutch cover is in good condition, do not replace it.

(15) Clean oil and dirt from clutch cover using mineral spirits and allow cover to air dry.

(16) Sand pressure plate surface of clutch cover lightly using fine emery cloth.

(17) On six-cylinder models, inspect pilot bushing. On four-cylinder models, inspect pilot roller bearing. Replace bushing or bearing if worn, deeply scored, or discolored.

NOTE: *If the pilot bushing requires replacement, soak the replacement bushing in engine oil before installation. If the pilot bearing requires replacement, lubricate the bearing rollers with an EP-type chassis grease before installation.*

(18) Inspect condition of splines on transmission clutch shaft and in clutch driven plate hub. If splines are worn, galled, chipped, or broken, replace clutch shaft or driven plate as necessary. Remove corrosion, rust, or burrs from splines using an oilstone or fine-tooth file. Install driven plate on clutch shaft. Driven plate must move back and fourth freely on clutch shaft splines.

(19) If all clutch components are in good condition, proceed to next step. If one or more components were determined to be faulty, repair as outlined and proceed to next step.

(20) Check clutch housing alignment as outlined in this chapter. Correct alignment if necessary and proceed to next step.

(21) Apply thin film of chassis grease to transmission clutch shaft splines.

(22) On six-cylinder models, lubricate pilot bushing using engine oil only. On four-cylinder models, lubricate pilot roller bearing using EP-type chassis grease only.

(23) On six-cylinder models, install pilot bushing lubricating wick.

(24) Install clutch components and transmission.

NOTE: *Do not replace the throwout bearing unless it is actually defective or damaged. Refer to Clutch Area Noises.*

Clutch Slippage or Inadequate Clutch Free Play

Clutch slippage can be described as a condition in which the engine overspeeds (overrevs) but does not generate any increase in torque supplied to the rear wheels.

Clutch slippage occurs when the driven plate is not gripped firmly between the flywheel and clutch cover pressure plate surfaces and slips between them during high torque and load application. Slippage can occur during initial acceleration or during subsequent shifts.

Check clutch operation as follows:

(1) Block front wheels and fully apply parking brake.

(2) Start and operate engine until engine is at normal operating temperature.

(3) Shift transmission into third gear and increase engine speed to 2000 rpm.

WARNING: *This test requires clutch engagement to a point where car movement could occur. Do not permit anyone to stand in front of the car during this test.*

(4) Slowly release clutch pedal until clutch is fully engaged.

CAUTION: *Do not allow clutch to be engaged for more than 5 seconds at a time as the clutch components may overheat and become damaged.*

(5) If engine stalls within 5 seconds, clutch is OK. If engine does not stall, proceed to next step .

(6) Raise car on hoist. Check clutch linkage or clutch cable mechanism for binding, worn, broken, or bent components. Lubricate or replace components as necessary. If all components tested are in good operating condition, proceed to next step.

(7) If one or more problems were discovered during inspection performed in previous step, repeat steps (1) through (4). If clutch slippage is corrected, stop repairs. If slippage persists, proceed to next step.

(8) Remove transmission and clutch components as outlined in this chapter.

(9) On six-cylinder models, remove pilot bushing lubricating wick and soak wick in engine oil. Install wick before assembly.

(10) Inspect clutch driven plate. If plate is excessively worn (1/16-inch or less friction material remaining above rivets), highly glazed, or if plate is contaminated by oil or grease, replace driven plate.

(11) If driven plate is oil or grease contaminated, determine cause and make correction before proceeding to next step.

(12) Inspect clutch cover assembly. If assembly is heat-checked, has broken or collapsed diaphragm spring, or shows signs of overheating (e.g., has turned blue), replace clutch cover assembly. If assembly does not exhibit any of these conditions do not replace it.

(13) Clean oil and dirt from clutch cover using mineral spirits and allow cover to air dry.

(14) Sand clutch cover pressure plate surface lightly using fine emery cloth.

(15) Check throwout bearing mounting surface of transmission front bearing cap for galling, deep scores, or roughness. Replace cap if it exhibits any of these conditions.

(16) Install throwout bearing on front bearing cap and check for smooth fore-and-aft movement. Replace bearing or front bearing cap if bind or excessive wear is evident.

(17) If throwout bearing is serviceable, fill groove of bearing with chassis lubricant and apply thin coat of lubricant to throwout bearing mounting surface of front bearing cap.

(18) On six-cylinder models, throwout bearing has retaining springs which position it on throwout lever. On four-cylinder models, throwout bearing is retained in throwout lever by lever guide springs. Check both types of springs for distortion, loss of tension, or for being bent or broken. On six-cylinder models, replace throwout bearing if springs are damaged. Also be sure retaining projections on throwout lever are properly engaged in retaining holes in bearing when installing bearing. On four-cylinder models, replace throwout lever if lever guide springs are damaged.

NOTE: *Do not replace the throwout bearing unless it is actually defective or damaged. Refer to Clutch Area Noises.*

(19) Apply thin film of chassis lubricant to transmission clutch shaft splines.

(20) On six-cylinder models, lubricate pilot bushing using engine oil only. On four-cylinder models, lubricate pilot bearing rollers using EP-type chassis grease only.

(21) On six-cylinder models, install pilot bushing lubricating wick.

(22) Install clutch components and transmission as outlined in this section.

(23) Lower car.

Clutch Drag or Inadequate Release

Clutch drag can be described as a condition in which the clutch driven plate, and consequently the transmission clutch shaft, does not come to a complete stop after the clutch pedal is depressed (clutch disengaged).

Clutch drag can cause gear clash when shifting into reverse or hard or difficult shifting.

Check clutch operation as follows:

NOTE: *Occasionally, the clutch driven plate and clutch shaft will require approximately 5 seconds to lose momentum and come to a complete stop after initial clutch disengagement. This is a normal occurence and should not be mistaken for clutch drag.*

(1) Start engine, depress clutch pedal fully, and shift transmission into first gear.

(2) Shift transmission into neutral but do not release clutch pedal.

(3) Wait 5 to 10 seconds and shift transmission into reverse. If shift is smooth and does not produce gear clash, clutch operation is normal. If shift into reverse produces gear clash, proceed to next step.

(4) Raise car on hoist. Check clutch linkage or clutch cable mechanism for binding, worn, broken or bent components. Lubricate or replace components as necessary. If components are in good operating condition, proceed to next step. If one or more problems were discovered and repaired, lower vehicle and repeat steps (1) through (3). If clutch now operates correctly, stop repairs. If clutch drag persists, proceed to next step.

(5) Remove transmission and clutch components as outlined in this section.

(6) On six-cylinder models, remove pilot bushing lubricating wick and soak wick in engine oil. Install wick before assembly.

(7) Observe wear pattern on driven plate. If wear pattern is uneven (e.g., two areas heavily worn on one side, or two areas only partially worn on opposite side), or has opposing wear patterns on front and reverse side, driven plate is warped and should be replaced.

(8) Inspect clutch cover. If clutch cover has worn, bent, or broken diaphragm spring release fingers, or is deeply scored, or warped, replace cover. If cover does not exhibit any of these conditions, do not replace it.

(9) Clean oil and dirt from clutch cover using mineral spirits and allow cover to air dry.

(10) Sand clutch cover pressure plate surface lightly with fine emery cloth.

(11) Inspect pilot bushing or pilot roller bearing for heavy scoring, angular wear pattern, or discoloration. Replace bushing or bearing as necessary. If bushing or bearing exhibits an angular wear pattern, replace bushing or bearing and proceed to next step. Soak replacement pilot bushing in engine oil (only) before installation. Lubricate replacement pilot roller bearing using EP-type chassis grease (only) before installation.

(12) Inspect condition of splines on transmission clutch shaft and in clutch driven plate hub. If splines are severely worn, galled, or corroded, replace clutch shaft or driven plate. Remove corrosion, rust, or burrs from clutch shaft and driven plate splines using an oilstone or fine-tooth file.

(13) Install driven plate on clutch shaft. Driven plate must move back and forth freely on clutch shaft splines.

(14) If components inspected in previous steps are in good condition, proceed to next step. If one or more problems were discovered in previous steps, repair as necessary before proceeding to next step.

(15) Check clutch housing alignment as outlined in this chapter. Correct alignment as necessary and proceed to next step.

(16) Apply thin film of chassis grease to transmission clutch shaft splines.

(17) On six-cylinder models, lubricate pilot bushing using engine oil only. On four-cylinder models, lubricate pilot roller bearing using EP-type chassis grease only.

(18) On six-cylinder models, install pilot bushing lubricating wick.

(19) Install transmission and clutch components.

NOTE: *Do not replace the throwout bearing unless it is actually defective. Refer to Clutch Area Noises.*

(20) Lower car.

Clutch Pedal Pulsation

Clutch pedal pulsation can be described as a rapid up-and-down (pumping-type) movement of the pedal that is not accompanied by any noise. This pedal movement, which is slight, can be felt by the driver. However, on occasion, pedal movement will be great enough to be visually observed and cause a noticeable vibration.

Clutch pedal pulsation occurs when the throwout bearing makes initial contact with the clutch cover diaphragm spring release fingers (clutch partially disengaged), or at any time the throwout bearing is in contact with the release fingers. Pulsation is usually caused by broken, bent, or warped release fingers or by clutch housing misalignment.

Check clutch operation as follows:

(1) Start engine and slowly depress clutch pedal until throwout bearing makes initial contact with clutch release fingers and check for pulsation.

NOTE: *Some minor pulsation is normal.*

(2) Continue to depress clutch pedal and check for pulsation until pedal is fully depressed.

(3) If pulsation is not evident or is minor, stop test. If pulsation is very rapid and can be felt throughout car, refer to Clutch-Related Vibrations. If car displays pulsation symptoms, proceed to next step.

(4) Remove transmission and clutch components as outlined in this chapter.

(5) On six-cylinder models, remove pilot bushing lubricating wick and soak wick in engine oil. Install wick before assembly.

(6) Inspect clutch cover for excessively worn or bent diaphragm spring release fingers. If fingers are bent or excessively worn, replace clutch cover and proceed to next step. If release fingers are in good condition, clean oil and dirt from clutch cover assembly using solvent and allow cover to air dry.

(7) Sand clutch cover pressure plate surface lightly using fine emery cloth.

(8) Check clutch housing alignment as outlined in this chapter. Correct alignment as necessary and proceed to next step.

(9) Apply thin film of chassis grease to transmission clutch shaft splines.

(10) On six-cylinder models, lubricate pilot bushing using engine oil only. On four-cylinder models, lubricate pilot bearing rollers using EP-type chassis grease only.

(11) On six-cylinder models, install pilot bushing lubricating wick.

(12) Install clutch components and transmission.
(13) Lower car.

Clutch-Related Vibrations

Clutch-related vibrations differ from pedal pulsations in frequency and magnitude and can be felt throughout the car.

Clutch vibrations usually occur at relatively high engine speeds (over 1500 rpm) regardless of clutch pedal position. However, vibrations related to clutch component imbalance occur infrequently as the clutch cover and driven plate are balanced as a unit at assembly. The clutch is installed on the crankshaft/flywheel assembly and given a final fine-tune balance. Replacement of clutch components to correct vibrations should be performed only after exhausting all other possibilities.

Check clutch operation as follows:

(1) Raise car on hoist and check engine front support cushion interlocks for grounding. Repair as necessary.

(2) Check for any other engine component (e.g., exhaust manifold, valve cover, etc.) for grounding on body or frame. If one of these components is grounded, repair as necessary and check for vibration.

(3) If vibration ceases, stop repair. If vibration continues, lower car and proceed to next step.

(4) Disconnect accessory drive belts one at a time and check for vibration. If vibration is corrected after removal of a drive belt, cause of vibration is related to accessory driven by belt or by belt itself. Repair as necessary.

(5) If vibration continues, check following areas for other possible causes of clutch-related vibrations:

- Loose flywheel mounting bolts.
- Excessive flywheel face runout of 0.1270 millimeters (0.005 inch) or more.
- Damaged crankshaft vibration damper.
- Clutch cover imbalance.

(6) To check for imbalance, remove transmission and clutch components, support engine securely, and operate engine with clutch components removed. If vibration is no longer evident, replace clutch cover.

Clutch Area Noises

Throwout Bearing Noise

Throwout bearing noises can be described as whirring, grating, or grinding noises which occur when the clutch pedal is depressed (clutch disengaged).

These noises usually continue until the clutch pedal is fully released (clutch engaged) and the bearing is no longer in contact with the clutch cover diaphragm spring release fingers.

Throwout bearing noise is corrected by replacing the bearing as outlined in this chapter.

NOTE: *The throwout bearing should not be replaced as a matter of course when the clutch cover or driven member are serviced. The bearing should be replaced only when it is actually defective.*

Transmission Clutch Shaft or Countershaft Bearing Noise

Clutch shaft or countershaft bearing noises can be described as whirring, grating, or grinding noises which cease when the clutch pedal is depressed (clutch disengaged) or when the transmission is shifted into gear. These noises are most noticeable when the clutch pedal is fully released and the transmission is in neutral. Correction requires transmission removal and replacement of the problem bearing(s).

Crankshaft Pilot Bushing Noise—Six-Cylinder Models

Pilot bushing noises can be described as squealing, howling, or elephant-type trumpeting noises which are most noticeable when the engine is cold. These noises occur during the first few inches of clutch pedal travel as the pedal is being released (partial clutch engagement) with the transmission in gear. It can also occur in very cold weather when the pedal is fully depressed (clutch disengaged) and the engine is started with the transmission in neutral. To correct pilot bushing noise, replace the bushing as outlined in this chapter.

Crankshaft Pilot Bearing Noise—Four-Cylinder Models

A worn, seized, or damaged pilot bearing may produce a grinding, or squealing noise that is most noticeable during clutch disengagement and when the engine is cold. To correct pilot bearing noise, replace the bearing as outlined in this chapter.

SPECIFICATIONS

Clutch Specifications

Clutch Pedal Free Play	
SR4 - 150T	7/8 to 1-1/8 inch with 1-1/8 inch preferred (2.2 to 2.8 cm with 2.8 cm preferred)
HR1	1/2 to 1.00 inch with 5/8 inch preferred (1.27 to 2.54 cm with 1.58 cm preferred)
Clutch Linkage Lubrication	
SR4 - 150T	Lubricate Bellcrank ball studs at 30,000 mile intervals with chassis lubricant.
Clutch Cover Diameter	
SR4 - 150T	9.500 inches (24.13 cm)
HR1	9.000 inches (22.87 cm)
Clutch Driven Plate Diameter	
SR4	9.125 inches (23.18 cm)
150T	9.000 inches (22.87 cm)
HR1	8.500 inches (21.59 cm)
Clutch Cover-Type (All)	Single diaphragm spring with multi-integral release fingers.
Clutch Driven Plate-Type (All)	Single plate, dry-disc with steel hub and integral cushion springs and riveted friction material.
Clutch Housing Alignment	
Bore Concentricity to Centerline	0.010 inch (0.254 mm)
Mounting Face to Crankshaft Centerline	0.007 inch (0.018 mm)

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CLUTCH SERVICE SIX-CYLINDER ENGINE

CLUTCH REMOVAL

(1) Remove transmission as outlined in Chapter 2B—Manual Transmission.

(2) Remove starter motor.

(3) Remove throwout bearing.

(4) Disconnect clutch linkage at clutch housing.

(5) Remove clutch housing.

(6) Mark clutch cover and flywheel for assembly reference.

(7) Remove clutch cover and driven plate.

CAUTION: *When removing the clutch cover, loosen the cover bolts a few turns at a time until diaphragm spring tension is completely released. The cover could be warped if removed improperly, resulting in clutch chatter when assembled.*

(8) Remove pilot bushing lubricating wick and soak wick in engine oil.

CLUTCH INSTALLATION

(1) Install pilot bushing lubricating wick.

(2) Position driven plate on flywheel using Alignment Tool J-25353 Be sure side of driven plate marked flywheel side is installed against flywheel.

NOTE: *If an alignment tool is not available, use a transmission clutch shaft to align the driven plate.*

(3) Position clutch cover on flywheel and over driven plate.

(4) Align driven plate and cover using Alignment Tool J-25353 and install cover attaching bolts finger tight.

(5) Tighten cover bolts alternately and evenly to 37.9 Nm (28 foot-pounds) torque.

CAUTION: *To avoid warping the clutch cover, tighten the cover bolts a few turns at a time only.*

(6) Install clutch housing and throwout bearing. Tighten housing upper bolts to 37 Nm (27 foot-pounds) torque and housing lower bolts to 58 Nm (43 foot-pounds) torque.

(7) Tighten clutch housing-to-engine dowel bolts to 35.2 Nm (26 foot-pounds) torque.

(8) Connect clutch linkage.

(9) Install starter motor.

(10) Install transmission as outlined in Chapter 2B—Manual Transmission.

(11) Check and adjust clutch pedal free play if necessary.

CLUTCH INSPECTION

Clean all parts, except the throwout bearing, with solvent. Allow the parts to air dry or wipe them dry with a shop cloth. Clean the throwout bearing using a shop cloth only. Do not immerse the bearing in solvent.

Inspect each clutch component for the various types of wear and damage described in the Service Diagnosis section and replace any parts that exhibit these conditions.

PILOT BUSHING

Removal

(1) Obtain replacement pilot bushing and soak bushing in engine oil.

(2) Remove transmission and clutch assemblies as outlined in this chapter.

(3) Remove pilot bushing lubricating wick and soak wick in engine oil.

(4) Fill crankshaft cavity and pilot bushing bore with chassis grease.

(5) Insert Clutch Alignment Tool J-25353 straight into pilot bushing.

(6) Tap end of alignment tool with lead hammer. Pressure exerted by compressed grease will force bushing out of crankshaft bore.

Installation

(1) Remove replacement bushing from engine oil, place bushing in palm of hand and fill bushing cavity with engine oil.

(2) Place thumb over open end of bushing and work oil into and through sides of bushing using thumb pressure.

(3) Remove all chassis grease from crankshaft cavity.

(4) Place bushing on Alignment Tool J-25353 and install bushing in crankshaft pilot bushing bore. Be sure bushing is properly seated in bore and that tool and bushing remain parallel with crankshaft centerline during installation.

(5) Remove pilot bushing lubricating wick from engine oil and install wick in bushing.

(6) Install clutch and transmission assemblies as outlined in this chapter.

THROWOUT LEVER AND BEARING

Removal

(1) Remove transmission as outlined in Chapter 2B—Manual Transmission.

(2) Disengage throwout bearing from throwout lever and remove bearing.

(3) Disconnect clutch bellcrank-to-throwout lever rod at bellcrank.

(4) Disconnect throwout lever springs at lever and bellcrank-to throwout lever rod.

(5) Remove throwout lever and boot.

Installation

(1) Fill slots in inner groove of replacement throwout bearing with chassis grease.

(2) Position throwout lever on pivot stud in clutch housing and install boot.

(3) Connect throwout lever springs and connect throwout lever rod to bellcrank.

(4) Mount throwout bearing in lever. Be sure bearing retaining springs are properly engaged in lever and locating lugs on lever are engaged in locating slots in bearing.

(5) Install transmission as outlined in Chapter 2B—Manual Transmission.

FLYWHEEL

Removal

(1) Remove transmission and clutch assemblies as outlined in this chapter.

(2) Mark flywheel and crankshaft flange for assembly reference.

(3) Remove flywheel attaching bolts and remove flywheel.

(4) Clean flywheel mounting surface of crankshaft.

Installation

(1) Install and align flywheel on crankshaft using alignment marks made at disassembly.

(2) Tighten flywheel attaching bolts to 142 newton meters (105 foot-pounds) torque.

(3) If installing replacement flywheel, clean flywheel clutch surface with alcohol to remove all traces of oil or other surface preservatives.

(4) If installing original flywheel, lightly sand flywheel clutch surface using fine emery cloth.

(5) Install clutch and transmission assemblies as outlined in this chapter.

TRANSMISSION CLUTCH SHAFT

If the transmission clutch shaft must be replaced, remove and disassemble the transmission and replace the clutch shaft as outlined in Chapter 2B—Manual Transmission.

CLUTCH HOUSING ALIGNMENT

Clutch housing misalignment can cause improper clutch release, premature driven plate failure, front transmission bearing failure, uneven wear in the crankshaft pilot bushing and clutch shaft roller bearings, and clutch noise. In extreme cases, misalignment can cause vibration and jumping out of gear on deceleration or acceleration.

Housing Alignment Check

(1) Remove transmission as outlined in Chapter 2B—Manual Transmission.

(2) Disconnect clutch linkage.

(3) Remove clutch housing and clutch assembly.

(4) Remove one flywheel attaching bolt.

(5) Obtain a 1/2-20 x 8 inch bolt and nut to serve as support for dial indicator.

(6) Thread bolt through nut until 10 or 12 bolt threads extend beyond rear face of nut.

(7) Thread bolt into crankshaft mounting bolt hole. Tighten nut to secure bolt and provide firm support for dial indicator.

(8) Install clutch housing on engine. Tighten housing upper bolts to 37 newton meters (27 foot-pounds) torque and tighten housing lower bolts to 58 newton meters (43 foot-pounds) torque.

(9) Mount dial indicator on bolt. Position indicator stylus so it touches rear face of clutch housing approximately 3.1750 millimeters (1/8 inch) from edge of bore at rear of housing (fig. 2A-8).

(10) Using pry bar, have helper pry crankshaft forward or rearward to eliminate crankshaft end play.

NOTE: *Crankshaft end play must be held to zero in order to obtain true and accurate indicator reading.*

(11) Rotate flywheel (and crankshaft) 360 degrees and note dial indicator reading. Face runout should not exceed 0.1778 millimeters (0.007-inch) total indicator reading at any point on housing.

(12) If runout exceeds 0.1778 millimeters (0.007-inch) total indicator reading at any point, correct alignment as outlined under Housing Alignment Adjustment.

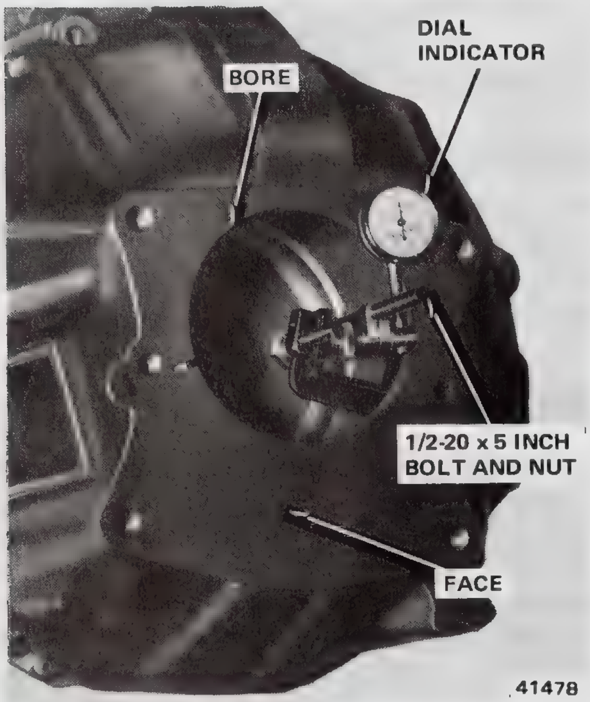

Fig. 2A-8 Checking Face Runout Of Clutch Housing

Housing Alignment Adjustment

To correct clutch housing alignment, shims must be installed between the clutch housing and the engine-to-clutch housing spacer.

Do not use flat washers to shim the housing. Use shim stock or caster shims which are available in increments of 0.0508 millimeters (0.002 inch) only.

Adjustment Procedure

(1) To align top of housing with bottom, install shims at point A as necessary (fig. 2A-9).

(2) To align sides of housing, install shims at points B and D or C and E as necessary.

(3) To align bottom of housing, install shims at points D and E as necessary.

(4) Install shims by loosening housing attaching bolts and inserting shims at necessary points as indicated in Figure 2A-9.

(5) After shims are installed, tighten housing attaching bolts and recheck alignment. Runout should not exceed 0.1778 millimeters (0.007 inch). Relocate shims as necessary until face runout is within specified limit.

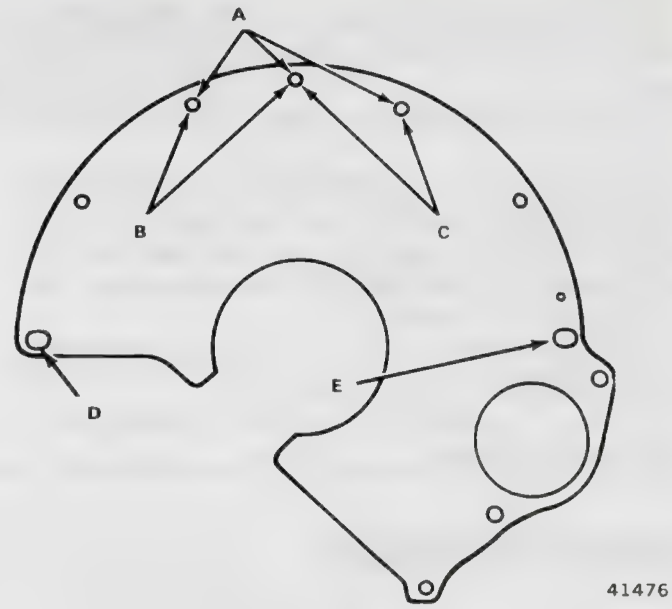

Fig. 2A-9 Shim Location

(6) To check clutch housing bore alignment, position dial indicator on inside diameter of clutch housing bore. Rotate crankshaft 360 degrees and note indicator reading at four equally spaced points. Total indicator reading must not exceed 0.2540 millimeters (0.010-inch) at any point.

NOTE: *Any change in face alignment will change bore alignment. Where it is impossible to correct bore or face alignment to within 0.2540 millimeters (0.010-inch) runout, replace the clutch housing.*

CLUTCH PEDAL

Removal

(1) On Gremlin, Concord and AMX models, disconnect battery negative cable.

(2) On Gremlin, Concord and AMX models, remove package tray if equipped and remove fuse panel attaching screws. Move fuse panel aside.

(3) On Pacer models, remove steering column tube cover and intermediate duct (under dash) if equipped with air conditioning.

(4) Disconnect clutch pedal-to-bellcrank rod (fig. 2A-10).

(5) Remove and discard clutch and brake pedal pivot bolt nut.

(6) Remove pivot bolt and remove clutch pedal. Do not place brakelight switch in bind when pedal is removed.

Installation

(1) Measure and record height of rubber stop bumper in clutch pedal stop bracket and remove stop bumper (Fig. 2A-10).

(2) Install stop bumper in replacement clutch pedal stop bracket to same height measured previously.

(3) Align clutch pedal with pivot bore in support bracket and insert pivot bolt into bracket and clutch pedal.

(4) Align brake pedal with pivot bolt and insert bolt through pedal and support bracket.

(5) Install replacement pivot bolt locknut. Tighten nut to 68 newton meters (50 foot-pounds) torque.

CAUTION: *Do not reuse the pivot bolt locknut and do not attempt to substitute any other type of fastener. Whenever the locknut is removed during service operations, a replacement locknut must be installed.*

(6) Connect clutch pedal-to-bellcrank rod to clutch pedal.

(7) On Gremlin, Concord and AMX models, install fuse panel and panel attaching screws and install package tray if equipped.

(8) On Pacer models, install intermediate duct if equipped with air conditioning and install steering column tube cover.

(9) On Gremlin, Concord and AMX models, connect battery negative cable.

(10) Adjust clutch as necessary.

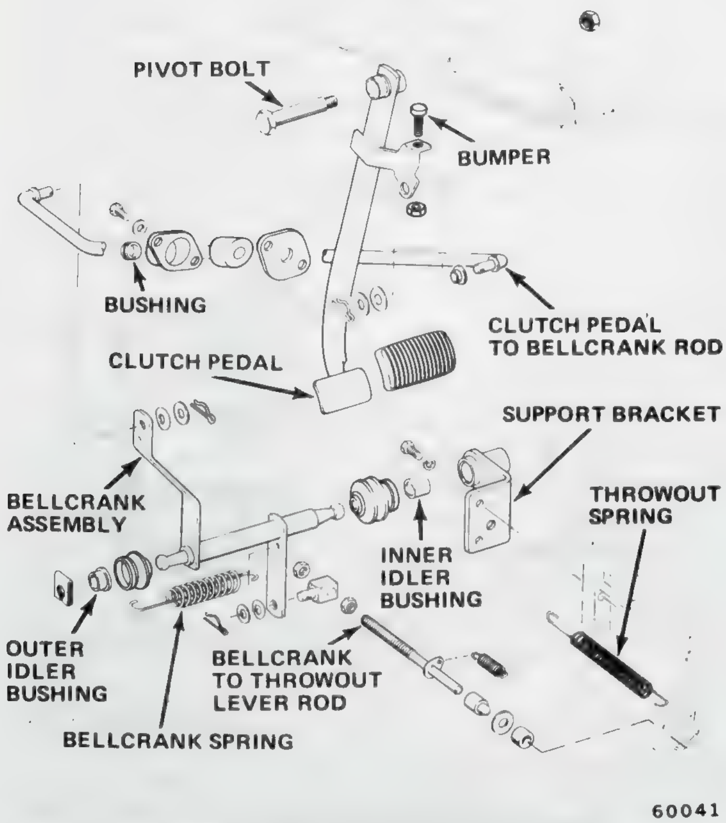

Fig. 2A-10 Clutch Pedal and Linkage—Six-Cylinder Engine

CLUTCH ADJUSTMENT

Clutch pedal free play is adjusted by varying the length of the bellcrank-to-throwout lever rod (Fig. 2A-10). Pedal free play should be from 2.223 centimeters to 2.603 centimeters (7/8-inch to 1-1/8-inch) with 2.603 centimeters (1-1/8-inch) preferred.

Clutch Pedal Height

Clutch pedal height is preset during manufacture and should not require further attention during normal service. If for any reason an adjustment should become necessary, pedal height can be adjusted by varying the length of the clutch pedal stop screw (Fig. 2A-10). The stop screw should be adjusted to obtain a pedal stroke of 32° (±1°). This setting will position the pedal, as measured from the underside of the pedal, 19.050 centimeters (7-1/2-inches) plus or minus 0.3500 millimeters (±1/4-inch) from the floorpan.

CLUTCH LINKAGE LUBRICATION

The clutch bellcrank ball studs are the only clutch linkake components that require periodic lubrication (Fig. 2A-00). The linkage must be disassembled and the bellcrank removed in order to lubricate the ball studs. The ball studs should be lubricated using chassis grease and at the intervals specified in the Maintenance Schedule provided in Chapter B.

Lubrication Procedure

(1) Raise car on hoist.

(2) Disconnect throwout lever-to-bellcrank rod at bellcrank.

(3) Remove inner support bracket attaching bolts and remove bracket and bellcrank. Note position of bellcrank for assembly reference.

(4) Inspect condition of ball stud protective boots, idler bushings and ball studs. Replace worn or damaged parts as necessary.

(5) Pack both idler bushings with chassis grease.

(6) Coat bellcrank ball studs with chassis grease.

(7) Assemble and install bellcrank and inner support bracket. Be sure ball studs are properly positioned in idler bushings.

(8) Tighten inner support bracket attaching bolts to 27 newton-meters (20 foot-pounds) torque.

(9) Connect throwout lever and clutch pedal rods to bellcrank.

(10) Lower car.

SPECIFICATIONS

Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Clutch Cover Bolts:				
SR4 - 150T	38	30-47	28	22-35
HR1	31	27-35	23	20-26
Clutch Housing-to-Engine Bolts:				
HR1 - All	73	62-84	54	46-62
SR4 - 150T — Top	37	30-41	27	22-30
— Bottom	58	50-64	43	37-47
Clutch Housing-to-Transmission Bolts:				
SR4 - 150T	75	61-88	55	45-65
HR1	73	62-84	54	46-62
Clutch Housing-to-Engine Dowel Bolt:				
SR4 - 150T	35	30-41	26	22-30
Starter Motor-to-Clutch Housing Bolt:				
SR4 - 150T	24	18-34	18	13-25
HR1	73	62-84	54	46-62
Clutch Housing Spacer-to-Engine Block Bolt:				
SR4 - 150T	16	12-20	12	9-15
Clutch Cable Locknut:				
HR1	34	28-39	25	21-29
Clutch Housing Inspection Cover Screws:				
HR1	41	34-47	30	25-35
Flywheel-to-Crankshaft Bolts:				
SR4 - 150T	142	136-149	105	100-110
HR1	88	80-96	65	59-71
Throwout Lever Pivot Ball Stud Nuts:				
HR1	68	57-79	50	42-58
Rear Crossmember Stud Nuts:				
SR4 - 150T	47	41-54	35	30-40
HR1	47	41-54	35	30-40
Transmission Support Cushion-to-Crossmember Bolt:				
HR1	34	27-41	25	20-30

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

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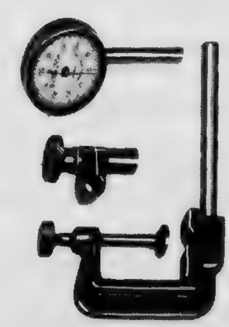
Clutch Specifications

Clutch Pedal Free Play	
SR4 - 150T	7/8 to 1-1/8 inch with 1-1/8 inch preferred (2.2 to 2.8 cm with 2.8 cm preferred)
HR1	1/2 to 1.00 inch with 5/8 inch preferred (1.27 to 2.54 cm with 1.58 cm preferred)
Clutch Linkage Lubrication	
SR4 - 150T	Lubricate Bellcrank ball studs at 30,000 mile intervals with chassis lubricant.
Clutch Cover Diameter	
SR4 - 150T	9.500 inches (24.13 cm)
HR1	9.000 inches (22.87 cm)
Clutch Driven Plate Diameter	
SR4	9.125 inches (23.18 cm)
150T	9.000 inches (22.87 cm)
HR1	8.500 inches (21.59 cm)
Clutch Cover-Type (All)	Single diaphragm spring with multi-integral release fingers.
Clutch Driven Plate-Type (All)	Single plate, dry-disc with steel hub and integral cushion springs and riveted friction material.
Clutch Housing Alignment	
Bore Concentricity to Centerline	0.010 inch (0.254 mm)
Mounting Face to Crankshaft Centerline	0.007 inch (0.018 mm)

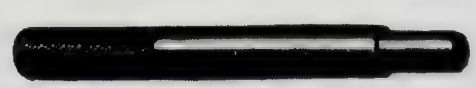
70278

Special Tools

J-1434
GUIDE PINS



J-8001
DIAL INDICATOR SET



J-25353
ALIGNING TOOL

41477

CLUTCH SERVICE FOUR-CYLINDER ENGINE

CLUTCH ADJUSTMENT

Clutch pedal free play is adjusted by increasing or decreasing clutch cable travel. Clutch pedal free play should be from 1.27 to 2.54 centimeters (1/2 to 1.00 inch) with 1.58 centimeters (5/8 inch) preferred.

Adjustment Procedure

(1) Raise car.

(2) Remove screw attaching throwout lever boot to clutch housing and remove boot.

(3) Loosen clutch cable housing locknut at transmission side of clutch housing (fig. 2A-11, View A).

(4) Pull cable housing toward front of car until free movement of throwout lever is eliminated; then rotate adjuster nut toward rear of car until faces of adjuster nut tabs contact housing boss (fig. 2A-11, View B).

(5) Release cable housing and rotate adjuster nut until adjuster nut tabs engage in clutch housing slots.

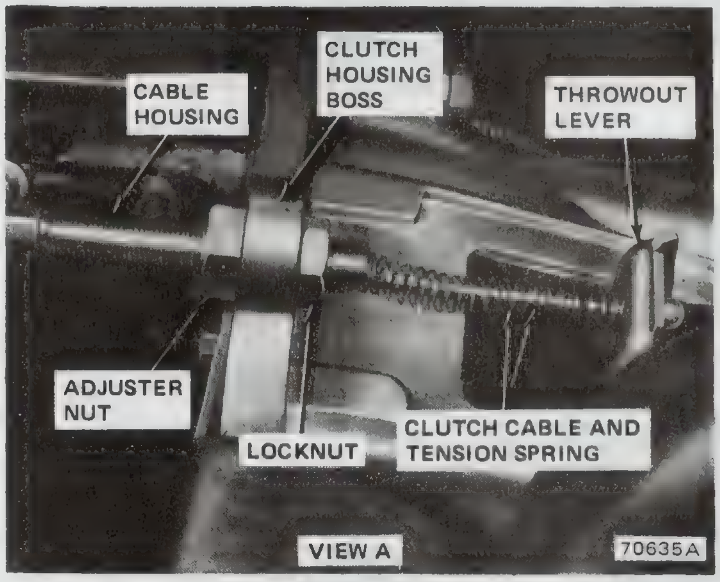
(6) Tighten clutch cable locknut to 34 newton-meters (25 foot-pounds) torque.

(7) Install throwout lever boot and boot attaching screw.

(8) Lower car.

Clutch Pedal Height

Clutch pedal height is preset during manufacture and should not require further attention during normal service. If for any reason an adjustment should become necessary, pedal height can be adjusted by varying the length of the clutch pedal stopscrew to obtain a pedal stroke of 32° to 34° (±1°). This setting will position the pedal, as measured from the underside of the pedal, 19.05 centimeters (7-1/2-inches) plus or minus 0.3500 millimeter (±1/4-inch) from the floorpan.



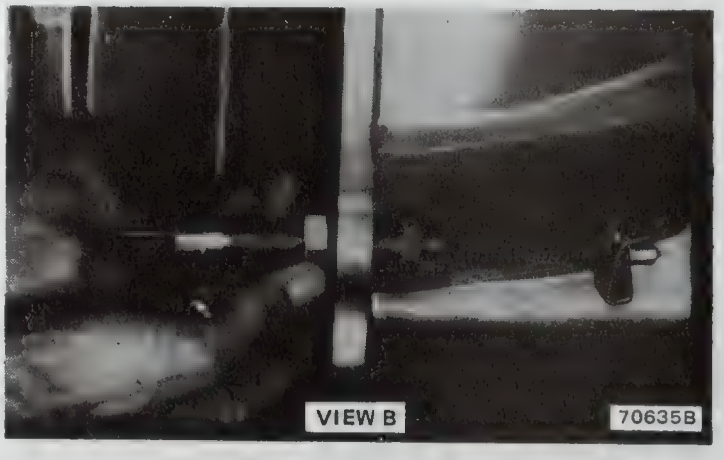


Fig. 2A-11 Clutch Adjustment

CLUTCH REMOVAL

(1) Remove gearshift lever bezel and slide outer and inner boots toward top of gearshift lever.

(2) Fold carpet under to provide working clearance and straighten all gearshift lever lock tabs that are bent downward (fig. 2A-12).

(3) Unthread plastic gearshift lever locknut and remove gearshift lever.

(4) Raise car.

(5) Mark propeller shaft and rear axle yoke for assembly alignment reference.

(6) Disconnect propeller shaft at rear axle yoke and remove shaft.

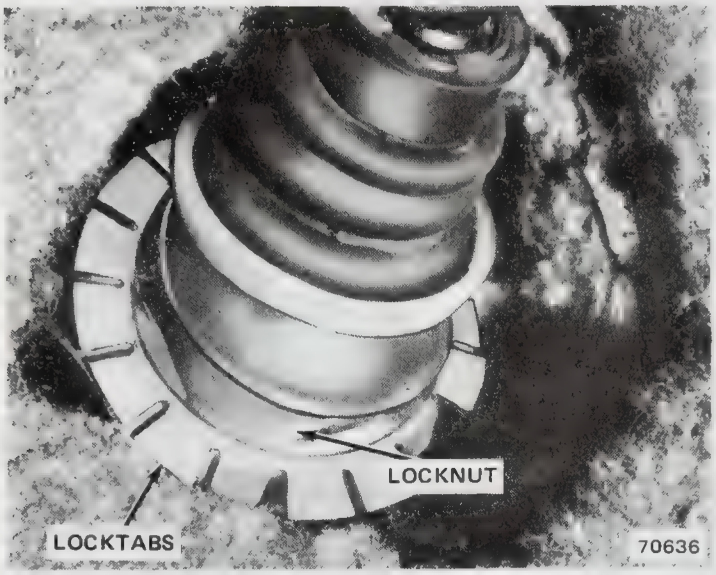


Fig. 2A-12 Gearshift Lever Removal

(7) Disconnect speedometer cable and adapter at transmission.

(8) Disconnect backup lamp switch wires and disengage wire harness from clips on transmission top cover.

(9) Disconnect starter motor cable and remove starter motor.

(10) Loosen clutch cable locknut and back off adjuster nut to create slack in cable. Slide cable toward clutch housing until cushion and cable ball end can be disengaged from throwout lever (fig. 2A-13).

(11) Remove inspection cover at front of clutch housing.

Fig. 2A-13 Clutch Cable Removal

(12) Remove bolts attaching catalytic converter support bracket to transmission rear support bracket.

(13) Place support stand under front of engine.

(14) Remove nuts and bolts attaching transmission support cushion to rear crossmember (fig. 2A-14).

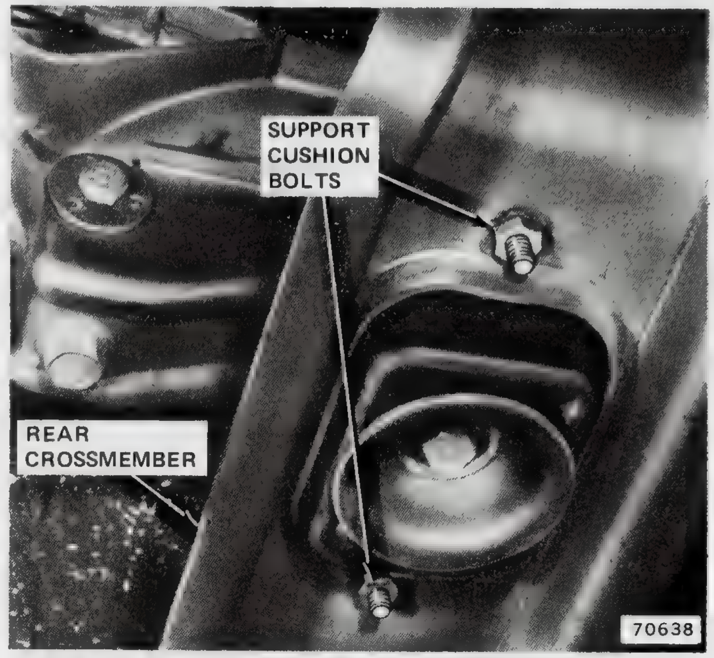


Fig. 2A-14 Support Cushion Attaching Bolt Location

(15) Remove nuts attaching rear crossmember to side sill studs and remove crossmember. Maneuver crossmember as necessary to clear exhaust pipe.

(16) Support transmission using transmission jack.

(17) Remove clutch housing-to-engine bolts.

(18) Remove transmission and clutch housing as assembly.

(19) Mark clutch cover and flywheel for assembly alignment reference.

(20) Remove clutch cover bolts and remove cover and driven plate.

CAUTION: *Loosen the clutch cover bolts alternately and evenly to avoid distorting the cover.*

CLUTCH INSTALLATION

CAUTION: *The clutch cover is positioned on dowel pins located on the flywheel face (fig. 2A-15). When mounting the clutch driven plate and cover on the flywheel, the cover must be indexed with the alignment marks made during removal and be properly engaged with the flywheel dowel pins.*

(1) Position clutch driven plate and cover on flywheel and install cover attaching bolts finger-tight only. Be sure cover is engaged with flywheel dowel pins.

(2) Align clutch driven plate using Clutch Alignment Tool J-5824-01.

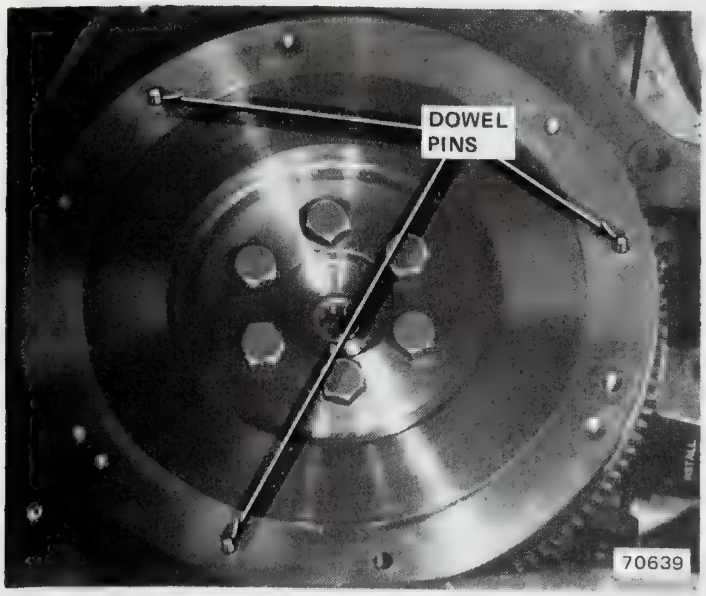


Fig. 2A-15 Flywheel Dowel Pin Location

(3) Tighten clutch cover bolts alternately and evenly to 31 newton-meters (23 foot-pounds) torque and remove alignment tool.

(4) Install transmission and clutch housing assembly. Manuever transmission jack as necessary to install assembly.

NOTE: *If the downward angle at the rear of the engine is not sufficient to permit transmission installation, raise the front end of the engine.*

(5) Install clutch housing-to-engine attaching bolts. Tighten bolts to 73 newton-meters (54 foot-pounds) torque and remove transmission jack.

(6) Position rear crossmember on side sills and install stud nuts finger-tight only.

(7) Install support cushion-to-crossmember attaching bolts. Tighten bolts to 34 newton-meters (25 foot-pounds) torque.

(8) Tighten rear crossmember stud nuts to 47 newton-meters (35 foot-pounds) torque and remove engine support stand.

(9) Connect speedometer cable and adapter to transmission.

(10) Connect backup lamp switch wires and engage wire harness in retaining clips on transmission top cover.

(11) Install inspection cover on front side of clutch housing.

(12) Install catalytic converter support bracket bolts.

(13) Install starter motor and connect starter cable to motor.

(14) Install propeller shaft. Index shaft to rear axle yoke using alignment marks made during removal. Tighten clamp strap bolts to 19 newton-meters (14 foot-pounds) torque.

(15) Connect clutch cable to throwout lever and adjust clutch as necessary. Refer to Clutch Adjustment.

(16) Install throwout lever boot and boot attaching screw.

(17) Lower car.

(18) Install gearshift lever in extension housing. Be sure shift rail insert is facing straight downward and that offset on side of lever fork if facing right-side of extension housing before installing lever. Bend at least three lock tabs downward to retain lever.

(19) Position inner and outer gearshift lever boots on floorpan and install bezel.

CRANKSHAFT PILOT BEARING

Removal

(1) Remove clutch cover and driven plate as outlined under Clutch Removal.

(2) Insert Pilot Bearing Remover J-26833 in pilot bearing and remove bearing (fig. 2A-16).

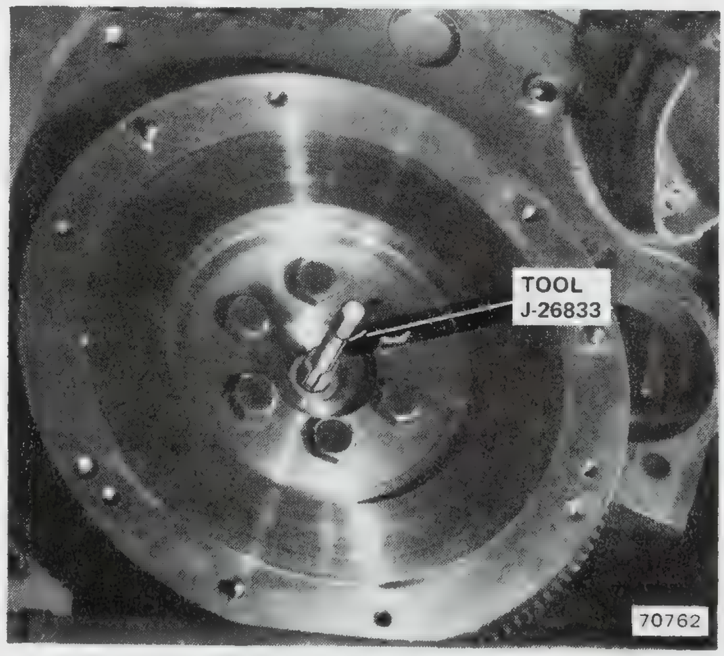


Fig. 2A-16 Pilot Bearing Removal

Installation

(1) Lubricate replacement pilot bearing with an EP-type chassis grease and mount bearing on Installer Tool J-26904.

CAUTION: *The bearing has a grease seal at one end (fig. 2A-17). This seal must face the transmission clutch shaft when installed.*

(2) Position bearing in crankshaft bearing bore and tap Tool J-26904 with hammer to seat bearing in crankshaft (fig. 2A-17).

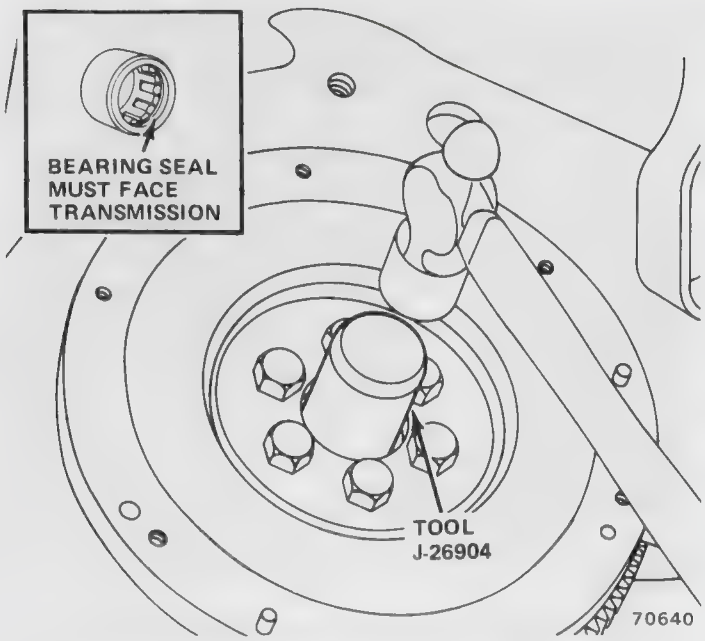


Fig. 2A-17 Pilot Bearing Installation

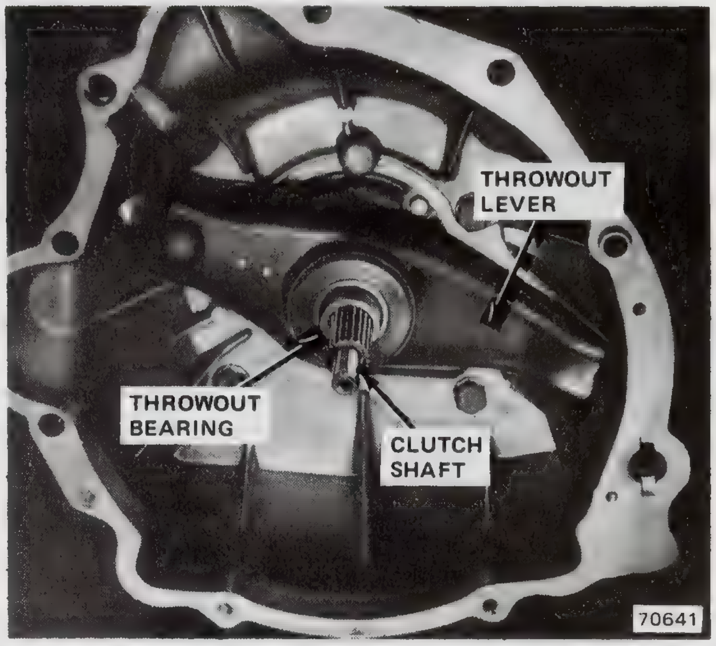


Fig. 2A-18 Throwout Bearing and Lever Arrangement

CAUTION: *Do not allow the bearing to become cocked during installation. The bearing and installation tool must be kept parallel with the crankshaft centerline during installation.*

(3) Remove tool J-26904 and install clutch assembly as outlined under Clutch Installation.

THROWOUT BEARING AND LEVER

Removal

(1) Remove transmission and clutch housing as outlined under Clutch Removal.
(2) Pull throwout lever straight out of lever opening in clutch housing to disengage throwout lever retaining clip from pivot ball stud (fig. 2A-18).
(3) Slide throwout lever and bearing off front bearing cap and remove lever and bearing as assembly.
(4) Slide throwout bearing out of lever.

Installation

(1) Install throwout bearing in lever. Bearing must be positioned on top of lever guide spring (fig. 2A-19).
(2) Lubricate bearing surface of front bearing cap with chassis grease.
(3) Install assembled throwout bearing and lever. Slide bearing onto front bearing cap and install throwout lever on pivot ball stud. Be sure lever and lever retaining clip are properly seated on ball stud.
(4) Install transmission and clutch housing as outlined under Clutch Installation.

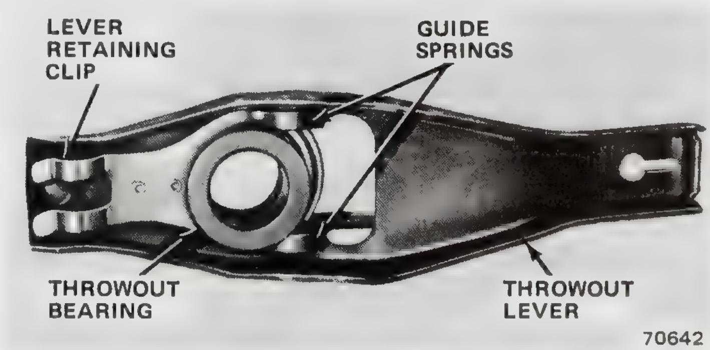


Fig. 2A-19 Positioning Throwout Bearing in Lever

FLYWHEEL

Removal

(1) Remove transmission and clutch assembly as outlined under Clutch Removal.
(2) Remove flywheel attaching bolts and remove flywheel.

NOTE: *The flywheel and crankshaft flange have index marks stamped on them for assembly alignment reference (fig. 2A-20). Be sure these marks are aligned during flywheel installation.*

Installation

(1) Mount flywheel on crankshaft flange and install flywheel attaching bolts finger-tight.
(2) Tighten flywheel attaching bolts alternately and evenly to 88 newton-meters (65 foot-pounds) torque.

(3) Install transmission and clutch assembly as outlined under Clutch Installation.

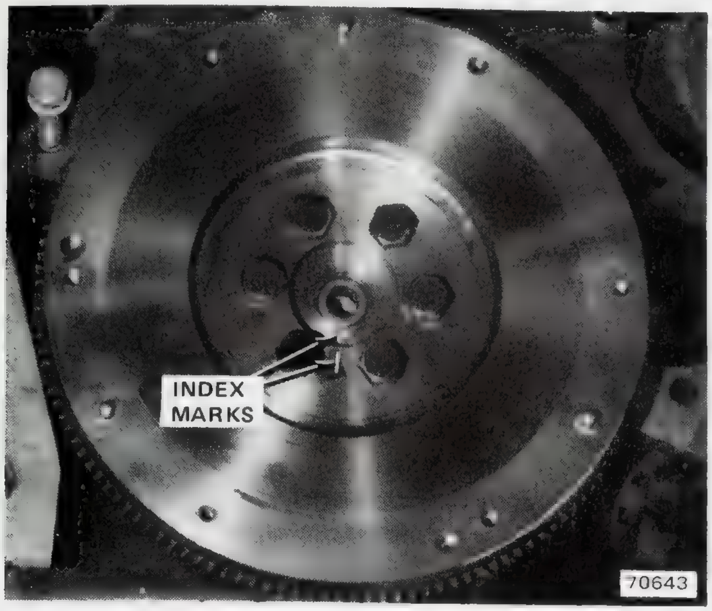


Fig. 2A-20 Crankshaft-To-Flywheel Index Marks

TRANSMISSION CLUTCH SHAFT

If the transmission clutch shaft must be replaced, remove and disassemble the transmission and replace the clutch shaft as outlined in Chapter 2B—Manual Transmission.

CLUTCH PEDAL

Removal

(1) Disconnect battery negative cable.

(2) Remove package tray, if equipped.

(3) Remove fuse panel attaching screws and move panel aside.

(4) Remove spring clip and clevis pin that retain clutch cable link to clutch pedal lever (fig. 2A-21).

(5) Remove clutch and brake pedal pivot shaft locknut. Discard locknut.

(6) Remove clutch pedal lever from pivot bolt and slide clutch pedal and pivot shaft out of pedal support bracket and brake pedal.

Installation

(1) Inspect clutch and brake pedal bushings. Replace bushings if worn, cracked, scored, or distorted.

(2) If clutch pedal is to be replaced, measure height of pedal stopscrew in original clutch pedal and install on replacement clutch pedal to same height.

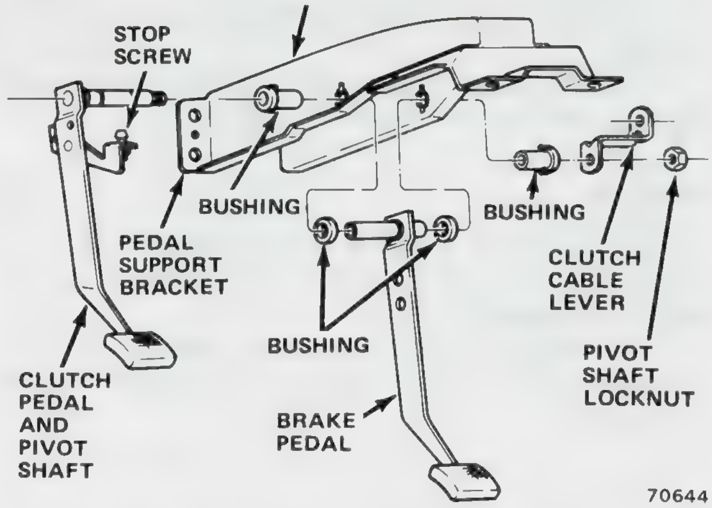


Fig. 2A-21 Clutch and Brake Pedal Assembly

(3) Install bushing on clutch pedal pivot shaft and insert pivot shaft through pedal support bracket (fig. 2A-21).

CAUTION: *The pedal bushings have locating tabs which must be engaged in the locating slots in the pedal support bracket.*

(4) Install bushings on brake pedal, position pedal in pedal support bracket and slide clutch pedal pivot shaft through brake pedal and support bracket.

(5) Install clutch cable lever on clutch pedal pivot shaft. Install replacement pivot shaft locknut. Tighten locknut to 68 newton-meters (50 foot-pounds) torque.

(6) Position clutch cable link over clutch cable lever and install clevis pin and spring clip.

(7) Install fuse panel and panel attaching screws.

(8) Install package tray, if equipped.

(9) Connect battery negative cable.

CLUTCH CABLE

Removal

(1) Raise car.

(2) Remove throwout lever boot retaining screw and remove boot.

(3) Loosen clutch cable locknut and back off adjuster nut to provide slack in cable. Slide cable toward clutch housing and disengage cable from throwout lever.

(4) Remove clutch cable housing locknut (fig. 2A-11).

(5) Slide cable out of clutch housing boss.

(6) Disengage cable from retaining spring.

(7) Lower car.

(8) Remove spring clip and clevis pin that retains cable link to clutch cable lever and remove link and cable from lever (fig. 2A-22).

(9) Disengage ball end of cable from cable link (fig. 2A-22).

(10) Remove screw attaching cable mounting bracket to dash panel and remove cable (fig. 2A-22).

Installation

(1) Insert upper end of cable through dash panel. Position cable mounting bracket on dash panel and install attaching screw.

(2) Engage ball on upper end of cable in cable link and attach link to clutch cable lever using clevis pin and spring clip.

(3) Route cable and housing through engine compartment and under car.

(4) Raise car.

(5) Engage cable housing in retaining spring.

(6) Insert lower end of cable through clutch housing boss and install cable locknut finger-tight (fig. 2A-11). Be sure rubber insulator at ball end of cable is positioned between lever and cable ball.

(7) Adjust clutch as outlined under Clutch Adjustment.

(8) Install throwout lever boot and boot retaining screw.

(9) Lower car.

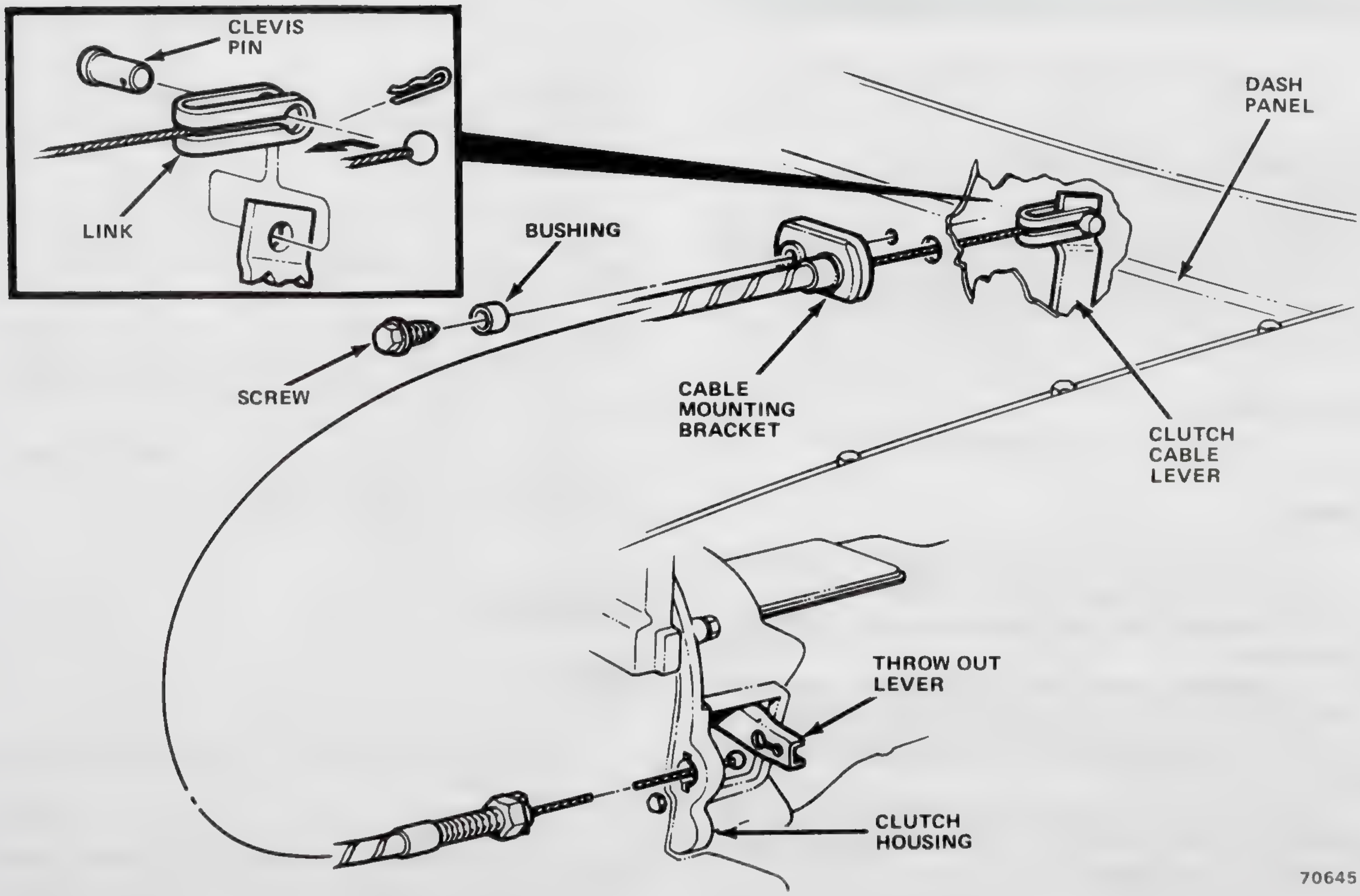


Fig. 2A-22 Clutch Cable Arrangement

SPECIFICATIONS

Clutch Specifications

Clutch Pedal Free Play	
SR4 - 150T	7/8 to 1-1/8 inch with 1-1/8 inch preferred (2.2 to 2.8 cm with 2.8 cm preferred)
HR1	1/2 to 1.00 inch with 5/8 inch preferred (1.27 to 2.54 cm with 1.58 cm preferred)
Clutch Linkage Lubrication	
SR4 - 150T	Lubricate Bellcrank ball studs at 30,000 mile intervals with chassis lubricant.
Clutch Cover Diameter	
SR4 - 150T	9.500 inches (24.13 cm)
HR1	9.000 inches (22.87 cm)
Clutch Driven Plate Diameter	
SR4	9.125 inches (23.18 cm)
150T	9.000 inches (22.87 cm)
HR1	8.500 inches (21.59 cm)
Clutch Cover-Type (All)	Single diaphragm spring with multi-integral release fingers.
Clutch Driven Plate-Type (All)	Single plate, dry-disc with steel hub and integral cushion springs and riveted friction material.
Clutch Housing Alignment	
Bore Concentricity to Centerline	0.010 inch (0.254 mm)
Mounting Face to Crankshaft Centerline	0.007 inch (0.018 mm)

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Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Clutch Cover Bolts:				
SR4 - 150T	38	30-47	28	22-35
HR1	31	27-35	23	20-26
Clutch Housing-to-Engine Bolts:				
HR1 - All	73	62-84	54	46-62
SR4 - 150T — Top	37	30-41	27	22-30
— Bottom	58	50-64	43	37-47
Clutch Housing-to-Transmission Bolts:				
SR4 - 150T	75	61-88	55	45-65
HR1	73	62-84	54	46-62
Clutch Housing-to-Engine Dowel Bolt:				
SR4 - 150T	35	30-41	26	22-30
Starter Motor-to-Clutch Housing Bolt:				
SR4 - 150T	24	18-34	18	13-25
HR1	73	62-84	54	46-62
Clutch Housing Spacer-to-Engine Block Bolt:				
SR4 - 150T	16	12-20	12	9-15
Clutch Cable Locknut:				
HR1	34	28-39	25	21-29
Clutch Housing Inspection Cover Screws:				
HR1	41	34-47	30	25-35
Flywheel-to-Crankshaft Bolts:				
SR4 - 150T	142	136-149	105	100-110
HR1	88	80-96	65	59-71
Throwout Lever Pivot Ball Stud Nuts:				
HR1	68	57-79	50	42-58
Rear Crossmember Stud Nuts:				
SR4 - 150T	47	41-54	35	30-40
HR1	47	41-54	35	30-40
Transmission Support Cushion-to-Crossmember Bolt:				
HR1	34	27-41	25	20-30

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

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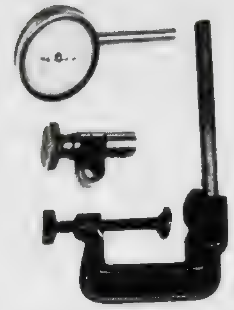
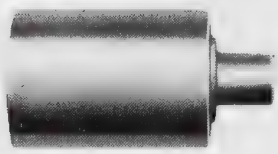
Special Tools



J-8001
DIAL INDICATOR SET

J-26833
PILOT
BEARING REMOVER



J-26904
PILOT
BEARING INSTALLER

J-5824-01
CLUTCH ALIGNMENT ARBOR

70646

MANUAL TRANSMISSION 2B

SECTION INDEX

GENERAL INFORMATION

GENERAL

Three manual transmission models are used in AMC cars, they are: Model 150T 3-Speed Transmission, Model SR4 4-Speed Transmission and Model HR1 4-Speed Transmission.

Each transmission model is a fully synchronized unit providing synchromesh engagement in all forward gear ranges. Reverse gear is not synchronized in any transmission model.

The forward range gears in each transmission model are helical-cut and are in constant mesh. The reverse gears are spur-cut and are not in constant mesh.

Transmission Application

Transmission Models 150T and SR4 are used in cars with six-cylinder engines only. Model 150T is the standard equipment transmission with the Model SR4 available as an option.

Transmission Model HR1 is used in cars equipped with the two-liter four-cylinder engine only.

Shift Mechanisms

All three transmission models are floor shift units. Column shift manual transmissions are not available in any car model.

Transmission Model 150T has an externally mounted, adjustable-type floor shift linkage. Models SR4 and HR1 have internal-type nonadjustable shift mechanisms with a reverse gear lockout. The lockout feature prevents accidental engagement in reverse when selecting any of the forward gears.

Transmission Manufacturing Tolerances

Transmission Models SR4 and HR1 are manufactured to Metric standard tolerances while the Model 150T is manufactured to American standard tolerances. When servicing any transmission model, use the specified thread-type fasteners only.

Dynamic Absorber—Four-Cylinder Models

A dynamic absorber is used on all AMC cars equipped with four-cylinder engine and manual or automatic transmission. The function of the absorber is to dampen out sympathetic driveline vibrations that may be generated by engine operation.

Two absorber designs are used. On cars with the HR1 4-speed manual transmission, the absorber consists of a series of segmented steel weight-plates which are bolted together to form a single assembly. The absorber is attached to a mounting flange located on the transmission extension housing.

If the absorber is removed during service operations, it must be securely reinstalled in its original location before completing service operations.

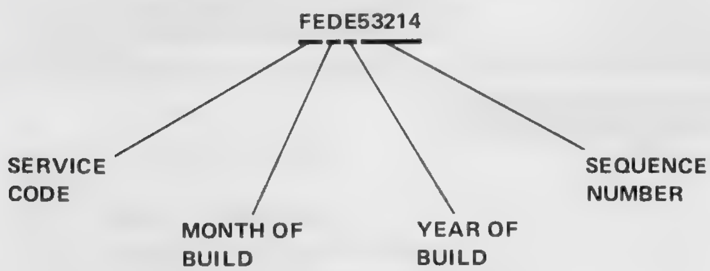
TRANSMISSION IDENTIFICATION

Model 150T

The Model 150T transmission case is made of cast iron and the extension housing of cast aluminum. The top cover is a steel stamping. The floor shift mechanism consists of an externally mounted gearshift lever and linkage.

The 150T has a nine-character identification number stamped on the left front case flange. Identification numbers are decoded as follows:

Identification Number—Model 150T



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The first two letters of the identification number represent the transmission service code. These letters identify the transmission part number and speedometer drive gear application.

Model SR4

The Model SR4 transmission case, transmission cover and extension housing are cast aluminum. The internal single-rail shift mechanism is contained within the transmission cover assembly.

The SR4 has an identification tag attached to the rear of the transmission which contains the AMC and vendor part numbers. This information is essential when ordering replacement parts. If the tag is removed during service operations, be sure it is securely attached to the transmission case in the original location after completing all service operations.

Model HR1

The Model HR1 transmission case is made of cast iron and the extension housing of cast aluminum. The top cover is a steel stamping. The internal single rail shift mechanism is contained within the transmission case.

The HR1 has an identification tag attached to the extension housing by the lower-left extension housing-to-transmission case bolt. This tag contains the AMC and vendor part numbers. The information on this tag is essential when ordering replacement parts. If the tag is removed during service operations, be sure it is securely attached to the transmission in the original location after completing all service operations.

Special Identification

Cars built for sale in Georgia and Tennessee have certain components identified by a nonrepeating number. On Model 150T transmissions, the number is stamped on the transmission extension housing. On Model SR4 transmissions, the number is stamped on a boss on the left side of the transmission case. On Model HR1 transmissions, the number is stamped on the upper part of the extension housing adjacent to the shift lever mounting surface.

The number used on Kenosha-built cars is the final line building sequence number followed by 78 to identify the year.

The number used on Brampton-built cars is the body sequence number preceded by C (for Canada) and followed by 78 to identify the year.

The sequence number on both Kenosha and Brampton-built cars begins and ends with an asterisk (*) to prevent alteration by extension.

GEARSHIFT PATTERN

Model 150T

The 150T gearshift pattern is in a standard "H" configuration (fig. 2B-1). The first-reverse and second-third gear positions are in the same horizontal planes respectively. A neutral detent position at the center of the "H" provides for crossover between the various gear positions.

Models SR4-HR1

The SR4 and HR1 gearshift patterns are also in an "H" configuration, however, an additional position for reverse is included (fig. 2B-2). An interlock system prevents accidental engagement of reverse gear when selecting any of the forward gear ranges.

To select reverse gear in the SR4 or HR1 transmission, first press the gearshift lever all the way down, then to the left and all the way forward (fig. 2B-2). To disengage reverse gear, simply move the gearshift lever back to the neutral detent.

NOTE: *On SR4 and HR1 transmissions, the gearshift lever must always be pressed down first, before reverse gear can be obtained. This movement disengages the interlock system components allowing the reverse gears to be engaged.*

LUBRICATION

The recommended lubricant for all manual transmission models is: SAE 80W-90 Gear Lubricant, API Grade GL-5. Use this lubricant whenever adding or replacing transmission lubricant. Refer to the Maintenance Schedule in Chapter B for lubricant inspection frequency.

The lubricant capacities of the three transmission models are:
Models 150T and SR4: 1.41 Liters (3.0 pints U.S. measure).
Model HR1: 1.13 Liters (2.4 pints U.S. measure).

CAUTION: *Do not use any gear lubricants which contain ingredients such as lead, sulphur, or chlorine compounds. These ingredients are not compatible with the lubrication requirements of the three transmission models.*

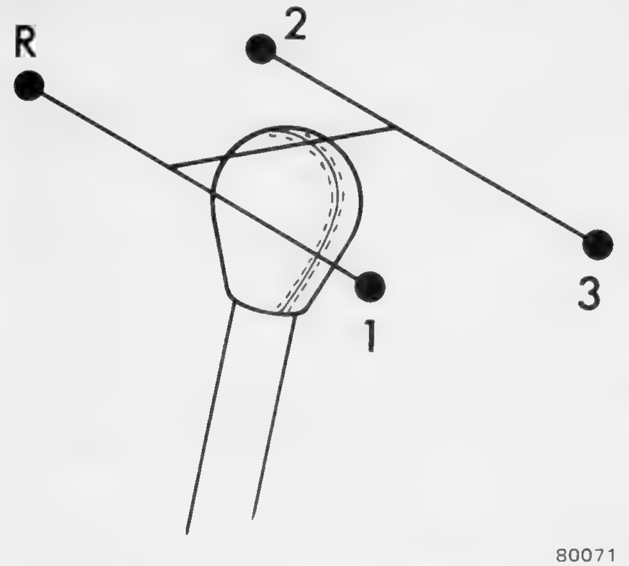

Fig. 2B-1 Gearshift Pattern—Model 150T

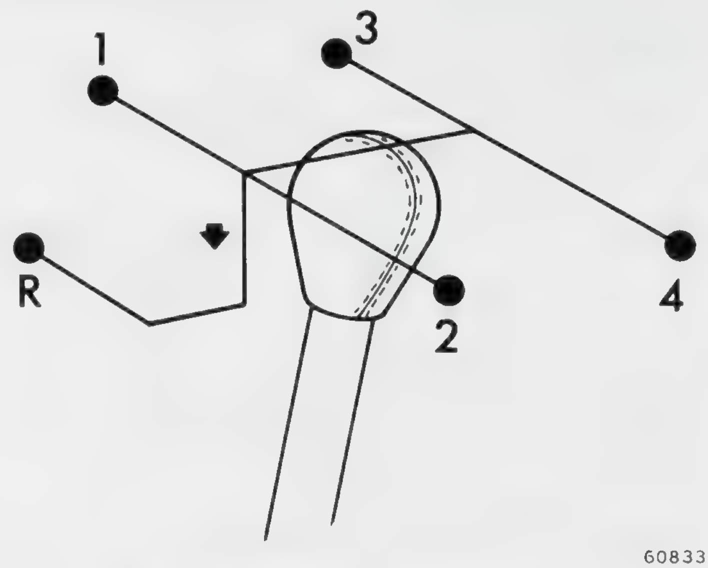

Fig. 2B-2 Gearshift Pattern—Models SR4-HR1

Service Diagnosis

Condition	Possible Cause	Correction
TRANSMISSION SHIFTS HARD	(1) Clutch adjustment incorrect	(1) Adjust clutch
	(2) Clutch linkage or cable binding	(2) Lubricate or repair as necessary
	(3) Shift rail binding (SR4, HR1)	(3) Check for mispositioned selector arm roll pin, loose cover bolts, shift worn shift rail bores, worn shift rail, distorted oil seal, or extension housing not aligned with case. Repair as necessary
	(4) Gearshift linkage binding bent or incorrectly adjusted (150T)	(4) Adjust linkage, correct binds, replace bent-damaged parts
	(5) Internal bind in transmission caused by shift forks, selector plates, or synchronizer assemblies	(5) Remove, disassemble and inspect transmission. Replace worn or damaged components as necessary
	(6) Clutch housing misalignment	(6) Check runout at rear face of clutch housing. Correct runout as outlined in Chapter 2A
	(7) Incorrect lubricant	(7) Drain and refill transmission
GEAR CLASH WHEN SHIFTING FROM ONE GEAR TO ANOTHER	(1) Clutch adjustment incorrect	(1) Adjust Clutch
	(2) Clutch linkage or cable binding	(2) Lubricate or repair as necessary
	(3) Gearshift linkage binding, bent or incorrectly adjusted (150T)	(3) Adjust linkage, correct binds, replace bent-damaged parts.

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Service Diagnosis

Condition	Possible Cause	Correction
GEAR CLASH WHEN SHIFTING FROM ONE GEAR TO ANOTHER (Continued)	(4) Clutch housing misalignment	(4) Check runout at rear face of clutch housing. Correct runout as outlined in Chapter 2A
	(5) Lubricant level low or incorrect lubricant	(5) Drain and refill transmission and check for lubricant leaks if level was low. Repair as necessary
	(6) Gearshift components, or synchronizer assemblies worn or damaged	(6) Remove, disassemble and inspect transmission. Replace worn or damaged components as necessary
TRANSMISSION NOISY	(1) Lubricant level low or incorrect lubricant	(1) Drain and refill transmission. If lubricant level was low, check for leaks and repair as necessary
	(2) Clutch housing-to-engine, or transmission-to-clutch housing bolts loose	(2) Check and correct bolt torque as necessary
	(3) Dirt, chips, foreign material in transmission	(3) Drain, flush, and refill transmission
	(4) Gearshift mechanism or transmission gear, or bearing components worn or damaged	(4) Remove, disassemble and inspect transmission. Replace worn or damaged components as necessary
	(5) Clutch housing misalignment	(5) Check runout at rear face of clutch housing. Correct runout as outlined in Chapter 2A
JUMPS OUT OF GEAR	(1) Clutch housing misalignment	(1) Check runout at rear face of clutch housing. Correct runout as outlined in Chapter 2A
	(2) Gearshift lever loose (HR1)	(2) Check lever for worn fork. Tighten loose attaching bolts.
	(3) Gearshift linkage bent or binding (150T)	(3) Correct bind or replace bent parts.
	(4) Offset lever nylon insert worn or lever attaching nut loose (SR4, HR1)	(4) Remove gearshift lever and check for loose offset lever nut or worn insert. Repair or replace as necessary
	(5) Gearshift mechanism, shift forks, selector plates, interlock plate, selector arm, shift rail, detent plugs, springs or shift cover) worn or damaged	(5) Remove, disassemble and inspect transmission cover assembly. Replace worn or damaged components as necessary

Service Diagnosis

Condition	Possible Cause	Correction
JUMPS OUT OF GEAR (Continued)	(6) Clutch shaft or roller bearings worn or damaged	(6) Replace clutch shaft or roller bearings as necessary
	(7) Gear teeth worn or tapered, synchronizer assemblies worn or damaged, excessive end play caused by worn thrust washers or output shaft gears	(7) Remove, disassemble, and inspect transmission. Replace worn or damaged components as necessary
	(8) Pilot bushing worn	(8) Replace pilot bushing
WILL NOT SHIFT INTO ONE GEAR	(1) Gearshift selector plates, interlock plate, or selector arm, worn, damaged, or incorrectly assembled (SR4, HR1)	(1) Remove, disassemble, and inspect transmission cover assembly. Repair or replace components as necessary.
	(2) Gearshift linkage broken, bent, or disconnected (150T)	(2) Replace or repair linkage as necessary.
	(3) Shift rails, shift forks, detent plugs or springs, worn or incorrectly assembled (150T)	(3) Disassemble transmission and replace worn parts or assemble parts correctly.
	(4) Shift rail detent plunger worn, spring broken, or plug loose (SR4, HR1)	(4) Tighten plug or replace worn or damaged components as necessary.
	(5) Gearshift lever worn or damaged (SR4, HR1)	(5) Replace gearshift lever.
	(6) Synchronizer sleeves or hubs, damaged or worn.	(6) Remove, disassemble and inspect transmission. Replace worn or damaged components.
LOCKED IN ONE GEAR — CAN NOT BE SHIFTED OUT OF THAT GEAR	(1) Gearshift linkage binding broken or bent (150T)	(1) Correct bind, replace bent, broken components.
	(2) Transmission shifter lever attaching nuts loose or levers are worn at shifter fork shaft hole (150T)	(2) Tighten nuts, replace worn levers.
	(3) Shift rail(s) worn or broken, shifter fork bent, setscrew loose, center detent plug missing or worn.	(3) Inspect and replace worn or damaged parts.
	(4) Broken gear teeth on countershaft gear, clutch shaft, or reverse idler gear.	(4) Inspect and replace damaged part.
	(5) Gearshift lever broken or worn, shift mechanism in cover incorrectly assembled or broken, worn or damaged gear train components (SR4, HR1)	(5) Disassemble transmission. Replace damaged parts or assemble correctly.

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BACKUP LAMP SWITCH

All AMC cars equipped with a manual transmission use a ball and plunger-type, nonadjustable backup lamp switch.

On Model 150T transmissions, the switch is located on the left side of the transmission extension housing and is actuated by the internally mounted first-reverse shift rail.

On Model SR4 transmissions, the switch is located on the left side of the transmission case and is actuated by the internally mounted reverse lever.

On Model HR1 transmissions, the switch is located on the right-rear side of the extension housing and is actuated by the gearshift lever.

Diagnosis—Backup Lamp Circuit

Refer to the wiring diagrams at the end of this volume for circuitry details and use a 12-volt test lamp when checking continuity throughout the circuit.

Backup Lamp Switch Test

(1) Check fuse and bulb condition. If OK, proceed to next step.

(2) Turn ignition lock to ON position and shift transmission into reverse.

(3) Disconnect wiring terminal connector at backup lamp switch and connect jumper wire across connector terminals.

(4) If backup lamps illuminate, replace switch. If backup lamps do not illuminate proceed to next step.

(5) Using 12-volt test lamp, check for current at tan color switch feed wire. If test lamp lights, proceed to Bulb Circuit Test. If lamp does not light, proceed to Switch Circuit Test.

Bulb Circuit Test

(1) Disconnect transmission harness at dash panel harness and check continuity of transmission harness brown wire. If test lamp lights proceed to next step. If test lamp does not light, repair open between harness connector and backup lamp switch.

(2) Disconnect dash harness at dash panel connector and check continuity of brown wire in dash harness. If test lamp lights, proceed to next step. If lamp does not light, repair open in dash harness or connectors.

(3) Check continuity at both sides of dash panel connector. If test lamp lights, proceed to next step. If lamp does not light, replace or repair open in dash connector.

(4) Remove left side door scuff plate and cowl trim panel and locate dash panel-to-body wire harness connector. Check for continuity in harness wires and connectors. If test lamp lights, proceed to next step. If lamp does not light, repair open in wires or between connectors.

(5) Check current through body wiring harness connector. If test lamp lights proceed to next step. If lamp does not light, repair open between connector terminals.

(6) Remove rear quarter trim panels and locate backup lamp switch-to-body wiring harness splice. Check current through splice and body harness connector. If test lamp lights, proceed to next step. If lamp does not light, repair open between body harness connector and splice.

(7) Check continuity between splice and backup light bulb socket. Repair open wires or connectors as required.

Switch Circuit Test

(1) Check continuity of tan color switch feed wire in transmission harness and dash panel harness as outlined in steps (1) through (5) in Bulb Circuit Test.

(2) Check continuity at both sides of dash panel connector. If test lamp lights, proceed to next step. If lamp does not light, replace or repair open in connector.

(3) Check for continuity at directional signal switch flasher. If test lamp lights, repair open between flasher and dash panel harness connector.

TCS SWITCH

A TCS (transmission controlled spark) switch is used on six-cylinder AMC California cars only. On Model 150T transmissions, the switch is located in the left side of the transmission case and is actuated by the second-third shift rail. On Model SR4 transmissions, the switch is located in the extension housing and is actuated by the shift rail.

Diagnosis—TCS Switch

(1) Shift transmission into neutral.

(2) Connect wire lead of test lamp to battery positive post.

(3) Disconnect two-wire connector at solenoid vacuum valve.

(4) Touch probe end of test lamp to solenoid vacuum valve ground wire terminal at connector. Test lamp should light. If lamp does not light, proceed to next step.

(5) Disconnect TCS switch wire at transmission.

(6) Connect one end of jumper wire to switch wire connector, and other end to ground.

(7) If test lamp lights when switch wire is grounded with jumper wire, TCS switch is defective. If test lamp does not light, switch wire is defective.

(8) Shift transmission into high gear. Test lamp should go out. If lamp does not go out, TCS switch is defective.

TRANSMISSION REMOVAL—MODELS 150T-SR4

(1) Remove gearshift lever knob, bezel, boot, and gearshift lever.

(2) Raise hood.

(3) Raise car on hoist.

(4) Mark propeller shaft and rear axle yokes for assembly reference.

(5) Remove propeller shaft.

(6) Disconnect speedometer cable, and backup lamp switch wires, and TCS switch wire if equipped.

(7) On cars with SR4 transmission, disengage backup lamp switch wires from retaining clip on transmission cover.

(8) Install support stand under clutch housing to support engine when transmission and rear crossmember are removed.

(9) On Pacer models, disconnect ground strap at support cushion bolt.

(10) Remove stud nuts attaching rear crossmember to frame side sills.

(11) On cars with catalytic converter, remove converter support bracket.

(12) On Gremlin and Concord models, remove bolts and nuts attaching rear support cushion to crossmember and remove crossmember.

NOTE: *On Pacer models, the crossmember is removed with the transmission.*

(13) Remove two transmission-to-clutch housing lower attaching bolts and install two Guide Pins, Tool J-1434 in place of bolts.

(14) Remove two remaining transmission-to-clutch housing bolts and remove transmission.

CAUTION: *Take care to avoid damaging the clutch shaft, pilot bushing, and driven plate during transmission removal.*

(15) Remove throwout bearing and remove pilot bushing lubricating wick. Soak wick in engine oil.

TRANSMISSION INSTALLATION—MODELS 150T-SR4

(1) Install pilot bushing lubricating wick. Remove excess oil from wick before installation.

(2) Shift transmission into first gear.

(3) Carefully slide transmission into position over guide pins.

(4) Rotate transmission output shaft and maneuver transmission as necessary to align clutch shaft and driven plate splines. Do not disturb throwout bearing alignment during transmission installation.

(5) Install two transmission-to-clutch housing upper attaching bolts. Finger-tighten bolts only.

(6) Remove Guide Pins, Tool J-1434, and install two lower transmission-to-clutch housing bolts. Tighten upper and lower bolts to 55 foot-pounds (74.5 Nm) torque.

(7) On Pacer models, position crossmember on frame side sills and install rear crossmember attaching stud nuts. Connect ground strap to support cushion bolt and tighten crossmember stud nuts to 30 foot-pounds (40.6 Nm) torque.

(8) On Gremlin and Concord models, position rear crossmember on frame side sills and install attaching nuts. Finger-tighten nuts only.

(9) On Gremlin and Concord models, install rear crossmember-to-support-cushion bolts and nuts and tighten bolts to 22 foot-pounds (29.8 Nm) torque. Tighten crossmember stud nuts to 30 foot-pounds (40.6 Nm) torque.

(10) Remove support stand from under clutch housing.

(11) Connect speedometer cable, backup lamp switch wires, and TCS switch wires if equipped.

(12) On cars with SR4 transmission, install backup lamp switch wires in retaining clip on transmission cover.

(13) On cars with catalytic converter, install convertor support bracket.

(14) Align propeller shaft and universal joint using alignment reference marks made during removal and connect shaft to rear yoke. Tighten universal joint clamp strap bolts to 18 foot-pounds (24.4 Nm) torque.

(15) Lower car and close hood.

(16) Install gearshift lever, boot, bezel, and knob. On cars with SR4 transmission, tighten gearshift lever attaching bolts to 18 foot-pounds (24.4 Nm) torque.

NOTE: *The gearshift lever attaching bolts used on SR4 transmissions are not metric-size bolts.*

TRANSMISSION REMOVAL—MODEL HR1

(1) Remove gearshift lever. Refer to Transmission Service-Model HR1 for removal procedure.

(2) Raise car.

(3) Mark propeller shaft and axle yokes for assembly alignment reference.

(4) Disconnect propeller shaft at axle yoke and remove shaft.

(5) Disconnect speedometer cable and adapter at transmission.

(6) Disconnect backup lamp switch wires and disengage wire harness from clips on transmission top cover.

(7) Disconnect starter motor cable and remove starter motor.

(8) Remove screw attaching throwout lever protective boot to clutch housing and remove boot.

(9) Loosen clutch cable locknut and back off adjuster nut to create slack in cable. Slide cable toward clutch housing until rubber cushion and cable ball end can be disengaged from throwout lever. Disengage cable from lever.

(10) Remove inspection cover at front of clutch housing.

(11) Remove bolts attaching catalytic converter support bracket to transmission rear support.

(12) Place support stand under front of engine.

(13) Remove nuts and bolts attaching transmission support cushion to crossmember.

(14) Remove nuts attaching rear crossmember to side sill studs and remove crossmember. Manuever crossmember as necessary to clear exhaust pipe.

(15) Support transmission using transmission jack.

(16) Remove clutch housing-to-engine bolts.

(17) Remove clutch housing and transmission as assembly.

TRANSMISSION INSTALLATION—MODEL HR1

(1) Install transmission and clutch housing as assembly. Manuever transmission as necessary to install.

NOTE: *If the downward angle of the engine is not sufficient to permit transmission installation, raise the front of the engine.*

(2) Install clutch housing-to-engine bolts. Tighten bolts to 73.2 Nm (54 foot-pounds) torque.

(3) Position rear crossmember on side sills and install stud nuts finger tight only.

(4) Remove transmission jack.

(5) Install support cushion-to-crossmember attaching bolts. Tighten bolts to 47.4 Nm (35 foot-pounds) torque.

(6) Tighten rear crossmember stud nuts to 47.4 Nm (35 foot-pounds) torque.

(7) Remove engine support stand.

(8) Connect speedometer cable and cable adapter to transmission.

(9) Connect clutch cable to throwout lever and adjust clutch as necessary. Refer to clutch adjustment procedure for cars with four-cylinder engine in Chapter 2A.

(10) Connect backup lamp switch wires and engage wire harness in retaining clips on transmission top cover.

(11) Install clutch housing inspection cover.

(12) Install catalytic converter support bracket bolts.

(13) Install starter motor and connect cable to motor.

(14) Connect propeller shaft to rear axle yoke. Index shaft to yoke using alignment marks made at disassembly. Tighten universal joint clamp strap bolts to 24.4 Nm (18 foot-pounds) torque.

(15) Install gearshift lever. Refer to Transmission Service-Model HR1 for installation procedure.

(16) Lower car.

TRANSMISSION SERVICE—MODEL 150T

GEARSHIFT LINKAGE

Adjustment

(1) Place both transmission shifter levers in neutral (levers are attached to transmission shift shafts).

(2) Loosen second-third shifter lever attaching nut and adjustment bolt.

(3) Place first-reverse shift rod in neutral position.

(4) Align second-third shift rod notch with first-reverse shift rod notch and tighten adjustment bolt and attaching nut.

(5) Operate gearshift lever. Check for smooth crossover and full engagement in all gear positions.

Removal

(1) Remove gearshift lever knob, bezel, boot and insulator (fig. 2B-3).

(2) Remove gearshift lever retainer bolts, unhook crossover spring and remove gearshift lever and crossover spring.

(3) Raise car on hoist.

(4) Disconnect shift rods at transmission shifter levers.

(5) Slide shift rods forward and out of bushings in gearshift lever retainer.

(6) Remove gearshift lever retainer mounting bolts and remove retainer.

Inspection

Inspect the shift rod notches, gearshift lever, pivot ball, pivot ball seat, gearshift lever retainer, and shift rod bushings for wear, cracks, or distortion. Inspect the crossover spring pin and pin bore in the pivot ball for wear or distortion. Inspect the crossover spring for loss of tension and inspect the shift rods for worn notches or for being bent. Replace any parts that exhibit the conditions just described.

Installation

(1) Install gearshift lever retainer.

(2) Position shift rods in bushings located in retainer and connect rods to transmission shifter levers.

(3) Lower car.

(4) Position gearshift lever, pivot ball seat and pivot ball in gearshift lever retainer.

(5) Install gearshift lever retainer mounting bolts.

(6) Hook crossover spring on crossover spring pin.

(7) Install insulator, boot, bezel and knob.

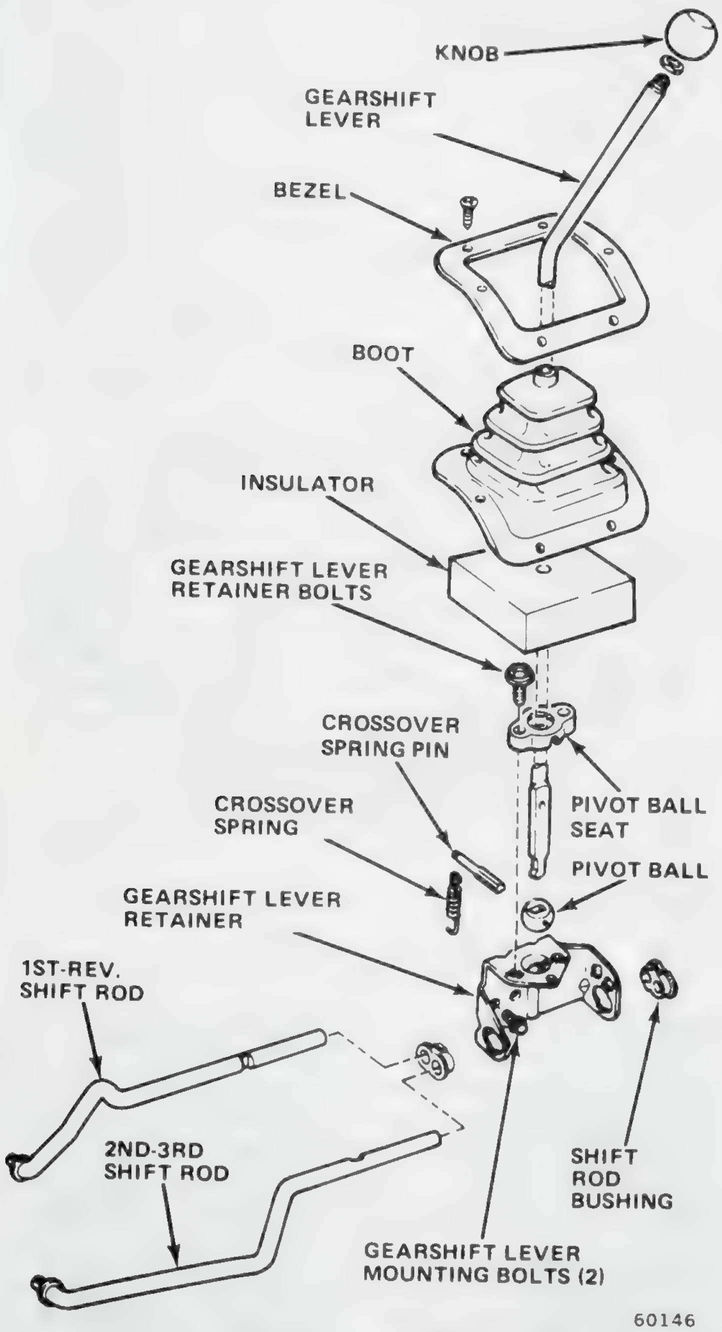


Fig. 2B-3 Gearshift Linkage—Model 150T

TRANSMISSION DISASSEMBLY

CAUTION: *All threaded holes and bolts used in the Model 150T are machined to American Standard sizes. Do not attempt to substitute a different thread-type bolt if the original ones are lost.*

(1) Remove transmission shifter levers from shift fork shafts (fig. 2B-4).

(2) Remove lower extension housing bolt (fig. 2B-5) and drain transmission lubricant from case.

(3) Remove top cover and gasket.

(4) Remove TCS switch from left side of case, if equipped, and remove backup light switch from left side of extension housing (fig. 2B-4).

(5) Remove long detent spring from case detent bore (fig. 2B-4).

(6) Remove upper detent plug from detent bore with magnet or tip case on side and allow plug to fall out. Do not lose plug.

(7) Remove extension housing and gasket.

(8) Remove speedometer drive gear retaining snap ring from output shaft and remove gear and lock ball.

NOTE: *The gear is located on the shaft by a lock ball which seats in a counterbore in the shaft and a recess molded into the speedometer drive gear bore.*

(9) Remove large locating snap ring from rear bearing and smaller retaining snap ring from output shaft.

(10) Punch alignment marks in front bearing cap and transmission case for assembly reference and remove cap and gasket.

(11) Remove large locating snap ring from front bearing, but do not remove smaller retaining snap ring from clutch shaft.

(12) Remove fill plug from right side of case (fig. 2B-4).

(13) Remove countershaft roll pin using 4.76 mm (3/16) pin punch. Roll pin is accessible through fill plug hole in case. Be sure roll pin is driven out of countershaft completely.

NOTE: *Do not attempt to retrieve the roll pin after driving it out. The pin can easily be retrieved after the output shaft assembly is removed.*

(14) Remove countershaft. Insert Countershaft Loading Tool J-25232 in front case bore and tap lightly on loading tool to drive countershaft out rear of case (fig. 2B-6).

(15) Shift synchronizer sleeves into neutral position.

(16) Remove rear bearing from output shaft and case using Bearing Remover Tool J-8157-01 (fig. 2B-7).

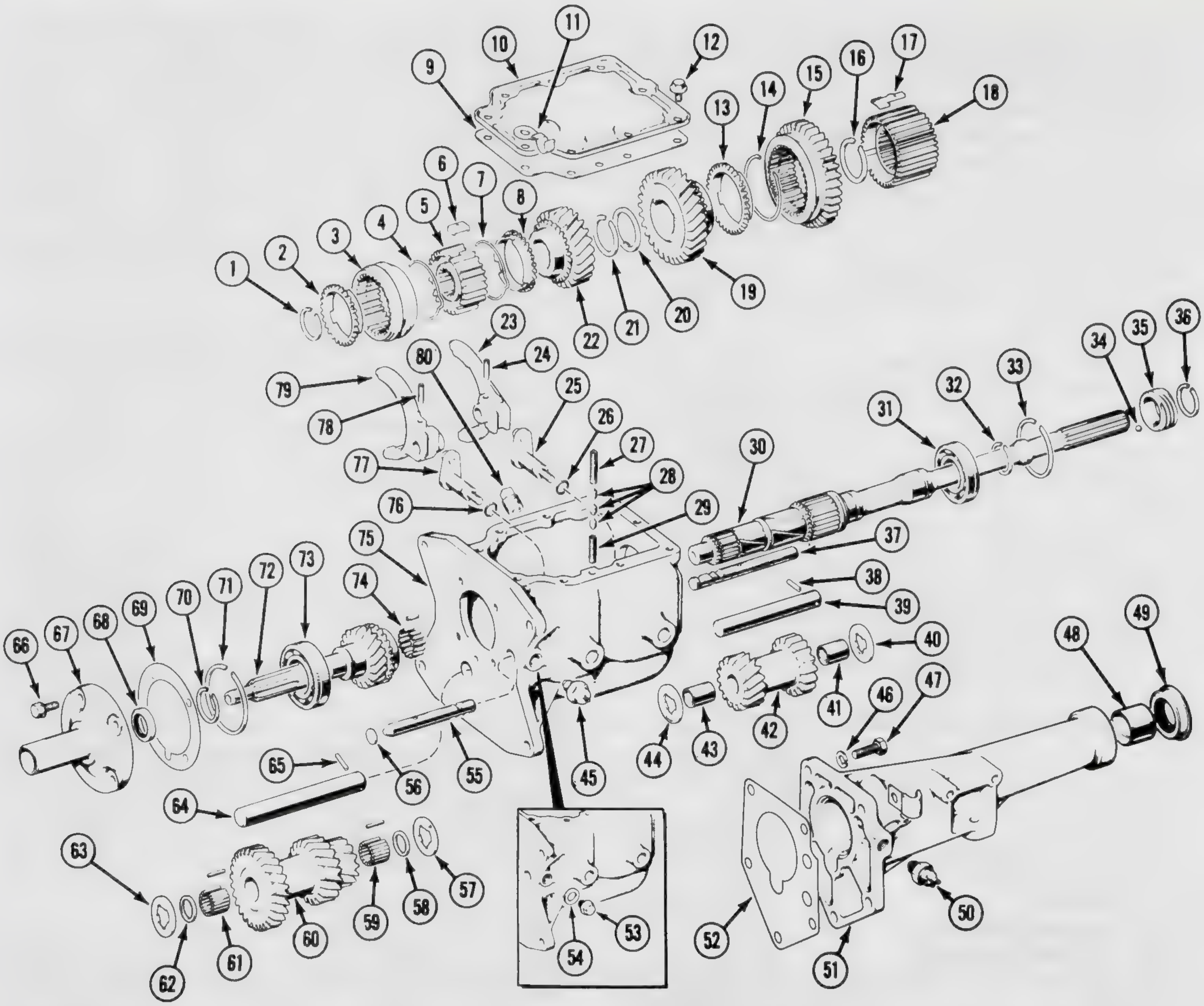
(17) Remove setscrew from first-reverse shift fork and slide shift rail out rear of case.

NOTE: *The first-reverse fork is at the rear of the case and is physically larger than the second-third fork.*

(18) Move first-reverse sleeve and gear forward and rotate first-reverse shift fork upward and out of case.

(19) Move second-third shift fork rearward until setscrew in fork is accessible.

(20) Remove setscrews, rotate shift rail 90° with pliers to clear bottom detent plug (fig. 2B-8), and remove center detent plug with magnet or tip case on side and allow plug to fall out. Do not lose plug.



1. Ring, Retaining (Snap) Output Shaft
2. Ring, Blocking, Second — Third Synchronizer
3. Sleeve, Second — Third Synchronizer
4. Spring, Insert, Second — Third Synchronizer
5. Hub, Second — Third
6. Insert, Second — Third Synchronizer
7. Spring, Insert, Second — Third Synchronizer
8. Ring, Blocking, Second — Third Synchronizer
9. Gasket, Top Cover
10. Top Cover, Case
11. Clip, TCS Switch Wire Harness
12. Bolt, Top Cover (9)
13. Ring, Blocking, First — Reverse Synchronizer
14. Spring, Insert, First — Reverse Synchronizer
15. Sleeve and Gear, First — Reverse
16. Ring, Retaining (Snap) First — Reverse Hub
17. Insert, First — Reverse Synchronizer (3)
18. Hub, First — Reverse
19. Gear, First
20. Washer, Thrust (Tabbed) First Gear
21. Ring, Retaining (Snap) First Gear
22. Gear, Second
23. Fork, First — Reverse Shift
24. Setscrew, First — Reverse Shift Fork
25. Shaft, Shift Fork
26. O-Ring, Shift Fork Shaft
27. Spring, Upper Detent (Long)
28. Plugs, Gear Shift Detent and Interlock (3)
29. Spring, Lower Detent (Short)
30. Shaft, Output
31. Bearing, Rear
32. Ring, Retaining (Snap) Rear Bearing
33. Ring, Locating (Snap) Rear Bearing
34. Lock Ball, ¼ Diameter — Speedometer Gear
35. Gear, Speedometer Drive
36. Ring, Retaining (Snap) Speedometer Drive Gear
37. Shift Rail, First — Reverse
38. Pin, Roll, Reverse Idler Gear Shaft
39. Shaft, Reverse Idler Gear
40. Washer, Thrust, Reverse Idler Gear
41. Bushing, Reverse Idler Gear (Included with Gear)
42. Gear, Reverse Idler
43. Bushing, Reverse Idler Gear (Included with Gear)
44. Washer, Thrust, Reverse Idler Gear
45. Switch, TCS
46. Lockwasher, Extension Housing Bolt (5)
47. Bolt, Extension Housing (5)
48. Bushing, Extension Housing (Included with Housing)
49. Seal, Oil, Extension Housing
50. Switch, Backup Lamp
51. Extension Housing
52. Gasket, Extension Housing
53. Plug
54. Gasket
55. Shift Rail, Second — Third
56. Plug, Expansion
57. Washer, Thrust, Countershaft Gear
58. Retainer, Countershaft Needle Bearing
59. Needle Bearing, Countershaft Gear (25)
60. Gear, Countershaft
61. Needle Bearing, Countershaft Gear (25)
62. Retainer, Countershaft Needle Bearing
63. Washer, Thrust, Countershaft Gear
64. Countershaft
65. Pin, Roll, Countershaft
66. Bolt, Front Bearing Cap (4)
67. Cap, Front Bearing
68. Oil Seal, Front Bearing Cap
69. Gasket, Front Bearing Cap
70. Ring, Retaining (Snap), Front Bearing to Clutch Shaft
71. Ring, Locating (Snap), Front Bearing
72. Shaft, Clutch
73. Bearing, Front
74. Bearings, Clutch Shaft Roller
75. Case, Transmission
76. O-Ring, Shift Fork Shaft
77. Shaft, Shift Fork
78. Setscrew, Second — Third Shift Fork
79. Fork, Second — Third Shift
80. Plug, Transmission Fill

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Fig. 2B-4 Model 150T 3-Speed Transmission—Exploded View

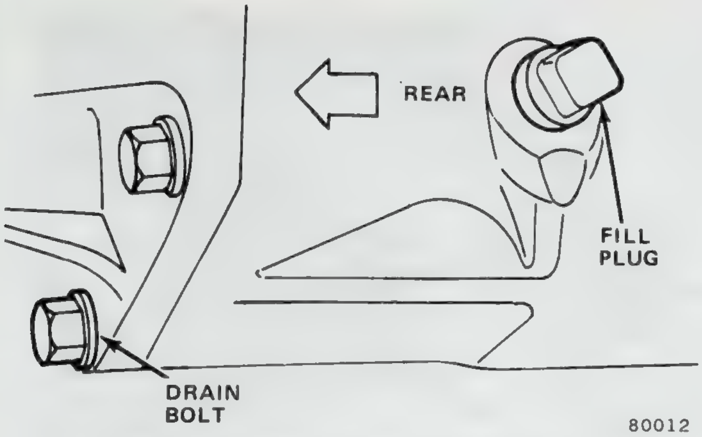

Fig. 2B-5 Fill Plug and Drain Bolt Location

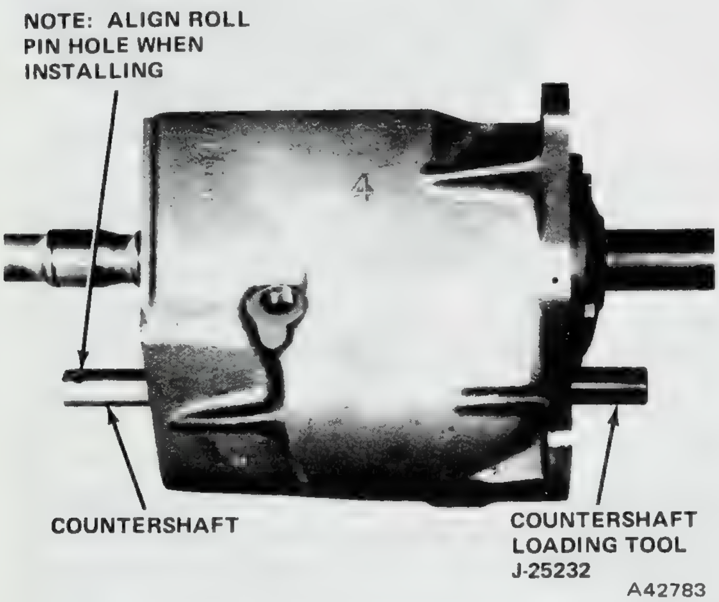

Fig. 2B-6 Countershaft Removal/Installation

(21) Remove second-third shift rail using long, thin punch 6.35 mm (1/4-inch) diameter or less. Insert punch through access hole in rear of case and remove rail and expansion plug located in shift rail bore at front of case.

(22) Remove bottom detent plug and short detent spring from detent bore in case.

(23) Rotate second-third shift fork upward and out of case.

(24) Remove clutch shaft, front bearing, and blocking ring as assembly using Bearing Remover Tool J-6654-01 (fig. 2B-9). Retrieve clutch shaft roller bearings that fall into case after output shaft is removed.

CAUTION: *Do not allow the puller screws of Bearing Remover Tool J-6654-01 to damage the threaded holes (for the front bearing cap attaching bolts) in the front of the case.*

(25) Remove output shaft assembly. Tilt spline end of shaft downward and lift gear end upward and out of case. First-reverse sleeve and gear must pass through notch at right rear side of case.

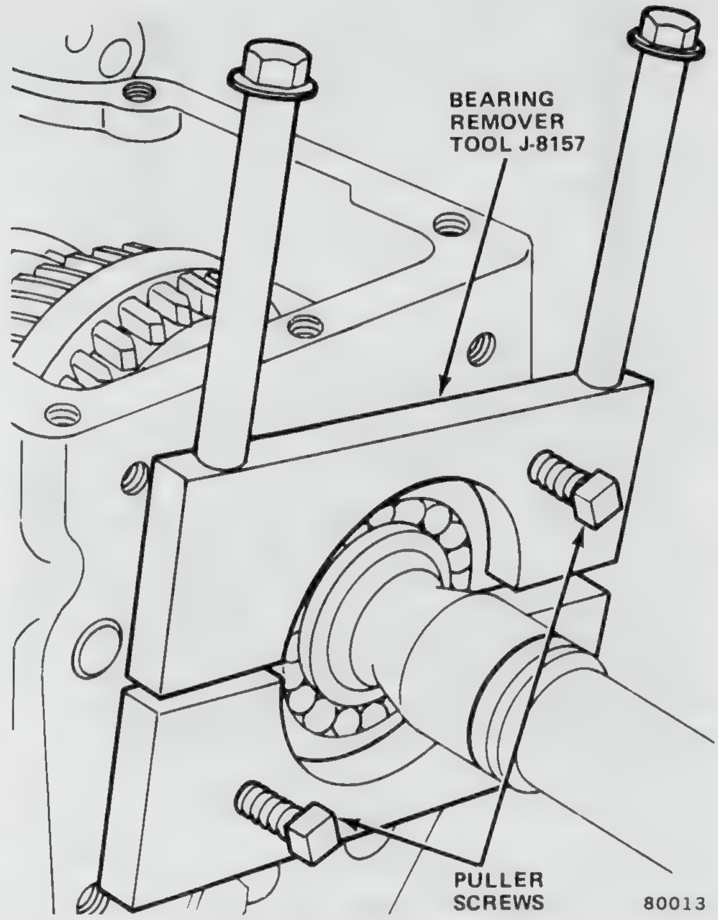

Fig. 2B-7 Rear Bearing Removal

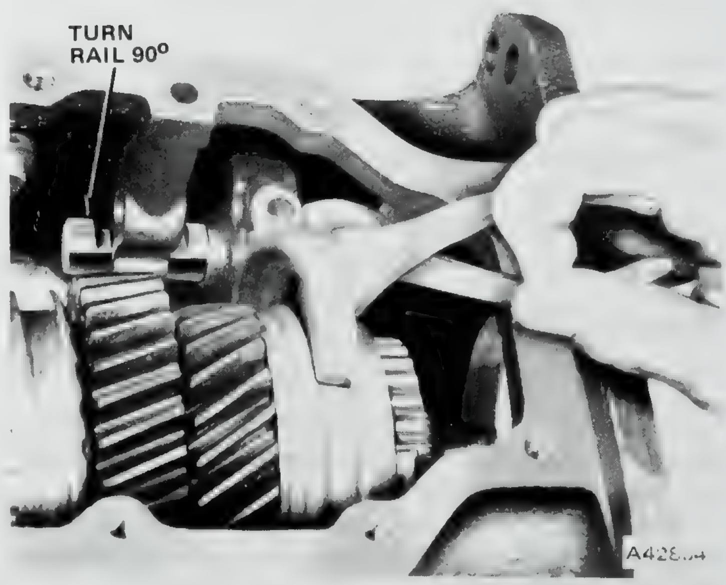

Fig. 2B-8 Rotating Shift Rail

(26) Remove countershaft gear and loading tool assembly and remove roll pin, thrust washers and countershaft needle bearing retainers.

(27) Remove shift fork shafts and any clutch shaft roller bearings or countershaft gear needle bearings that may have fallen into case during disassembly.

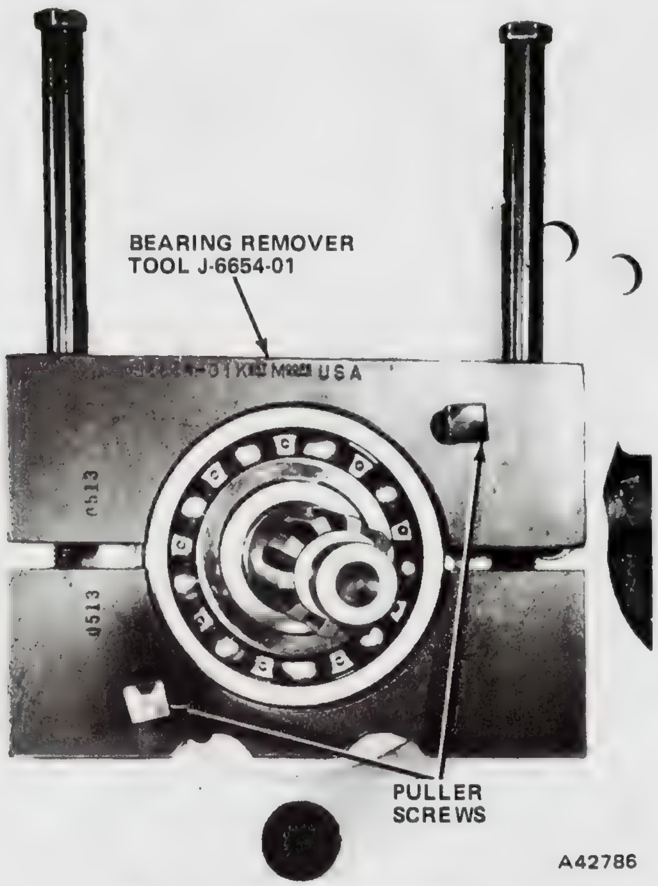

Fig. 2B-9 Clutch Shaft Removal

(28) Remove Countershaft Loading Tool J-25232 from countershaft gear and remove bearing retainers and needle bearings from each end of gear.

NOTE: *A total of 50 needle bearings are used—25 at each end of the gear.*

(29) Remove reverse idler gear and thrust washers. Tap reverse idler gear shaft with plastic hammer until end of shaft that has roll pin clears counterbore at rear of case and remove shaft (fig. 2B-10).

Disassembly—Output Shaft Gear Train

(1) Remove snap ring from front of output shaft.
(2) Remove second-third synchronizer assembly and second gear. Punch alignment marks on hub and sleeve for assembly reference.
(3) Remove insert springs from second-third synchronizer, remove three inserts, and separate sleeve from synchronizer hub.

NOTE: *Observe the position of the insert springs and inserts before removal for assembly reference.*

(4) Remove snap ring and tabbed thrust washer from shaft and remove first gear and blocking ring.
(5) Remove first-reverse hub retaining snap ring.
(6) Remove first-reverse sleeve and gear, insert spring, and three inserts from hub.

Fig. 2B-10 Reverse Idler Gear Shaft Removal/Installation

NOTE: *Observe the position of the inserts and spring before removal for assembly reference.*

(7) Remove hub from output shaft using arbor press.

CAUTION: *Do not attempt to hammer the press-fit hub from the shaft. Hammer blows will damage both hub and shaft.*

Disassembly—Clutch Shaft

(1) Remove clutch bearing retaining snap ring.
(2) Remove front bearing from shaft using Arbor Press and Bearing Remover Tool J-6654-01.

CAUTION: *Do not attempt to drive the bearing from the shaft with a hammer. Hammer blows will damage both the bearing and shaft.*

CLEANING AND INSPECTION

Cleaning

Thoroughly wash all parts in solvent and dry them using compressed air. Do not dry the front or rear roller bearings with compressed air. Air dry the bearings or use a clean cloth or paper towel only.

Clean the countershaft needle bearings and clutch shaft roller bearings by wrapping them in a clean shop cloth and submerging them in solvent. Or, place the bearings in a shallow parts cleaning tray and cover them with solvent. Air dry the bearings or use a clean shop cloth or paper towel only.

Inspection

Inspect the transmission components for wear or damage. Replace any components that exhibit the following conditions.

Case

- Cracks in bores, sides, bosses, or at bolt holes.
- Stripped threads in bolt holes.
- Nicks, burrs, rough surfaces in shaft bores or on gasket surfaces.

Gear and Synchronizer Assemblies

- Broken, chipped, or worn gear teeth.
- Damaged splines on synchronizer hubs or sleeves.
- Broken or worn teeth or excessive wear of blocking rings.
- Bent or broken inserts.
- Weak insert springs.
- Damaged needle bearings or bearing bores in countershaft gear.
- Wear or galling of countershaft, clutch shaft, or idler shaft splines.
- Worn thrust washers.
- Nicked, broken, or worn output shaft or clutch shaft splines.
- Bent, distorted, weak snap rings.
- Worn bushings in reverse idler gear.
- Rough, galled, or broken front or rear bearing.

TRANSMISSION ASSEMBLY

(1) Lubricate reverse idler gear shaft and bushings with transmission lubricant.

(2) Coat reverse idler gear thrust washers with petroleum jelly and position thrust washers in case. Be sure to engage thrust washer locating tabs in locating slots in case.

(3) Position reverse idler gear in case. Align gear bore, thrust washers, and case bores, and install reverse idler gear shaft from rear of case. Be sure to align and seat shaft roll pin in counterbore at rear of case (fig. 2B-10).

(4) Measure reverse idler gear end play by inserting feeler gauge between thrust washer and gear. End play should be 0.1016 to 0.4572 mm (0.004 to 0.018-inch). If end play exceeds 0.4572 mm (0.018 -inch), remove idler gear and replace thrust washers.

(5) Coat needle bearing bores in countershaft gear with petroleum jelly.

(6) Insert Countershaft Loading Tool J-25232 in gear bore and install 25 needle bearings at each end of gear.

(7) Coat two needle bearing retainers with petroleum jelly and install one retainer at each end of gear.

(8) Coat countershaft gear thrust washers with petroleum jelly and position thrust washers in case. Be sure to engage thrust washer locating tabs in locating slots in case.

(9) Insert countershaft in rear case bore just far enough to hold rear thrust washer in position. This prevents thrust washer from being displaced during countershaft gear installation.

(10) Position countershaft gear in case. Align gear bore, thrust washers, and case bores and install countershaft (fig. 2B-6).

NOTE: *Do not install the countershaft roll pin at this time and do not remove the countershaft loading tool completely.*

(11) Measure countershaft end play by inserting feeler gauge between front thrust washer and countershaft gear. End play should be 0.1016 to 0.4572 mm (0.004 to 0.018-inch). If end play exceeds 0.4572 mm (0.018-inch), remove gear and replace thrust washers.

(12) Install loading tool completely into countershaft gear after checking, or correcting end play. Allow gear to remain at bottom of case and leave countershaft in rear case bore to hold rear thrust washer in place.

NOTE: *The countershaft gear must remain at the bottom of the case in order to provide sufficient clearance for installation of the output and clutch shaft assemblies.*

(13) Install short lower detent spring in detent bore in case (fig. 2B-11). Drop spring into position at bottom of second-third shift rail bore.

(14) Insert lower detent plug in detent bore in case. Drop plug into place on top of detent spring. If plug becomes cocked in bore, plug can be repositioned using small magnet and screwdriver.

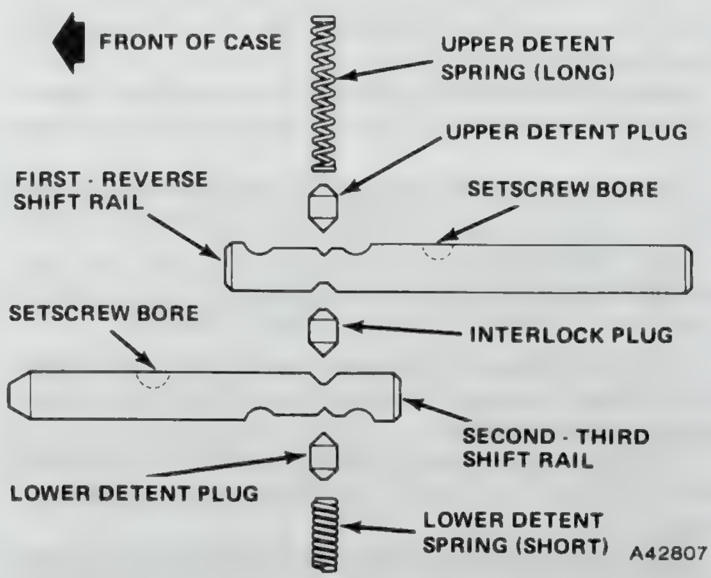

Fig. 2B-11 Installation Sequence—Detent Plugs and Springs

(15) Coat splines and machined surfaces of output shaft with transmission lubricant and start first-reverse sychronizer hub on output shaft splines by hand. Slotted end of hub must face front of shaft.

(16) Install hub completely using arbor press and install retaining snap ring in most rearward groove (fig. 2B-13).

CAUTION: *Do not attempt to drive the hub onto the shaft using a hammer. Hammer blows will damage both the hub and splines.*

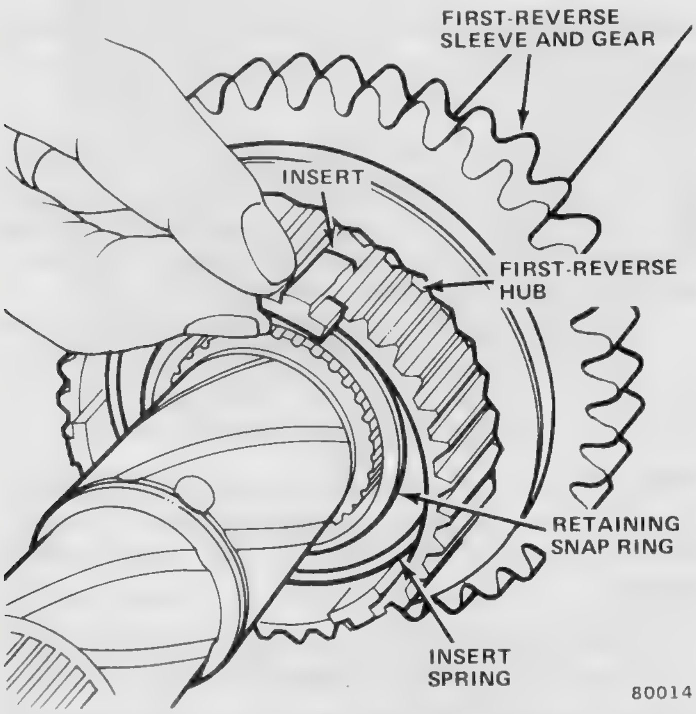

Fig. 2B-12 Installing Retaining Snap Ring in First-Reverse Hub

(17) Coat splines of first-reverse hub with transmission lubricant.

(18) Install first-reverse sleeve and gear halfway onto hub with gear end of sleeve facing rear of shaft. Align sleeve and hub using alignment marks made during disassembly.

(19) Install insert spring in first-reverse hub. Be sure spring is bottomed in hub and covers all three insert slots.

(20) Install three T-shaped inserts in hub with small ends in hub slots and large ends inside hub (fig. 2B-12).

(21) Push inserts into hub until they seat on insert spring, and slide first-reverse sleeve and gear over inserts until inserts engage in sleeve (fig. 2B-13).

(22) Coat bore and blocking ring surface of first gear with transmission lubricant and install blocking ring on tapered surface of gear.

(23) Install first gear on output shaft and rotate gear until notches in blocking ring engage inserts in first-reverse hub.

(24) Install tabbed thrust washer on output shaft with sharp edge facing outward, and install retaining snap ring (fig. 2B-14).

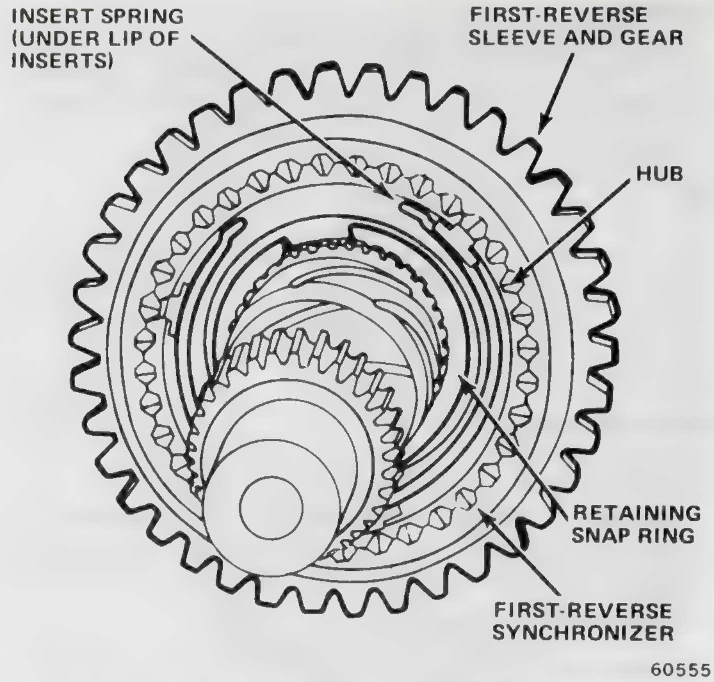

Fig. 2B-13 Snap Ring and Insert Spring Position—First-Reverse Hub

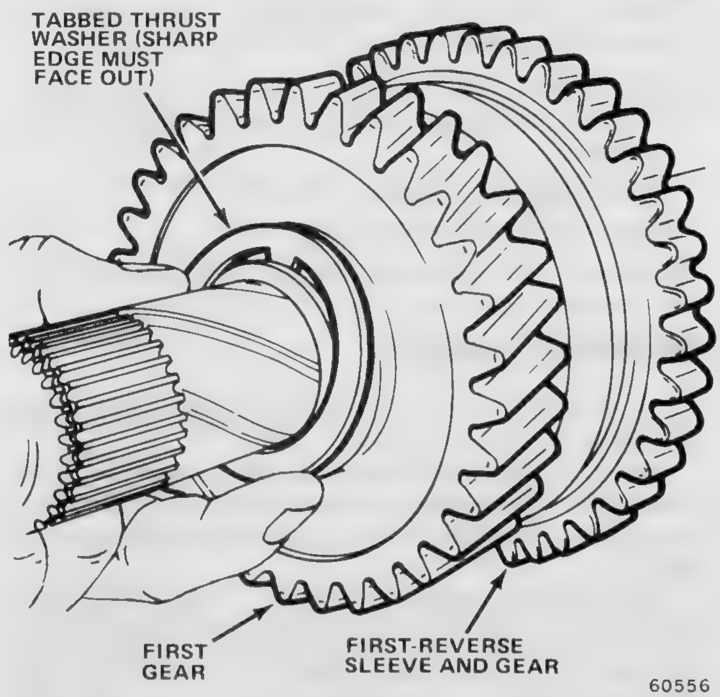

Fig. 2B-14 First Gear Thrust Washer Installation

(25) Coat bore and blocking ring surface of second gear with transmisson lubricant and install second gear blocking ring on tapered surface of gear.

(26) Install second gear on output shaft with tapered surface of gear facing front of output shaft.

(27) Install one insert spring in gear train side of second-third hub. Be sure spring covers all three insert slots in hub.

(28) Align second-third sleeve and hub using alignment marks made during disassembly and start sleeve onto hub.

(29) Install three inserts in hub slots and on top of insert spring, and push sleeve completely onto hub to engage inserts in sleeve (fig. 2B-15).

(30) Install remaining second-third insert spring in exact same position as first spring. Ends of both springs must align and cover same slots in hub.

NOTE: *The inserts have a small lip on each end. When correctly installed, this lip will fit over the insert spring (fig. 2B-15).*

(31) Install second-third synchronizer assembly on output shaft and rotate second gear until notches in blocking ring engage inserts in second-third synchronizer assembly.

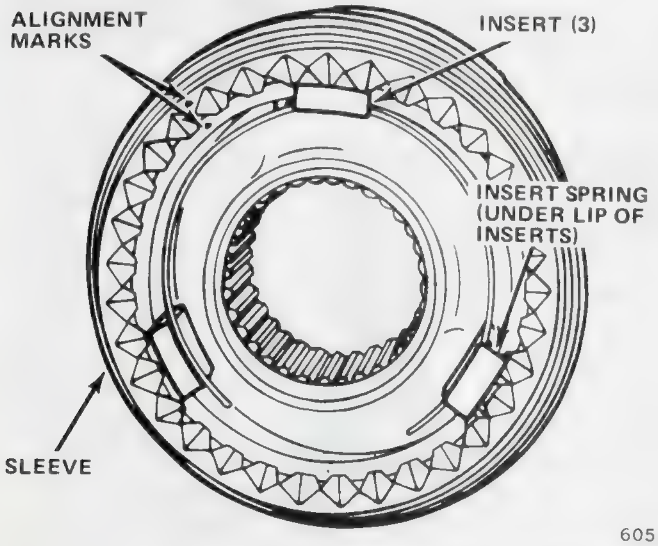

Fig. 2B-15 Second-Third Synchronizer Assembly

(32) Install retaining snap ring on output shaft and measure end play between snap ring and second-third synchronzier hub using feeler gauge (fig. 2B-16). End play should be 0.1016 to 0.3556 mm (0.004 to 0.014 inch). If end play exceeds 0.3556 mm (0.014 inch), replace thrust washer and all snap rings on output shaft assembly.

(33) Install output shaft and geartrain assembly in case. Be sure first-reverse sleeve and gear is in neutral position so gear end of sleeve will clear notch at top of case.

(34) Move second-third sleeve rearward and position second-third shift fork in groove of sleeve. Be sure setscrew hole in shift fork is facing upward.

NOTE: *The tapered end of the shift rail must face the front of the case.*

(35) Rotate shift rail until detent notches in rail face bottom of case.

(36) Insert Phillips screwdriver into detent bore, compress lower detent plug and spring and push shift rail into rear bore. Move rail inward until detent plug engages forward notch in shift rail which is second gear position.

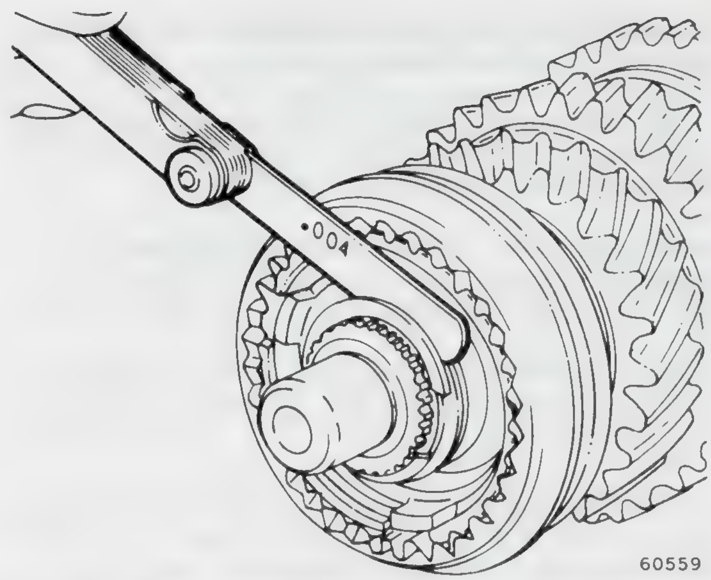

Fig. 2B-16 Measuring Second-Third Synchronizer End Play

(37) Install setscrew in shift fork and move second-third synchronizer to neutral position.

(38) Install center detent plug in detent bore. When second-third synchronizer is in neutral position, top of plug should be slightly below surface of first-reverse shift rail bore.

(39) Move first-reverse synchronizer forward to first gear position.

(40) Place first-reverse shift fork in groove of sleeve with setscrew hole in fork facing upward.

(41) Rotate fork into position, engage fork in shift fork shaft, and install first-reverse shift rail through rear case bore and into fork.

(42) Rotate shift rail until detent notches in rail face upward.

(43) Move shift rail inward until setscrew hole in fork and setscrew bore in shift rail are aligned and install setscrew.

(44) Place first-reverse sleeve and gear in neutral position.

(45) Press front bearing on clutch shaft and install retaining snap ring on shaft and large locating snap ring in bearing groove.

NOTE: *The snap ring groove in the front bearing must face the front of the clutch shaft.*

(46) Coat clutch shaft roller bearing bore with petroleum jelly (only) and install 15 roller bearings.

CAUTION: *Do not use chassis grease or a similar "heavy" grease in the clutch shaft bearing bore. This type grease will plug the lubricant holes in the shaft and prevent proper lubrication of the roller bearings. Use petroleum jelly only.*

(47) Coat blocking ring surface of clutch shaft with transmission lubricant and install blocking ring on shaft.

(48) Support output shaft assembly and insert clutch shaft into front bearing bore of case.

(49) Seat output shaft pilot hub in clutch shaft roller bearings and seat front bearing (and clutch shaft) in case using plastic or rawhide mallet.

(50) Apply thin film of sealer to front bearing cap gasket and position gasket on case. Be sure cutout in gasket is aligned with oil return hole in case.

(51) Remove front bearing cap oil seal using screwdriver and install replacement oil seal using Installer Tool J-25303 (fig. 2B-17).

(52) Install front bearing cap and tighten attaching bolts to 44.7 newton meters (33 foot-pounds) torque. Position cap on case using alignment marks made at disassembly. Be sure oil return slot in cap is aligned with oil return hole in case.

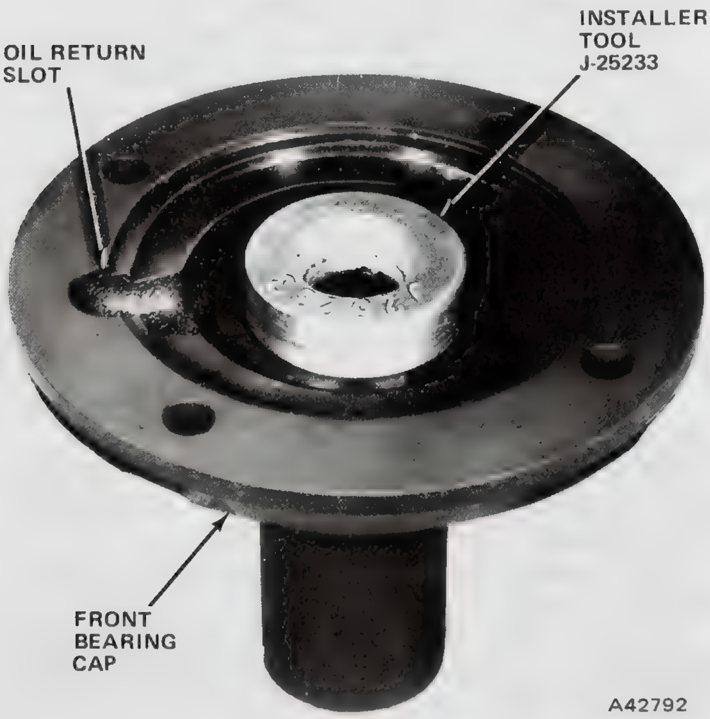

Fig. 2B-17 Front Bearing Cap Oil Seal Installation

(53) Install large locating snap ring on rear output shaft bearing and install bearing on shaft with snap ring groove facing rear of shaft.

(54) Seat rear bearing in case using Installer Tool J-25234 (fig. 2B-18) and install rear bearing retaining snap ring on output shaft.

(55) Install speedometer drive gear lock ball in shaft, slide gear onto shaft and over lock ball, and install gear retaining snap ring.

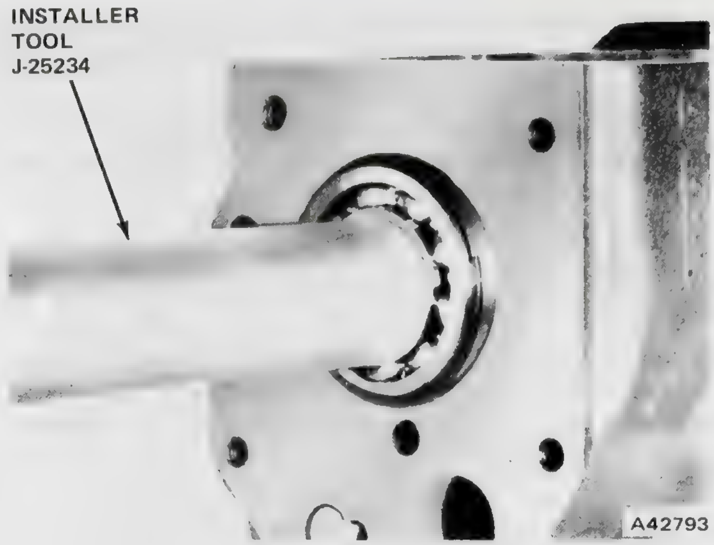

Fig. 2B-18 Rear Bearing Installation

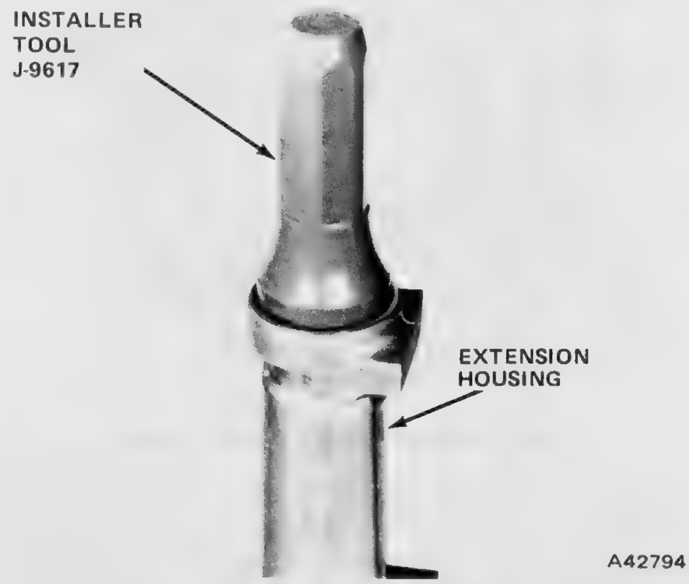

Fig. 2B-19 Extension Housing Oil Seal Installation

(56) Align bores in case, countershaft gear and front thrust washer and start countershaft into countershaft gear. Before countershaft is completely installed, be sure that roll pin hole in countershaft is aligned with roll pin holes in case. When holes are aligned, tap contershaft into place, remove loading tool, and install roll pin in case.

NOTE: *A magnet can be used to insert and start the roll pin into the hole in the case.*

(57) Coat extension housing gasket with sealer and position gasket on case.

(58) Remove extension housing oil seal using screwdriver and install replacement seal using Installer Tool J-9617 (fig. 2B-19).

(59) Coat extension housing-to-case bolts with sealer and install extension housing. Tighten attaching bolts to 62.3 newton meters (46 foot-pounds) torque.

(60) Coat edges of expansion plug with sealer and install it in second-third shift rail bore at front of case. Be sure plug is fully seated in bore, and is approximately 1.5875 mm (1/16 inch) below surface of case.

(61) Install upper detent plug in detent bore, and install long detent spring on top of plug.

(62) Install transmission fill plug and tighten to 15 foot-pounds torque.

(63) Install backup lamp switch in extension housing and TCS switch in case if equipped. Tighten switches to 24.4 newton meters (18 foot-pounds) torque.

(64) Place transmission in gear and pour 1.41 litres (3.0 pints) of transmission lubricant over gear train and into case while rotating clutch shaft. Check transmission operation in all gear positions.

(65) Coat top cover gasket with sealer and position gasket on case.

(66) Install top cover on case and install attaching bolts. Tighten bolts to 29.8 newton meters (22 foot-pounds) torque.

(67) Install shifter levers on shift fork shafts and tighten retaining nuts to 27.1 newton meters (20 foot-pounds) torque.

SPECIFICATIONS

Transmission Specifications

Lubrication Frequency
Inspection/Correct Fill Level . . . . Every 5,000 Miles

Lubricants
Recommended . . . . SAE 80W-90 Gear Lubricant
Acceptable . . . . SAE 80W or 90W Gear Lubricant

CAUTION: Gear lubricants containing ingredients such as lead, sulphur, or chlorine compounds must not be used.

Capacity
Metric Measure . . . . 1.41 liters
U.S. Measure . . . . 3.0 pints
Imperial Measure . . . . 3.5 pints

End Play Tolerance
Countershaft Gear to Case . . . . 0.004 to 0.018 inch (0.102 to 0.457 mm)
Reverse Idler Gear to Case . . . . 0.004 to 0.018 inch (0.102 to 0.457 mm)
Output Shaft Gear Train End Play . . . . 0.004 to 0.014 inch (0.102 to 0.356 mm)

Gear Ratios
First 2.56:1
Second 1.75:1
Third 2.03:1
Reverse 3.77:1

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Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft.lbs.)	
	Service Set-To Torque	Service In-Use Recheck Torque	Service Set-To Torque	Service In-Use Recheck Torque
Backup Lamp Switch	24	20-27	18	15-20
Extension Housing Bolts	62	57-68	46	42-50
Fill Plug	20	14-27	15	10-20
Front Bearing Cap Bolts	45	41-49	33	30-36
Rear Crossmember Stud Nut	41	38-43	30	28-32
Rear Support Cushion-to-Transmission Bolt	30	27-33	22	20-24
Shifter Lever Retaining Nut	27	24-31	20	18-23
Top Cover Bolts	30	27-34	22	20-25
Transmission Controlled Spark (TCS) Switch	24	20-27	18	15-20
Transmission-to-Clutch Housing Bolt	75	61-88	55	45-65

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

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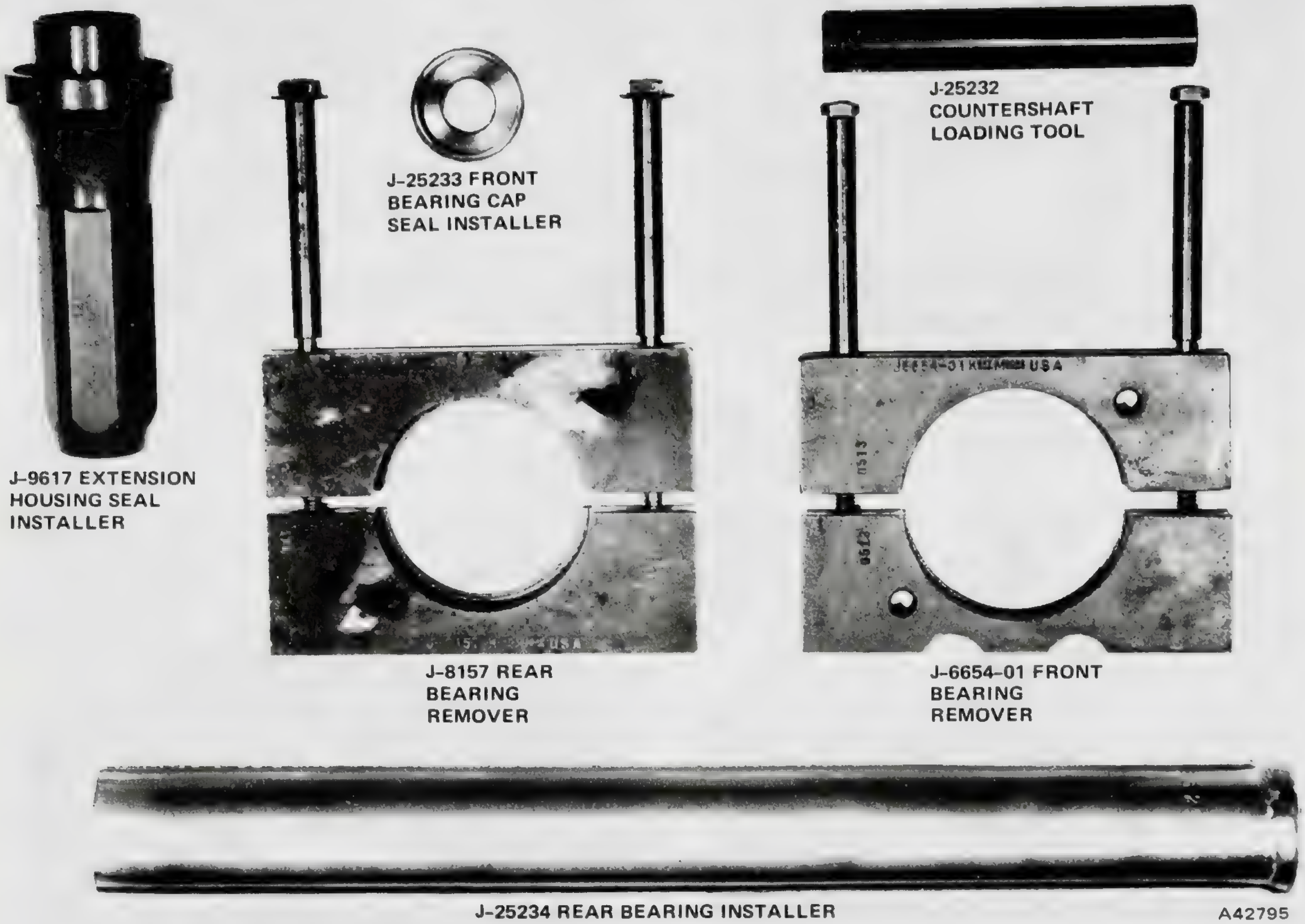
Special Tools



TRANSMISSION SERVICE—MODEL SR4

GEARSHIFT LEVER

Removal

(1) Shift transmission into neutral.

(2) Remove screws attaching gearshift lever bezel to floorpan (fig. 2B-20).

(3) Pull bezel and boot upward on gearshift lever to provide access to lever attaching bolts.

(4) Remove bolts attaching gearshift lever to lever mounting flange on transmission extension housing (fig. 2B-20).

(5) Pull gearshift lever straight up-and-out of transmission extension housing.

Installation

(1) Install gearshift lever in transmission extension housing. Be sure gearshift lever fork is seated on offset lever bushing.

(2) Align gearshift lever mounting flange on extension housing and install lever attaching bolts. Tighten bolts to 18 foot-pounds (24.4 Nm) torque.

NOTE: *The gearshift lever attaching bolts are not metric size bolts.*

(3) Position boot and bezel on floorpan and install bezel attaching screws.

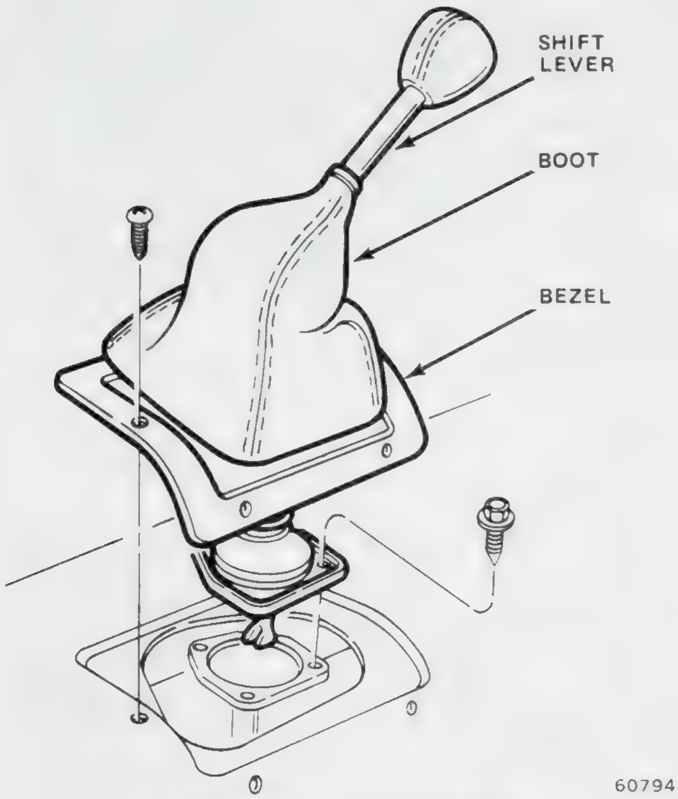


Fig. 2B-20 Gearshift Lever—Model SR4

TRANSMISSION DISASSEMBLY

CAUTION: *Except for the gearshift lever attaching bolts and fill plug, all threaded holes and bolts used in the Model SR4 Transmission case are metric sizes. Do not attempt to substitute a different thread-type bolt if the original ones are lost.*

(1) Remove large access plug from extension housing using hammer and punch (fig. 2B-21).

(2) Remove flanged nut attaching offset lever to shift rail (fig. 2B-22) and remove offset lever.

(3) Remove extension housing drain bolt (fig. 2B-23) and drain lubricant.

(4) Remove remaining extension housing attaching bolts and remove housing and gasket.

(5) Remove extension housing oil seal (fig. 2B-24). Use screwdriver to pry seal out of housing.

(6) Remove rear crossmember from extension housing if crossmember or housing require replacement.

(7) Remove transmission cover assembly and gasket. Discard cover gasket.

NOTE: *Two of the transmission cover attaching bolts are alignment-type dowel bolts (fig. 2B-25). Note the location of these bolts for assembly reference.*

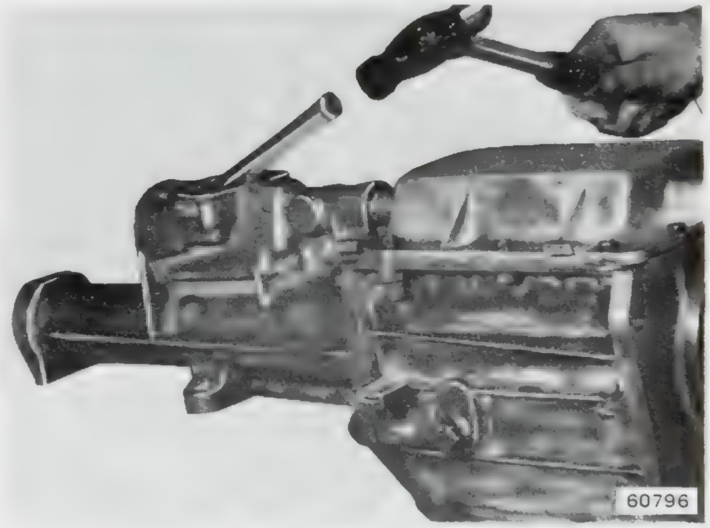


Fig. 2B-21 Access Plug Removal

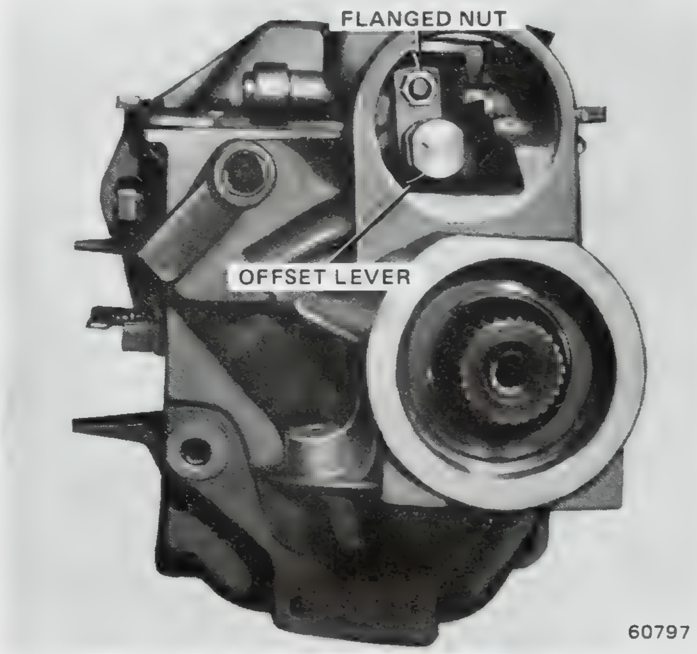


Fig. 2B-22 Offset Lever Retaining Nut

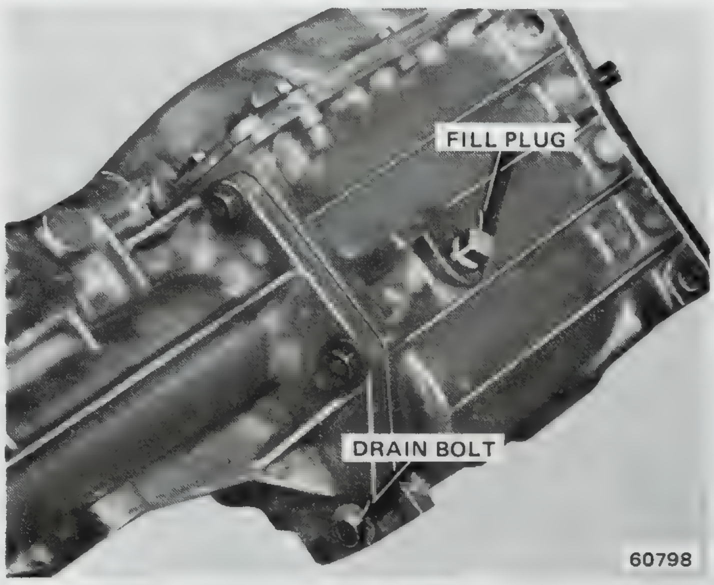
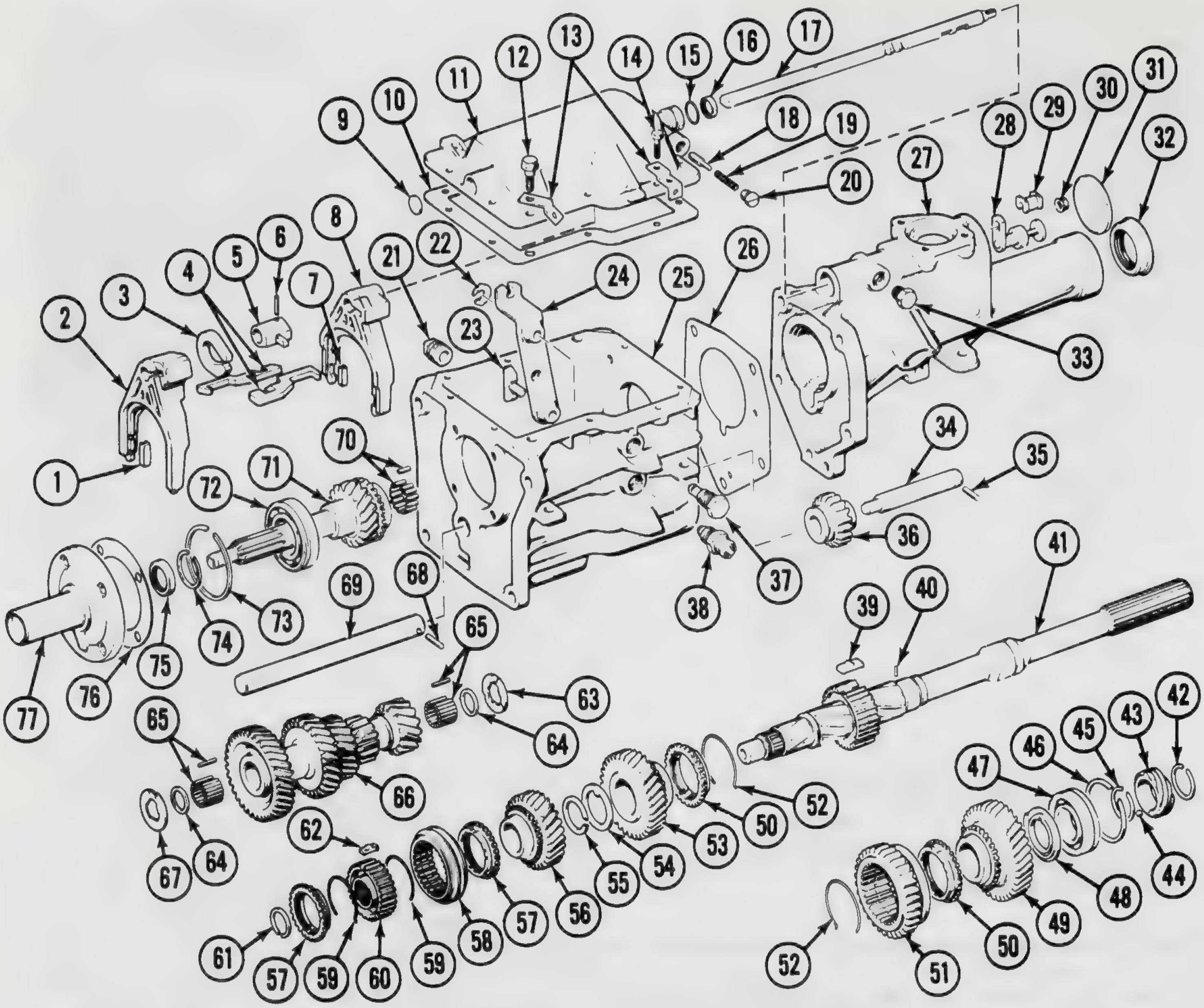


Fig. 2B-23 Drain Bolt and Fill Plug Location



1. THIRD – FOURTH SHIFT FORK INSERT
2. THIRD – FOURTH SHIFT FORK
3. SELECTOR INTERLOCK PLATE
4. SELECTOR ARM PLATE (2)
5. SELECTOR ARM
6. SELECTOR ARM ROLL PIN
7. FIRST – SECOND SHIFT FORK INSERT
8. FIRST – SECOND SHIFT FORK
9. SHIFT RAIL PLUG
10. TRANSMISSION COVER GASKET
11. TRANSMISSION COVER
12. TRANSMISSION COVER DOWEL BOLT (2)
13. CLIP
14. TRANSMISSION COVER BOLT (8)
15. SHIFT RAIL O-RING SEAL
16. SHIFT RAIL OIL SEAL
17. SHIFT RAIL
18. DETENT PLUNGER
19. DETENT SPRING
20. DETENT PLUG
21. FILL PLUG
22. REVERSE LEVER PIVOT BOLT C-CLIP
23. REVERSE LEVER FORK
24. REVERSE LEVER
25. TRANSMISSION CASE
26. EXTENSION HOUSING GASKET
27. EXTENSION HOUSING
28. OFFSET LEVER
29. OFFSET LEVER INSERT
30. OFFSET LEVER RETAINING NUT
31. ACCESS PLUG
32. EXTENSION HOUSING OIL SEAL
33. THREADED PLUG
34. REVERSE IDLER SHAFT
35. REVERSE IDLER SHAFT ROLL PIN
36. REVERSE IDLER GEAR
37. REVERSE LEVER PIVOT BOLT
38. BACKUP LAMP SWITCH
39. FIRST – SECOND SYNCHRONIZER INSERT (3)
40. FIRST GEAR ROLL PIN
41. OUTPUT SHAFT AND HUB ASSEMBLY
42. SPEEDOMETER GEAR SNAP RING
43. SPEEDOMETER GEAR
44. SPEEDOMETER GEAR DRIVE BALL
45. REAR BEARING RETAINING SNAP RING
46. REAR BEARING LOCATING SNAP RING
47. REAR BEARING
48. FIRST GEAR THRUST WASHER
49. FIRST GEAR
50. FIRST – SECOND SYNCHRONIZER BLOCKING RING (2)
51. FIRST – REVERSE SLEEVE AND GEAR
52. FIRST – SECOND SYNCHRONIZER INSERT SPRING (2)
53. SECOND GEAR
54. SECOND GEAR THRUST WASHER (TABBED)
55. SECOND GEAR SNAP RING
56. THIRD GEAR
57. THIRD – FOURTH SYNCHRONIZER BLOCKING RING (2)
58. THIRD – FOURTH SYNCHRONIZER SLEEVE
59. THIRD – FOURTH SYNCHRONIZER INSERT SPRING (2)
60. THIRD – FOURTH SYNCHRONIZER HUB
61. OUTPUT SHAFT SNAP RING
62. THIRD – FOURTH SYNCHRONIZER INSERT (3)
63. COUNTERSHAFT GEAR REAR THRUST WASHER (METAL)
64. COUNTERSHAFT NEEDLE BEARING RETAINER (2)
65. COUNTERSHAFT NEEDLE BEARING (50)
66. COUNTERSHAFT GEAR
67. COUNTERSHAFT GEAR FRONT THRUST WASHER (PLASTIC)
68. COUNTERSHAFT ROLL PIN
69. COUNTERSHAFT
70. CLUTCH SHAFT ROLLER BEARINGS (15)
71. CLUTCH SHAFT
72. FRONT BEARING
73. FRONT BEARING LOCATING SNAP RING
74. FRONT BEARING RETAINING SNAP RING
75. FRONT BEARING CAP OIL SEAL
76. FRONT BEARING CAP GASKET
77. FRONT BEARING CAP

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Fig. 2B-24 Model SR4 4-Speed Transmission—Exploded View

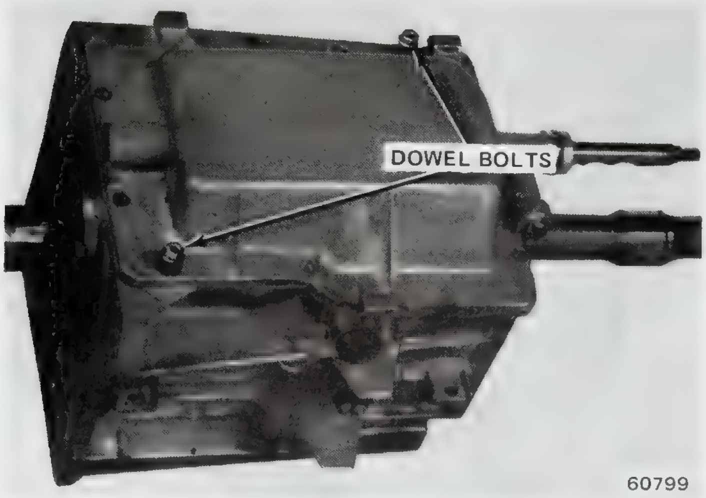


Fig. 2B-25 Transmission Cover Dowel Bolt Location

(8) Remove spring clip that attaches reverse lever to reverse lever pivot bolt (fig. 2B-24).

(9) Remove reverse lever pivot bolt (fig. 2B-26) and remove reverse lever and reverse lever fork as assembly.

(10) Punch alignment marks in front bearing cap and transmission case for assembly reference and remove bearing cap and gasket. Discard gasket.

(11) Remove speedometer gear snap ring and remove speedometer gear and drive ball.

(12) Remove small retaining and large locating snap rings from front and rear bearings.

(13) Remove front bearing from clutch shaft using Bearing Remover J-8157-01, Puller Bolts J-26636, and Puller Assembly J-25152 (fig. 2B-27), and remove clutch shaft from case.

(14) Remove rear bearing from output shaft using Bearing Remover J-8157-01, Puller Bolts J-26636, and Puller Assembly J-25152 (fig. 2B-28).

(15) Remove output shaft and gear train as assembly. Do not allow first-second or third-fourth synchronizer sleeves to separate from hubs during removal.

(16) Push reverse idler gear shaft out rear of case and remove shaft and reverse idler gear.

(17) Remove countershaft from rear of case using Countershaft Loading Tool J-26624 (fig. 2B-29).

(18) Remove countershaft gear and loading tool as assembly and remove countershaft gear thrust washers and any clutch shaft pilot bearings that fell into case during disassembly.

NOTE: *The countershaft gear front thrust washer is plastic. The rear washer is metal.*

(19) Remove countershaft loading tool, needle bearing retainers and 50 needle bearings from countershaft gear.

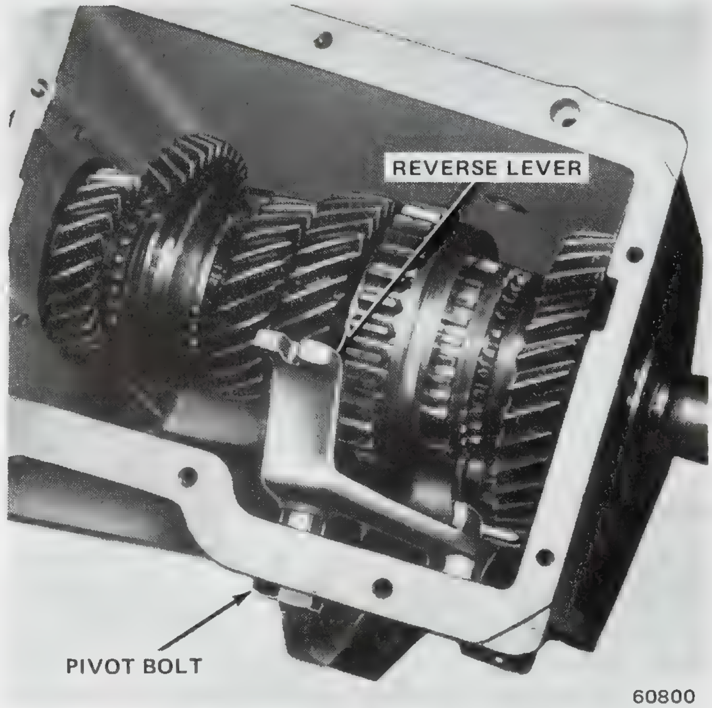


Fig. 2B-26 Reverse Lever and Pivot Bolt

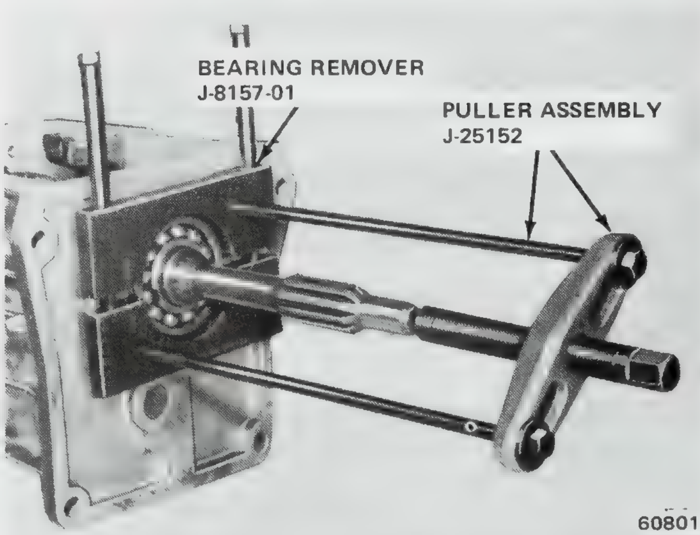


Fig. 2B-27 Front Bearing Removal

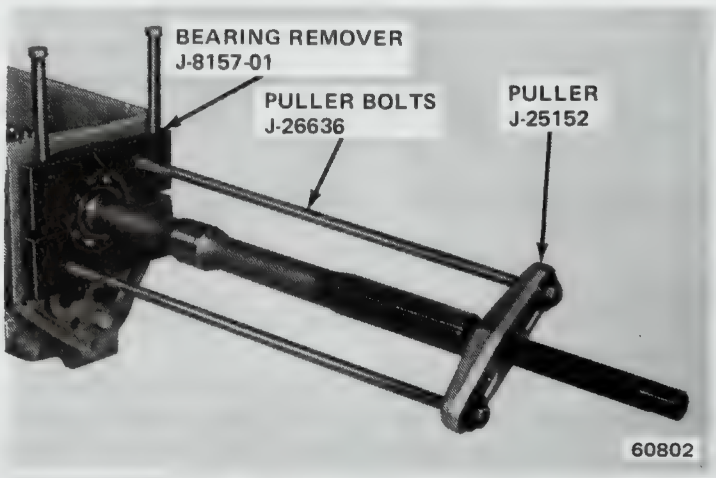


Fig. 2B-28 Rear Bearing Removal

Fig. 2B-29 Countershaft Removal/Installation

Disassembly—Output Shaft Gear Train

(1) Scribe alignment marks on third-fourth synchronizer hub and sleeve for assembly alignment reference (fig. 2B-30).

(2) Remove output shaft snap ring (fig. 2B-24) and remove third-fourth synchronizer assembly.

(3) Disassemble third-fourth synchronizer assembly. Remove blocking rings, insert springs, and inserts and separate synchronizer sleeve from hub.

(4) Remove third gear.

(5) Remove second gear retaining snap ring, remove tabbed thrust washer and remove second gear and blocking ring.

(6) Remove first gear thrust washer (fig. 2B-31) and first gear roll pin (fig. 2B-32) from rear of output shaft. Use diagonal cutters to remove roll pin.

NOTE: *The thrust washer has an oil groove and roll pin locating slot on one side. This side must face first gear when assembled.*

(7) Remove first gear and blocking ring.

(8) Scribe alignment marks on first-second synchronizer sleeve and output shaft hub for assembly reference.

(9) Remove insert spring and inserts from first-second sleeve and remove sleeve from output shaft hub.

CAUTION: *Do not attempt to remove the first-second-reverse hub from the output shaft. The hub and shaft are assembled and machined as a matched unit during manufacture, to insure concentricity.*

Disassembly—Transmission Cover Assembly

(1) Remove detent plug, spring, and plunger (fig. 2B-33).

(2) Place selector arm plates and shift rail in neutral position (centered).

(3) Rotate shift rail counterclockwise until selector arm disengages from selector arm plates and selector arm roll pin is accessible (fig. 2B-34).

(4) Pull shift rail rearward until selector arm contacts first-second shift fork.

Fig. 2B-30 Marking Third-Fourth Synchronizer Assembly

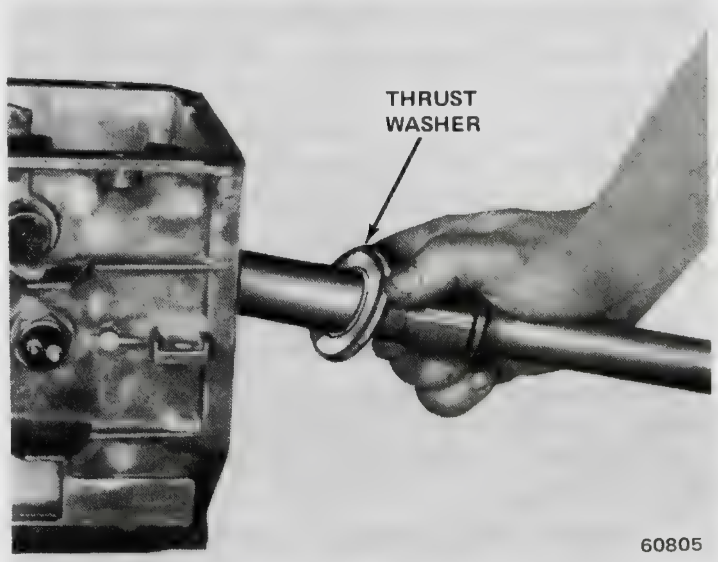


Fig. 2B-31 First Gear Thrust Washer Removal/Installation

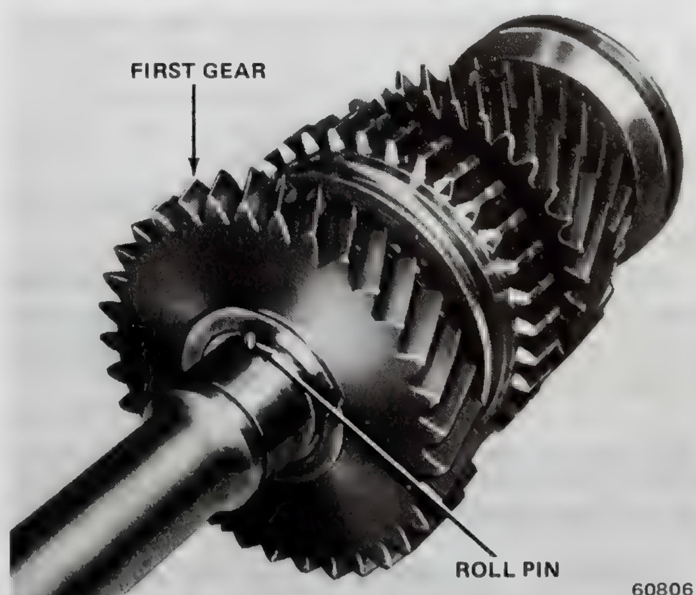


Fig. 2B-32 First Gear Roll Pin Location

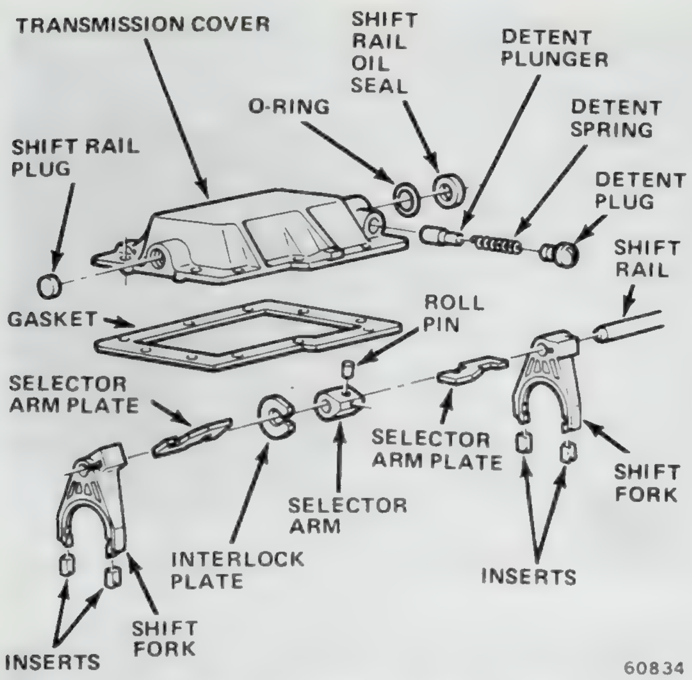


Fig. 2B-33 Transmission Cover Assembly

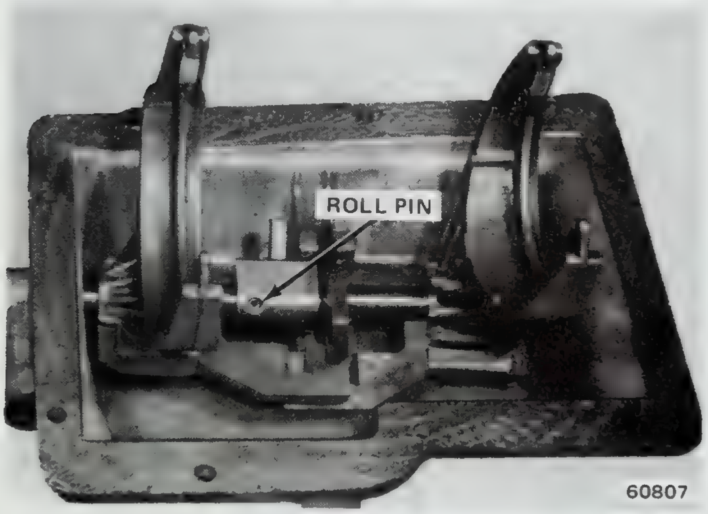


Fig. 2B-34 Roll Pin Location

(5) Remove selector arm roll pin using 3/16 pin punch and remove shift rail.

(6) Remove shift forks, selector arm plates, selector arm and roll pin, and interlock plate.

(7) Remove shift rail oil seal and O-ring using screwdriver.

(8) Remove shift rail plug using hammer and punch.

(9) Remove nylon inserts and selector arm plates from shift forks. Note position of inserts and plates for assembly reference.

CLEANING AND INSPECTION

Thoroughly wash all parts in solvent and dry them with compressed air. Do not dry the front or rear bearings with compressed air. Allow them to air dry or wipe them dry with a clean shop cloth.

Clean the needle and roller bearings by wrapping them in a cloth and submerging the cloth and bearings in solvent. Or, place them in a shallow parts cleaning tray and cover them with solvent. Allow the bearings to air dry or wipe them dry with a clean shop cloth.

Inspect the transmission case, cover, and extension housing. Replace any of these parts if they exhibit the following conditions:

- Cracks in bores, sides, bosses, or at bolt holes.
- Stripped threads in bolt holes.
- Nicks, burrs, rough surfaces in shaft bores or on gasket surfaces.

Inspect the gear train and shift mechanism. Replace any parts that exhibit the following conditions:

- Broken, chipped, or worn gear teeth.
- Bent or broken inserts.
- Weak or broken insert springs.
- Damaged roller or needle bearings, or bearing bores in countershaft gear or clutch shaft.
- Worn or galled countershaft and hub, clutch shaft or reverse idler gear shaft.
- Worn thrust washers.
- Nicked, broken, or worn output or clutch shaft splines.
- Bent, distorted, or weak snap rings.
- Worn bushings in reverse idler gear.
- Rough, galled, or broken front or rear bearing.
- Worn shift fork inserts.
- Broken, cracked, or worn shift forks.
- Bent, worn, or galled shift rail.
- Worn, bent, or broken selector arms, plates, or interlock.
- Worn, bent, broken, or stripped offset lever or worn lever insert.

TRANSMISSION ASSEMBLY

Assembly—Transmission Cover

(1) Install nylon inserts and selector arm plates in shift forks (fig. 2B-35).

(2) Install shift rail plug. Coat edges of plug with sealer before installing.

(3) Coat shift rail and shift rail bores with petroleum jelly and insert shift rail in cover. Install rail until end of rail is flush with inside edge of cover.

(4) Position first-second shift fork in cover with fork offset facing rear of cover and push shift rail through fork.

NOTE: *The first-second shift fork is the larger of the two forks.*

(5) Position selector arm and C-shaped interlock plate in cover and insert shift rail through arm. Widest part of interlock plate must face away from cover, and selector arm roll pin hole must face downward and toward rear of cover.

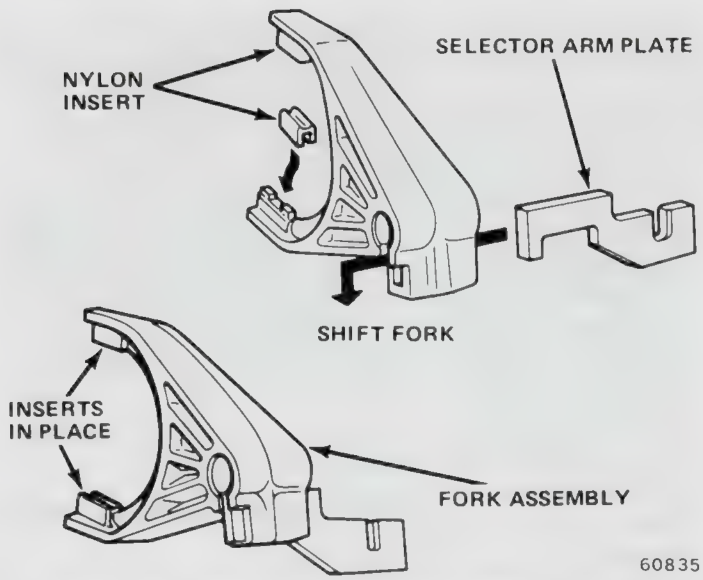
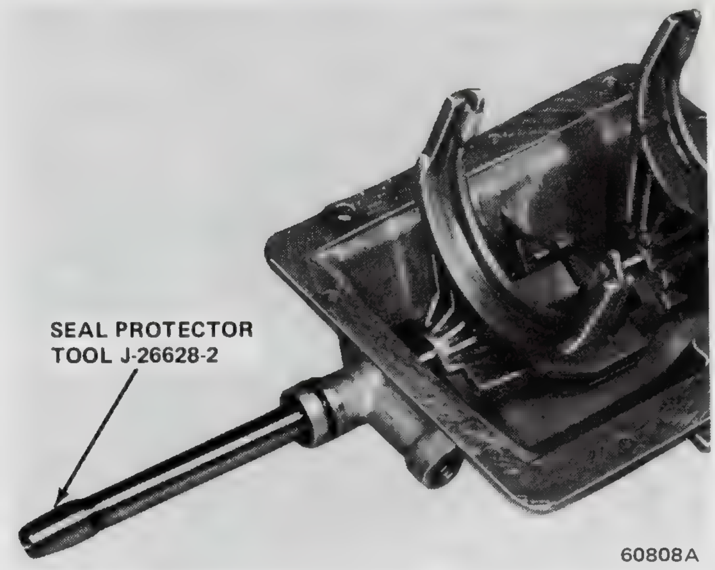
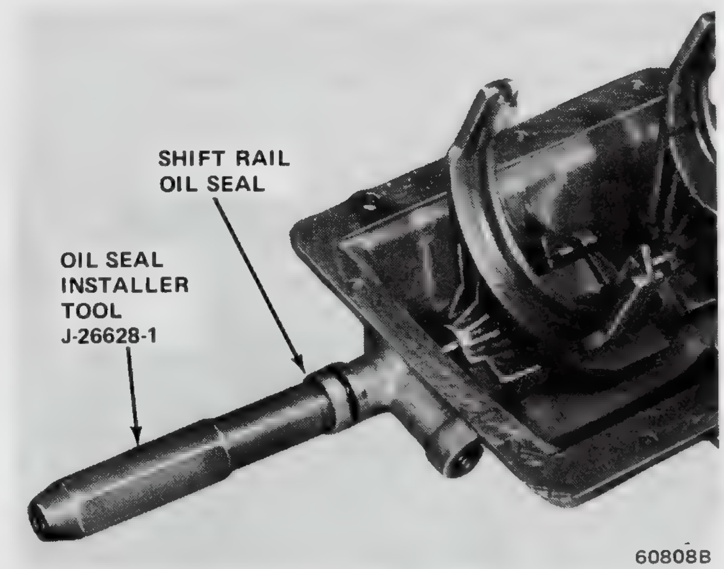


Fig. 2B-35 Assembling Shift Forks and Selector Arm Plates



VIEW A



VIEW B

Fig. 2B-36 Shift Rail Oil Seal Installation

(6) Position third-fourth shift fork in cover with fork offset facing rear of cover. Third-fourth shift fork selector arm plate must be positioned under first-second shift fork selector arm plate.

(7) Insert shift rail through third-fourth shift fork and into front shift rail bore in cover.

(8) Rotate shift rail until selector arm plate at forward end of rail faces away from, but is parallel to cover.

(9) Align roll pin holes in selector arm and shift rail and install roll pin. Be sure roll pin is installed flush with surface of selector arm to prevent pin from contacting selector arm plates during shifts.

(10) Install detent plunger, spring, and plug.

(11) Install O-ring in groove of shift rail oil seal.

(12) Install shift rail oil seal as follows:

(a) Install Oil Seal Protector Tool J-26628-2 over threaded end of shift rail (fig. 2B-36, View A).

(b) Lubricate lip of oil seal with petroleum jelly and slide seal over protector and onto shift rail.

(c) Seat oil seal in transmission cover using Oil Seal Installer Tool J-26628-1 (fig. 2B-36, View B).

Assembly—Output Shaft Gear Train

(1) Coat output shaft and gear bores with transmission lubricant.

(2) Install and align first-second synchronizer sleeve on output shaft hub using reference marks made at disassembly.

(3) Install three first-second synchronizer inserts and two insert springs in first-second synchronizer sleeve. Engage tang end of each insert spring in same synchronizer insert but position open ends of springs so they face away from one another. Refer to third-fourth synchronizer insert spring assembly illustration.

(4) Place blocking ring on first gear and install gear and ring on output shaft. Be sure synchronizer inserts engage notches in first gear blocking ring.

(5) Install first gear roll pin in output shaft (fig. 2B-32).

(6) Place blocking ring on second gear and install gear and ring on output shaft. Be sure synchronizer inserts engage notches in second gear blocking ring.

(7) Install second gear thrust washer and snap ring on output shaft. Be sure sharp edge of washer faces outward and that tab is engaged in output shaft notch.

(8) Measure second gear end play using feeler gauge (fig. 2B-37). Insert gauge between gear and thrust washer. End play should be 0.1016 to 0.3556 mm (0.004 to 0.014 inch). If end play is over 0.3556 mm (0.014 inch), replace thrust washer and snap ring and inspect synchronizer hub for excessive wear on thrust faces.

NOTE: *If any output shaft gear is replaced, the countershaft gear must also be replaced to maintain proper gear mesh and avoid noisy operation.*

Fig. 2B-37 Measuring Second Gear End Play

(9) Place blocking ring on third gear and install gear and ring on output shaft.

(10) Install and align third-fourth synchronizer sleeve on third-fourth synchronizer hub using reference marks made at disassembly.

(11) Install three third-fourth synchronizer inserts and two insert springs in third-fourth synchronizer sleeve. Engage tang end of each insert spring in same synchronizer insert but position open ends of springs so they face away from one another (fig. 2B-38).

(12) Install assembled third-fourth synchronizer on output shaft with machined groove in synchronizer hub facing forward and install output shaft snap ring. Be sure synchronizer inserts engage notches in third gear blocking rings.

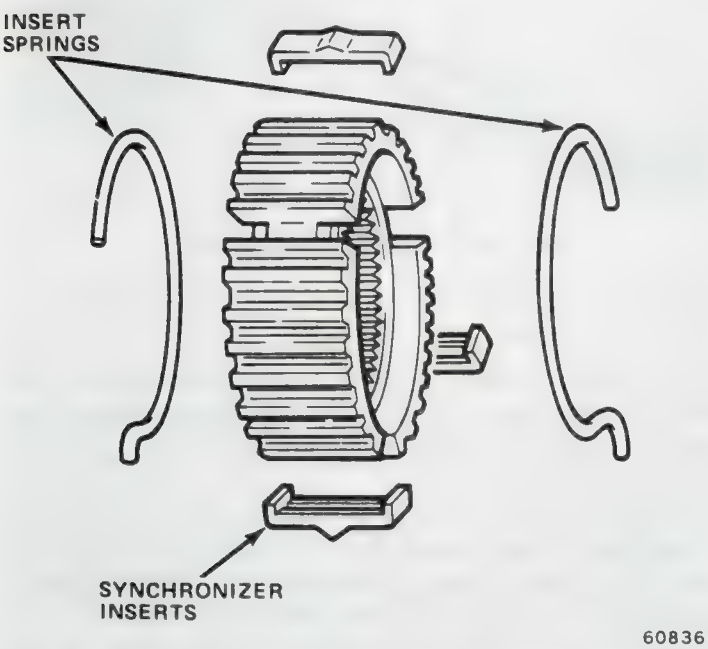


Fig. 2B-38 Third-Fourth Synchronizer Spring Installation

(13) Measure third-fourth synchronizer end play using feeler gauge (fig. 2B-39). Insert gauge between output shaft snap ring and third-fourth synchronizer hub. End play should be 0.1016 to 0.3556 mm (0.004 to 0.014 inch). If end play is over 0.3556 mm (0.014 inch), replace snap ring and inspect synchronizer hub for excessive wear on thrust faces.

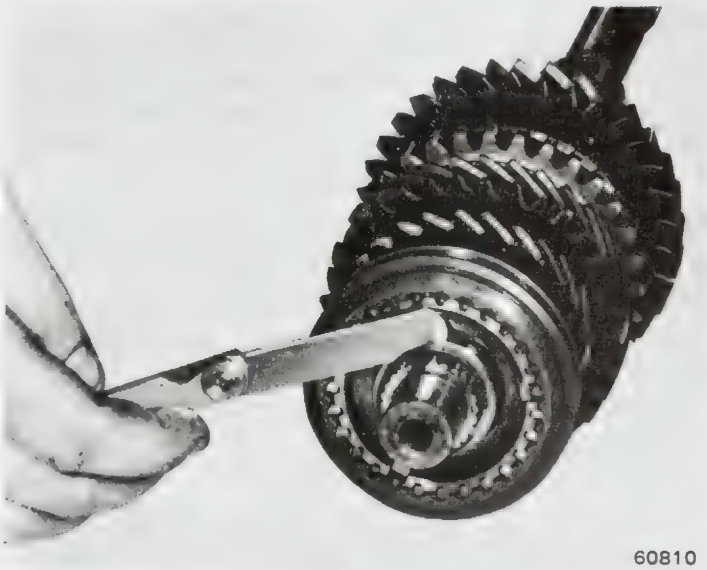


Fig. 2B-39 Measuring Third-Fourth Synchronizer End Play

NOTE: *If any output shaft gear is replaced, the countershaft gear must also be replaced to maintain proper gear mesh and prevent noisy operation.*

Assembly—Transmission Case

CAUTION: *Except for the gearshift lever attaching bolts and fill plug, all threaded holes and bolts used in the Model SR4 Transmission are metric sizes. Do not attempt to substitute a different thread-type bolt if the original ones are lost.*

(1) Coat countershaft gear thrust washers with petroleum jelly and position washers in case.

NOTE: *Install the plastic washer at the front of the case and the metal washer at the rear.*

(2) Insert Countershaft Loading Tool J-26624 in countershaft gear. Install 50 needle bearings in bearing bores at front and rear of gear and install needle bearing retainers. Lubricate bearings with petroleum jelly during installation.

(3) Position assembled countershaft gear in case and install countershaft from rear of case (fig. 2B-39). Be sure that thrust washers are not displaced during installation of countershaft and gear.

(4) Position reverse idler gear in case with shift lever groove facing front of case and install reverse idler shaft from rear of case.

(5) Install output shaft and gear train in case. Do not disturb position of synchronizer assemblies during installation.

(6) Install fourth gear blocking ring in third-fourth synchronizer sleeve. Be sure synchronizer inserts engage notches in blocking ring.

(7) Coat pilot roller bearing bore of clutch shaft with petroleum jelly (only) and install 15 roller bearings. Install clutch shaft in case and engage it with third-fourth synchronizer sleeve and blocking ring.

(8) Install front bearing using tool J-22697 (fig. 2B-40). Start front bearing onto clutch shaft. Position output shaft first gear against rear of case. Align bearing with bearing bore in case and drive bearing completely onto clutch shaft and into case.

NOTE: *To identify the front and rear bearings, inspect the bearing races. The rear bearing race has a notch in it, while the front bearing race does not.*

(9) Install front bearing retaining and locating snap rings.

(10) Install front bearing cap oil seal in front bearing cap using tool J-26625 (fig. 2B-41).

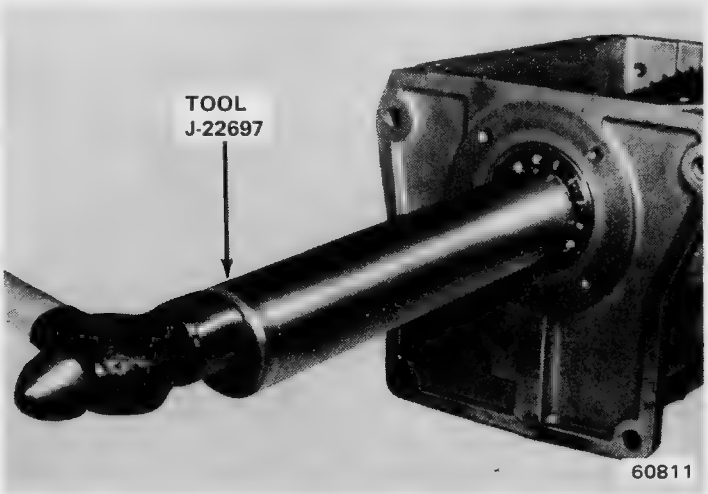


Fig. 2B-40 Front Bearing Installation

(11) Install front bearing cap gasket and front bearing cap. Be sure to align groove in cap and cutout in gasket with oil hole in case. Coat bearing cap bolts with nonhardening sealer and install bolts. Tighten bolts to 17.6 Nm (13 foot-pounds) torque.

(12) Install first gear thrust washer on output shaft. Be sure side of washer with oil groove faces first gear after installation.

(13) Install rear bearing using tool J-25234 (fig. 2B-42).

CAUTION: *Be sure the first gear thrust washer is correctly installed and is engaged on the first gear roll pin before installing the rear bearing.*

(14) Install retaining and locating snap rings on rear bearing.

(15) Install speedometer gear drive ball in output shaft and install speedometer gear and snap ring.

(16) Position reverse lever in case. Apply nonhardening sealer to threads of reverse lever pivot bolt and partially install bolt in case. Mount reverse lever on pivot bolt, install spring clip and tighten pivot bolt to 27.1 Nm (20 foot-pounds) torque.

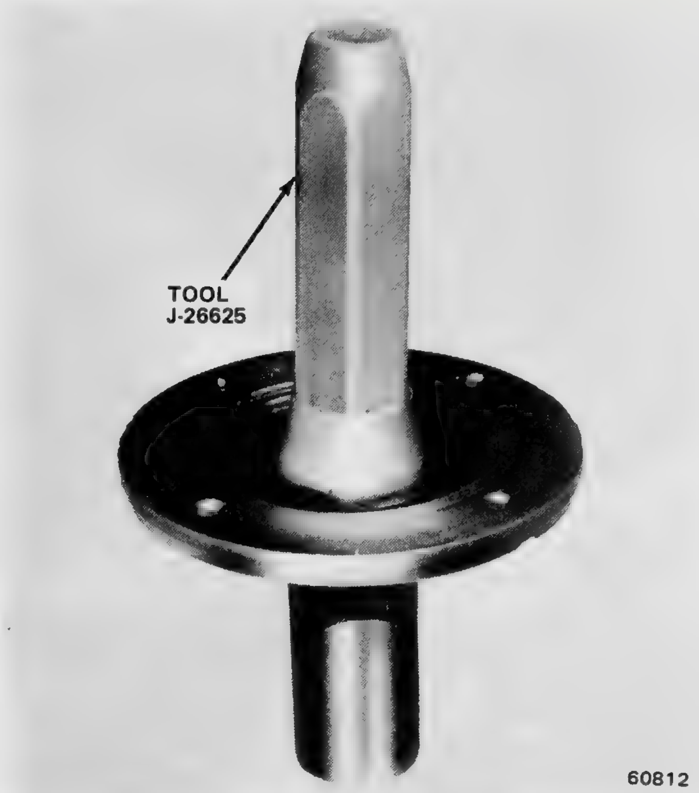


Fig. 2B-41 Front Bearing Cap Oil Seal Installation

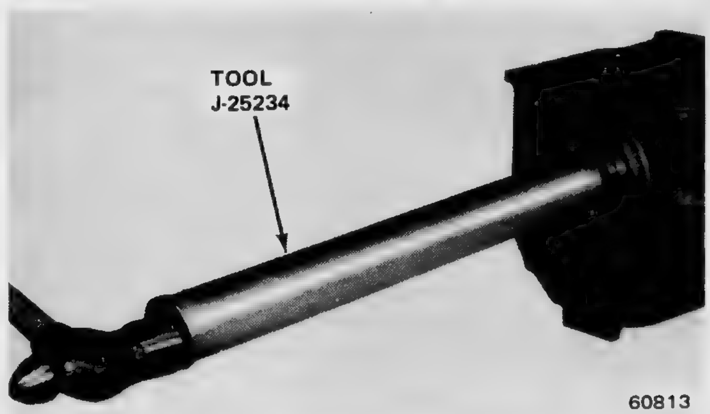


Fig. 2B-42 Rear Bearing Installation

NOTE: *Be sure the reverse lever fork is engaged in the reverse idler gear.*

(17) Rotate clutch shaft and output shaft gears. If blocking rings tend to stick on gear cones, release the rings by gently prying them off the cones using a screwdriver.

(18) Place reverse lever in neutral position, position transmission cover gasket and cover assembly on case, and install cover bolts. Alternately and evenly tighten cover bolts to 13.5 Nm (10 foot-pounds) torque.

CAUTION: *The two cover dowel bolts must be installed in the proper location to maintain cover alignment and prevent hard shifting. Refer to figure 2B-25 for correct bolt location.*

(19) Position extension housing gasket on case and carefully install extension housing.

(20) Apply nonhardening sealer to extension housing access plug and install plug.

(21) Pour 1.41 litres (3 pints) of transmission lubricant into transmission case through fill hole and install fill plug. Tighten plug to 31.1 Nm (23 foot-pounds) torque.

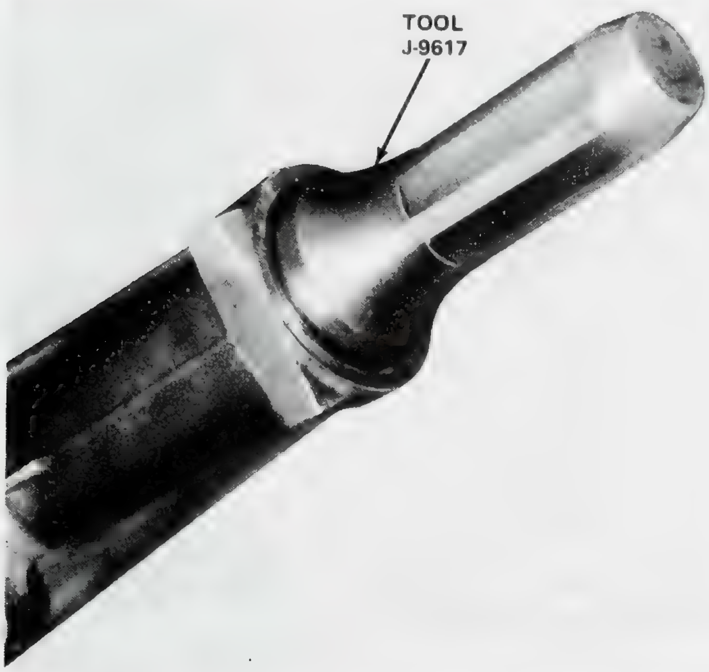


Fig. 2B-43 Extension Housing Oil Seal Installation

(22) Install extension housing oil seal using Tool J-9617 (fig. 2B-43).

(23) Install rear crossmember on extension housing if removed and tighten crossmember attaching bolts to 29.8 Nm (22 foot-pounds) torque.

SPECIFICATIONS

Transmission Specifications

Transmission Specifications	
End Play Tolerance:	
Countershaft Gear End Play	0.004 to 0.018 inch (0.102 to 0.457 mm)
Second Gear End Play	0.004 to 0.014-inch (0.102 to 0.356 mm)
Output Shaft End Play	0.004 to 0.014-inch (0.102 to 0.356 mm)
Gear Ratios	
First	3.50:1
Second	2.21:1
Third	1.43:1
Fourth	1.00:1
Reverse	3.39:1
Lubrication	
Level	to bottom of fill hole
Inspect Correct Fill Level	every 5000 miles (8045 km)
Recommended Lubricants	SAE 90 or 80 W-90, API GL-5
Lubricant Capacity	
U.S. Measure	3.0 pints
Imperial Measure	3.5 pints
Metric Measure	1.41 liters

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Torque Specifications

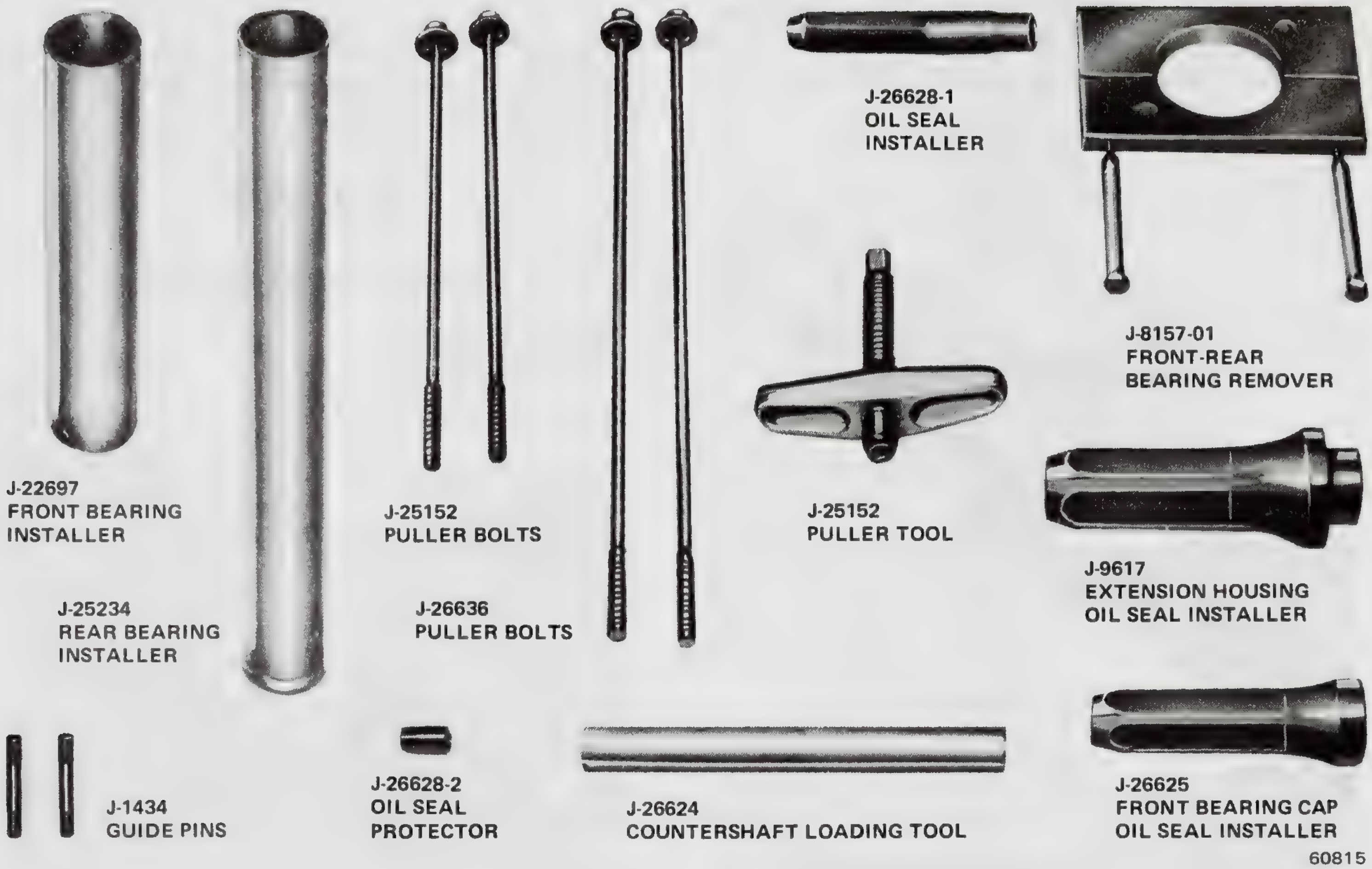
Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft.lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Backup Lamp Switch	14	11-16	10	8-12
Extension Housing Bolt	31	24-37	23	18-27
Detent Plug (in cover)	14	11-16	10	8-12
Fill Plug	27	20-34	20	15-25
Front Bearing Cap Bolt	18	15-20	13	11-15
Gear Shift Lever Bolt	24	19-30	18	14-22
Offset Lever Nut	14	11-16	10	8-12
Rear Crossmember Stud Nut	41	38-43	30	28-32
Reverse Lever Pivot Bolt	27	20-34	20	15-25
Rear Support Cushion-to-Transmission Bolt	30	27-33	22	20-24
Transmission Cover Bolt	14	9-16	10	7-12
Transmission-to-Clutch Housing Bolt	75	61-65	55	45-65
Universal Joint Clamp Strap Bolt	19	16-24	14	12-18

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

60791

Special Tools



TRANSMISSION SERVICE— MODEL HR1

GEARSHIFT LEVER

Removal

(1) Shift transmission into neutral.

(2) Remove bezel and slide inner and outer boots upward on gearshift lever (fig. 2B-44, View A).

(3) Remove "E" clip retaining lever spring and slide spring upward on lever (fig. 2B-44, View B).

(4) Fold carpet under to provide working clearance.

(5) Straighten gearshift lever lock tabs that are bent downward (fig. 2B-44) and unthreaded plastic locknut from extension housing.

(6) Lift gearshift lever upward and remove from housing.

Installation

(1) Inspect insulator on shift rail. Insulator must be straight and in a downward position on shift rail. Correct position is necessary before installing gearshift lever.

(2) Install gearshift lever in extension housing. Be sure forked end of lever is engaged in shift rail.

(3) Tighten plastic locknut by hand until it seats in housing and bend at least three lock tabs downward to retain locknut.

(4) Install lever spring retaining "E" clip. Insert large screwdriver between spring and lever and move spring away from lever to expose retaining clip groove.

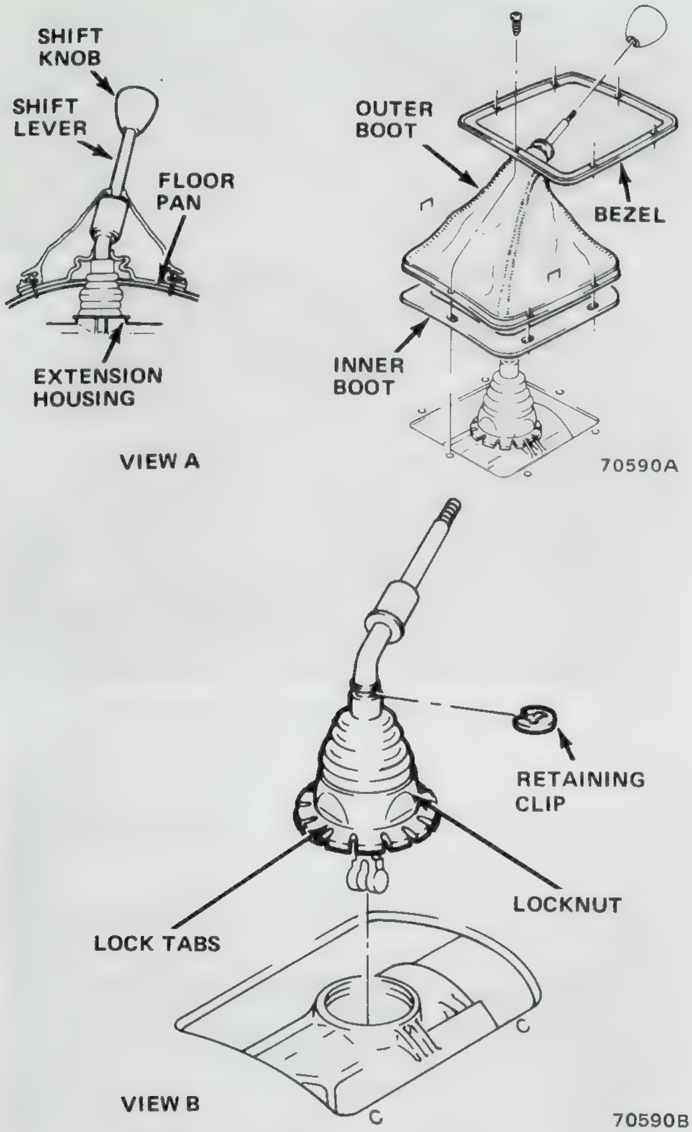


Fig. 2B-44 Gearshift Lever—Model HR1

(5) Install inner and outer boots and bezel.
(6) Check gearshift lever operation in all positions.

TRANSMISSION DISASSEMBLY

CAUTION: *Except for the fill plug, all threaded holes and bolts used in the Model HR1 transmission are metric sizes. Do not attempt to substitute a different thread-type bolt if the original ones are lost.*

(1) Pull throwout lever straight out of lever opening in clutch housing to disengage lever retaining clip from pivot ball stud.

(2) Slide throwout lever and bearing off front bearing cap and remove lever and bearing as assembly.

(3) Remove bolts attaching clutch housing to transmission and remove clutch housing.

(4) Remove dynamic absorber from extension housing.

(5) Remove transmission support cushion adapter bracket from extension housing.

(6) Remove backup lamp switch from extension housing.

(7) Remove bolts attaching top cover to transmission case and remove top cover and gasket.

(8) Remove detent plug using hex wrench (fig. 2B-45) and remove detent spring and detent plunger (fig. 2B-46).

(9) Remove access plug at rear of case using punch and hammer (fig. 2B-47).

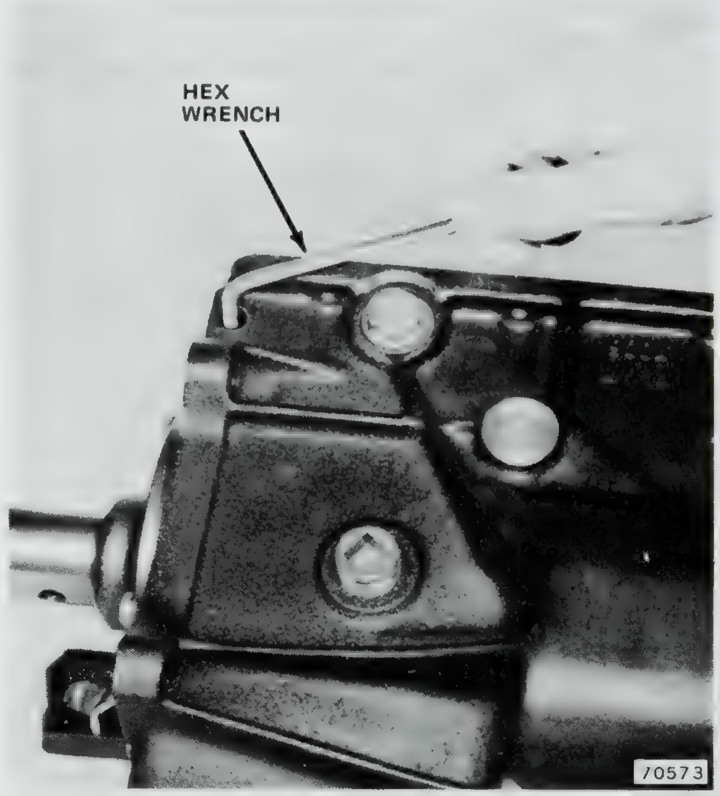


Fig. 2B-45 Detent Plug Removal

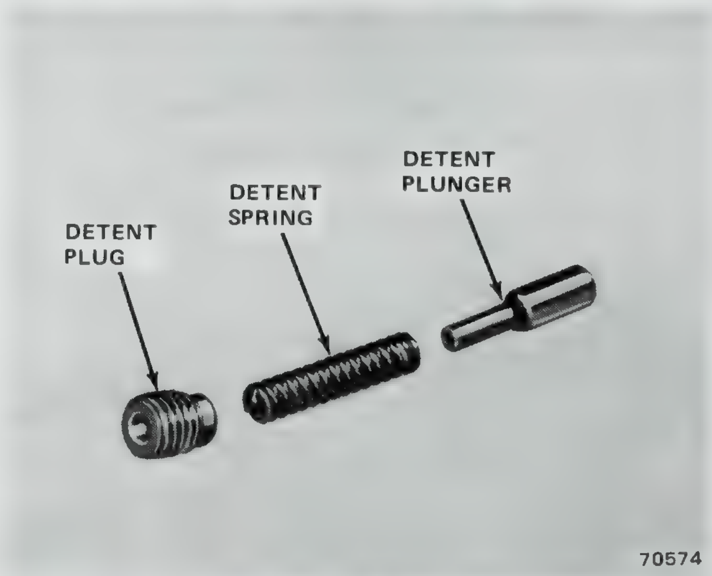


Fig. 2B-46 Detent Plug, Spring, and Plunger

(10) Remove interlock plate retaining pin using 5/16-diameter rod inserted through access plug hole (fig. 2B-48) and remove interlock plate.

(11) Remove selector arm roll pin using 3.9688 mm (5/32) pin punch (fig. 2B-49).

(12) Tap forward end of shift rail until rail displaces large plug at rear of extension housing and remove shift rail from rear of housing.

(13) Remove selector arm, interlock plate and shift forks from case.

NOTE: *Before removing the interlock plate, note the location and assembled position of the plate, selector arm, and shift forks for assembly reference (fig. 2B-50).*

(14) Remove bolts attaching front bearing cap to case and remove bearing cap and bearing cap O-ring. Discard O-ring.

(15) Remove front bearing cap oil seal. Use screwdriver to pry seal from cap.

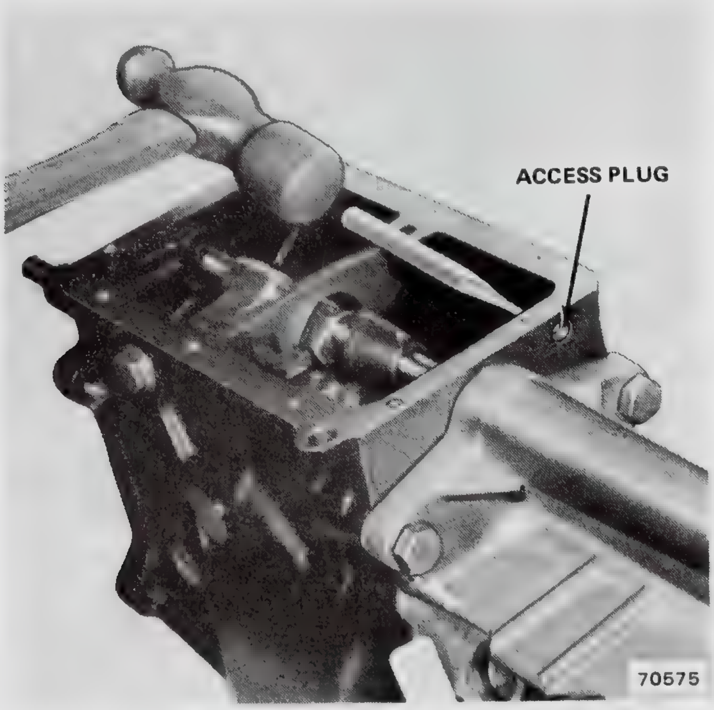


Fig. 2B-47 Access Plug Removal

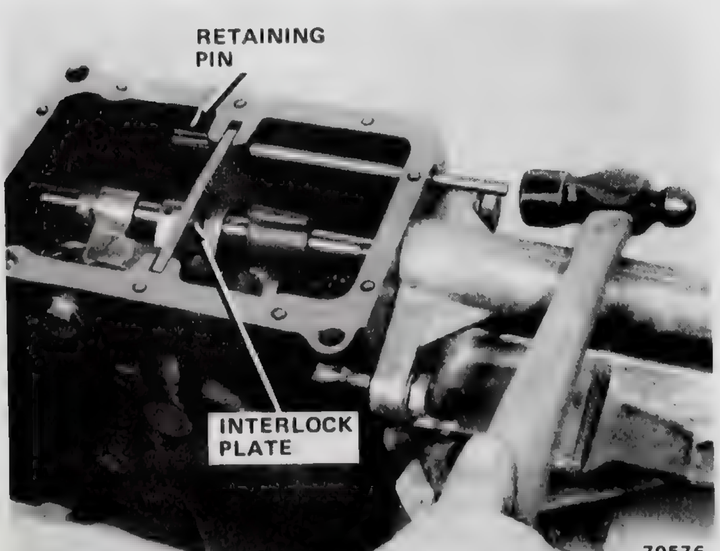


Fig. 2B-48 Interlock Plate Retaining Pin Removal

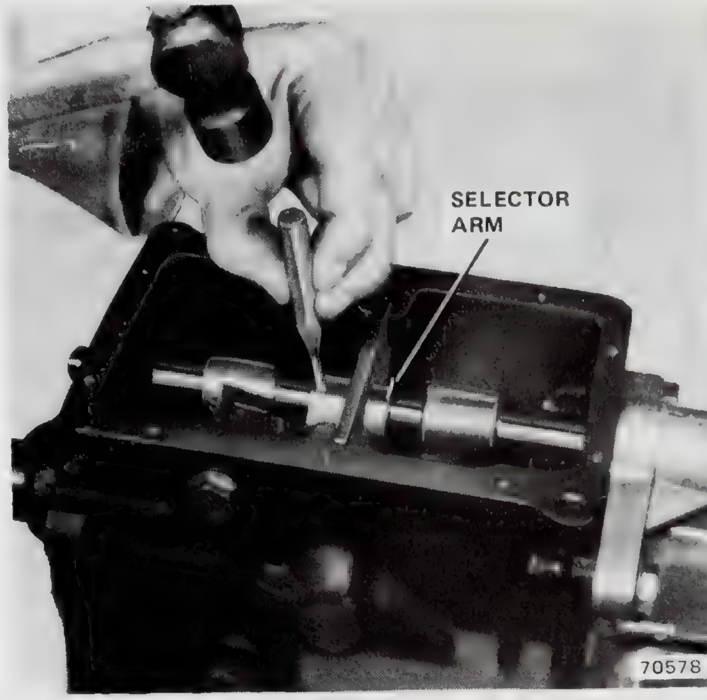


Fig. 2B-49 Selector Arm Roll Pin Removal

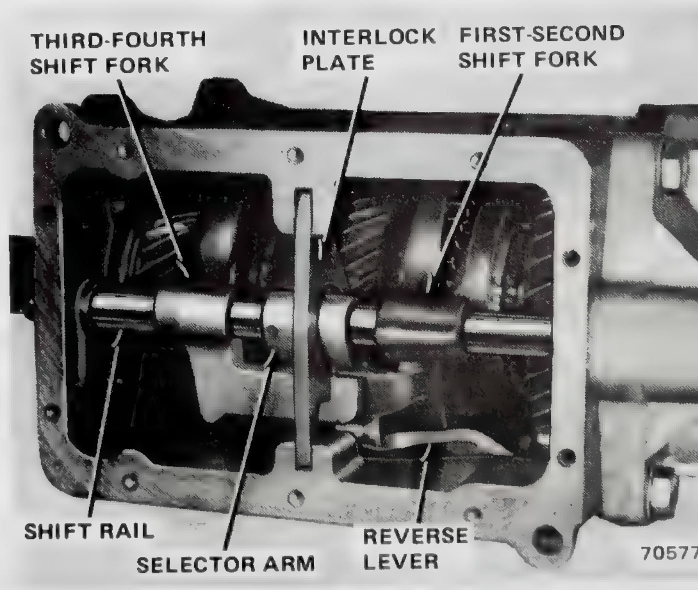


Fig. 2B-50 Assembled Position of Shift Mechanism Components

NOTE: *If seal removal proves difficult, partially collapse the metal wall of the seal using a small-sharp chisel, however, do not gouge or nick the seal bore.*

(16) Remove front bearing retaining and locating snap rings from clutch shaft and front bearing.

(17) Install Bearing Remover J-8157-01 on front bearing and install Puller J-25132 and Puller Bolts J-26827 on clutch shaft and bearing remover tool (fig. 2B-51). Remove front bearing.

(18) Remove bolts attaching extension housing to transmission case and tap housing with plastic tipped hammer to loosen it from case.

(19) Remove clutch shaft from front of case.

(20) Remove extension housing and output shaft gear train assembly from rear of case (fig. 2B-52). Do not allow third-fourth synchronizer sleeve to separate from hub during removal.

(21) Remove shift rail oil seal from seal counterbore at rear of case (fig. 2B-53). Use screwdriver to pry seal out of counterbore.

(22) Remove main shaft pilot roller bearing from clutch shaft bore or from output shaft pilot bearing hub.

(23) Remove reverse idler gearshaft using Slide Hammer J-7004-1 and Shaft Remover J-26856 (fig. 2B-54). Thread shaft remover into reverse idler shaft and thread slide hammer bolt into shaft remover and remove reverse idler shaft.

(24) Remove reverse idler gear and gear spacer from case. Note position of spacer for assembly reference.

(25) Remove countershaft using Countershaft Loading Tool J-26826 (fig. 2B-55).

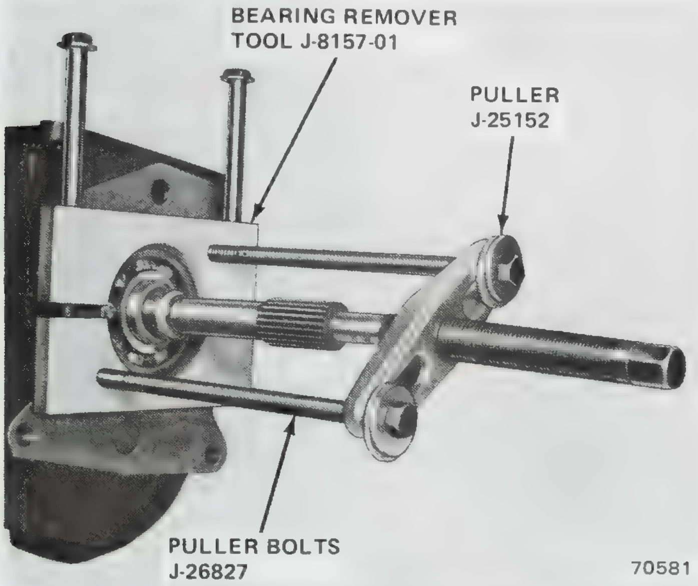


Fig. 2B-51 Clutch Shaft and Front Bearing Removal

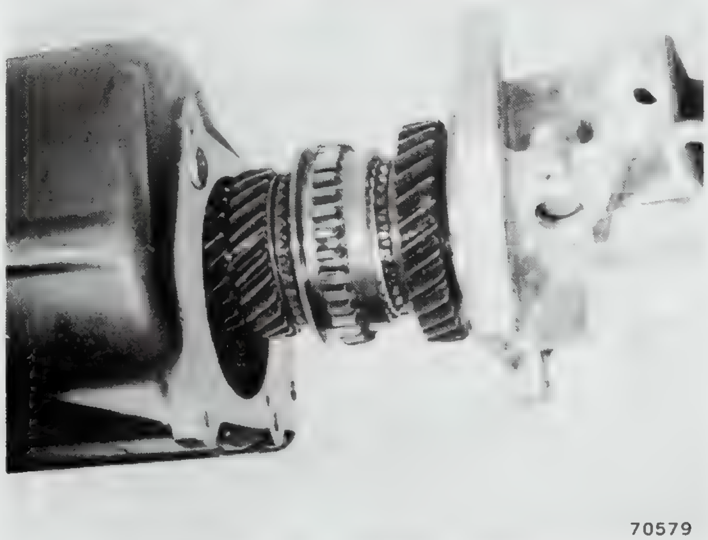


Fig. 2B-52 Extension Housing and Output Shaft Gear Train Removal

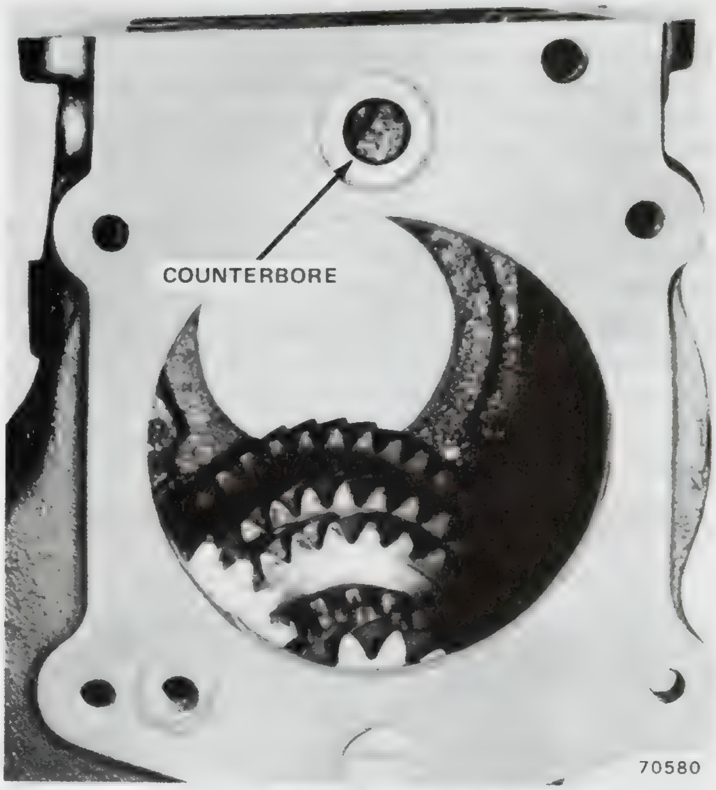


Fig. 2B-53 Shift Rail Oil Seal Counterbore Location

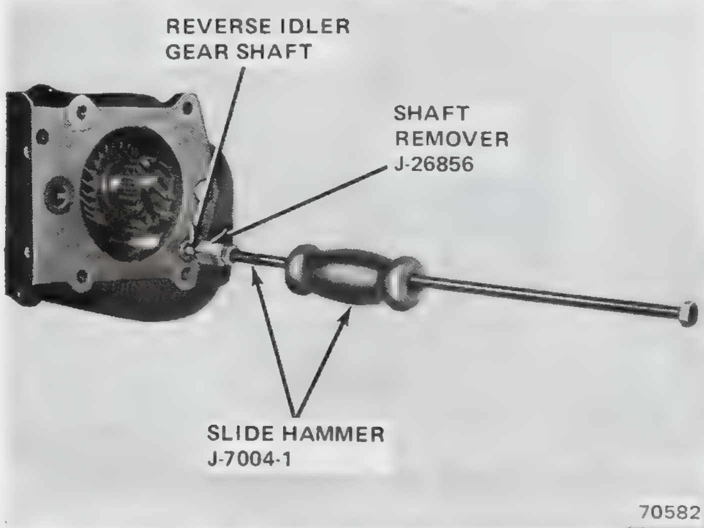


Fig. 2B-54 Reverse Idler Gear Shaft Removal

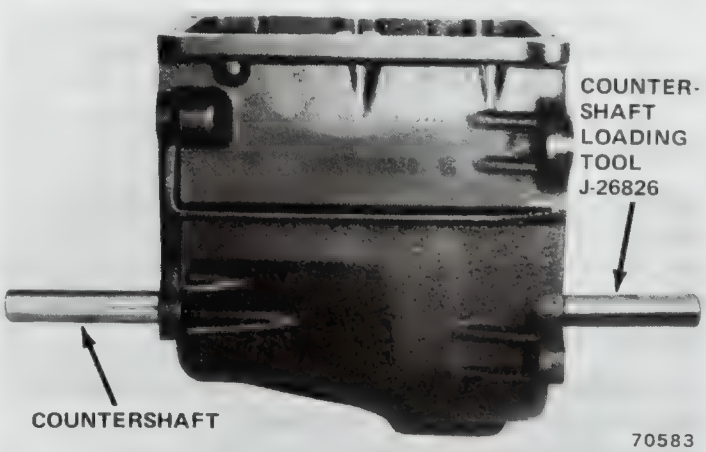


Fig. 2B-55 Countershaft Removal/Installation

(26) Remove shift fork from reverse lever. Note position of fork for assembly reference.

(27) Remove spring clip that retains reverse lever on lever pivot shaft (fig. 2B-56) and remove reverse lever and lever spring. Note spring position for assembly reference.

(28) Remove countershaft gear and loading tool as assembly. Remove loading tool and remove 38 needle bearings and 4 bearing retainers.

CAUTION: *There are two thick and two thin bearing retainers. Note the position of these parts for assembly reference. In addition, there are short and long countershaft needle bearings. Also note the position of these parts for assembly reference.*

(29) Remove countershaft gear thrust washers.

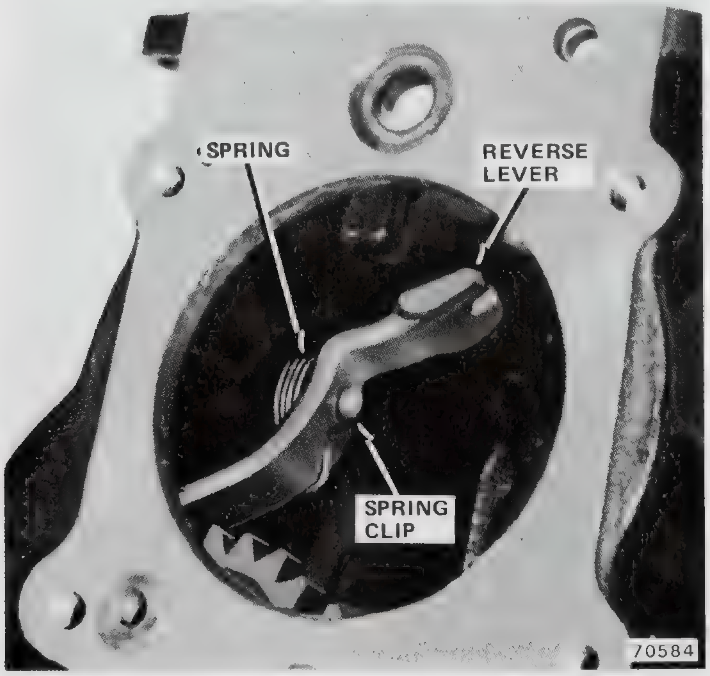


Fig. 2B-56 Reverse Lever, Spring Clip, and Spring Position

Disassembly—Output Shaft Gear Train

(1) Remove fourth gear blocking ring from third-fourth synchronizer.

(2) Remove output shaft rear snap ring using needlenose pliers (fig. 2B-57).

NOTE: *The snap ring is positioned in a groove machined in the extension housing bore. To unseat the snap ring, first compress it using the needlenose pliers, then slide it toward the first gear until it clears the extension housing.*

(3) Remove extension housing from bearing by tapping end of output shaft with plastic tipped hammer.

(4) Remove output shaft front snap ring (fig. 2B-58). Discard snap ring.

(5) Remove third-fourth synchronizer. Mark hub and sleeve for assembly reference and separate sleeve from hub. Remove synchronizer inserts and insert springs.

(6) Remove third gear and blocking ring.

(7) Remove second gear snap ring and remove second gear and blocking ring.

(8) Unseat rear bearing snap ring using snap ring pliers having 45° angle tips (fig. 2B-59) and slide snap ring toward speedometer drive gear.

(9) Remove first gear, first gear spacer, rear bearing, and speedometer gear as assembly using Bearing Remover J-8157-01 and arbor press (fig. 2B-60). Position bearing remover against forward face of first gear. Do not allow first gear blocking ring to become caught between remover tool and gear.

(10) Remove first gear blocking ring.

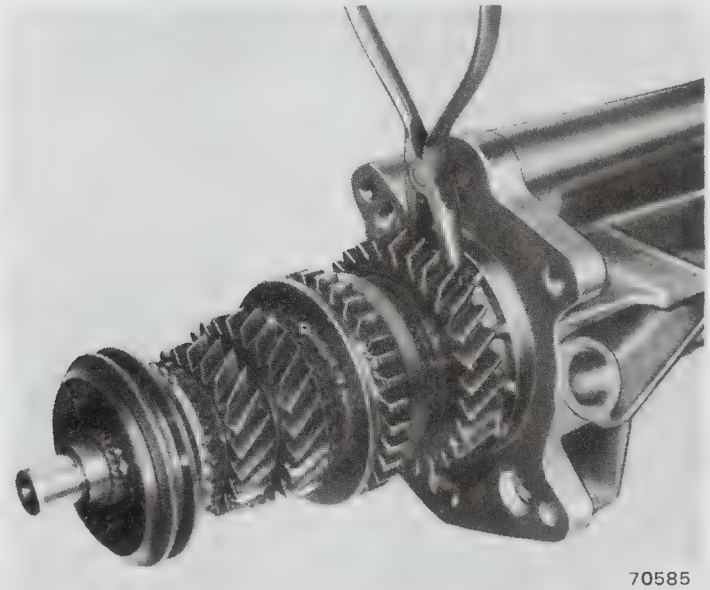


Fig. 2B-57 Output Shaft Rear Snap Ring Removal/Installation

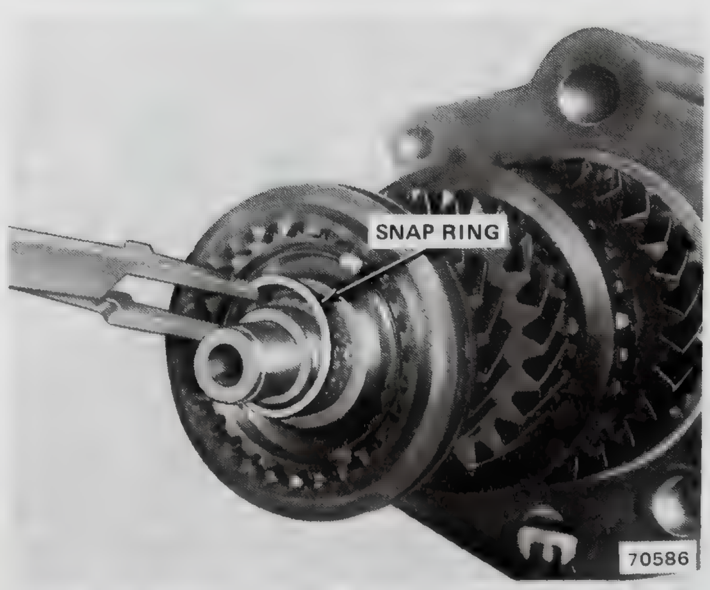


Fig. 2B-58 Output Shaft Front Snap Ring Removal/Installation

Fig. 2B-59 Rear Bearing Snap Ring Removal

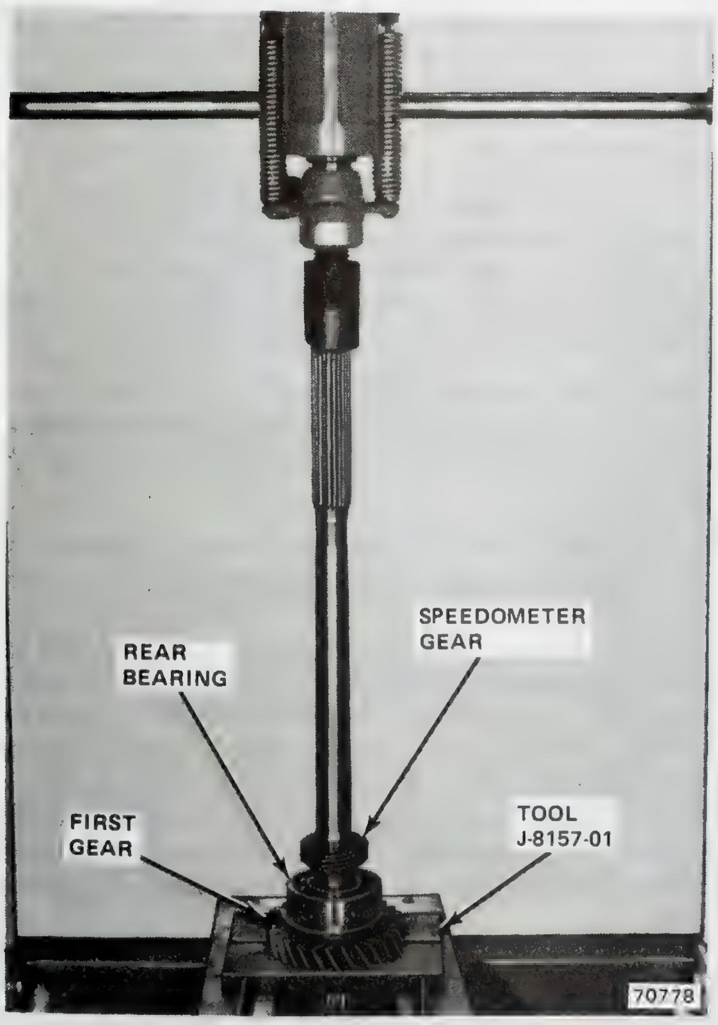


Fig. 2B-60 First Gear, Rear Bearing, and Speedometer Gear Removal

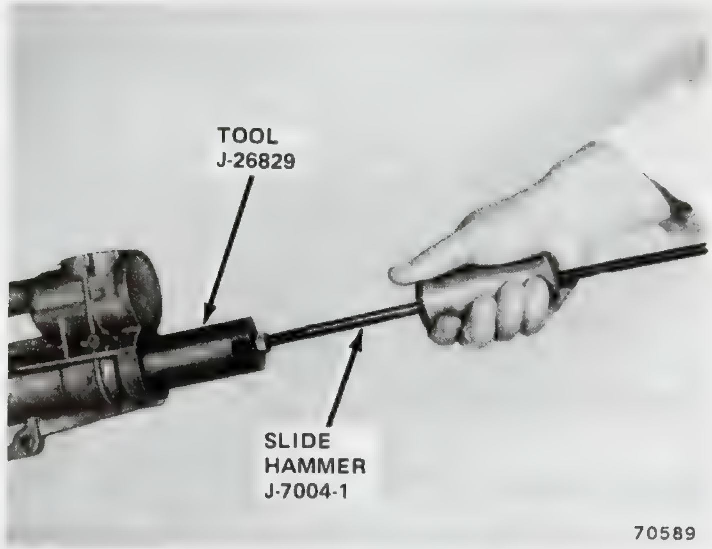


Fig. 2B-61 Extension Housing Seal Removal

(11) Mark first-second synchronizer sleeve and hub for assembly reference. Remove sleeve from hub and remove inserts and insert springs.

CAUTION: *Do not attempt to remove the first-second synchronizer from the output shaft. The hub and shaft are serviced as an assembly only.*

(12) Remove extension housing oil seal using Tool J-26829 and Slide Hammer J-7004-1 (fig. 2B-61).

CLEANING AND INSPECTION

Thoroughly wash all parts in solvent and dry them with compressed air. Do not dry the front or rear bearings with compressed air. Allow them to air dry or wipe them dry with a clean shop cloth.

Clean the needle and roller bearings by wrapping them in a cloth and submerging the cloth and bearings in solvent. Or, place them in a shallow parts cleaning tray and cover them with solvent. Allow the bearings to air dry or wipe them dry with a clean shop cloth.

Inspect the transmission case, synchronizers, gears and shafts, and extension housing. Replace any of these parts if they exhibit the following conditions:

- Cracks in bores, sides, bosses, or at bolt holes.
- Stripped threads in bolt holes.
- Nicks, burrs, rough surfaces in shaft bores or on gasket surfaces.

Inspect the gear train and shift mechanism. Replace any parts that exhibit the following conditions.:

- Broken, chipped, or worn gear teeth.
- Bent or broken inserts.
- Weak or broken insert springs.
- Worn, cracked, or broken synchronizer blocking rings, hubs, or sleeves.
- Damaged roller or needle bearings, or bearing bores in countershaft gear or clutch shaft.
- Worn or galled countershaft and hub, clutch shaft or reverse idler gearshaft.

- Worn thrust washers.
- Nicked, broken, or worn output or clutch shaft splines.
- Bent, distorted, or weak snap rings.
- Worn bushings in reverse idle gear.
- Rough, galled, or broken front or rear bearing.
- Broken, cracked, or worn shift forks.
- Bent, worn, or galled shift rail.
- Worn, bent, or broken selector arm, interlock plate, detent plunger, or spring.

TRANSMISSION ASSEMBLY

Assembly—Output Shaft Gear Train

(1) Install rear bearing in extension housing bore. Use plastic tipped hammer to install bearing. Be sure bearing is fully seated in housing bearing bore.

(2) Select thickest possible output shaft rear snap ring that will fit in snap ring groove of extension housing—then remove snap ring.

NOTE: *The output shaft rear snap ring is a selective-type and is available in varying thickness increments. Trial-fit the snap rings until the desired thickness snap ring is obtained.*

(3) Remove rear bearing from extension housing using long punch or ratchet handle extension.

(4) Lubricate output shaft, synchronizer components and all gear bores with transmission lubricant. Lubricate tapered blocking ring surfaces of all gears with petroleum jelly.

(5) Install synchronizer spring and inserts in first-second hub and install first-second synchronizer sleeve over hub and inserts. Index hub to sleeve using alignment marks made at disassembly.

NOTE: *Engage the tang end of each insert spring in the same synchronizer insert but position the open ends of each spring face away from one another (fig. 2B-63).*

(6) Install blocking ring on tapered surface of second gear and install ring and gear on output shaft. Be sure synchronizer inserts engage in blocking ring notches.

(7) Install second gear thrust washer and snap ring on output shaft. Be sure tabbed end of snap ring is seated in groove machined in output shaft (fig. 2B-64).

(8) Measure second gear end play using feeler gauge (fig. 2B-64). End play should be 0.1016 to 0.3556 mm (0.004 to 0.014 inch). If end play exceeds 0.3556 mm (0.014 inch), replace thrust washer, snap ring and gear (if necessary).

(9) Install first gear blocking ring on tapered surface of gear and install ring and gear on output shaft. Be sure tapered gear surface faces first-second synchronizer hub (fig. 2B-62) and that synchronizer inserts engage in blocking ring notches.

(10) Install oil slinger-spacer on output shaft. Be sure oil slinger grooves face first gear and flat surface of slinger-spacer faces away from gear (fig. 2B-65).

(11) Install output shaft rear snap ring, selected in step (2), on output shaft. Position snap ring over oil slinger-spacer and against first gear.

(12) Install rear bearing on output shaft using tool J-25678-01 (fig. 2B-66). Be sure bearing seats against slinger-spacer and that first gear seats in first-second synchronizer hub (on output shaft).

(13) Install thickest possible replacement rear bearing snap ring in output shaft groove. Be sure snap ring is completely seated in output shaft groove.

(14) Install speedometer gear on output shaft and install Positioning Gauge J-26832 over speedometer gear (fig. 2B-67).

(15) Mount output shaft assembly in arbor press.

(16) Place Rear Bearing Installer Tool J-25678-01 over output shaft and onto positioning gauge tool (fig. 2B-68).

(17) Press speedometer gear onto output shaft until positioning gauge contacts rear bearing; then release arbor press and remove output shaft assembly and tools from press. Remove tools from output shaft assembly.

CAUTION: *Do not attempt to install the speedometer gear without using the positioning gauge tool. The speedometer gear must be installed to a predetermined depth on the output shaft. The gauge tool must be used in order to correctly position the gear to this predetermined depth.*

(18) Install third gear on output shaft and install blocking ring on tapered surface of gear.

(19) Assemble third-fourth synchronizer hub, sleeve, inserts, and insert springs. Index hub to sleeve using alignment marks made at disassembly.

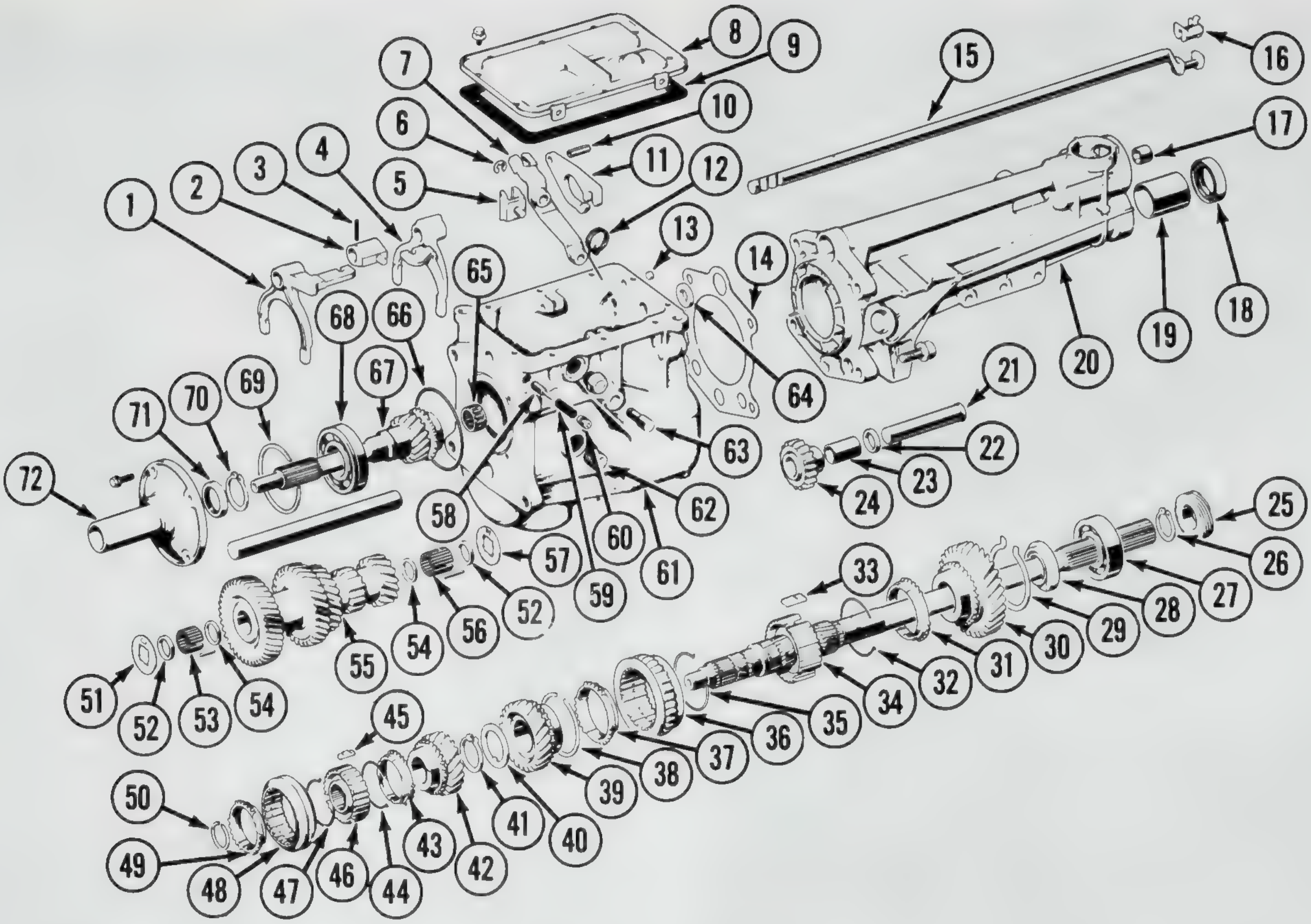
NOTE: *Engage the tang end of each insert spring in the same synchronizer insert but position the open ends of the springs so they face away from one another (fig. 2B-63).*

(20) Install third-fourth synchronizer assembly on output shaft and install output shaft front snap ring (fig. 2B-58).

(21) Measure third-fourth synchronizer end play using feeler gauge (fig. 2B-69). End play should be 0.1016 to 0.3556 mm (0.004 to 0.014 inch). If end play exceeds 0.3556 mm (0.014 inch), replace snap ring and synchronizer hub and sleeve (if necessary).

(22) Insert assembled output shaft and gear train into extension housing. Tap front end of output shaft with plastic hammer to seat rear bearing in extension housing.

(23) Compress output shaft rear snap ring using needlenose pliers (fig. 2B-57) and install snap ring in extension housing snap ring groove. Be sure snap ring is completely seated.



1. THIRD-FOURTH SHIFT FORK
2. SELECTOR ARM
3. SELECTOR ARM ROLL PIN
4. FIRST-SECOND SHIFT FORK
5. REVERSE LEVER SHIFT FORK
6. REVERSE LEVER SPRING CLIP
7. REVERSE LEVER
8. TOP COVER
9. TOP COVER GASKET
10. INTERLOCK PLATE RETAINING PIN
11. INTERLOCK PLATE
12. REVERSE LEVER SPRING
13. INTERLOCK RETAINING PIN ACCESS PLUG
14. EXTENSION HOUSING GASKET
15. SHIFT RAIL
16. SHIFT RAIL INSERT
17. SHIFT RAIL BUSHING (NYLON)
18. EXTENSION HOUSING SEAL
19. EXTENSION HOUSING BUSHING (SERVICED AS PART OF HOUSING)
20. EXTENSION HOUSING
21. REVERSE IDLER GEAR SHAFT
22. REVERSE IDLER GEAR SPACER
23. REVERSE IDLER GEAR BUSHING (SERVICED AS PART OF GEAR)
24. REVERSE IDLER GEAR
25. SPEEDOMETER GEAR
26. REAR BEARING SNAP RING
27. REAR BEARING
28. OIL SLINGER/SPACER
29. OUTPUT SHAFT REAR SNAP RING
30. FIRST GEAR
31. FIRST GEAR BLOCKING RING
32. FIRST-SECOND SYNCHRONIZER INSERT SPRING
33. FIRST-SECOND SYNCHRONIZER INSERT (3)
34. OUTPUT SHAFT AND FIRST-SECOND SYNCHRONIZER HUB ASSEMBLY (SERVICED AS ASSEMBLY ONLY)
35. FIRST-SECOND SYNCHRONIZER INSERT SPRING
36. FIRST-SECOND SYNCHRONIZER SLEEVE
37. SECOND GEAR BLOCKING RING
38. SECOND GEAR STOP RING (INSTALLED ON GEAR)
39. SECOND GEAR
40. SECOND GEAR SPACER
41. SECOND GEAR SNAP RING
42. THIRD GEAR
43. THIRD GEAR BLOCKING RING
44. THIRD-FOURTH SYNCHRONIZER INSERT SPRING
45. THIRD-FOURTH SYNCHRONIZER INSERT (3)
46. THIRD-FOURTH SYNCHRONIZER HUB
47. THIRD-FOURTH SYNCHRONIZER INSERT SPRING
48. THIRD-FOURTH SYNCHRONIZER SLEEVE
49. FOURTH GEAR BLOCKING RING
50. OUTPUT SHAFT FRONT SNAP RING
51. COUNTERSHAFT THRUST WASHER (METAL FACE)
52. COUNTERSHAFT BEARING RETAINER (THICK)
53. COUNTERSHAFT FRONT BEARINGS (SHORT-19 REQD.)
54. COUNTERSHAFT BEARING RETAINER (THIN)
55. COUNTERSHAFT GEAR
56. COUNTERSHAFT REAR BEARINGS (LONG-19 REQD.)
57. COUNTERSHAFT THRUST WASHER (METAL FACE)
58. DETENT PLUNGER
59. DETENT SPRING
60. DETENT PLUG
61. TRANSMISSION CASE
62. FILL PLUG
63. REVERSE LEVER PIVOT (SERVICED AS PART OF CASE)
64. SHIFT RAIL OIL SEAL
65. CLUTCH SHAFT ROLLER BEARING
66. FRONT BEARING CAP O-RING
67. CLUTCH SHAFT
68. FRONT BEARING
69. FRONT BEARING LOCATING SNAP RING
70. FRONT BEARING RETAINING SNAP RING
71. FRONT BEARING CAP OIL SEAL
72. FRONT BEARING CAP

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Fig. 2B-62 Model HR-1 Transmission—Exploded View

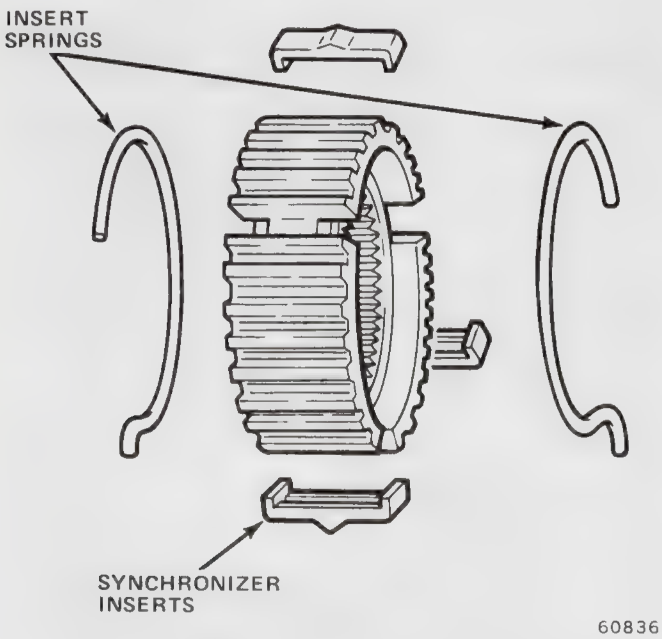

Fig. 2B-63 Insert Spring Position

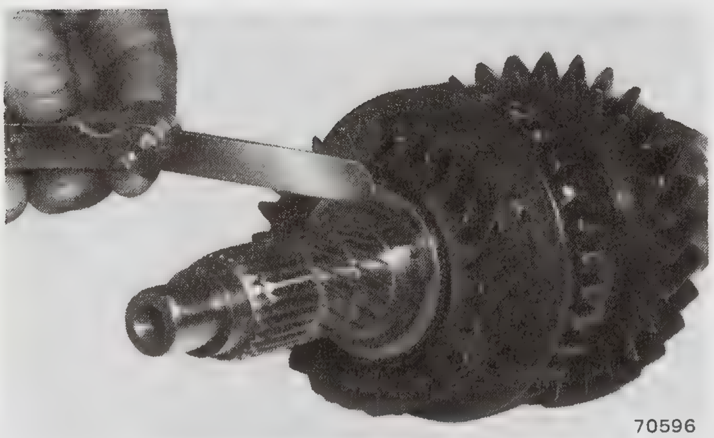

Fig. 2B-64 Measuring Second Gear End Play

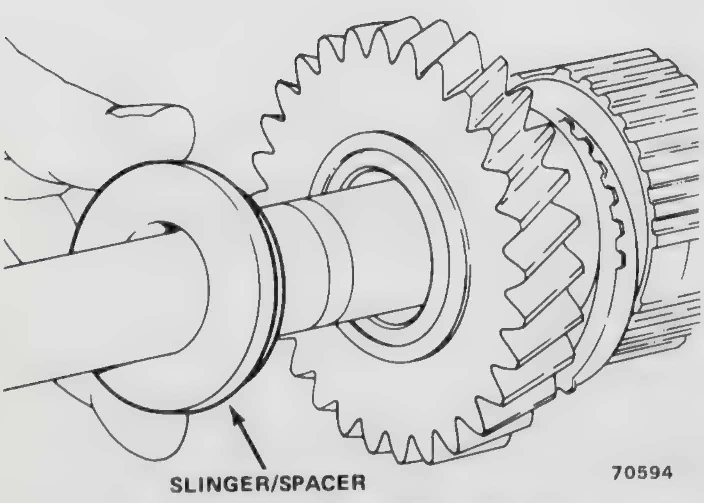

Fig. 2B-65 Oil Slinger/Spacer Installation

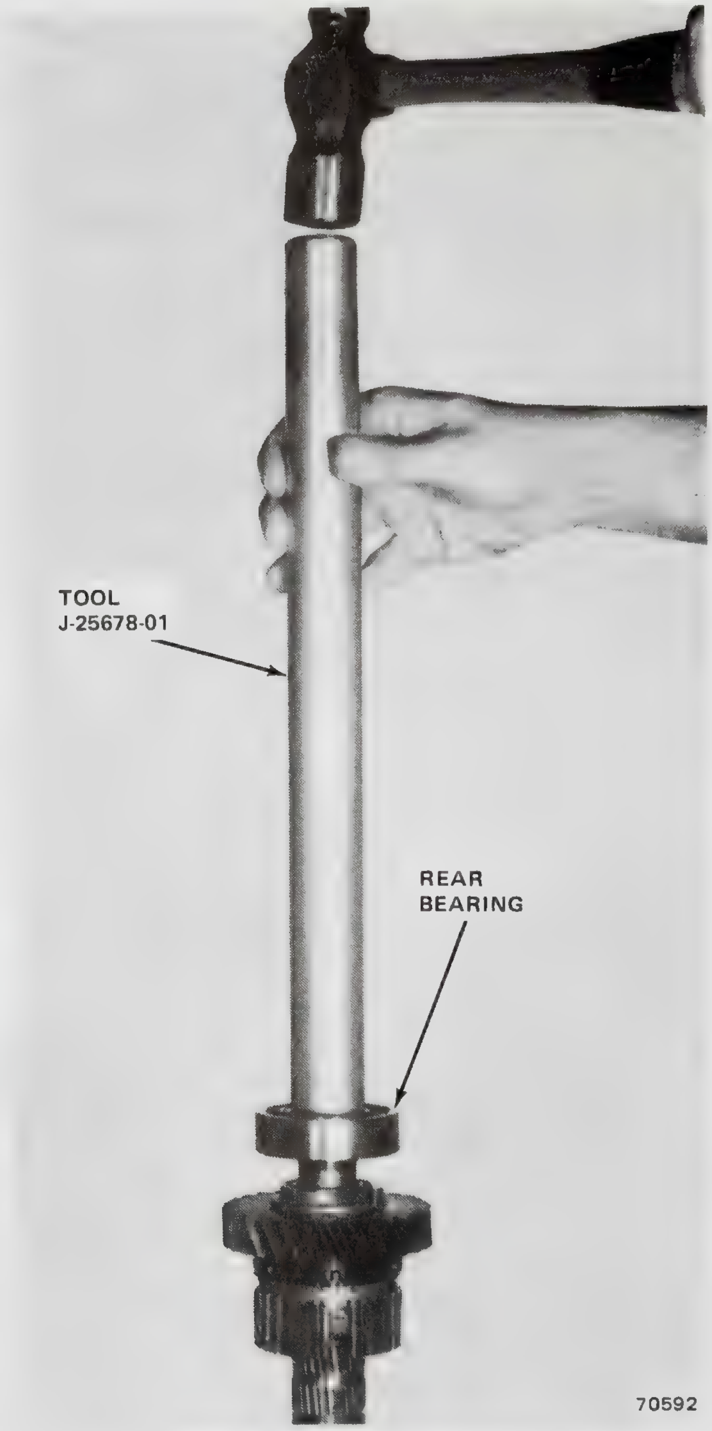

Fig. 2B-66 Rear Bearing Installation

Assembly—Transmission Case Components

(1) Lubricate all components with transmisson lubricant except where noted otherwise.

(2) Insert Countershaft Loading Tool J-26826 into countershaft gear bore.

(3) Coat countershaft needle bearings and bearing retainers with petroleum jelly.

(4) Install a **thin** bearing retainer in needle bearing bores in each end of countershaft gear (fig. 2B-62).

(5) Install 19 **long** needle bearings in bore at **rear** of countershaft gear.

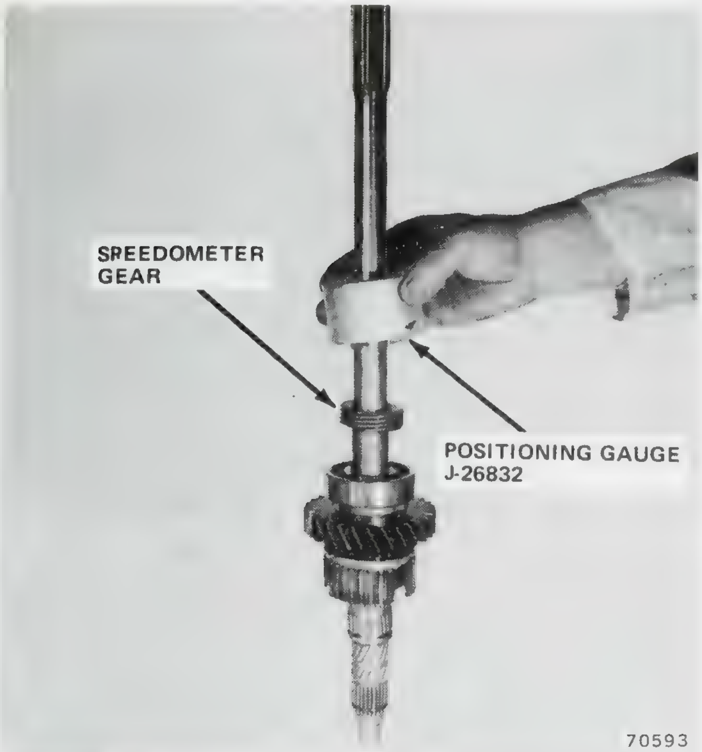

Fig. 2B-67 Speedometer Gear and Positioning Gauge Installation

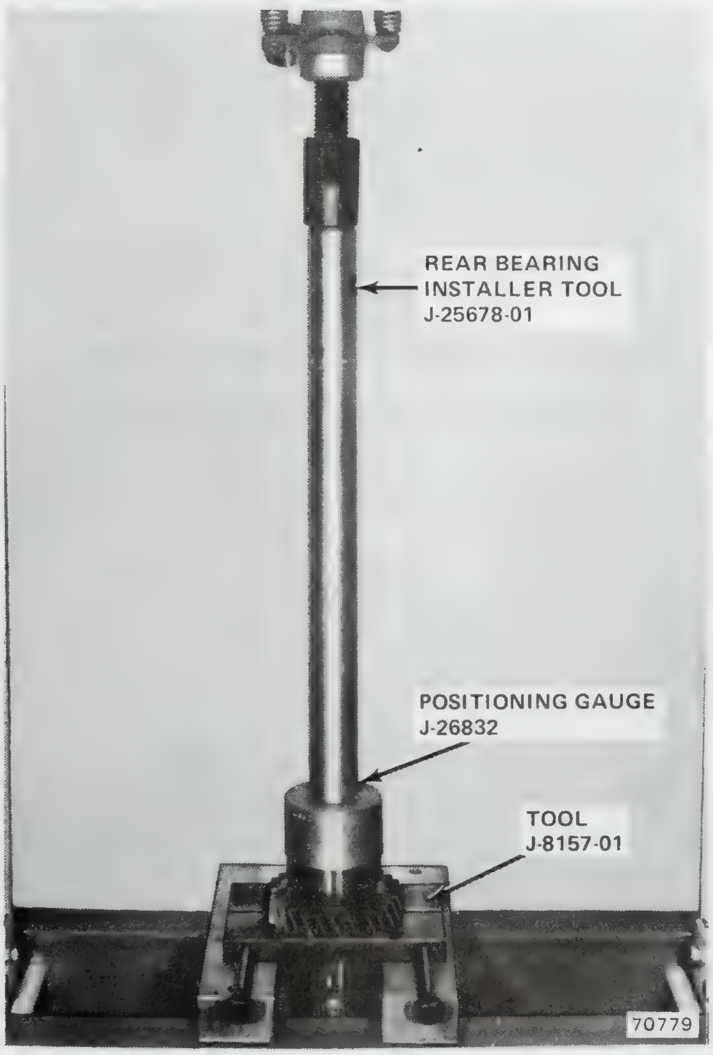

Fig. 2B-68 Seating Speedometer Gear

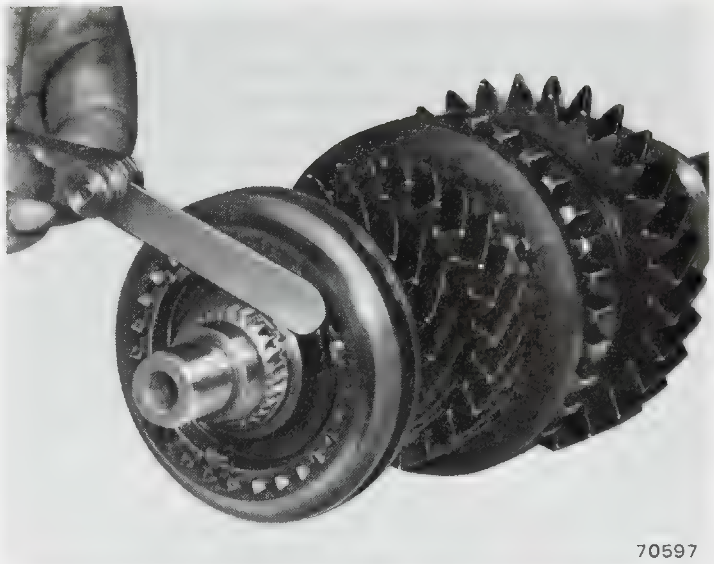

Fig. 2B-69 Measuring Third-Fourth Synchronizer End Play

(6) Install 19 **short** needle bearings in bore at **front** of countershaft gear.

(7) Install a **thick** bearing retainer in each countershaft gear bore over ends of needle bearings.

(8) Coat replacement countershaft gear thrust washers with petroleum jelly.

(9) Position thrust washer over bearing bore at front of countershaft gear. Push loading tool toward front of gear and through thrust washer. Loading tool should extend only far enough to hold washer in position.

(10) Align locating tab on countershaft gear front thrust washer with locating notch in case and install gear in case. Be sure washer tab and case notch are aligned to avoid mispositioning washer.

(11) Align thrust washer and loading tool with front countershaft bore in case. Push loading tool into case front bore just enough to hold thrust washer and countershaft gear in position.

(12) Turn case on end so case rear bearing bore is now facing upward.

(13) Align locating tab on countershaft gear rear thrust washer with locating notch in case and install thrust washer between gear and case.

(14) Align countershaft gear rear bore, case rear bore, and rear thrust washer. Insert countershaft through case bore and thrust washer and into rear bore of countershaft gear.

(15) Turn case back to original position and complete installation of countershaft.

NOTE: *Be sure the step machined in the rear end of the countershaft is in a horizontal position and that the lower step is facing downward.*

(16) Measure countershaft gear end play using feeler gauge. End play should be 0.1524 to 0.4572 mm (0.006 to 0.018 inch). If end play exceeds 0.4572 mm (0.018 inch), replace thrust washers.

(17) Install reverse lever fork in reverse lever.

(18) Install reverse lever and spring on pivot shaft in case and install lever retaining spring clip (fig. 2B-70).

(19) Position reverse idler gear and gear spacer in case. Be sure spacer is positioned between idler gear and rear of case (fig. 2B-70). Also be sure reverse lever fork engages idler gear.

(20) Position reverse idler gear and spacer and install idler gear shaft from rear of case. Be sure reverse lever fork remains engaged with gear during shaft installation.

(21) Install replacement shift rail oil seal in counterbore at rear of case (fig. 2B-71). Use suitable size socket to install seal.

(22) Coat output shaft pilot bearing with petroleum jelly and install bearing in clutch shaft bore.

(23) Install blocking ring on tapered surface of clutch shaft and insert shaft into case.

(24) Install replacement gasket on extension housing.

(25) Insert output shaft into case and install clutch shaft on output shaft. Be sure output shaft pilot hub is fully engaged in clutch shaft pilot bearing.

(26) Coat extension housing bolts with non-hardening sealer.

(27) Align clutch and output shafts in case and install extension housing bolts finger tight only.

CAUTION: *Be sure the notch in the end of the countershaft is aligned with the recess in the extension housing before installing the housing attaching bolts (fig. 2B-72). If the notch and recess are not aligned, the housing will not seat against the case properly and result in lubricant leaks or a cracked housing.*

(28) Install front bearing on clutch shaft and into case using Front Bearing Installer J-5590 (fig. 2B-73).

(29) Install front bearing retaining and locating snap rings.

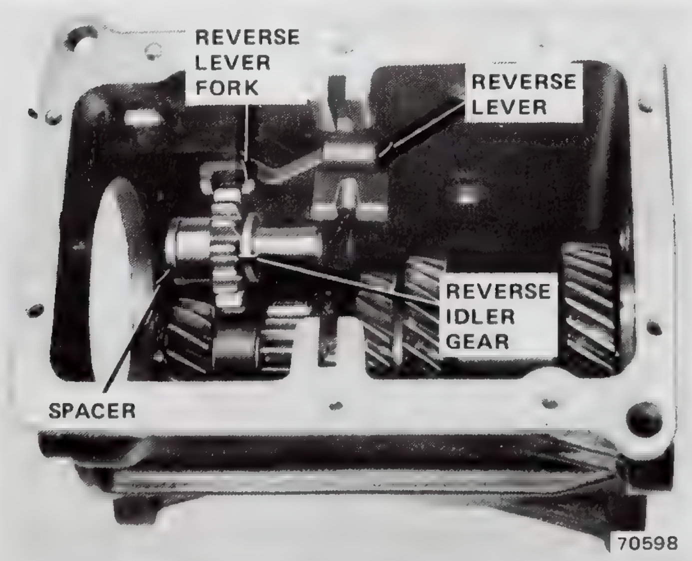

Fig. 2B-70 Assembled Position of Reverse Idler Gear, Idler Gear Spacer, Reverse Lever and Lever Fork

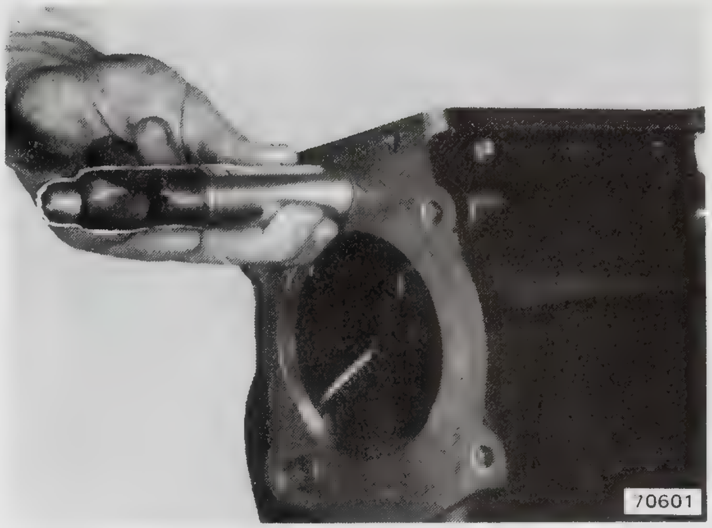

Fig. 2B-71 Shift Rail Oil Seal Installation

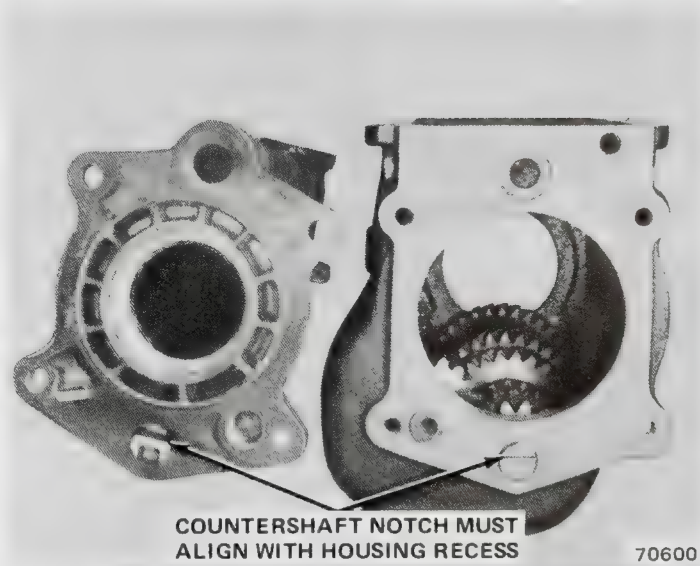

Fig. 2B-72 Countershaft-to-Extension Housing Alignment

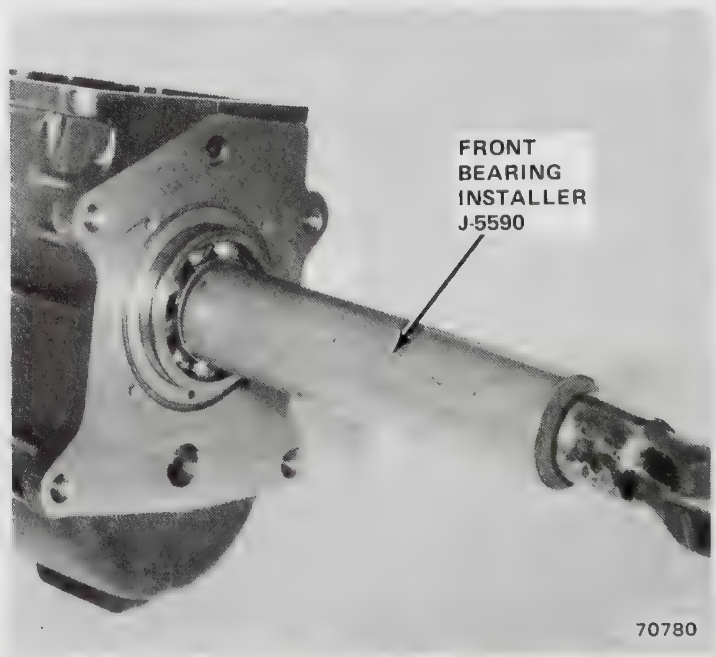

Fig. 2B-73 Front Bearing Installation

(30) Install replacement oil seal in front bearing cap using tool J-26540 (fig. 2B-74).

(31) Position replacement front bearing cap O-ring on case and install front bearing cap.

Fig. 2B-74 Front Bearing Cap Oil Seal Installation

(32) Install shift forks in synchronizer sleeves (fig. 2B-50).

(33) Position interlock plate in case and install replacement retaining pin.

(34) Lubricate shift rail with transmission lubricant and install shift rail.

(35) Slide shift rail into case and through first-second shift fork and interlock plate.

(36) Install selector arm on shift rail and slide rail through third-fourth shift fork and into case front bore.

(37) Install selector arm roll pin in arm and shift rail. Be sure pin is flush with surface of selector arm.

(38) Install detent plunger, spring, and plug in case. Tighten plug to 17.6 Nm (13 foot-pounds) torque.

(39) Tighten front bearing cap bolts to 12.2 Nm (9 foot-pounds) torque.

(40) Tighten extension housing bolts to 46.1 Nm (34 foot-pounds) torque.

(41) Install replacement access plugs in shift rail bore in extension housing and in interlock plate retaining pin access hole in case.

(42) Install replacement extension housing oil seal using tool J-26830 (fig. 2B-75).

(43) Pour 1.13 liters (2.4 pints) of transmission lubricant in case and install replacement top cover gasket and top cover. Tighten cover bolts to 12.2 Nm (9 foot-pounds) torque.

(44) Install dynamic absorber and rear support adapter bracket on extension housing.

(45) Install clutch housing, throwout lever, and throwout bearing. Tighten clutch housing-to-case bolts to 73.2 Nm (54 foot-pounds) torque.

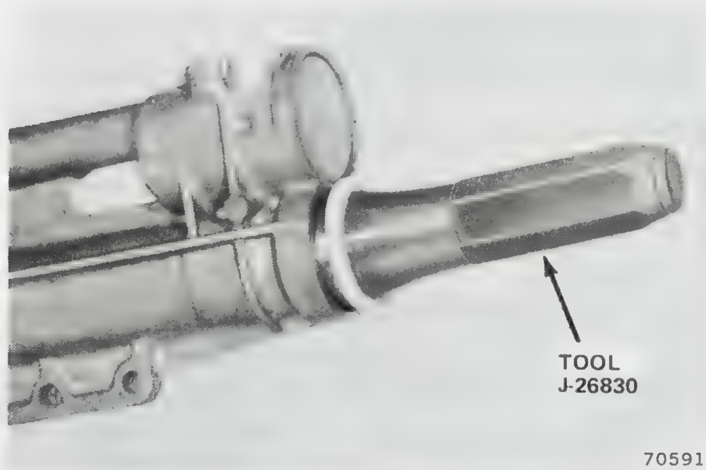

Fig. 2B-75 Extension Housing Seal Installation

SPECIFICATIONS

Transmission Specifications

Transmission Model	HR-1
Application	Used with 4-cylinder engine only.
Transmission Type	4-speed manual, fully synchronized, constant mesh, with internal shift mechanism (floor shift only).
Lubricant Capacity	1.13 liter (2.4 pints U.S. Measure)
Lubricants	
In Service	Use SAE 80W-90 Gear Lubricant, API Grade GL-4.
During Overhaul	Prelubricate all thrust washers, needle and roller bearings, and gear tapered surfaces with petroleum jelly. Prelubricate all other components with SAE 80W-90 Gear Lubricant.

Gear Ratios	49 State/Cal.	High Alt.
First	3.65:1	3.98:1
Second	1.97:1	2.14:1
Third	1.37:1	1.42:1
Fourth	1.00:1	1.00:1
Reverse	3.66:1	3.99:1

End Play Tolerance	
Countershaft Gear	0.006-0.018 inch (2.591-4.57 mm)
Second Gear	0.004-0.014 inch (0.102-0.356 mm)
Output Shaft (measured at third-fourth synchronizer	0.004-0.014 inch (0.102-0.356 mm)

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Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft-lb)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Extension Housing-to-Case Bolts	1.0	0.9-1.1	9	8-10
Fill Plug	1.4	2.7-3.1	12	24-27
Detent Plug	1.5	1.4-1.6	13	12-14
Front Bearing Cap Bolt	1.0	0.9-1.1	9	8-10
Top Cover-to-Case Bolt	1.0	0.9-1.1	9	8-10
Backup Lamp Switch	2.0	1.7-2.3	18	15-20
Clutch Housing-to-Case Bolts	6.1	5.8-6.4	54	51-57
Clutch Housing-to-Engine Bolts	6.1	5.2-7.0	54	46-62
Starter Motor and Housing Nuts	3.7	3.2-4.3	33	28-38

All Torque values given in newton-metres and foot-pounds with dry fits unless otherwise specified.

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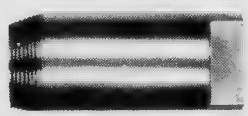
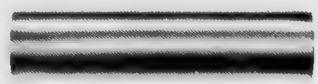
Special Tools

J-7004-1 SLIDE HAMMER

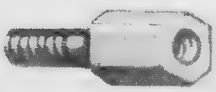
J-8157-01 FRONT-REAR BEARING REMOVER



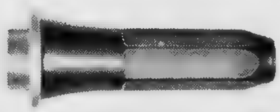
J-26829 EXTENSION HOUSING SEAL REMOVER



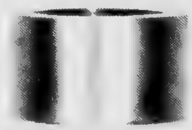
J-26826 COUNTERSHAFT LOADING TOOL



J-26856 REVERSE IDLER SHAFT REMOVER

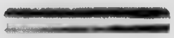


J-26830 EXTENSION HOUSING SEAL INSTALLER

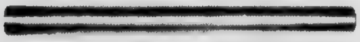


J-26832 SPEEDOMETER GEAR POSITIONING GAUGE

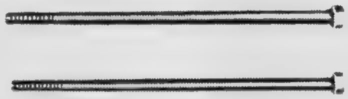
J-26540 FRONT BEARING CAP SEAL INSTALLER



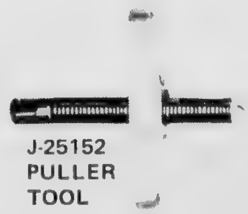
J-5590 FRONT BEARING INSTALLER



J-25678-01 REAR BEARING INSTALLER



J-26827 PULLER BOLTS (FRONT BEARING)



J-25152 PULLER TOOL

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AUTOMATIC TRANSMISSION

2C

SECTION INDEX

GENERAL INFORMATION

GENERAL

Automatic transmissions used in AMC cars are fully automatic, three-speed units equipped with a three element torque converter and compound planetary gears. Transmission clutches, bands, and band actuating servos are hydraulically applied. The compound planetary gears consist of two planetary gear sets which provide one reverse and three forward gear ranges. The transmission case and converter housing on all transmission models consists of an integral (one-piece) aluminum casting. A manually operated gearshift linkage is used to select desired gear range. Both column mounted and floor mounted gearshift linkages are used for this purpose.

Transmission Model Application

Three automatic transmission models are used. They are, Models 904, 998, and 727 (figs. 2C-1 and 2C-2). Application is as follows: Model 904 is used with four-cylinder and six-cylinder engines only. Model 998 is used with 304 CID eight-cylinder engines only. Model 727 is used with 360 CID eight-cylinder engines and with 258 CID six-cylinder engines used in heavy duty and Fleet applications.

Torque Converter

The torque converter consists of an impeller connected to the engine, a turbine splined to the transmission input shaft, and a stator connected to the case by an overrunning clutch. The impeller functions as the driving member, the turbine as the driven member, and the stator as the reaction member. The converter assembly is welded together during manufacture and cannot be disassembled for service.

Fluid Capacities

The total fluid capacity of each transmission model is:

- Model 904 with four-cylinder engine: 14.2 pints (U.S.) or 6.67 liters (metric).
- Model 904 with six-cylinder engine: 17 pints (U.S.) or 7.99 liters (metric).
- Model 998 with eight-cylinder engine: 17 pints (U.S.) or 7.99 liters (metric).
- Model 727 with Eight-Cylinder engine: 19 pints (U.S.) or 8.93 liters (metric).

Clutch—Band—Gear System

The transmission contains two multiple disc clutches, two bands, two band actuating servos, an overrunning clutch, and two planetary gear sets. The planetary gear sets are connected by a common sun gear which is interconnected to the two multiple-disc clutches through the driving shell. The driving shell is splined to the sun gear and front clutch retainer.

Hydraulic System

The hydraulic system consists of a single oil pump, a valve body which contains the pressure regulating and shift control valves, a governor valve assembly, two band actuating servos and an accumulator.

Fluid Cooling and Filtration

The transmission fluid is cooled by circulating the fluid through an external oil cooler located in the radiator lower tank. Cars with the optional 2,000-pound capacity trailer towing package have an auxiliary transmission cooler. The cooler is mounted in front of the radiator and in front of the AC condensor on cars with air conditioning. The auxiliary cooler supplements the radiator cooler to prevent overheating the transmission fluid when pulling heavy loads on hilly terrain and when ambient temperatures are extremely high. Transmission fluid is filtered by a Dacron element filter attached to the valve body.

Venting

The transmission is vented through a passage drilled in the upper portion of the oil pump housing.

IDENTIFICATION

Transmission Identification

Models 904 and 998 are similar in size, appearance, and operation but have different internal components. Major differences are in the valve body and rear band. Model 998 has a double wrap rear band while model 904 has a single wrap. Model 998 also has an external characteristic that identifies it from the 904. The 998 has reinforcing ribs cast into the top of the rear servo boss on the case.

Model 727 is physically larger being designed for use with eight-cylinder engines or for heavy-duty applications. Major internal differences between 727 and 904/998 models are in the rear clutch, valve body, front servo, planetary gear assemblies and end play adjustments. The 727 has an external characteristic that will identify it from 904/998 models. The slope of the converter housing is much more gradual. This difference is

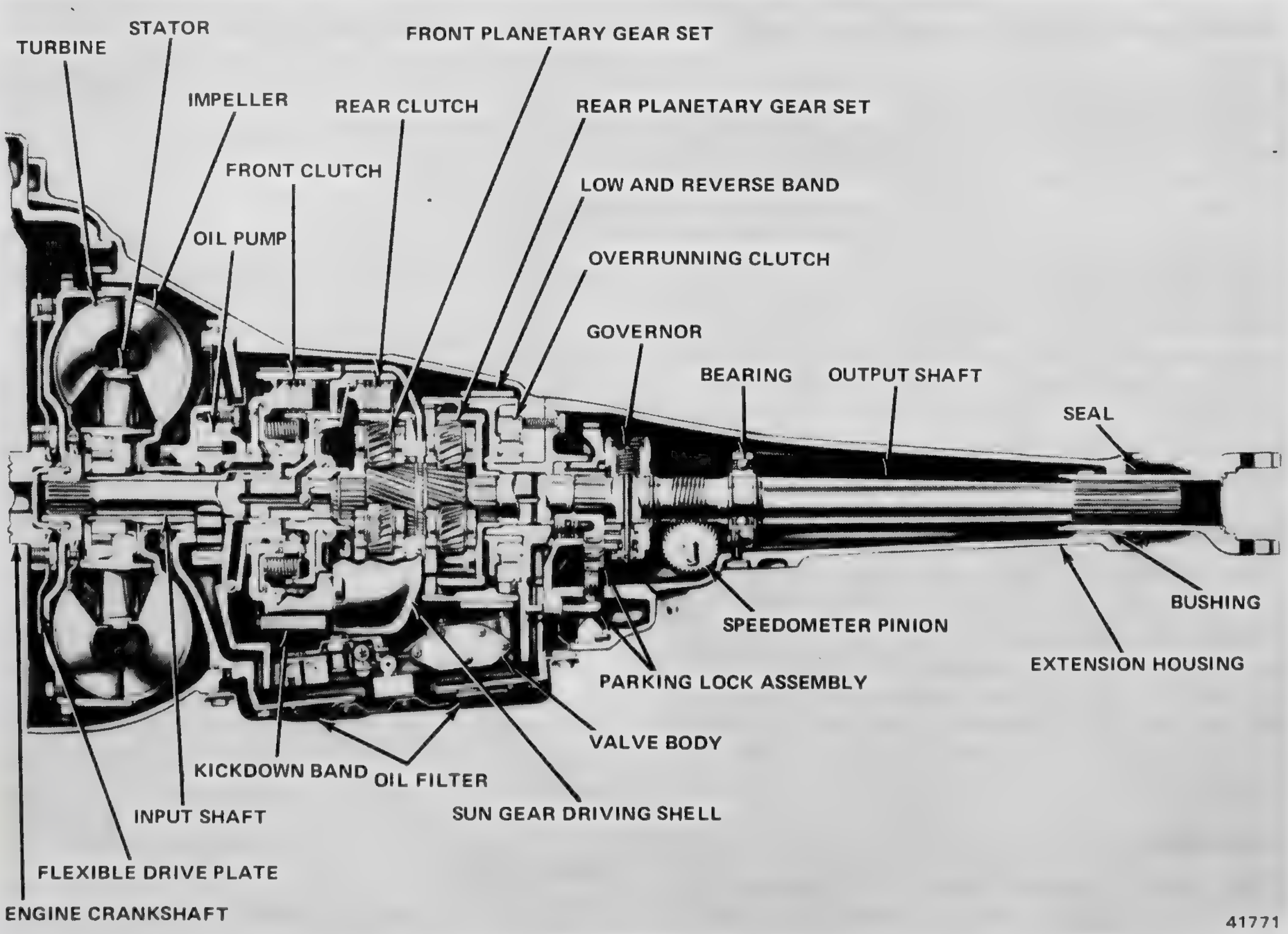

Fig. 2C-1 Automatic Transmission—Model 727

readily distinguished by referring to figures 2C-1 and 2C-2 and comparing the outline of each transmission.

Dynamic Absorber—Four-Cylinder Models

A dynamic absorber is used on all AMC cars with a four-cylinder engine. The absorber dampens out sympathetic driveline vibrations that may be generated by engine operation.

On four-cylinder cars with Model 904 automatic transmission, the absorber consists of a specially shaped cast iron balance-weight. The absorber is mounted on a bracket attached to the transmission extension housing.

If the absorber is removed during service operations, it must be securely reinstalled in its original location before completing service operations.

Torque Converter Identification

Three torque converters are used for the various engine/transmission combinations. Application is as follows: Four-cylinder cars with Model 904 automatic transmission use a 9.5 inch (24.13 cm) converter. Six-cylinder and 304 CID eight-cylinder cars with transmission models 904 or 998 use a 10.75 inch (27.30 cm) converter with small diameter pilot hub. Eight-cylinder cars with transmission Model 727 use a 10.75 inch (27.30 cm) converter with large diameter pilot hub.

Transmission Code and Part Numbers

The seven-digit transmission part number is stamped on the left side of the case just above the oil pan mating surface (fig. 2C-3). This number is followed by a four-digit code number which indicates date of manufacture. Date code numbers above 5269 are decoded by adding 1 for each calendar day after January 1, 1977 (e.g. 5635 for January 1, 1977—5636 for January 2, 1977—5646 for January 12, 1977). The last four-digit number group stamped on the case represents the transmission serial number (fig. 2C-3).

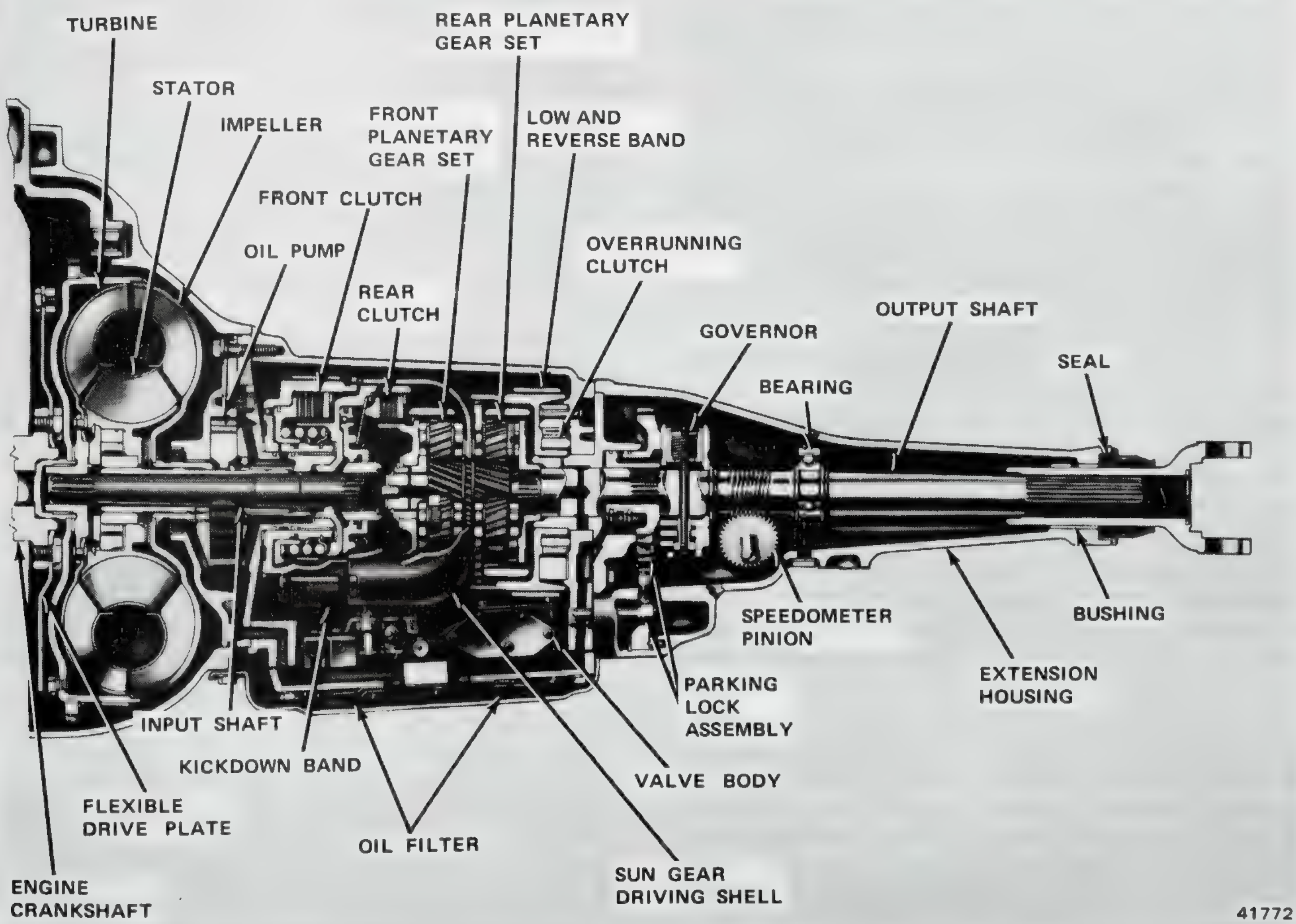

Fig. 2C-2 Automatic Transmission—Models 904-998

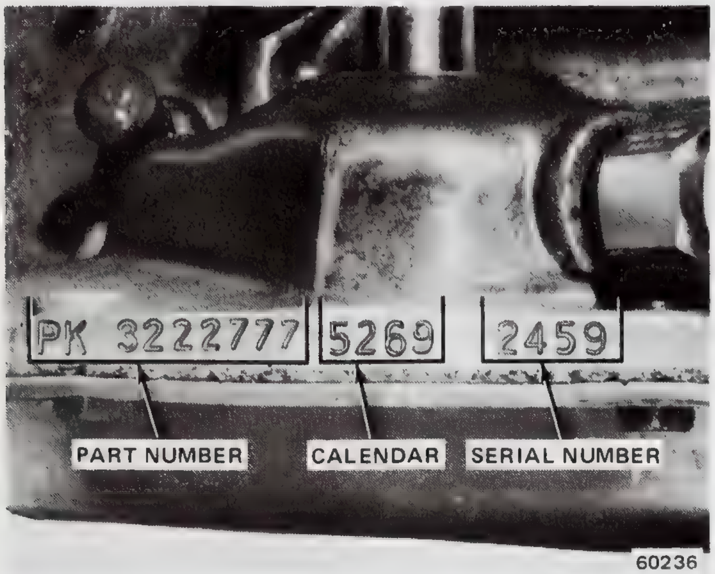

Fig. 2C-3 Transmission Code and Part Numbers

Special Identification

Cars built for sale in Georgia and Tennessee have a different identification system. These transmissions are stamped on the right side of the converter housing on the starter housing boss.

The number used on Kenosha-built cars is the Final Line Building Sequence Number followed by 78 to identify the year.

The number used on Brampton-built cars is the Body Sequence Number preceded by C and followed by 78.

These numbers on Kenosha and Brampton built cars begin and end with an asterisk to prevent alteration by extension.

POWER FLOW

The torque converter is connected to the engine crankshaft by a drive plate and to the transmission input shaft by the converter overrunning clutch. In operation, power flow is as follows: Engine torque is transmitted to the torque converter through the drive plate connecting the crankshaft and converter. The converter multiplies engine torque and transmits this torque directly to the input shaft and subsequently to the multiple disc clutches in the transmission.

The clutches then transfer engine torque through the compound planetary gear sets to the transmission output shaft. However, the actual torque flow path through the planetary gear sets is dependent on the clutch/band combination in effect at that point in transmission operation. Refer to the Clutch and Band Application Chart for details.

The torque transmitted through the planetary gear set is applied to the transmission output shaft. Torque is then transferred to the rear axle by the propeller shaft to complete the torque transfer cycle.

HYDRAULIC CONTROL SYSTEM

The hydraulic control system provides fully automatic operation of the transmission and performs five basic functions, which are:

- Pressure Supply
- Pressure Regulation
- Flow Control
- Clutch and Band Application
- Lubrication

Pressure Supply System

The single oil pump develops fluid pressure for operation and lubrication. The pump is driven by the engine through the torque converter.

Pressure Regulating System

The pressure regulator valve controls transmission main line pressure. The amount of line pressure developed is dependent upon the degree of throttle opening. The converter contol valve maintains both converter operating pressure and transmission lubrication pressure. The pressure regulator and converter control valves are located in the valve body.

The governor valve controls upshift and downshift speeds by regulating pressure according to car speed. The governor is operated by the transmission output shaft.

The throttle valve also controls upshift and downshift speeds by regulating pressure in conjunction with throttle position.

Shift Valves

The manual valve is actuated by the gearshift linkage and provides the drive ranges selected by the operator. The 1-2 shift valve provides automatic 1-2 or 2-1 shifts. The 2-3 shift valve provides automatic 2-3 and 3-2 shifts. The kickdown valve provides forced 3-2 or 3-1 downshifts depending on car speed. Downshifts occur when the throttle is opened beyond downshift detent position, which is just before wide open throttle.

The 2-3 shift valve throttle pressure plug provides 3-2 downshifts with varying throttle openings depending on car speed. On 998 and 727 models, the 1-2 shift control valve sends 1-2 shift control pressure to the accumulator piston to control front band capacity on 1-2 upshifts and 3-2 downshifts. The limit valve controls the maximum speed at which a 3-2 part throttle downshift can be made.

The shuttle valve has two independent functions. First is fast front band release and smooth front clutch engagement during "lift foot" 2-3 upshifts. Second is to regulate front servo and band application during 3-2 downshifts.

Clutches, Bands, Servos, Accumulator

The front and rear clutch pistons and servo pistons are actuated by line pressure. When line pressure is removed, the pistons are released by spring tension.

On 2-3 upshifts, the front servo piston is released by spring tension and hydraulic pressure. The accumulator controls hydraulic pressure on the apply side of the front servo during 1-2 shifts and serves to cushion front band application at all throttle openings.

GEARSHIFT LEVER POSITIONS

Park (P)

In Park position the transmission output shaft is mechanically locked by the internal parking linkage. The car must be completely stopped before engaging the transmission in park.

CAUTION: *Internal damage to the transmission could result by shifting the transmission into park position while the car is moving, or by moving the car with the transmission engaged in park position.*

Reverse (R)

When shifted to the R position, the reverse gears are engaged providing the reverse direction of movement necessary for backing and parking maneuvers.

Neutral (N)

In Neutral position, forward or reverse movement will not occur. The engine can be started in Neutral as well as Park. However, the transmission is not locked mechanically in Neutral as it is in Park position.

D—Forward Range

The D position provides automatically shifted forward ranges which are: 1-2 and 2-3 upshifts and 3-2 and 3-1 downshifts. The 3-2 and 3-1 downshifts occur at various car speeds depending on throttle opening. Approximate shift speeds for various modes of operation are shown in the Automatic Shift Speed and Governor Pressure Chart.

For extra acceleration in D position third gear, above approximately 30 mph and below approximately 70 mph, completely depress the accelerator. This forces a 3-2 downshift. The transmission will remain in second gear until full throttle automatic upshift speed is attained or the accelerator pedal is released.

If the accelerator pedal is completely depressed while in third gear below approximately 30 mph, a 3-1 downshift should occur. Upshifts to second and third gears occur at full throttle automatic upshift speeds or when the accelerator pedal is released.

2—Forward Range

The 2 position provides automatic 1-2 and 2-1 shifts. Automatic 1-2 upshift speeds in 2 position are the same as for D position except that 2-3 upshifts should not occur.

If the gearshift lever is moved from D to 2 position while in D third gear, the transmission will downshift to second gear and remain in that gear until the gearshift lever is moved back to D position.

1—Forward Range

The 1 position permits no automatic upshifts. If 1 position is selected initially, the transmission will remain in first gear until the gearshift lever is moved to another range.

If the gearshift lever is moved from D or 2 to 1 while the car is in second gear at a speed below the full throttle 1-2 upshift point, the transmission will downshift to first gear. If car speed is above 1-2 full throttle shift point, the transmission will remain in second gear until car speed is reduced to the 1-2 full throttle shift point.

If the gearshift lever is moved from D to 1 position at speeds below approximately 30 mph, the transmission will downshift to first gear.

TOWING

Cars may be towed safely in Neutral with the rear wheels on the ground at speeds under 30 mph except as follows:

CAUTION: *Disconnect the propeller shaft or raise the rear wheels if any of the following conditions are present:*

- Known or suspected transmission malfunction.
- Car is to be towed over 15 miles.
- Car is to be towed over 30 mph.
- Ignition key is not available.

DIAGNOSIS AND TEST PROCEDURES

GENERAL

In all automatic transmission repair, the logical and proper procedure is diagnosis before disassembly.

A systematic diagnosis is necessary and practical for two important reasons. First, in locating the cause of a malfunction, and second, to avoid repair delays resulting from incorrect or unnecessary repairs.

Automatic transmission malfunctions may be caused by five general conditions which are:

- Poor engine performance.
- Incorrect fluid levels.
- Incorrect linkage, band, or hydraulic control pressure adjustments.
- Hydraulic system malfunctions.
- Mechanical component malfunctions.

PRELIMINARY DIAGNOSIS

Two basic procedures are required. One procedure for cars in operating condition (can be driven) and an alternate procedure for cars not in operating condition (cannot back up or move forward).

Car In Operating Condition

(1) Check fluid level and note condition of fluid.

(2) Adjust throttle and gearshift linkage before road testing if complaint was based on delayed, erratic, or harsh shifts.

(3) Perform stall test if complaint was based on sluggish, low-speed acceleration or abnormal throttle opening requirements to maintain highway speeds with engine in good tune.

(4) Road-test car and analyze results.

(5) Perform hydraulic pressure tests.

(6) Perform air pressure test of clutch and band operation.

Car Not In Operating Condition

(1) Check fluid level and condition.

(2) Check for broken or disconnected throttle linkage.

(3) Check for broken cooler lines and loose or missing pressure port plugs.

(4) Raise rear of car, start engine, shift transmission into gear and note following:

(a) If propeller shaft turns but rear wheels do not, problem is in differential or axle shafts.

(b) If propeller shaft does not turn and transmission is noisy, stop engine, remove oil pan, and check for debris. If debris is not found, remove transmission and check for broken drive plate or drive plate-to-converter bolts, broken converter hub, broken input or output shaft, or broken oil pump.

(c) If propeller shaft does not turn and transmission is not noisy, perform hydraulic pressure test to determine if problem is malfunction of hydraulic or mechanical component.

Specific details of each of the diagnostic procedural steps are outlined in the following paragraphs.

FLUID LEVEL AND CONDITION

Check fluid level and condition as follows:

(1) Drive car a distance sufficient to bring transmission fluid to normal operating temperature of approximately 175°F (79.4°C).

NOTE: *To avoid false readings, which could result in an over or under-fill condition, do not attempt to check the fluid level until the fluid is at operating temperature.*

(2) Shift transmission into Neutral.

NOTE: *The transmission fluid level is checked in neutral because the converter fills more rapidly in this position.*

(3) Apply parking brake.

(4) Operate engine at idle speed.

(5) Wipe dirt from filler cap and tube before removing dipstick.

(6) Remove dipstick and check fluid level. Fluid level is correct when between ADD ONE PINT and FULL marks on dipstick.

(7) Add or drain fluid as necessary to bring fluid to correct level. If level was low, check transmission for leaks.

(8) Check condition of fluid.

(a) Fluid should be dark red in color and free of dirt or debris.

(b) If fluid is discolored or smells burnt, but transmission operation is OK, fluid and filter should be replaced.

(c) If fluid is badly discolored, smells burnt, contains metal or frictional material particles and transmission problems were experienced, transmission may require overhaul.

A low fluid level can produce a number of conditions because it allows the pump to take in air along with the fluid. As in any hydraulic system, aerated fluid will cause hydraulic pressures to be low and develop slower than normal.

If the transmission is overfilled, the gears churn the fluid into foam aerating the fluid and causing the same conditions that occur with a low fluid level.

In either case, air bubbles cause fluid overheating, oxidation, and varnish buildup which interferes with valve, clutch, and servo operation. Foaming can also result in fluid escaping from the transmission vent where it may be mistaken for a leak.

Along with fluid level, it is also important to check fluid condition. When the fluid is dark, smells burned, or is contaminated with metal or frictional material particles, an overhaul may be necessary. Examine the fluid on the dipstick closely. If there is any doubt about its condition, drain out a sample for further inspection.

After checking fluid level and condition, seat the dipstick fully to seal out water and dirt.

NOTE: *After completing any repairs that required draining the transmission fluid, add six quarts (5.7 liters) of AMC, Dexron, or equivalent, automatic transmission fluid to the transmission before starting the engine.*

THROTTLE LINKAGE

The throttle linkage adjustment is important to proper operation. This adjustment positions a valve which controls shift speed, shift quality, and part throttle downshift sensitivity. If the setting is too short, early shifts and slippage between shifts may occur. If the linkage setting is too long, shifts may be delayed and part throttle downshifts may be very sensitive.

This adjustment is so critical that the use of a throttle lever holding spring is necessary to remove slack in the linkage during adjustment. Refer to Throttle Linkage Adjustment in In-Car Service and Adjustment.

GEARSHIFT LINKAGE

The gearshift linkage adjustment is important because the linkage positions the manual valve in the valve body. Incorrect adjustment will result in creeping in Neutral, premature clutch wear, delayed engagement in any gear, or a no-start in Park or Neutral condition.

Proper operation of the neutral start switch will provide a quick check of linkage adjustment as follows:

(1) Insert key in ignition lock and turn lock to ON position to unlock column and gearshift lever.

(2) Move gearshift lever slowly upward until it clicks into Park detent in shift selector gate.

(3) Turn ignition lock cylinder to START postion and start engine. If starter operates, Park position is correct.

(4) Stop engine.

(5) Move gearshift lever slowly toward Neutral until lever engages in edge of Neutral detent in shift selector gate.

(6) Turn ignition lock cylinder to START position and start engine. If starter operates, Neutral position is correct and linkage is properly adjusted.

(7) If starter failed to operate in Park or Neutral, or if gearshift lever had to be moved back and forth to achieve start in either position, linkage adjustment is required. Refer to Gearshift linkage Adjustment in In-Car Service and Adjustment section.

ROAD TEST

Before performing a road test, be sure the fluid level and throttle and gearshift linkage adjustments have been checked and corrected if necessary.

Observe engine performance when road testing. An engine that is not operating correctly will effect transmission operation adversely.

During the road test, the transmission should be operated in all positions to check for slippage and shift variations. Note whether the shifts are harsh or spongy, and check the speeds at which the upshifts and downshifts occur. Refer to the Shift Speed and Governor Pressure Charts at the end of this section.

Observe closely for slippage or engine speed flareup. Slipping or flareup in any gear usually indicates clutch, band, or overruning clutch problems. If the condition is far advanced, an overhaul may be necessary to restore normal operation.

In most cases, the clutch or band that is slipping can be determined by noting the transmission operation in all gearshift lever positions and by comparing which internal units are applied in those positions. The Clutch and Band Application Chart provides a basis for analyzing the results of the road test.

Analyzing The Road Test

Refer to the Clutch and Band Application Chart and note which elements are in use in the various gearshift positions. The rear clutch is applied in all forward ranges (D, 2, 1). The overrunning clutch is applied in first gear D and 2 positions only and the front (low and reverse) band is applied in 1 and R positions only.

Clutch and Band Application Chart

Drive Position	P	R	N	D			2		1
				1	2	3	1	2	
Front Clutch		•				•			
Front Band					•			•	
Rear Clutch				•	•	•	•	•	•
Rear Band		•							•
Overrunning Clutch				•			•		•

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For example: if the transmission slips in D and 2 first gear but does not slip in 1, the overrunning clutch is the slipping unit. Similiarly, if the transmission slips in any two forward gears, the rear clutch is slipping.

Applying the same method of analysis, note that the rear clutch and front clutch are applied in D third gear only. If the transmission slips in third gear, either the front clutch or the rear clutch is slipping. By selecting another gear which does not use one of these units, the slipping clutch can be determined. For example, if the transmission also slips in reverse, the front clutch is slipping. If the transmission does not slip in reverse, the rear clutch is slipping.

This process of elimination can be used to determine the slipping unit and check operation. The key being proper utilization of the Clutch and Band Application Chart.

Road test analysis will help determine the slipping unit, but the actual cause of a malfunction usually cannot be ascertained unless hydraulic and air pressure tests are performed. Practically any condition can be caused by leaking hydraulic circuits or sticking valves.

Unless the condition is obvious, such as no drive in D range first gear only, do not disassemble the transmission until hydraulic and air pressure tests have been performed made.

Diagnostic Test Sequence

The diagnosis and test procedures should be performed in the following sequence:

- Road test.
- Hydraulic pressure test.
- Air pressure test.
- Stall test.
- Consult diagnosis guides and service diagnosis charts for probable cause of malfunction.

HYDRAULIC PRESSURE TEST

Before performing a hydraulic pressure test, be sure the fluid level and condition and control linkage adjustments have been checked and are correct.

Hydraulic pressure testing is an important step in the diagnostic procedure. This test usually reveals the cause of most problems. Refer to the Flow Charts at the end of this chapter for hydraulic circuitry details.

The hydraulic pressure test is performed using Pressure Test Set J-24027. The set contains five separate, color coded pressure hoses, a 400 psi capacity pressure gauge, and a 100 psi capacity pressure gauge. The 400 psi gauge is used to record rear servo pressures in the R and 1 positions only.

When installed, the test set permits simultaneous connection to all of the transmission pressure ports. In use, the set permits sequential or independent pressure readings at each of the ports as desired.

The transmission pressure ports are located as follows:

The accumulator line pressure port is located on the right side of the case between the front and rear servo castings, about three inches above the oil pan mating surface (fig. 2C-4).

The front servo release pressure port is located on the right side of the case just behind the filler tube opening, about two inches (5.08 cm) above the oil pan mating surface (fig. 2C-4).

The rear servo apply pressure port is on the right rear side of the case, facing rearward about three and one-half inches above the oil pan mating surface (fig. 2C-4).

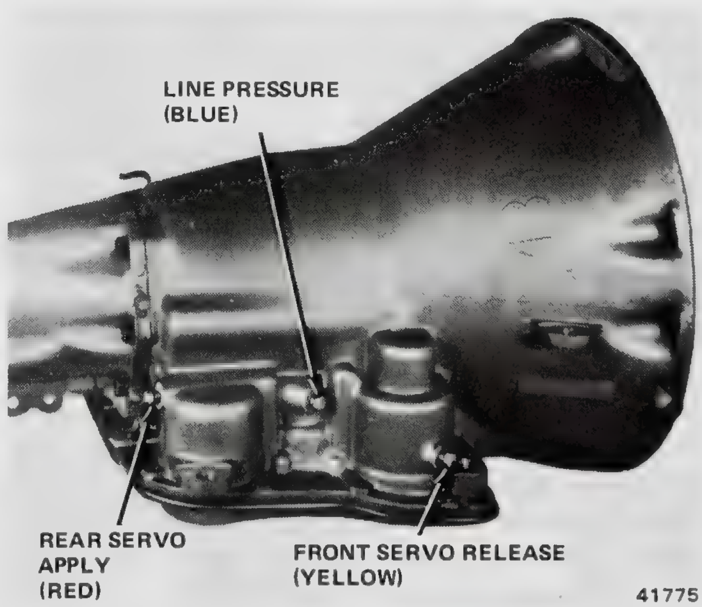

Fig. 2C-4 Pressure Port Locations

The governor pressure port faces to the left side in the front lower center section of the extension housing between the speedometer cable adpater and case mating surface (fig. 2C-5).

Lubrication pressure is measured by installing a T-fitting in the fluid cooler return line on the left side at the rear edge of the case halfway to the top of the case (fig. 2C-5).

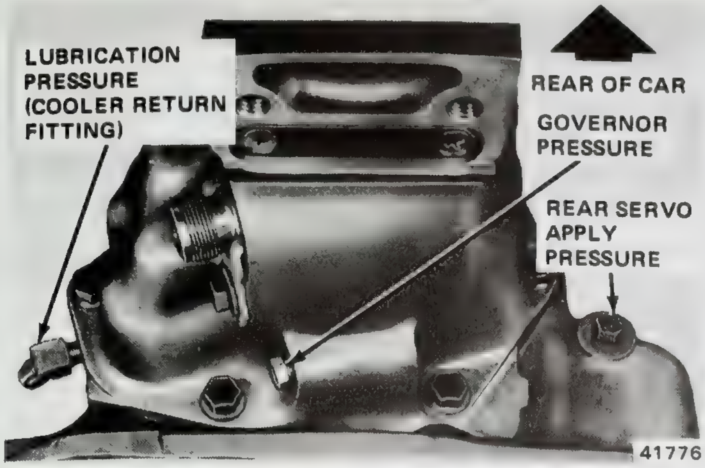

Fig. 2C-5 Pressure Port Locations

Hydraulic Pressure Test Procedure

(1) Connect tachometer to engine.

(2) Raise and support car so that rear wheels are free to rotate.

(3) Connect Pressure Test Set J-24027 to transmission pressure ports. Hoses on test set are color coded and identified as to which pressure ports they should be connected (fig. 2C-6).

(4) Apply parking brake to lock rear wheels.

(5) Start and operate engine at idle speed.

(6) Move gearshift lever to D position and record governor pressure (if any exists) and lubrication pressure.

(7) Move gearshift lever to 1 position. Release parking brake and increase engine speed to 1000 rpm. Record miles per hour, governor pressure, rear servo apply pressure and accumulator line pressure.

(8) Move gearshift lever to 2 position and allow transmission to shift to second gear. Maintain engine speed at 1000 rpm. Record miles per hour, governor pressure and accumulator line pressure.

(9) Move gearshift lever to D position and allow transmission to shift into third gear. Maintain engine speed at 1000 rpm. Record miles per hour, governor pressure, accumulator line pressure, and front servo release pressure.

(10) Move transmission throttle rod toward full throttle position and record front servo release pressure. Front servo release pressure should gradually increase until transmission downshifts (kickdown) and then drop to 0 psi at downshift. Record highest reading observed immediately before downshift.

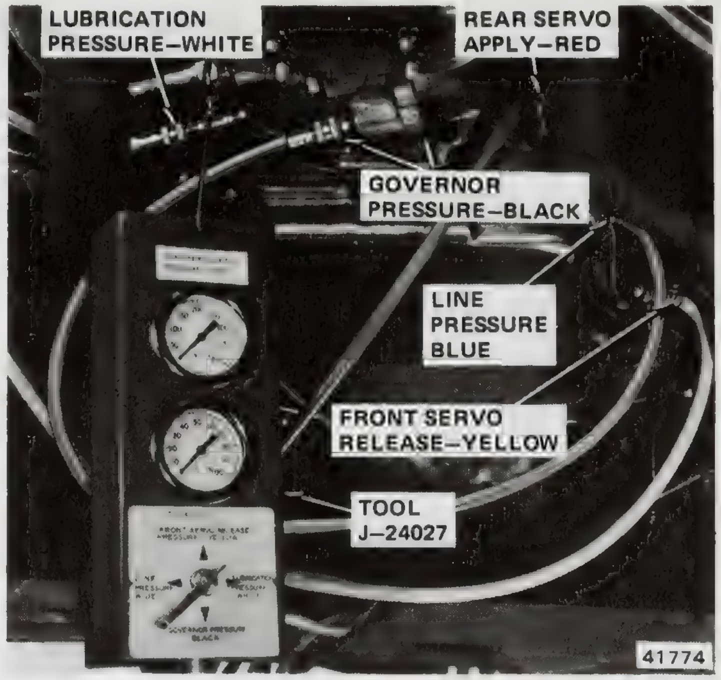

Fig. 2C-6 Pressure Test Set Installed

(11) Move transmission throttle rod until transmission shifts into third gear.

(12) Slowly move transmission throttle lever toward full throttle position until front servo release pressure is 5 psi lower than pressure just recorded at kickdown. Hold throttle rod in this position and record accumulator line pressure.

(13) Move transmission throttle rod to full throttle position and record lubrication pressure.

(14) Stop engine and apply service brakes. Place gearshift lever in R position and release service brakes. Increase engine speed to 1600 rpm and record rear servo apply pressure.

After recording the test pressures, refer to the Hydraulic Pressure Test Specifications and Hydraulic Pressure Diagnosis Guides.

Hydraulic Pressure Test Specifications

Lube Pressure	Closed throttle Full throttle	5-30 psi 10-30 psi
Line Pressure	Closed throttle 1000 rpm	52-56 psi 54-60 psi
Front Servo Release	Third gear only	No more than 3 psi lower than line pressure
Rear Servo Apply	1 Range R Range	No more than 3 psi lower than line pressure 1600 rpm—230-300 psi
Governor	D Range Closed throttle	See Shift Speeds and Governor Pressure Chart. Governor Pressure should respond smoothly to changes in MPH and should return to 0 to 1-1/2 PSI when output shaft is stopped with transmission still in D,1,2. **Pressure above 1-1/2 PSI at standstill will prevent the transmission from downshifting.**

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Hydraulic Pressure Test Diagnosis Guide

Condition	Indication
Line pressure OK during any one test	Pump and regulator valve OK
Pressure OK in R but low in D, 2, 1	Leakage in rear clutch area (servo, clutch seals, governor support seal rings)
Pressure OK in 1, 2 but low in D3 and R	Leakage in front clutch area (servo, clutch seals, retainer bore, pump seal rings)
Pressure OK in 2 but low in R and 1	Leakage in rear servo
Front servo pressure high in 2	Leakage in servo; broken servo ring or cracked servo piston
Pressure low in all positions	Clogged filter, stuck pressure regulator valve, worn or defective pump
Governor pressure high at idle (over 0 to 1-1/2 psi)	Governor valve sticking open
Governor pressure zero or below specifications at all mph figures	Governor valve sticking in closed position
Lubrication pressure low at all throttle positions	Clogged oil cooler or lines, seal rings leaking, output shaft plugged with debris, worn bushings in pump or clutch retainer

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AIR PRESSURE TEST

Air pressure testing is used as a diagnostic tool before transmission removal and also as a method of confirming proper clutch, band and servo operation after repair. The tests involve substituting air pressure for fluid pressure by applying air pressure to the appropriate case passages after the valve body has been removed (fig. 2C-7).

CAUTION: *Use dry, filtered compressed air only when performing air pressure tests. Pressures of 30 to 100 psi are required to perform the tests.*

Front Clutch Test

Place one or two fingers on the clutch housing and apply air pressure to the front clutch apply passage. Movement of the piston can be felt and a soft thud may be heard as the clutch applies. While air pressure is applied, check for excessive air leakage.

Rear Clutch Test

Place one or two fingers on the clutch housing and apply air pressure to the rear clutch apply passage. Movement of the piston can be felt and a soft thud may be heard as the clutch applies. While air pressure is applied, check for excessive or unusual air leakage.

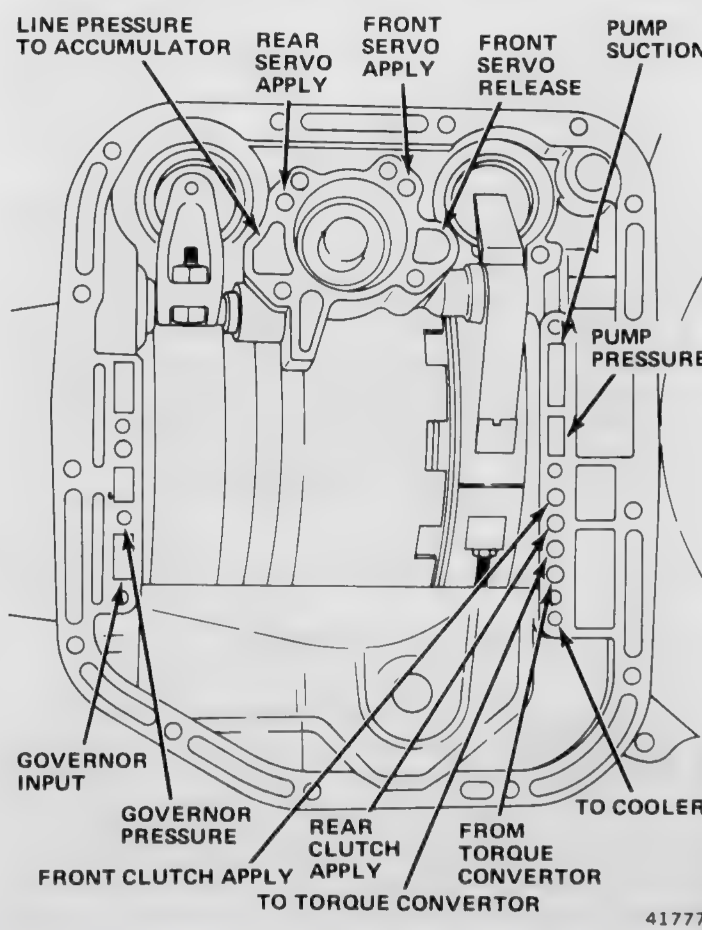

Fig. 2C-7 Transmission Case Passages

Front Servo Test

Apply air pressure to the front servo apply passage. The servo rod should extend and cause the band to tighten around the drum. While air pressure is applied, check for excessive air leakage. Spring tension should release the servo when air pressure is removed.

Rear Servo Test

Apply air pressure to the rear servo apply passage. The servo rod should extend and cause the band to tighten around the drum. While air pressure is applied, check for excessive air leakage. Spring tension should release the servo when air pressure is removed.

CONVERTER HOUSING FLUID LEAK DIAGNOSIS

When diagnosing converter housing fluid leaks, two facts must be established before attempting repair. First, it must be verified that a leak condition does actually exist and second, the real source of the leak must be determined. Failure to establish these facts beforehand can result in incorrect and unnecessary repairs.

In some cases, suspected converter housing fluid leaks may not be leaks at all. They may be the result of residual fluid in the converter housing or excess fluid spilled during factory filling or initial transmission operation. These conditions may be incorrectly diagnosed as fluid leaks.

Converter housing area leaks may have several sources. Through careful observation, it is possible to pinpoint the leak source before removing the transmission. The paths various types of fluid leaks follow are shown in Figure 2C-8 and are described below.

- Oil Pump Seal—leaks past the seal lip tend to move along the drive hub and onto the rear of the converter housing. However, if total seal failure occurs, fluid will be deposited inside the converter housing only, near the outside diameter of the housing.
- Oil Pump Body—leaks past the pump body follow the same path as an oil pump seal leak, or fluid may travel down the pump face into the converter housing.
- Oil Pump-to-Case Bolt—leaks past any one of these bolts are deposited on the inside of the converter housing only and not on the converter itself.
- Oil Pump-to-Case Gasket—leaks past the gasket are deposited inside the converter housing only.

Leak Diagnosis Procedure

(1) Check fluid level and condition. If fluid level is high or low, adjust to proper level.

(2) Raise and support car.

(3) Inspect transmission and correct any external leaks from oil pan gasket, filler tube, governor line to TCS switch (if equipped), cooler line fittings, pressure test port plugs, and case-to-extension housing gasket.

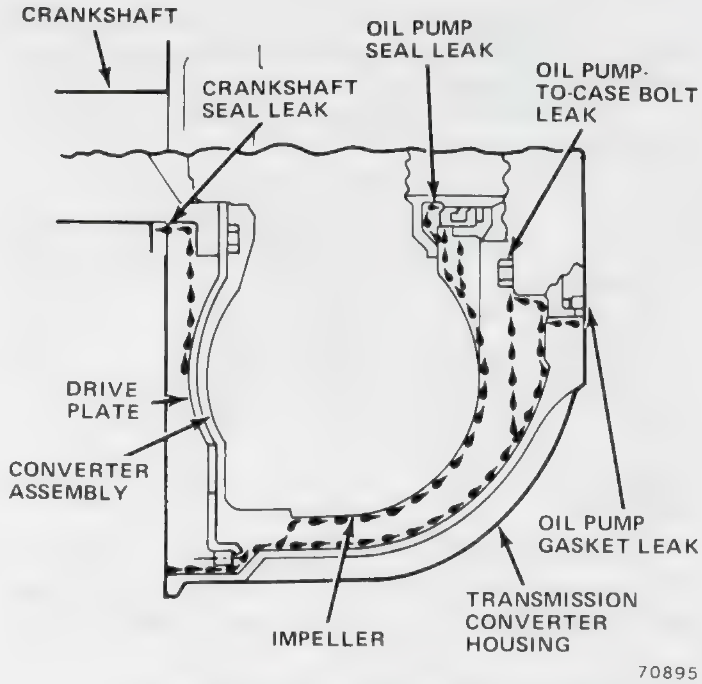

Fig. 2C-8 Converter Housing Fluid Leak Diagram

(4) Remove converter housing spacer plate.

(5) Wipe all fluid from converter housing area.

(6) Operate engine at 2,000 rpm for 2 minutes and observe converter housing for fluid accumulation pattern.

(7) If fluid accumulation pattern is not evident, proceed to next step.

(8) If a circular pattern develops, it indicates a defective or damaged torque converter. Correct leak by replacing converter.

(9) If a trickle develops, it indicates an oil pump leak caused by one or more of the following conditions:

- Pump drainback hole obstructed.
- Pump housing vent obstructed.
- Pump bushing or converter hub scored, nicked, pitted, or burred.
- Defective oil pump O-ring, gasket, or seal.
- Kickdown lever pin plug loose or plug threads in case are stripped.

(10) Correct these conditions as outlined in following steps.

(a) Remove transmission and converter.

(b) Tighten front band adjusting screw until band is tight around front clutch retainer. This will prevent front clutch assembly from also coming out when oil pump is removed and prevent damaging clutch discs.

(c) Remove oil pump and oil seal.

(d) Inspect pump housing drainback and vent holes for obstructions. If drainback hole cannot be opened using thin wire, replace pump housing. Check vent hole by blowing solvent through vent. If vent cannot be opened, replace pump housing.

(e) Inspect condition of pump housing and converter hub. If bushing is scored, replace it and polish hub using fine sandpaper.

(f) Install replacement oil pump seal, O-ring, gasket, and oil pump.

(g) Loosen kickdown lever pin plug two turns.

(h) Apply small quantity of No. 2 Permatex or equivalent sealer, to plug threads and tighten plug to 150 inch-pounds (17.0 Nm) torque.

(i) Adjust front band.

(11) Install transmission and converter.

(12) Install converter housing spacer plate.

(13) Remove supports and lower car.

GOVERNOR

Governor operational problems should be diagnosed using the road test and shift speed and governor pressure chart, and hydraulic pressure test procedures.

STALL TEST

Stall testing involves determining the maximum engine rpm obtainable at full throttle with the rear wheels locked and the transmission in D position.

This test checks the holding ability of the converter-stator overrunning clutch and both transmission clutches.

When stall testing is completed, refer to the Stall Speed Specifications Chart and diagnosis guides.

WARNING: *Never allow anyone to stand in front of the car when performing a stall test. In addition, always block the front wheels and have the parking and service brakes fully applied during the test.*

(1) Connect tachometer to engine.

(2) Check and adjust transmission fluid level as necessary.

(3) Operate engine until transmission fluid reaches operating temperature.

(4) Block front wheels.

(5) Fully apply parking brakes.

(6) Fully apply service brakes.

(7) Open throttle completely and record maximum engine rpm registered on tachometer.

CAUTION: *Do not hold the throttle open any longer than necessary and never longer than five seconds at a time. If more than one stall test is required, operate the engine at 1000 rpm with the transmission in Neutral for at least 20 seconds to cool the transmission fluid.*

(8) If engine speed exceeds maximum shown in stall speed chart, release accelerator immediately. This indicates that transmission clutch slippage is occurring.

(9) Shift transmission into Neutral, operate engine for 20 seconds, stop engine, shift transmission into Park, and release brakes.

(10) Compare test results with stall speed chart and refer to stall test diagnosis.

Stall Test Diagnosis

Stall Speed Too High

If stall speed exceeds the maximum specified in the chart by more than 200 rpm, transmission clutch slippage is indicated. Refer to the transmission road test, hydraulic pressure test and air pressure test procedures to diagnose the cause of slippage.

Stall Speed Too Low

Low stall speeds with a properly tuned engine indicate a torque converter stator clutch problem. The condition should be confirmed by road testing prior to converter replacement. If stall speeds are 250 to 350 rpm below the minimum specifed in the chart, and the car operates properly at highway speeds but has poor low speed acceleration, the stator overrunning clutch is slipping and the torque converter should be replaced.

Stall Speed Normal

If stall speeds are normal but road testing shows that abnormally high throttle opening is required to maintain highway speeds even though low speed acceleration is normal, the stator overrunning clutch is seized and the torque converter must be replaced.

Noise

A whining or siren-like noise caused by fluid flow is normal during a stall test. Loud metallic noises from loose internal parts or interference within the assembly indicates a defective torque converter. To confirm that a noise is originating from within the converter, operate the car at light throttle in Drive and Neutral on a hoist and listen for noise coming from the torque converter housing.

When the stall test is completed, compare the test speeds recorded with those listed in the Stall Speed Specifications Chart.

Stall Speed Specifications Chart

Engine	Trans. Model	Engine RPM
2 Liter	904	2050-2350
232	904	1700-2000
258	904	1850-2150
304	998-727	1950-2250
360	727	2100-2300

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SERVICE DIAGNOSIS

General

The diagnosis charts provide a quick reference for transmission diagnosis. A step-by-step approach to diagnosing and correcting transmission malfunctions is used.

The In-Car Procedures chart lists problem conditions that can be corrected with the transmission in the car. The Out-Of-Car Procedures chart lists problems that require transmission removal and disassembly.

The In-Car Procedures should always be performed first. Do not remove the transmission unless the In-Car Procedures fail to correct the problem.

How to Use the Charts

The *Condition* columns in each chart describe the most frequently encountered malfunctions. Each problem condition is cross-referenced to the necessary service procedures.

The code letters in the boxes at the top of each chart identify the individual service procedures. These code letters correspond to descriptions of the various procedures, which appear on the pages immediately following the charts.

Capital letters A through T denote In-Car Procedures. Lower case letters a through j denote Out-Of-Car Procedures.

The numbers in the boxes adjacent to the *Condition* column cross-reference each problem condition to the

Service Diagnosis

IN-CAR PROCEDURES

CONDITIONS	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
HARSH ENGAGEMENT R, D, 2, 1		2		1	3		4							6			5			
SLOW TO ENGAGE N, R, D, 2, 1	1		2	3	4		6						5	9			8	7		
NO UPSHIFT, STUCK IN LOW GEAR	1	2	3		4	7						5		6	8			9		
NO LOW GEAR MOVES IN 2ND OR 3RD GEAR												1		2						
NO KICKDOWN OR NORMAL DOWNSHIFT	1	2	3		5	4						6		7	8			9		
DELAYED, ERRATIC SHIFTS (HARSH AT TIMES)	1	2	3		4	5						6	7	8	9	10				
SLIPS IN FORWARD DRIVE RANGES	1	2	3		4	5								6	7	8	9	10		
SLIPS IN REVERSE ONLY	1		2		3		4							5		6		7		
WILL NOT MOVE IN FORWARD OR REVERSE	1		2		3								4	5				6		
REVERSE OK, WILL NOT MOVE FORWARD IN D, 2, 1			1		2									3				4		
NO REVERSE			1		2		3									4		5		
MOVES IN NEUTRAL POSITION (CREEPS IN "N")			1											2						
DRAGS OR LOCKS UP					1	2	3		4					5	6	7	8			
GROWLING, GRATING OR SCRAPING NOISES	1								2		3		4							
BUZZING NOISE	1											2		3				4		
OIL BLOWS OUT FILLER TUBE	1									2			3	4						
OVERHEATS	1			2	5	4	7			3			6	8						
WILL NOT START IN N OR P POSITION			1					2						4					3	
SLUGGISH ACCELERATION, EXCESSIVE THROTTLE NEEDED TO MAINTAIN SPEED	1	3			5														2	4

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necessary service procedures. These numbers also show the order in which the various service procedures should be performed.

As an example, assume that the problem condition is Harsh Engagement in R-D-2-1. First, locate the problem description in the *Condition* column; then note which service procedures are indicated. As shown in the chart, procedures B, D, E, G, N, Q are required. Next, note the numbers which indicate the sequence in which these procedures are to be performed. In this case, the correct order will be D, B, E, G, Q, N. Finally, refer to the service procedure descriptions, which appear on the pages immediately following the charts, for details of each procedure.

Become familiar with both charts and the procedures required. Some conditions require in-car service only, others require out-of-car service only, and some require a combination of both.

In-Car Procedures

A—Fluid Level and Condition: Fluid should be at full mark with engine idling. Fluid should not be milky, full of bubbles, or dark and burnt smelling. Use AMC, Dexron, or equivalent, transmission fluid only.

B—Throttle Linkage: Check for smooth travel. Clean, but do not lube, linkage pivot points as necessary, then adjust to specifications.

C—Gearshift Linkage: Adjust to specifications.

D—Engine Idle Adjustment: Set to specifications.

E—Hydraulic Pressures: Perform hydraulic pressure test to determine if operating pressures are within specifications. Repair hydraulic components as necessary. Check and correct throttle and line pressure settings if required.

Service Diagnosis

OUT-OF-CAR PROCEDURES

CONDITIONS	a	b	c	d	e	f	g	h	i	j
HARSH ENGAGEMENT R, D, 2, 1				1	2					
SLOW TO ENGAGE N, R, D, 2, 1		1		2	3					4
NO UPSHIFT, STUCK IN LOW GEAR		1		2						
DELAYED, ERRATIC SHIFTS (HARSH AT TIMES)		1								
SLIPS IN FORWARD DRIVE RANGES		1		2	3		4			5
SLIPS IN REVERSE ONLY		1		2			3			
SLIPS IN LOW GEAR "D" ONLY BUT NOT IN "1" POSITION								1		
WILL NOT MOVE IN FORWARD OR REVERSE	1	2				3				
REVERSE OK, WILL NOT MOVE FORWARD IN D, 2, 1					1					
NO REVERSE				1			2			
MOVES IN NEUTRAL POSITION (CREEPS IN "N")					1					
DRAGS OR LOCKS UP				1	2	3	4	5		
GROWLING, GRATING OR SCRAPING NOISES	1	2		3		4		5	6	
BUZZING NOISE		1							2	
OIL BLOWS OUT FILLER TUBE		1	2							
OVERHEATS	1									
SLUGGISH ACCELERATION, EXCESSIVE THROTTLE NEEDED TO MAINTAIN SPEED					2				1	

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F—Front Band: Adjust to specifications.
G—Rear Band: Adjust to specifications.
H—Neutral Start Switch: Check wires and connections. Test switch. See if valve body manual lever grounds switch in P and N positions. If not OK, check ground strip at valve body manual lever. If OK, check starting circuit.
I—Park Lock: Check condition of lock rod, lock rod ball, sprag reaction plug, governor support, and sprag shaft. Replace parts as required.
J—Transmission Oil Cooler: Check lines and cooler for obstructions, or leaks (look for transmission fluid in radiator coolant, or milky colored transmission fluid which indicates coolant in fluid).
K—Output Shaft Bearing, Bushing, or Seal: Remove extension housing, inspect parts, and replace parts as neccessary.
L—Governor Valve: Clean and inspect all parts. Check weights, shaft, and valve for burrs, nicks, scores, or binding. Check spring for collapsed or distorted coils and snap rings for distortion. Check filter for dirt and debris. Inspect body for cracks or wargape. Check torque on governor and output shaft support bolts.
M—Oil Filter: Inspect and replace if clogged.
N—Valve Body: Remove, disassemble, clean thoroughly, and inspect valves and plugs for nicks, scratches, burrs, and rounded edges on valve lands. Check bores for scratches, springs for collapsed coils, and all mating surfaces for nicks, burrs, or warpage. Reassemble and install, tightening all screws to exact specifications.
O—Front Servo and Linkage: Inspect piston for wear, cracks, and worn or broken seal rings. Check springs for collapsed or broken coils. Check servo bore for scratches, nicks, or wear. Check lever, strut, and band for damage. Check lever shaft for wear, being loose in case, or for leaking O-ring.
P—Rear Servo and Linkage: Inspect piston for wear, cracks, worn or broken seal ring, or damaged seal. Check springs for collapsed or broken coils. Check servo bore for scratches, nicks, or wear. Check lever and band for damage. Check lever shaft for wear or being loose in case.
Q—Accumulator: Clean and inspect for broken seal rings, scratched bore, or broken or collapsed spring. Check piston for cracks or evidence of piston cocking in bore.
R—Air Pressure Test: Remove valve body and use air pressure to apply clutches and bands to check operation.
S—Engine Tune and Performance: Verify proper engine operation. Be sure compression meets specifications and fuel and ignition systems are functioning properly.
T—Stall Test: Perform stall test to check holding ability of converter and transmission clutches.

Out-Of-Car Procedures

a—Converter Drive Plate: Check plate for flatness, cracks at mounting bolt holes, loose attaching bolts, or damaged ring gear teeth. Broken drive plate may indicate engine-to-transmission caused by loose, missing, or misaligned dowels.
b—Oil Pump: Clean pump and check all clearances. Inspect rotors for scoring and the seal and bushings for wear. Inspect pump housing and reaction shaft support mating surfaces for flatness.
c—Transmission Vent: Make sure vent is open and not obstructed.
d—Front Clutch: Clean and inspect all parts. Examine retainer and piston for scores and scratches, discs and plates for wear, return springs for collapsed coils, and the seal rings for damage. The vent check ball in the retainer must operate freely.
e—Rear Clutch: Inspect all rear clutch parts as outlined under front clutch procedure.
f—Planetary Gear Set: Clean and inspect annulus gear, planet pinion carrier assembly, and sun gear for worn thrust washers, damaged gear teeth, and excessive pinion end clearance. Examine the bushings in the sun gear for excessive wear.
g—Rear Band: Inspect the band for wear and for good bond of lining to band. Inspect lining for burn marks, glazing, uneven wear patterns, flaking, or if band grooves are worn away at any portion of band. Replace band if it exhibits any of these conditions.
h—Overrunning Clutch: Clean and inspect clutch parts for brinnelled clutch rollers or cam, or improperly assembled rollers or springs. Check for collapsed springs and bent spring retainer tabs.
i—Torque Converter: Flush thoroughly to remove all foreign material and oxidized oil. Inspect front seal surface of converter hub for scratches, burrs, nicks, or scoring. Check oil pump drive slots in hub for wear, or sharp edges. Polish minor surface irregularities with crocus cloth.
j—Seal Rings: Inspect seal rings on reaction shaft support and governor support for wear, cracks, or breakage. Inspect ring grooves on both support assemblies for nicks, burrs, or distortion. Inspect bores in front clutch retainer and output shaft support for nicks, grooves, wear, cracks, or scratches.

SPECIFICATIONS

Transmission Shift Speeds and Governor Pressures

SHIFT SPEEDS AND GOVERNOR PRESSURES (Standard Axles and Tires) — Pacer, Gremlin, Concord, AMX

Series	Pacer — Gremlin — Concord																	
Transmission Model	904	904	904	904	904	904	904	904	904	904	904	904	904	904	998	998	998	998
Engine C.I.D.	2 Liter	2 Liter	232 258	232 258	232 258	232 258	232 258	232 258	232 258	232 258	232 258	232 258	232 258	232 258	304	304	304	304
Axle Gear Ratio	3.31	3.31	2.53	2.53	2.53	2.53	2.73	2.73	2.73	2.73	3.08	3.08	3.08	3.08	2.87	2.87	3.15	3.15
Tire Size (x14)	C78	B78	C78	B78	D78	DR78	C78	B78	D78	DR78	C78	B78	D78	DR78	D78	DR78	D78	DR78
Wheel/RPM	831	814	831	814	811	818	831	814	811	818	831	814	811	818	811	818	811	818
Throttle Closed	OK Range																	
1-2 Upshift	8-13	9-14	10-13	11-13	11-13	11-13	9-13	9-13	9-13	9-13	9-11	9-11	9-11	9-11	10-12	10-12	8-10	8-10
2-3 Upshift	10-18	13-19	15-18	16-19	16-19	16-19	14-17	14-17	14-17	14-17	13-17	13-17	13-17	13-17	14-17	14-17	12-15	12-15
3-1 Downshift	8-14	9-14	10-13	11-13	11-13	11-13	9-13	9-13	9-13	9-13	9-11	9-11	9-11	9-11	10-12	10-12	8-10	8-10
W.O.T. thru Detent	OK Range																	
1-2 Upshift	29-48	30-49	33-48	34-49	34-49	34-49	31-46	31-46	31-46	31-46	26-40	27-41	27-41	27-41	32-47	32-47	29-43	29-43
2-3 Upshift	59-80	60-82	67-82	69-84	69-84	69-84	63-81	63-81	63-81	63-81	55-72	56-73	56-73	56-73	63-83	66-83	60-76	60-76
Kickdown Limit	OK Range																	
3-2 Part Throttle Downshift	21-41	22-42	27-41	28-42	28-42	28-42	29-43	29-43	29-43	29-43	25-38	26-39	26-39	26-39	33-41	33-41	29-37	29-37
3-2 W.O.T. Downshift	20-36	21-36	28-34	29-35	29-35	29-35	28-34	28-34	28-34	28-34	24-29	25-30	25-30	25-30	27-33	27-33	25-30	25-30
Governor Pressure	OK Range																	
15 psi.	15-26	15-25	19-23	20-24	20-24	20-24	20-24	20-24	20-24	20-24	17-21	17-21	17-21	17-21	19-23	19-23	15-19	15-19
50 psi.	43-60	44-60	50-58	51-59	51-59	51-59	47-55	47-55	47-55	47-55	42-50	42-50	42-50	42-50	49-57	49-57	44-52	44-52
75 psi.	66-80	67-80	70-78	72-80	72-80	72-80	66-74	66-74	62-74	66-74	59-66	59-66	59-66	59-66	69-77	69-77	62-70	62-70

70052

SHIFT SPEEDS AND GOVERNOR PRESSURES (Standard Axles and Tires) — Matador

Series	— 16-80 Matador —																
Transmission Model	907	904	904	904	904	904	904	904	998	998	998	998	998	998	727	727	727
Engine C.I.D.	258	258	258	258	258	258	258	258	304	304	304	304	304	304	360	360	360
Axle Gear Ratio	3.15	3.15	3.15	3.15	3.54	3.54	3.54	3.54	3.15	3.15	3.15	3.54	3.54	3.54	3.15	3.15	3.15
Tire Size (x14)	ER78	FR78	F78	HR78	ER78	FR78	F78	HR78	FR78	F78	HR78	FR78	F78	HR78	FR78	F78	HR78
Wheel/RPM	815	791	784	784	815	791	784	784	791	784	748	791	784	748	791	784	748
Throttle Closed	OK Range																
1-2 Upshift	10-12	10-12	9-11	8-10	9-11	9-11	9-11	8-10	10-12	10-12	9-11	9-11	9-11	9-11	10-12	9-11	10-12
2-3 Upshift	14-17	14-17	13-16	12-16	12-16	12-16	12-16	11-16	14-17	14-17	13-16	10-16	10-16	10-16	14-17	13-16	14-17
3-1 Downshift	10-12	10-12	9-11	7-10	9-11	9-11	9-11	8-10	10-12	10-12	9-11	9-11	9-11	9-11	10-12	9-11	10-12
W.O.T. thru Detent	OK Range																
1-2 Upshift	28-42	28-42	28-43	29-44	25-35	25-35	25-35	25-41	25-41	30-45	31-46	36-41	27-41	27-41	27-41	30-45	30-47
2-3 Upshift	57-73	57-73	59-73	60-74	48-62	46-60	46-60	54-66	56-72	62-79	65-82	56-72	56-72	56-72	56-72	62-79	65-82
Kickdown Limit	OK Range																
3-2 Part Throttle Downshift	27-40	25-39	25-36	23-36	17-33	18-34	18-34	18-34	26-39	31-45	32-45	24-36	24-36	24-36	26-39	31-43	32-45
3-2 W.O.T. Downshift	26-31	25-30	24-30	22-28	23-28	22-27	22-27	22-27	25-30	25-33	26-34	23-28	23-28	23-28	25-30	25-33	26-34
Governor Pressure	OK Range																
15 psi.	17-21	17-21	17-21	16-20	14-18	16-20	16-20	16-20	17-21	16-20	17-21	14-18	14-18	14-18	17-21	16-26	17-21
50 psi.	43-50	42-50	42-49	41-48	36-42	38-44	38-44	38-44	42-49	46-54	49-57	42-50	42-50	42-50	42-50	46-54	49-57
75 psi.	59-67	63-66	57-65	52-64	50-58	52-60	52-60	52-60	63-66	65-73	68-77	59-68	59-68	59-68	58-66	65-73	63-77

70051

Torque Specifications

	Metric (N·m) Service Set-To Torque	Metric (N·m) In-Use Recheck Torque	USA (ft. lbs.) Service Set-To Torque	USA (ft. lbs.) In-Use Recheck Torque
Cooler Line Fitting	20	14-41	15	10-30
Cooler Line Nut	34	20-41	25	15-30
Converter Drain Plug	12	—	110 in-lb	—
Converter Drive Plate to Crankshaft Bolt	142	129-163	105	95-120
Converter Drive Plate to Torque Converter Bolt	30	27-34	22	20-25
Extension Housing to Transmission Case Bolt	33	—	24	—
Extension Housing to Insulator Mounting Bolt	68	—	50	—
Governor Body to Support Bolt	11	—	100 in-lb	—
Kickdown Band Adjusting Screw Locknut	47	—	35	—
Kickdown Lever Shaft Plug	17	—	150 in-lb	—
Low Reverse Band Adjusting Screw Locknut	47	—	35 ft-lb	—
Neutral Starter Switch	33	—	24	—
Oil Filler Tube Bracket Bolt	17	—	150 in-lb	—
Oil Pan Bolt	17	—	150 in-lb	9-13
Oil Pump Housing-to-Transmission Case Bolt	20	—	175 in-lb	—
Output Shaft Support Bolt	17	—	150 in-lb	—
Overrunning Clutch Cam Setscrew	4	—	40 in-lb	—
Pressure Test Port Plug	12	—	110 in-lb	—
Reaction Shaft Support to Oil Pump Bolt	18	—	160 in-lb	—
Speedometer Adapter Clamp Screw	11	—	100 in-lb	—
Transmission-to-Engine Bolt	38	30-41	28	22-30
Valve Body Screw	4	—	35 in-lb	—
Valve Body-to-Transmission Case Screw	11	—	100 in-lb	—

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

70121

Fluid Level

Fill to "Add One Pint" mark on dipstick. Use AMC, Dexron, or equivalent Automatic transmission fluid.

NOTE: Check fluid level with gearshift selector lever in N (neutral) position and with fluid at normal operating temperature.

70129

Fluid Capacity and Converter Size

Torque Converter Diameter
- 904 (four cylinder) . . . . . 9.5 inch
- 904-998-727 (six-eight cylinder) . . . . . 10.75 inch

Oil Capacity—Transmission and Torque Converter
- 904 (four cylinder) . . . . . . 14.2 pts. (U.S.) 6.67 Liters (Metric)
- 904-998 (six-eight cylinder) . 17 pts. (U.S.) 7.99 Liters (Metric)
- 727 (eight cylinder) . . . . . . 19 pts. (U.S.) 8.93 Liters (Metric)

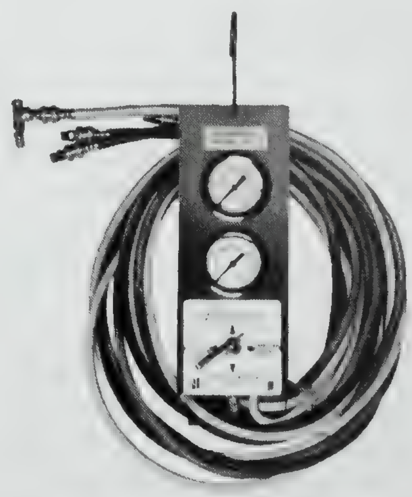
Cooling Method—All Models . . . . Water-Heat Exchanger in Radiator Lower Tank

Fluid Pressure and Lubrication—All Models . . . . . Rotor-Type Pump

Gear Ratios—All Models
- First 2.45:1
- Second 1.45:1
- Third 1.00:1
- Reverse 2.20:1

80069

Special Tools



J-24027 PRESSURE TEST SET

70124

IN-CAR SERVICE AND ADJUSTMENT

GEARSHIFT LINKAGE ADJUSTMENT

(1) Raise car.

(2) Loosen shift rod trunnion jamnuts.

(3) Remove lockpin retaining shift rod trunnion to bellcrank and disengage trunnion and shift rod at bellcrank.

(4) Place gearshift lever in Park position and lock steering column.

(5) Move transmission control lever rearward into Park detent. Be sure lever is moved rearward as far as possible. Park detent is last rearward detent.

(6) Check for positive engagement of park lock by attempting to rotate propeller shaft. Shaft will not rotate if park lock pawl is fully engaged in governor support.

(7) Adjust shift rod trunnion to obtain free pin fit in bellcrank arm and tighten trunnion jamnuts. Prevent shift rod from turning while tightening jamnuts.

NOTE: *On column shift cars, all gearshift linkage lash must be eliminated in order to obtain a proper adjustment. When making adjustment, eliminate lash by pulling downward on the shift rod and pressing upward on the outer bellcrank.*

(8) Move gearshift lever to Park and Neutral positions and check engine starting. Engine should start in these positions only. Engine must not start in any gear position other than Park or Neutral. If engine does not start or starts in R, D, 2, or 1, adjustment is incorrect or neutral switch is defective.

(9) Check steering lock for ease of operation.

(10) Lower car.

SHIFT QUADRANT POINTER ADJUSTMENT—PACER-MATADOR

(1) Pacer models, remove steering column tube cover.

(2) On Matador models, remove lower finish panel.

(3) Unlock steering column and place gearshift lever in neutral position.

(4) Loosen screw attaching cable adjusting clip to steering column shift bowl (fig. 2C-9).

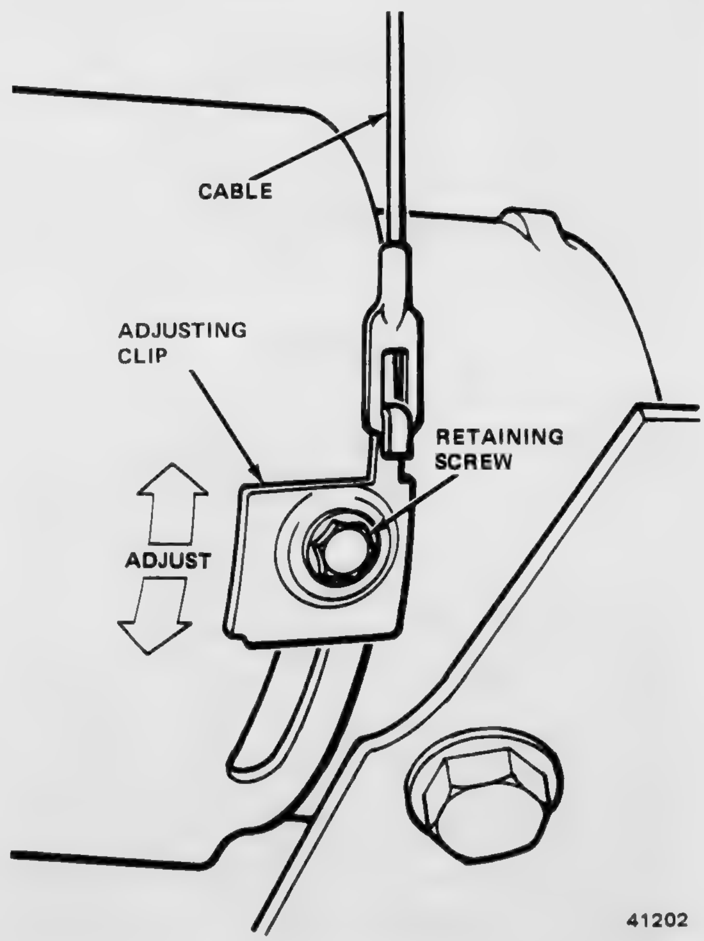


Fig. 2C-9 Shift Quadrant Cable

(5) Move clip up or down as required to center quadrant pointer on neutral position.

(6) Tighten screw and check position of pointer in other gearshift positions and adjust if necessary

(7) On Pacer models, install steering column tube cover.

(8) On Matador models, install lower finish panel.

SHIFT QUADRANT REPLACEMENT—PACER-MATADOR

Pacer

(1) Disconnect battery negative cable.

(2) Remove steering column tube cover, and disconnect quadrant cable at adjuster clip.

(3) Remove instrument cluster bezel.

(4) Remove radio control knobs and radio retaining nuts, if equipped.

(5) Remove right-side overlay attaching screws and remove overlay.

(6) Remove headlamp control overlay attaching screws and remove overlay.

(7) Remove instrument cluster attaching screws.

(8) Disconnect speedometer cable and wiring connectors at instrument cluster and remove cluster. Push wiring connector tabs inward, then pull connectors outward to remove.

(9) Remove quadrant attaching screws, quadrant from cluster, and cable from quadrant.

(10) Install cable on lever of replacement quadrant. Be sure cable is seated in quadrant lever notch.

(11) Position quadrant in instrument cluster and install attaching screws.

(12) Attach wiring connectors and speedometer cable to instrument cluster.

(13) Position cluster in instrument panel and install cluster attaching screws.

(14) Connect quadrant cable to adjuster clip on steering column.

(15) Install right-side and headlamp control overlays.

(16) Install radio retaining nuts and control knobs, if equipped.

(17) Install instrument cluster bezel.

(18) Adjust qaudrant pointer.

(19) Install steering column tube cover.

(20) Connect battery negative cable.

Matador

(1) Disconnect battery negative cable.

(2) Remove lower finish panel.

(3) Disconnect quadrant cable at adjuster clip.

(4) Remove radio control knobs and radio retaining nuts.

(5) Remove passenger side remote mirror control retaining nut, if equipped.

(6) Remove instrument cluster bezel attaching screws, tilt bezel toward column, disconnect wiring connectors at bezel, and remove bezel.

(7) Remove clock or clock opening cover.

(8) Remove instrument cluster attaching screws.

(9) Disconnect speedometer cable at cluster.

(10) Tilt cluster toward column, disconnect wiring connectors at cluster, and remove cluster.

(11) Remove screws attaching speedometer lens housing to cluster.

(12) Remove speedometer housing from cluster, remove quadrant attaching screws, and remove quadrant from speedometer housing.

(13) Position replacement quadrant in speedometer housing and install quadrant attaching screws.

(14) Install speedometer housing in cluster, position lens housing on cluster and install lens housing attaching screws.

(15) Position instrument cluster in panel, attach wiring connectors and speedometer cable to cluster, and install cluster attaching screws.

(16) Connect quadrant cable to adjuster clip on steering column.

(17) Install clock or clock opening cover.

(18) Position instrument cluster bezel on cluster and attach wiring connectors to bezel. If bezel is difficult to position over steering column, loosen column mounting bracket attaching nuts, position bezel, and tighten bracket nuts to 15 foot-pounds (20.3 Nm) torque.

(19) Install passenger side remote mirror control attaching nut if equipped.

(20) Install instrument cluster bezel attaching screws.

(21) Adjust quadrant pointer.

(22) Install lower finish panel.

(23) Connect battery negative cable.

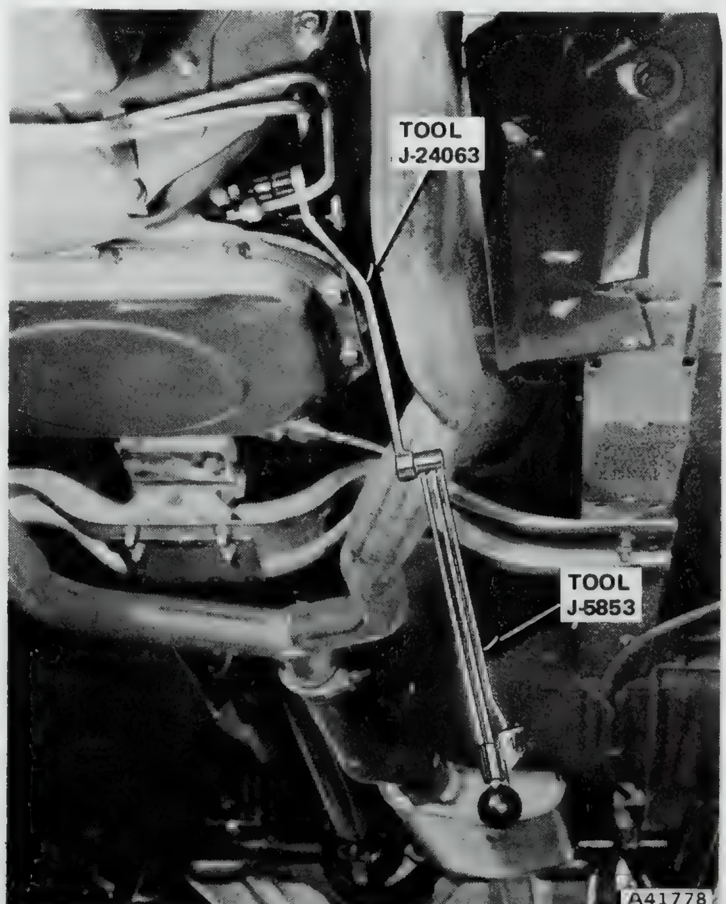


Fig. 2C-10 Front Band Adjustment

FRONT BAND ADJUSTMENT

The front band adjusting screw is located on the left side of the transmission case just above the manual valve and throttle lever control levers (fig. 2C-10).

Adjustment Procedure

(1) Loosen adjusting screw locknut and back off locknut five turns.

(2) Check adjusting screw rotation. Screw must turn freely in case.

(3) Tighten adjusting screw to 36 inch-pounds (4.07 Nm) torque using Torque Wrench J-5853, Adapter Tool J-24063, and a 5/16-inch square socket (fig. 2C-9).

CAUTION: *If Adapter Tool J-24063 is not used, the band adjusting screw must be tightened to 72 inch-pounds (8.13 Nm) torque.*

(4) On Models 904/998, back off adjusting screw 2 turns.

(5) On Model 727, back off adjusting screw 2-1/2 turns.

(6) Tighten adjuster screw locknut to 35 foot-pounds (47.5 Nm) torque. Do not allow adjuster screw to rotate when tightening locknut.

REAR BAND ADJUSTMENT

The rear band adjustment is an internal adjustment. The transmission oil pan must be removed to gain access to the band adjusting screw (fig. 2C-11).

Adjustment Procedure

(1) Remove oil pan and drain fluid.

(2) Inspect fluid and filter for heavy accumulation of friction material or metal particles which indicate worn or damaged parts. However, a very light accumulation of this material is normal.

(3) On Models 904/998, adjust band as follows (fig. 2C-11):

(a) Remove adjusting screw locknut.

(b) Tighten adjusting screw to 41 inch-pounds (4.6 Nm) using torque wrench and 1/4-inch hex head socket wrench.

(c) On Model 904, back off adjusting screw 7-1/2 turns.

(d) On Model 998, back off adjusting screw 4 turns.

(e) Hold adjusting screw in position and install locknut. Tighten locknut to 35 foot-pounds (47.5 Nm) torque.

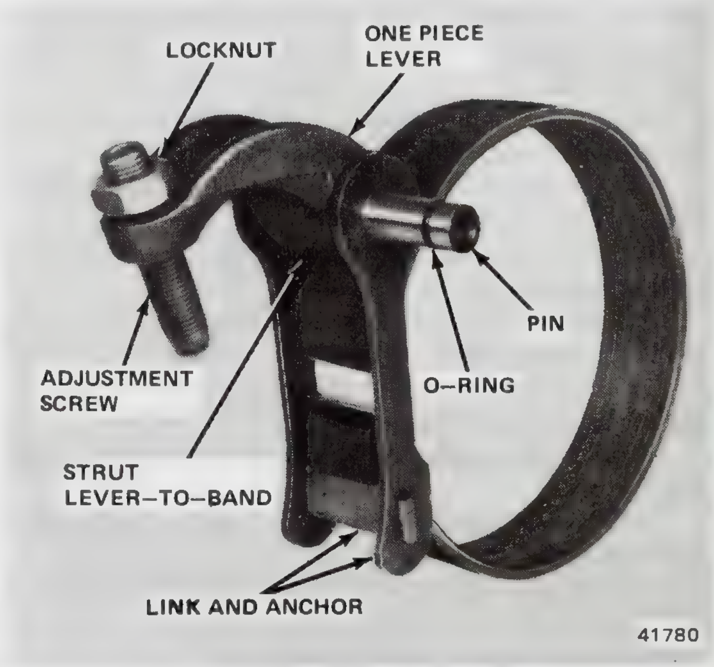


Fig. 2C-12 Rear Band Arrangement—Model 904

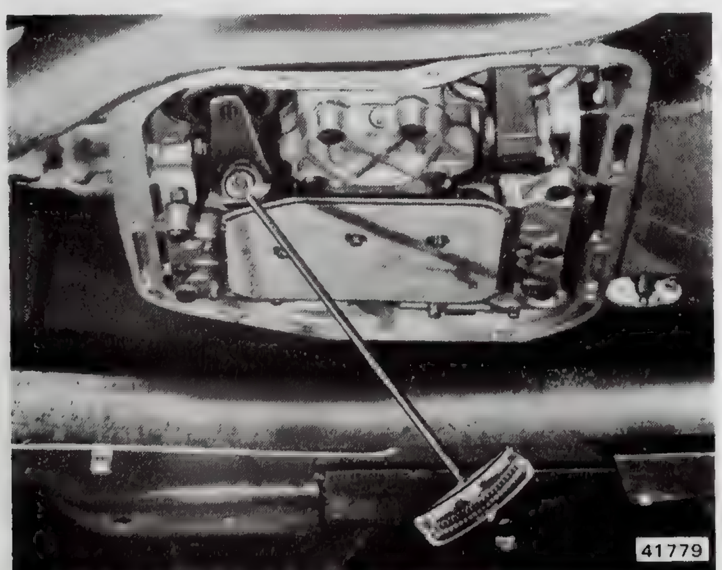


Fig. 2C-11 Rear Band Adjustment

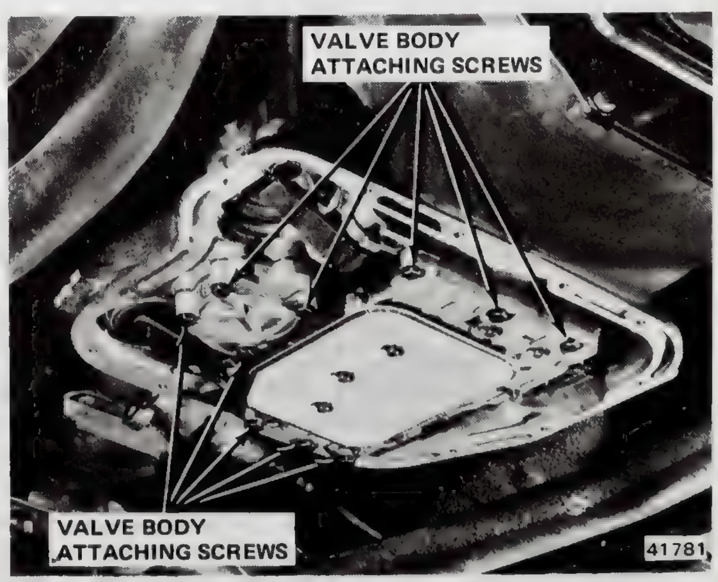


Fig. 2C-13 Valve Body Attaching Screw Location

(4) On Model 727, adjust band as follows:

(a) Loosen adjuster screw locknut. Back off locknut five turns.

(b) Tighten adjusting screw to 72 inch-pounds (8.1 Nm) torque.

(c) Back off adjusting screw 2 turns.

(d) Hold adjusting screw in position and tighten locknut to 35 foot-pounds (47.5 Nm) torque.

(5) Install oil pan and replacement pan gasket. Tighten oil pan bolts to 150 inch-pounds (17.0 Nm) torque.

(6) Fill transmission with AMC, Dexron, or equivalent automatic transmission fluid. Refer to Fluid Level and Condition for refill procedure.

OIL FILTER REPLACEMENT

(1) Remove oil pan and drain fluid.

(2) Inspect fluid and filter for friction material or metal particles which indicate worn or damaged parts.

(3) Remove three screws attaching filter to valve body and remove filter.

(4) Install replacement filter and tighten filter attaching screws to 35 inch-pounds (4.0 Nm) torque.

(5) Clean and install oil pan and replacement pan gasket. Tighten pan bolts to 150 inch-pounds (17.0 Nm) torque.

(6) Fill transmission with AMC, Dexron, or equivalent automatic transmisson fluid. Refer to Fluid Level and Condition for refill procedure.

VALVE BODY SERVICE

Removal

(1) Remove oil pan and drain fluid.

(2) Loosen clamp bolts and remove throttle and manual valve control levers from valve body shafts.

(3) Remove neutral start switch from case.

(4) Remove valve body attaching screws (fig. 2C-13).

(5) Lower valve body, pull forward to disengage park lock rod, and remove valve body.

NOTE: *It may be necessary to rotate the output shaft before the park lock rod will pass by the park sprag.*

(6) Remove oil filter.

(7) Mount valve body on Support Stand J-24043.

(8) Refer to Out-of-Car Service and Overhaul section for valve body service procedures.

Valve Body Hydraulic Control Pressure Adjustments

There are two hydraulic control pressure adjustments that can be performed on the valve body, they are: Line Pressure and Throttle Pressure adjustment.

Because line and throttle pressure are interdependent (each affects shift quality and timing), both adjustments must be performed properly and in the correct sequence; line pressure adjustment first—throttle pressure adjustment last.

Line Pressure Adjustment

(1) Measure distance from valve body to inner edge of adjusting screw using accurate steel scale (fig. 2C-14).

(2) Distance measured should be 1-5/16 inches (3.3 cm).

(3) If adjustment is required, turn adjusting screw in or out to obtain 1-5/16 inch (3.3 cm) setting.

NOTE: *The 1-5/16-inch (3.3 cm) setting is an approximate setting. Because of manufacturing tolerances, it may be necessary to vary from this dimension to obtain the desired pressure. One complete turn of the adjusting screw changes line pressure approximately 1-2/3 psi. Turning the adjusting screw counterclockwise increases pressure while turning the screw clockwise decreases pressure.*

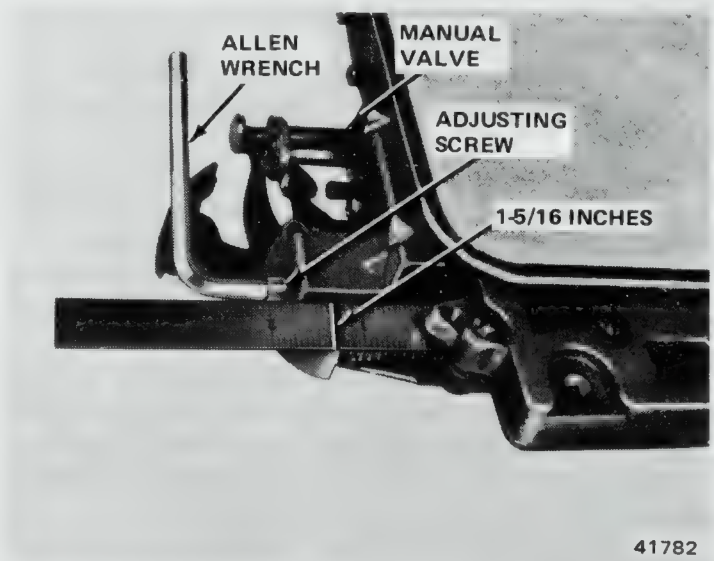


Fig. 2C-14 Line Pressure Adjustment

Throttle Pressure Adjustment

(1) Insert Gauge Tool J-24031 between throttle lever cam and kickdown valve (fig. 2C-15).

(2) Push gauge tool inward to compress kickdown valve against its spring and to bottom throttle valve in valve body.

(3) Maintain pressure against kickdown valve spring and turn throttle lever stop screw until screw head touches throttle lever tang and throttle lever cam touches gauge tool.

NOTE: *The kickdown valve spring must be fully compressed and the kickdown valve completely bottomed in the valve body to obtain a correct adjustment.*

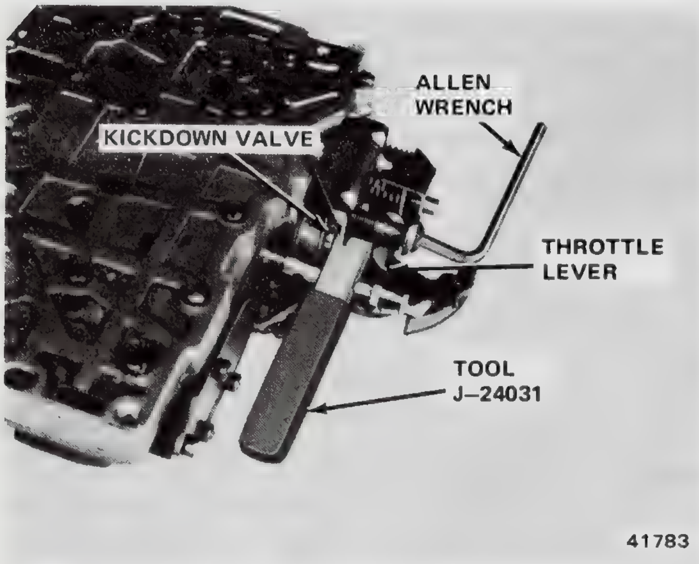


Fig. 2C-15 Throttle Pressure Adjustment

Installation

(1) Clean all mating surfaces. Be sure burrs are removed from transmission case and valve body steel plate surfaces.

(2) Position accumulator spring on valve body.

(3) Insert park lock rod through opening in rear of case.

(4) Position knob on end of lock rod against reaction plug in sprag and exert rearward pressure on rod to force rod past sprag. Rotate output shaft if necessary.

(5) Align and install valve body. Install attaching screws finger-tight only.

(6) Install neutral safety switch.

(7) Move manual valve in valve body to neutral position. Align valve body as necessary to align neutral finger of manual lever with neutural switch plunger.

(8) Tighten valve body attaching screws alternately and evenly to 100 inch-pounds (11.3 Nm) torque.

(9) Install oil filter. Tighten attaching screws to 35 inch-pounds (4.0 Nm) torque.

(10) Install manual and throttle valve control levers and tighten clamp bolts. Check both shafts for binding after tightening bolts.

(11) Install oil pan and replacement gasket. Tighten oil pan bolts to 150 inch-pounds (17.0 Nm) torque.

(12) Fill transmission with AMC, Dexron, or equivalent automatic transmission fluid. Refer to Fluid Level and Condition for refill procedure.

(13) Adjust gearshift and throttle linkage.

Front and Rear Servos

The front and rear servos may be removed, reconditioned, installed, and adjusted with the transmission in the car.

For removal, inspection, and installation procedures, refer to Out-Of-Car Service and Overhaul section.

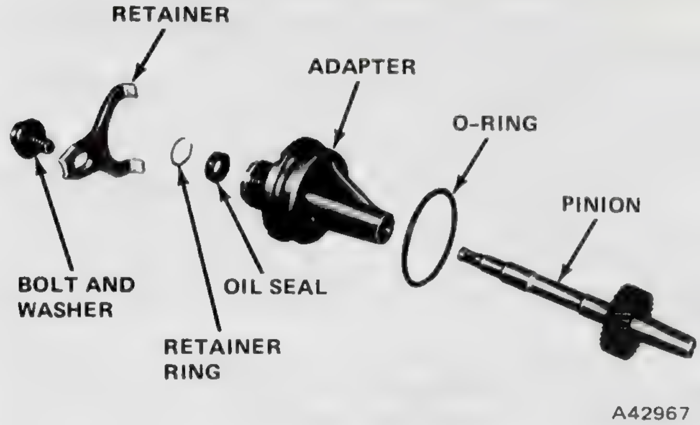


Fig. 2C-16 Adapter Assembly—Gremlin-Concord-AMX-Matador

SPEEDOMETER PINION ADAPTER AND SEAL REPLACEMENT

Gremlin-Concord-AMX-Matador

(1) Disconnect speedometer cable housing and TCS switch, if equipped.

(2) Remove bolt and retainer which secures adapter to extension housing (fig. 2C-16).

(3) Remove adapter assembly from extension housing.

(4) Push seal and retainer ring from adapter. A 1/8-inch punch may be used.

(5) Start seal and retainer ring into adapter. Seal lip should face into adapter. Use Seal and Retainer Installer Tool J-24028 to press seal and retainer into adapter until tool bottoms (fig. 2C-17).

(6) Clean adapter and extension housing mating surfaces. Dirt or sand causes misalignment and speedometer pinion gear noise.

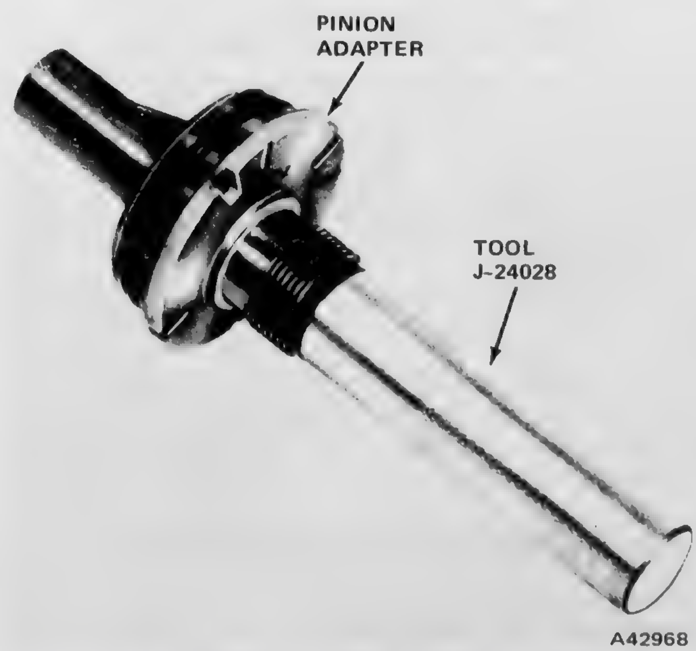


Fig. 2C-17 Pinion Seal and Retainer Installation

(7) Note number of teeth on pinion and install pinion in adapter.

(8) Rotate adapter until number on adapter that corresponds to number of teeth on pinion is in 6 o'clock position, and install adapter (fig. 2C-18).

(9) Install adapter retainer and retainer bolt. Be sure retainer tangs are seated in adapter positioning slots. Tap adapter firmly into extension housing and tighten retainer bolt to 100 inch-pounds (11.3 Nm) torque.

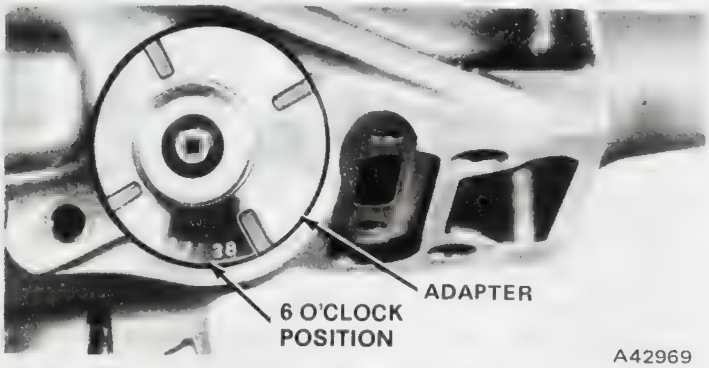


Fig. 2C-18 Adapter Indexing Position

Pacer

(1) Remove speedometer adapter retainer bolt and retainer (fig. 2C-19).

(2) Position drain pan under adapter and remove adapter. Note adapter position before removal.

(3) Remove speedometer pinion retaining clip and remove pinion. Note number of teeth on pinion.

(4) Remove cable from adapter by pulling cable straight out of adapter.

(5) Remove O-ring seals from adapter and cable. Clean cable and adapter.

(6) Install O-ring seals on adapter and cable (fig. 2C-19).

(7) Insert cable into adapter and push cable in until it bottoms.

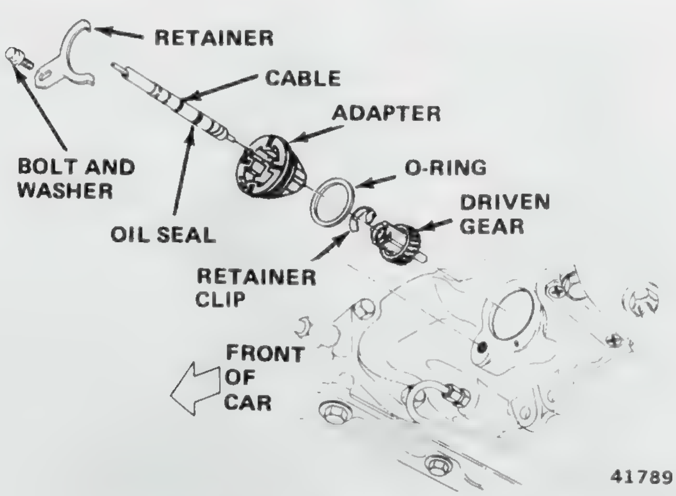


Fig. 2C-19 Adapter Assembly—Pacer

(8) Install pinion on cable.

NOTE: *Be sure square end of inner drive cable is seated in pinion.*

(9) Insert pinion retaining clip into notches in pinion. Shoulder on clip must face adapter. Press down on clip until fully seated in retaining groove of cable.

(10) Clean adapter seat in extension housing. Dirt causes poor seating and misalignment and results in leakage or pinion damage.

(11) Apply transmission fluid to adapter O-ring and install adapter in extension housing. Be sure adapter is fully seated.

(12) Index adapter as follows:

(a) Determine correct index position for adapter (e.g., if pinion has 26 to 21 teeth, index adapter at 26/21 mark; if pinion has 32 to 38 teeth, index adapter at 32/38 mark).

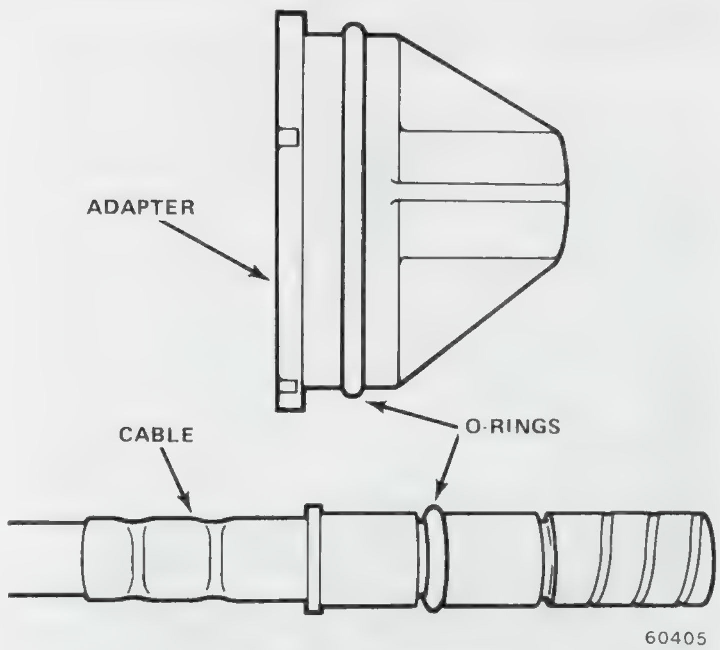


Fig. 2C-20 O-Ring Location

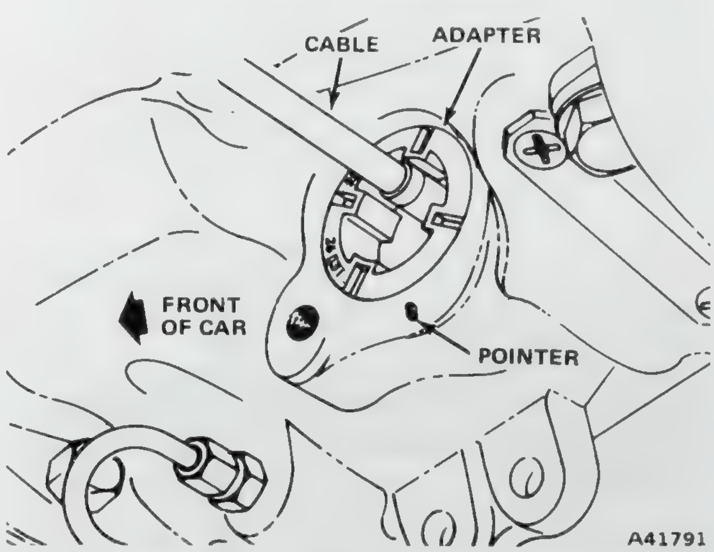


Fig. 2C-21 Adapter Indexing Position

(b) Rotate adapter until appropriate index mark on adapter is aligned with pointer on extension housing (fig. 2C-21).

(13) Install adapter retainer and tighten retainer bolt to 100 inch-pounds (11.3 Nm) torque.

(14) Correct transmission fluid level as required. Refer to Fluid Level and Condition for refill procedure.

EXTENSION HOUSING SEAL REPLACEMENT

(1) Raise car on hoist.

(2) Mark propeller shaft and rear axle yokes for assembly alignment reference.

(3) Disconnect propeller shaft at rear yoke and remove propeller shaft.

(4) Remove seal from housing using screwdriver (View A, fig. 2C-22).

(5) Place new seal on Installer J-9348 and install seal in housing (View B, Fig. 2C-22).

(6) Install propeller shaft. Align assembly reference marks and tighten clamp bolts to 14 foot-pounds (19.0 Nm) torque.

(7) Lower car.

(8) Check and correct transmission fluid level as necessary.

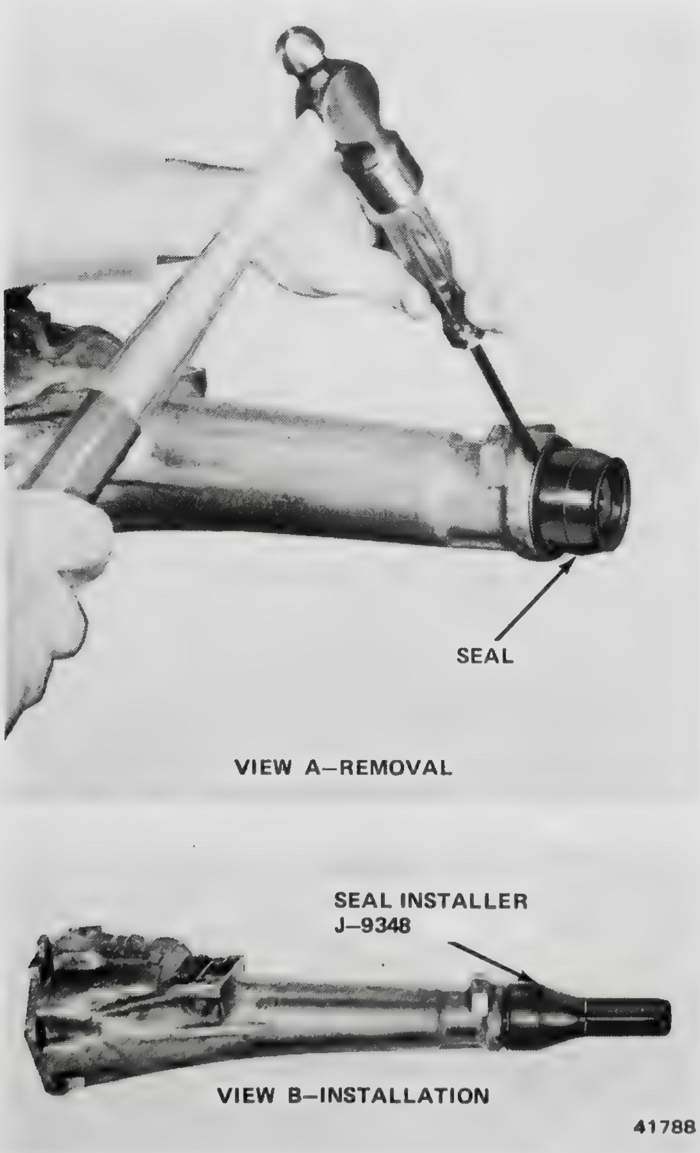


Fig. 2C-22 Extension Housing Seal Removal/Installation

GOVERNOR VALVE SERVICE

Removal

(1) Raise car on hoist.

(2) Mark propeller shaft and rear axle yokes for assembly alignment reference.

(3) Disconnect propeller shaft at rear axle yoke and remove propeller shaft.

(4) Support transmission using transmission jack.

(5) Remove speedometer cable and adapter from extension housing.

(6) Remove rear support crossmember from side sills.

(7) Remove catalytic converter support bracket bolts from extension housing.

(8) Remove rear support cushion and adapter from extension housing.

(9) Remove transmission rear bearing cover plate from extension housing.

(10) Remove bolts that attach extension housing to case and install two pilot studs, tool J-24108, into case (fig. 2C-23).

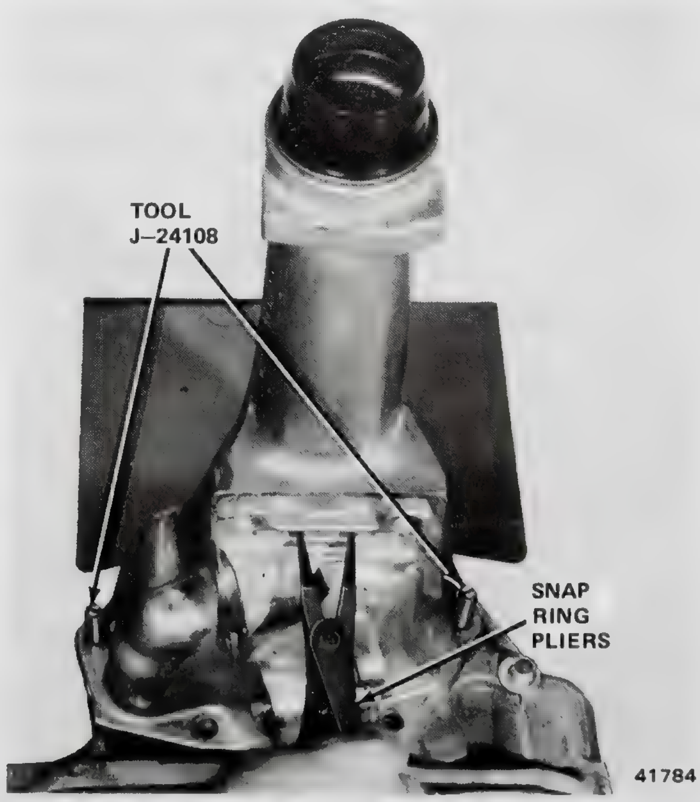


Fig. 2C-23 Extension Housing Removal/Installation

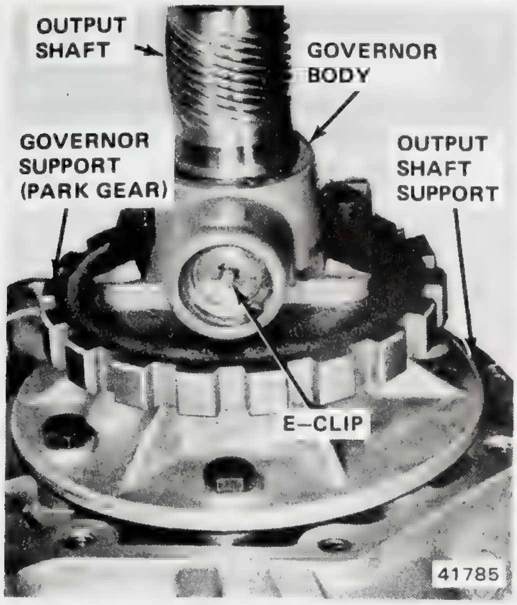


Fig. 2C-24 Weight End E-Clip Location

(11) Expand rear bearing snap ring using large snap ring pliers (fig. 2C-23).

(12) Hold snap ring expanded and tap extension housing off bearing and output shaft.

(13) Remove rear bearing snap ring.

(14) Remove output shaft bearing.

NOTE: *On model 727 transmission only, remove the additional remaining snap ring from the output shaft.*

(15) Remove E-clip from weight end of governor valve shaft (fig. 2C-24).

(16) Remove valve and shaft from governor body.

(17) Rotate output shaft until governor weight faces downward.

(18) Remove output shaft snap ring located behind governor body.

(19) Remove governor body and governor support from output shaft.

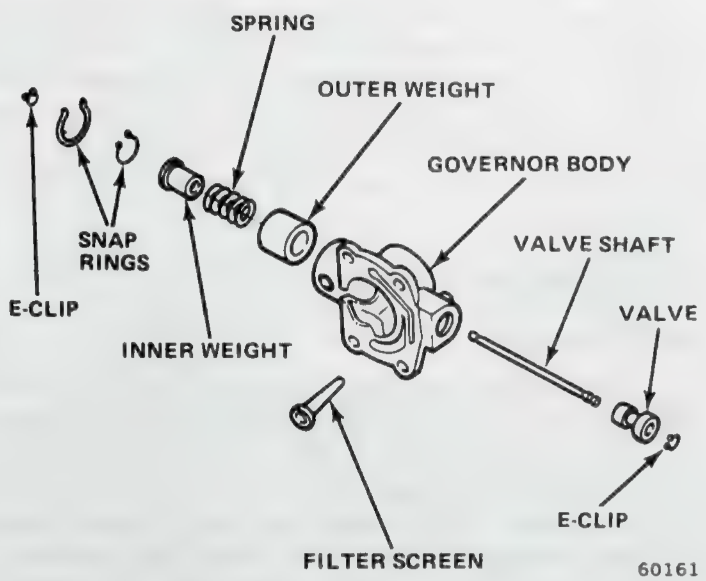


Fig. 2C-25 Governor Valve Assembly

Disassembly

(1) Remove large snap ring from weight end of governor body (fig. 2C-25).

(2) Remove weight assembly.

(3) Remove snap ring from governor weight assembly.

(4) Separate inner weight, spring, and outer weight. Identify spring with tag.

(5) If governor support or governor body is to be replaced, straighten lock tabs and remove four bolts that attach body to support.

(6) Remove governor filter.

Cleaning and Inspection

Thoroughly clean all governor parts in a suitable cleaning solution but do not use any type of caustic cleaning solution.

The weights and valves should fall freely in their bores when clean and dry. Rough surfaces and burrs may be polished using crocus cloth.

Inspect the governor weight spring for distortion. Replace the spring if damaged.

Clean the filter in solvent and dry it with compressed air. Replace the filter if damaged.

Inspect the governor support (park gear) for chipped or worn gear teeth or damaged ring grooves. Replace the gear if damaged.

Check the bolt torque on the output shaft support attaching bolts. If loose, the bolts permit cross-leakage and loss of governor pressure.

Assembly

(1) If governor body was separated from governor support, install filter, assemble body and support, and install attaching bolts finger-tight.

NOTE: *Do not tighten the bolts to specified torque until the assembly is installed on the output shaft.*

(2) Install governor weights and spring inside of outer weight and install snap ring.

(3) Install weight assembly in body.

(4) Install snap ring.

Installation

(1) Position governor support and governor body assembly on output shaft.

(2) Align governor valve shaft hole in body with hole in output shaft and install assembly.

(3) Install snap ring in governor body.

(4) Install body-to-support attaching screws and tighten to 100 inch-pounds (11.3 Nm) torque.

(5) Bend ends of lock tabs against bolt heads.

(6) Install governor valve on valve shaft.

(7) Insert assembly into body and through governor weights.

(8) Install retaining E-clip.

(9) On Model 727 transmission only, install additional snap ring in front groove in output shaft.

(10) Install rear bearing with outer race ring groove facing forward end of output shaft.

(11) Press or tap bearing against snap ring or shoulder and install rear snap ring.

(12) Thread two Pilot Studs, tool J-24108, into case and position replacement extension housing gasket on case (fig. 2C-23).

(13) Position rear bearing snap ring in extension housing.

(14) Expand snap ring as far as possible and carefully tap extension housing into place.

(15) Release snap ring. Be sure it seats in bearing groove.

(16) Install and tighten extension housing bolts to 24 foot-pounds (32.5 Nm) torque.

(17) Install gasket, plate, and rear support cushion and adapter on extension housing mounting pad.

(18) Install rear crossmember and attach it to side sill and support cushion. Tighten crossmember stud nuts to 35 foot-pounds (47.5 Nm) torque and suppport cushion-to-crossmember bolts to 28 foot-pounds (37.4 Nm) torque.

(19) Install speedometer cable and adapter assembly.

NOTE: *Be sure the adapter is properly indexed in the extension housing and that the O-ring seals are in the correct location.*

(20) Install catalytic converter support bracket.

(21) Remove transmission jack.

(22) Install propeller shaft. Align assembly reference marks and tighten clamp bolts to 14 foot-pounds (19.0 Nm) torque.

(23) Adjust gearshift and throttle linkage.

(24) Lower car.

(25) Fill transmission with AMC, Dexron, or equivalent transmission fluid. Refer to Fluid Level and Condition for refill procedure.

PARK LOCK COMPONENT REPLACEMENT

Disassembly

(1) Remove extension housing as outlined in Governor Valve.

(2) Slide shaft out of extension housing and remove park sprag and spring (fig. 2C-26).

(3) Remove snap ring and slide reaction plug and pin assembly out of housing.

(4) To replace park lock control rod, refer to Valve Body in Out-of-Car Service and Overhaul.

Inspection

Check the sprag shaft for scores and for free movement in the housing and sprag. Check the sprag and control rod springs for loss of tension or distortion. Check the square lug on the sprag for broken edges. Check the lugs on the governor support (park gear) for broken edges. Check the knob on the end of the control rod for nicks, burrs, and free turning.

Assembly

(1) Install reaction plug and pin assembly in housing and install snap ring (fig. 2C-26).

(2) Position sprag and spring in housing and install shaft. Be sure square lug on sprag is facing park gear and that spring is positioned so it moves sprag away from gear.

(3) Install extension housing as outlined in Governor Valve.

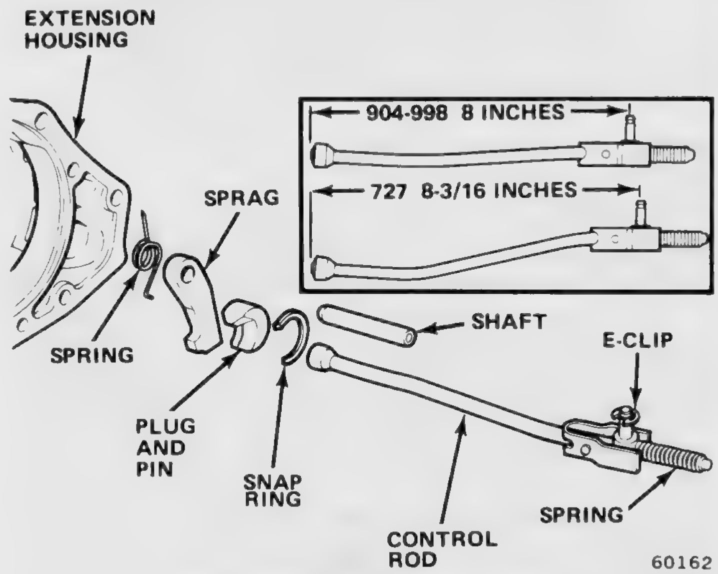


Fig. 2C-26 Park Lock Components

NEUTRAL START AND BACKUP LAMP SWITCH

The neutral start section of the switch is located in the center terminal of the three terminal switch. It provides a ground for the starter solenoid circuit through the gearshift lever in Park and Neutral positions only.

The two outside terminals of the neutral switch are for the backup lamp switch circuit (fig. 2C-27). Refer to the wiring diagrams at the end of this volume for switch circuitry.

Test and Replacement Procedure

Neutral Start Circuit

(1) Remove wiring connector from switch and test for continuity between center terminal pin and transmission case. Continuity should exist only when transmission is in park or neutral.

(2) If tests show switch may be defective, check gearshift linkage adjustment before replacing switch.

(3) Remove switch from transmission. Allow transmisson fluid to drain into container.

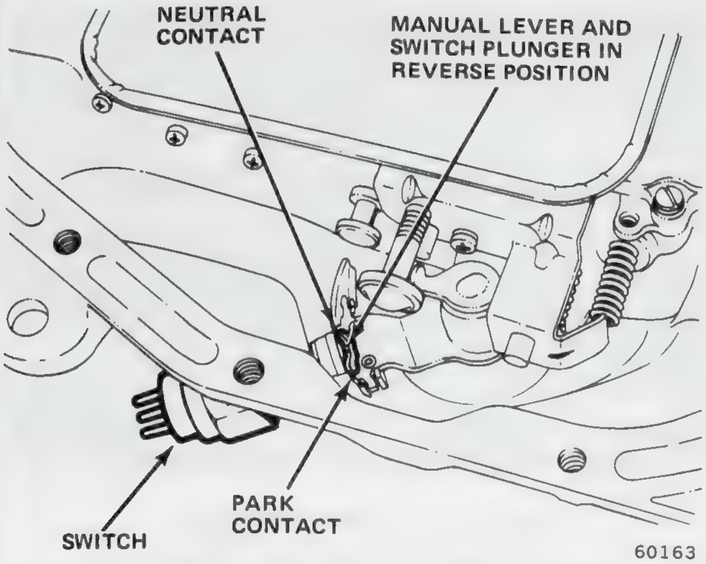


Fig. 2C-27 Neutral Start and Backup Lamp Switch

(4) Move gearshift lever to Park and Neutral positions. Inspect switch operating lever fingers and manual lever and shaft for proper alignment with switch opening in case.

(5) Install switch and switch seal in transmission case. Tighten switch to 24 foot-pounds (32.5 Nm) torque.

(6) Test switch continuity.

(7) Correct transmission fluid level as required. Refer to Fluid Level and Condition for refill procedure.

Backup Lamp Circuit

(1) Remove wiring connector from switch and test for continuity between two outside pins.

(2) Continuity should exist when transmission is in reverse only.

(3) Continuity should not exist from either pin to transmission case in reverse.

(4) Replace switch if tests prove switch is defective.

THROTTLE LINKAGE ADJUSTMENT

Four-Cylinder and Six-Cylinder Engine

(1) Disconnect throttle control rod spring at carburetor.

(2) Raise car.

(3) Use throttle control rod spring to hold transmission throttle control lever forward against stop (fig. 2C-28). Hook one end of spring on throttle control lever and other end on throttle linkage bellcrank bracket attached to converter housing.

(4) Block choke open and set carburetor throttle off fast idle cam.

NOTE: *On carburetors equipped with a throttle operated solenoid valve, turn the ignition lock to the ON position to energize the solenoid. Then open the throttle halfway to allow the solenoid to lock and return the carburetor to idle position.*

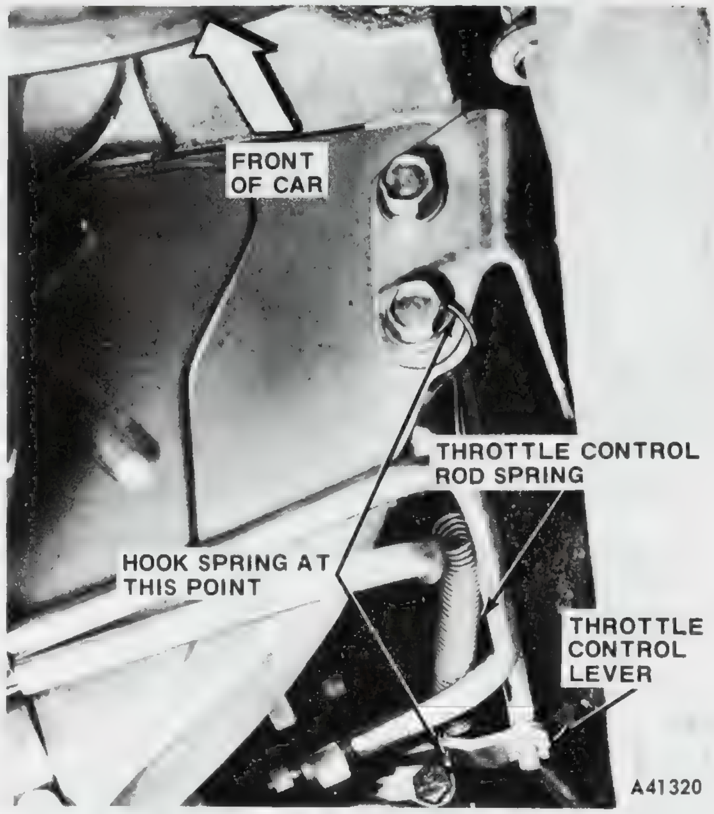


Fig. 2C-28 Installing Throttle Control Lever Spring

(5) Loosen retaining bolt on throttle control adjusting link. **Do not remove spring clip and nylon washer.**

(6) Pull on end of link to eliminate lash and tighten link retaining bolt (fig. 2C-29).

(7) Remove throttle control rod spring from linkage and install it on control rod.

(8) Lower car.

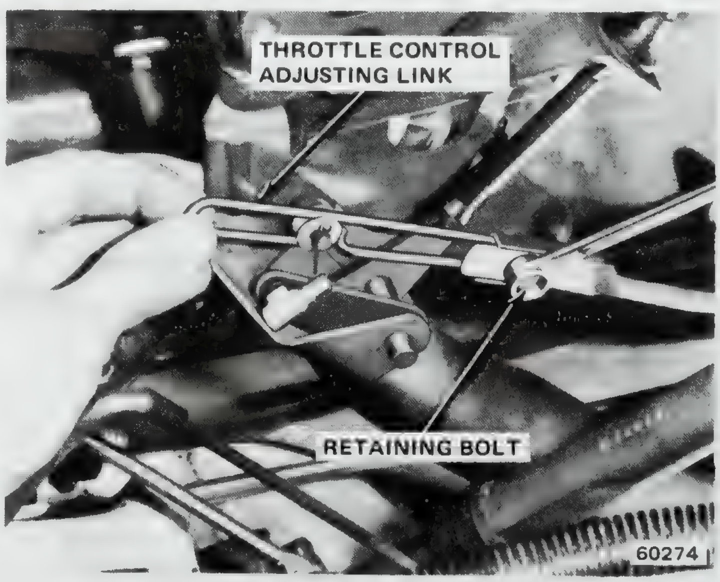


Fig. 2C-29 Tightening Link Retaining Bolt—Four-Cylinder and Six-Cylinder Engines

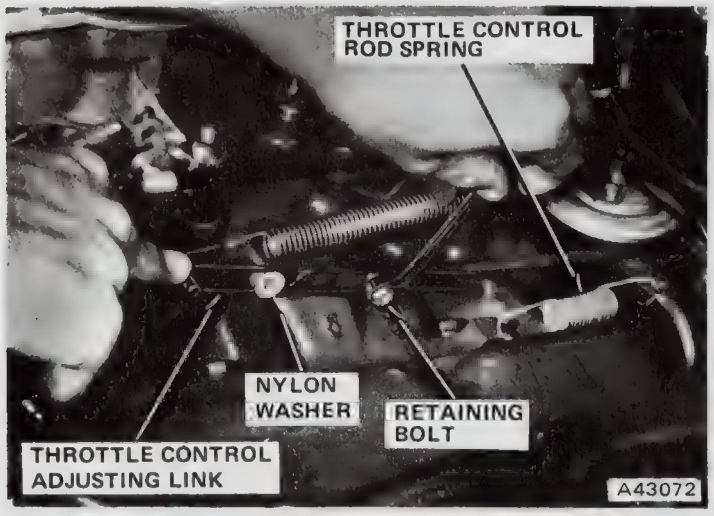


Fig. 2C-30 Tightening Link Retaining Bolt—Eight-Cylinder Engine

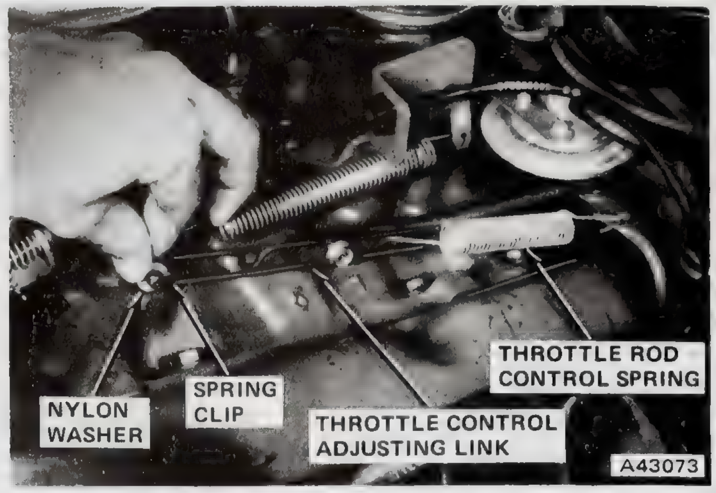


Fig. 2C-31 Installing Nylon Washer and Spring Clip—Eight-Cylinder Engine

Eight-Cylinder Engine

(1) Disconnect throttle control rod spring at carburetor.

(2) Raise car.

(3) Use throttle control rod spring to hold transmission throttle valve control lever forward against stop.

(4) Block choke open and set carburetor throttle off fast idle cam.

NOTE: *On carburetors equipped with throttle operated solenoid valve, turn ignition lock to ON position to energize solenoid; then open throttle halfway to allow solenoid to lock and return carburetor to idle position.*

(5) Loosen retaining bolt on throttle control rod adjusting link. Remove spring clip and move nylon washer to rear of link.

(6) Push on end of link to eliminate lash and tighten link retaining bolt (fig. 2C-30).

(7) Install nylon washer and spring clip (fig. 2C-31).

(8) Remove throttle control rod spring from linkage and install it on rod.

(9) Lower car.

SPECIFICATIONS

Torque Specifications

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Cooler Line Fitting	20	14-41	15	10-30
Cooler Line Nut	34	20-41	25	15-30
Converter Drive Plate to Crankshaft Bolt	142	129-163	105	95-120
Converter Drive Plate to Torque Converter Bolt	30	27-34	22	20-25
Extension Housing to Transmission Case Bolt	33	–	24	–
Extension Housing to Insulator Mounting Bolt	68	–	50	–
Governor Body to Support Bolt	11	–	100 in-lb	–
Kickdown Band Adjusting Screw Locknut	47	–	35	–
Kickdown Lever Shaft Plug	17	–	150 in-lb	–
Low Reverse Band Adjusting Screw Locknut	47	–	35 ft-lb	–
Neutral Starter Switch	33	–	24	–
Oil Filler Tube Bracket Bolt	17	–	150 in-lb	–
Oil Pan Bolt	17	–	150 in-lb	9-13
Oil Pump Housing-to-Transmission Case Bolt	20	–	175 in-lb	–
Output Shaft Support Bolt	17	–	150 in-lb	–
Overrunning Clutch Cam Setscrew	4	–	40 in-lb	–
Pressure Test Port Plug	12	–	110 in-lb	–
Reaction Shaft Support to Oil Pump Bolt	18	–	160 in-lb	–
Speedometer Adapter Clamp Screw	11	–	100 in-lb	–
Transmission-to-Engine Bolt	38	30-41	28	22-30
Valve Body Screw	4	–	35 in-lb	–
Valve Body-to-Transmission Case Screw	11	–	100 in-lb	–

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

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Band Adjustments

Engine Cu. In.	2 Liter, 232	258		304		360	
	STD	STD (904)	HD (727)	STD (998)	HD (727)	STD (727)	HD (727)
Kickdown (Front) Turns*	2	2	2-1/2	2	2-1/2	2-1/2	2
Low-Reverse (Internal) Turns*	**7	**7	2	4	2	2	2

*Backed off from 72 inch-pounds

**Backed off from 41 inch-pounds. All others backed off from 72 inch-pounds.

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Fluid Levels

Fill to "Add One Pint" mark on dipstick. Use AMC, Dexron, or equivalent Automatic transmission fluid.

NOTE: Check fluid level with gearshift selector lever in N (neutral) position and with fluid at normal operating temperature.

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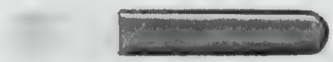
Special Tools

J-24063 KICKDOWN BAND ADJUSTMENT ADAPTER



J-24031 KICKDOWN VALVE GAUGE

J-24043 VALVE BODY SUPPORT STAND

J-5853 TORQUE WRENCH

J-24028 SPEEDOMETER PINION SEAL & RETAINER INSTALLER

70131

OUT-OF-CAR SERVICE AND OVERHAUL

TRANSMISSION REMOVAL—SIX- AND EIGHT-CYLINDER ENGINES

(1) Disconnect fan shroud if equipped.

(2) Disconnect transmission fill tube at upper bracket.

(3) Open hood.

CAUTION: *It is necessary that the hood be open to avoid damaging the hood and air cleaner when the rear crossmember is removed.*

(4) Raise car on hoist.

(5) Remove inspection cover from converter housing.

(6) On six-cylinder cars, remove screw attaching clamp to exhaust pipe support bracket and slide clamp off bracket.

(7) Remove transmission fill tube.

(8) Remove starter.

(9) Mark propeller shaft and rear axle yoke for assembly alignment reference.

(10) Remove propeller shaft.

(11) On eight-cylinder cars, disconnect exhaust pipes at exhaust manifolds.

(12) Remove speedometer adapter and cable assembly. Cover adapter bore in case after adapter removal.

(13) Disconnect gearshift and throttle linkage.

(14) Disconnect wires at neutral start switch.

(15) Disconnect TCS switch oil line at transmission fitting.

(16) Mark converter drive plate and converter for assembly alignment reference.

(17) Remove bolts attaching converter to drive plate. Rotate crankshaft and drive plate using ratchet handle and socket on crankshaft front pulley bolt to gain access to drive plate bolts.

(18) Support transmission using transmission jack. Retain transmission on jack using safety chain.

(19) Lower transmission slightly and disconnect oil cooler lines at transmission.

(20) Remove bolts attaching rear support cushion to transmission.

(21) Remove rear crossmember-to-frame side sill attaching nuts and remove crossmember. On Pacers, remove ground strap.

(22) Remove bolts attaching converter support bracket to transmission.

(23) Remove bolts attaching transmission to engine.

(24) Move transmission and converter rearward to clear crankshaft.

(25) Hold converter in position and lower assembly until converter housing clears engine.

(26) If necessary, the following items can now be serviced:

- Torque converter
- Torque converter drive plate
- Oil pump seal (fig. 2C-32 and 2C-33)
- Engine core hole plugs
- Engine oil galley plugs

CAUTION: *If the transmission was removed to correct a malfunction that generated sludge and/or heavy accumulations of metal particles or friction material, the torque converter, oil cooler and cooler lines must be flushed thoroughly. Refer to Torque Converter Flushing for procedure.*

TRANSMISSION INSTALLATION—SIX- AND EIGHT-CYLINDER ENGINES

(1) If torque converter was removed, insert Pump Aligning Tool J-24033 (Models 904/998) or J-24045 (Model 727) in pump rotor until rotor drive lugs engage slots in tool.

(2) Rotate tool until drilled hole in tool is vertical and remove tool.

(3) Rotate converter until pump drive slots in converter hub are vertical and carefully insert converter hub into pump. Be sure drive lugs of pump inner rotor are properly engaged in drive slots of converter hub.

(4) Raise transmission and align converter with drive plate. Refer to assembly alignment marks.

(5) Pull transmission forward.

(6) Raise, lower, or tilt transmission to align converter housing pilot holes with dowels in engine.

(7) Install two converter housing lower attaching bolts and tighten bolts to pull housing to engine.

(8) Install drive plate-to-converter attaching bolts.

(9) Install remaining converter housing-to-engine attaching bolts and tighten all bolts to 28 foot-pounds (38.0 Nm) torque.

(10) Connect oil cooler lines.

(11) Install rear support cushion on transmission.

(12) Raise transmission, position rear crossmember, and install crossmember attaching nuts. On Pacers, install ground strap.

(13) Remove safety chain and transmission jack.

(14) Install inspection cover.

(15) On six-cylinder cars, install exhaust pipe support bracket.

(16) Install starter.

(17) Connect wires to neutral switch.

(18) Connect gearshift and throttle linkage.

(19) Install speedometer cable and adapter assembly. Be sure adapter is correctly indexed.

(20) Install propeller shaft. Refer to alignment marks made during removal.

(21) On cars with eight-cylinder engine, connect front exhaust pipes and catalytic converter support bracket bolts.

(22) Lower car.

(23) Fill transmission to correct level as described in Fluid Level and Condition.

(24) Adjust gearshift selector lever linkage linkage.

(25) Road-test car to check transmission operation.

TRANSMISSION REMOVAL—FOUR-CYLINDER ENGINE

(1) Open hood.

CAUTION: *The hood must remain open to avoid damaging the hood and air cleaner when the rear crossmember is removed.*

(2) Disconnect fan shroud.

(3) Remove bolt attaching transmission filler tube to rear of engine.

(4) Place gearshift lever in Neutral.

(5) Raise car on hoist.

(6) Mark propeller shaft and yoke for assembly alignment reference.

(7) Remove propeller shaft.

(8) Remove starter motor.

(9) Remove speedometer adapter and cable assembly. Cover adapter bore in case after removal.

(10) Disconnect gearshift and throttle linkage. On

cars with column shift, remove bolt attaching linkage bellcrank bracket to converter housing.

(11) Remove cover at front of converter housing.

(12) Mark converter drive plate and converter for assembly alignment reference.

(13) Remove bolts attaching converter to drive plate. Rotate crankshaft and drive plate using ratchet handle and socket or box-end wrench on crankshaft front pulley bolt to gain access to drive plate-to-converter bolts.

NOTE: *The crankshaft pulley bolt is a metric size and requires a 24 mm socket or wrench. However, a 15/16 socket or wrench may also be used.*

(14) Support transmission using transmission jack. Retain transmission on jack using safety chain.

(15) Lower transmission slightly and disconnect oil cooler lines at transmission.

(16) Remove bolt attaching rear support cushion to rear support cushion bracket (bracket is attached to transmission extension housing).

(17) Remove rear crossmember-to-frame side sill attaching nuts and remove crossmember and support cushion as assembly.

(18) Place support stand under front of engine.

(19) Remove bolts attaching catalytic converter support bracket to transmission.

(20) Remove bolts attaching transmission and filler tube to engine.

NOTE: *The transmission-to-engine block bolts are metric size bolts.*

(21) Move transmission and converter rearward until clear of crankshaft.

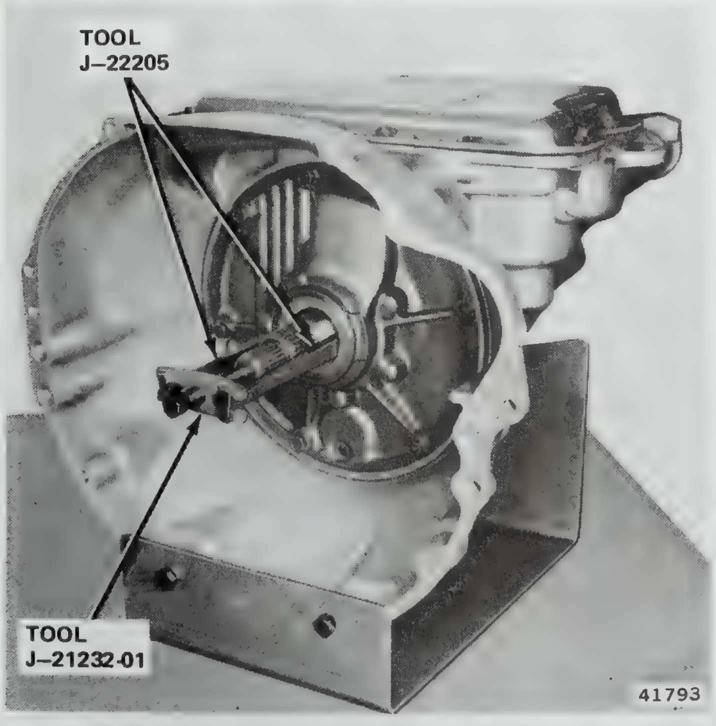


Fig. 2C-32 Oil Pump Seal Removal

(22) Hold converter in position and lower transmission until converter housing clears engine.

(23) With transmission removed, following components can now be serviced:

- Torque converter
- Drive plate
- Oil pump seal
- Engine water jacket core hole plug
- Engine crankshaft rear seal (drive plate removed)

CAUTION: *If the transmission was removed to correct a malfunction that generated sludge and/or heavy accumulations of metal or friction material particles, the torque converter and oil cooler and cooler lines must be thoroughly flushed. Refer to Torque Converter Flushing for procedures.*

TRANSMISSION INSTALLATION—FOUR-CYLINDER ENGINE

(1) If torque converter was removed, insert Pump Aligning Tool J-24033 into pump rotor and engage tool slots with pump rotor drive lugs.

(2) Rotate aligning tool until drilled hole in tool is vertical then remove tool.

(3) Rotate converter until pump drive slots in converter hub are vertical.

(4) Carefully insert converter hub into oil pump. Be sure drive lugs of pump inner rotor are completely engaged with drive slots in converter hub.

(5) Raise transmission and align converter with drive plate. Refer to alignment marks made during removal.

(6) Move transmission forward and raise, lower, or tilt transmission to align converter housing pilot holes with dowels in engine block.

NOTE: *If the downward angle at the rear of the engine is not sufficient to permit transmission installation, raise the front of the engine to increase the downward angle.*

(7) Install two transmission-to-engine lower attaching bolts and tighten bolts to pull transmission to engine.

(8) Install drive plate-to-converter attaching bolts. Tighten bolts to 26 foot-pounds (35.3 Nm) torque.

(9) Install remaining transmission-to-engine attaching bolts. Tighten bolts to 54 foot-pounds (73.2 Nm) torque.

(10) Connect oil cooler lines.

(11) Raise transmission, position rear crossmember, install crossmember attaching nuts and tighten nuts to 30 foot-pounds (40.7 Nm) torque.

(12) Install rear support cushion-to-support cushion bracket bolt and tighten bolt to 48 foot-pounds (65.1 Nm) torque.

(13) Remove safety chain and transmission jack.

(14) Install cover at front of converter housing.

(15) Install starter motor.

(16) Connect neutral start switch wires to switch terminal.

(17) Connect gearshift and throttle linkage. On cars with column shift, position linkage bellcrank bracket on converter housing and install bracket attaching bolt.

(18) Install speedometer cable and adapter assembly. Be sure adapter is correctly indexed.

(19) Install catalytic converter support bracket bolts.

(20) Lower car.

(21) Fill transmission to correct fluid level.

(22) Adjust gearshift lever and throttle linkage.

NOTE: *The gearshift lever adjusting trunnion is located on the steering column shift lever.*

(23) Road test car to check transmission operation.

TRANSMISSION DISASSEMBLY—ALL MODELS

CAUTION: *Cleaniness during disassembly and assembly is necessary to avoid a further malfunction after assembly. Before removing any of the transmission subassemblies, plug all openings and thoroughly clean the transmission exterior. Steam cleaning equipment is preferable for this purpose. During disassembly, clean all parts in a suitable solvent and dry each part using compressed air. Do not use cloth or paper towels to dry any parts after cleaning, use compressed air only.*

End Play Measurement

NOTE: *Measuring end play before disassembly will indicate whether a thrust washer change is required and save a considerable amount of time at assembly.*

(1) Mount transmission in Holding Fixture J-24026 (fig. 2C-34).

(2) Remove one pump attaching bolt and thread Dial Indicator Support Rod J-5864 into bolt hole.

(3) Attach Dial Indicator J-8001 to rod.

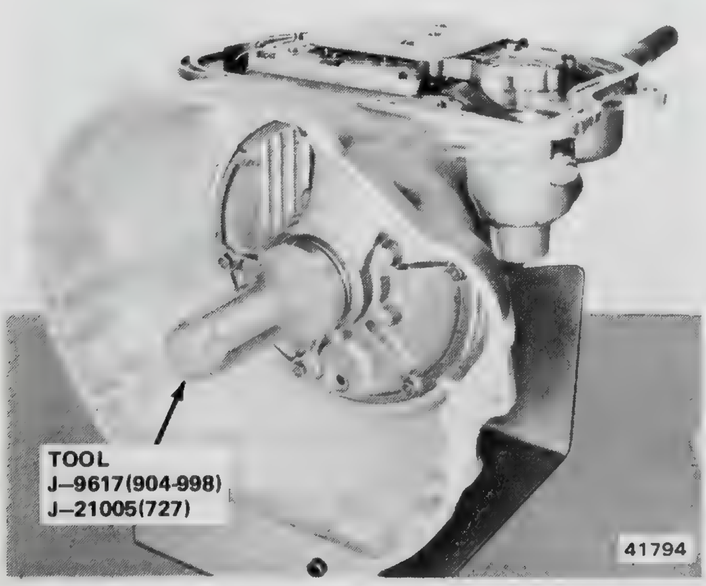


Fig. 2C-33 Oil Pump Seal Installation

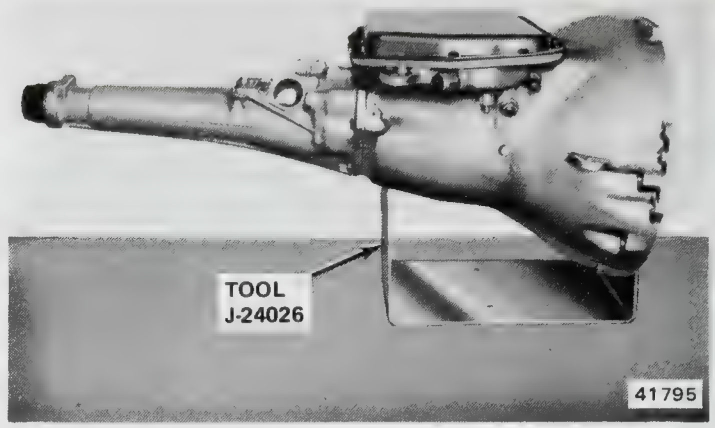


Fig. 2C-34 Transmission Holding Fixture

(4) Position indicator stylus against forward end of input shaft (fig. 2C-35).

(5) Move input shaft rearward and set dial indicator at zero.

(6) Pull input shaft forward to obtain end play reading.

(7) Record reading for assembly reference.

(8) Remove dial indicator and rod.

Oil Pan

Remove pan attaching bolts and remove oil pan and gasket. Be sure that any dirt which remained around bolts does not fall into transmission.

Valve Body

(1) Loosen clamp bolts and remove throttle and gear selector levers from shafts.

(2) Remove neutral start switch.

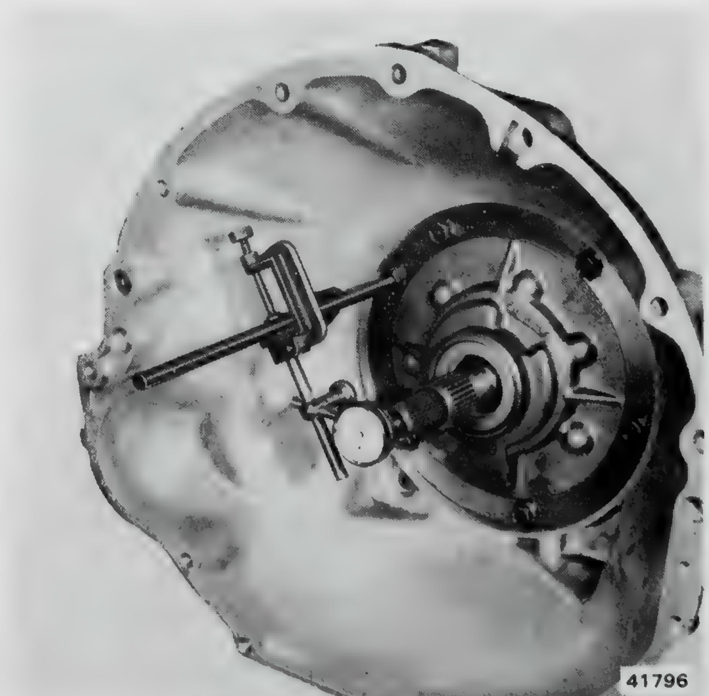


Fig. 2C-35 Measuring End Play

(3) Remove valve body attaching screws.

(4) Remove valve body. Lift valve body from case and pull park lock rod forward out of case at same time.

NOTE: *If necessary, rotate the output shaft to allow the park lock rod to clear the sprag.*

(5) Mount valve body on Support Stand J-24043.

Accumulator Piston and Spring

(1) Remove spring from piston.

(2) Identify spring with tag for assembly reference.

(3) Remove piston from case.

Extension Housing and Bearing

(1) Remove retaining screws, rear bearing access plate and access plate gasket from housing.

(2) Remove housing attaching bolts and install two Pilot Studs J-24108 in case (fig. 2C-36).

(3) Expand rear bearing snap ring using snap ring pliers (fig. 2C-36).

(4) Hold snap ring expanded and carefully tap housing off bearing and output shaft.

(5) Remove rear bearing snap ring from shaft.

(6) Remove bearing from shaft.

NOTE: *On Model 727 only, remove remaining snap ring from shaft.*

Governor—Governor Support

(1) Remove E-clip from weight end of governor valve (fig. 2C-37).

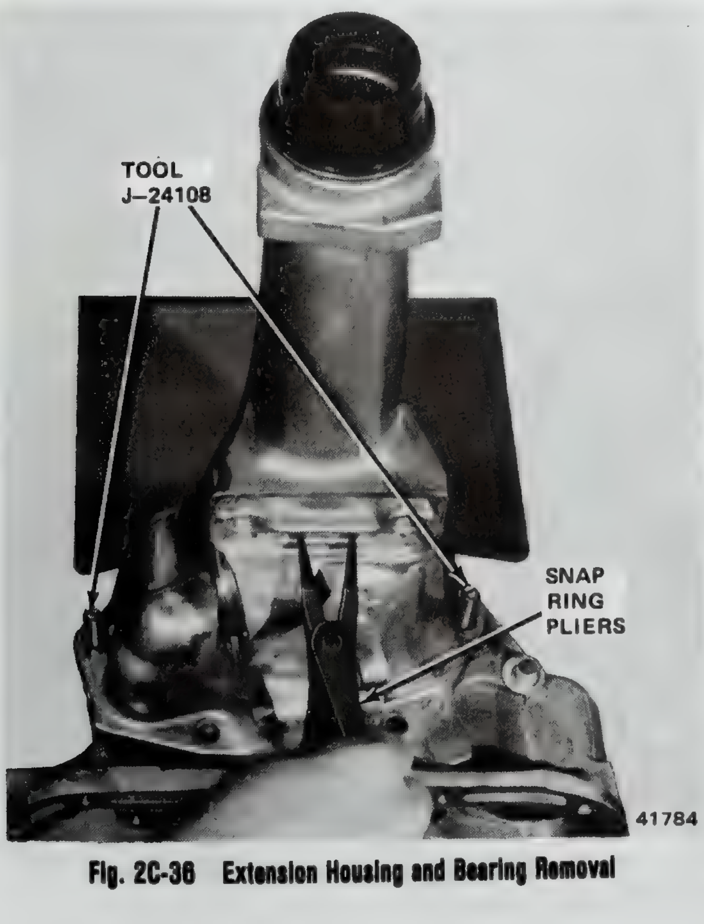


Fig. 2C-36 Extension Housing and Bearing Removal

(2) Remove valve and shaft from governor body.

(3) Rotate output shaft until governor weight faces downward.

(4) Remove snap ring located behind governor body.

(5) Remove governor body and governor support from output shaft.

Oil Pump—Reaction Shaft Support

(1) Tighten front band adjusting screw until band is tight around front clutch retainer. This prevents front clutch assembly from coming out with pump and damaging clutch discs.

(2) Remove oil pump attaching bolts.

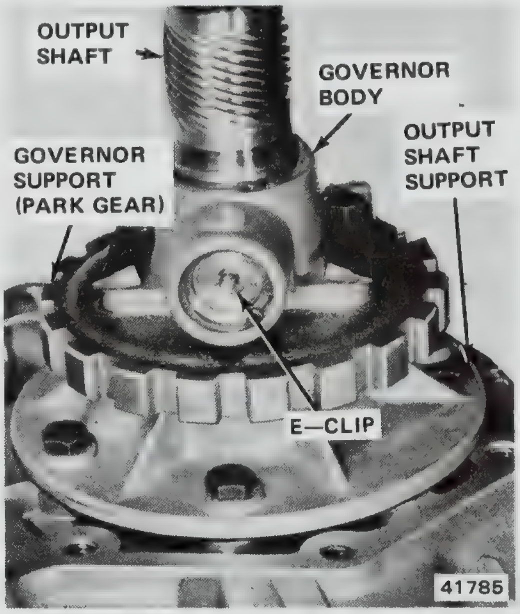


Fig. 2C-37 Governor and Support Removal

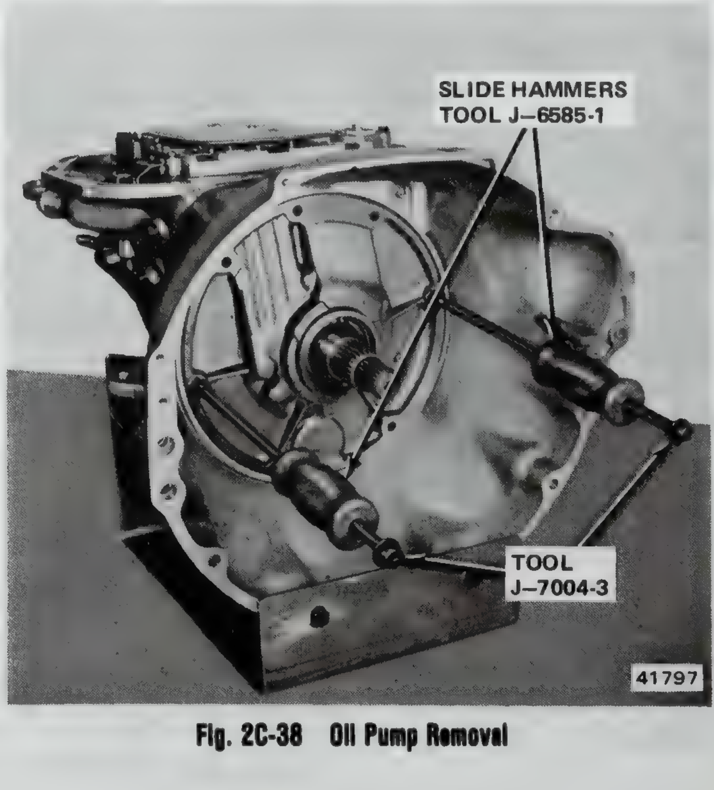


Fig. 2C-38 Oil Pump Removal

(3) Install Slide Hammer Tool J-6585-1 on Slide Hammer Bolts Tool J-7004-3 (fig. 2C-38).

(4) Thread bolts into holes in oil pump housing flange.

(5) Bump outward evenly with slide hammers to remove pump and reaction shaft support.

Front Band—Front Clutch

(1) Loosen front band adjusting screw and remove band strut and band.

(2) Remove front clutch assembly.

Input Shaft and Rear Clutch

(1) Remove input shaft and rear clutch assembly by grasping input shaft and pulling assembly straight out of case.

NOTE: *Do not lose the thrust washer that is located between the rear end of the input shaft and the front end of the output shaft.*

Output Shaft—Planetary Gears

(1) Carefully remove driving shell and output shaft assembly.

CAUTION: *Be very careful to protect the machined surfaces on the output shaft during removal.*

Rear Band—First/Reverse Drum

(1) Pull drum forward and out of case.

(2) Loosen band adjusting screw.

(3) Thread 1/4-inch bolt into actuating lever pivot pin.

(4) Grip bolt with pliers and remove pivot pin.

(5) Remove lever, linkage, and band.

Overrunning Clutch

(1) Carefully remove clutch hub, rollers, and springs and store parts where they will not be lost or damaged.

Front Servo

(1) Remove front servo pressure port plug.

(2) Compress servo piston rod guide until it bottoms in case bore.

(3) Insert No. 2 Phillips screwdriver into pressure port (fig. 2C-39).

(4) Slowly release rod guide against screwdriver (fig. 2C-39).

(5) Remove servo retaining snap ring.

(6) Compress rod guide and remove screwdriver.

(7) Slowly release rod guide and remove rod guide, springs, and piston rod.

CAUTION: *Do not attempt to remove the rod using pliers. If the rod sticks in the case, tap it gently to release it.*

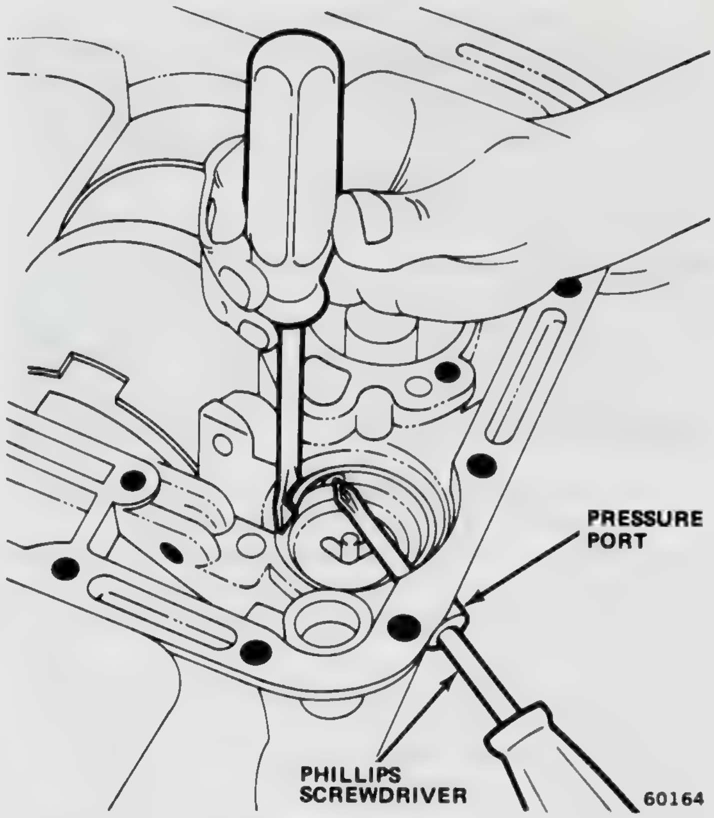


Fig. 2C-39 Front Servo Removal

(8) Identify spring(s) with tag(s) for assembly reference.

(9) Remove servo piston.

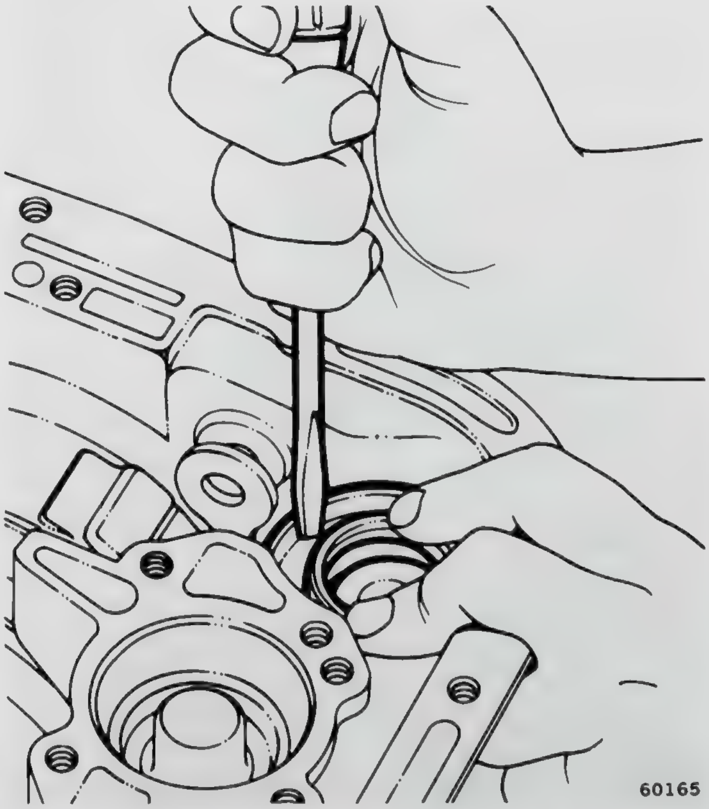


Fig. 2C-40 Rear Servo Spring and Snap Ring Removal

Rear Servo

(1) Compress piston spring and remove snap ring (fig. 2C-40).

(2) Remove spring retainer, spring, piston, and plug assembly. Identify spring with tag for assembly reference.

SUBASSEMBLY OVERHAUL

Valve Body—Model 904

Disassembly

CAUTION: *Do not clamp any part of the valve body or transfer plate in a vise. Any slight distortion of the body or plate will cause sticking valves or excessive leakage or both. When removing and installing valves or plugs, slide them in or out very carefully. Do not use force to remove or install the valves.*

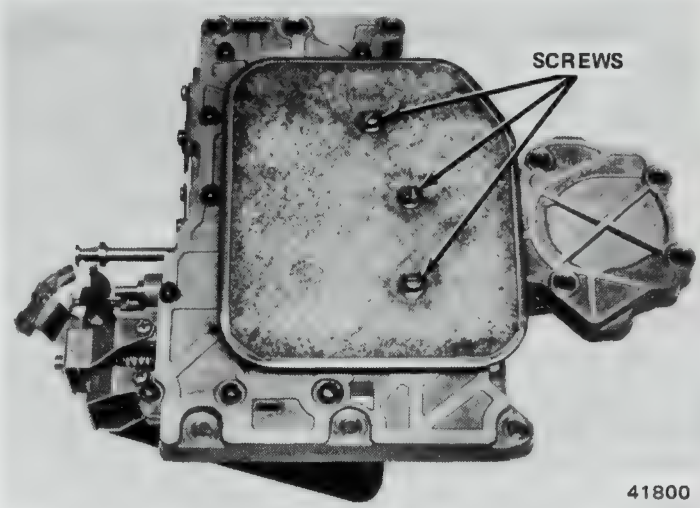


Fig. 2C-41 Oil Filter Screw Location

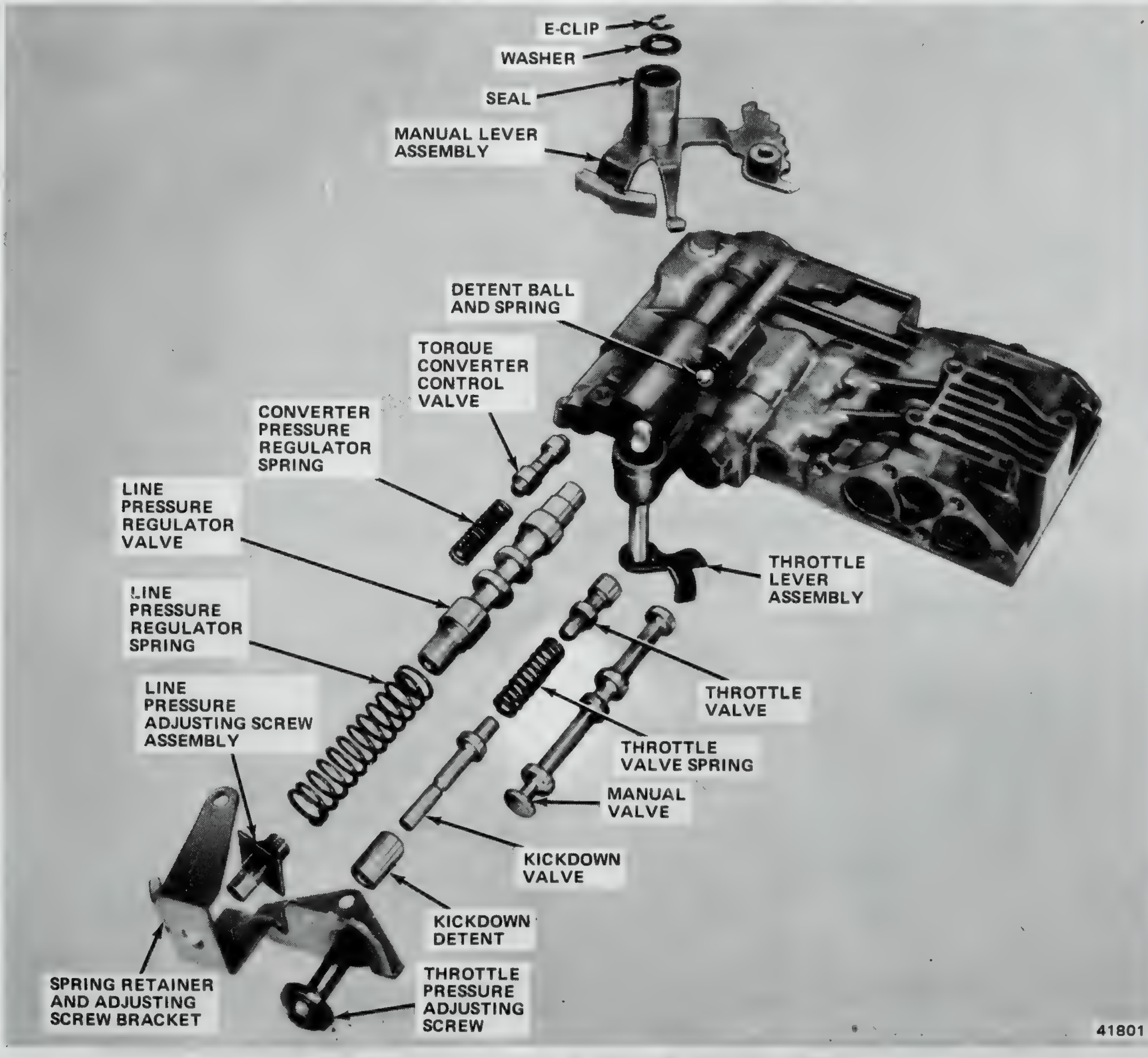


Fig. 2C-42 Pressure Regulator and Manual Controls—Model 904

(1) Mount valve body assembly on Repair Stand Tool J-24043.

NOTE: *When disassembling the valve body, identify all valve springs with a tag for assembly reference.*

(2) Remove oil filter attaching screws and oil filter (fig. 2C-41).

NOTE: *Oil filter screws are longer than transfer plate screws.*

(3) Remove upper and lower screws from pressure regulator valve spring retainer and adjustment screw bracket. Hold spring retainer firmly against spring force while removing last retaining screw.

(4) Remove spring retainer, line, and throttle pressure adjusting screws **(do not disturb setting)** and line pressure and torque converter valve regulator springs (fig. 2C-42). Tag springs for assembly reference.

(5) Remove torque converter and line pressure control valves.

(6) Remove transfer plate assembly retaining screws and transfer plate assembly (fig. 2C-43).

(7) Remove screws attaching stiffener and separator plate to transfer plate and separate these parts (fig. 2C-44).

(8) Remove rear clutch check ball from transfer plate and pressure regulator valve screen from separator plate.

Fig. 2C-43 Transfer Plate Attaching Screw Location—Model 904

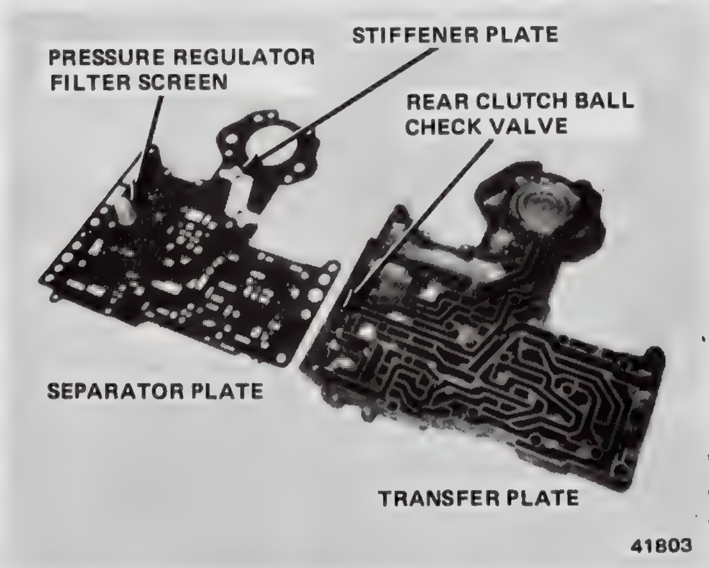


Fig. 2C-44 Transfer Plate Assembly—Model 904

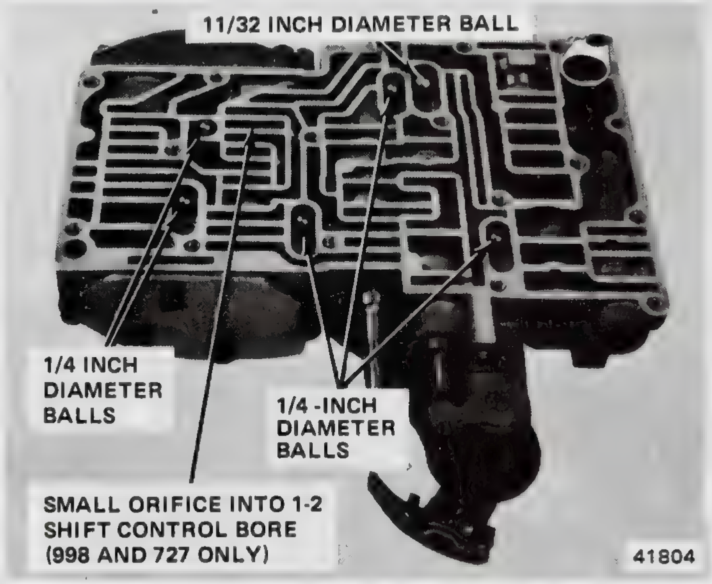


Fig. 2C-45 Check Ball Location—Model 904

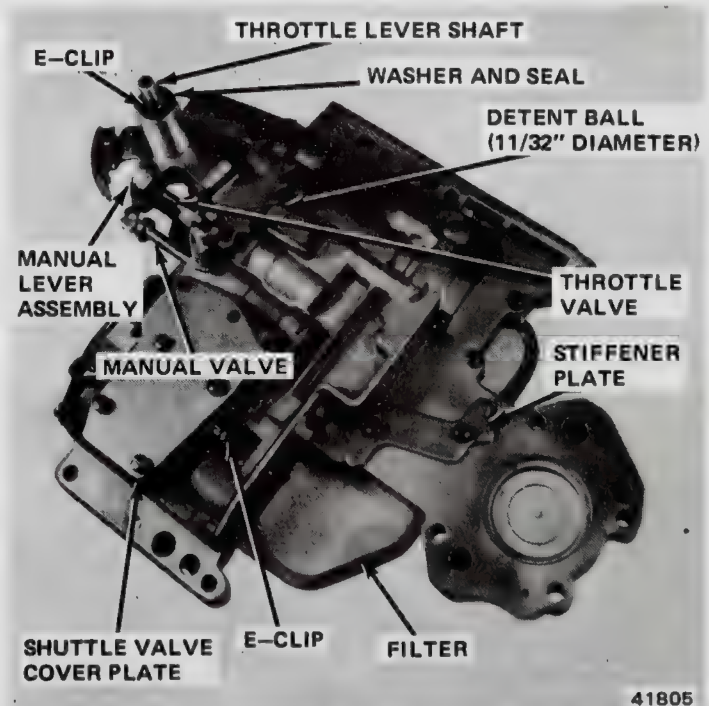


Fig. 2C-46 Valve Body Controls—Model 904

(9) Remove check balls and spring from valve body (fig. 2C-45).

(10) Turn valve body over and remove shuttle valve cover plate (fig. 2C-46).

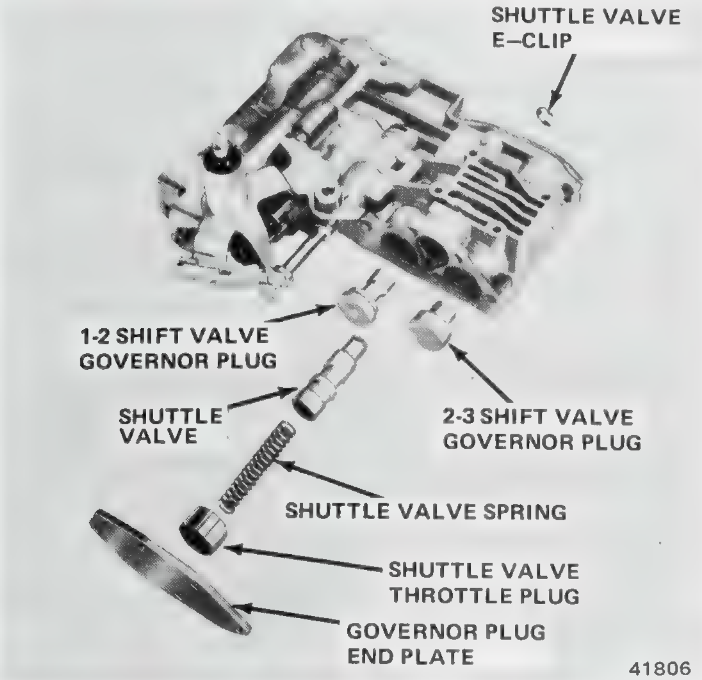


Fig. 2C-47 Shuttle Valve and Governor Plugs—Model 904

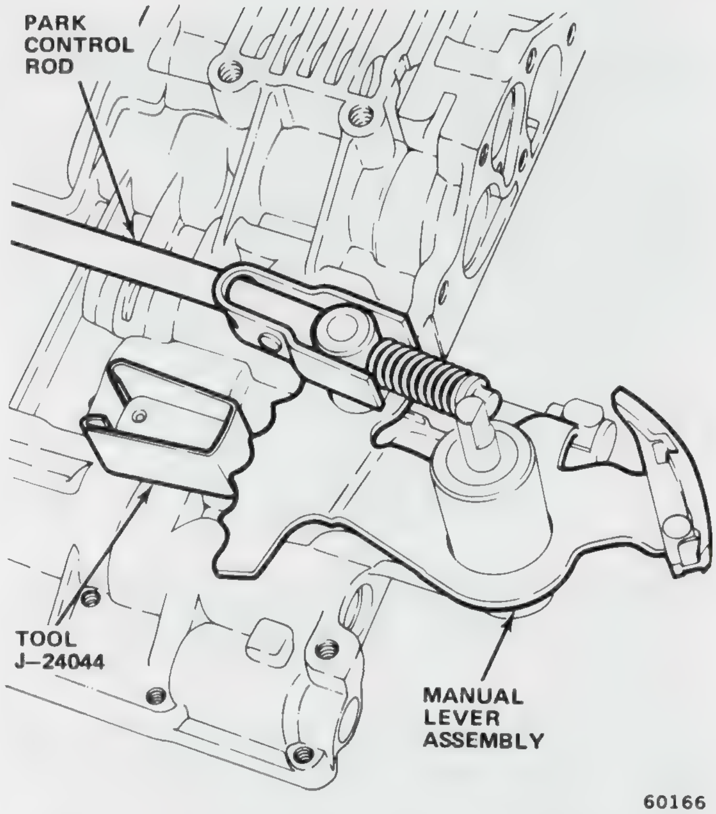


Fig. 2C-48 Detent Ball Retainer Tool Installation

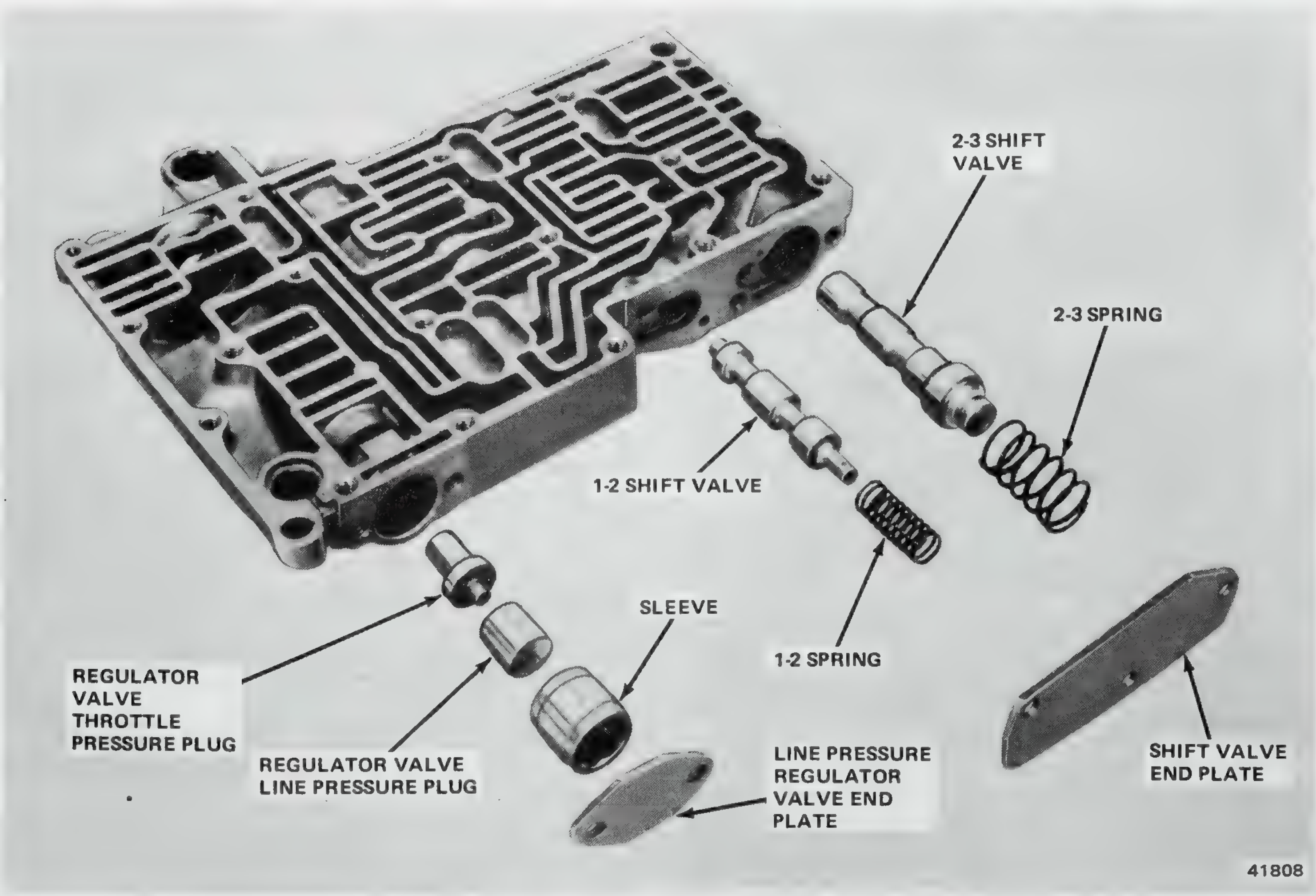


Fig. 2C-49 Shift Valves and Pressure Regulator Valve Plugs—Model 904

(11) Remove governor plug end plate (fig. 2C-47). Remove shuttle valve throttle plug and spring and 1-2 and 2-3 shift valve governor plugs.

(12) Remove shuttle valve E-clip, and slide shuttle valve out of bore.

(13) Install Detent Ball Retainer Tool J-24044 over detent ball casing (fig. 2C-48).

(14) Remove E-clip, washer, and seal from throttle lever shaft.

(15) Remove any burrs on shaft with crocus cloth.

(16) Slide manual lever assembly off of throttle lever shaft and remove throttle lever assembly.

(17) Remove E-clip and park control rod from manual lever.

(18) Remove detent ball retainer tool, detent ball, and spring. Tag spring for assembly reference.

WARNING: *The detent ball retainer tool is holding the ball under spring pressure. Shield the ball casing area with one hand before removing the tool and ball.*

(19) Remove manual valve.

(20) Remove kickdown detent, kickdown valve, throttle valve spring, and throttle valve (fig. 2C-42). Tag spring for assembly reference.

(21) Remove line pressure regulator valve end plate (fig. 2C-49).

(22) Remove regulator valve sleeve, line pressure plug, and throttle pressure plug.

(23) Remove shift valve end plate.

(24) Remove shift valve springs and shift valves. Tag springs for assembly reference.

Cleaning and Inspection

Thoroughly wash and air dry all parts. Do not use any type of caustic cleaning solution.

Be sure all passages are clean and free from obstructions. Clean the regulator filter in solvent and air dry. Replace the filter if damaged.

Inspect the manual and throttle valve levers and shafts for being bent, worn, or excessively loose. If a lever is loose on a shaft, it may be repaired by silver soldering or by replacing the lever and shaft assembly. If a lever or shaft is bent, replace the assembly.

Inspect all mating surfaces for burrs, nicks, and scratches. Remove minor irregularities using crocus cloth and very light pressure.

Using a straightedge, inspect all mating surfaces for warpage or distortion. Very slight warpage or distortion may be corrected by abrading the mating surface on a sheet of crocus cloth. Position the cloth on a surface plate or flat piece of glass and use very light pressure.

Be sure all metering holes in the separator plate and valve body are open. Use a penlight to inspect the valve body bores for scores, burrs, scratches, and pits.

Inspect all valve springs for distortion or collapsed coils. Replace damaged springs.

Inspect all valves and plugs for burrs, nicks, and scores. Remove slight irregularities using crocus cloth, but do not round off the sharp edges. The sharpness of these edges is vitally important because it prevents foreign matter from lodging between the valve and the body bore.

Inspect all valves and plugs for freedom of operation in the valve body bores. When bores, valves, and plugs are clean and dry, the valves and plugs should fall freely in the bores.

NOTE: *A valve body that functioned properly when the car was new will operate correctly if: all mating surfaces are flat, bores, plugs, and valves are smooth, metering holes are open, springs not damaged, and if all valves and plugs fall freely in the bores; after being properly cleaned, reconditioned, assembled, and adjusted. There is no need to replace a valve body unless it is damaged in handling.*

Assembly

(1) Install 1-2, 2-3 shift valves and springs in valve body (fig. 2C-49).

(2) Install shift valve end plate and tighten screws to 35 inch-pounds (4.0 Nm) torque.

(3) Install throttle pressure plug, line pressure plug and sleeve in valve body.

(4) Install line pressure regulator valve end plate and tighten screws to 35 inch-pounds (4.0 Nm) torque.

(5) Install throttle valve, throttle valve spring, kickdown valve, and kickdown detent in valve body (fig. 2C-42).

(6) Install manual valve.

(7) Insert detent ball and spring in valve body and install retainer tool J-24057 to retain ball and spring (fig. 2C-48).

(8) Install throttle lever assembly.

(9) Install manual lever assembly on throttle lever shaft.

(10) Position manual lever assembly so it engages manual valve and detent ball.

(11) Install seal, washer, and E-clip on throttle lever shaft and remove detent ball retainer tool.

(12) Install 1-2 and 2-3 shift valve governor plugs (fig. 2C-47).

(13) Install shuttle valve, shuttle valve spring, and shuttle valve throttle plug.

(14) Install governor plug end plate and tighten screws to 35 inch-pounds (4.0 Nm) torque.

(15) Install E-clip in shuttle valve.

(16) Install shuttle valve cover plate and tighten screws to 35 inch-pounds (4.0 Nm) torque (fig. 2C-46).

(17) Install check balls and spring in valve body (fig. 2C-45).

(18) Install rear clutch check ball in transfer plate and initial pressure regulator valve screen in separator plate (fig. 2C-44).

(19) Position separator plate on transfer plate and stiffener plate on separator plate.

(20) Secure stiffener and separator plates to transfer plate with retaining screws and tighten screws to 35 inch-pounds (4.0 Nm) torque.

(21) Place transfer plate assembly on valve body and install retaining screws finger-tight (fig. 2C-43).

NOTE: *Before tightening retaining screws be sure that the pressure regulator screen is properly aligned.*

(22) Tighten transfer plate assembly retaining screws to 35 inch-pounds (4.0 Nm) torque. When tightening screws, start at center of plate and work outward, and tighten screws alternately and evenly.

(23) Install torque converter and line pressure control valves and springs (fig. 2C-42).

(24) Install line pressure adjusting screw assembly on spring retainer bracket and position spring retainer bracket on valve body. Attach bracket to side of valve body and tighten retaining screws only after starting both the top and bottom bracket screws. Tighten all screws to 35 inch-pounds (4.0 Nm) torque.

NOTE: *Be sure the retainer bracket is properly aligned before tightening the screws.*

(25) Install E-clip and park control rod on manual lever assembly.

(26) Install oil filter.

(27) Measure throttle and line pressure settings. Refer to In-Car Service and Adjustments—Valve Body Control Pressure Adjustments. Correct adjustments as required.

NOTE: *If pressures were satisfactory prior to disassembly, do not change line or throttle pressure adjusting screw settings.*

Valve Body—Models 998-727

Disassembly

CAUTION: *Do not clamp any part of the valve body or transfer plate in a vise. Any slight distortion of the body or plate will cause sticking valves or excessive leakage or both. When removing and installing valves or plugs, slide them in or out very carefully. Do not use force to remove or install valves.*

(1) Mount valve body on Repair Stand Tool J-24043.

NOTE: *When disassembling the valve body, identify all valve springs with a tag for assembly reference.*

(2) Remove oil filter attaching screws and oil filter (fig. 2C-50).

NOTE: *Oil filter screws are longer than transfer plate screws.*

(3) Remove upper and lower screws from spring retainer and adjustment screw bracket (fig. 2C-51). Hold spring retainer firmly against spring force while removing last screw.

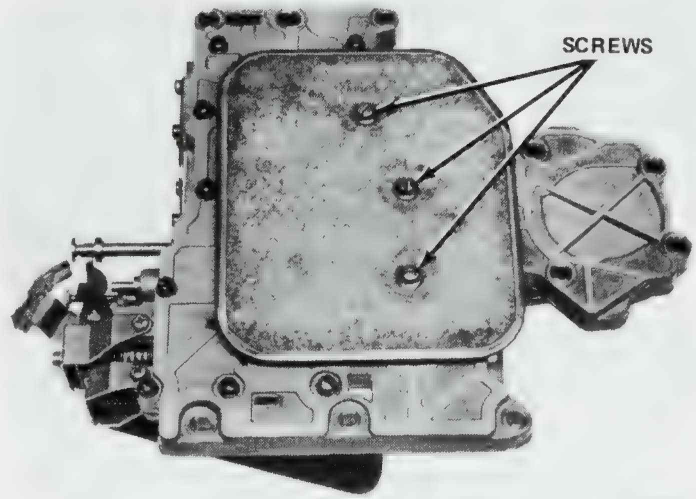


Fig. 2C-50 Oil Filter Screw Location

(4) Remove spring retainer and line and throttle pressure adjusting screws. Do not disturb screw settings. Remove line pressure and torque converter valve regulator springs. Tag springs for assembly reference.

(5) Remove line pressure regulator and torque converter control valves.

(6) Remove transfer plate assembly retaining screws and remove transfer plate assembly.

(7) Remove screws attaching stiffener and separator plates to transfer plate and separate these parts (fig. 2C-52).

(8) Remove rear clutch check ball from transfer plate and remove pressure regulator valve screen from separator plate.

(9) Remove check balls and spring from valve body (fig. 2C-53). Tag spring for assembly identification.

(10) Turn valve body over and remove shuttle valve cover plate (fig. 2C-54).

(11) Remove governor plug end plate (fig. 2C-55), shuttle valve throttle plug and spring, and 1-2 and 2-3 shift valve governor plugs.

(12) Remove shuttle valve E-clip, shuttle valve secondary spring, spring guides, and shuttle valve.

(13) Install Detent Ball Retainer Tool J-24044 around detent ball casing (fig. 2C-48).

(14) Remove E-clip, washer, and seal from throttle valve lever shaft (fig. 2C-51).

(15) Remove burrs on shaft with crocus cloth.

(16) Slide manual lever assembly off throttle lever shaft and remove throttle lever assembly.

(17) Remove E-clip and park control rod from manual lever.

CAUTION: *The detent ball retainer tool is holding the ball under spring pressure. Shield the ball casing area with one hand before removing the retainer tool and detent ball.*

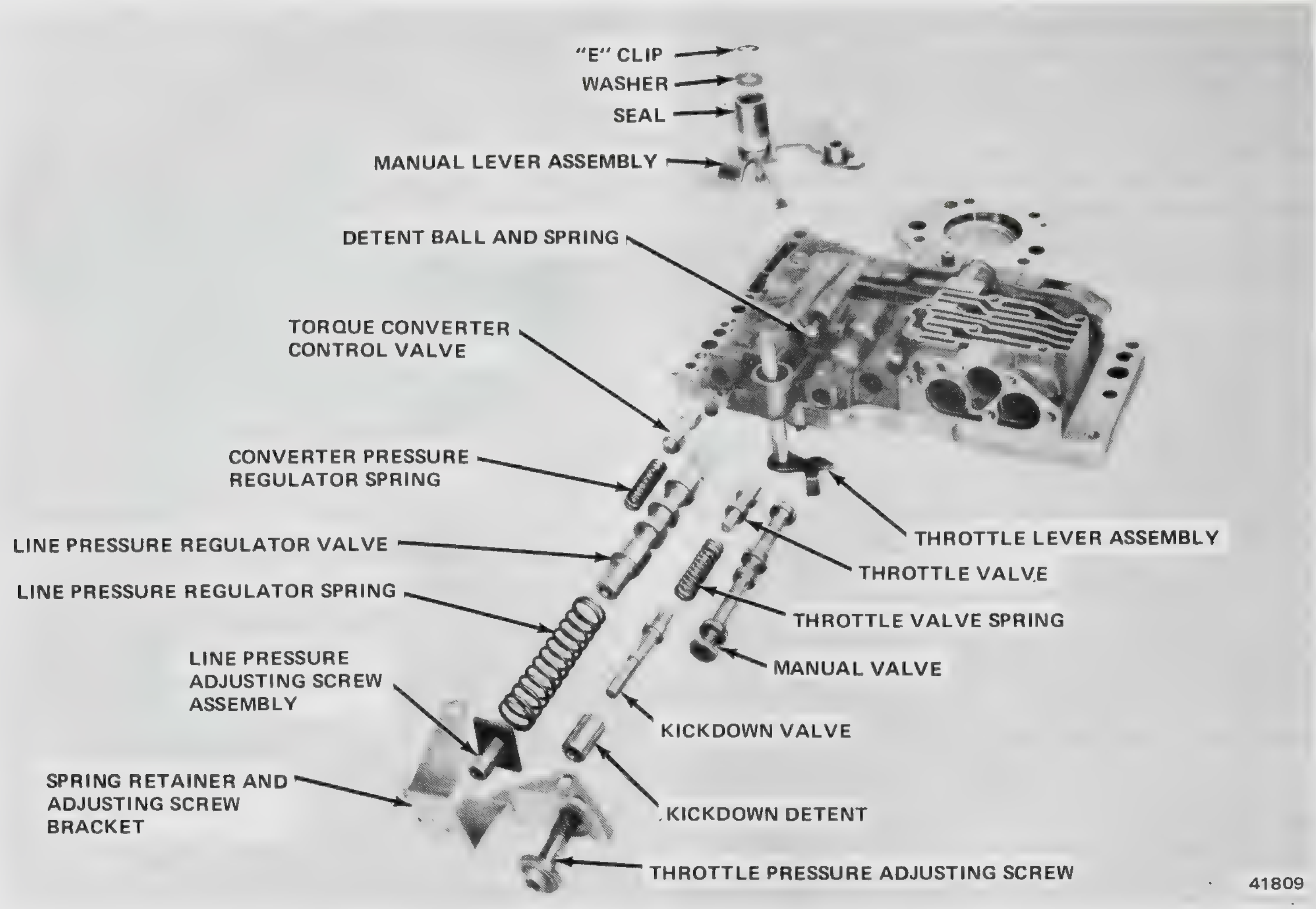


Fig. 2C-51 Pressure Regulator and Manual Controls—Models 998-727

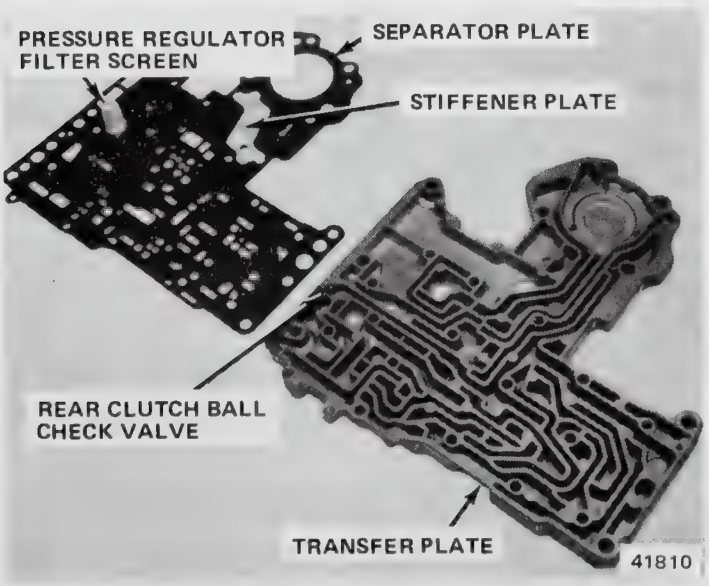


Fig. 2C-52 Transfer Plate Assembly—Models 998-727

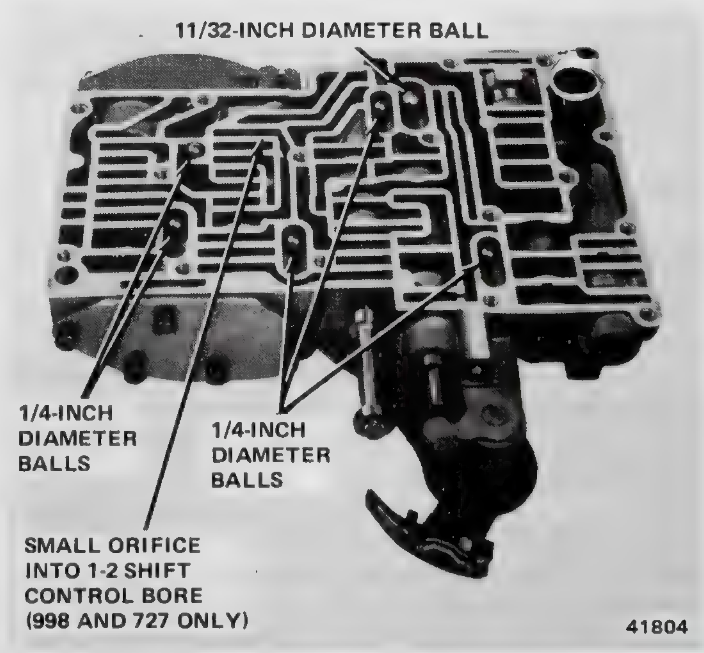


Fig. 2C-53 Check Ball Location—Models 998-727

(18) Remove retainer tool, detent ball, and spring. Tag spring for assembly reference.

(19) Remove manual valve.

(20) Remove kickdown detent, kickdown valve, throttle valve spring, and throttle valve (fig. 2C-51). Tag spring for assembly reference.

(21) Remove pressure regulator valve end plate (fig. 2C-56).

(22) Remove sleeve, line pressure regulator valve plug, and throttle pressure regulator valve plug.

(23) On Model 998, remove downshift valve housing end plate.

(24) On Model 727 only, remove downshift valve housing, remove throttle plug from downshift valve retainer, and remove spring, and limit valve from housing. Tag spring for assembly reference.

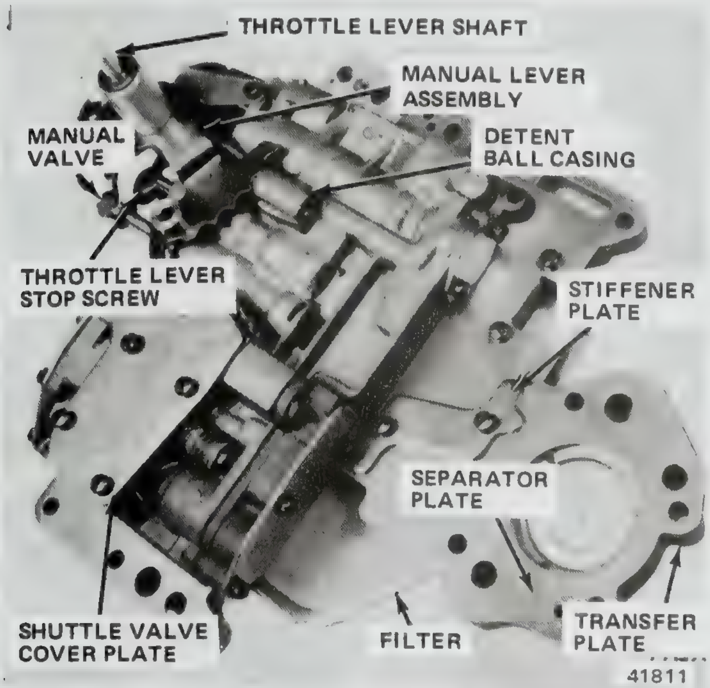


Fig. 2C-54 Valve Body Controls—Models 998-727

(25) Remove 1-2 shift control valve and spring, 1-2 shift valve and spring, and 2-3 shift valve and spring. Tag all springs for assembly reference.

Cleaning and Inspection

Thoroughly wash and air dry all parts.

Do not use any type of caustic cleaning solution. Be sure all passages are clean and free from obstructions.

Clean the regulator filter in solvent and air dry. Replace the filter if damaged.

Inspect the manual and throttle valve levers and shafts for being bent, worn, or excessively loose. If a lever is loose on a shaft, it may be repaired by silver soldering or by replacing the lever and shaft assembly. If a lever or shaft is bent, replace the assembly.

Inspect all mating surfaces for burrs, nicks, and scratches. Remove minor irregularities using crocus cloth and very light pressure.

Using a straightedge, inspect all mating surfaces for warpage or distortion. Very slight warpage or distortion may be corrected by abrading the surface on a sheet of crocus cloth. Position the cloth on a surface plate or flat piece of glass and use very light pressure.

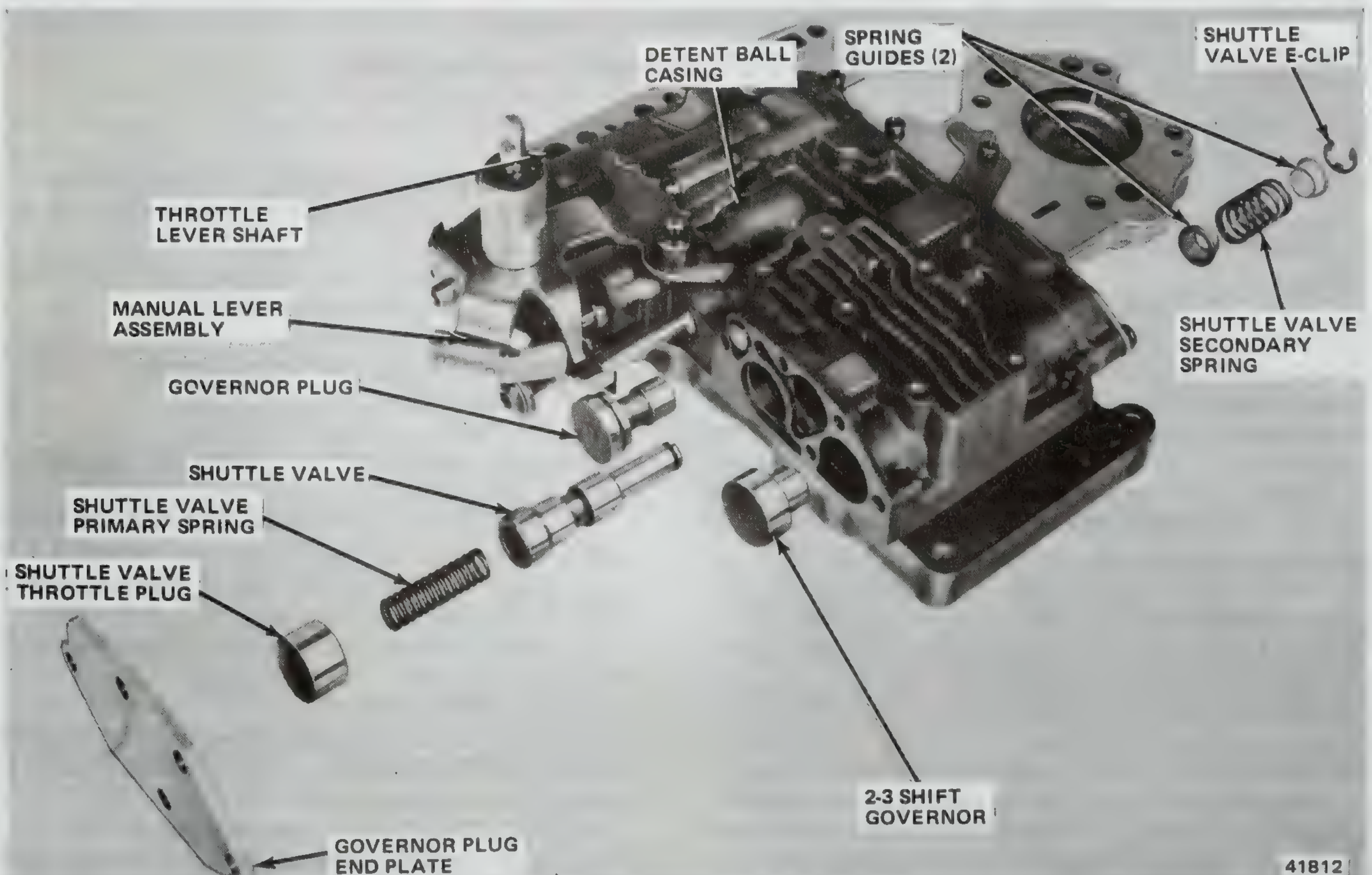


Fig. 2C-55 Shuttle Valve and Governor Plugs—Models 998-727

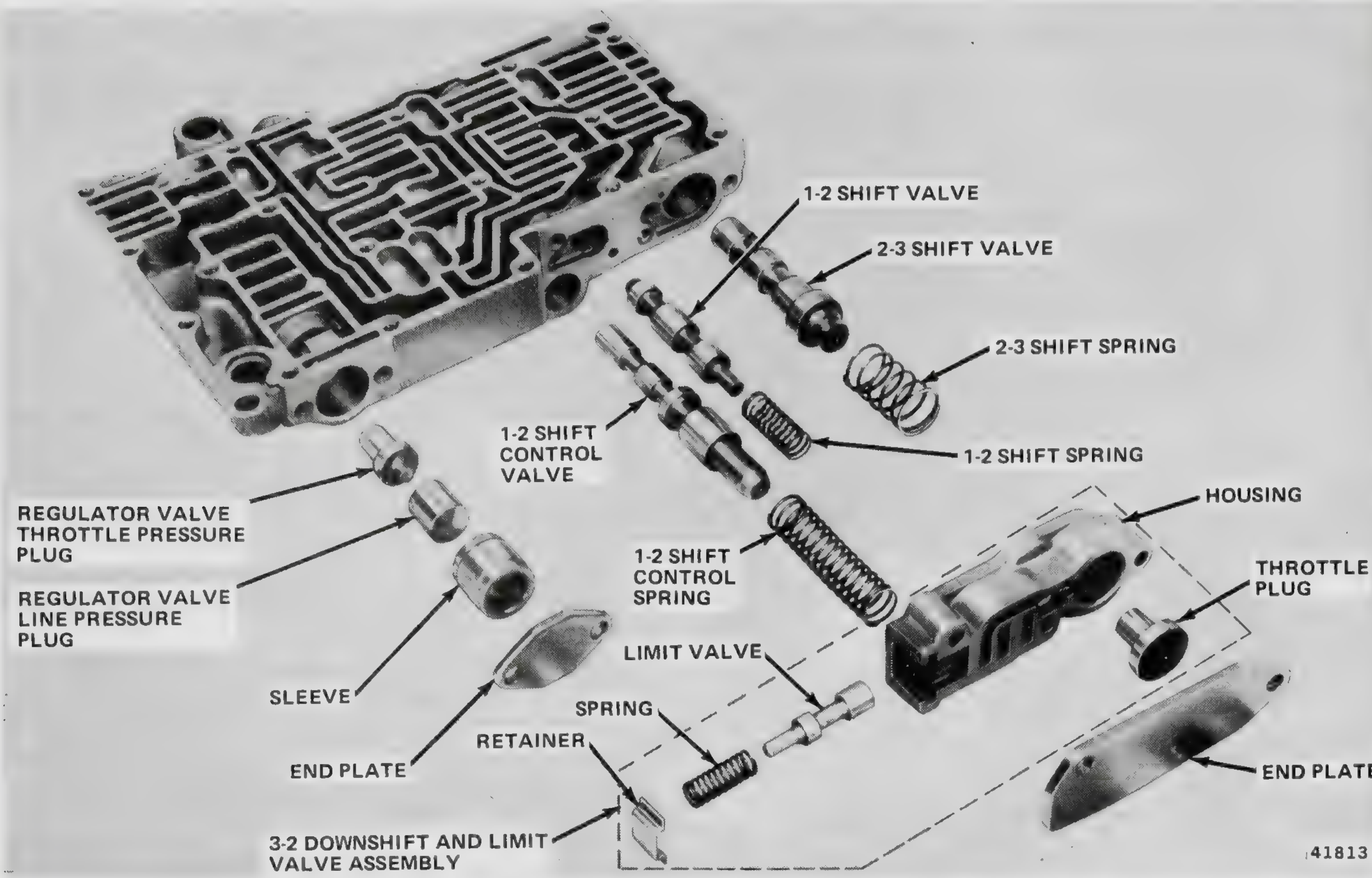


Fig. 2C-56 Shift Valves and Pressure Regulator Valves—Models 998-727

Be sure all metering holes in the separator plate and valve body are open. Use a penlight to inspect the bores in the valve body for scores, burrs, scratches, pits, and other irregularities.

Inspect all valve springs for distortion or collapsed coils.

Inspect all valves and plugs for burrs, nicks, and scores. Remove slight irregularities using crocus cloth but do not round off the sharp edges. The sharpness of these edges is vitally important because it prevents foreign matter from lodging between the valve and the body bore.

Inspect all valves and plugs for freedom of operation in the valve body bores. When the bores, valves, and plugs are clean and dry, the valves and plugs fall freely in the bores. Make sure the orifice into the 1-2 shift control bore in the valve body is open (fig. 2C-53). Verify this by inserting a 1/32-inch diameter drill through the orifice and into the 1-2 shift control bore.

NOTE: *A valve body that functioned properly when the car was new will operate correctly if: all mating surfaces are flat, bores, plugs and valves are smooth, metering holes are open, springs not damaged, and if all valves and plugs fall freely in the bores; after being properly cleaned, reconditioned, assembled and adjusted. There is no need to replace a valve body unless it is damaged in handling.*

Assembly

(1) Install 1-2 and 2-3 shift valves and springs, and 1-2 shift control valve and spring in valve body (fig. 2C-56).

(2) On Model 727, assemble and install downshift housing assembly in following sequence:

(a) Install limit valve and spring.

(b) Slide spring retainer into groove.

(c) Insert throttle plug in bore.

(d) Position downshift housing end plate in housing and install retaining screws. Do not tighten screws at this time.

(e) Position downshift housing assembly against shift valve springs. Be sure all springs are in proper alignment. Install and tighten retaining screws to 35 inch-pounds (4.0 Nm) torque.

(3) Install throttle valve, valve spring, kickdown valve and detent (fig. 2C-51).

(4) Install manual valve.

(5) Insert detent ball and spring in valve body. Install Retainer Tool J-24044 around detent ball casing to retain ball and spring (fig. 2C-48).

(6) Install throttle lever assembly (fig. 2C-51).

(7) Install manual lever assembly on throttle lever shaft. Position manual lever assembly so it engages manual valve and detent ball.

(8) Install seal, washer, and E-clip on throttle lever shaft.

(9) Remove detent ball retainer tool.

(10) Install 1-2 and 2-3 shift valve governor plugs (fig. 2C-55).

(11) Install shuttle valve, primary spring and throttle plug.

(12) Install governor plug end plate and tighten screws to 35 inch-pounds (4.0 Nm) torque.

(13) Install spring guides, shuttle valve secondary spring, and E-clip.

(14) Install shuttle valve cover plate (fig. 2C-54) and tighten screws to 35 inch-pounds (4.0 Nm) torque.

(15) Install check balls and spring in valve body (fig. 2C-53).

(16) Install rear clutch check ball (model 727 only) in transfer plate and pressure regulator valve screen in separator plate (fig. 2C-51).

(17) Position separator plate on transfer plate and stiffener plate on separator plate.

(18) Install stiffener and separator plate-to-transfer plate retaining screws. Tighten screws to 35 inch-pounds (4.0 Nm) torque.

(19) Position transfer plate assembly on valve body and install retaining screws finger-tight.

NOTE: *Before tightening retaining screws be sure the pressure regulator filter screen is properly aligned.*

(20) Starting at center and working outward, tighten transfer plate assembly retaining screws to 35 inch-pounds (4.0 Nm) torque.

(21) Install torque converter and line pressure control valves and springs (fig. 2C-51).

(22) Install line pressure adjusting screw assembly on spring retainer bracket and position on valve body.

(23) Attach bracket to side of valve body and tighten retaining screws only after starting both the top and bottom bracket screws. Tighten screws to 35 inch-pounds (4.0 Nm) torque.

NOTE: *When installing retainer the bracket, be sure all parts are properly aligned before tightening the screws.*

(24) Install E-clip and park control rod on manual lever assembly.

(25) Install oil filter.

(26) Measure throttle and line pressure settings. Refer to In-Car Service and Adjustment—Valve Body—Hydraulic Control Pressure Adjustments. Correct settings as required.

NOTE: *If pressures were satisfactory before disassembly, do not change line or throttle pressure adjusting screw settings.*

Fig. 2C-57 Extension Housing Seal Removal/Installation

Accumulator Piston and Spring—Inspection

Inspect the piston for nicks, burrs, scores, and wear. Be sure the rings turn freely in the piston grooves. Inspect the case bore for scores or other damage.

Inspect the spring for cracks or distortion. Replace damaged or worn parts.

Extension Housing Bushing and Seal Replacement

(1) Remove seal from extension housing using screwdriver and hammer (fig. 2C-57).

(2) Remove extension housing bushing using Driver Handle J-8092 and Remover and Installer Tool J-22538 (Models 904 and 998) or J-24048 (Model 727) (fig. 2C-58).

(3) Install replacement bushing with tools used in step (2).

(4) Align oil hole in bushing with oil slot in housing.

(5) Install bushing until it is flush with end of bore.

(6) Position replacement seal on Installer Tool J-9348 and install seal in housing (fig. 2C-58).

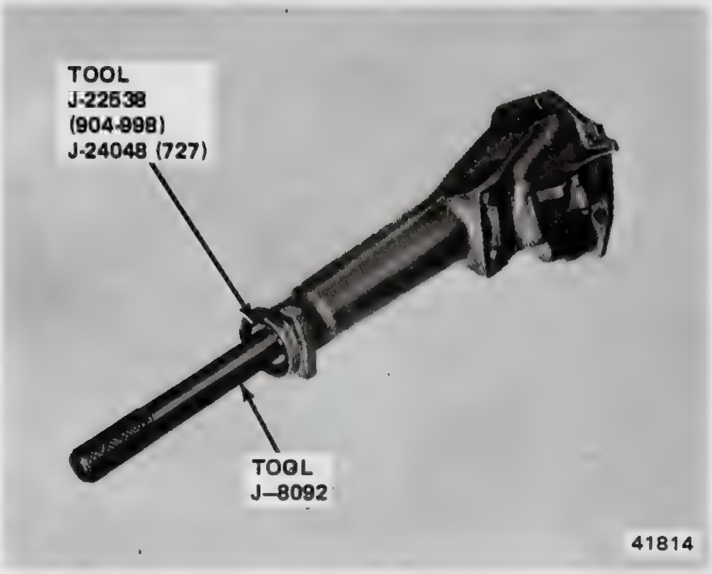


Fig. 2C-58 Extension Housing Bushing Removal/Installation

Park Lock Sprag

Disassembly

(1) Remove pivot shaft from extension housing.
(2) Remove park sprag and spring.
(3) Remove snap ring and reaction plug and pin assembly from housing.

Inspection

Inspect the pivot shaft for scores and free movement in the housing and sprag. Inspect the control rod and sprag springs for distortion and loss of tension. Inspect the sprag and gear for cracks and broken edges on the engagement lugs. Inspect the knob at the end of the control rod for excessive wear, nicks, burrs, and free turning.

If necessary, replace the park gear as outlined under Governor and Support—Disassembly and Assembly.

Assembly

(1) Install reaction plug and pin assembly in housing and install snap ring.
(2) Install sprag and spring in housing.

NOTE: *The square lug on the sprag must face the park gear.*

(3) Position spring so it moves sprag away from gear.
(4) Install pivot pin.

GOVERNOR AND SUPPORT

Disassembly

(1) Remove large snap ring from weight end of governor body.
(2) Remove weight assembly.
(3) Remove snap ring from governor weight assembly.
(4) Separate inner weight, spring, and outer weight.

NOTE: *If park gear or governor body are to be replaced, straighten the lock tabs and remove the four attaching bolts.*

Inspection

Thoroughly clean and dry all governor parts and check for free movement. Do not use a caustic cleaning solution.

The weights and valve should fall freely in their bores when clean and dry. Rough surfaces and burrs may be polished with crocus cloth.

Inspect the governor weight spring for distortion.

Inspect the park gear and governor support for chipped or worn gear teeth and damaged ring grooves.

Clean the filter in solvent and air dry. Replace it if damaged or defective.

Assembly

(1) If governor body was separated from governor support, assemble parts and install attaching bolts finger-tight.

NOTE: *Bolts must not be tightened to specified torque until assembly is installed on output shaft.*

(2) Install governor weights and spring in outer weight, and install snap ring.
(3) Install weight assembly into body.
(4) Install snap ring.

Oil Pump and Reaction Shaft Support—Models 904-998

Disassembly

(1) Remove bolts attaching pump to support and remove support.

NOTE: *Mark rotors with chalk for assembly reference.*

(2) Remove rotors.
(3) Remove O-ring seal using blunt punch.
(4) Remove front clutch seal rings from support.

Inspection

Inspect the front clutch seal ring grooves for burrs, nicks, or cracked edges. Inspect the front clutch retainer-to-reaction shaft support thrust washer for wear. The washer should be 0.043 to 0.045 inch (1.092 to 1.143 mm) thick. Inspect all machined surfaces on the pump housing and support for nicks and burrs. Inspect the pump body and reaction shaft support bushings for wear and scores. Inspect the pump rotors for scores or pits.

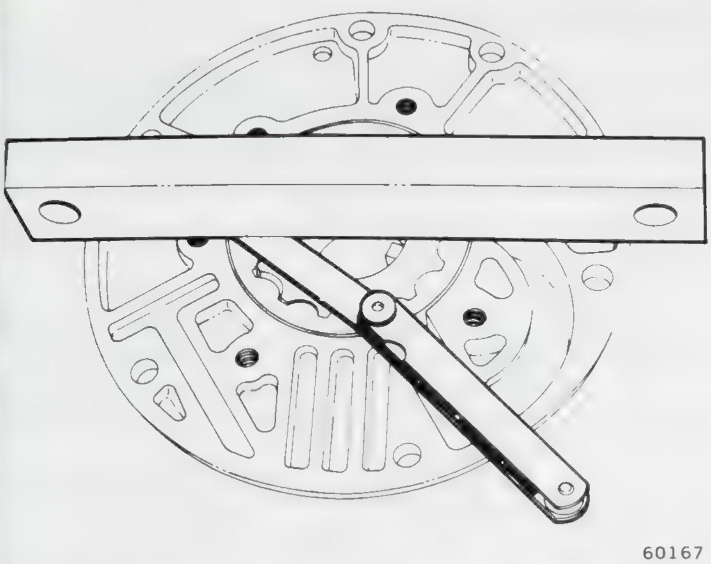


Fig. 2C-59 Measuring Pump Rotor End Clearance—Models 904-998

Install the pump rotors in the pump body. Place a straightedge across the rotor faces and pump body. Using a feeler gauge, measure the clearance between the straightedge and pump rotors. Clearance limits are 0.001 to 0.003 inch (0.0254 to 0.0762 mm). Refer to figure 2C-59.

Position the inner and outer rotors so that the center of one tooth on each rotor is aligned. Measure the clearance between the tips of the teeth. Make four measurements. Rotate the inner rotor approximately 1/4 turn between measurements. Rotor tip clearance should be 0.005 to 0.010 inch (0.1270 to 0.2540 mm). Refer to view A, figure 2C-60.

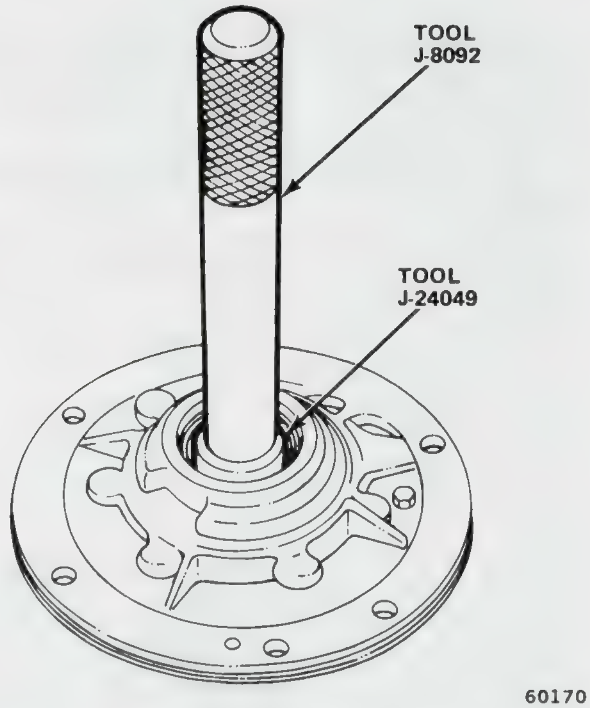


Fig. 2C-61 Pump Bushing Removal—Models 904-998

Measure the clearance between the outer surface of the outer rotor and the pump bore. The clearance should be 0.004 to 0.008 inch (0.1016 to 0.2032 mm). Refer to view B, fig. 2C-60.

Pump Bushing Replacement

(1) Position pump housing, with reaction shaft support mating surface facing downward, on flat, level surface.

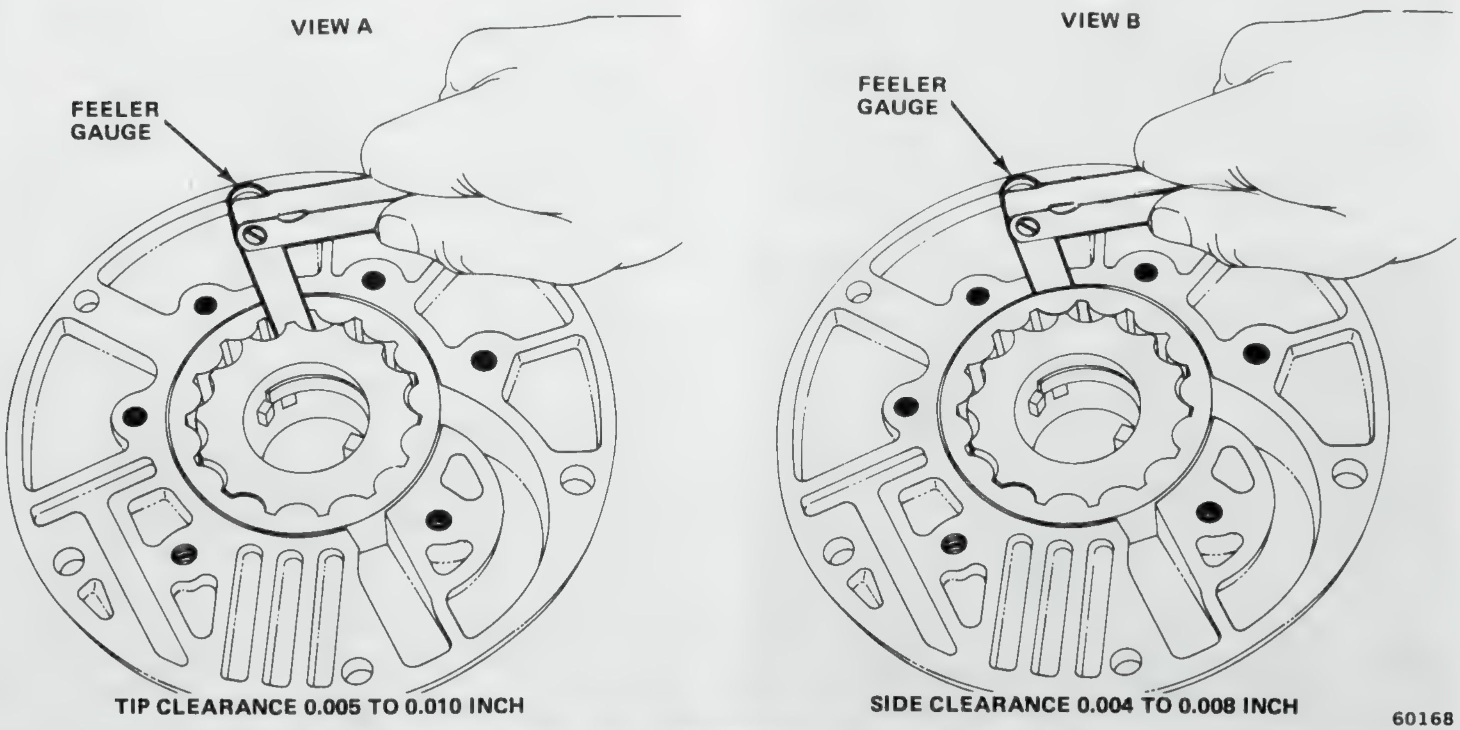


Fig. 2C-60 Measuring Rotor Side Clearance—Models 904-998 (View A and View B)

(2) Remove bushing using Remover and Installer Tool J-24049 and Driver Handle J-8092 (fig. 2C-61).

NOTE: *Be careful to keep the tool straight in the bore during removal.*

(3) Position replacement bushing on Installer Tool J-24049.

(4) Turn pump housing over and install bushing straight into housing until edge of bushing is flush with bore (fig. 2C-62).

(5) Stake bushing in two places (to retain it) using blunt punch (fig. 2C-63).

(6) Use knife, with narrow blade only, to remove burrs or high points at stake points (fig. 2C-63). Do not use file or other tool that will remove more metal than is necessary.

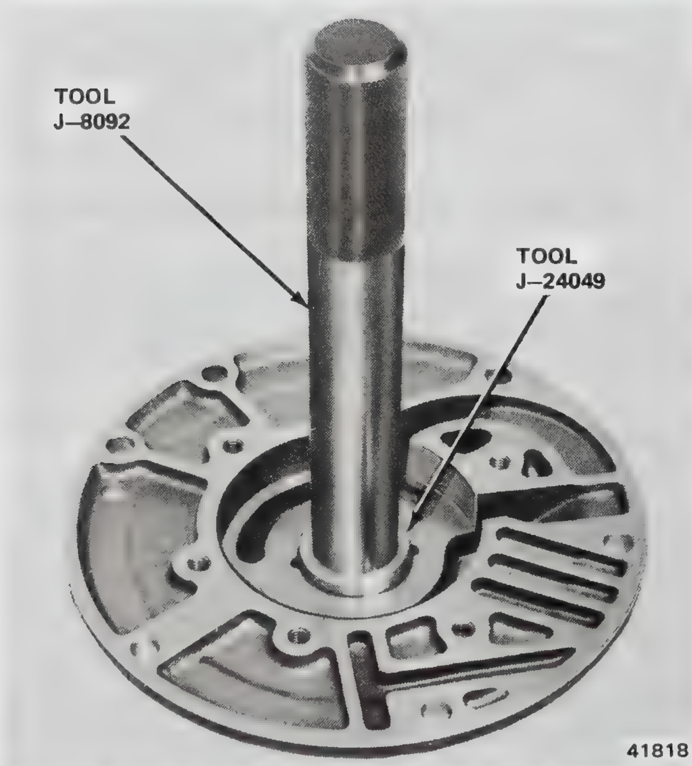


Fig. 2C-62 Pump Bushing Installation—Models 904-998

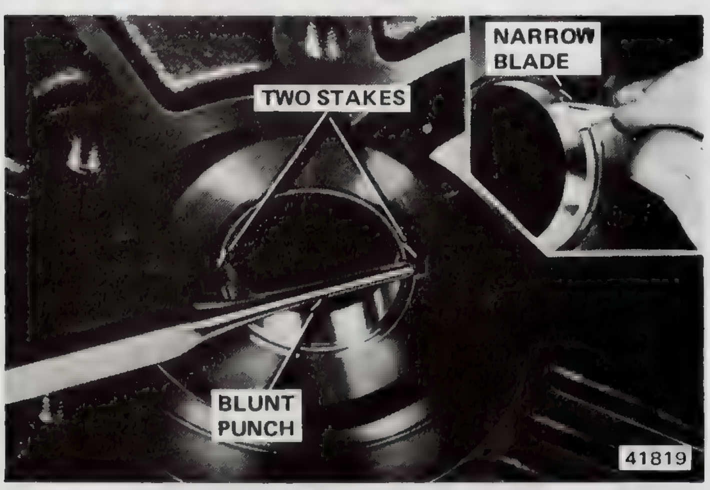


Fig. 2C-63 Staking Oil Pump Bushing

Reaction Shaft Bushing Replacement

NOTE: *If reaction shaft bushing requires replacement, be sure to inspect the support for wear from the input shaft and rear clutch retainer seal ring lands. If worn or grooved, replace the entire support assembly.*

CAUTION: *Do not clamp any part of the reaction shaft or support in a vise.*

(1) Thread Bushing Remover Tool J-24036 straight into bushing as far as possible by hand (fig. 2C-64).

(2) Using wrench, thread remover tool into bushing three or four additional turns to fully engage threads of tool in bushing.

(3) Install Slide Hammer Tools J-7004-3 and J-6585-1 in remover tool (fig. 2C-64).

(4) Bump outward with slide hammers to remove bushing.

(5) Clean chips from reaction shaft support assembly.

(6) Grip removed bushing with pliers and pull it from Tool J-24036.

CAUTION: *Be sure to protect the remover tool threads when using the tool.*

(7) Thread Bushing Installer Tool J-24032 onto Driver Handle J-8092 (fig. 2C-64).

(8) Position replacement bushing on installer tool and install bushing straight into shaft bore until tool bottoms (fig. 2C-65).

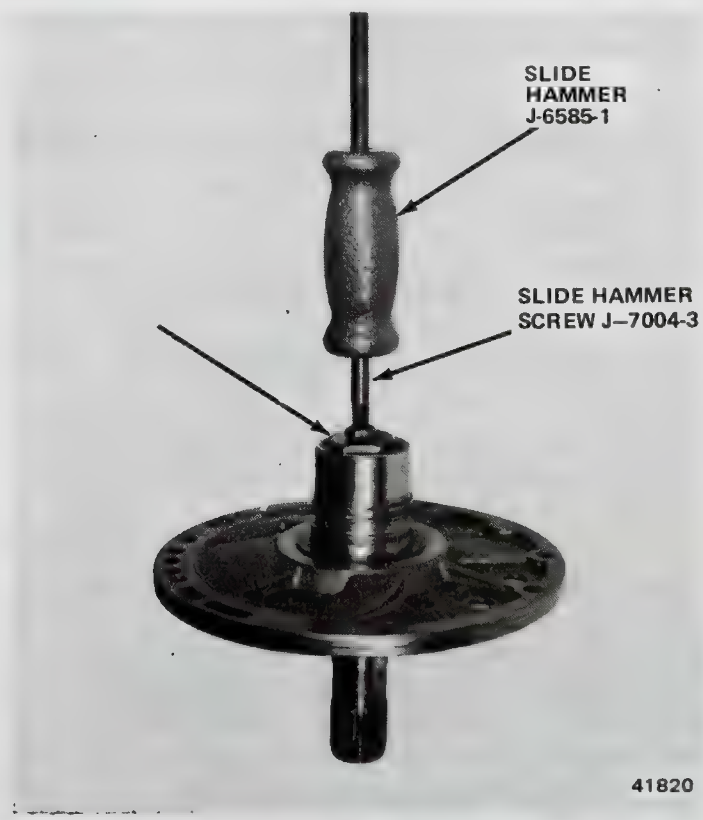


Fig. 2C-64 Reaction Shaft Bushing Removal—Models 904-998

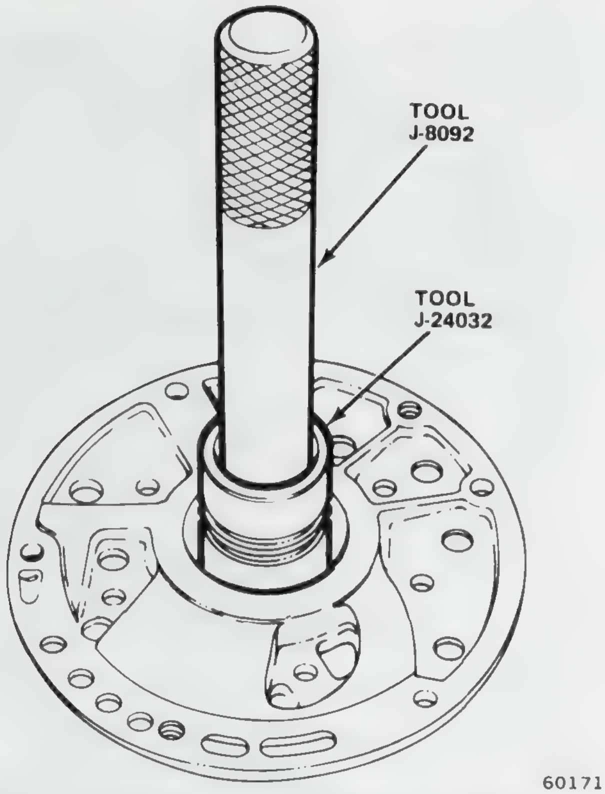


Fig. 2C-65 Reaction Shaft Bushing Installation—Models 904-998

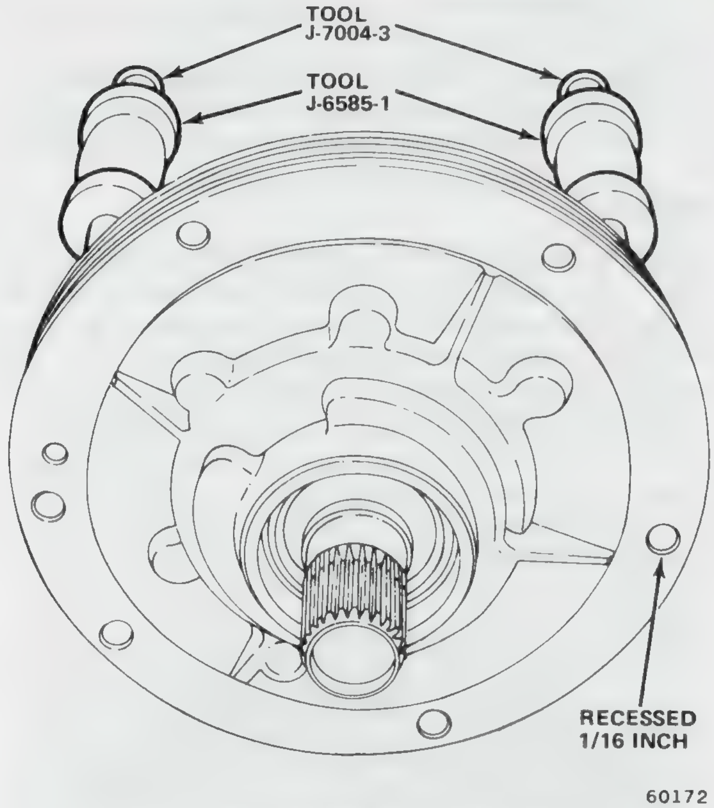


Fig. 2C-66 Installing Slide Hammer Bolts

(9) Clean reaction shaft support thoroughly after bushing installation.

Assembly

(1) Position pump housing on smooth flat surface and install pump rotors.

NOTE: *New rotors may be installed with either face up. Used rotors must be installed as removed. Refer to reference chalk marks made during disassembly.*

(2) Align and install reaction shaft support on pump housing and finger-tighten attaching bolts.

(3) Insert two Slide Hammer Bolts Tool J-7004-3, from back to front, into threaded reaction shaft support holes (fig. 2C-66). Bolts should be threaded into support until ends of bolts are 1/16 inch (1.5875 mm) below front machined surface of pump housing.

(4) Install one Pilot Stud Tool J-3387-2 into case pump opening (fig. 2C-67).

(5) Install pump assembly **backward** into case opening. It may be necessary to tap pump gently to seat it in case.

(6) Tighten bolts attaching reaction shaft support to pump housing to 160 inch-pounds (18.1 Nm) torque.

(7) Remove pump and reaction shaft support assembly from case.

(8) Remove slide hammer bolts from pump.

(9) Position oil seal in pump housing with seal lip facing inward.

(10) Install seal using Installer Tool J-9617. Install seal into housing until tool bottoms.

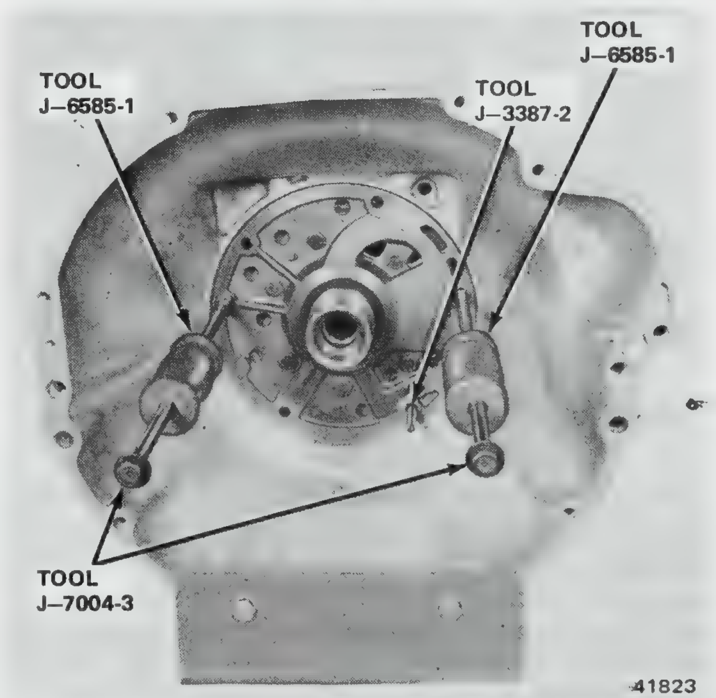


Fig. 2C-67 Pump Alignment—Models 904-998

Oil Pump and Reaction Shaft Support—Model 727

Disassembly

(1) Remove pump-to-support attaching bolts and remove support from pump.

(2) Mark rotors with chalk for assembly alignment reference.

(3) Remove rotors.
(4) Remove O-ring seal.
(5) Remove O-ring seal from pump body flange.
(6) Remove front oil seal using blunt punch.
(7) Remove front clutch seal rings from support.

Inspection

Inspect the front clutch seal ring grooves for burrs, nicks, or cracked edges. Inspect all machined surfaces on the pump housing for nicks and burrs. Inspect the pump body and reaction shaft support bushings for wear and scores. Inspect the pump rotors for scores and pits.

Install the pump rotors in the pump body. Position a straightedge across the rotor faces and pump body and use a feeler gauge to measure the clearance between the straightedge and rotors. Clearance limits are 0.001 to 0.003 inch (0.0254 to 0.0762 mm) (fig. 2C-68).

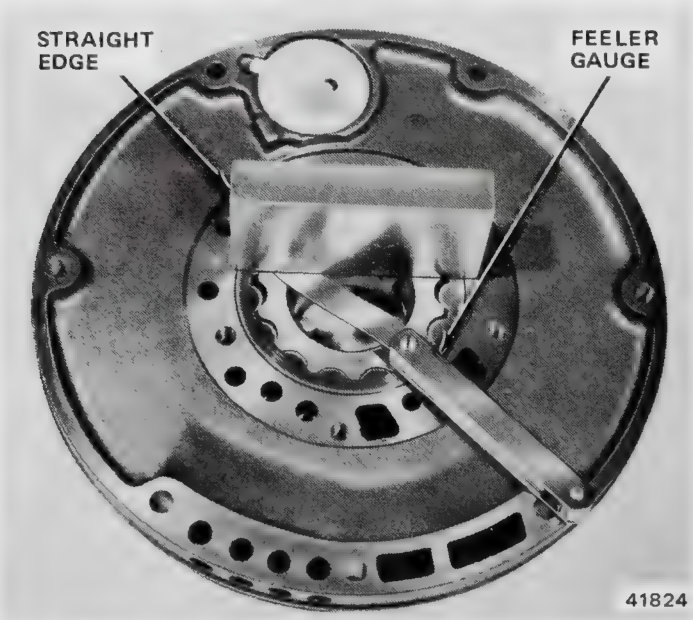


Fig. 2C-68 Measuring Pump Rotor End Clearance—Model 727

Position the inner and outer rotors so that the center of one tooth on each rotor is aligned and measure the clearance between the tips of the teeth. Make four measurements. Rotate the inner rotor approximately 1/4 turn between measurements. Rotor tip clearance should be 0.005 to 0.010 inch (0.1270 to 0.2540 mm). Refer to view A, figure 2C-69.

Measure the clearance between the outer surface of the outer rotor and the pump bore. Clearance should be 0.004 to 0.008 inch (0.1016 to 0.2032 mm). Refer to view B, figure 2C-69.

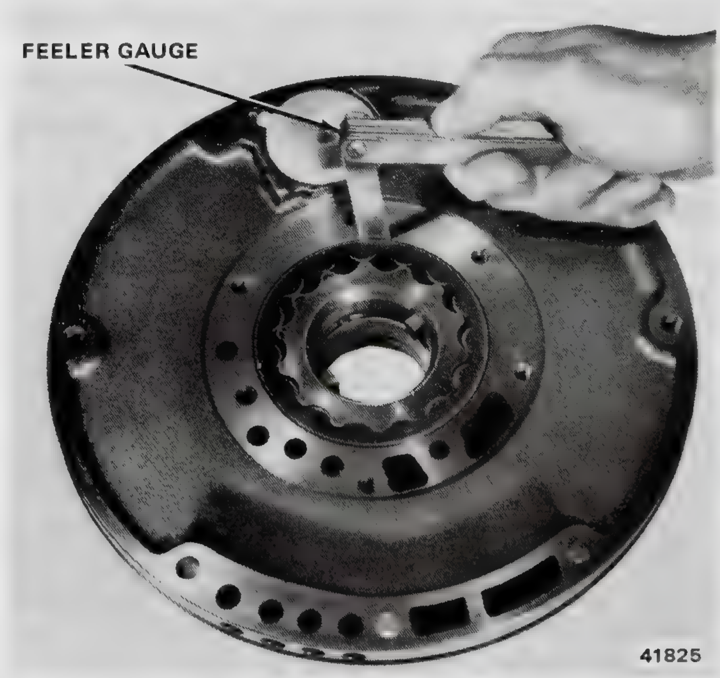
Pump Bushing Replacement

(1) Place pump housing, with reaction shaft support mating surface facing downward, on flat, level surface.

VIEW A

TIP CLEARANCE 0.005 TO 0.010 INCH

VIEW B



SIDE CLEARANCE 0.004 TO 0.008 INCH

Fig. 2C-69 Measuring Rotor Tip Clearance—Model 727 (View A and View B)

(2) Remove bushing using Remover-Installer Tool J-24055 and Driver Handle J-8092 (fig. 2C-70).

(3) Install replacement bushing on Remover-Installer Tool J-24055 (fig. 2C-71).

(4) Turn pump housing over and install bushing straight into housing until edge of bushing is flush with bore.

(5) Stake bushing in two places (to retain it) using blunt punch (fig. 2C-63).

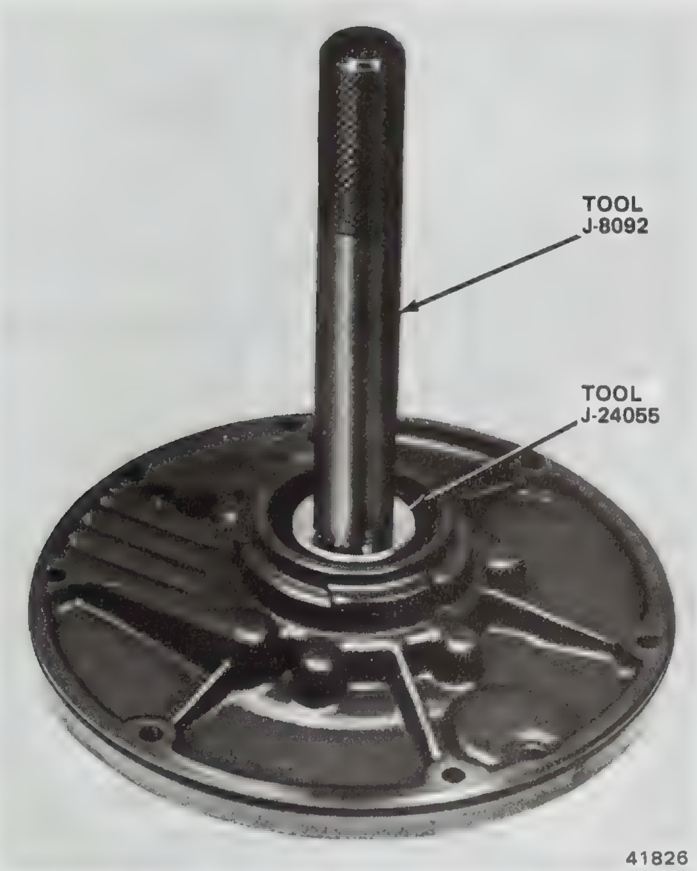


Fig. 2C-70 Pump Bushing Removal—Model 727

Fig. 2C-71 Pump Bushing Installation—727

(6) Remove burrs or high spots at stake points using knife with narrow blade (only).

NOTE: *Do not use a file or similar tool that might remove more metal than is necessary.*

(7) Clean pump housing thoroughly after bushing installation.

Reaction Shaft Bushing Replacement

NOTE: *If the reaction shaft bushing requires replacement, also inspect the shaft and support bore for wear caused by the input shaft seal ring lands. If the bore is worn or grooved, replace the entire support assembly.*

CAUTION: *Do not clamp any part of the reaction shaft or support in a vise.*

(1) Thread Bushing Remover Tool J-24037 into bushing as far as possible by hand (fig. 2C-72).

(2) Using wrench, thread remover tool into bushing three to four additional turns to fully engage threads of tool in bushing.

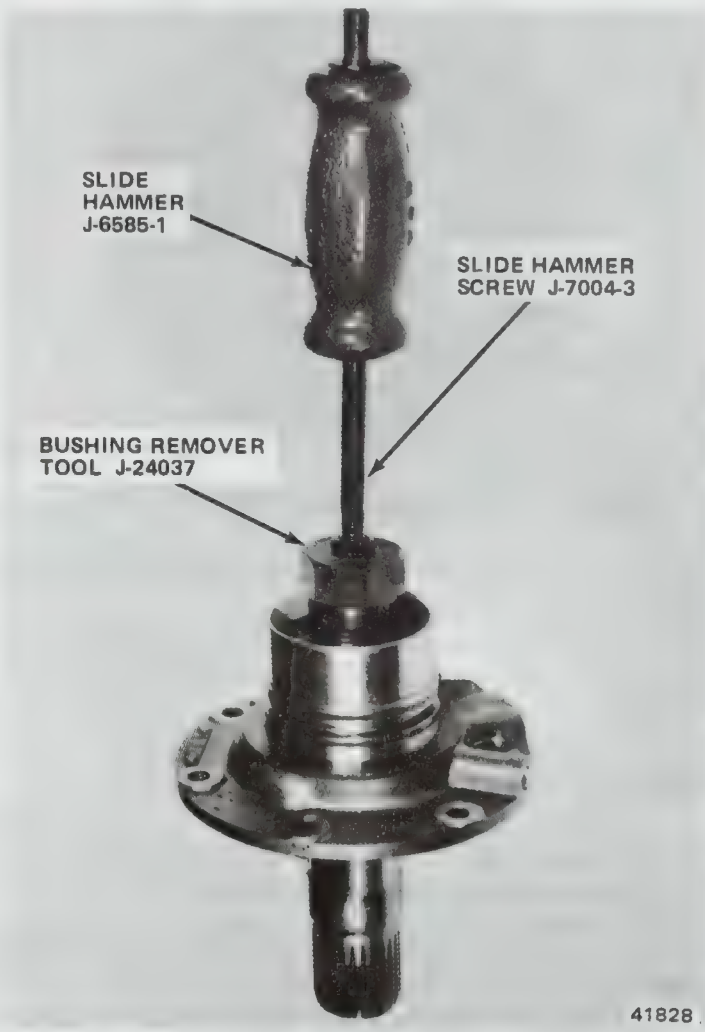


Fig. 2C-72 Reaction Shaft Bushing Removal—Model 727

(3) Install Slide Hammer Bolts Tool J-7004-3 and J-6585-1 into remover tool (fig. 2C-72). Bump outward with slide hammers to remove bushing.

(4) Thoroughly clean reaction shaft support assembly after bushing removal.

(5) Grip bushing with pliers and remove it from Tool J-24037.

NOTE: *Be sure to protect the tool threads during removal.*

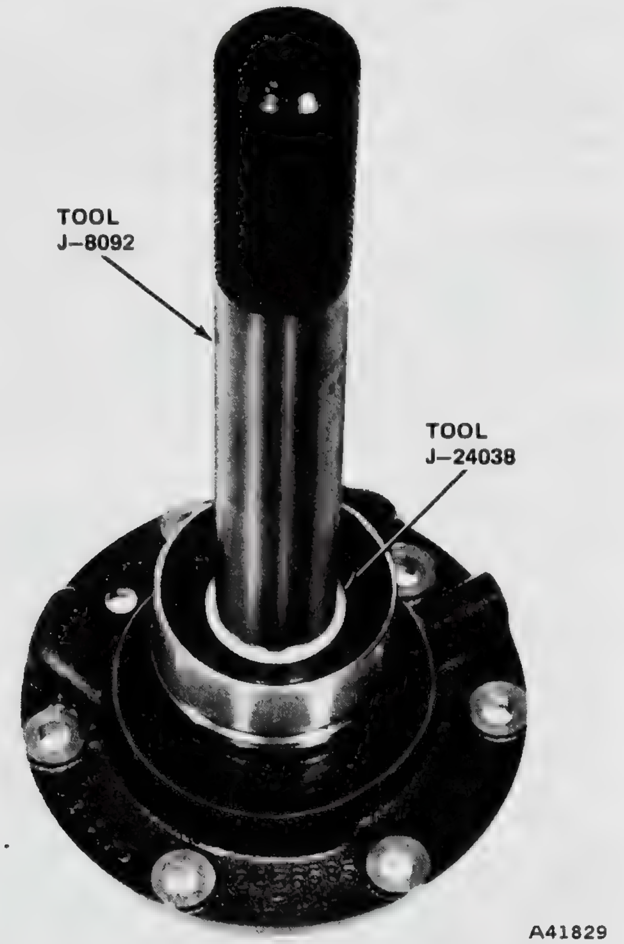


Fig. 2C-73 Reaction Shaft Bushing Installation—Model 727

(6) Thread Bushing Installer Tool J-24038 onto Driver Handle J-8092 (fig. 2C-73).

(7) Position replacement bushing on installer tool and install bushing straight into shaft bore until tool bottoms.

Assembly

(1) Install pump rotors in housing.

(2) Install reaction shaft support and tighten attaching bolts to 160 inch-pounds (18.1 Nm) torque.

(3) Install O-ring seal around pump housing flange.

(4) Insert oil seal in pump housing with seal lip facing inward.

(5) Install oil seal Installer Tool J-21005. Drive seal straight into housing until tool bottoms.

(6) Thoroughly clean reaction shaft support assembly.

Front Clutch—Models 904-998

Disassembly

(1) Remove large waved snap ring which secures pressure plate in clutch retainer.

(2) Install Spring Compressor Tool J-5886-01 over piston spring retainer (fig. 2C-74).

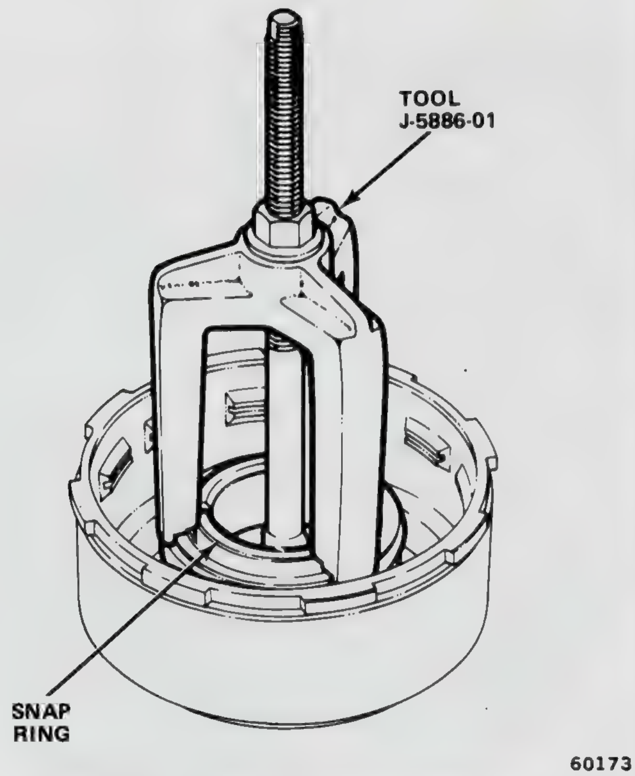


Fig. 2C-74 Front Clutch Snap Ring Removal and Installation—Models 904-998

(3) Compress piston springs and remove snap ring.

(4) Release compressor tool slowly until spring retainer is free of hub.

NOTE: *When releasing the compressor tool, do not allow the spring retainer to stick or bind in the snap ring groove.*

(5) Remove tool, retainer, and spring.

(6) Turn clutch retainer over and bump on wood block to dislodge and remove piston.

(7) Remove seal rings from piston and clutch retainer hub.

Inspection

Inspect the facing material on all driving discs. Replace discs that are charred, glazed, heavily pitted, flaking or if the facing material can be scraped off easily.

Inspect the steel plates and pressure plate surfaces for overheating, scoring, and for damaged driving lugs. Replace any worn, damaged parts.

Inspect the steel plate lug grooves in the clutch retainer for smooth surfaces. The plates must slide freely in the grooves.

Inspect the band application surface on the clutch retainer for nicks and scores. Light scratches and nicks can be removed with crocus cloth.

Inspect the ball check in the clutch retainer. The ball should move freely in its cage.

Inspect the seal ring surfaces inside the clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing of the rings. Inspect the clutch retainer bushing for scores and wear and inspect the inner bore surface for wear from the reaction shaft support seal rings and lands.

Inspect the inside of the piston bore for score marks. Remove light scores with crocus cloth. Inspect the seal ring grooves for nicks and burrs. Inspect the piston spring, retainer, and snap ring for distortion.

Retainer Bushing Replacement

(1) Place clutch retainer, with open end facing down, on a clean, smooth surface.

(2) Insert Bushing Remover-Installer Tool J-24064 in bushing (fig. 2C-75).

(3) Install Driver Handle J-8092 in remover tool and drive bushing straight down and out of retainer bore.

(4) Position clutch retainer so open end faces upward.

(5) Install replacement bushing on tool and drive bushing straight into retainer bore until bushing is flush with base of bore chamfer (fig. 2C-76).

Assembly

(1) Lubricate inner seal with petroleum jelly and install seal on hub of clutch retainer.

NOTE: *Be sure the seal lip is facing into the piston bore and that the seal is properly seated in the retainer groove.*

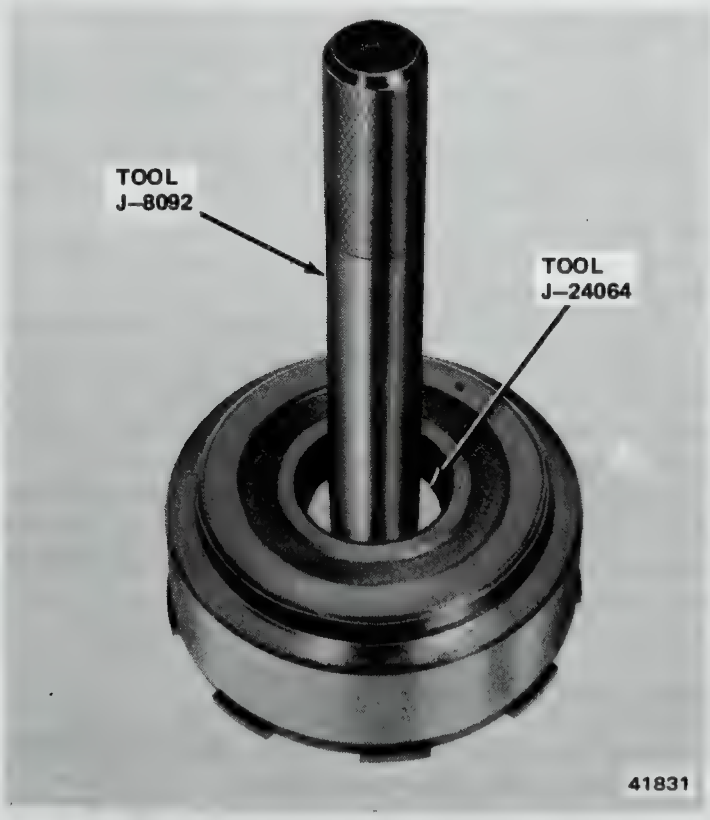


Fig. 2C-75 Clutch Retainer Bushing Removal—Models 904-998

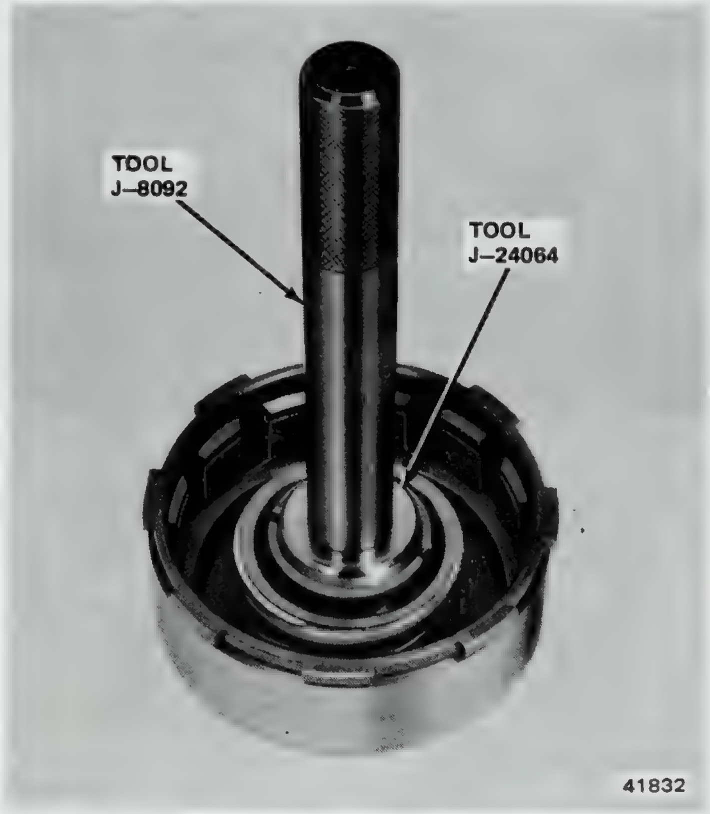


Fig. 2C-76 Clutch Retainer Bushing Installation—Models 904-998

(2) Lubricate outer seal with petroleum jelly and install it on clutch piston so seal lip faces piston bore.

(3) Install piston assembly in retainer. Seat piston at bottom of bore using twisting motion.

(4) Install spring on piston hub and spring retainer.

(5) Install snap ring over spring.

(6) Install Spring Compressor Tool J-5886-01 over retainer assembly.

(7) Compress spring and seat snap ring in clutch hub groove.

(8) Remove compressor tool.

(9) Lubricate clutch plates and discs with transmission fluid.

(10) Install one steel plate followed by a lined plate until proper number of plates are installed.

NOTE: *Transmissions used with two-liter four-cylinder and 232 CID six-cylinder engines require three steel and three lined plates. Transmissions used with 258 CID six-cylinder and 304 CID eight-cylinder engines require four steel and four lined plates.*

(11) Install pressure plate and waved snap ring.

NOTE: *Be sure snap ring is completely seated in groove.*

(12) Measure clutch pack clearance using feeler gauge.

(13) Insert gauge between pressure plate and snap ring (fig. 2C-77). Refer to Clutch Plate Clearance in Specifications for tolerances.

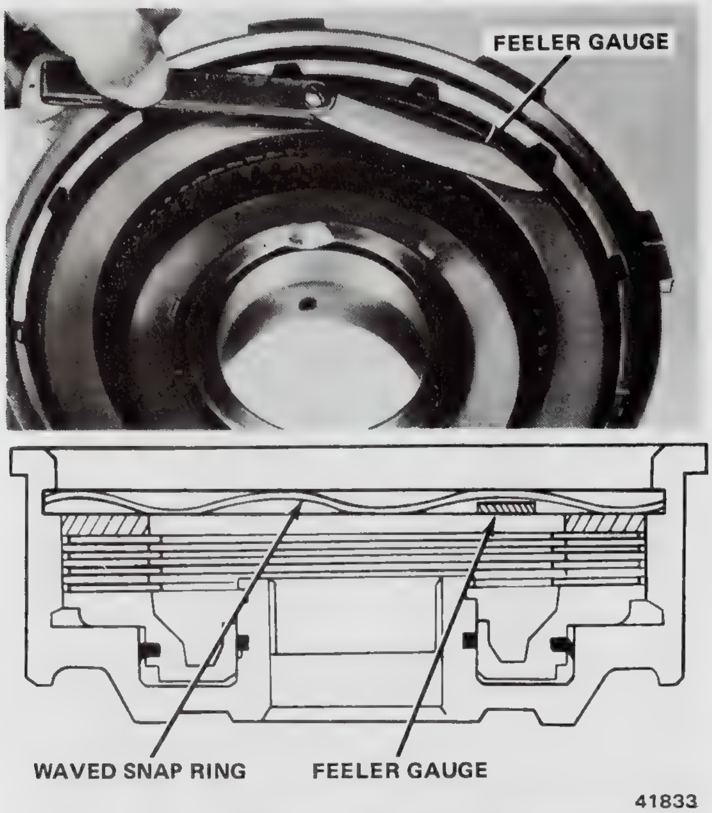


Fig. 2C-77 Measuring Front Clutch Pack Clearance

(14) If clutch plate clearance is not within specifications, disassemble clutch pack and measure thickness of lined plates, steel plates and pressure plate. Thickness should be as follows:

Lined Plate .... 0.083 to 0.088 inch (2.11 to 2.23 mm)
Steel Plate......... 0.066 to 0.071 inch (1.68 to 1.80 mm)
Pressure Plate ..... 0.214 to 0.218 inch (5.44 to 5.54 mm)

Any component not meeting the listed thickness specification must be replaced in order to obtain the correct clutch pack clearance.

Front Clutch—Model 727

Disassembly

(1) Remove large waved snap ring that retains pressure plate in clutch piston retainer.

(2) Remove pressure plate and clutch plates.

(3) Install Compressor Tool J-24042 over piston spring retainer (fig. 2C-78).

(4) Compress springs and remove snap ring.

(5) Slowly release compressor tool until spring retainer is free of hub.

NOTE: *Do not allow the spring retainer to stick or bind in the snap ring groove.*

(6) Remove compressor tool, retainer and springs.

(7) Turn clutch retainer over and bump on wood block to dislodge and remove piston.

(8) Remove seals from piston and retainer hub.

Fig. 2C-78 Front Clutch Spring Retainer Removal/Installation—Model 727

Inspection

Inspect the facing material on all driving discs. Replace discs that are charred, glazed, heavily pitted, flaking, or if the facing material can be scraped off easily. Inspect internal splines for wear or other damage.

Inspect the steel plates and pressure plate surfaces for overheating, scoring, and damaged driving lugs and replace as necessary.

Inspect the steel plate lug grooves in the clutch retainer for smooth surfaces. The plates must slide freely in the grooves.

Inspect the band application surface on the clutch retainer for nicks and scores. Remove light scratches and nicks with crocus cloth.

Inspect the check ball in the clutch retainer. The ball should move freely in its cage.

Inspect the seal ring surface inside the clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing of the rings. Inspect the clutch retainer bushing for scores and wear from the reaction shaft support sealing rings and lands.

Inspect the innner bore of the piston for score marks. Remove light scores with crocus cloth. Inspect the seal ring grooves for nicks and burrs. Inspect the piston springs, retainer, and snap ring for distortion.

Retainer Bushing Replacement

(1) Place clutch retainer, with open end facing downward, on clean, smooth surface.

(2) Insert Bushing Remover-Installer Tool J-24039 in bushing (fig. 2C-79).

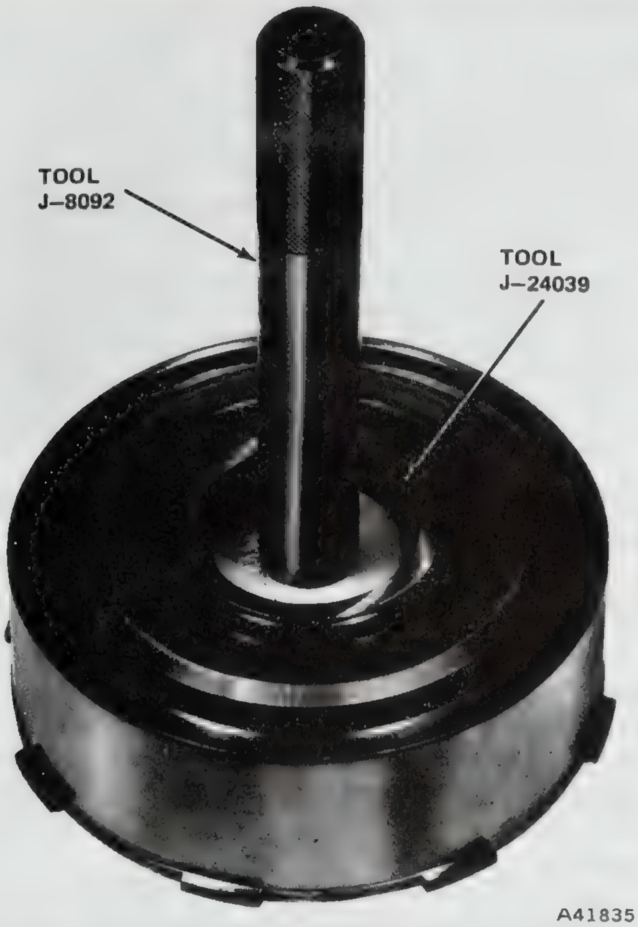


Fig. 2C-79 Front Clutch Retainer Bushing Removal—Model 727

(3) Install Driver Handle J-8092 in tool and drive bushing downward and out of bore.

(4) Position clutch retainer so open end faces upward.

(5) Install replacement bushing on Tool J-24039 and drive bushing straight into retainer bore until bushing is flush with base of bore chamfer (fig. 2C-80).

Assembly

(1) Lubricate inner seal with petroleum jelly and install it on hub of clutch retainer.

NOTE: *Be sure the seal lip faces into the piston bore and is properly seated in the seal groove.*

(2) Lubricate outer seal with petroleum jelly and install it on clutch piston with seal lip facing into piston bore.

(3) Install piston assembly in retainer and carefully seat piston at bottom of retainer bore.

(4) Install clutch piston springs on piston (fig. 2C-81).

NOTE: *A four disc front clutch with 9 clutch piston springs is used for Fleet and Heavy Duty applications. A three disc front clutch with 13 clutch piston springs is used for all other applications. Refer to Figure 2C-81, View A and B, for piston spring position.*

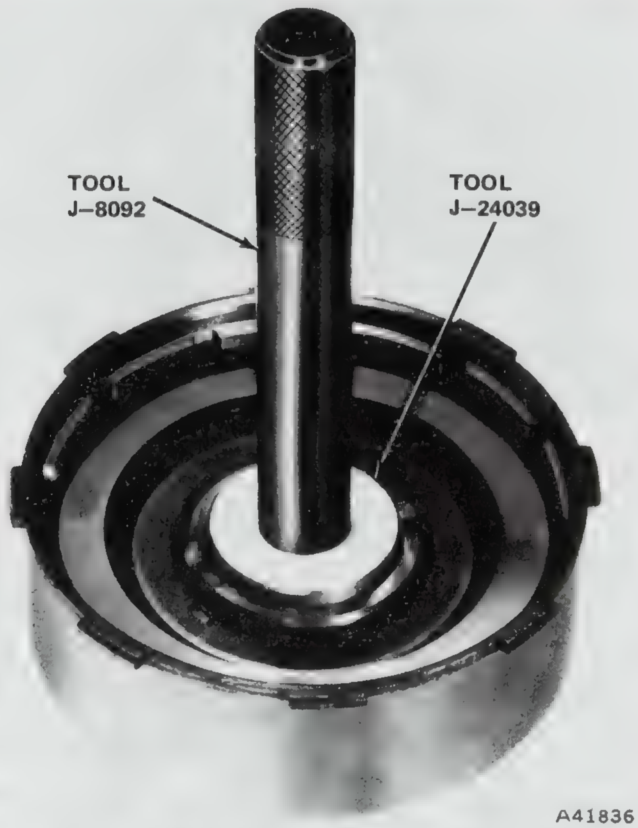


Fig. 2C-80 Front Clutch Retainer Bushing Installation—Model 727

(5) Install spring retainer and snap ring over clutch piston springs.

(6) Install Compressor Tool J-24042 over retainer assembly.

(7) Compress springs and seat snap ring in hub groove.

(8) Remove compressor tool.

(9) Lubricate clutch plates with transmission fluid.

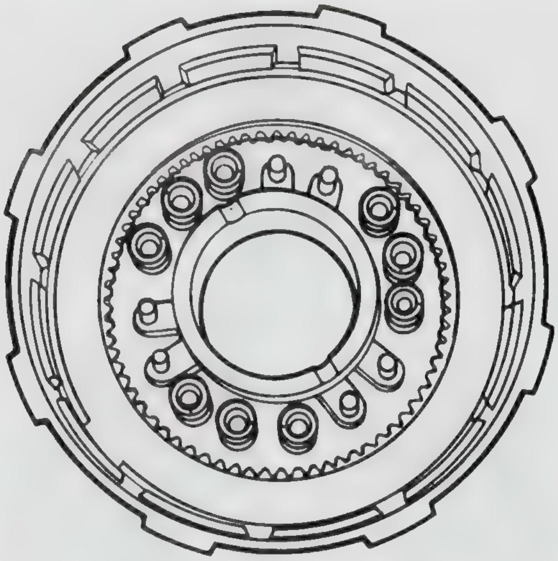
(10) Alternately install one steel plate followed by one lined plate until correct number of plates are installed.

(11) Install pressure plate and waved snap ring. Measure clutch pack clearance using feeler gauge (fig. 2C-77). Refer to clutch plate clearance in Specifications for tolerances.

(12) If clutch plate clearance is not within specifications, disassemble clutch pack and measure thickness of lined plates, steel plates, and pressure plate. Thickness should be as follows:

Lined Plate .... 0.090 to 0.095 inch (2.29 to 2.41 mm)
Steel Plate......... 0.060 to 0.071 inch (1.52 to 1.80 mm)
Pressure Plate ..... 0.278 to 0.282 inch (7.06 to 7.16 mm)

Any component not meeting listed thickness specification must be replaced in order to obtain correct clutch plate clearance.



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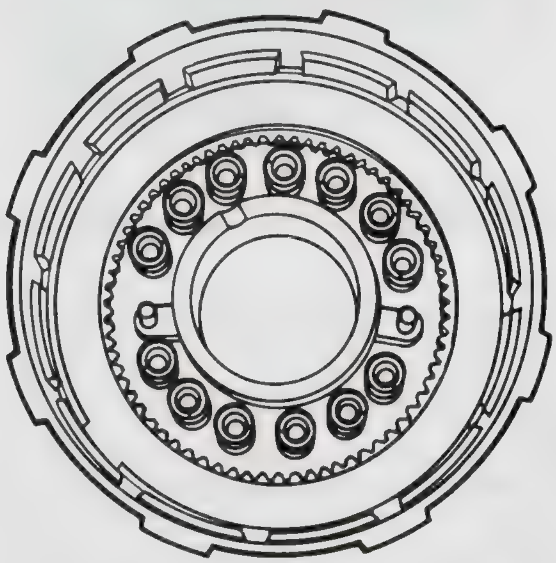
View A, 9-Spring, 4-Disc Clutch



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View B, 13 Spring, 3-Disc Clutch

Fig. 2C-81 Front Clutch Piston Spring Location

Rear Clutch—Models 904-998

Disassembly

(1) Remove large snap ring that retains pressure plate in clutch piston retainer (fig. 2C-82).

NOTE: *This is a selective thickness snap ring and determines clutch pack clearance.*

(2) Lift pressure plate, clutch plates, and inner pressure plate out of retainer.

(3) Remove wave spring and clutch piston spring.

(4) Turn retainer over and bump it on wood block to remove piston.

(5) Remove piston seals.

NOTE: *If necessary, remove snap ring and press input shaft out of retainer.*

Inspection

Inspect the facing material on the driving discs. Replace discs that are charred, heavily pitted, flaking or if the driving disc inner splines are worn or damaged.

Inspect the steel plates and pressure plate surfaces for overheating, scoring, and for damaged drive lugs. Inspect all discs and plates for flatness. Replace if necessary.

Inspect the steel plate lug grooves in the clutch retainer for smooth surfaces. The plates must slide freely in these grooves. Inspect the clutch piston ball check. The ball should move freely in its cage. Inspect the seal ring surfaces in the clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing. Inspect the piston spring and wave spring for distortion or breakage.

Inspect the seal ring grooves in the input shaft and piston retainer for nicks, burrs, and wear.

Inspect the rear clutch to front clutch thrust washer. The washer should be 0.043 to 0.045 inch (1.0922 to 1.1430 mm) thick.

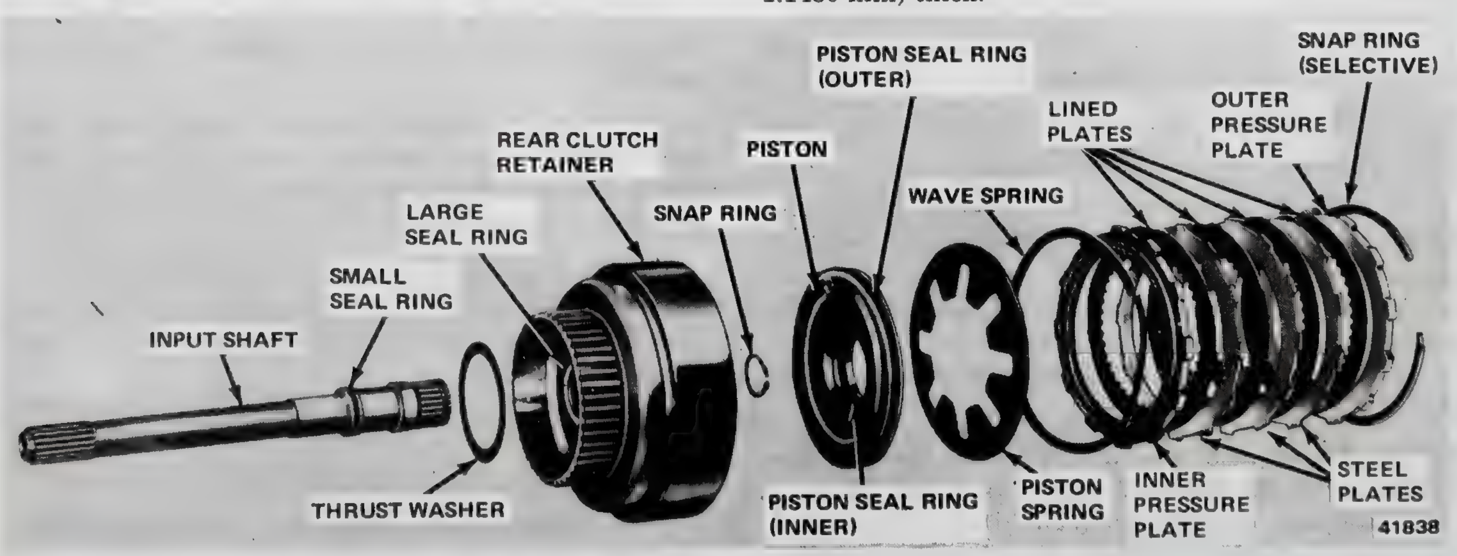

Fig. 2C-82 Rear Clutch Assembly—Models 904-998

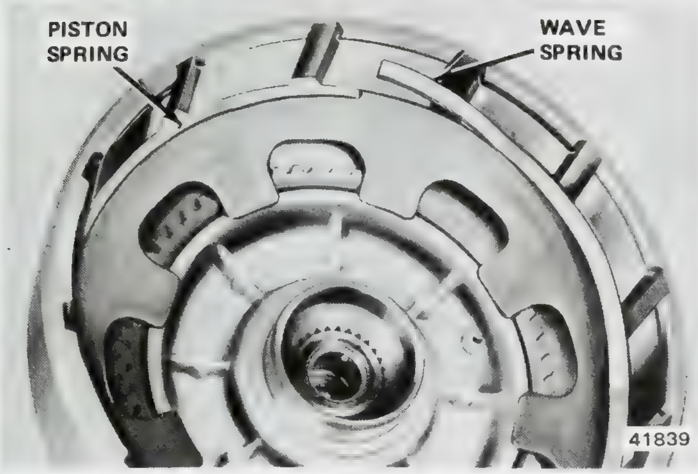

Fig. 2C-83 Clutch Piston Spring and Wave Spring Installation

Assembly

(1) Press input shaft into piston retainer (if removed) and install snap ring.

(2) Lubricate and install inner and outer seal rings on clutch piston.

NOTE: *Be sure that the seal lips face into the retainer bore and that the seals are properly seated in the piston grooves.*

(3) Insert piston assembly into retainer. Using a twisting motion, seat piston at bottom of retainer bore.

(4) Install piston spring in retainer. Spring fingers must touch piston and spring must be centered in retainer.

(5) Insert one end of wave spring into retainer groove (fig. 2C-83) and progressively push or tap spring into place until completely seated. If necessary, tap piston spring lightly to keep it centered.

(6) Install inner pressure plate. Raised side of plate must rest on piston spring and flat surface must face open end of retainer.

(7) Lubricate clutch plates with transmission fluid.

(8) Alternately install one lined plate followed by a steel plate until correct number of plates are installed.

(9) Install outer pressure plate and selective thickness snap ring.

(10) Measure rear clutch pack clearance. Press down firmly on outer pressure plate and insert feeler gauge between pressure plate and selective snap ring (fig. 2C-84).

(11) If necessary, adjust clearance using one of the following selective thickness outer snap rings. Snap rings are available in 0.060, 0.074, and 0.098 inch (1.5240, 1.8796, and 2.4892 mm) thicknesses. Low limit clearance is desirable.

NOTE: *Rear clutch pack clearance is very important in obtaining proper clutch engagement and shift quality.*

Fig. 2C-84 Measuring Rear Clutch Pack Clearance

Rear Clutch—Model 727

Disassembly

(1) Remove large snap ring that retains pressure plate in clutch piston retainer (fig. 2C-85).

NOTE: *This a selective thickness snap ring and determines clutch pack clearance.*

(2) Remove pressure plate, clutch plates, and inner pressure plate.

(3) Remove wave spring, spacer ring, and clutch piston spring.

(4) Turn retainer over and bump on wood block to remove piston.

(5) Remove piston inner and outer seals.

(6) Remove input shaft snap ring and press input shaft out of retainer if necessary.

Inspection

Inspect facing material on driving discs. Replace discs that are charred, glazed, heavily pitted, flaking or if the facing material can be scraped off easily. Inspect the driving disc inner splines for wear or other damage.

Inspect the steel plates and pressure plate surfaces for over heating, scoring, and damaged driving lugs. Inspect all discs and plates for distortion. Replace warped or coned discs or plates.

Inspect the steel plate lug grooves in the retainer for smooth surfaces. The plates must slide freely in these grooves. Inspect the clutch piston ball check. The ball should move freely in its cage. Inspect the seal ring surfaces in the clutch retainer for nicks or deep scratches. Light scratches will not interfere with sealing. Inspect the piston spring, wave spring, and spacer for distortion or breakage.

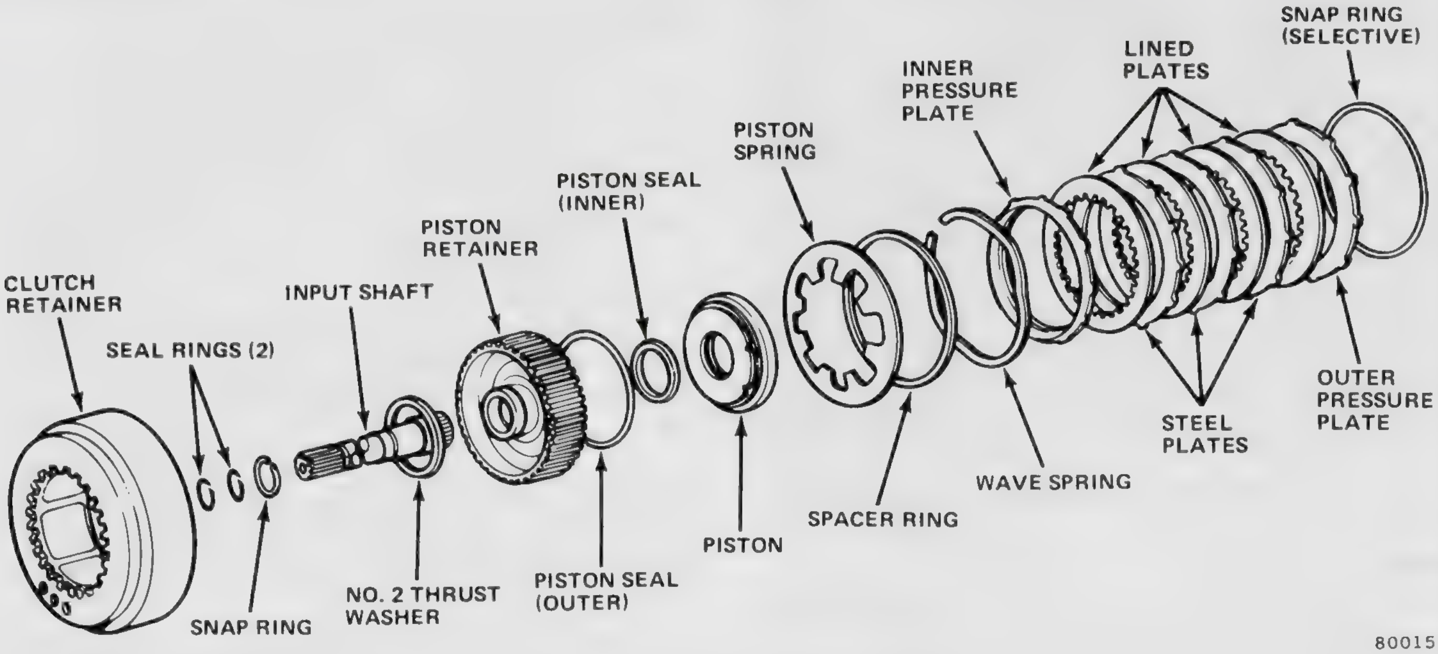

Fig. 2C-85 Rear Clutch Assembly— Model 727

Inspect the seal ring grooves in the input shaft and piston retainer for nicks, burrs, and wear.

Inspect the rear clutch to front clutch thrust washer. The washer should be 0.061 to 0.063 inches (1.5494 to 1.6002 mm) thick.

Input Shaft Bushing Replacement

(1) Clamp input shaft in a vise using brass protective jaws.

CAUTION: *Do not clamp the seal ring land or bearing journal surfaces in the vise.*

(2) Thread Bushing Remover Tool J-24041 straight into bushing as far as possible by hand.

(3) Use wrench to thread puller into bushing three to four additional turns to fully engage puller threads in bushing.

(4) Thread Slide Hammer Bolts Tool J-7004-3 into puller (fig. 2C-86).

(5) Bump outward with slide hammers to remove bushing.

(6) Thoroughly clean input shaft and remove chips produced by puller.

(7) Grip removed bushing with pliers and remove it from remover tool.

NOTE: *Be careful to protect remover tool threads.*

(8) Thread Bushing Installer Tool J-24040 onto Driver Handle J-8092 (fig. 2C-87).

(9) Position replacement bushing on installer tool and drive bushing straight into shaft until installer tool bottoms.

(10) Clean assembly thoroughly.

Assembly

(1) Press input shaft into piston retainer and install snap ring if removed.

(2) Lubricate inner and outer sealing rings with petroleum jelly and install on clutch piston.

NOTE: *Be sure that the seal lips face into the retainer bore and that the seals are seated in the piston grooves.*

(3) Install piston assembly in clutch retainer.

(4) Seat piston at bottom of retainer bore using a twisting motion.

(5) Position clutch retainer over piston retainer splines. Support assembly to maintain position of clutch retainer.

(6) Install piston spring in clutch retainer with spring fingers touching piston.

(7) Install spacer ring. Be sure piston spring and ring are centered in retainer recess.

(8) Install one end of wave spring in retainer groove. Progressively push or tap spring into plate until completely seated.

NOTE: *If necessary, gently tap piston spring and spacer to keep them centered.*

(9) Install inner pressure plate in retainer. Raised side of plate must rest on piston spring and flat surface must face outward.

(10) Lubricate remaining clutch plates with transmission fluid and install in retainer. Alternately install lined plate followed by steel plate until four lined and three steel plates have been installed.

(11) Install outer pressure plate and selective thickness snap ring.

Fig. 2C-86 Input Shaft Bushing Removal

(12) Measure rear clutch pack clearance. Press down firmly on outer pressure plate and insert feeler gauge between pressure plate and selective outer snap ring.

(13) If necessary, adjust clearance using selective thickness snap ring. Snap rings are available in 0.060, 0.074, 0.088, and 0.106 inch (1.5240, 1.8796, 2.2352, and 2.6924 mm) thickness.

NOTE: *Rear clutch pack clearance is very important in obtaining proper clutch engagement and shift quality.*

Planetary Gear Assembly—Models 904-998

End Play Measurement

(1) Measure end play of planetary assembly before removing component parts from output shaft.

(2) Support front end of output shaft on wood block and position assembly in an upright positon.

(3) Push rear annulus gear support downward on output shaft (fig. 2C-88).

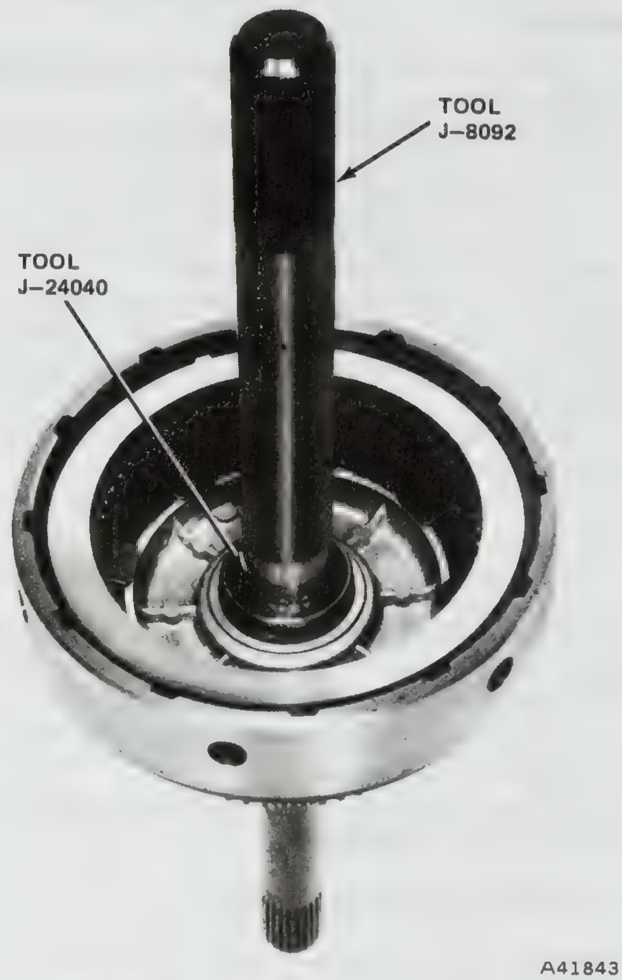

Fig. 2C-87 Input Shaft Bushing Installation

(4) Insert feeler gauge between rear annulus support and shoulder on output shaft. Clearance should be 0.001 to 0.047 inch (0.0254 to 1.1938 mm). If clearance is not within specifications, replace thrust washers, any worn parts, and selective thickness snap ring at assembly.

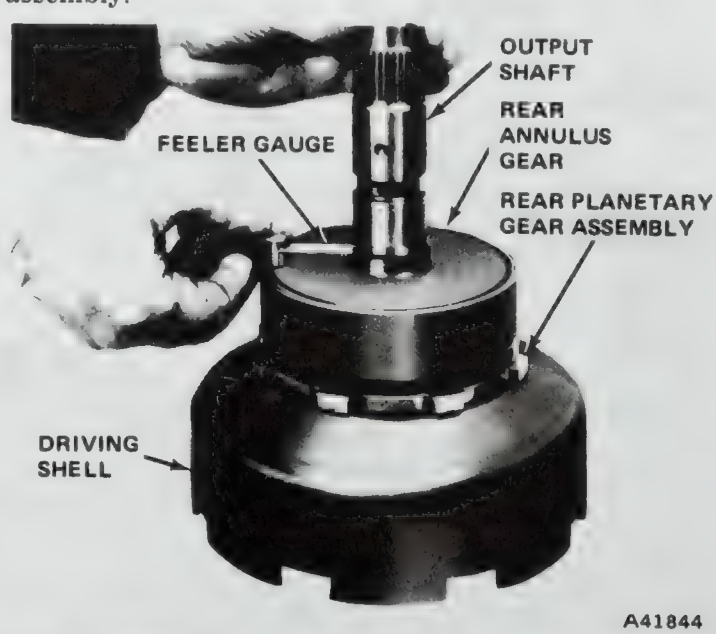

Fig. 2C-88 Measuring Planetary Gear Assembly End Play

Disassembly

(1) Remove No. 3 thrust washer from forward end of output shaft (fig. 2C-89).

(2) Remove selective snap ring from forward end of output shaft.

(3) Remove front planetary gear assembly.

(4) Remove snap ring and No. 4 thrust washer from forward hub of front planetary assembly.

(5) Remove front annulus gear and support from planetary gear assembly. If necessary, remove large snap ring from front annulus gear and separate support from gear.

(6) Remove No. 5 and No. 6 thrust washers from planetary gear assembly.

(7) Remove sun gear, driving shell, and rear planetary assembly from output shaft.

(8) Separate sun gear and driving shell from rear planetary assembly.

(9) Remove rear snap ring and No. 8 steel thrust plate from sun gear.

(10) Remove sun gear from driving shell.

(11) Remove remaining snap ring and No. 7 steel thrust plate from sun gear.

(12) Remove No. 9 thrust washer from forward side of rear planetary assembly.

(13) Remove planetary gear assembly and No. 10 thrust washer.

(14) If necessary, remove large snap ring from rear of annulus gear to separate support from gear.

Inspection

Inspect the bearing surfaces on the output shaft for nicks, burrs, scores, or other damage. Light scratches, nicks, or burrs can be removed with crocus cloth. Be sure all oil passages in the shaft are open and clean. Inspect the speedometer drive gear. Remove nicks and burrs with a sharp-edged stone.

Inspect the sun gear bushings for wear or scores. Replace the sun gear if the bushings are damaged.

Inspect all thrust washers and plates. Replace if damaged or worn below thickness specifications.

Inspect gear assemblies for cracks, broken pinions, worn gear teeth, broken pinion shafts or lockpins and damaged thrust faces. Replace as required.

Inspect annulus gears for cracks and worn teeth.

Replace all distorted snap rings.

Assembly

(1) Install rear annulus gear support in annulus gear and install snap ring.

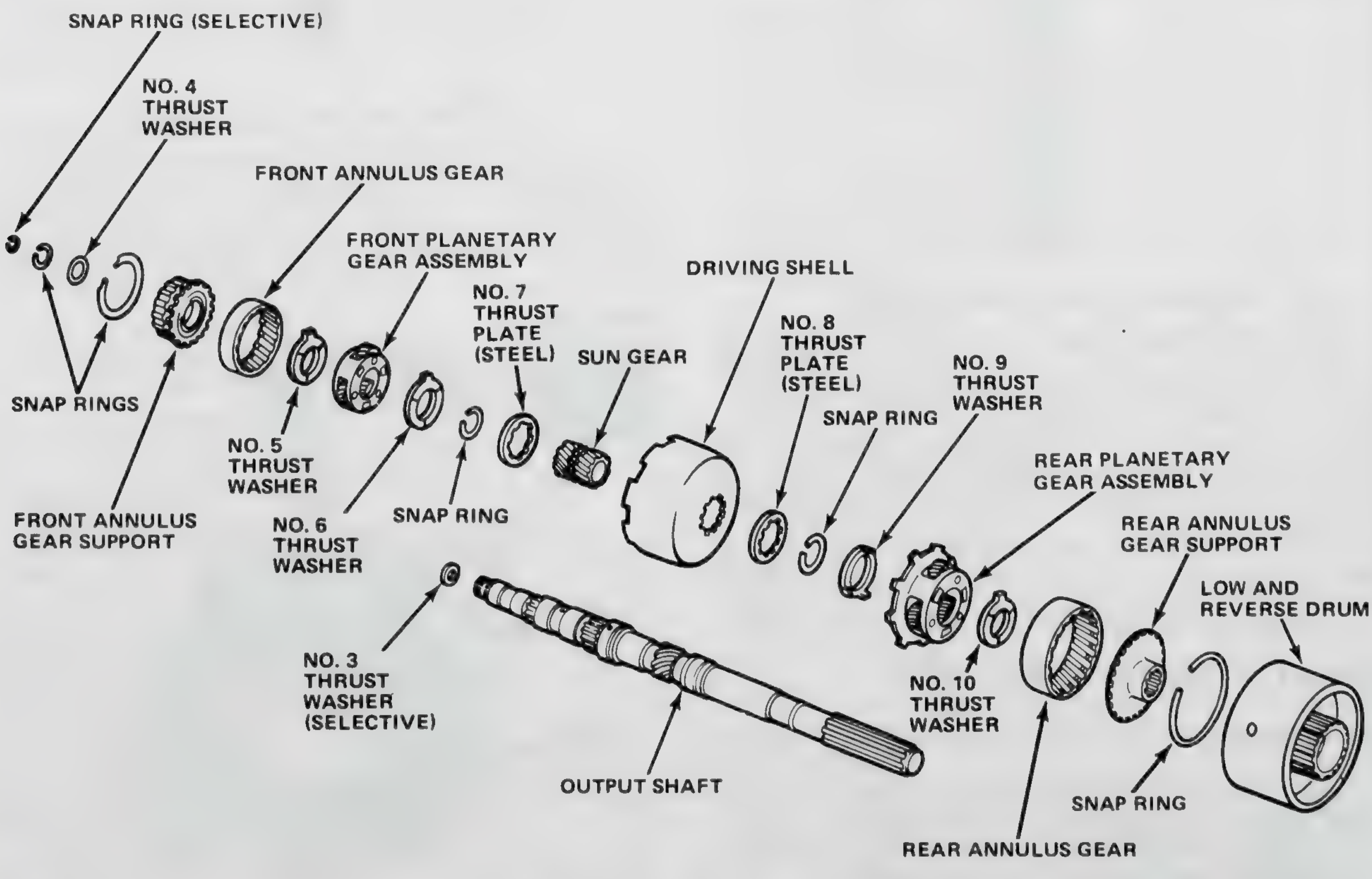

Fig. 2C-89 Planetary Gear Assembly—Models 904-998

(2) Install rear annulus gear assembly on output shaft.

(3) Install No. 10 thrust washer on output shaft.

(4) Position rear planetary gear assembly in rear annulus gear. Install No. 9 thrust washer on front side of gear assembly.

(5) Install No. 7 steel thrust plate and snap ring on one end of sun gear.

(6) Insert sun gear through front side of driving shell, and install No. 8 steel thrust plate and snap ring on opposite end of sun gear.

(7) Install driving shell and sun gear onto output shaft, and engage sun gear teeth with rear planetary pinions.

(8) Install front annulus gear support in annulus gear and install large snap ring.

(9) Install No. 5 thrust at forward end of front planetary gear assembly, and insert assembly into front annulus gear.

(10) Position No. 6 thrust washer on rear side of front planetary gear assembly.

(11) Carefully work front planetary and annulus gear assembly onto output shaft and mesh planetary pinions with sun gear.

(12) Install No. 3 thrust washer on output shaft.

(13) Install selective snap ring and measure assembly end play.

(14) If necessary, adjust end play by using selective thickness snap rings. Snap rings are available in 0.040, 0.048, 0.055, 0.059, 0.062, and 0.084 inch (1.0160, 1.2192, 1.3970, 1.4986, 1.5748, and 2.1336 mm) thickness.

Planetary Gear Assembly—Model 727

End Play Measurement

(1) Measure planetary assembly end play before removing component parts from output shaft.

(2) Support front end of output shaft on wood block and place assembly in upright position.

(3) Push rear annulus gear support downward on output shaft.

(4) Insert feeler gauge between rear annulus support and shoulder on output shaft (fig. 2C-88). Clearance should be 0.009 to 0.044 inch (0.2286 to 1.1176 mm). If clearance is not within specifications, replace thrust washers, any worn parts and selective thickness snap ring at assembly.

Disassembly

(1) Remove No. 3 thrust washer from forward end of output shaft.

(2) Remove front planetary assembly from output shaft (fig. 2C-90).

(3) Remove front annulus gear from planetary assembly.

(4) Remove No. 4 thrust washer from rear side of planetary gears.

(5) Remove sun gear, driving shell and rear planetary assembly from output shaft.

(6) Separate sun gear and driving shell from rear planetary assembly.

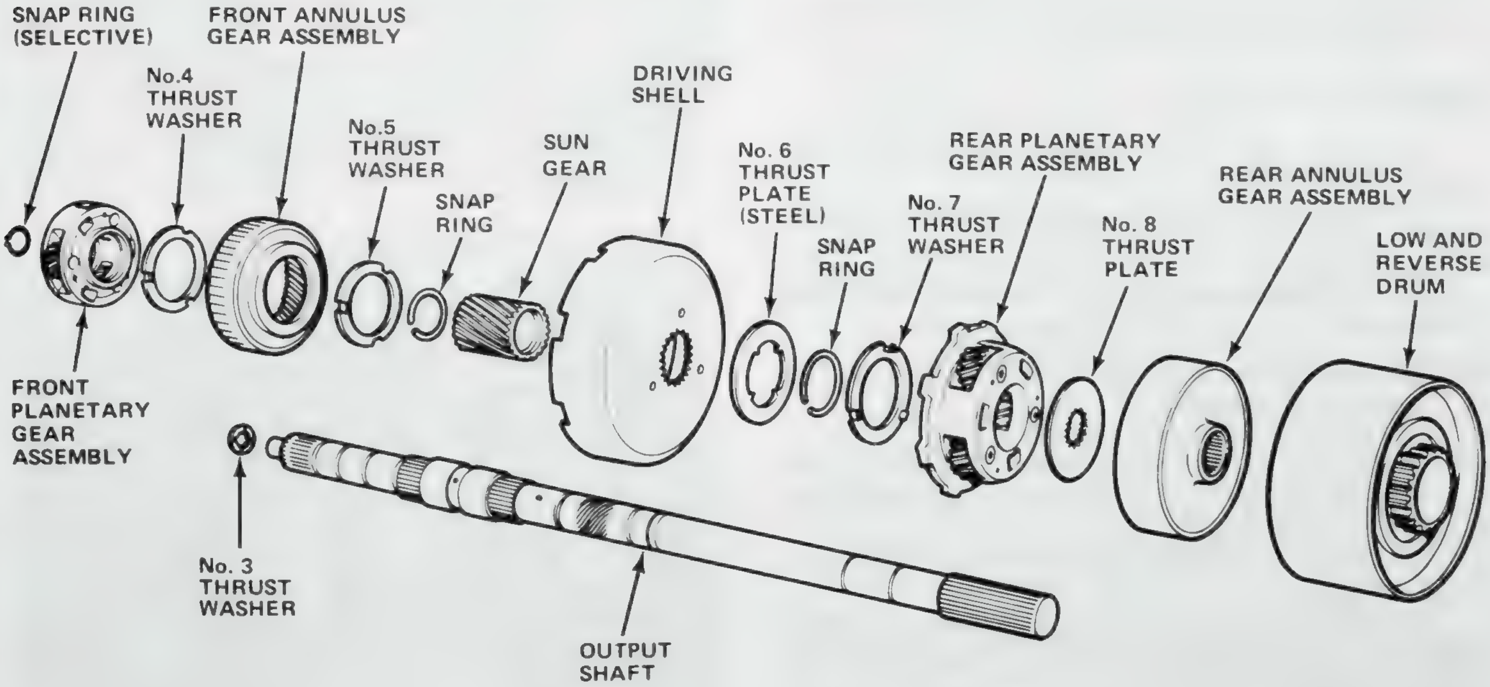

Fig. 2C-90 Planetary Gear Assembly—Model 727

(7) Remove No. 5 thrust washer from inside of driving shell.

(8) Remove rear snap ring and No. 6 steel thrust plate from sun gear.

(9) Remove sun gear from driving shell.

(10) Remove remaining snap ring from sun gear if necessary.

NOTE: *The forward end of the sun gear is longer than the rear.*

(11) Remove No. 7 thrust washer from forward side of rear planetary assembly.

(12) Remove gear assembly and No. 8 thrust plate from rear annulus gear.

Inspection

Inspect the bearing surfaces on the output shaft for nicks, burrs, scores, and other damage. Light scratches, nicks, or burrs can be removed with crocus cloth.

NOTE: *Be sure all oil passages in the output shaft are open and clean.*

Inspect the speedometer drive gear. Remove nicks and burrs with an oilstone.

Inspect the sun gear bushings for wear and scores. Replace the sun gear if the bushings are damaged.

Inspect all thrust washers and plates. Replace them if damaged or worn below thickness specifications.

Inspect the gear assemblies for cracks, broken pinions, worn gear teeth, broken pinion shafts or lockpins, or damaged thrust faces. Replace as required.

Inspect the annulus gears for cracks and worn teeth.

Replace any distorted snap rings.

Assembly

(1) Install rear annulus gear on output shaft (fig. 2C-90).

(2) Apply thin coat of petroleum jelly to No. 8 thrust plate.

(3) Position thrust plate on output shaft and in rear annulus gear.

NOTE: *Be sure the thrust plate teeth are engaged with the output shaft splines.*

(4) Position rear planetary gear assembly in rear annulus gear and install No. 7 thrust washer on forward side of gear assembly.

(5) Install snap ring in forward groove of sun gear (long end of gear).

(6) Insert sun gear through forward side of driving shell and install steel thrust plate and snap ring on rear side of sun gear.

(7) Install snap ring in forward groove of sun gear. Install No. 5 thrust washer in driving shell over sun gear.

(8) Install driving shell and sun gear assembly on output shaft and engage sun gear teeth with rear planetary pinions.

(9) Position No. 4 thrust washer on rear hub of front planetary gear and engage plantetary gear with front annulus gear.

(10) Install front planetary and annulus gear assembly onto output shaft and mesh planetary pinions with sun gear.

(11) Install selective snap ring and measure assembly end play.

(12) If necessary, adjust clearance using selective thickness snap rings. Snap rings are available in 0.048, 0.055, and 0.062 inch (1.2192, 1.3970, and 1.5748 mm) thickness.

OVERRUNNING CLUTCH

Inspection

Inspect the clutch rollers for smooth, round surfaces. They must be free of flat spots and chipped teeth.

Inspect the roller contact surfaces in the cam and race for brinelling and inspect the springs for distortion, wear or other damage.

On model 727 transmission only, inspect the cam setscrew for tightness. If loose, tighten the setscrew and restake the case around the screw.

Cam Replacement 904-998

If the overrunning clutch cam or spring retainer are damaged, they can be replaced with a service replacement cam, spring retainer, and retaining screw (fig. 2C-91).

(1) Remove bolts attaching output shaft support to rear of case.

(2) Remove support from rear of case using wood block and hammer.

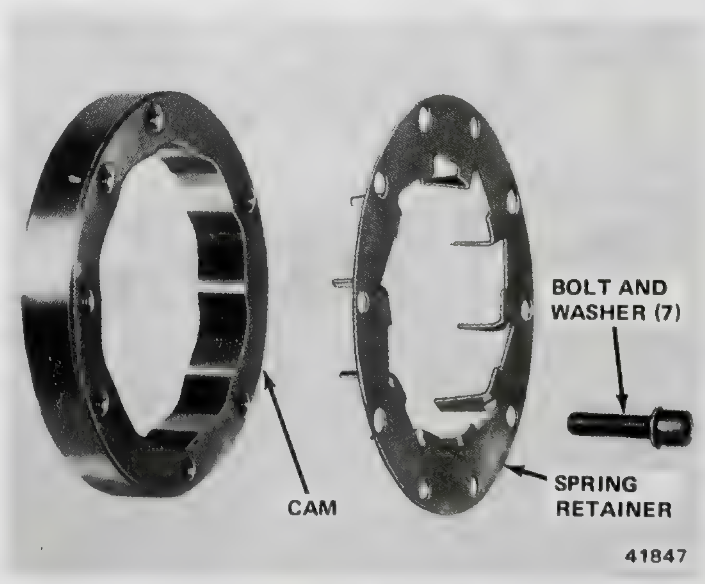

Fig. 2C-91 Cam and Spring Retainer

(3) Centerpunch rivets **exactly** in center of each rivet head (fig. 2C-92).

(4) Drill through each rivet head using 3/8-inch (9.5250 mm) diameter drill.

CAUTION: *Do not drill into the transmission case.*

(5) Remove rivet heads using small chisel.

(6) Remove rivets and cam from case using blunt punch (fig. 2C-93).

NOTE: *Move the punch from one rivet to another in a clockwise direction after each punch stroke, to drive the cam out of the case evenly.*

(7) Enlarge rivet holes in case carefully using 17/64-inch (6.7469 mm) diameter drill.

(8) Remove chips, burrs, and any foreign material from case. Also, be sure cam area is free of burrs and chips.

(9) Install replacement cam and spring retainer in case with bolt holes in cam and retainer aligned with holes in case.

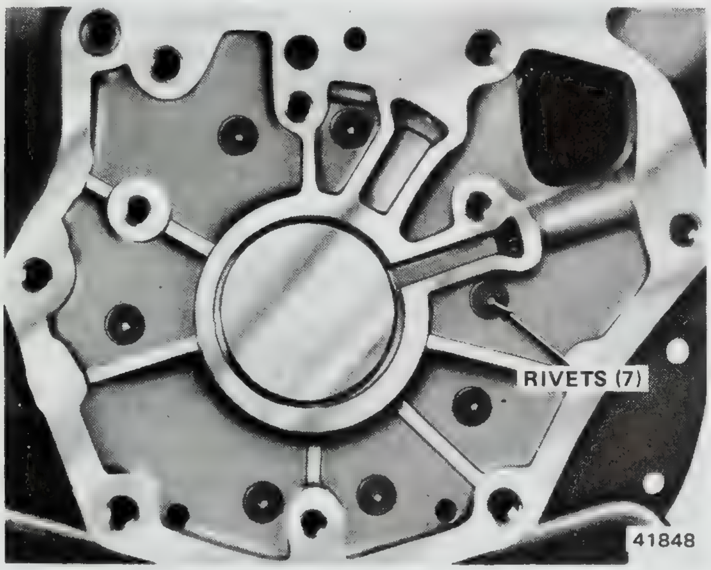

Fig. 2C-92 Cam Rivet Location

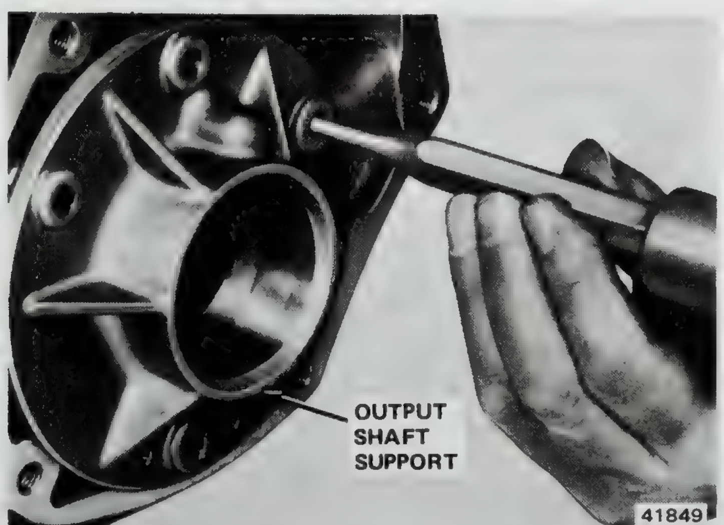

Fig. 2C-93 Overrunning Clutch Cam Removal

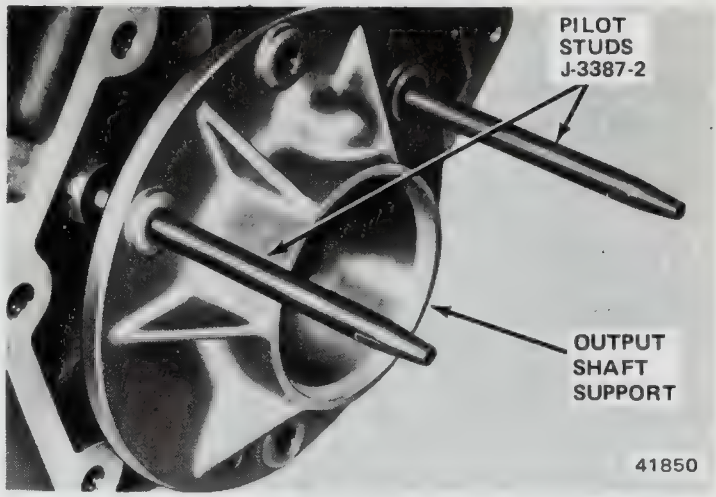

Fig. 2C-94 Output Shaft Support Alignment

(10) Thread retaining screws and washers into cam.

NOTE: *Install the washers on the screws so that the inner diameter of the washer contacts the screw head.*

(11) Install cam in case using brass hammer.

(12) Alternately and evenly tighten retaining screws to 100 inch-pounds (11.3 Nm) torque.

(13) Thread two Pilot Studs Tool J-3387-2 into case (fig. 2C-94).

(14) Position illuminated light bulb next to case to heat it.

CAUTION: *Do not use an open flame to heat the case.*

(15) Chill support with ice (preferably dry ice).

(16) Remove light, position support over pilot studs and install support in case using wood block and hammer.

(17) Install and tighten support attaching bolts to 150 inch-pounds (17.0 Nm) torque.

Cam Replacement—Model 727

The overrunning clutch cam and spring retainer should be removed only if replacement is necessary.

(1) Remove setscrew from case.

(2) Remove bolts attaching output shaft support to rear of case.

(3) Insert punch through bolt holes and drive cam out of case (fig. 2C-93).

NOTE: *Move punch from one bolt hole to another in clockwise direction after each punch stroke to drive the cam out of the case evenly.*

CAUTION: *The output shaft support must be installed in the case before the overrunning clutch cam can be installed. If the support must be replaced drive it out the rear of the case using a wood block and hammer.*

(4) Thread two Pilot Studs Tool J-3387-2 into case (fig. 2C-94).

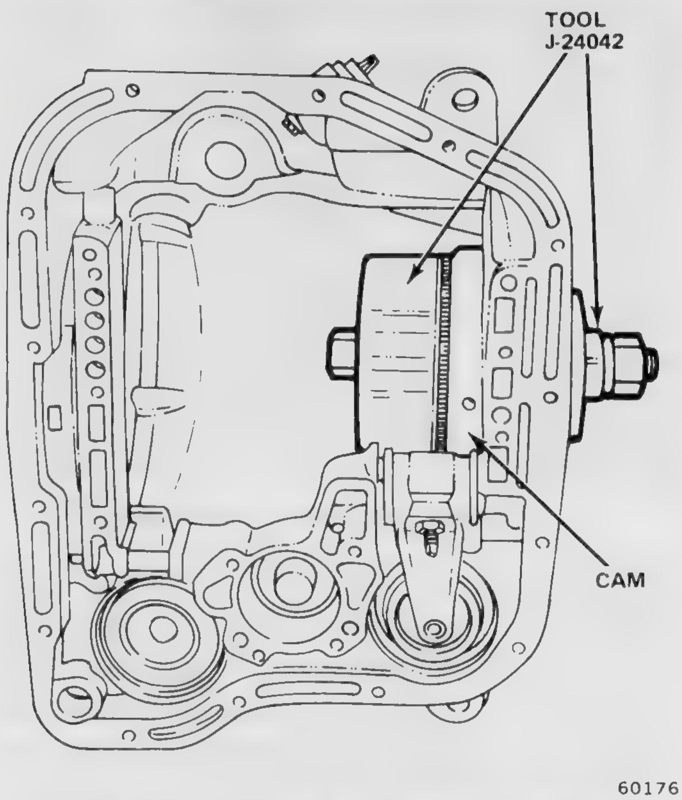

Fig. 2C-95 Overrunning Clutch Cam Installation—Model 727

(5) Position iluminated light bulb next to case to heat it.

CAUTION: *Do not use an open flame to heat the case.*

(6) Chill support with ice (preferably dry ice).

(7) Remove light, position support over pilot studs and install support in case using wood block and hammer.

(8) Clean all burrs, chips, and foreign material from cam area in case.

(9) Position spring retainer on cam. Be sure retainer lugs snap firmly into cam notch.

(10) Align cam serrations with those in case.

(11) Install cam evenly into case as far as possible using brass mallet.

(12) Install Tool J-24042 (fig. 2C-95).

(13) Tighten tool nut to seat cam in case. Be sure cam is completely seated.

(14) Install cam retaining setscrew and stake case around setscrew.

(15) Remove Tool J-24042.

(16) Install and tighten support retaining bolts to 150 inch-pounds (17.0 Nm) torque.

(17) Stake case around cam in twelve places using blunt chisel.

Front Servo and Band

Two front servo designs are used. Refer to figures 2C-96 and 2C-97 for assembly details and engine/ transmission application.

Disassembly

NOTE: *The front servo in model 727 transmissions used with heavy-duty 304 CID and standard 360 CID eight-cylinder engines requires further disassembly after removal from the servo bore (fig. 2C-97). Disassemble the servo as follows:*

(1) Remove piston rod retaining snap ring from servo piston.

(2) Remove washer, piston rod spring, and piston rod from servo piston.

Inspection

Inspect the piston for nicks, burrs, scores, and wear. Be sure the ring grooves are not damaged. Inspect the fit of the guide on the piston rod. Inspect the piston bore in the case for scores or other damage. Inspect the piston spring(s) for distortion. On model 727 transmissions, inspect the bore in the piston and the piston rod O-ring (fig. 2C-97).

Inspect the band lining for a poor bond to the band, burn marks, glazing, uneven wear pattern and flaking. If the lining is so badly worn that the grooves are not

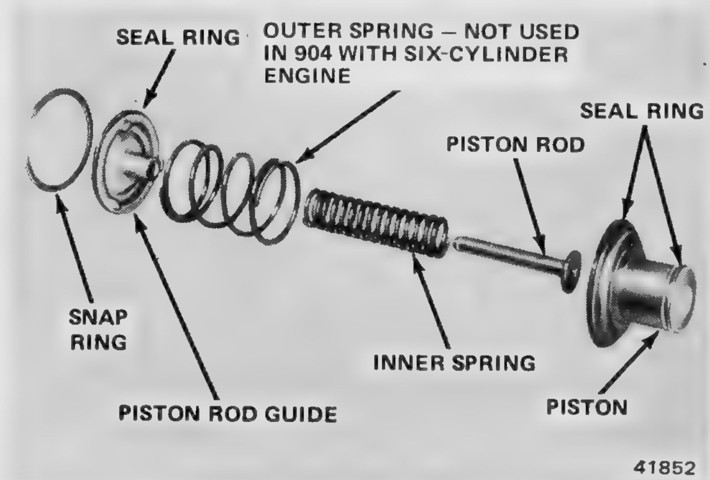

Fig. 2C-96 Front Servo Assembly—Models 904-998-727

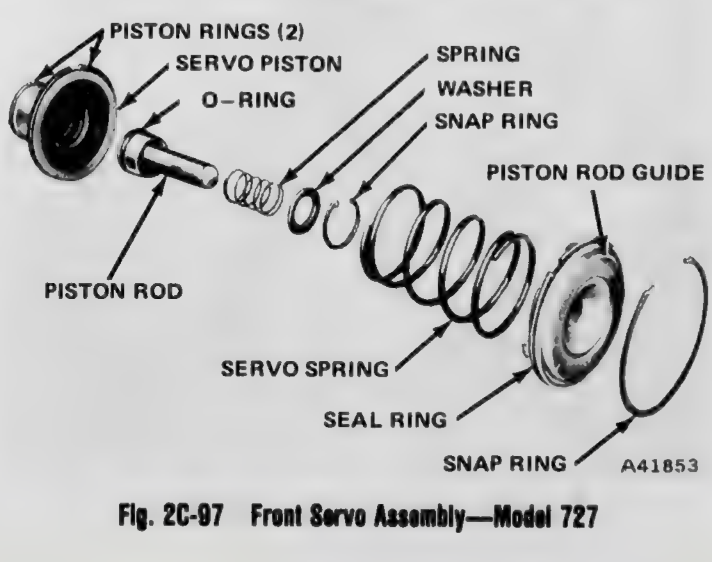

Fig. 2C-97 Front Servo Assembly—Model 727

visible at any portion of the band, replace the band. Inspect the band for distortion or cracked ends. Replace as necessary.

Assembly

CAUTION: *Do not use force to assemble any of the servo components. If they do not assemble easily, investigate and correct the cause before proceeding with assembly.*

(3) Apply petroleum jelly to piston rod O-ring and install piston rod in servo piston bore.

(4) Install piston rod spring on piston rod.

(5) Install washer.

(6) Compress spring and install piston rod retaining snap ring.

Rear Servo and Band

Disassembly

(1) Compress piston plug spring and remove snap ring.

(2) Remove snap ring, piston plug, and plug spring (fig. 2C-98).

Inspection

Inspect the piston and piston plug for nicks, burrs, scores, and wear. The plug must move freely in the piston. Inspect the piston bore in the case for scores or other damage. Inspect the springs for distortion.

Inspect the band lining for poor bonding to the band and for excessive wear. If the lining is so excessively worn that the grooves are not visible at any portion of the band, replace the band. Inspect the band for distortion or cracks and relace as necessary.

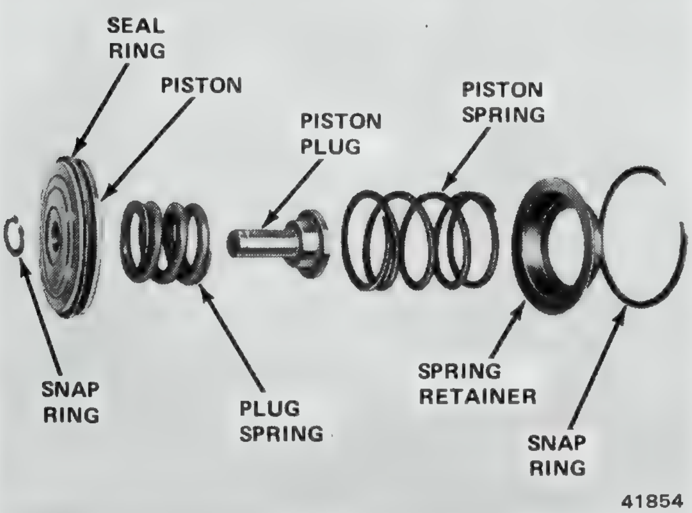

Fig. 2C-98 Rear Servo Assembly

Assembly

(1) Lubricate piston plug and piston with petroleum jelly and insert piston plug through plug spring and into piston.

(2) Compress piston spring and install snap ring.

TORQUE CONVERTER FLUSHING

If a transmission malfunction has contaminated the fluid, the torque converter, oil cooler and cooler lines must be flushed thoroughly to remove all metal or friction material particles, foreign material, or oxidized transmission fluid (sludge). Flushing must be performed to prevent these materials from being recirculated back into the transmission after repairs are completed.

The oil cooler and cooler lines can be flushed using solvent and compressed air. The following two methods may be used to flush the converter:

Machine Flushing The Converter (Preferred Method)

The type of cleaning machine that rotates the converter while pumping cleaning solvent through it is recommended for converter flushing. This type of machine also adds automatically timed blasts of compressed air to the cleaning solvent as it enters the converter to provide a more thorough cleaning action than will hand flushing.

Hand Flushing The Converter

(1) Place converter in horizontal position and pour two quarts of clean solvent into converter through impeller hub.

(2) Rotate and shake converter to circulate cleaning solvent through converter internal parts.

(3) Insert transmission input and reaction shafts in converter and rotate turbine and stator to dislodge foreign material.

(4) Drain solvent through impeller hub.

NOTE: *To prevent dirt particles from settling when draining the cleaning solvent, shake the converter frequently and rotate the turbine and stator.*

(5) Repeat flushing operation as many times as needed or until drained solvent is clear.

(6) When flushing operation is completed, shake and rotate converter several times to loosen and circulate any residual solvent and dirt.

(7) Drain residual solvent. If residual solvent contains dirt, repeat flushing operation until drained solvent is clear.

(8) After removing residual solvent, pour 2 quarts (1.9 liters) of new transmission fluid into converter and flush and drain converter again. Drain transmission fluid from converter. If necessary, repeat this operation until all traces of solvent are removed from converter.

(9) Drain fluid from converter and pour 2 quarts (1.9 liters) of new transmission fluid into converter.

(10) Rotate and shake converter to circulate new fluid in converter.

Flushing Oil Cooler and Cooler Lines

(1) Place length of hose over cooler outlet line and secure end of hose in waste container.

(2) Place length of hose over cooler inlet line.

(3) Pump approximately on pint (0.47 liter) cleaning solvent into oil cooler through hose attached to inlet line.

(4) Insert compressed air gun nozzle into hose attached to cooler inlet line. Apply very short blasts of compressed air to flush dirt and solvent from cooler and lines. Repeat flushing operation until drained fluid is clear.

(5) Pump approximately one pint (0.47 liters) of new transmission fluid into cooler and lines. Repeat flushing operation, using new transmission fluid, to remove all traces of cleaning solvent and any residual dirt.

(6) Remove hoses from cooler lines when flushing operations are completed.

TRANSMISSION ASSEMBLY

NOTE: *Use automatic transmission fluid or petroleum jelly only to lubricate transmission components during assembly.*

Overrunning Clutch

(1) Place transmission case in upright position and install clutch cam and spring retainer.

(2) Install clutch springs and rollers so springs rest against retainer post and rollers rest against springs, and with both springs and rollers installed on counterclockwise side of spring retainer posts (fig. 2C-99).

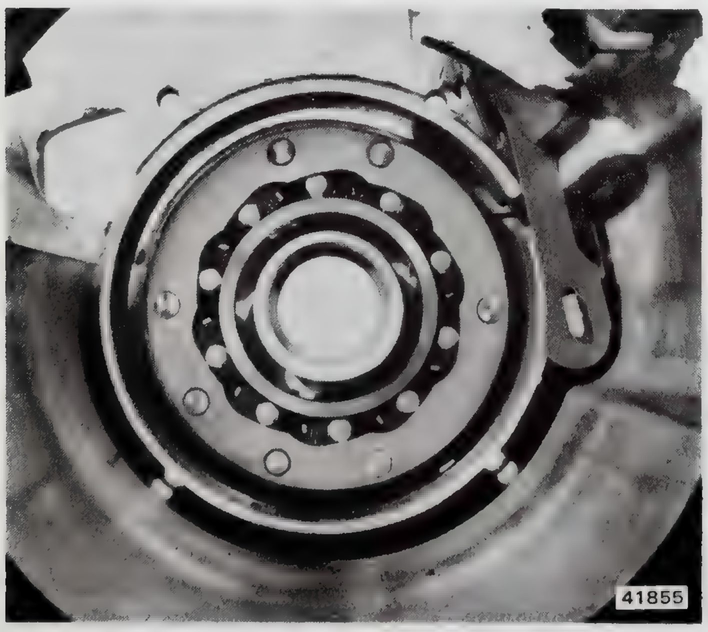

Fig. 2C-99 Overrunning Clutch and Rear Band Link Position

Rear Servo and Band

Servo

(1) Install servo piston assembly in case bore with twisting motion.

(2) Place spring retainer and snap ring over piston (fig. 2C-98).

(3) Compress piston spring by hand and install snap ring.

Rear Band—Models 904-727

(1) Install rear band in case.

(2) Install short strut, and connect long link and anchor in band (fig. 2C-100).

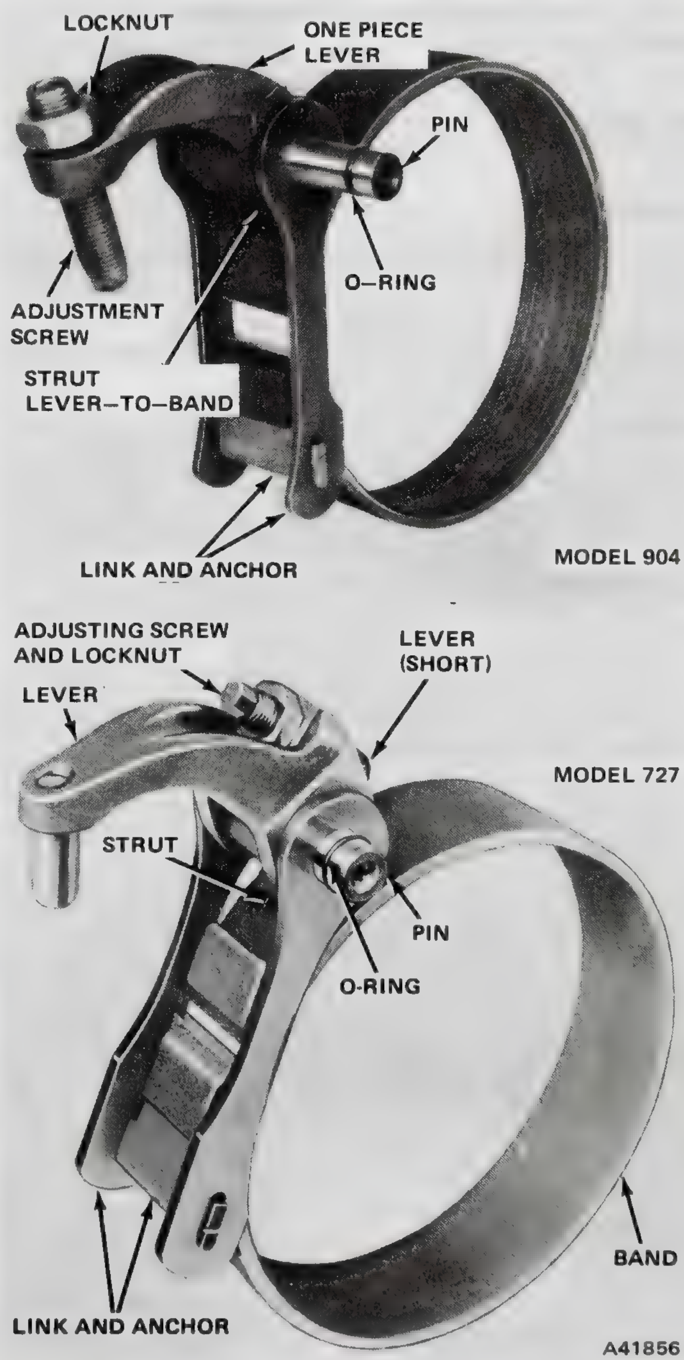

Fig. 2C-100 Rear Band—Models 904-727

(3) Thread band adjusting screw inward just enough to hold band strut in place.

(4) On model 727 transmission, be sure long link and anchor assembly is installed as shown in figure 2C-99 to provide clearance for rear band and drum.

(5) Install first-reverse drum in overrunning clutch hub and rear band.

Rear Band—Model 998

The model 998 transmission has a double wrap band supported at two points by a reaction pin mounted in the case. It is actuated at one point by the rear servo adjusting screw (fig. 2C-101).

(1) Install replacement O-ring on reaction pin and insert pin into case until pin is flush with gasket surface.

(2) Position band in case so two band lugs rest against reaction pin.

Fig. 2C-101 Rear Band and Linkage—Model 998

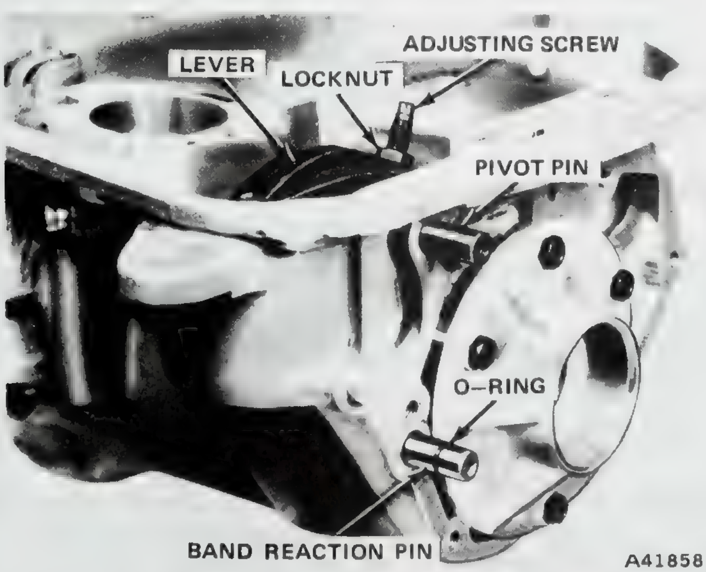

Fig. 2C-102 Rear Band Installation—Model 998

(3) Install first-reverse drum in overrunning clutch hub and into rear band.

(4) Install band operating lever and pivot pin.

NOTE: *When correctly installed, the lever adjusting screw should touch the center lug of the band and the pivot pin should be flush with the case (fig. 2C-102).*

Front Servo

NOTE: *On model 727 transmission used with standard 360 CID or heavy-duty 304 CID eight-cylinder engines, the servo piston must be subassembled before prior to installation.*

(1) Lubricate O-ring with petroleum jelly and install on piston rod.

(2) Install rod in piston.

(3) Install spring, flat washer, and snap ring.

(4) Insert servo piston assembly into case bore.

(5) Install piston rod, spring(s), and guide.

(6) Compress piston spring(s) with large C-clamp and install snap ring.

(7) Remove C-clamp.

Planetary Gear Assembly and Output Shaft

CAUTION: *Protect all machined surfaces of the output shaft during installation.*

(1) Position and support gear and output shaft assembly in case and insert output shaft through rear support.

(2) Carefully work gear and shaft assembly rearward and engage rear planetary carrier lugs in first-reverse drum slots.

Front and Rear Clutch Assemblies

The front and rear clutches, front band, oil pump and reaction shaft support are installed with the transmission in an upright position.

Cut a 3-1/2-inch (8.89 cm) diameter hole in a workbench, in the end of a small oil drum, or a large wooden box strong enough to support the transmission. Cut or file notches at the edge of the hole to accommodate the output shaft.

Carefully insert the output shaft into the hole and support the transmission in an upright position on the output shaft support flange.

Models 904-998

(1) Apply thin coat of petroleum jelly to selective thrust washer.

(2) Install washer on front end of output shaft.

(3) If transmission end play was not within specifications of 0.022 to 0.091 inch (0.5588 to 2.3114 mm) when measured at disassembly, replace thrust washer with one that will provide proper end play.

Thrust Washer Chart—Models 904-998

Thickness (Inch)	Color
0.052-0.054	Natural (Brown)
0.068-0.070	Red
0.083-0.085	Black

60234

(4) Align front clutch inner splines and place assembly in position on rear clutch.

NOTE: *Be sure the front clutch plate splines are fully engaged on the rear clutch front hub.*

(5) Align rear clutch inner splines.
(6) Grasp input shaft and lower clutch assemblies into case.
(7) Install clutch assemblies using circular motion and engage rear clutch splines over splines of front annulus gear.

NOTE: *Be sure the front clutch drive lugs are fully engaged in the driving shell slots.*

Model 727

(1) Apply thin coat of petroleum jelly to output shaft thrust washer.
(2) Install washer on front of output shaft.
(3) Align front clutch inner splines and place assembly in position on rear clutch.

NOTE: *Be sure the front clutch, splines are fully engaged on the rear clutch front hub.*

(4) Align rear clutch inner splines.
(5) Grasp input shaft and lower clutch assemblies into case.

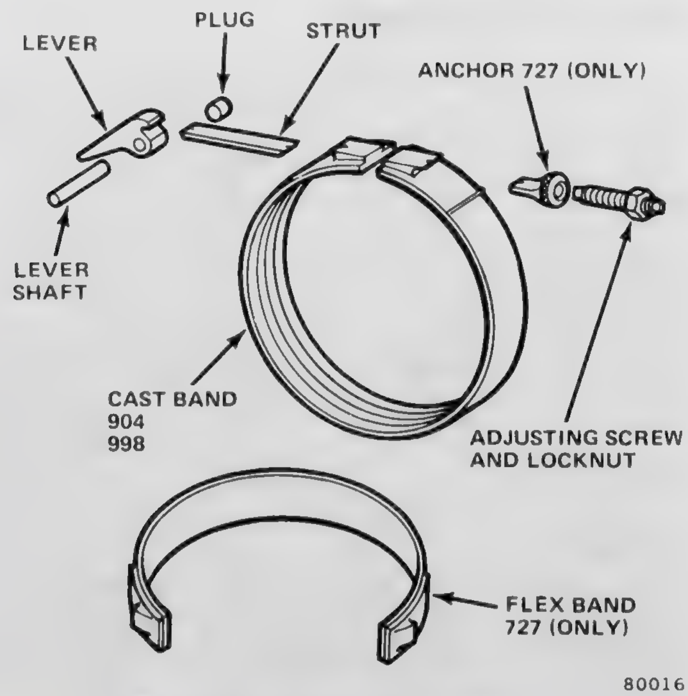

Fig. 2C-103 Front Band Arrangement

(6) Install clutch assemblies using a circular motion to engage rear clutch splines over splines of front annulus gear.

NOTE: *Be sure the front clutch drive lugs are fully engaged in the driving shell slots.*

Front Band

(1) Slide band over front clutch assembly.
(2) Install band strut (and anchor on model 727) (fig. 2C-103).
(3) Tighten band adjusting screw enough to hold band and linkage in place.

Oil Pump and Reaction Shaft Support

If difficulty was encountered in removing the pump assembly due to an exceptionally tight fit in the case, it may be necessary to heat and expand the case in order to install the pump. If necessary, heat the pump area for a few minutes with a heat lamp before installing the pump and support assembly.

Models 904-998

(1) Install thrust washer on reaction shaft support hub.
(2) Thread two Pilot Studs J-3387-2 into case pump opening.
(3) Install gasket over studs.
(4) Install rubber seal ring in groove in outer flange of pump housing. Be sure seal is not twisted.
(5) Coat seal ring with petroleum jelly.
(6) Install pump assembly in case. If necessary, tap pump assembly lightly with rawhide mallet to install.
(7) Install four pump attaching bolts finger-tight.
(8) Remove pilot studs and install remaining pump attaching bolts finger-tight.
(9) Rotate input and output shafts to see if any binding exists.
(10) If shafts rotate freely, tighten all pump attaching bolts to 175 inch-pounds (19.8 Nm) torque.
(11) Recheck shafts for bind-free rotation. If bind exists, loosen bolts and tighten bolts evenly and in sequence to 175 inch-pounds (19.8 Nm) torque.

Model 727

(1) If transmission end play was not within specifications of 0.036 to 0.084 inch (0.9144 to 2.1336 mm) when measured at disassembly, replace thrust washer on reaction shaft support hub with one that will provide correct end play.

Thrust Washer Chart—Model 727

Thickness (Inch)	Color
0.061—0.063	Natural (Brown)
0.084—0.086	Red
0.102—0.104	Yellow

60235

(2) Thread two Pilot Studs Tool J-3387-2 into case pump opening.

(3) Install gasket over studs.

(4) Install rubber seal ring in groove in outer flange of pump housing. Be sure seal is not twisted.

(5) Coat seal ring with petroleum jelly.

(6) Install pump assembly in case. If necessary, tap pump assembly lightly with rawhide mallet to install.

(7) Position deflector, if equipped, over vent opening and install four pump attaching bolts finger-tight.

(8) Remove pilot studs and install remaining pump attaching bolts finger-tight.

(9) Rotate input and output shafts to see if any binding exists.

(10) If shafts rotate freely, tighten all pump attaching bolts to 175 inch-pounds (19.8 Nm) torque.

(11) Recheck shafts for free rotation. If bind exists, loosen bolts and tighten bolts evenly and in sequence to 175 inch-pounds (19.8 Nm) torque.

Governor and Support

(1) Install support and governor body assembly on output shaft.

(2) Align assembly so governor valve shaft hole in governor body is aligned with hole in output shaft.

(3) Slide assembly into place and install snap ring behind governor body.

(4) Tighten governor body-to-support attaching bolts to 100 inch-pounds (11.3 Nm) torque.

(5) Bend end of lock tabs against shoulders of bolt heads.

(6) Install governor valve on valve shaft.

(7) Insert assembly into body and through governor weights.

(8) Install valve shaft retaining E-clip.

Output Shaft Bearing and Extension Housing

(1) On model 727 transmission, install snap ring in front groove on output shaft.

NOTE: *Models 904 and 998 transmissions do not use this snap ring, but have a shoulder machined on the shaft instead.*

(2) Install bearing with outer race ring groove toward front of shaft (fig. 2C-104).

(3) Press or tap bearing against snap ring or shoulder.

(4) Install rear snap ring.

(5) Thread two Pilot Studs Tool J-24108 into case and install extension housing gasket (fig. 2C-105).

(6) Install output shaft bearing snap ring in extension housing.

(7) Expand snap ring as far as possible and tap extension housing into place use rawhide mallet.

(8) Release snap ring. Be sure it seats in bearing groove.

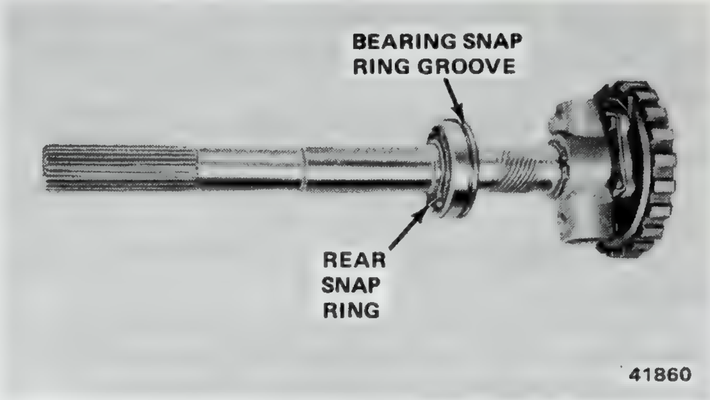

Fig. 2C-104 Output Shaft Bearing Installation

(9) Install and tighten extension housing bolts to 24 foot-pounds (32.5 Nm) torque.

(10) Install gasket, access plate, and screws on bottom of extension housing mounting pad.

(11) Install speedometer pinion and adapter assembly.

NOTE: *Measure transmission end play as described in Transmission Disassembly. Correct end play if necessary.*

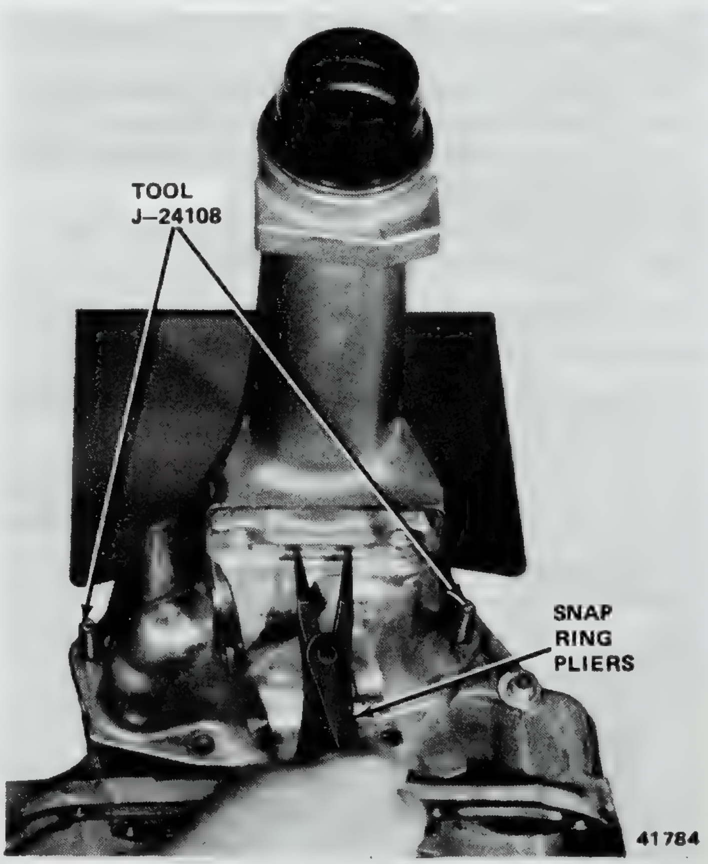

Fig. 2C-105 Snap Ring Installation

Valve Body and Accumulator Piston

(1) Before installing valve body, check operation of clutches and bands using air pressure test procedure to confirm proper operation.

(2) Clean all mating surfaces and remove any burrs from transmission case or valve body steel plate mating surfaces.

(3) Install accumulator piston assembly in case bore and install piston spring on piston.

(4) Insert park lock rod through opening in rear of case.

(5) Position knob of lock rod against reaction plug and sprag.

(6) Move front end of rod toward centerline of transmission while exerting rearward pressure on rod to force it past sprag. Rotate output shaft if necessary.

NOTE: *Before installing the valve body, be sure the neutral start switch has not been installed yet.*

(7) Place valve body manual lever in Drive position.

(8) Place valve body assembly in its approximate position in case.

(9) Align valve body in case and install attaching screws finger-tight.

(10) Install neutral start switch.

(11) Move valve body manual lever to neutral position.

(12) Relocate valve body if necessary to align manual lever neutral finger over neutral start switch plunger ball.

(13) Tighten valve body attaching screws alternately and evenly to 100 inch-pounds (11.3 Nm) torque.

(14) Install gearshift control lever on manual lever shaft and tighten clamp bolt.

(15) Check manual lever shaft for binding in case by moving lever through all detent positions.

NOTE: *If binding exists, loosen the valve body attaching screws and align the valve body.*

(16) Install flat washer and throttle lever and tighten throttle lever clamp bolt.

Rear Band Adjustment

Models 904-998

(1) Remove band adjusting screw locknut.

(2) Tighten adjusting screw to 41 inch-pounds (4.6 Nm) torque using 1/4-inch (6.35 mm) hex head socket and torque wrench.

(3) On Model 904, back off adjusting screw 7-1/2 turns. On Model 998, back off adjusting screw 4 turns.

(4) Hold adjusting screw in position and install locknut. Tighten locknut to 35 foot-pounds (47.5 Nm) torque.

Model 727

(1) Loosen locknut and back nut off five turns.

(2) Tighten band adjusting screw to 72 inch-pounds (8.1 Nm) torque.

(3) Back off adjusting screw 2 turns.

(4) Hold adjusting screw in position and tighten locknut to 35 foot-pounds (47.5 Nm) torque.

(5) Install oil pan and gasket.

Front Band Adjustment

Models 904-998-727

(1) Loosen band adjusting screw locknut and back nut off five turns.

(2) Be sure band adjusting screw turns freely in case.

(3) Tighten adjusting screw to 72 inch-pounds (8.1 Nm) torque using Torque Wrench J-5853 and a 5/16 square socket.

CAUTION: *If Adapter Tool J-24063 is used to adjust the front band, tighten the adjusting screw to 36 inch-pounds (4.1 Nm) torque only.*

(4) On Models 904-998, back off adjusting screw 2 turns. On model 727, back off adjusting screw 2-1/2 turns.

(5) Hold adjusting screw in position and tighten locknut to 35 foot-pounds (47.5 Nm) torque.

SPECIFICATIONS

Transmission Specifications

	MODEL 904-998	MODEL 727
Clutch Plate Clearance		
Front Clutch	3 Disc 0.074 to 0.125 inch 4 Disc 0.067 to 0.134 inch	3 Disc 0.070 to 0.129 inch 4 Disc 0.082 to 0.151 inch
Rear Clutch	3 and 4 Disc. 032 to 0.55 inch	4 Disc 0.025 to 0.045 inch
Clutch Component Thickness Tolerance		
Front Clutch		
Lined Plate	.083 to .088 inch	.090 to .095 inch
Steel Plate	.066 to 0.71 inch	.066 to .071 inch
Pressure Plate	.244 to .218 inch	.278 to .282 inch
Rear Clutch		
Lined Plate	.060 to .065 inch	.060 to .065 inch
Steel Plate	.066 to .071 inch	.066 to .071 inch
Flat Pressure Plate	.214 to .218 inch	.278 to .282 inch
Formed Pressure Plate	.409 to 4.13 inch	.441 to .445 inch

Clutches — Engine Cu. In.	2-Liter, 232 STD (904)	258 STD (904)	304 STD (998)	304 HD (727)	360 STD (727)	360 HD (727)
Number of Front Clutch Plates	3	4	4	3	3	4
Number of Front Clutch Discs	3	4	4	3	3	4
Number of Rear Clutch Plates	2	2	3	3	3	3
Number of Rear Clutch Discs	3	3	4	4	4	4

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Transmission Specifications (Continued)

	MODEL 904 (w/2-Liter)		MODEL 904-998		MODEL 727	
	U.S. Measure	Metric Measure	U.S. Measure	Metric Measure	U.S. Measure	Metric Measure
Torque Converter Diameter	9.5 inches		10.75 inches		10.75 inches	
Oil Capacity — Transmission and Torque Converter	14.2 Pts.	6.6 Liters	17 Pts.	7.9 Liters	19 Pts.	8.9 Liters
Cooling Method — All Models			Water-Heat Exchanger (In Radiator Lower Tank)			
Lubrication — All Models			Rotor Type Pump			
Gear Ratios — All Models			First 2.45 to 1	Second 1.45 to 1	Third 1.00 to 1	Reverse 2.20 to 1
Pump Clearances						
Outer Rotor to Case Bore			.004 to .008 inch			
Outer to Inner Tip			.005 to .010 inch			
End Clearance-Rotors			.001 to .003 inch		.001 to .002 inch	
Gear Train End Play			.001 to .047 inch		.009 to .044 inch	
Input Shaft End Play			.022 to .091 inch		.036 to .082 inch	
Snap Rings						
Front and Rear Clutches Rear Snap Ring (Selective)			.060 to .062 inch		.060 to .062 inch	
			.068 to .070 inch		.074 to .076 inch	
			.076 to .078 inch		.088 to .090 inch	
Output Shaft (Forward End)			.040 to .044 inch		.106 to .108 inch	
			.048 to .052 inch		.055 to .059 inch	
			.059 to .065 inch		.062 to .066 inch	

70122B

Thrust Washer Chart

Thrust Washers	Thrust Washer No. and Transmission Model			
	904-998		727	
Reaction Shaft Support to Front Clutch Retainer	No. 1	.061 to .063	No. 1	Selective .061 to .063 — Natural .084 to .086 — Red .102 to .104 — Yellow
Rear Clutch to Front Clutch Retainer	No. 2	.061 to .063	No. 2	.061 to .063 — Natural
Output Shaft to Input Shaft	No. 3	Selective .052 to .054 — Tin .068 to .070 — Red .083 to .085 — Green	No. 3	.062 to .064
Front Annulus Support to Rear Clutch Retainer	No. 4	.121 to .125		—
Front Annulus Support to Front Planetary Gear	No. 5	.048 to .050	No. 4	.059 to .062
Driving Shell to Front Annulus Gear		—	No. 5	.060 to .062
Front Planetary Gear to Driving Shell	No. 6	.048 to .050		—
Sun Gear and Driving Shell Front Thrust Plate	No. 7	.050 to .052	No. 6	.034 to .036
Sun Gear and Driving Shell Rear Thrust Plate	No. 8	.050 to .052		—
Rear Planetary Gear to Driving Shell	No. 9	.048 to .050	No. 7	.059 to .062
Rear Planetary Gear to Rear Annulus Gear		—	No. 8	.034 to .036
Rear Planetary Gear to Rear Annulus Support	No. 10	.048 to .050		—

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Band Adjustments

Engine Cu. In.	2 Liter, 232	258		304		360	
	STD	STD (904)	HD (727)	STD (998)	HD (727)	STD (727)	HD (727)
Kickdown (Front) Turns*	2	2	2-1/2	2	2-1/2	2-1/2	2
Low-Reverse (Internal) Turns*	**7	**7	2	4	2	2	2

*Backed off from 72 inch-pounds
**Backed off from 41 inch-pounds. All others backed off from 72 inch-pounds

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Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Cooler Line Fitting	20	14-41	15	10-30
Cooler Line Nut	34	20-41	25	15-30
Converter Drain Plug	12	—	110 in-lb	—
Converter Drive Plate-to-Converter Bolts	35	30-41	26	22-30
Converter Drive Plate to Crankshaft Bolt	142	129-163	105	95-120
Converter Drive-to-Crankshaft Bolts-4 Cylinder	88	80-96	65	59-71
Converter Drive Plate to Torque Converter Bolt	30	27-34	22	20-25
Converter Housing Inspection Cover Screws	41	34-47	30	25-35
Converter Housing-to-Engine Bolts	73	62-84	54	46-62
Extension Housing to Insulator Mounting Bolt	68	—	50	—
Extension Housing to Transmission Case Bolt	33	—	24	—
Filler Tube Bracket Bolt	8	7-9	70 in-lb	60-80 in-lb
Governor Body to Support Bolt	11	—	100 in-lb	—
Kickdown Band Adjusting Screw Locknut	47	—	35	—
Kickdown Lever Shaft Plug	17	—	150 in-lb	—
Low Reverse Band Adjusting Screw Locknut	47	—	35	—
Manual Linkage Control Lever Screw	11	9-12	95 in-lb	81-109 in-lb
Neutral Starter Switch	33	—	24	—
Oil Filter Tube Bracket Bolt	17	—	150 in-lb	—
Oil Pan Bolt	17	—	150 in-lb	9
Oil Pump Housing-to-Transmission Case Bolt	20	—	175 in-lb	—
Output Shaft Support Bolt	17	—	150 in-lb	—
Overrunning Clutch Cam Setscrew	4	—	40 in-lb	—
Pressure Test Port Plug	12	—	110 in-lb	—
Reaction Shaft Support to Oil Pump Bolt	18	—	160 in-lb	—
Rear Cushion-to-Crossmember Bolt (5/16-18)	34	27-41	25	20-30
Rear Support Bracket-to-Rear Cushion Bolt	65	61-72	48	45-53
Rear Support Bracket-to-Transmission Bolt	65	58-72	48	43-53
Speedometer Adapter Clamp Screw	11	—	100 in-lb	—
Starter Motor-to-Converter Housing Bolt	73	62-84	54	46-62
Starter Motor-to-Converter Housing Hex-nut	45	38-52	33	28-38
Throttle Valve Control Rod Clamp	5	4-5	40 in-lb	34-46 in-lb
Transmission-to-Engine Bolt	38	30-41	28	22-30
Valve Body Screw	4	—	35 in-lb	—
Valve Body-to-Transmission Case Screw	11	—	100 in-lb	—

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

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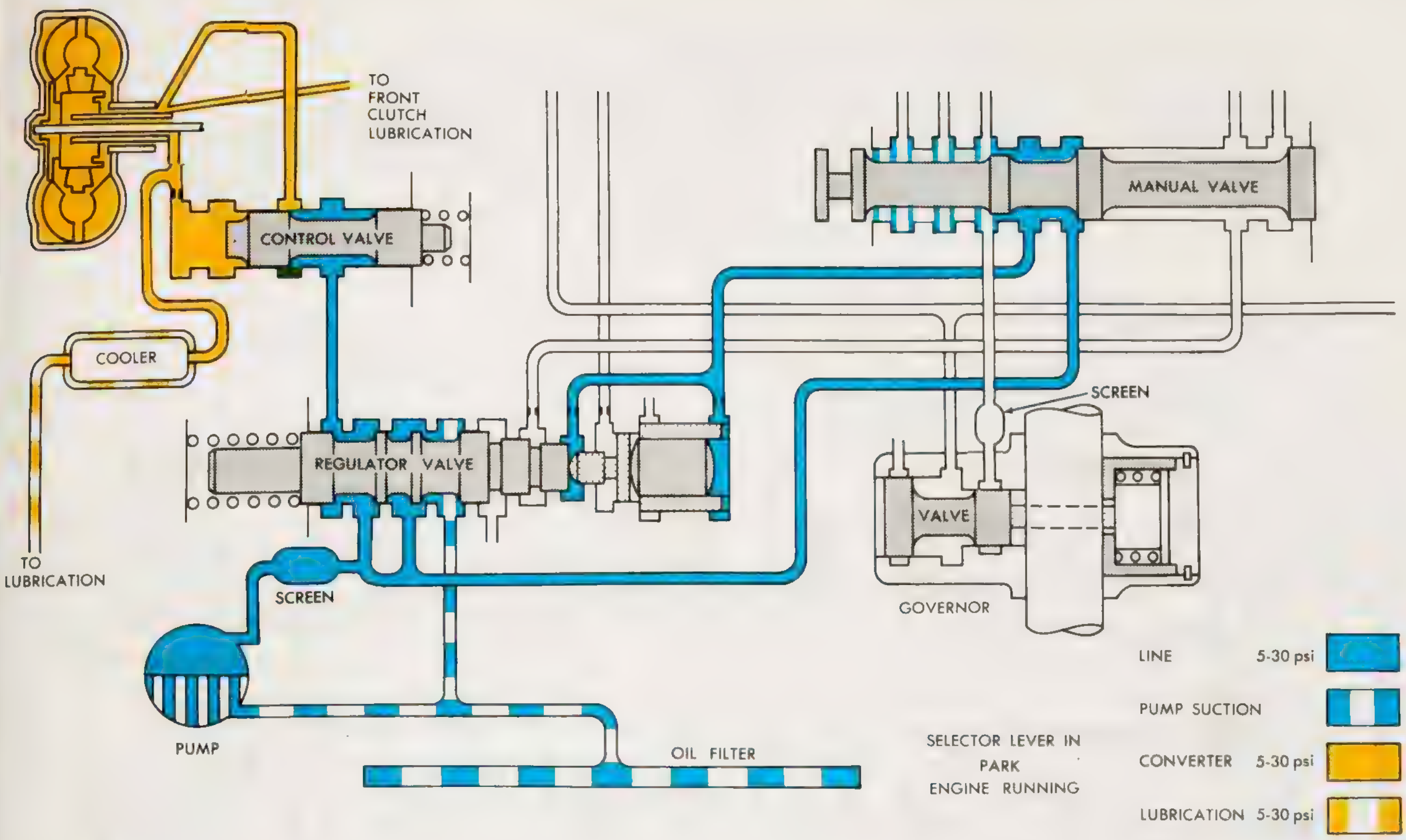
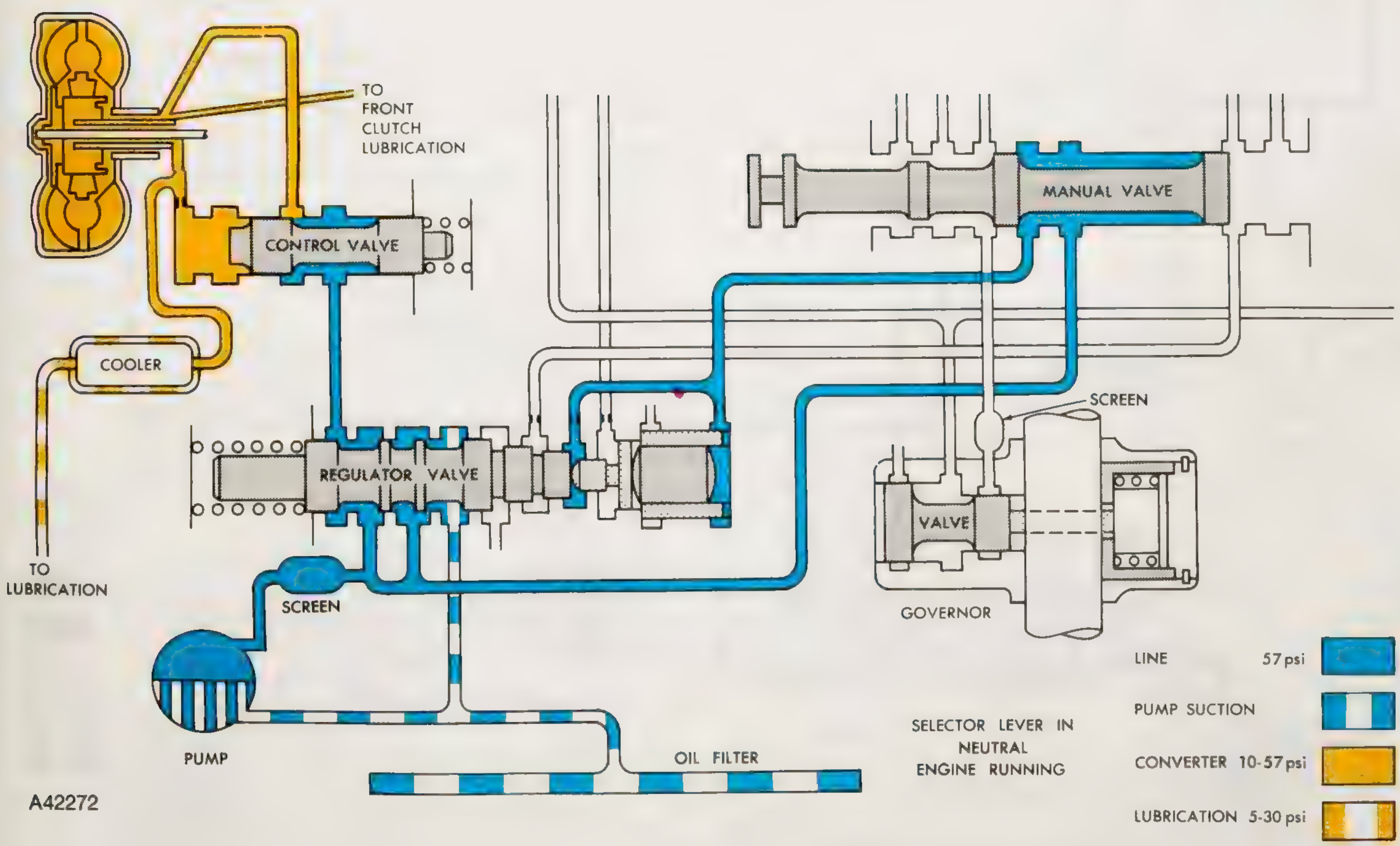
Special Tools

41861B

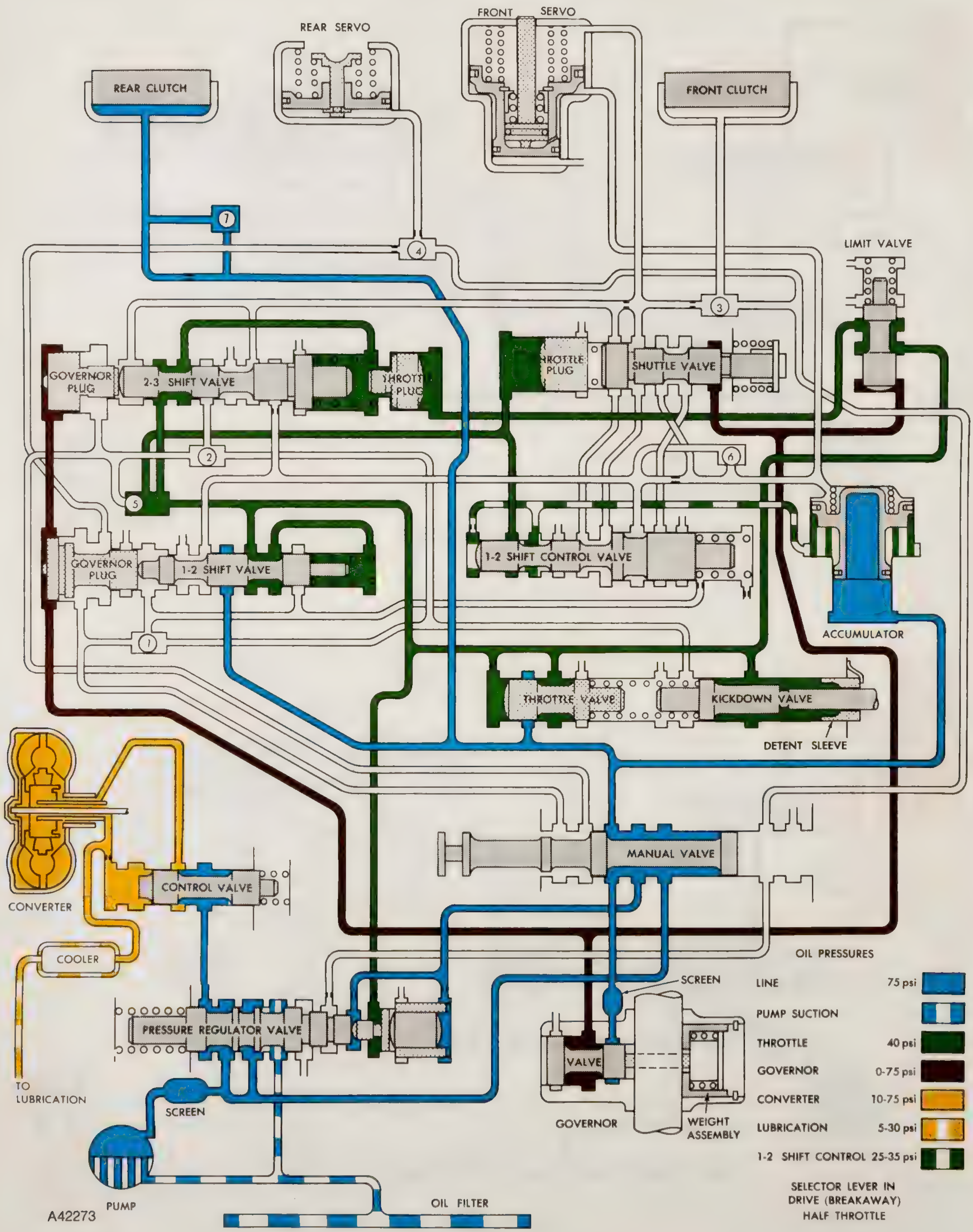
NOTES

HYDRAULIC FLOW CHARTS

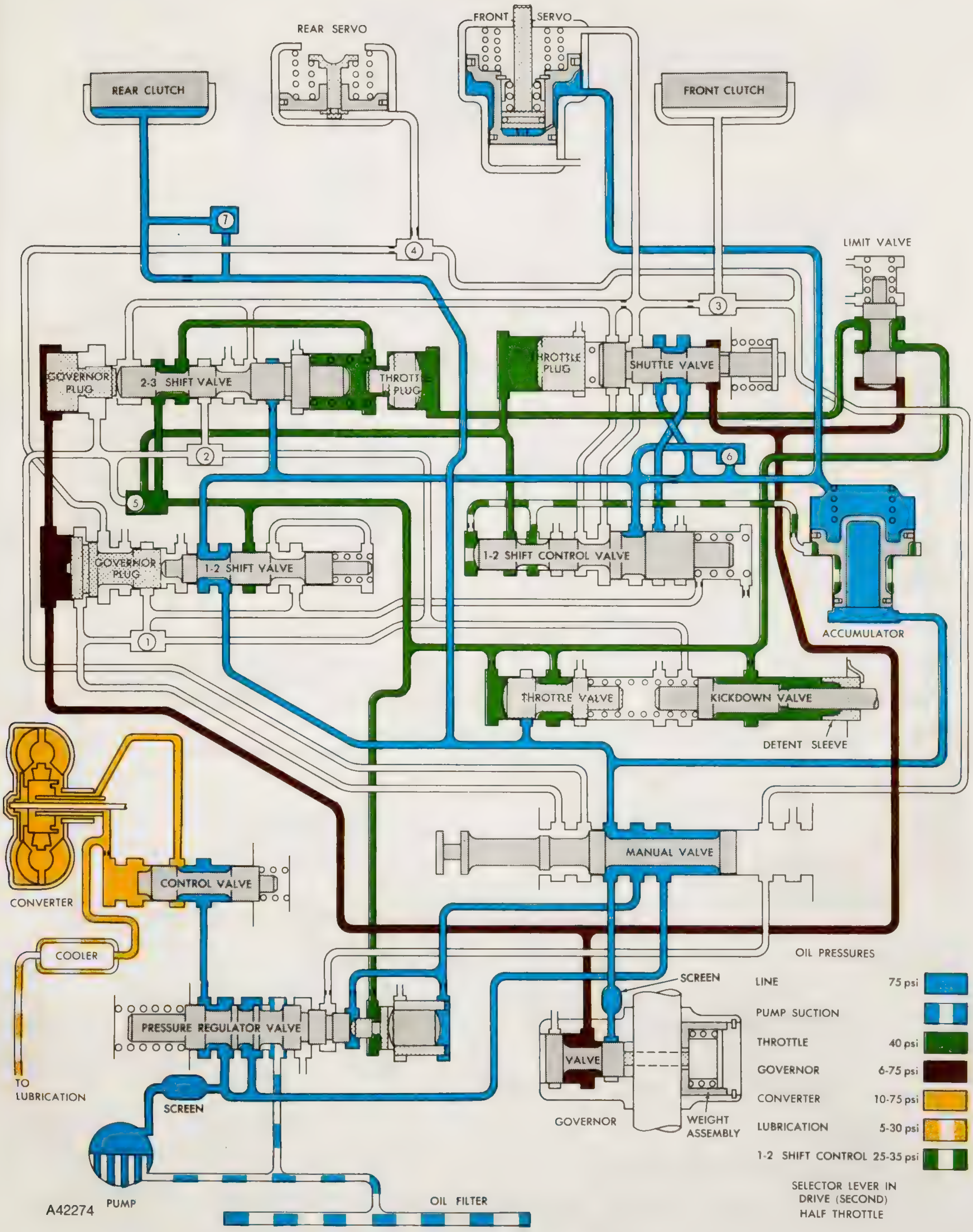




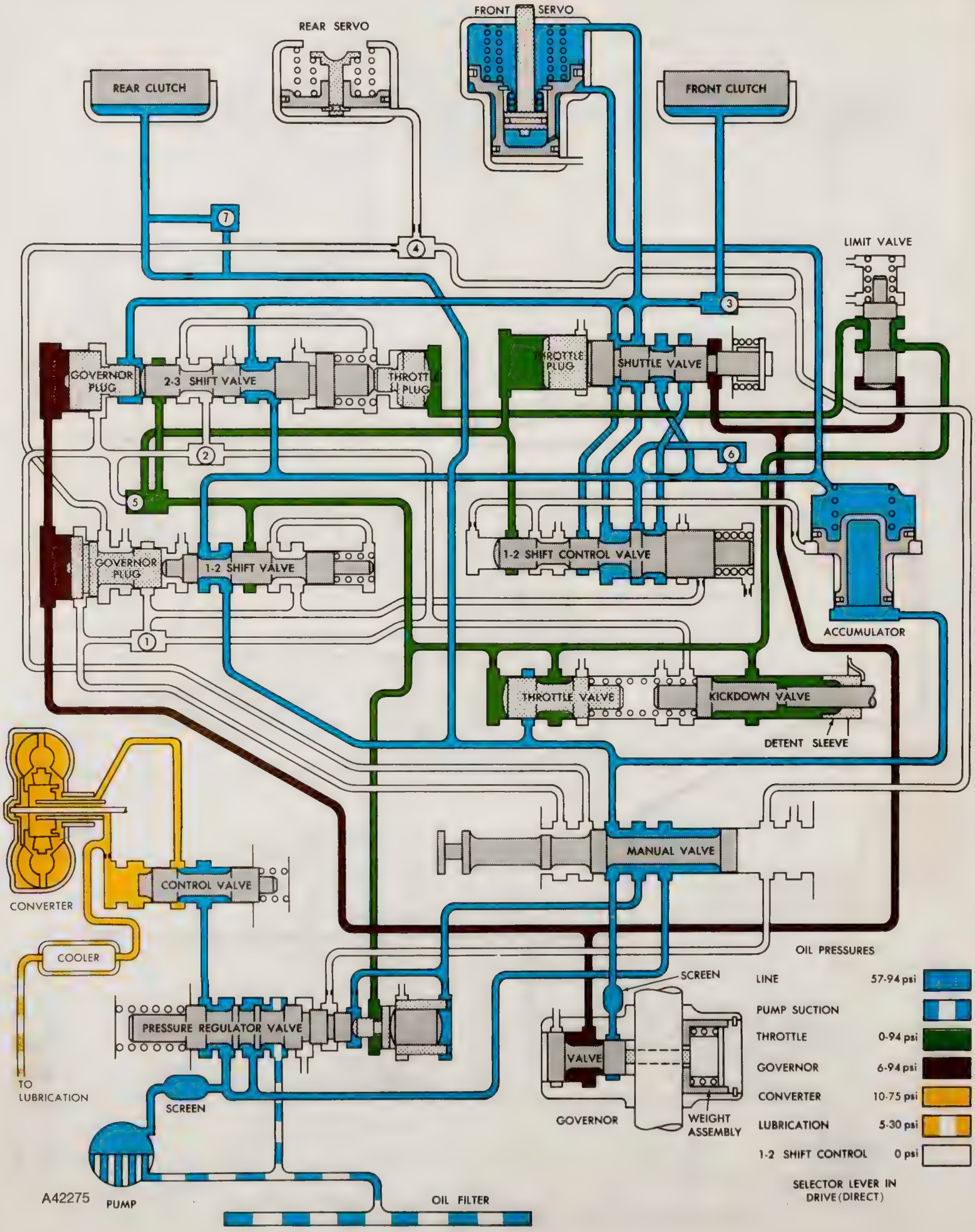
PARK AND NEUTRAL (Six-Cylinder and V-8)



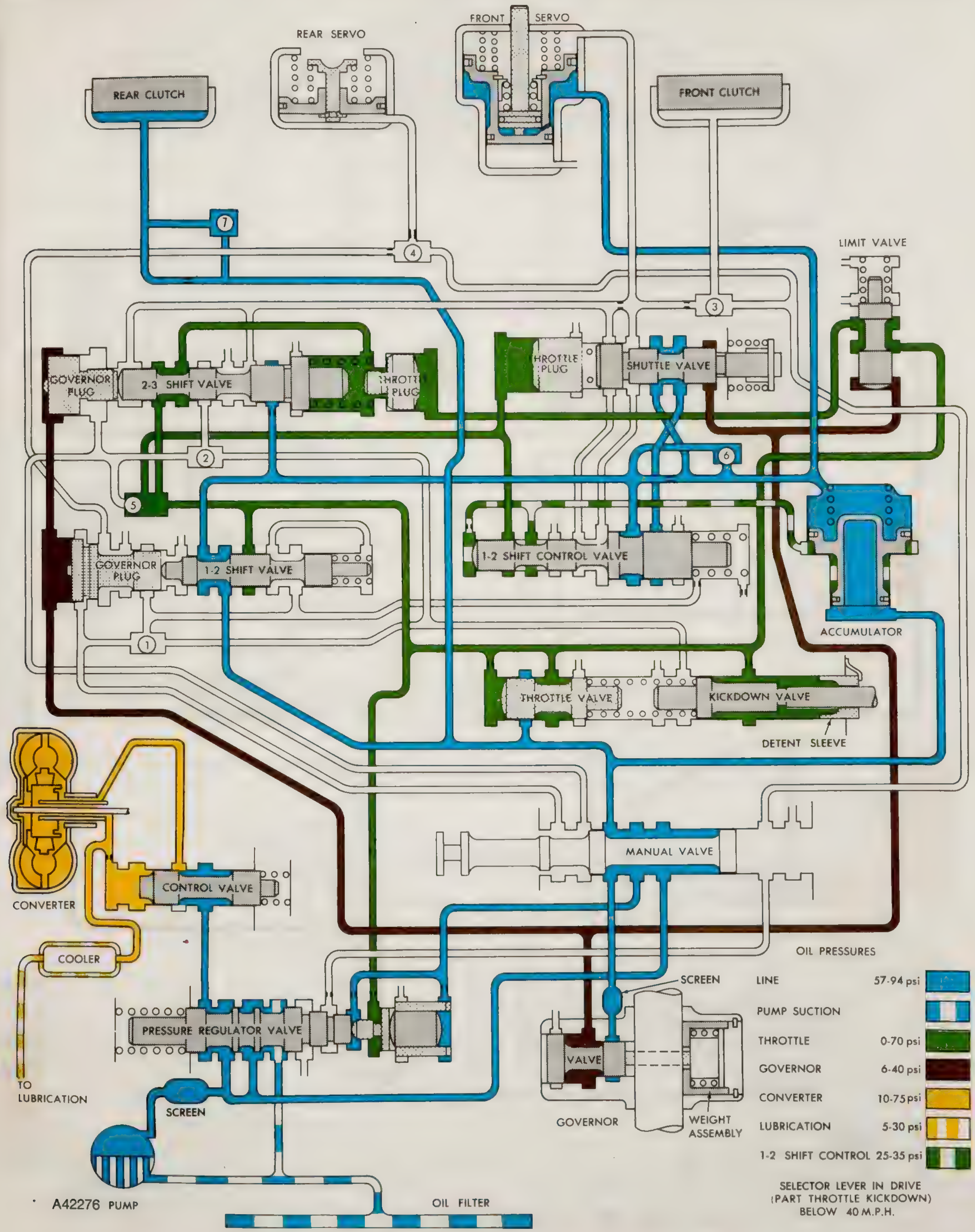
DRIVE—BREAKAWAY (V-8)



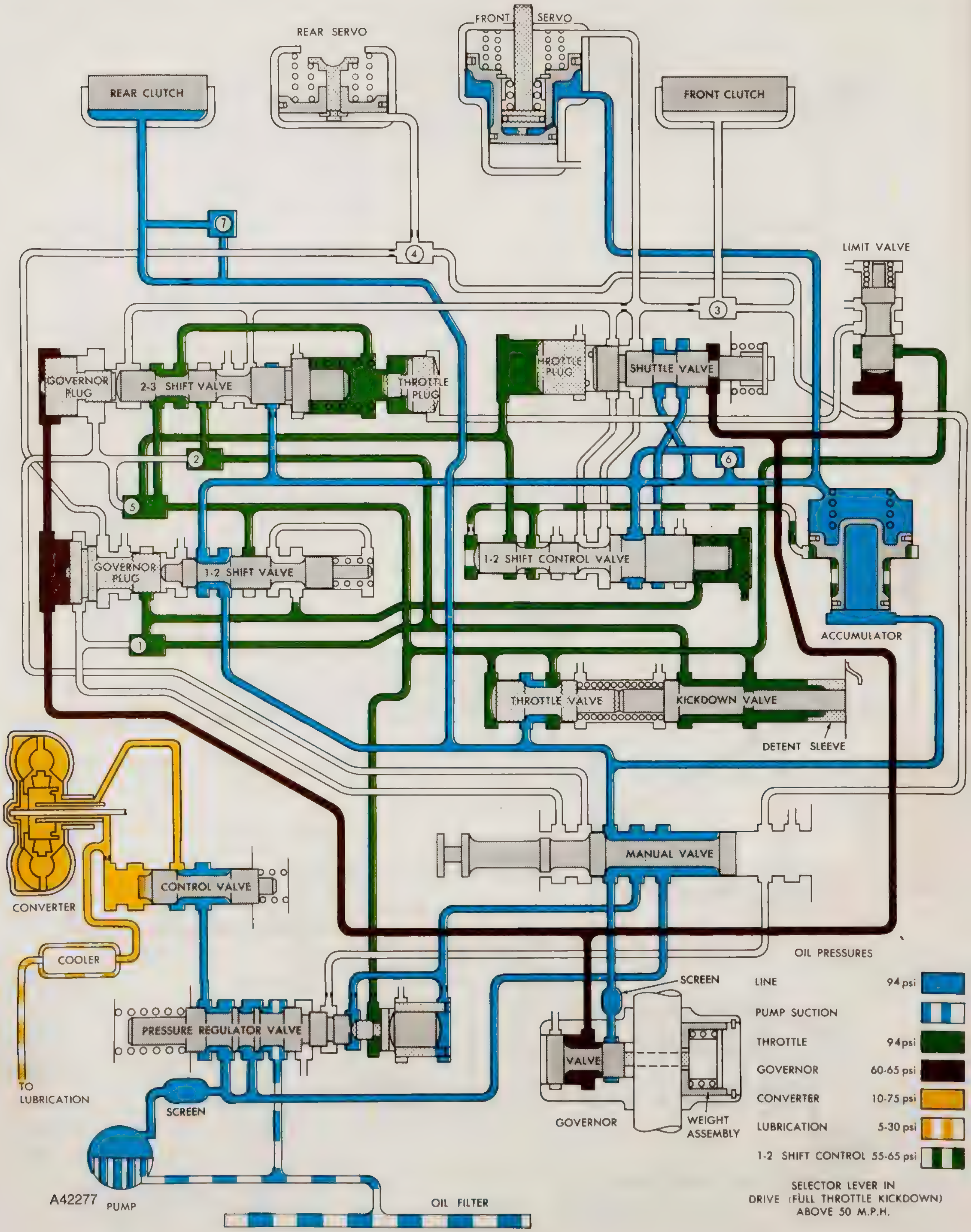
DRIVE—SECOND (V-8)



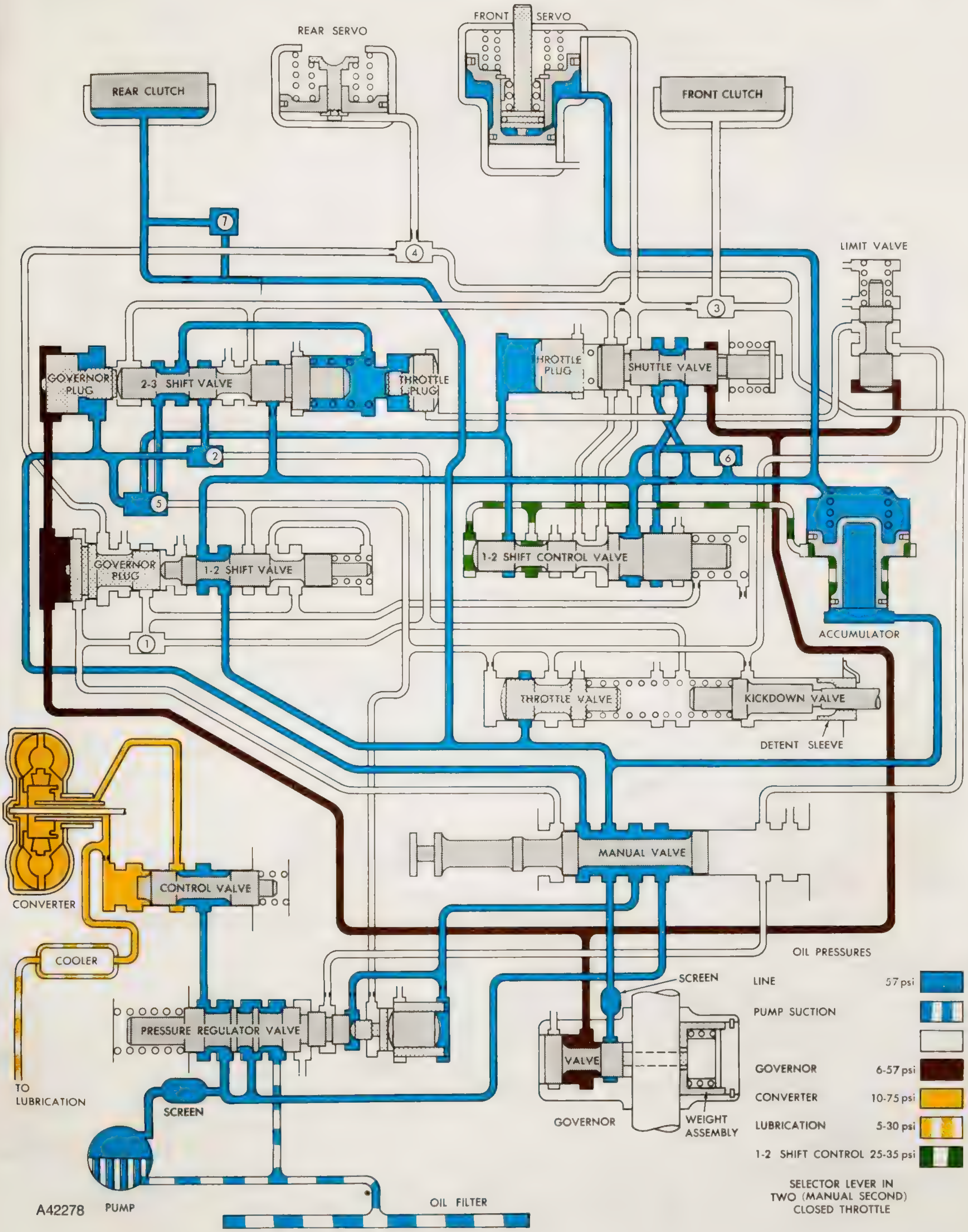
DRIVE—DIRECT (V-8)



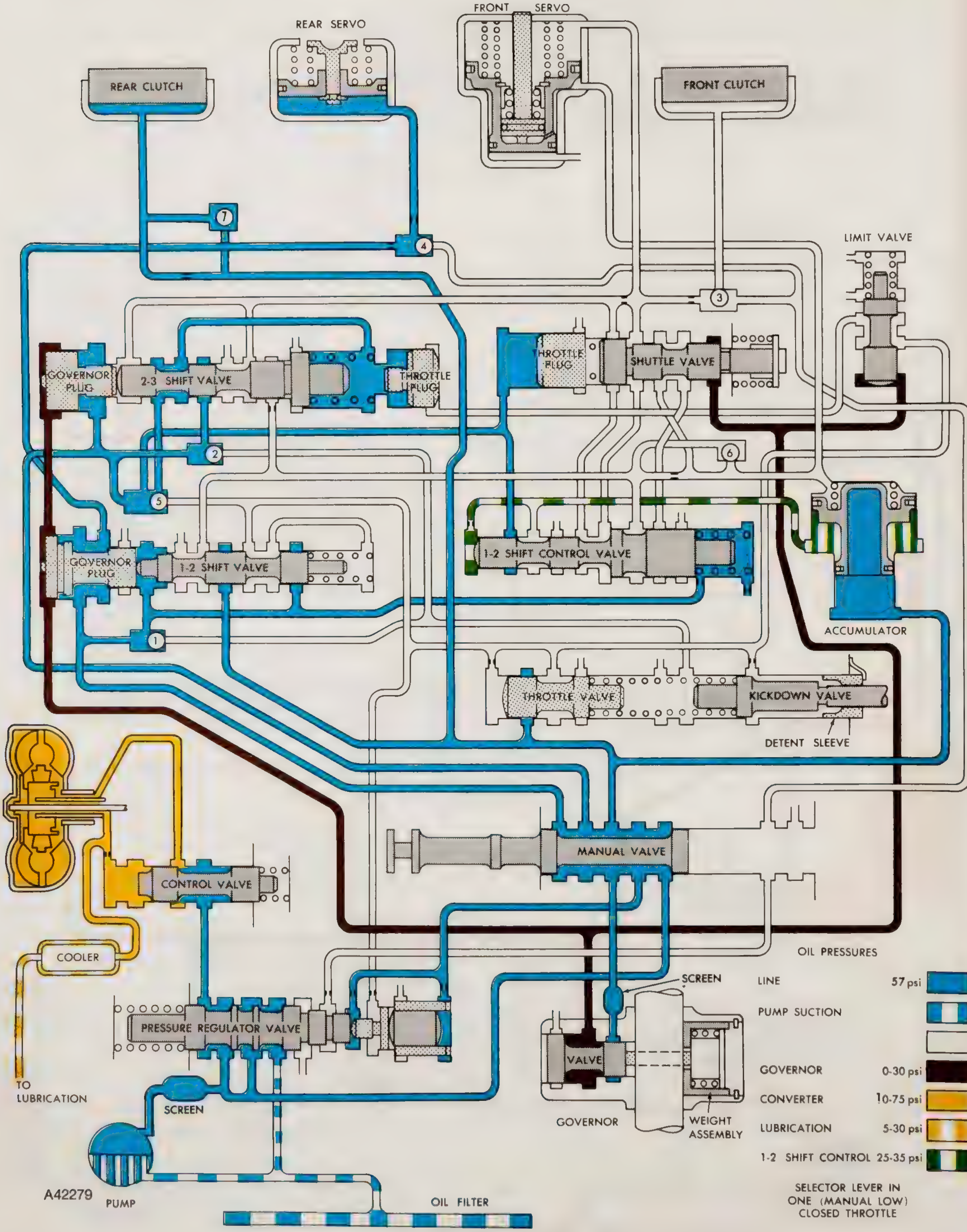
DRIVE—PART THROTTLE KICKDOWN (V-8)



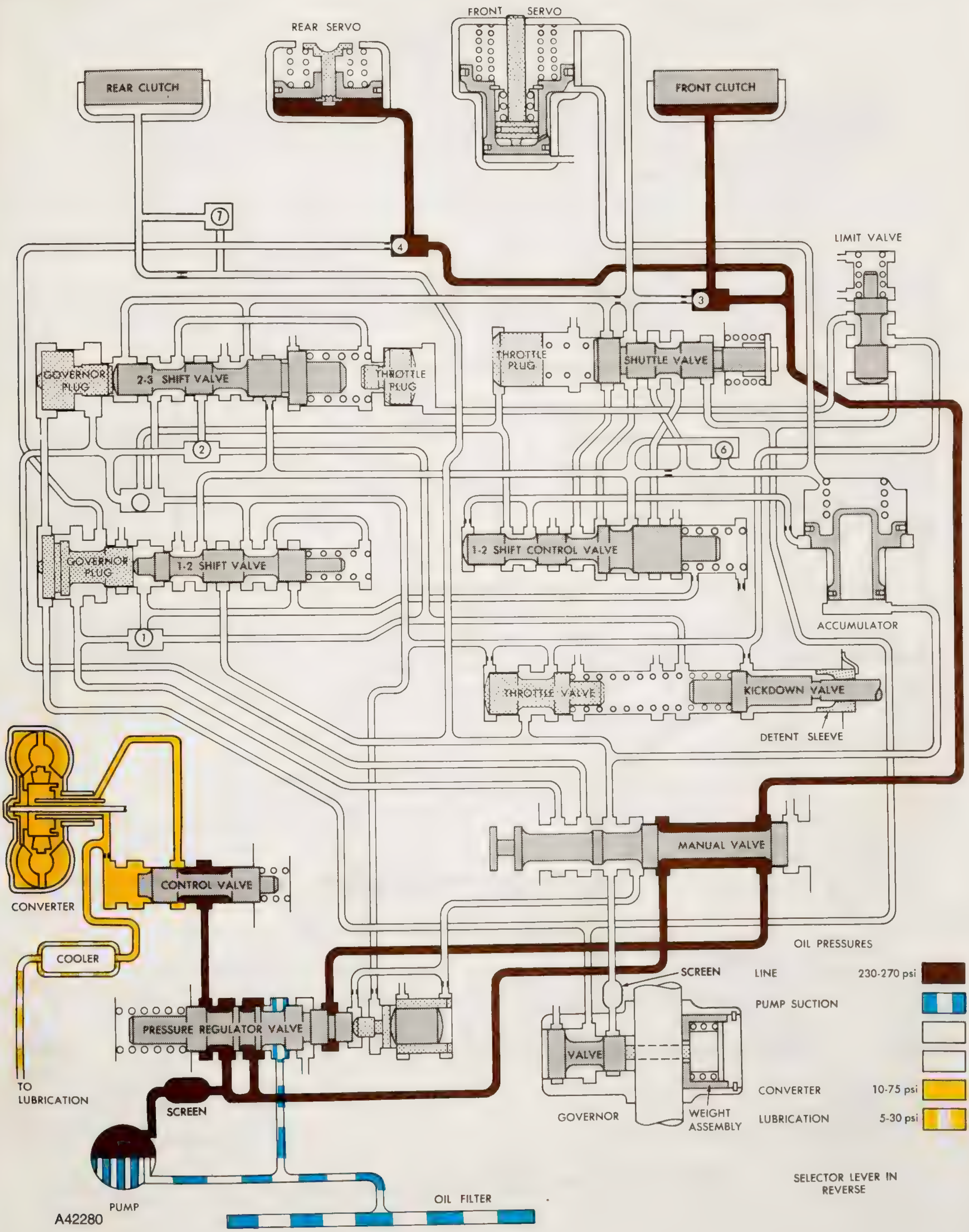
DRIVE—FULL THROTTLE KICKDOWN (V-8)



SELECTOR LEVER—TWO (V-8)

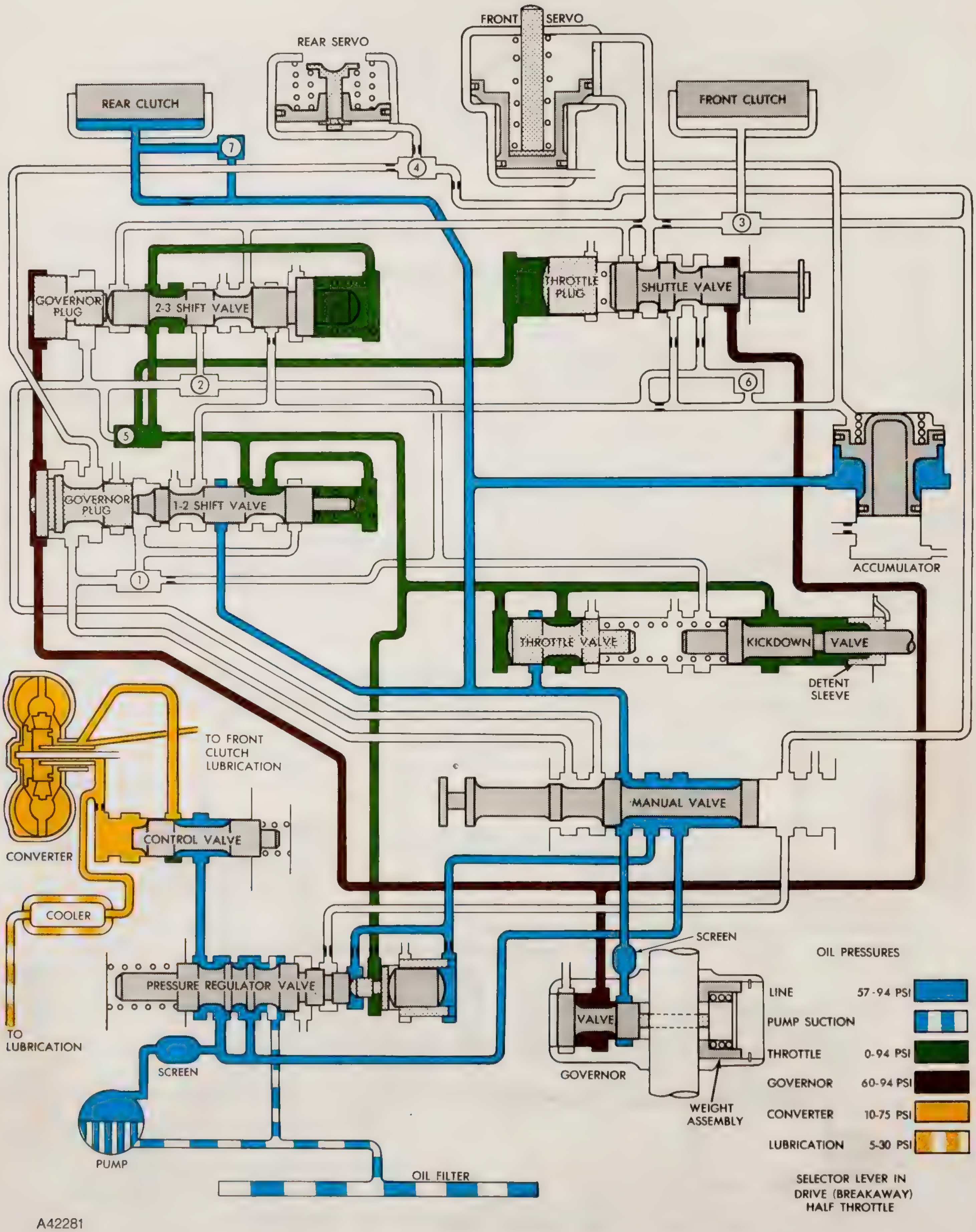


SELECTOR LEVER—ONE (V-8)

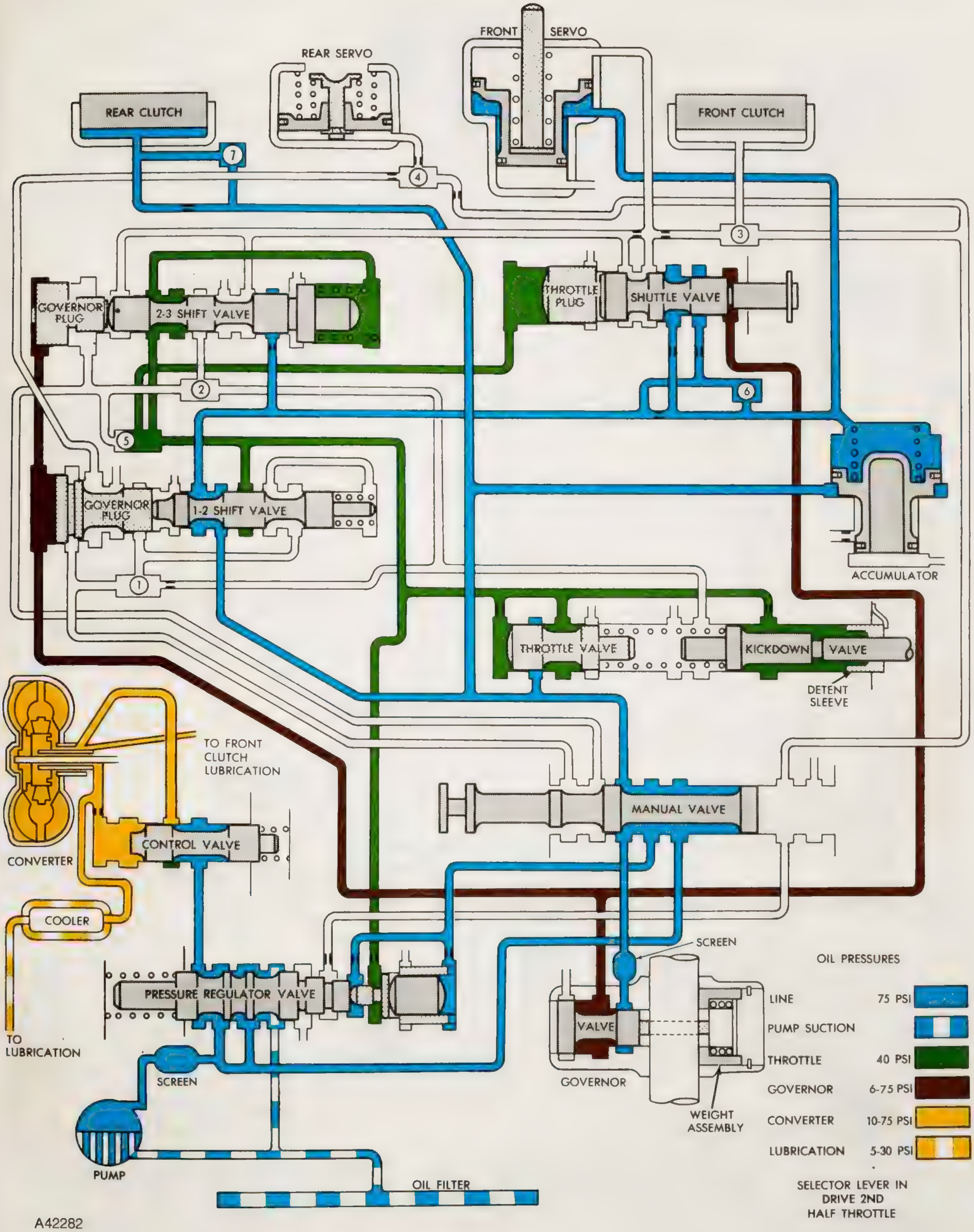


REAR SERVO
FRONT SERVO
REAR CLUTCH
FRONT CLUTCH
7
4
3
LIMIT VALVE
GOVERNOR PLUG
2-3 SHIFT VALVE
THROTTLE PLUG
THROTTLE PLUG
SHUTTLE VALVE
2
6
GOVERNOR PLUG
1-2 SHIFT VALVE
1-2 SHIFT CONTROL VALVE
1
ACCUMULATOR
THROTTLE VALVE
KICKDOWN VALVE
DETENT SLEEVE
MANUAL VALVE
CONVERTER
CONTROL VALVE
COOLER
OIL PRESSURES
SCREEN
LINE 230-270 psi
PUMP SUCTION
PRESSURE REGULATOR VALVE
VALVE
CONVERTER 10-75 psi
TO LUBRICATION
SCREEN
GOVERNOR
WEIGHT ASSEMBLY
LUBRICATION 5-30 psi
SELECTOR LEVER IN REVERSE
PUMP
OIL FILTER
A42280

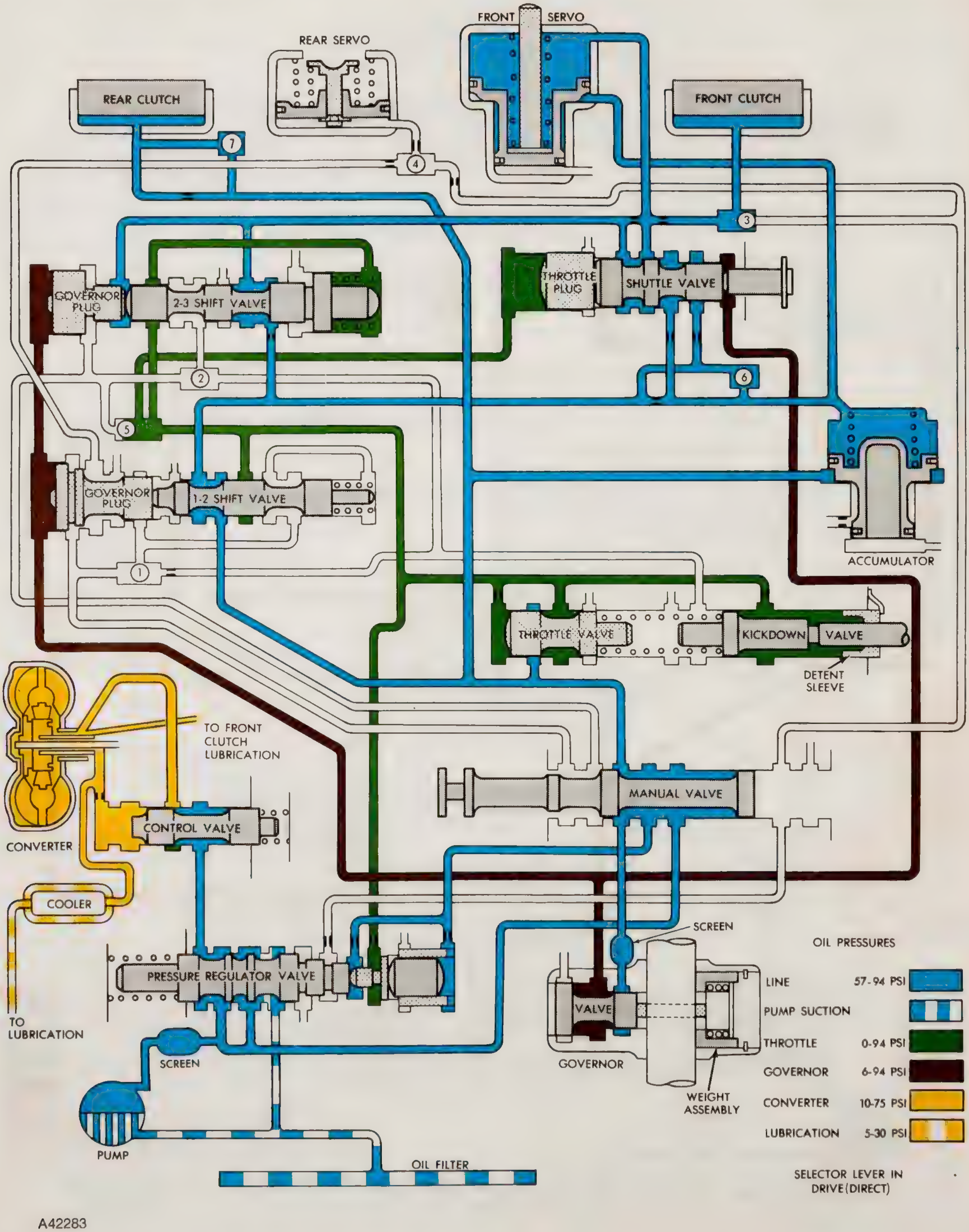
REVERSE (V-8)



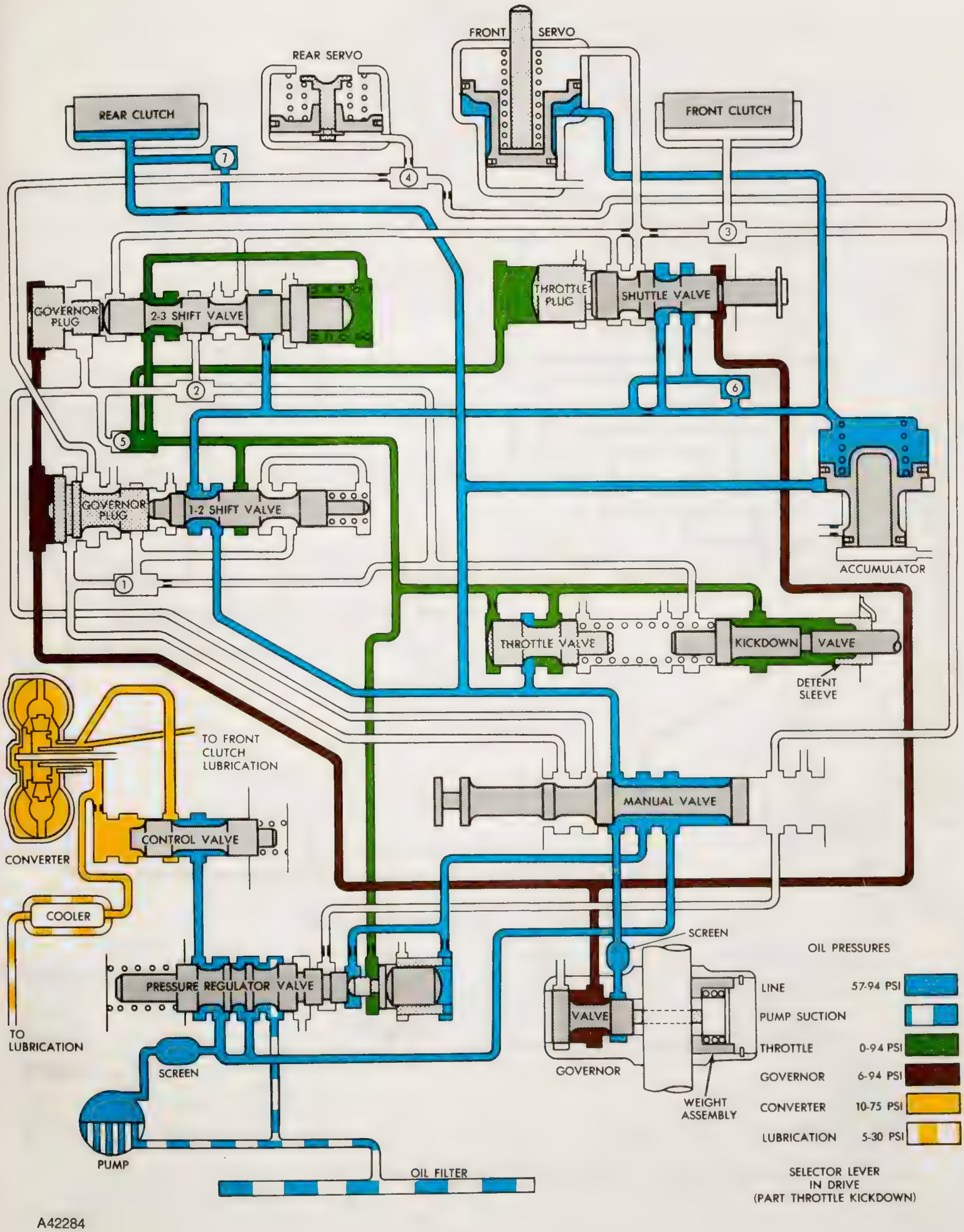
DRIVE—BREAKAWAY (Six-Cylinder)



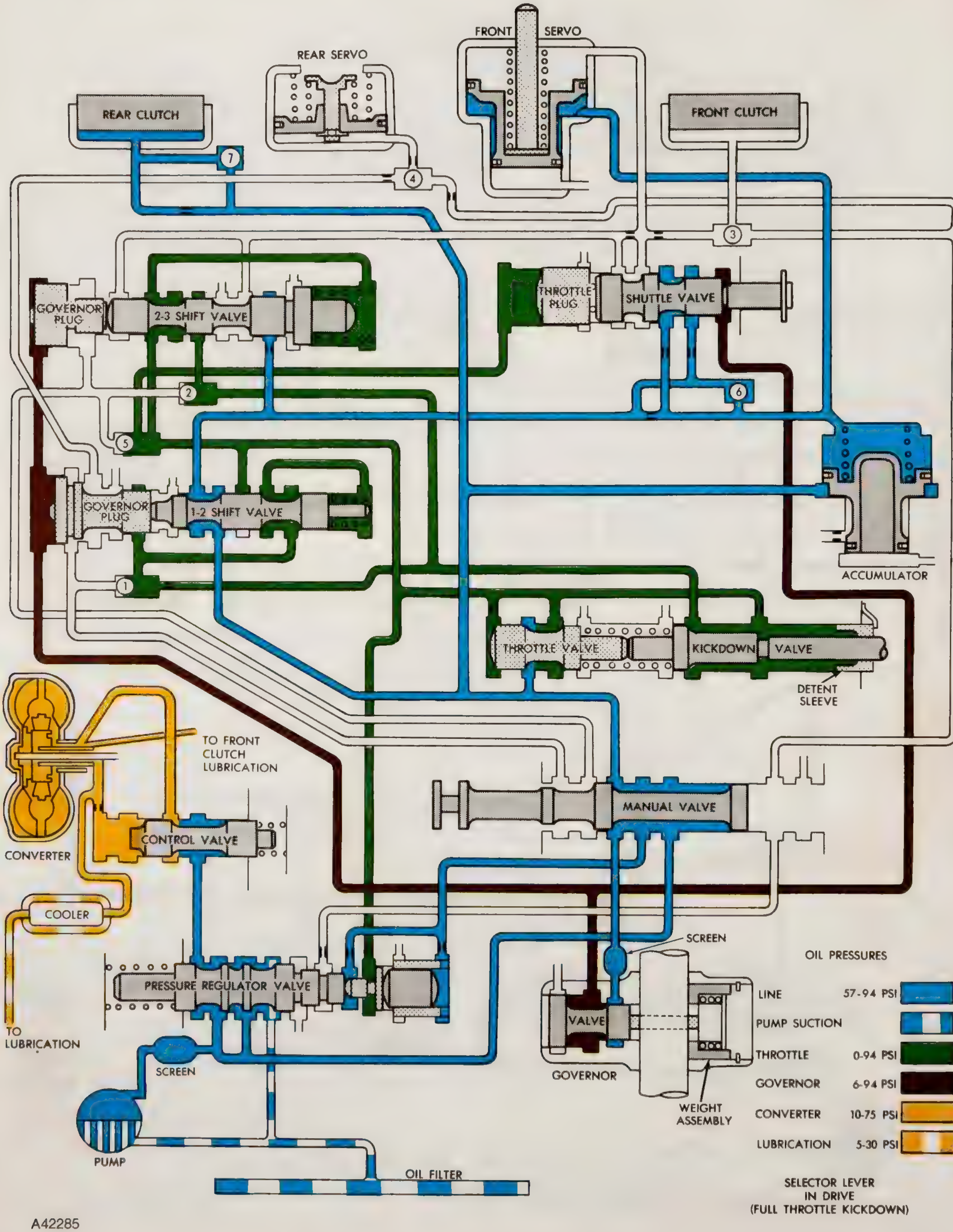
DRIVE—SECOND (Six-Cylinder)



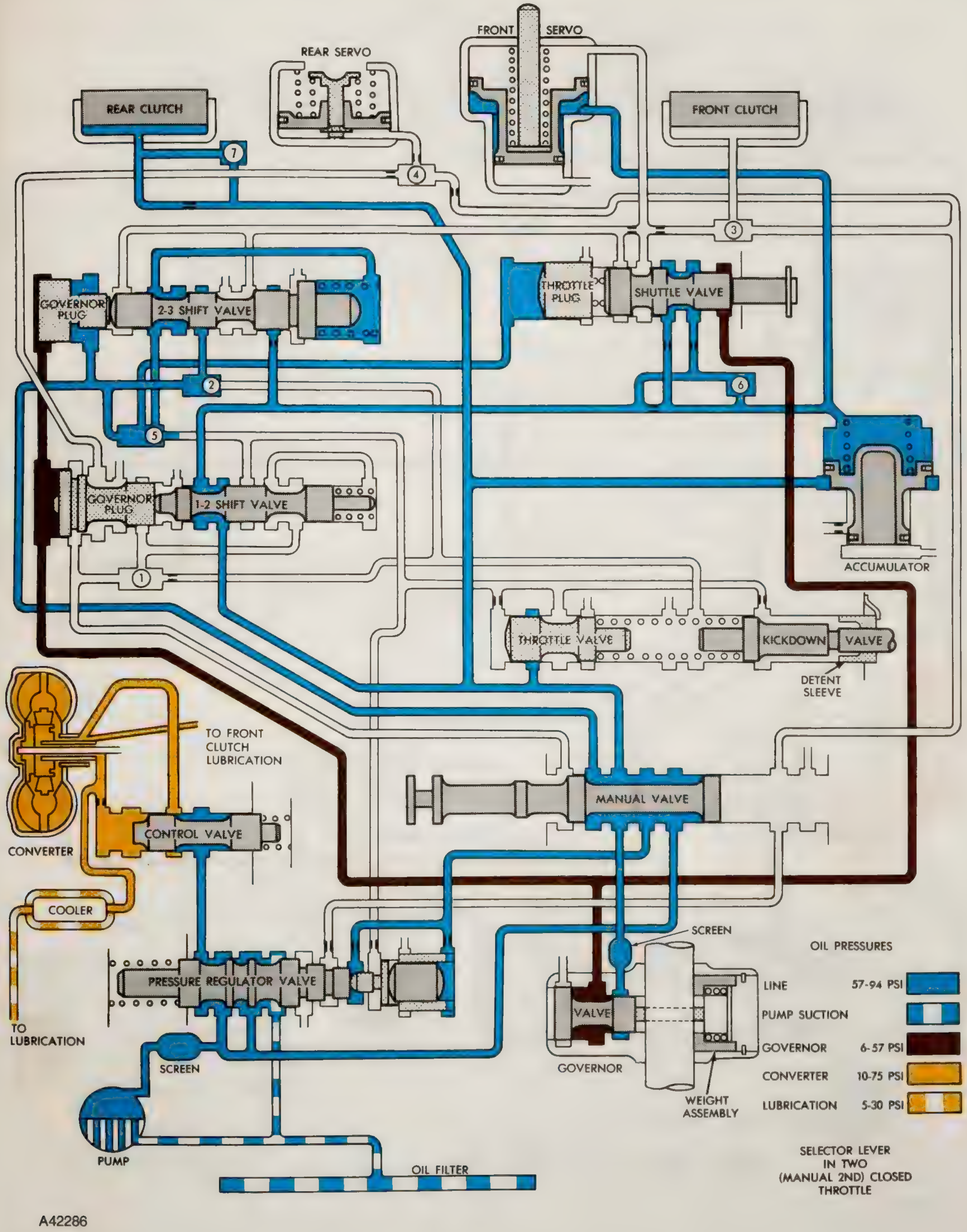
DRIVE—DIRECT (Six-Cylinder)



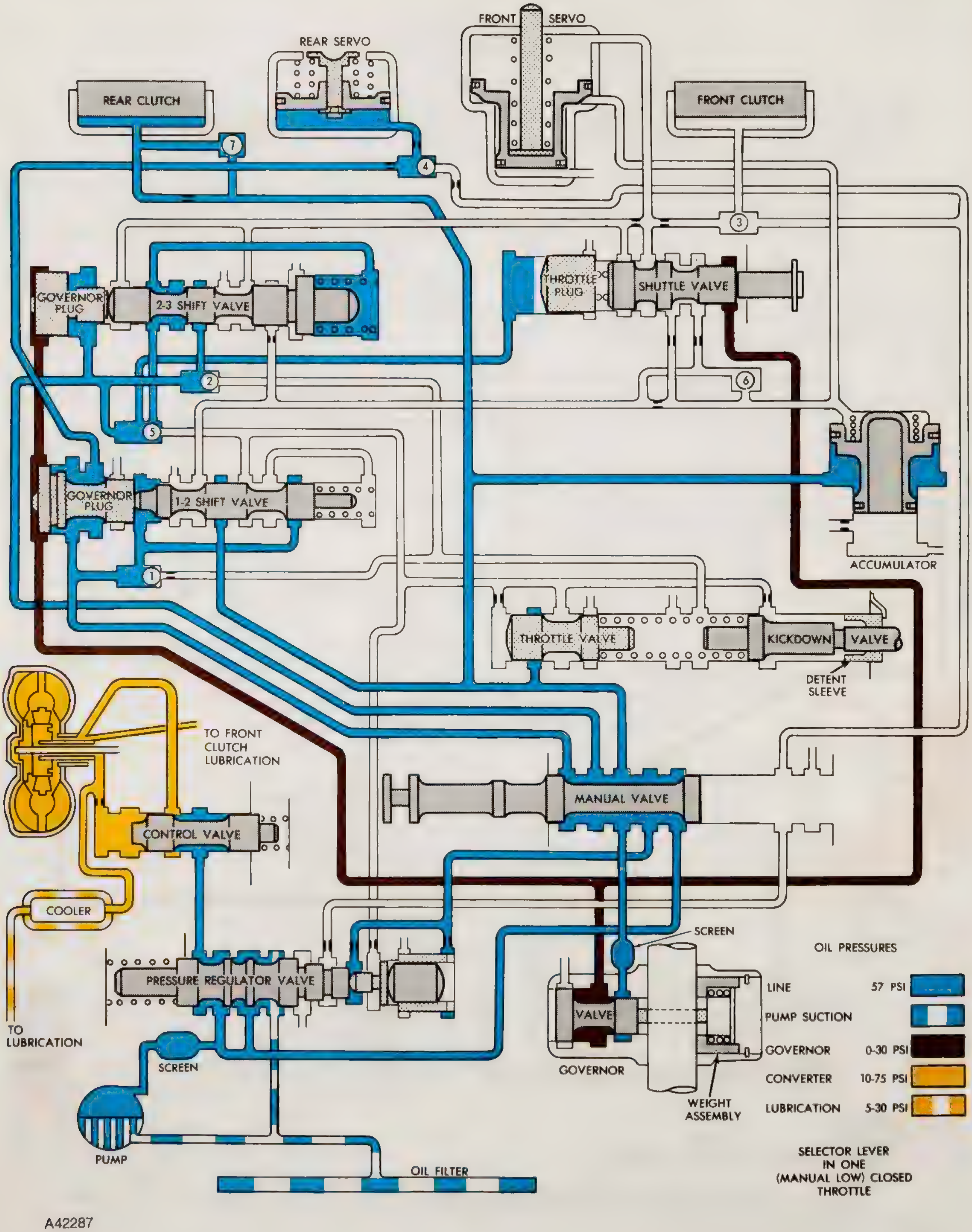
DRIVE—PART THROTTLE KICKDOWN (Six-Cylinder)



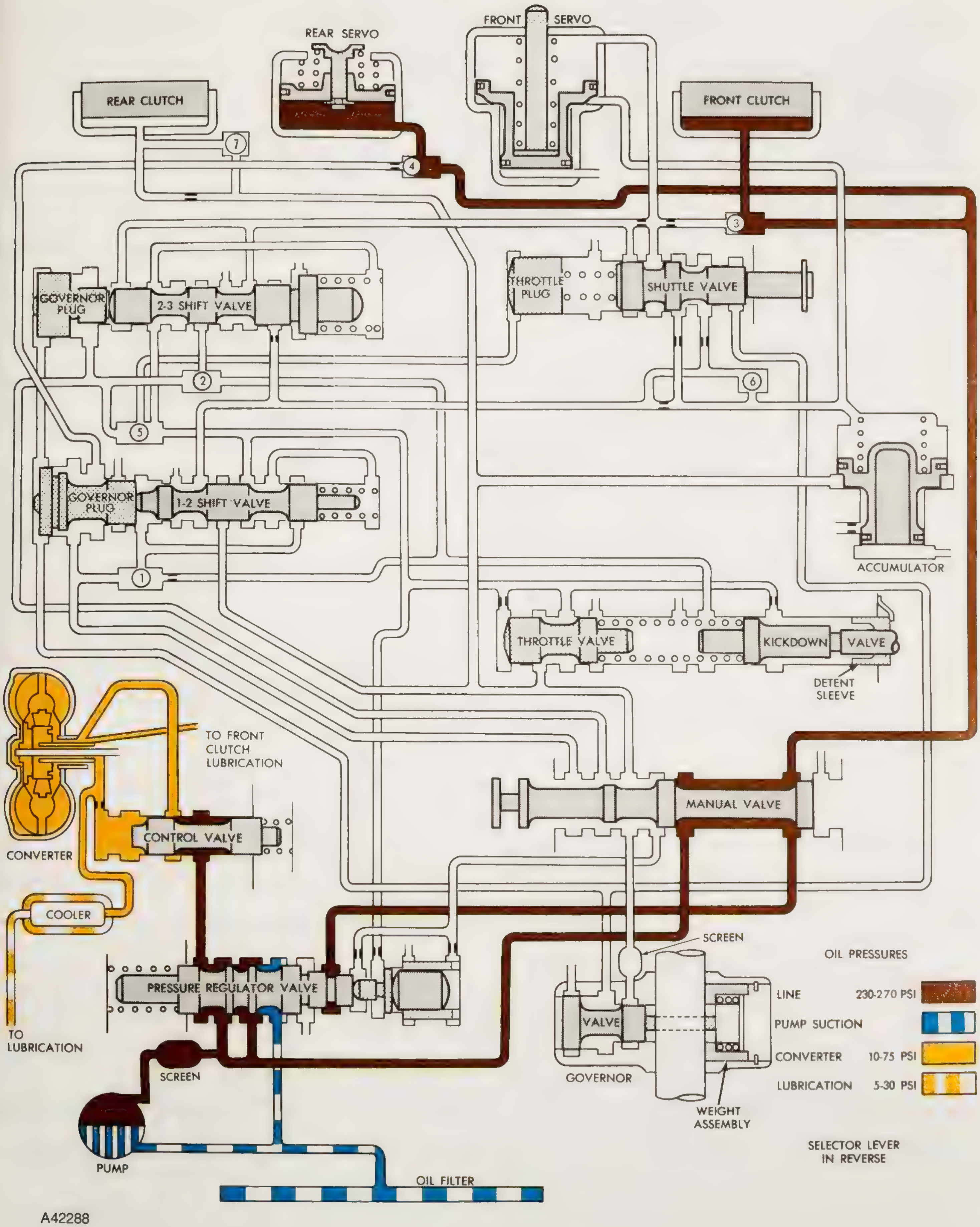
DRIVE—FULL THROTTLE KICKDOWN (Six-Cylinder)



SELECTOR LEVER—TWO (Six-Cylinder)



SELECTOR LEVER—ONE (Six-Cylinder)



REVERSE (Six-Cylinder)

NOTES

PROPELLER SHAFT 2D

SECTION INDEX

GENERAL

The propeller shaft is a tubular steel, one-piece shaft with a yoke welded at each end to accept the cross and roller type universal joints (fig. 2D-1).

The rear universal joint is attached to the rear axle yoke with clamp straps on all models. The front universal joint is connected to the transmission output shaft by an internally splined slip yoke. The yoke slides back and forth on the transmission output shaft to compensate for rear axle and suspension movement. The slip yoke is supported in the transmission extension housing by a bushing installed in the rear of the housing.

The universal joints are serviced as assemblies only. If the needle bearings, bearing cap seals, or spiders become damaged or worn excessively, replace the complete universal joint assembly.

CAUTION: *The propeller shaft is a balanced assembly and must be handled carefully during service. Dents or bends in the tube or distortion of the yokes will produce excessive runout and result in vibration. If the car is to be undercoated, undercoating material must be kept off the shaft and joints. This material will cause an unbalanced condition resulting in vibration.*

PROPELLER SHAFT REMOVAL

(1) Shift transmission into neutral.

(2) Raise car on hoist.

(3) Mark rear axle and propeller shaft yokes for assembly alignment reference.

(4) Disconnect propeller shaft at rear axle yoke.

CAUTION: *The rear axle yoke is attached to the drive pinion by the pinion nut. Do not loosen this nut.*

(5) Move propeller shaft forward, disengage rear universal joint, slide front slip yoke off transmission output shaft, and remove propeller shaft.

(6) Wrap slip yoke in cloth or with tape to protect it from damage during handling.

PROPELLER SHAFT INSTALLATION

(1) Remove protective cloth or tape from slip yoke.

(2) Install front slip yoke on transmission output shaft splines until rear universal joint can be seated in rear axle yoke.

(3) Align reference marks on rear axle and propeller shaft yokes. Rotate propeller shaft to align reference marks if necessary.

(4) Seat universal joint in yoke and install clamp straps. Tighten clamp strap bolts to 14 foot-pounds (18.9 Nm) torque.

(5) Lower car.

DRIVELINE VIBRATION

Driveline vibration may be caused by the propeller shaft, rear axle yoke, universal joints, or rear universal joint angle.

Vibration caused by the propeller shaft may be the result of:

- Undercoating on the shaft tube
- Missing shaft balance weight(s)
- Excessive shaft runout
- Worn or damaged propeller shaft yokes or universal joints
- Broken seam welds at either end of the shaft
- Dents or bends in the shaft tube.

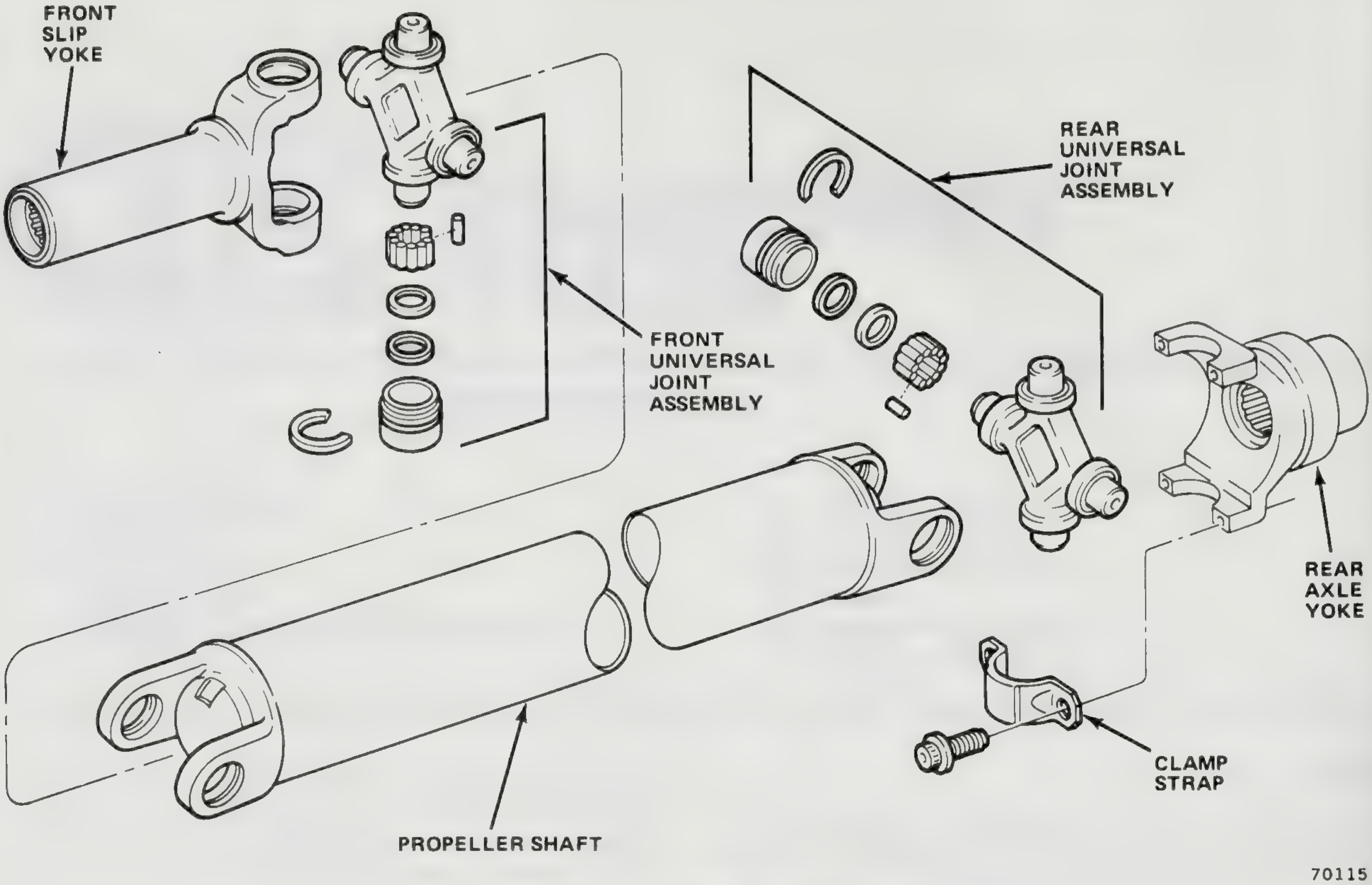


Fig. 2D-1 Propeller Shaft Assembly

Vibration caused by the rear axle yoke may be due to:

- Excessive yoke runout
- Loose clamp strap bolts or drive pinion nut
- Damaged rear axle yoke.

An incorrect rear universal joint pinion angle can produce an out-of-phase condition in the rear joint resulting in vibration at low or high speeds.

Driveline Vibration Diagnosis

Whenever a vibration condition is encountered, corrective procedures should not be initiated until the source of the vibration has actually been identified. The vibration type, sensitivity, and speed range must first be determined before the general problem area can be ascertained. Refer to Vibration Diagnosis in Chapter 2G for details.

When a vibration condition is confirmed as being driveline related, the following procedures for determining the vibration source must be performed in the sequence indicated. Deviation from the sequence or procedures could result in ineffective or unnecessary repairs.

(a) Inspect driveline.

(b) Check and adjust rear universal joint angle, if necessary.

(c) Check and correct propeller shaft runout if necessary.

(d) Check and correct propeller shaft balance if necessary.

After performing each procedure, road test the car to determine if the vibration has been eliminated or reduced to an acceptable level.

Each of the required diagnosis procedures are outlined in this chapter. Refer to: Driveline Inspection, Propeller Shaft Runout, Propeller Shaft Balance, and Universal Joint Angle Measurement and Adjustment.

DRIVELINE INSPECTION

Raise the car on a hoist and inspect the driveline components for the following conditions:

(1) Undercoating or other foreign material on propeller shaft.

(2) Missing propeller shaft balance weights.

(3) Broken seam welds in propeller shaft where yokes are welded to ends of shaft tube.

(4) Dents, bends, or cracks in propeller shaft tube.

(5) Loose, broken, or worn universal joints.

(6) Worn or damaged transmission extension housing or housing bushing.

(7) Loose drive pinion nut.

(8) Loose or missing rear universal joint clamp strap bolts.

(9) Broken or loose engine front supports or rear crossmember.

(10) Broken or loose rear springs or broken or loose spring U-bolts on Pacer, Gremlin, and Concord models.

(11) Rear axle spring mounting pads broken, cracked, or loose.

(12) Damaged rear control arms on Matador models.

If any of the indicated conditions are discovered, make repairs as necessary and road test the car to determine if the problem has been corrected.

PROPELLER SHAFT RUNOUT

Measure propeller shaft runout at the center and both ends of the shaft using a dial indicator.

The dial indicator must be installed perpendicular to the shaft surface and be rigidly mounted to prevent inaccurate readings. As a further precaution when measuring propeller shaft runout, remove all dirt, paint, and undercoating from the areas where the dial indicator stylus will contact the surface of the shaft.

Runout Measurement Procedure

(1) Shift transmission into neutral.

(2) Raise car on twin post, or similar-type hoist that will support axle and allow rear wheels to be turned.

NOTE: *If a drive on-type hoist must be used, place a support stand under each axle tube and lower the hoist until the rear wheels clear the hoist ramps.*

(3) Clean one-inch wide strips around circumference of propeller shaft in following three locations. Runout will be measured at these points:

(a) Rear end of shaft, 1/2-inch (12.700 mm) forward of weld joint.

(b) Center of shaft.

(c) Front of shaft, 1/2-inch (12.700 mm) to rear of weld joint.

(4) Check runout at front of propeller shaft. Mount and zero dial indicator, turn rear wheels to rotate shaft, and measure runout. If runout exceeds 0.010-inch (0.2540 mm), replace shaft. If runout is within specified limits, proceed to next step.

(5) Check runout at front of propeller shaft. Mount and zero dial indicator, turn rear wheels to rotate shaft, and measure runout. If runout exceeds 0.015-inch (0.3810 mm), replace shaft. If runout is within specified limits, proceed to next step.

(6) Check runout at rear of propeller shaft. Mount and zero dial indicator, turn rear wheels to rotate shaft, and measure runout. If runout exceeds 0.010-inch (0.2540 mm), proceed to next step.

(7) Disconnect shaft at rear axle yoke, turn shaft 180 degrees, reconnect shaft to yoke, and measure runout at rear of shaft again. If runout still exceeds 0.010-inch (0.2540 mm), proceed to next step.

(8) Mark propeller shaft and rear axle yokes for assembly alignment reference and disconnect shaft from yoke and secure shaft to axle tube using wire.

(9) Measure rear axle yoke runout using Yoke Runout Tool J-28488 as follows:

(a) Position tool in yoke bearing saddles and reinstall universal joint clamp straps to secure tool in yoke.

(b) Mount dial indicator on frame side sill or other convienient location. Position dial indicator stylus on concave surface machined into ring portion of runout tool.

(c) Turn rear wheels to rotate yoke and measure yoke runout. Runout must not exceed 0.010 inch (0.2540 mm) total indicator reading at any point in 360 ° rotation.

(10) If yoke runout is within limits, remove tool and install propeller shaft.

(11) If yoke runout exceeds limits, remove runout tool and proceed to next step.

(12) Measure drive pinion rotating torque using socket and inch-pound torque wrench.

CAUTION: *Do not remove the yoke without first measuring pinion rotating torque. The original rotating torque must be known in order to maintain correct pinion bearing preload at assembly. Failure to observe this step could result in unneccessary differential teardown.*

(13) Remove pinion nut and yoke. Refer to Pinion Oil Seal and Yoke Replacement in Chapter 2E.

(14) Turn yoke 90° from its original position and reinstall it on drive pinion.

(15) Install original pinion nut but tighten it only enough to remove yoke end play.

(16) Reinstall runout tool in yoke and remeasure yoke runout again. Continue repositioning yoke on pinion until runout is within specified limits.

(17) Reconnect propeller shaft to yoke and check propeller shaft rear runout. If runout is 0.010-inch (0.2540 mm) or less, proceed to next step. If shaft runout cannot be corrected to specified limits, install replacement shaft and check runout of replacememt shaft.

(18) When runout is within specified limits, disconnect propeller shaft and install replacement pinion nut as outlined under Pinion Oil Seal and Rear Yoke Replacement in Chapter 2E.

CAUTION: *Do not overtighten the pinion nut. If the desired rotating torque is exceeded, the drive pinion must be removed and a replacement collapsible sleeve and pinion nut installed.*

(19) Connect propeller shaft to rear axle yoke. Align shaft and yoke using reference marks made at removal and tighten clamp strap bolts to 14 foot-pounds (18.9 Nm) torque.

(20) When all runout tolerances are within specified limits, lower car and road test to check operation.

PROPELLER SHAFT BALANCING

The propeller shaft may be balanced using the following procedures when diagnosis indicates a possible unbalance condition exists.

(1) Raise and support rear of car at axle and remove rear wheels.

(2) Remove undercoating and accumulated dirt from propeller shaft.

(3) Position an electronic wheel balancer pickup under axle housing as close as possible to rear axle yoke.

(4) Mark four equally spaced horizontal lines on circumference of propeller shaft using crayon or chalk. To identify each line, make them unequal in length.

(5) Start engine, shift transmission into gear, and operate car at speed where vibration occured.

(6) Using wheel balancer strobe light, locate heavy spot on propeller shaft. Identify location of heavy spot using horizontal lines previously marked on shaft.

CAUTION: *To avoid overheating the transmission and engine, do not operate the car for extended periods .*

(7) Install two worm-type hose clamps on propeller shaft with heads of clamps located 180° from heavy spot and slide clamps rearward as far as possible (fig. 2D-2).

(8) Start engine and operate car at speed where vibration occured. If vibration still exists, stop engine and move both hose clamp heads an equal distance in opposite directions toward heavy spot (fig. 2D-3). Continue moving hose clamps until wheel balancer indicator remains within balance range of scale.

(9) Repeat balance procedure at front of propeller shaft with electronic wheel balancer pickup located at rear of transmission extension housing.

NOTE: *On cars equipped with an aluminum extension housing, it will be necessary to install a steel hose clamp on the rear of the extension housing to accommodate the magnetic pickup.*

(10) Lower car and road test to verify correct after propeller shaft balance.

Mechanical Method

(1) Raise and support rear of car at axle and remove rear wheels.

(2) Remove accumulated dirt and undercoating from propeller shaft.

(3) Operate car in gear at approximately 40 mph to locate heavy spot of propeller shaft.

(4) Use support stand as steady rest and slowly advance crayon or chalk toward rotating propeller shaft.

(5) At instant crayon or chalk contacts propeller shaft, withdraw crayon or chalk. This mark indicates heavy spot of propeller shaft.

CAUTION: *To avoid overheating the engine and transmission, do not operate the car for extended periods.*

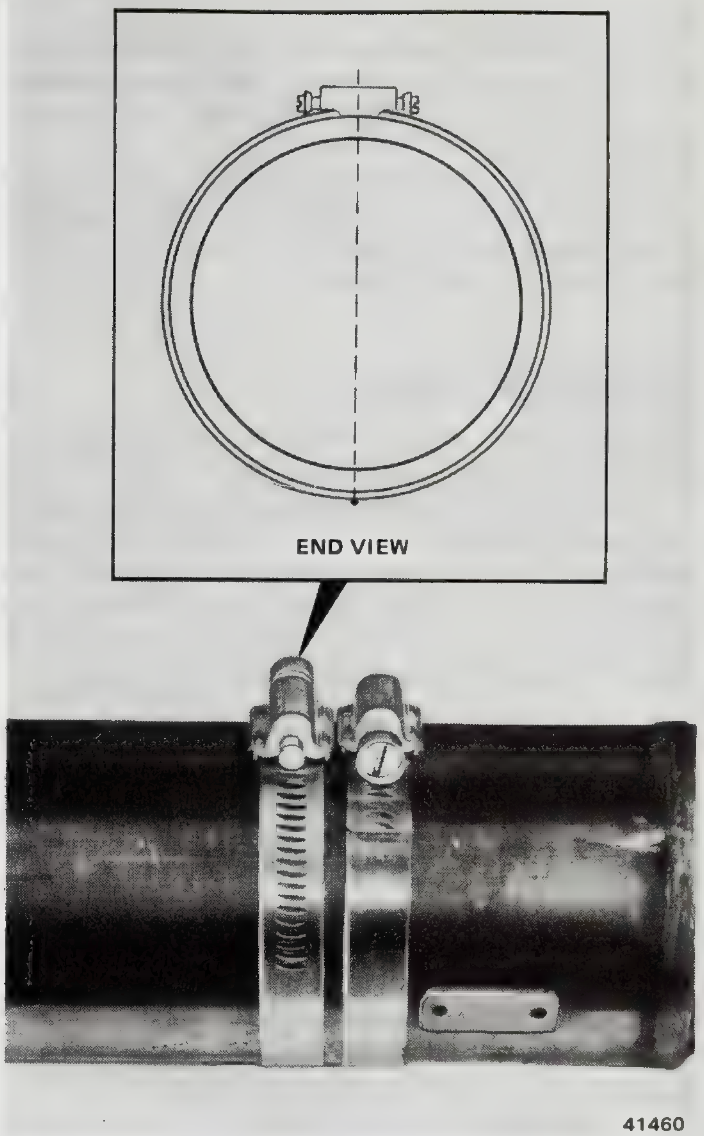


Fig. 2D-2 Hose Clamp Heads 180° from Heavy Spot

(6) Stop engine and install two worm-type hose clamps at rear of propeller shaft with clamp heads located 180° from heavy spot. Slide clamps rearward as far as possible (fig. 2D-4).

(7) Start engine, shift transmission into gear, and operate car at speed where vibration occured. If vibration is not reduced, stop engine, rotate both clamp heads at 90-degree increments around shaft. Continue moving clamps until vibration is at minimum .

(8) When point of minimum vibration is determined, rotate both clamp heads an equal distance in opposite directions toward heavy spot until vibration is eliminated or reduced to acceptable level. If results are still not satisfactory, repeat balance procedure at front of propeller shaft.

UNIVERSAL JOINTS

Cross and roller-type universal joints are used at the

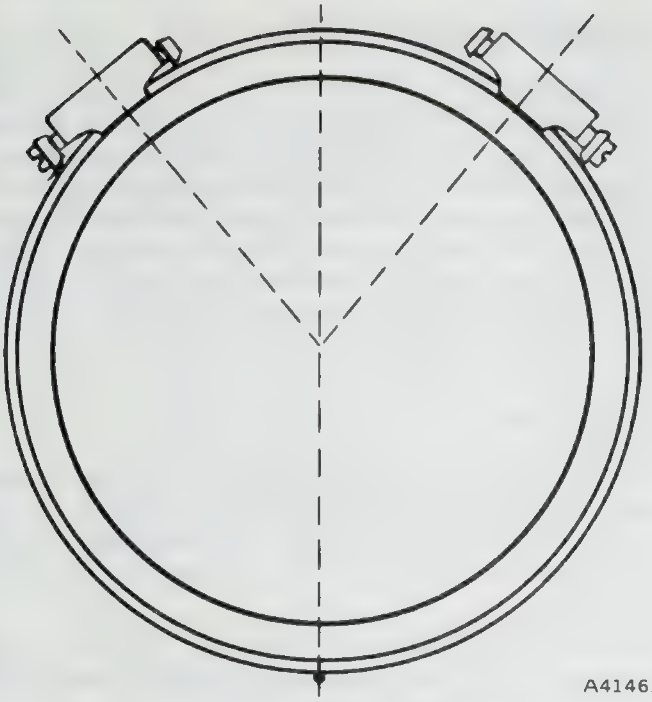


Fig. 2D-3 Hose Clamp Heads Moved Toward Heavy Spot

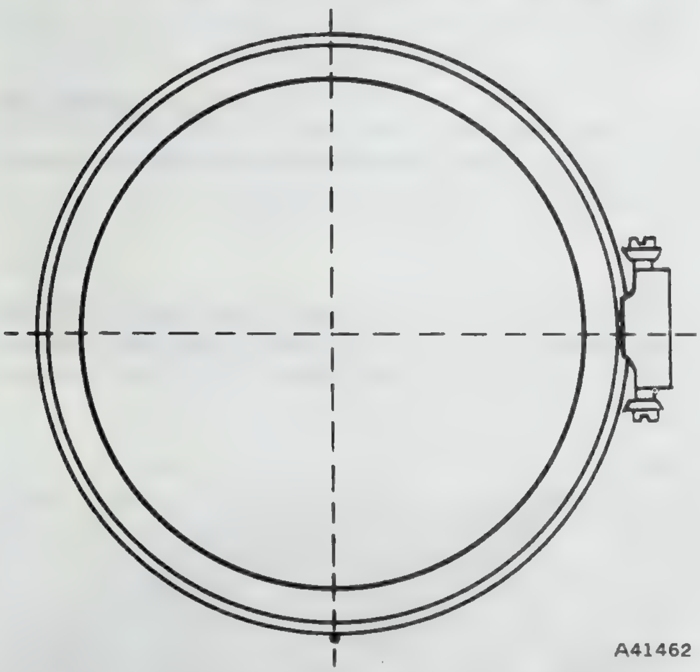


Fig. 2D-4 Hose Clamp Heads Moved 90° From Initial Location

front and rear of the propeller shaft on all AMC car models. The four front universal joint bearing caps are retained in the propeller shaft yokes by the bearing retainers (fig. 2D-5). The four rear universal joint bearing caps are retained in the propeller shaft and rear axle with two bearing retainers and two clamp straps (fig. 2D-6).

Universal Joint Lubrication

The front and rear universal joints are lubricated at

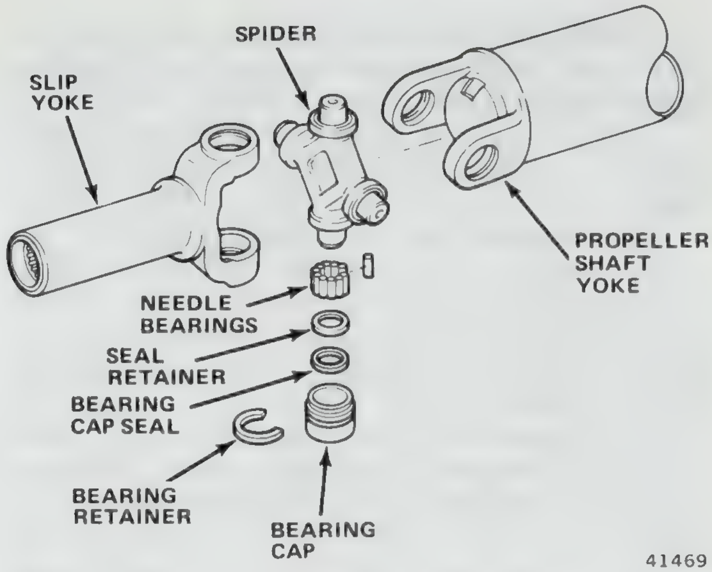


Fig. 2D-5 Front Universal Joint Assembly

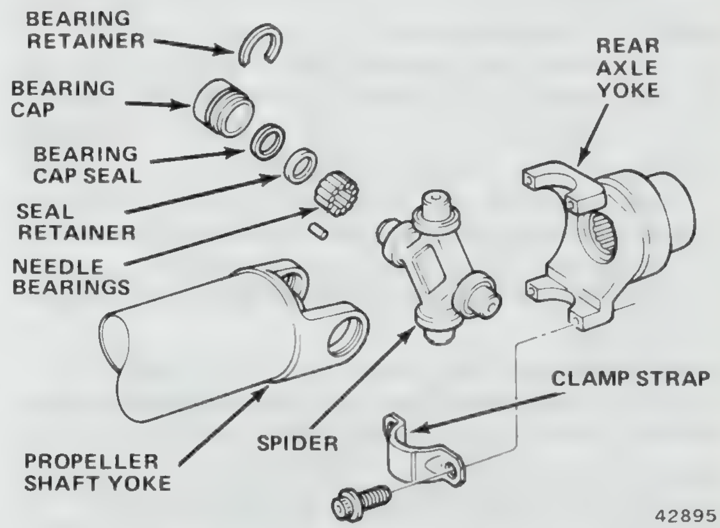


Fig. 2D-6 Rear Universal Joint Assembly

time of assembly for the normal service life of the part. Additional lubrication is required only when the universal joint is disassembled for other service reasons.

Disassembly—Front Universal Joint

(1) Wrap sliding surface of front slip yoke with cloth or tape to protect surface during handling.

(2) Mark position of front slip yoke and propeller shaft yoke for assembly reference.

(3) Remove all bearing retainers and apply penetrating oil to bearing caps.

(4) Mount propeller shaft yoke and universal joint in vise.

CAUTION: *Do not clamp any portion of the propeller shaft tube in the vise. If the tube becomes bent, dented, or distorted, vibration will result.*

(5) Position 1-1/8 socket against yoke and over first bearing cap to be removed and position 9/16 socket against opposite bearing cap (fig. 2D-7).

(6) Compress vise jaws until 9/16 socket presses opposite bearing cap partially out of yoke and into 1-1/8 socket.

(7) Release vise jaws and remove sockets.

(8) Remove bearing cap that was partially pressed out of yoke.

(9) Position 1-1/8 socket against yoke and over remaining bearing cap and position 9/16 socket against bearing surface of spider.

(10) Compress vise jaws until 9/16 socket presses remaining bearing cap out of yoke and into 1-1/8 socket.

(11) Remove front yoke and spider from propeller shaft yoke.

(12) Remove bearing caps from front yoke and spider using procedure outlined in steps (2) through (10).

Disassembly—Rear Universal Joint

(1) Remove all bearing retainers and apply penetrating oil to bearing caps.

(2) Mount propeller shaft yoke in vise.

(3) Position 1-1/8 socket against yoke and over first bearing cap to be removed and position 9/16 socket against opposite bearing cap (fig. 2D-7).

(4) Compress vise jaws until 9/16 socket presses opposite bearing cap out of yoke and into 1-/8 socket.

(5) Release vise jaws and remove sockets.

(6) Remove bearing cap that was partially pressed out of yoke.

(7) Position 1-1/8 socket against yoke and over remaining bearing cap. Position 9/16 socket against spider and compress vise jaws until 9/16 socket presses bearing cap out of yoke and into 1-1/8 socket.

(8) Remove spider from propeller shaft yoke.

Cleaning and Inspection

Clean the bearing cap bores in the propeller shaft yokes using solvent and a wire brush. Inspect the bearing surfaces of the spiders for ladder-type tracks, galling, excessive wear, surface cracks, and surface nicks or chipping. Inspect the bearing caps and bearing rollers for excessive wear, cracks, flattened bearing rollers, or lack of lubrication. Replace the complete assembly if any component exhibits these characteristics.

Assembly—All

(1) Apply all purpose chassis grease to bearing caps, bearing rollers and bearing surfaces of spiders.

(2) On front universal joint, align front slip yoke and propeller shaft yoke using reference marks made at disassembly.

(3) Position spider in yoke and partially install bearing caps. Be sure bearing cap seals and seal retainers are correctly positioned.

(4) Mount yoke in vise and press bearing caps into yoke using 9/16 socket (fig. 2D-8). When one bearing cap retaining ring groove clears inside of yoke, install retaining ring in that bearing cap and loosen vise jaws.

(5) Position 1-1/8 socket between vise jaw and opposite bearing cap and press cap into yoke. Install retaining ring in bearing cap when ring groove clears inside of yoke.

NOTE: *If the retaining rings prove difficult to install, the bearing caps may not be seated completely. If necessary, strike the ends of the bearing caps with a rawhide mallet to seat them completely.*

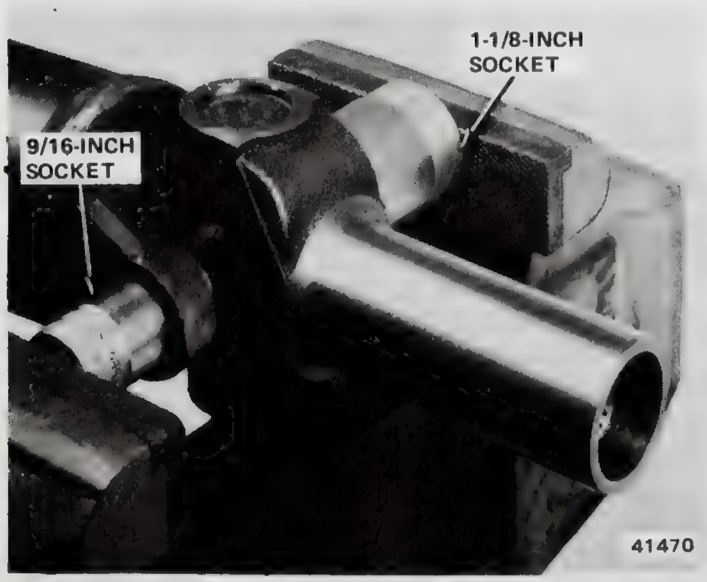


Fig. 2D-7 Removing Bearing Caps

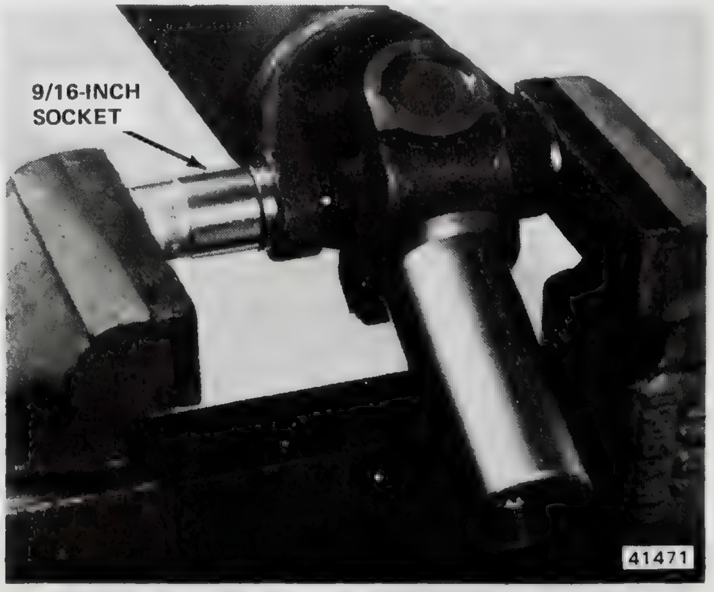


Fig. 2D-8 Installing Bearing Caps

UNIVERSAL JOINT ANGLE MEASUREMENT AND ADJUSTMENT

When universal joints operate at an angle, the rotational speed of the driven yoke will fluctuate even when the speed of the driving yoke is constant. The driven yoke will increase and decrease its rotating speed twice during each revolution of the propeller shaft. This fluctuation in speed is proportional to the operating angle of the universal joint. This means that the greater the angle, the greater the fluctuation. To minimize this fluctuation the operating angles of the propeller shaft front and rear universal joints must be controlled.

Positive universal joint angles only are used. A wide variance in operating angles will result in driveline vibration. When excessive driveline vibration is encountered, universal joint angles must be checked and corrected if necessary.

If the angles formed by the intersection of the crankshaft, propeller shaft, and drive pinion centerlines are below the propeller shaft centerline, they are positive (+) angles (fig. 2D-9). If the angles found are above the propeller shaft centerline, they are negative (-) angles. Negative angles must be avoided at all times, Use positive angles only.

Measurement Procedure

(1) Shift transmission into neutral.

(2) Raise car on twin post or similar-type hoist that will support rear of car at axle and allow rear wheels to be turned.

NOTE: *If a drive on-type hoist is used, place support stands under each rear axle tube and lower the hoist until the rear wheels clear the hoist ramp.*

(3) On Matador models, measure distance between top of each axle tube and bottom of frame side sill. Make measurement with scale placed next to rubber bumper on each side sill.

(4) Add both measurements and divide by two to obtain average sill height for both sides.

(5) Refer to Matador Rear Universal Joint Angle Chart to determine proper angle specifications.

(6) Install Inclinometer Tool J-22910 and record gauge reading taken at:

- Rear axle yoke bearing cap
- Rear propeller shaft yoke bearing cap
- Front propeller shaft yoke bearing cap
- Front slip-yoke bearing cap

Refer to figures 2D-10 and 2D-11 for tool placement.

(7) Place inclinometer magnet on rear propeller shaft yoke bearing cap. Align inclinometer frame parallel to propeller shaft centerline. Rotate shaft to zero top bubble on inclinometer. Zero pendulum bubble with thumbscrew and read scale at base of inclinometer frame. Reading is indicated by vertical hairline mark on inclinometer pendulum. Record reading and remove tool.

(8) Place inclinometer magnet on rear axle yoke bearing cap. Take reading as outlined in step (7).

NOTE: *The inclinometer frame must face the same direction for both readings.*

(9) Difference in readings at propeller shaft rear yoke and rear axle yoke is rear universal joint angle (fig. 2D-12 and 2D-13).

Example:

Reading at rear axle yoke .... 16.2°
Reading at propeller shaft rear yoke .... 12.8°
Difference equals rear universal joint angle .... 3.4°

CAUTION: *Negative angles must be avoided at all times.*

(10) Place inclinometer magnet on propeller shaft front yoke bearing cap. Take reading as outlined in step (7). Record reading and remove tool.

NOTE: *Due to the proximity of the exhaust pipes to the transmission extension housing, it will be necessary to reverse the position of the inclinometer in order to take readings at the propeller shaft front yoke and transmission front (slip) yoke bearing caps. The inclinometer frame must face the same direction for both readings.*

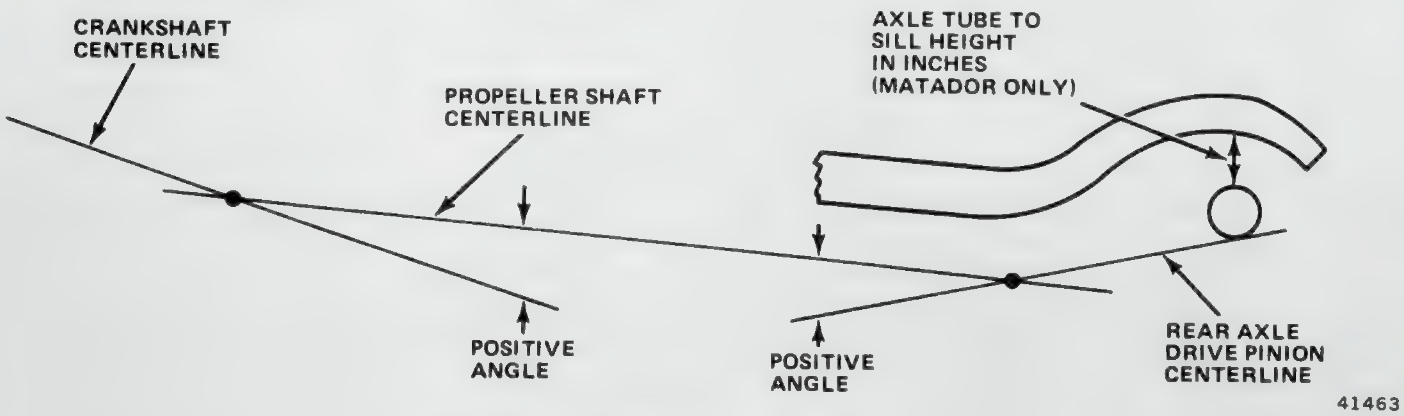


Fig. 2D-9 Positive Universal Joint Angles

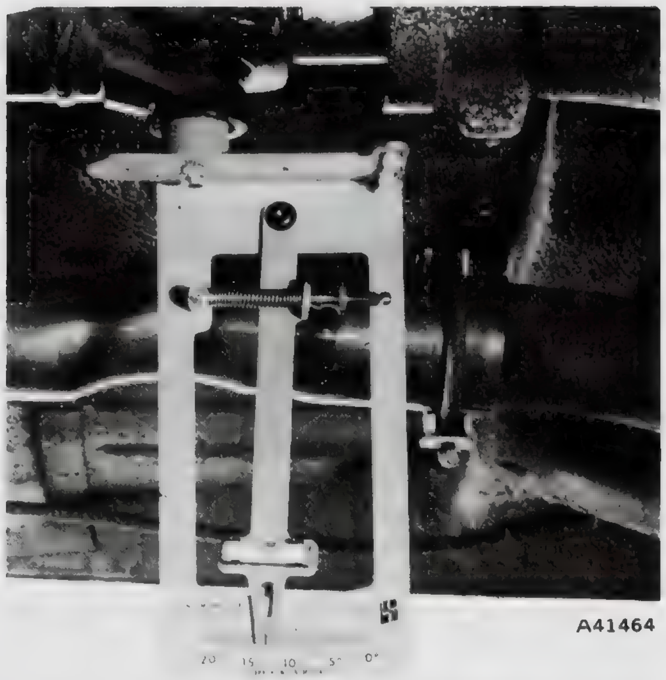


Fig. 2D-10 Inclinometer Installed at Propeller Shaft Front Yoke

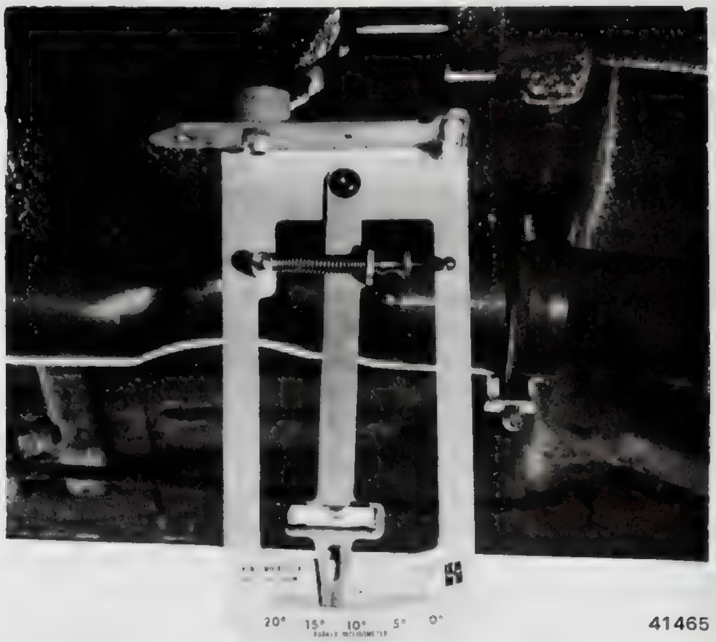


Fig. 2D-11 Inclinometer Installed at Transmission Front Slip Yoke

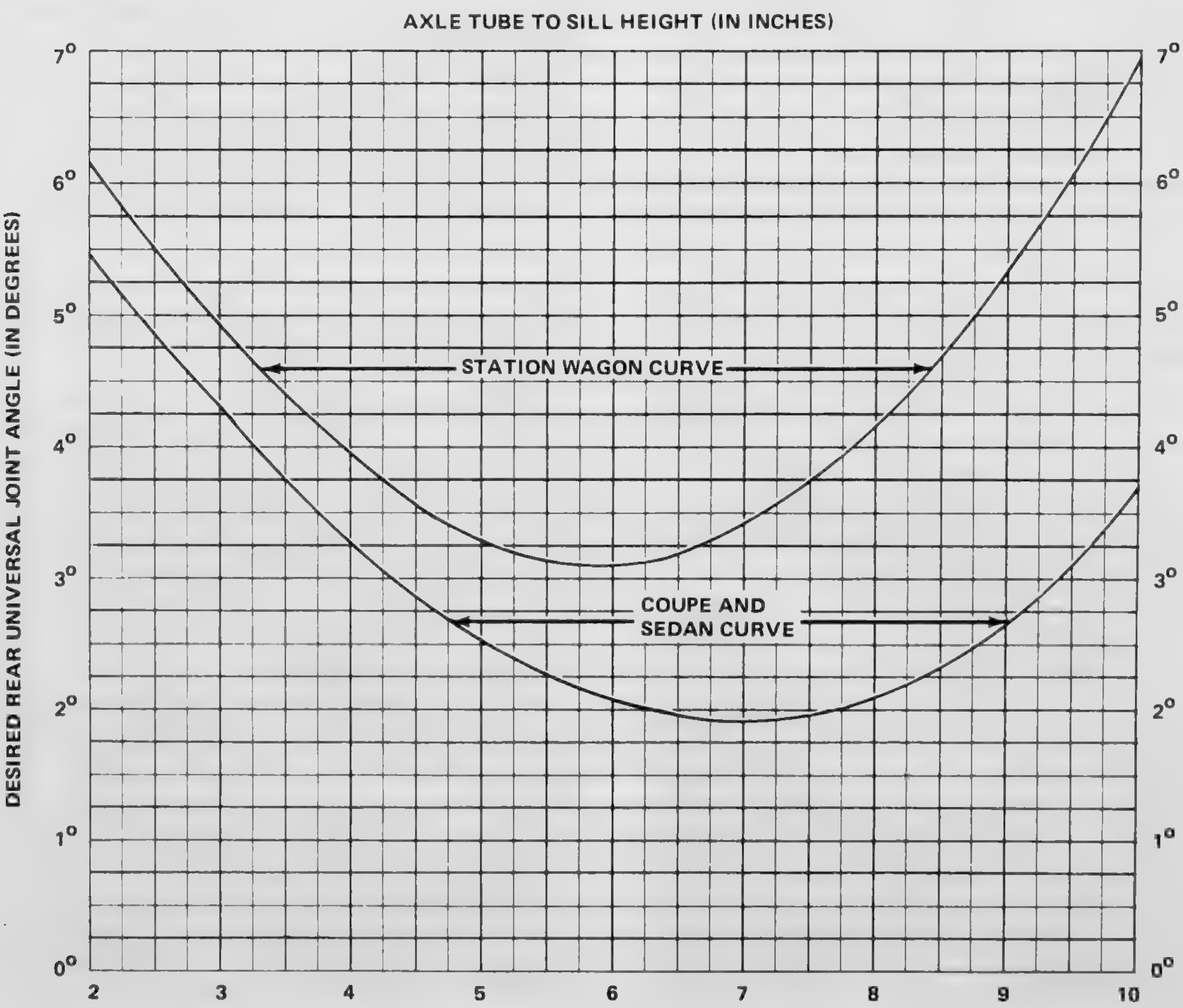


Fig. 2D-12 Universal Joint Angle—Matador

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(11) Place inclinometer magnet on transmission front slip yoke bearing cap. Take reading as outlined in step (7). Record reading and remove tool.

(12) Difference in readings at propeller shaft front yoke and transmission front (slip) yoke is front universal joint angle (fig. 2D-12 and 2D-13).

Example:

Reading at propeller shaft front yoke .... 10.7°
Reading at transmission front (slip) yoke .... 9.8°
Difference equals front universal joint angle .... 0.9°

NOTE: *Negative angles must be avoided at all times.*

(13) Adjust angles as necessary.
(14) Lower car and road test.

Rear U-Joint Angle—		
Pacer	+2 1/2°	(±1/2°)
Gremlin	+2 1/2°	(±1/2°)
Concord	+2 1/2°	(±1/2°)
AMX	+2 1/2°	(±1/2°)

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Fig. 2D-13 Universal Joint Angle—Pacer, Gremlin, Concord, AMX

Universal Joint Angle Adjustment

If the front universal joint angle is negative, adjust the front angle first; then check and adjust the rear universal joint angle. If the front universal joint angle is positive, adjust the rear universal joint angle first and then check and adjust the front angle.

On Matador models, install shims between the rear suspension crossmember and mounting bracket to adjust the rear universal joint angle (fig. 2D-14).

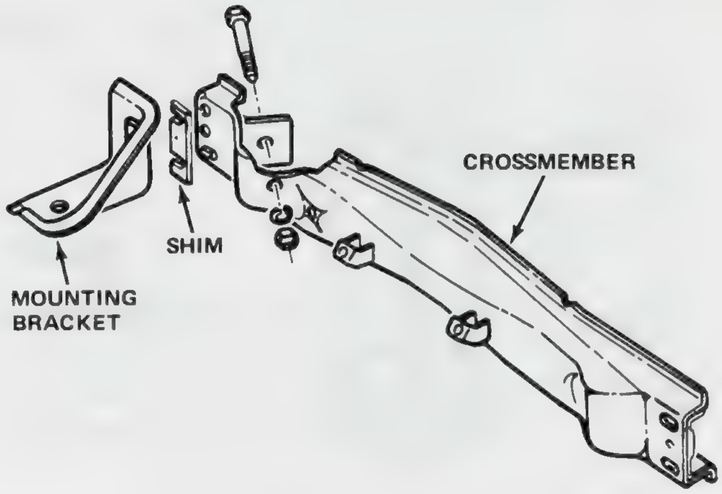

Fig. 2D-14 Rear Suspension Crossmember Shims

On Pacer, Gremlin and Concord models, install wedge-shaped shims between the rear springs and rear axle tube spring pads to adjust the rear universal joint angle. To increase the angle, install the shim so the thick end end faces the rear of the car. To decrease the angle, install the shim so the thick end faces the front of the car.

If shimming is required to reduce the front universal joint angle on any model, the rear suspension crossmember shims used on Matador models may be altered to fit between the engine rear crossmember and the frame side sill. If the front angle must be increased, install shims between the transmission and front crossmember.

If it is necessary to correct the front universal joint angle by adding shims, the transmission gearshift linkage must also be adjusted to compensate for the installation of the shims.

SPECIFICATIONS

Runout Specifications

Propeller Shaft	
Front	0.010 inch (0.254 mm)
Center	0.015 inch (0.381 mm)
Rear	0.010 inch (0.254 mm)
Rear Axle Yoke	0.006 inch (0.152 mm)

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Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft.lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Universal Joint Clamp Strap Bolt	19	16-22	14	12-16
Drive Pinion Yoke Nut, (Replacement Nut-Pinion Not Removed)	Original Rotating Torque Plus 5 Inch-Pounds			

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

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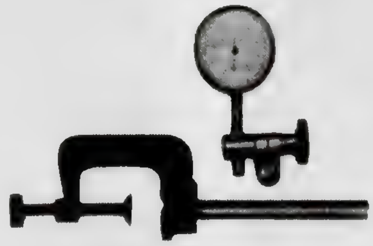
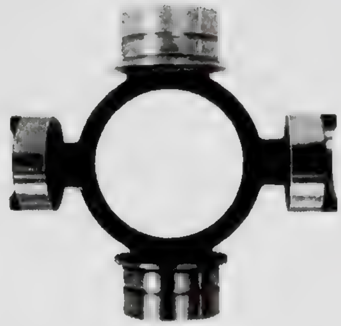
Special Tools

J-22910 — PINION ANGLE GAUGE (INCLINOMETER)



J-8001 — DIAL INDICATOR SET



J-28488 YOKE RUNOUT TOOL

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AXLE 2E

SECTION INDEX

GENERAL INFORMATION

GENERAL

AMC cars are equipped with a semi-floating rear axle with hypoid gears and tapered axle shafts. Two different size axles are used. Pacer, Gremlin, Concord and AMX models use the AMC 7-9/16 axle. Concord and AMX models with eight-cylinder engine and all Matador models use the AMC 8-7/8 axle. Axle size designations are derived from the diameter of the ring gear used in these axles. A Twin-Grip limited slip differential is available as an option all axles.

The axle housing consists of a nodular cast iron center section and two steel axle tubes which are pressed into the center section.

The ring and pinion gears and differential are contained within the axle housing. A vent fitting and hose assembly are mounted on the right-hand axle tube to relieve internal pressure buildup.

The axle shafts, oil seals, and axle shaft bearings are contained within the axle tubes. The rear drum brake support plates are attached to mounting flanges welded to the axle tube outboard ends.

The differential assembly consists of a cast iron case containing two differential side gears, two differential pinion gears, and a pinion shaft on which the pinion gears are mounted. The differential side and pinion gears are in constant mesh.

DIFFERENTIAL OPERATION

The differential gear system divides torque between the axle shafts allowing them to rotate at different speeds when turning corners.

Each differential side gear is splined to an axle shaft. The pinion gears are mounted on the pinion shaft and rotate on the shaft. The pinion shaft is fitted into a bore in the differential case and is positioned at a right angle to the axle shafts.

In operation, power flow through the differential is as follows: the pinion gear rotates the ring gear. The ring gear, which is bolted to the differential case, rotates the case. The differential pinions, which are mounted on the pinion shaft (which is fitted in the case), rotate the side gears. The side gears, which are splined to the axle shafts, rotate the shafts.

During straight-ahead driving, the pinions do not rotate on the pinion shaft because input torque on the pinion gears is equally divided between the side gears. As a result, the pinions revolve with the pinion shaft but do not rotate around it (fig. 2E-1).

When turning corners, the outside wheel must travel farther than the inside wheel. This difference must be compensated for to prevent the wheels from scuffing and sliding through the turn. To accomplish this, the differential becomes effective allowing the axle shafts to rotate at different speeds.

As the inside wheel slows down, the side gear splined to this axle shaft also slows down. The pinions now rotate on the pinion shaft and act as balance levers by maintaining equal tooth loads to both side gears while allowing the axle shafts to rotate at unequal speeds (fig. 2E-2).

Powertrain-Driveline Combinations

Car Model	Engine CID	Trans. Model	Axle Ratio			Axle Size
			49 State	California	High Altitude	
Gremlin	2-Liter	HR1	3.31	3.08	3.31	7-9/16
		904	3.31	3.31	**	
Pacer, Concord (Wagon)	232	150T SR4 904	2.73 2.53 2.53	*	*	
Gremlin, Concord (Sedan-Hatchback)	232	150T SR4 904	2.73 2.53 2.53	*	*	
Pacer, Concord (Wagon)	258	SR4 904	2.53 2.73	2.73 3.08	3.08 3.08	
Gremlin, Concord (Sedan-Hatchback)	258	SR4 904	2.53 2.53	2.73 3.08	3.08 3.08	
AMX	258	SR4 904	2.53 2.53	2.73 3.08	3.08 3.08	
Concord (Sedan-Wagon)	304	998	2.56	2.87	3.15	8-7/8
Concord (Hatchback)	304	998	2.87	3.15	3.15	
Matador	258 304 360	904 998 727	3.15 2.87 2.87	3.15 3.15 3.15	3.15 3.15 3.15	

*232 CID not available for California or high altitude area applications. ** Auto-Trans. Not available For High Altitude Applications. 70152

AXLE IDENTIFICATION

The axle size and ratio identification code is stamped on the right-side axle tube boss of the center section. The letter codes are decoded as follows:

Axle Identification

LETTER CODE		AXLE RATIO	RING GEAR DIAMETER (Axle Size)
Standard Differential	Twin Grip Differential		
A	N	3.54:1 (11/39)	8-7/8
B	P	3.15:1 (13/41)	8-7/8
C	O	2.87:1 (15/43)	8-7/8
D	Q	3.91:1 (11/43)	8-7/8
X	Y	2.56:1 (16/41)	8-7/8
E	R	3.58:1 (12/43)	7-9/16
F	T	3.08:1 (13/40)	7-9/16
G	S	3.31:1 (13/43)	7-9/16
H	U	2.73:1 (15/41)	7-9/16
K	V	2.53:1 (17/43)	7-9/16

70153

AXLE TESTING AND DIAGNOSIS

The first important step in diagnosing axle noises is to obtain a complete description of the noise and driving conditions when the noise occurred. A road test with the customer demonstrating the complaint condition is recommended.

The transmission of engine torque through an angle of 90° to drive the rear wheels will produce some axle noise. Slight noises confined to a short speed range or to a specific period are considered normal.

Noise produced by the engine, air conditioner, heater, transmission, tires, wheel bearings, exhaust system, propeller shaft; or the action of wind on the body, grille, and luggage rack or air deflectors may be incorrectly

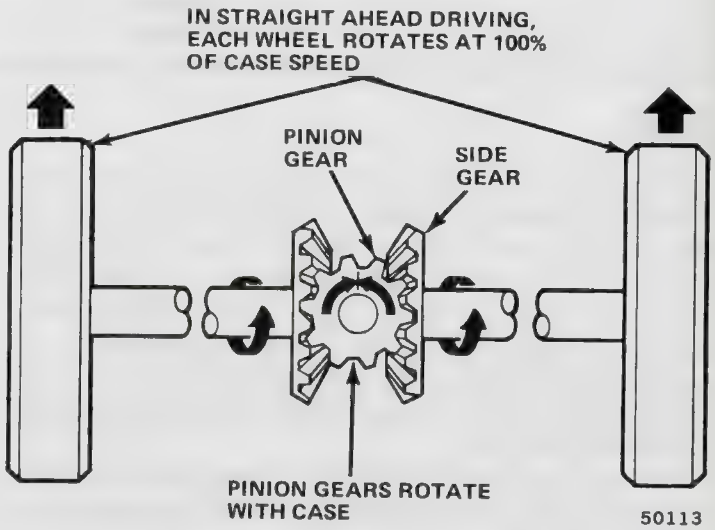

Fig. 2E-1 Differential Operation—Straight Ahead Driving

diagnosed as axle noise. The car must be thoroughly tested to isolate the trouble to a specific unit.

Stop the car, shift the transmission into Neutral, and operate the engine at various speeds. If the noise is heard during this test only, it is caused by the engine, exhaust system, clutch, transmission, or by engine operated accessories.

Before road testing, always check the tire pressures and rear axle lubricant level.

Tire Noise Tests

Some types of tire tread wear or tread patterns can produce noise. Drive the car on various types of road surfaces and listen for a change in the noise. If the noise varies with the type of road surface, the tires may be the cause.

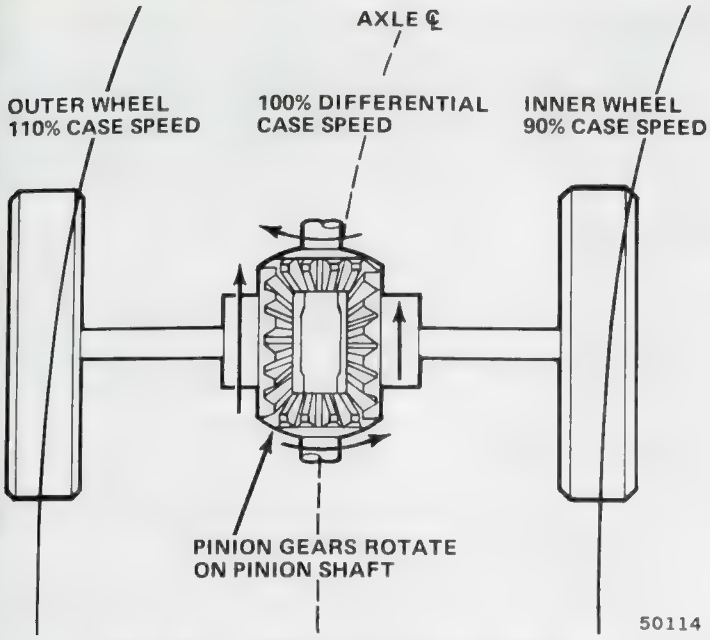

Fig. 2E-2 Differential Operation—On Turns

Wheel Bearing Tests

Noise produced by worn, loose, or damaged wheel bearings can be confused with axle noise. Wheel bearing noise is usually more noticeable when coasting at lower car speeds. Applying the brakes gently will usually change bearing noise. Another test is to turn the car alternately left and right which side loads the bearings and causing the problem bearing to become noisy.

Axle Tests

Drive the car a sufficient distance to warm the axle lubricant, then drive at various speeds and in all transmission gear ranges.

Axle noises are usually related to car speed rather than engine rpm or transmission gear range.

Axle noises may be classified into two types: gear noise and bearing noise.

Gear noise is recognized as a whine or high-pitched resonating sound more pronounced at certain speeds and usually occurring within a narrow speed range under a drive (accelerating load), coast (decelerating load), or float (continuous speed) condition.

Axle bearing noise is usually constant and the pitch directly related to car speed. Since the pinion gear turns faster than the ring gear, pinion bearing noises will be higher pitched than differential bearing noises. Pinion bearings are usually heard at low speeds (20 to 30 mph).

Differential bearing noises are lower in pitch because they turn at the same speed as the wheels when the car is driven straight ahead. Differential bearing noise will not vary when the car is turned alternately left or right or when the brakes are gently applied.

Axle Backlash

Axle backlash must be distinguished from worn universal joints, or a loose fitting front universal joint slip-yoke on the transmission output shaft splines.

Backlash may be caused by excessive ring and pinion clearance or by a loose fitting differential pinion shaft.

Excessive side gear-to-case clearance will also cause excessive backlash. Gear noise usually is present as a result of improper ring pinion gear depth or backlash adjustment.

Other Axle Conditions

A knocking or clucking noise that occurs during a low speed coast condition may be caused by a excessive differential side gear clearance. When this condition is encountered, a light brake application will usually decrease the noise to help identify the problem cause.

A driveline clunk noise that occurs during initial transmission engagement in Drive or Reverse may be caused by: excessive differential side gear clearance, excessive ring and pinion backlash, or a worn or loose pinion shaft.

Differential gear noise that occurs only under certain conditions such as when spinning a rear wheel during on-the-car wheel balancing, or when a rear wheel is spinning on icy pavement, is considered normal.

When a noise is caused by bearings, the gears do not require replacement unless an inspection reveals signs of obvious damage.

When noise is caused by the ring and pinion gears at low mileage, the need for bearing replacement depends upon inspection of the bearings during overhaul.

AXLE SERVICE

AXLE HUB REPLACEMENT

Removal

(1) Apply parking brakes and shift transmission into first gear, or Park if equipped with automatic transmission.

(2) On cars equipped with standard wheels, remove hub cap.

(3) On cars equipped with styled wheels with bolt-on hub caps, raise car, remove wheel, remove hub cap retaining bolts and hub cap, reinstall wheel, and lower car.

(4) Remove and discard cotter pin retaining axle shaft nut.

(5) Remove axle shaft nut.

(6) Raise and support rear of car.

(7) Remove wheels and remove brake drum retaining screws.

(8) Release parking brakes.

(9) Remove brake drum. If drum is difficult to remove, retract brakeshoes by backing off adjuster screw. Use section of welding rod to unseat adjuster lever before turning adjuster screw.

(10) Remove axle hub using Puller Tool J-1644-02 (fig. 2E-3).

CAUTION: *Do not use a knockout type puller to remove the hub. This type of puller may damage the rear wheel bearings and differential thrust block.*

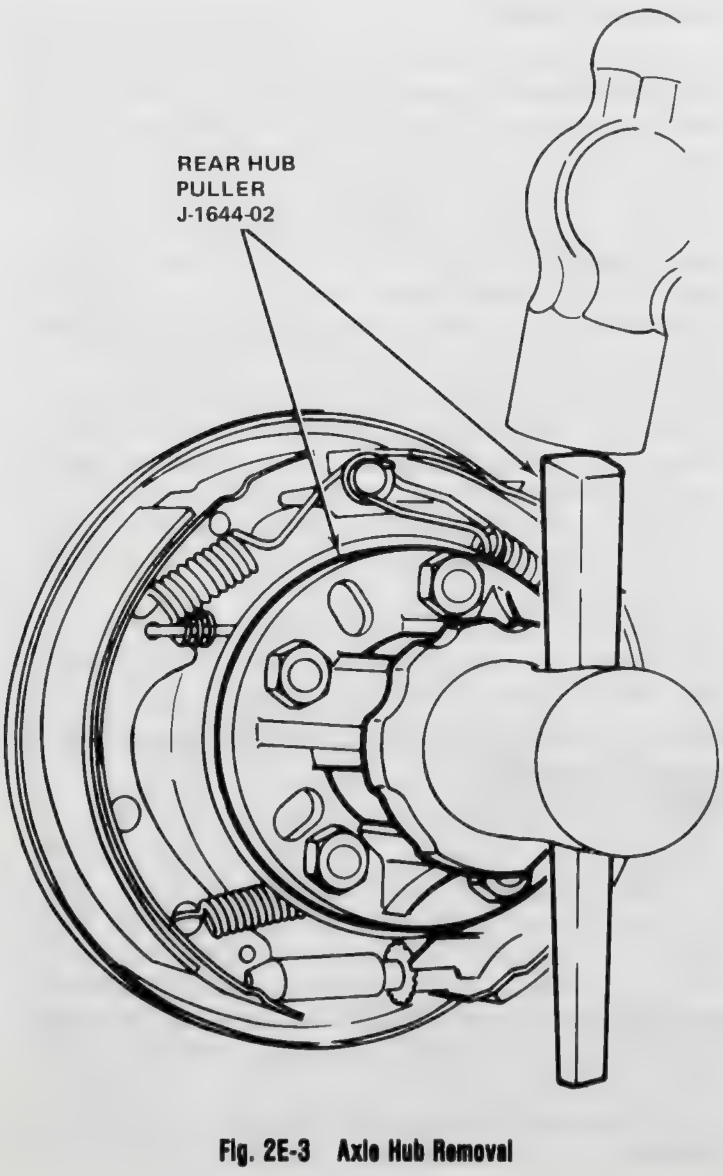

Fig. 2E-3 Axle Hub Removal

Inspection

Inspect the hub for loose or distorted wheel mounting studs and inspect the keyway and tapered bore for wear, damaged serrations, or cracks. Replace the hub if worn or damaged.

Installation

NOTE: *The methods for installing original and replacement hubs are different. Refer to the following two procedures for the appropriate installation method.*

Installing Original Hub

(1) Align keyway in hub with axle shaft key and slide hub onto axle shaft as far as possible.

(2) Install axle shaft thrust washer and nut.

(3) Install brake drum and drum retaining screws. If brakeshoes were retracted to ease drum removal, adjust drum-to-brakeshoe clearance before installing drum. Refer to Service Brake Adjustment in Chapter 2F.

(4) Install wheel.

(5) Lower car.

(6) Apply parking brake.

(7) Tighten axle shaft nut to 250 foot-pounds (338.9 Nm) torque.

(8) Install replacement cotter pin in nut. If cotter pin hole is not aligned, tighten nut to next castellation. Do not loosen nut to align cotter pin hole.

(9) On cars with standard wheels, install hub cap.

(10) On cars with styled wheels having bolt-on hub cap, raise car, remove wheel, install hub cap, reinstall wheel, and lower car.

(11) Release parking brakes.

Installing Replacement Hub

NOTE: *When a replacement axle shaft is installed, a replacement hub must also be installed. However, a replacement hub may be installed on an original axle shaft if the serrations on the shaft are not worn or damaged.*

(1) Align keyway in hub with axle shaft key and slide hub onto shaft as far as possible.

(2) Lubricate two thrust washers with chassis grease and install washers on end of shaft.

(3) Install axle shaft nut.

(4) Install brake drum and drum retaining screws. If brakeshoes were retracted to ease drum removal, adjust brakeshoe-to-drum clearance before installing drum. Refer to Service Brake Adjustment in Chapter 2F.

(5) Install wheel.

(6) Lower car.

(7) Apply parking brake.

(8) Tighten axle shaft nut until distance between hub outer face and end of shaft measures 1-3/16 inches (3.01 cm) on cars with 7-9/16 axle. Or, 1-5/16 inches (3.33 cm) on cars with 8-7/8 axle (fig. 2E-4).

CAUTION: *The hub must be pressed onto the axle shaft to the specified dimension in order to form the hub serrations properly.*

(9) Remove axle shaft nut.
(10) Remove one thrust washer.
(11) Reinstall axle shaft nut. Tighten nut to 250 foot-pounds (338.9 Nm) torque.
(12) Install replacement cotter pin. If cotter pin hole is not aligned, tighten nut to next castellation. Do not loosen nut to align cotter pin hole.
(13) On cars with standard wheels, install hub cap.
(14) On cars with styled wheels having bolt-on hub cap, raise car, remove wheel, install hub cap, reinstall wheel, and lower car.
(15) Release parking brake.

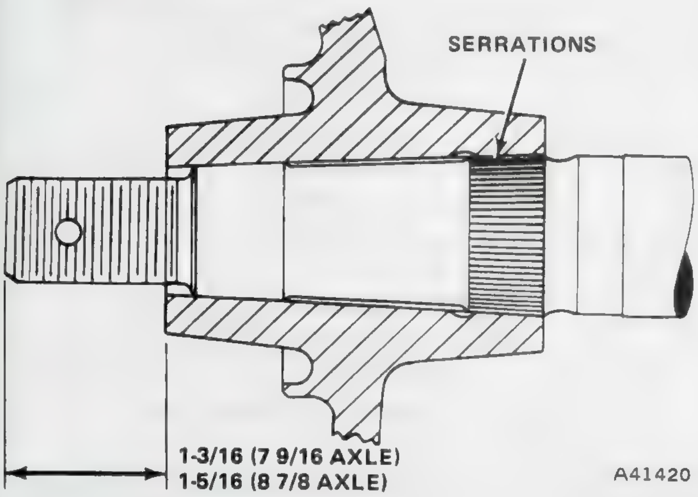

Fig. 2E-4 Axle Hub Installation Measurement

AXLE SHAFT AND BEARING REPLACEMENT

Removal

(1) Remove axle hub. Refer to Axle Hub Replacement.
(2) Disconnect brake line at wheel cylinder.
(3) Remove brake support plate assembly, axle shaft oil seal and retainer, and remove axle shaft end play shims if left side shaft is being removed.

NOTE: *Axle shaft end play shims are installed on the left side of the axle only.*

(4) Remove axle shaft and bearing using tool J-2498 (fig. 2E-5).

CAUTION: *On cars with a Twin Grip axle, do not rotate the differential unless both axle shafts are in place. If one shaft is removed and the remaining shaft is rotated, the side gear splines will become misaligned and prevent installation of the replacement shaft.*

(5) Remove and discard axle shaft inner oil seal.
(6) Remove axle shaft bearing using arbor press (fig. 2E-6).

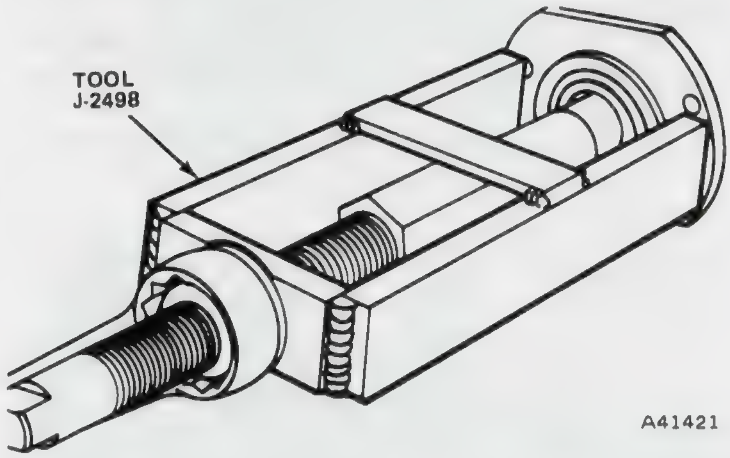

Fig. 2E-5 Axle Shaft and Bearing Removal

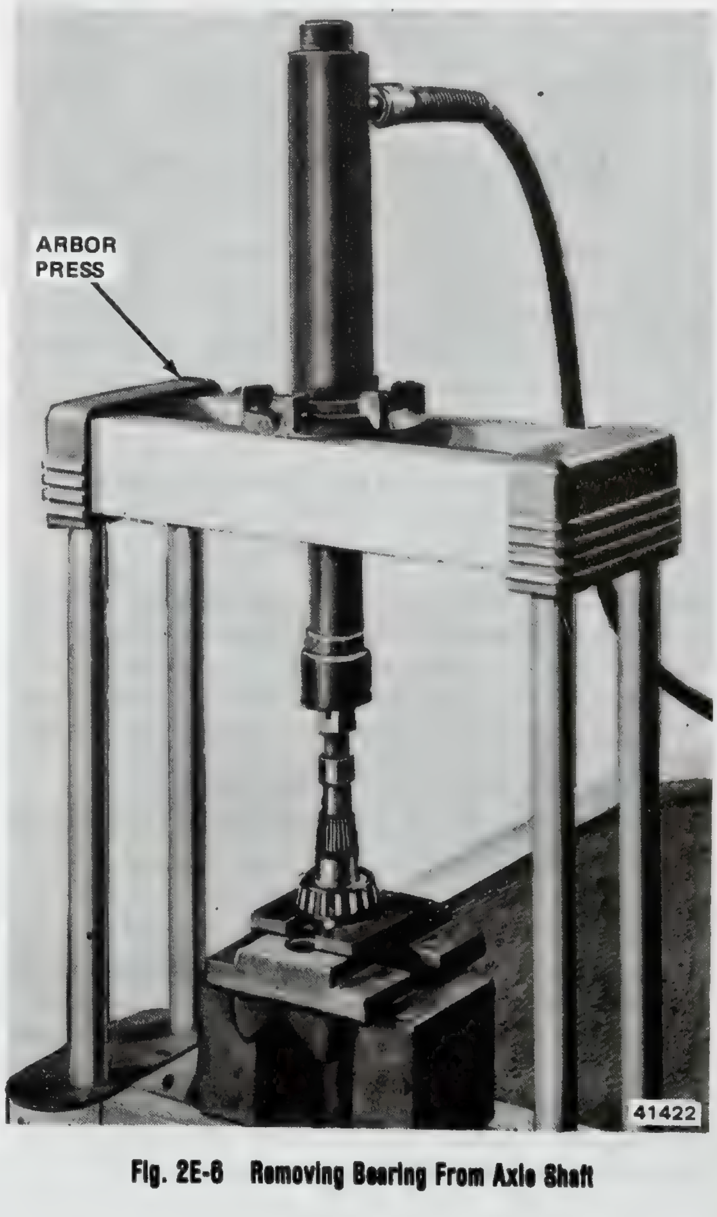

Fig. 2E-6 Removing Bearing From Axle Shaft

Installation

(1) Pack axle shaft bearings with wheel bearing lubricant.

(2) Press bearings onto shafts. Small diameter of bearing must face threaded end of shaft.

(3) Coat lip of inner oil seal with axle lubricant and coat outer surface of seal metal retainer with non-hardening sealant.

(4) Install inner oil seal using tool J-21788 on 8-7/8 axle or tool J-9431 on 7-9/16 axle (fig. 2E-7).

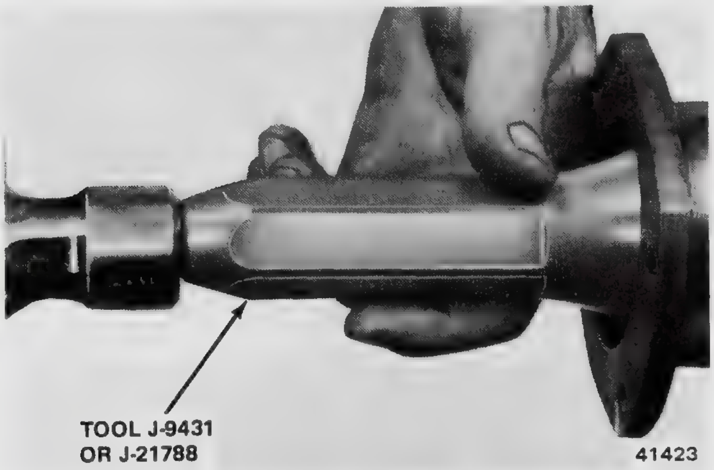

Fig. 2E-7 Axle Shaft Inner Oil Seal Installation

(5) Install axle shafts. Align splined ends of shafts with splined bores in differential side gears.

(6) Install axle shaft bearing cup.

(7) Inspect and replace brake support plate if plate is bent, distorted, has worn ledges, or if bolt holes are elongated. Refer to Support Plate Replacement in Chapter 2F.

(8) Install original end play shims, oil seal and retainer, and support plate. Tighten support plate attaching bolts to 35 foot-pounds (47.4 Nm) torque.

NOTE: *The oil seal and retainer is installed between the axle tube flange and support plate on cars with 7-9/16 axle and six-cylinder engine. On cars with 8-7/8 axle and eight-cylinder engine, the seal and retainer are installed on the axle hub side of the brake support plate.*

(9) Connect brake line to wheel cylinder.

(10) Check and adjust axle shaft end play as as outlined in following steps.

Axle Shaft End Play Adjustment

(11) Strike ends of axle shafts with lead hammer to seat bearing cups against support plates.

(12) Thread Axle Shaft End Play Tool J-2092 onto shaft.

(13) Mount dial indicator on support plate or end play tool, and measure end play while pushing and pulling on axle shaft (fig. 2E-8).

(14) End play should be 0.004 to 0.008 inch (0.1016 to 0.2032 mm) with 0.006 inch (0.1524 mm) desired.

(15) Correct end play as necessary by adding shims to increase end play, or removing shims to decrease end play.

NOTE: *Axle shaft end play shims are installed on the left side of the axle only. Add or remove shims at the left side only to adust end play.*

(16) Install axle hub, brake drum, and wheel as outlined in Axle Hub Replacement).

(17) Bleed and adjust brakes as outlined in Chapter 2F.

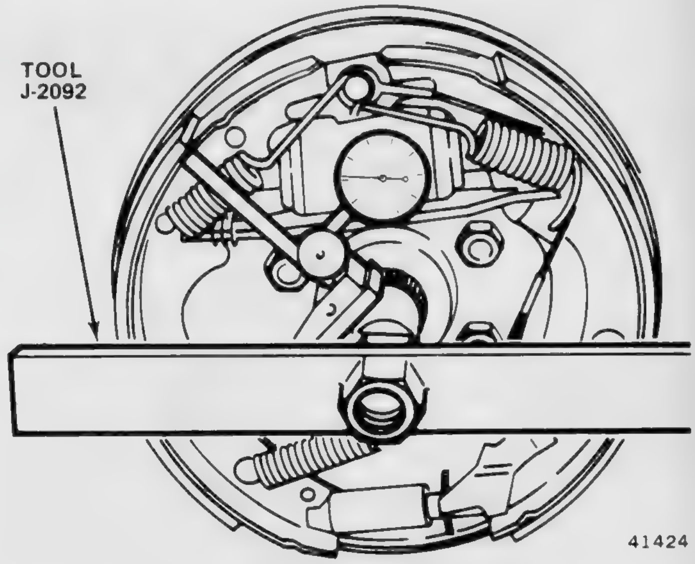

Fig. 2E-8 Measuring Axle Shaft End Play

PINION AND SIDE GEAR REPLACEMENT—STANDARD DIFFERENTIAL

Removal

(1) Remove axle shaft nuts and thrust washers. Refer to Axle Hub Replacement.

(2) Raise car.

(3) Remove axle housing cover and drain lubricant.

(4) Remove wheels, brake drums, axle hubs, axle shafts, oil seals and retainers, and end play shims. Refer to removal procedures outlined in this chapter as necessary.

(5) Remove pinion shaft pin using punch 3 inches (7.62 cm) long by 3/16 inches (4.78 mm) in diameter.

(6) Remove pinion shaft using brass drift and hammer.

(7) Remove thrust block. Manuever block through differential side gear bore.

(8) Roll differential pinions around on side gears until pinions and thrust washers can be removed from case.

(9) Remove side gears and thrust washers.

Installation

(1) Install thrust washers on differential side gears and install gears in case.

(2) Install thrust washers on pinions. Mate washer lips with shaft bores in gears to maintain washer position during installation.

(3) Install pinions. Mesh pinions with side gears until pinion shaft bores are aligned.

(4) Install thrust block. Be sure to align thrust block bore with pinion shaft bores in case.

(5) Install pinion shaft. Be sure shaft pin bore is aligned with pin bore in case.

(6) Install pinion shaft pin.

(7) Install axle shafts, oil seals and retainers, end play shims, support plates, axle hubs, axle shaft thrust washers and nuts, brake drums, wheels, and hub caps. Refer to installation procedures outlined in this chapter as necessary.

(8) Bleed brake hydraulic system. Refer to Brake Bleeding in Chapter 2F.

(9) Install axle cover gasket and cover.

(10) Fill axle to edge of fill hole with specified lubricant.

(11) Lower car.

PINION SEAL AND AXLE YOKE REPLACEMENT

Removal

(1) Raise and support car.

(2) Remove rear wheels and brake drums.

(3) Mark propeller shaft and axle yokes for assembly reference.

(4) Disconnect propeller shaft from axle yoke.

(5) Rotate pinion gear several revolutions and measure torque required to turn pinion. Use 1-1/8 socket and torque wrench calibrated in inch-pounds to rotate pinion and measure torque.

(6) Record torque required to rotate pinion gear for assembly reference.

(7) Remove and discard pinion nut. Remove nut using Remover Tool J-8614-01 and Nut Socket J-22575 (fig. 2E-9).

(8) Mark axle yoke and pinion gear for assembly reference.

(9) Position drain pan under axle housing.

(10) Remove axle yoke. If yoke cannot be removed by hand, remove it using tools J-8614-01,-02,-03 (fig. 2E-10).

(11) Inspect seal surface of yoke. If damaged or grooved, replace yoke.

(12) Remove pinion oil seal using tool J-9233 or J-7583 (fig. 2E-11).

Installation

(1) Before installing replacement seal, coat seal lip with axle lubricant.

(2) Install seal using tool J-22661 (fig. 2E-12).

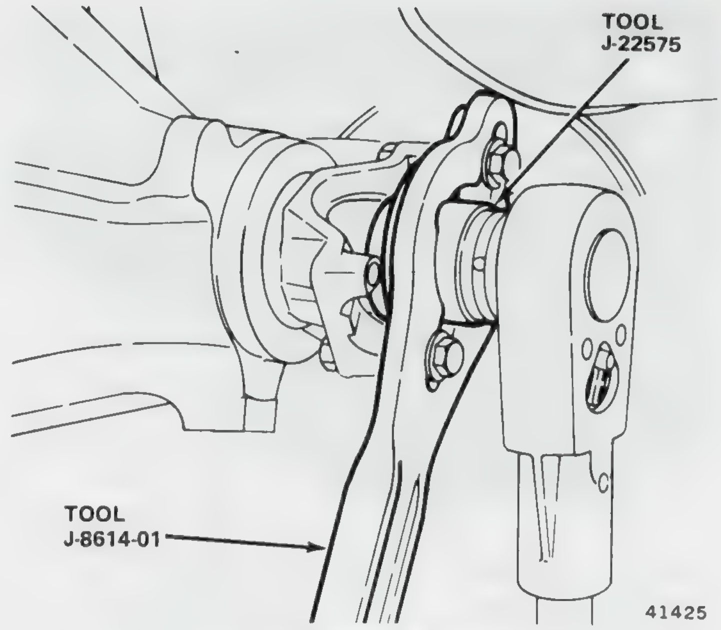

Fig. 2E-9 Pinion Nut Removal

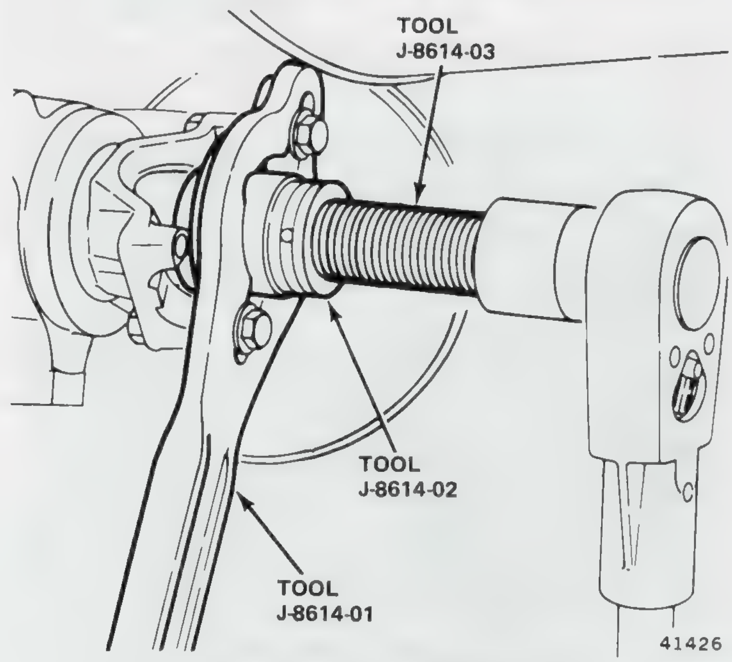

Fig. 2E-10 Axle Yoke Removal

(3) Install axle yoke on pinion. Align yoke and pinion using reference marks made at disassembly.

(4) Install replacement pinion nut. Tighten nut only enough to remove pinion bearing end play using tools J-8614-01 and J-22575. **Do not overtighten nut**.

(5) Measure torque required to rotate pinion gear using torque wrench calibrated in inch-pounds. Turn pinion several revolutions to ensure accurate reading.

(6) Refer to torque reading recorded during disassembly and add 5 inch-pounds (0.56 Nm) torque for correct amount of preload.

(7) If preload torque is less than desired amount, which should equal disassembly torque reading plus 5-inch pounds (0.56 Nm), tighten pinion nut very slightly and recheck torque.

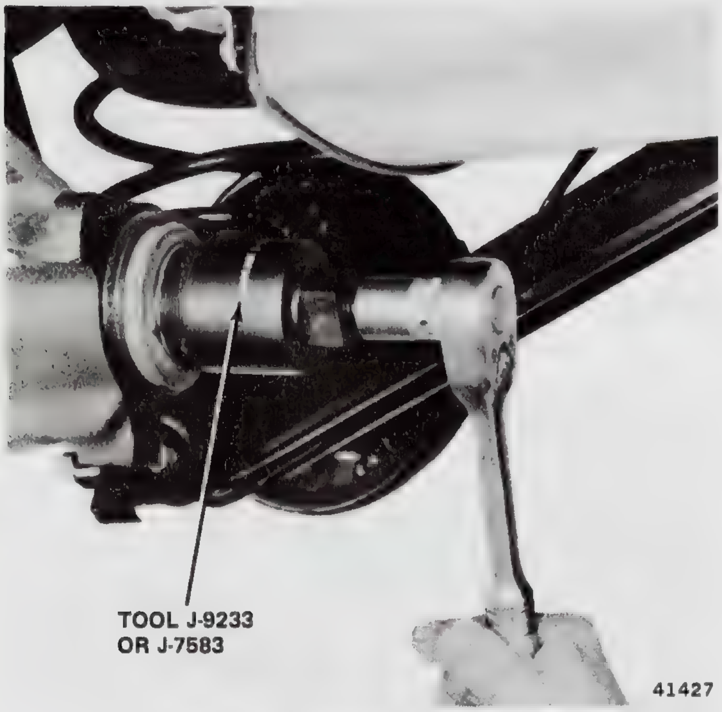

Fig. 2E-11 Pinion Oil Seal Removal

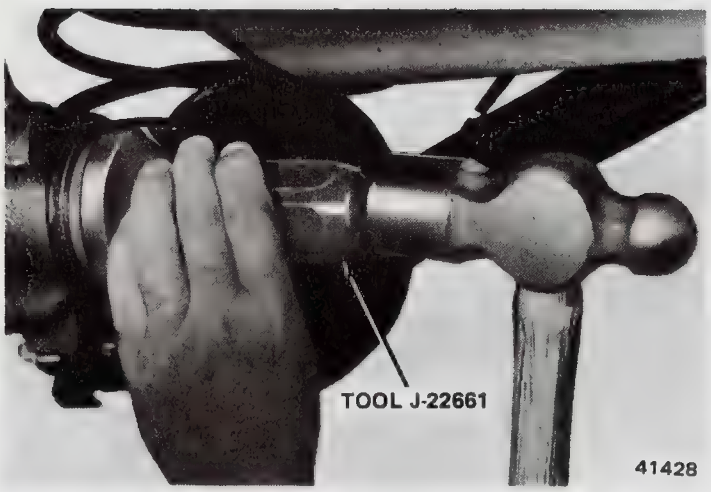

Fig. 2E-12 Pinion Oil Seal Installation

(8) Continue tightening nut in very small increments until desired torque is obtained.

CAUTION: *Do not overtighten, or loosen and retighten the pinion nut. If desired torque is exceeded, or if the nut is alternately tightened and loosened, the pinion nut and collapsible spacer must be replaced and the pinion bearing preload reset.*

(9) Install propeller shaft. Align propeller shaft and axle yokes using reference marks made at disassembly.
(10) Install brake drums and wheels.
(11) Fill axle to edge of fill hole with specified lubricant.
(12) Lower car.

AXLE REMOVAL

Pacer-Gremlin-Concord-AMX

(1) Apply parking brake and shift manual transmission into first gear, or automatic transmission into Park.
(2) On cars with standard wheels, remove hub caps.
(3) On cars with styled wheels having bolt-on hub caps, raise car, remove wheels, remove hub caps, reinstall wheels, and lower car.
(4) Remove and discard cotter pins from axle shaft nuts.
(5) Remove axle shaft nuts.
(6) Raise and support rear of car. Place support stands under rear frame side sills.
(7) Remove wheels.
(8) Remove brakedrum retaining screws.
(9) Release parking brake and remove brakedrums. If drums are difficult to remove, retract brakeshoes by backing off adjuster screws. Use section of welding rod to unseat adjuster lever before attempting to rotate adjuster screw.
(10) Remove axle hub using tool J-1644-02 (fig. 2E-3).
(11) Disconnect brake lines at wheel cylinders.
(12) Remove support plates, oil seals and retainers, and end play shims.

NOTE: *Axle shaft end play shims are installed at the left side of the axle only.*

(13) Remove axle shafts using tool J-2498 (fig. 2E-5).
(14) Remove axle housing cover and drain lubricant. Install cover after lubricant has drained.
(15) Disconnect parking brake cables at equalizer.
(16) Mark propeller shaft and axle yokes for assembly reference.
(17) Disconnect propeller shaft at axle yoke.
(18) Disconnect flexible brake hose at body floorpan bracket.
(19) Disconnect vent hose at axle tube.
(20) Support rear axle using hydraulic jack.
(21) Disconnect shock absorbers at spring tie plates.
(22) Remove spring U-bolts and spring plates.
(23) Rotate axle until it clears springs, lower hydraulic jack, and remove axle.

Matador

(1) Apply parking brake and shift transmission into first gear, or into park if equipped with automatic transmission.
(2) On cars with standard wheels, remove hub caps.
(3) On cars with styled wheels having bolt-on hub caps, raise car, remove wheels, remove hub caps, reinstall wheels, and lower car.
(4) Remove and discard cotter pins from axle shaft nuts.
(5) Remove axle shaft nuts.

(6) Raise and support rear of car. Position support stands under rear frame side sills.

(7) Remove wheels.

(8) Remove brakedrum retaining screws.

(9) Release parking brake and remove brakedrums. If drums are difficult to remove, retract brakeshoes by backing off adjuster screws. Use section of welding rod to unseat adjuster lever before attempting to rotate adjuster screw.

(10) Remove axle hubs using tool J-1644-02 (fig. 2E-3).

(11) Disconnect brake lines at wheel cylinders.

(12) Remove support plates, oil seals and retainers, and end play shims.

NOTE: *Axle shaft end play shims are installed at the left side of the axle only.*

(13) Remove axle shafts using tool J-2498 (fig. 2E-5).

(14) Remove axle housing cover and drain lubricant. Install cover after lubricant has drained. Use only two bolts to attach cover.

(15) Mark propeller shaft and axle yoke for assembly reference.

(16) Disconnect propeller shaft at axle yoke.

(17) Remove stabilizer bar if equipped.

(18) Disconnect flexible brake hose at at rear crossmember bracket.

(19) Disconnect vent hose at axle tube.

(20) Support rear axle using hydraulic jack.

(21) Disconnect shock absorbers at lower control arms.

NOTE: *If the car is equipped with air adjustable shock absorbers, release all air pressure from the shock absorbers by opening the air valves.*

(22) Lower hydraulic jack and disconnect upper control arms at axle housing.

(23) Pull left side axle tube downward and remove coil spring; then pull right side axle tube downward and remove remaining spring.

(24) Disconnect lower control arms at axle tube brackets.

(25) Lower hydraulic jack and remove rear axle.

AXLE INSTALLATION

Pacer-Gremlin-Concord-AMX

(1) Support rear axle using hydraulic jack and position axle between springs.

(2) Raise jack until axle is above springs, manuever axle into position, and lower jack until axle is seated on springs.

(3) Install spring plates and U-bolts. Tighten U-bolt nuts to 55 foot-pounds (74.5 Nm) torque.

NOTE: *Be sure the spring centering bolt heads are seated in the axle spring seat locating holes before tightening the U-bolt nuts.*

(4) Lower and remove hydraulic jack.

(5) Connect shock absorbers to spring plates.

(6) Connect flexible brake hose at floorpan bracket.

(7) Connect vent hose at axle tube.

(8) Connect propeller shaft to axle yoke. Align shaft and axle yokes using reference marks made during disassembly. Tighten clamp strap bolts to 14 foot-pounds (18.9 Nm) torque.

(9) Install axle shafts and bearing cups.

CAUTION: *On cars with a Twin Grip Axle, do not rotate the differential unless both axle shafts are installed. If one axle shaft is removed and the installed shaft is rotated, the differential side gear splines will become misaligned and prevent installation of the remaining shaft.*

(10) Install support plate and brakeshoes, oil seals and retainers, and end play shims.

NOTE: *End play shims are installed on the left side of the axle only.*

(11) Check and adjust axle shaft end play as necessary. Refer to end play adjustment procedure outlined under Axle Shaft and Bearing Replacement.

(12) Connect brake lines at wheel cylinders.

(13) Align keyways in axle hubs with keys in shafts and slide hubs onto shafts as far as possible.

(14) Install thrust washers and nuts on axle shafts.

(15) Install brakedrums and drum retaining screws.

NOTE: *If the brakeshoes were retracted to ease drum removal, adjust the brakeshoe-to-drum clearance as outlined under Service Brake Adjustment in Chapter 2F.*

(16) Bleed brakes as outlined under Brake Bleeding in Chapter 2F.

(17) Install wheels.

(18) Lower car.

(19) Apply parking brake.

(20) Tighten axle shaft nuts. If original axle hub is installed, tighten nut to 250 foot-pounds (338.9 Nm) torque. If replacement hub is installed, refer to procedure for installing replacement hub outlined under Axle Hub Replacement.

(21) Install replacement cotter pins in axle shaft nuts. If holes in nut and shaft do not align, tighten nut to align holes only. Do not loosen nut to align holes.

(22) On cars with standard wheels, install hub caps.

(23) On cars with styled wheels having bolt-on hub caps, raise car, remove wheels, install hub caps, reinstall wheels, and lower car.

(24) Fill rear axle to edge of fill hole with specified lubricant.

Matador

(1) Support axle using hydraulic jack and position axle under car.

(2) Connect lower control arms to axle tube brackets. Do not tighten attaching bolts completely at this time.

(3) Raise axle and connect upper control arms to axle housing. Do not tighten attaching bolts completely at this time.

NOTE: *The rear coil springs must support the weight of the car before the control arm bolts are tightened.*

(4) Insert rear springs in upper spring seats.

(5) Pull axle downward and engage lower end of springs in axle tube seats.

(6) Raise axle assembly until springs support rear of car.

(7) Tighten all control arm bolts to 60 foot-pounds torque.

(8) Connect shock absorbers to lower control arm brackets and remove hydraulic jack.

(9) Connect propeller shaft to rear axle yoke. Align propeller shaft and rear axle yokes using reference marks made at disassembly. Tighten clamp strap bolts to 14 foot-pounds torque.

(10) Install axle shafts and bearing cups.

CAUTION: *On cars with a Twin Grip axle, do not rotate the differential unless both axle shafts are installed. If one shaft is removed and the installed shaft is rotated, the differential side gears will become misaligned and prevent installation of the remaining shaft.*

(11) Install support plates and brakeshoes, oil seals and retainers, and end play shims. Install end play shims at left side of axle only.

(12) Check and adjust axle shaft end play as necessary. Refer to end play adjustment procedure outlined under Axle Shaft and Bearing Replacement.

(13) Connect brake lines at wheel cylinders.

(14) Connect flexible brake hose at floorpan bracket.

(15) Connect vent hose at axle tube.

(16) Align keyways in axle hubs with axle shaft keys and slide hubs onto axles as far as possible.

(17) Install thrust washers and nuts on axle shafts.

(18) Install brakedrums and drum retaining screws. If brakeshoes were retracted to ease drum removal, adjust brakeshoe-to-drum clearance as outlined under Service Brake Adjustment in Chapter 2F.

(19) Bleed brakes as outlined under Brake Bleeding in Chapter 2F.

(20) Install wheels.

(21) Lower car.

(22) Apply parking brakes.

(23) Tighten axle shaft nuts. If original axle hub is installed, tighten nuts to 250 foot-pounds (338.9 Nm) torque. If replacement hub is installed, refer to procedure for installing replacement hub outlined under Axle Hub Replacement.

(24) Install replacement cotter pins in axle shaft nuts. If holes in nut and shaft do not align, tighten nut to align holes only, do not loosen nut to align holes.

(25) On cars with standard wheels, install hub caps.

(26) On cars with styled wheels having bolt-on hub caps, raise car, remove wheels, install hub caps, reinstall wheels, and lower car.

(27) Fill rear axle to edge of fill hole with specified lubricant.

(28) Tighten axle control arm pivot bolts to 65 foot-pounds (88.1 Nm) torque.

SPECIFICATIONS

Axle Specifications

	7-9/16 Inch Dia. Ring Gear Axle		8-7/8 Inch Dia. Ring Gear Axle	
	(USA)*	(Metric)**	(USA)*	(Metric)**
Capacity	3 pts.	1.4 liters	4 pts.	1.9 liters
Pinion Depth Standard Setting (Shims)	2.095 inches	53.21	2.547 inches	64.69
Bearing Preload (Collapsible Sleeve)	15-25 in-lb	2-3 N-m	17-28 in-lb	2-3 N-m
Ring and Pinion Backlash (Shim)	.005-.009 inch (.008 inch desired)		.013-0.23 (0.20 preferred)	
Differential Bearing Preload (Shims)	.008 inch		0.20	
Differential Case Face Runout	.002 inch max.		0.05 max.	
Axle Shaft End Play (Shims — left side only)	.004-.008 inch (.006 inch desired)		0.10-0.20 (0.15 preferred)	
Axle Hub Installation Dimension	1-3/16 inch	30.16	1-5/16 inch	33.34
Differential Side Gear-to-Case Clearance (All Axles)	0.000-0.007 inches		0.000-0.018 mm	

*Add inches unless otherwise specified.
**Add mm unless otherwise specified.

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Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft.lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Brake Tubing-to-Rear Wheel Brake Cylinder	11	10-12	97 in-lb	90-105 in-lb
Differential Bearing Bolt (8-7/8-inch Axle)	118	109-129	87	80-95
Differential Bearing Bolt (7-9/16-inch Axle)	77	71-91	57	52-67
Drive Gear-to-Case Bolt (8-7/8-inch Axle)	142	129-156	105	95-115
Drive Gear-to-Case Bolt (7-9/16-inch Axle)	71	57-88	52	42-65
Rear Brake Support Plate Screw Nut	43	34-54	32	25-40
Rear Wheel Hub-to-Axle Shaft Nut	339 min.	339 min.	250 min.	250 min.
Axle Cover Screw	20	14-27	15	10-18
Clamp Strap Bolt	19	14-24	14	10-18

All torque values given in foot-pounds/newton-meters with dry fits unless otherwise specified.

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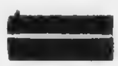
Special Tools

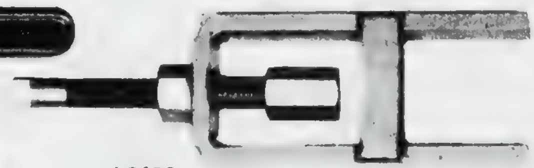


J-8614-01
HOLDER AND REMOVER TOOL

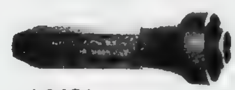


J-1644-02
THREAD PROTECTOR

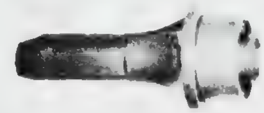
J-22661
AXLE SHAFT OIL SEAL INSTALLER



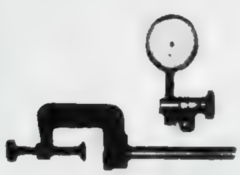
J-2498
AXLE SHAFT REMOVER



J-9431
PINION OIL SEAL INSTALLER



J-21788
PINION OIL SEAL INSTALLER



J-8001
DIAL INDICATOR SET

J-1644-02
REAR HUB PULLER

J-2092
END PLAY CHECKING TOOL

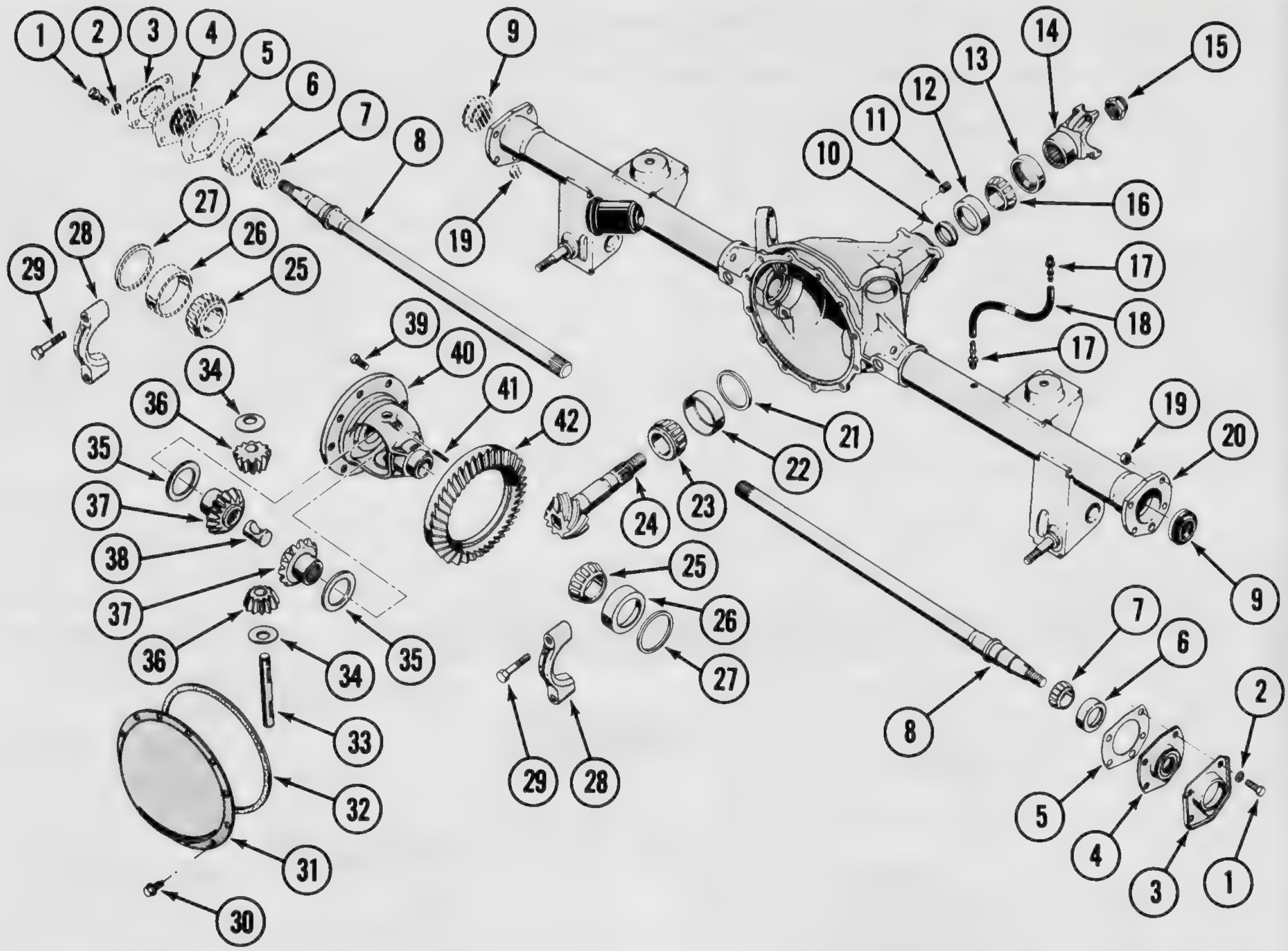
J-22575
NUT SOCKET

DIFFERENTIAL OVERHAUL—STANDARD DIFFERENTIAL

DISASSEMBLY

NOTE: *It is not necessary to remove the rear axle in order to remove and overhaul the differential. However, the car underbody should be cleaned to prevent dirt contamination when installing the differential after completing all service operations. Refer to figures 2E-13 and 2E-14 as a guide to parts identification during overhaul. Figure 2E-13 applies to 8-7/8 axles. Figure 2E-14 applies to 7-9/16 axles.*

(1) Remove axle shaft nuts.
(2) Raise and support rear of car.
(3) Remove axle housing cover and drain lubricant.



1. BOLT
2. WASHER
3. AXLE SHAFT OIL SEAL RETAINER
4. AXLE SHAFT OIL SEAL
5. AXLE SHAFT BEARING SHIM
6. AXLE SHAFT BEARING CUP
7. AXLE BEARING
8. AXLE SHAFT
9. AXLE SHAFT INNER OIL SEAL
10. PINION COLLAPSIBLE SPACER
11. FILLER PLUG
12. FRONT PINION BEARING CUP
13. PINION OIL SEAL
14. UNIVERSAL JOINT YOKE
15. PINION NUT
16. FRONT PINION BEARING
17. BREATHER
18. BREATHER HOSE
19. NUT
20. REAR AXLE HOUSING
21. DRIVE PINION DEPTH ADJUSTING SHIM
22. REAR PINION BEARING CUP
23. REAR PINION BEARING
24. PINION GEAR
25. DIFFERENTIAL BEARING
26. DIFFERENTIAL BEARING CUP
27. DIFFERENTIAL BEARING SHIM
28. DIFFERENTIAL BEARING CUP
29. BOLT
30. BOLT
31. HOUSING COVER
32. HOUSING COVER GASKET
33. DIFFERENTIAL PINION SHAFT
34. DIFFERENTIAL PINION GEAR THRUST WASHER
35. DIFFERENTIAL SIDE GEAR THRUST WASHER
36. DIFFERENTIAL PINION GEAR
37. DIFFERENTIAL SIDE GEAR
38. DIFFERENTIAL PINION SHAFT THRUST BLOCK
39. BOLT
40. DIFFERENTIAL CASE
41. DIFFERENTIAL PINION SHAFT PIN
42. RING GEAR

Fig. 2E-13 Rear Axle with Standard Differential—8-7/8 Axle

(4) Remove wheels, brakedrums, hubs, axle shafts, oil seals, and bearing end play shims.

(5) Mark differential bearing caps with center punch for assembly reference.

(6) Loosen bearing cap attaching bolts until only several threads are engaged and pull bearing caps away from bearings. This will prevent differential from falling out and sustaining possible damage when it is pried out of axle housing.

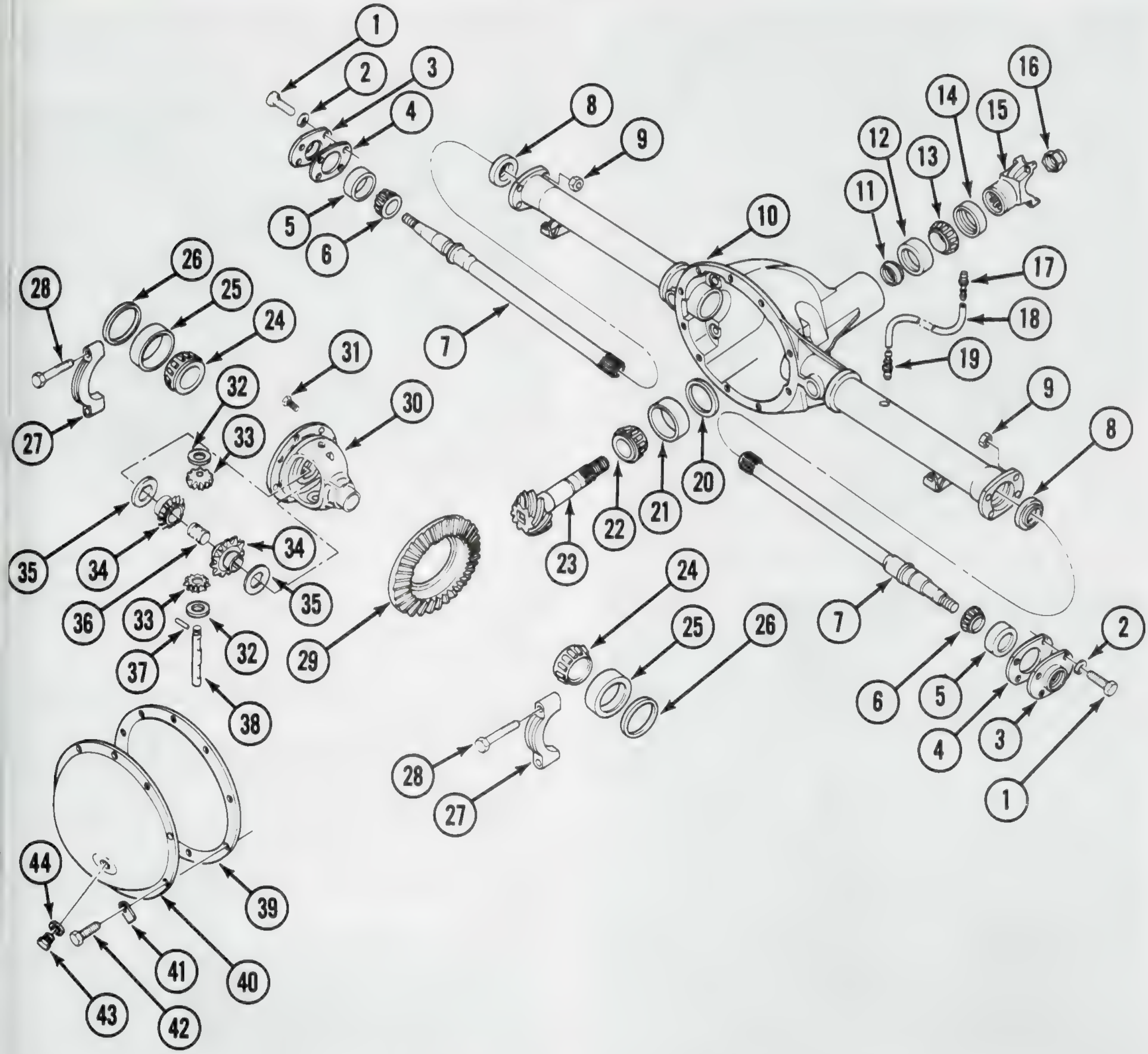
(7) Pry differential loose in axle housing.

(8) Remove bearing caps and remove differential.

(9) Tie differential bearing shims to their respective bearing caps and cups to prevent misplacement.

(10) Remove differential bearings from case using tool J-22888-02 (fig. 2E-15).

CAUTION: *When using this tool, be sure it pulls on the bearing cone and not the cage. If the puller bears on the bearing roller cage, the cage will be damaged.*



1. BOLT
2. WASHER
3. AXLE SHAFT OIL SEAL AND RETAINER ASSEMBLY
4. AXLE SHAFT BEARING SHIM
5. AXLE SHAFT BEARING CUP
6. AXLE SHAFT BEARING
7. AXLE SHAFT
8. AXLE SHAFT INNER OIL SEAL
9. NUT
10. AXLE HOUSING
11. COLLAPSIBLE SPACER
12. PINION BEARING CUP-FRONT
13. PINION BEARING-FRONT
14. PINION OIL SEAL
15. UNIVERSAL JOINT YOKE
16. PINION NUT
17. BREATHER
18. BREATHER HOSE
19. BREATHER
20. PINION DEPTH ADJUSTING SHIM
21. PINION REAR BEARING CUP
22. PINION BEARING-REAR
23. PINION GEAR
24. DIFFERENTIAL BEARING
25. DIFFERENTIAL BEARING CUP
26. DIFFERENTIAL BEARING SHIM
27. DIFFERENTIAL BEARING CAP
28. DIFFERENTIAL BEARING CAP BOLT
29. RING GEAR
30. DIFFERENTIAL CASE
31. RING GEAR BOLT
32. DIFFERENTIAL PINION WASHER
33. DIFFERENTIAL PINION
34. DIFFERENTIAL SIDE GEAR
35. DIFFERENTIAL SIDE GEAR THRUST WASHER
36. DIFFERENTIAL PINION SHAFT THRUST BLOCK
37. DIFFERENTIAL PINION SHAFT PIN
38. DIFFERENTIAL PINION SHAFT
39. AXLE HOUSING COVER GASKET
40. AXLE HOUSING COVER
41. AXLE IDENTIFICATION TAG
42. BOLT
43. AXLE HOUSING COVER FILL PLUG
44. WASHER

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Fig. 2E-14 Rear Axle with Standard Differential—7-9/16 Axle

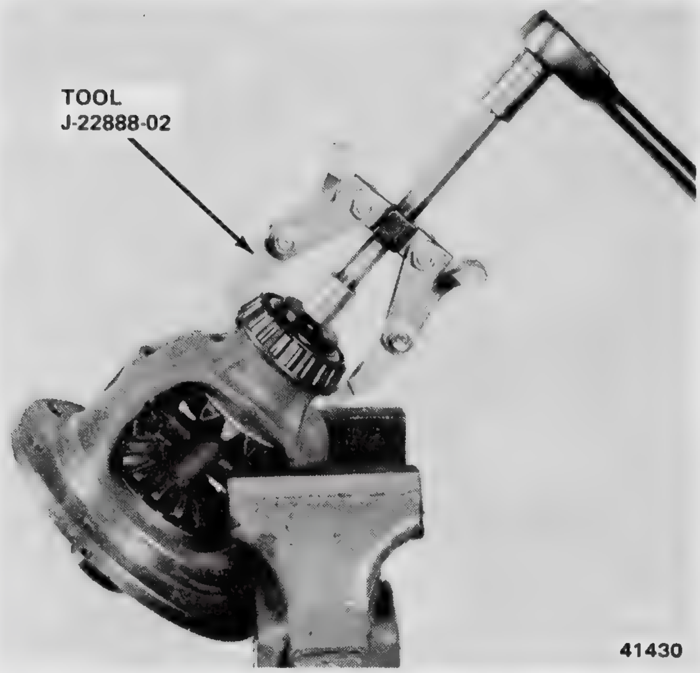

Fig. 2E-15 Differential Bearing Removal

Fig. 2E-16 Ring Gear Removal

(11) Remove ring gear-to-case bolts and remove gear from case using brass drift and hammer (fig. 2E-16). Do not nick drive gear mating face of case or drop gear. Do not attempt to chisel or wedge gear from case.

(12) Remove pinion shaft lockpin using punch that is 3 inches long by 3/16 inch (7.62 cm by 4.76 mm) in diameter (fig. 2E-17).

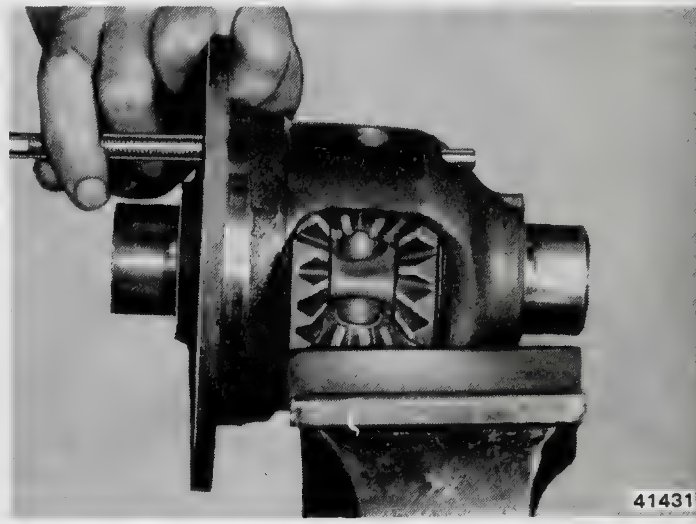

Fig. 2E-17 Pinion Shaft Lockpin Removal

(13) Measure and record differential side gear-to-case clearance for assembly reference. Insert equal thickness feeler gauges between each gear and case to measure clearance.

NOTE: *To ensure accurate measurement, do not remove either feeler gauge until clearance at both gears has been measured.*

(14) Remove pinion shaft using punch and hammer and remove thrust block through differential side gear bore (fig. 2E-18).

(15) Roll differential pinions around on differential side gears until pinions and thrust washers can be removed from case, then remove side gears and thrust washers.

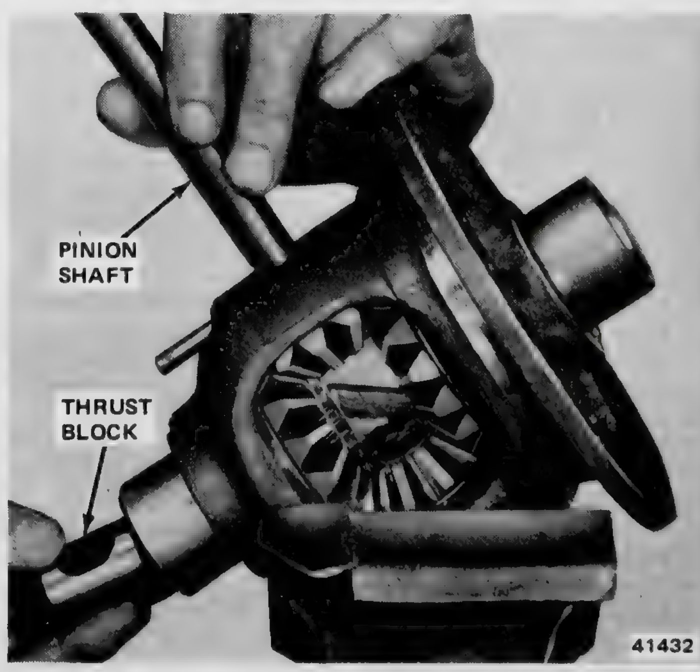

Fig. 2E-18 Pinion Shaft and Thrust Block Removal

(16) Remove pinion nut using tools J-8614-01 and J-22575 (fig. 2E-9).

(17) Remove axle yoke. If yoke can not be removed by hand, remove yoke using tools J-8614-01, 02, and 03 (fig. 2E-10).

(18) Install axle housing cover to prevent pinion gear from falling out of housing during removal.

(19) Remove pinion oil seal using tool J-9233 (fig. 2E-11).

(20) Tap end of pinion gear with fiber hammer to until gear is driven out of front bearing and remove front bearing.

NOTE: *A collapsible spacer is used to control pinion gear bearing preload. Discard this spacer; it is not reusable.*

(21) Remove housing cover, pinion gear, and rear bearing from housing.

(22) Remove pinion gear rear bearing cup using Driver Handle J-8592 and Cup Remover J-21786 on 8-7/8 axles or Cup Remover J-9349 on 7-9/16 axles.

(23) Remove pinion depth adjustment shim(s) from housing bore.

NOTE: *The pinion depth adjustment shim(s) are located under the pinion rear bearing cup. Tag and retain the shim(s) for assembly reference.*

(24) Remove pinion front bearing cup using Driver Handle J-8592 and Cup Remover J-21787 on 8-7/8-inch axles or Cup Remover J-9351 on 7-9/16-inch axles.

CAUTION: *Keep the cup remover tools squarely in the cup bore to avoid damaging the bore.*

CLEANING AND INSPECTION

Cleaning

Clean each part thoroughly in solvent and dry the parts (except bearings) using compressed air or shop towels. Air dry bearings or dry them using shop towels only. Do not use compressed air on bearings.

If the parts are not to be assembled immediately, cover them to prevent dust or dirt contamination.

Inspection

Axle Housing

Check axle housing alignment. Place two straightedges across the tube flanges and measure the distance between flange ends (fig. 2E-19). If the straightedges are parallel within 3/32 inch (2.38 mm) at a distance of 11 inches (27.94 cm) from the tube centerline, the axle housing is serviceable.

Perform this inspection with the straightedges placed in horizontal and vertical positions (fig. 2E-19).

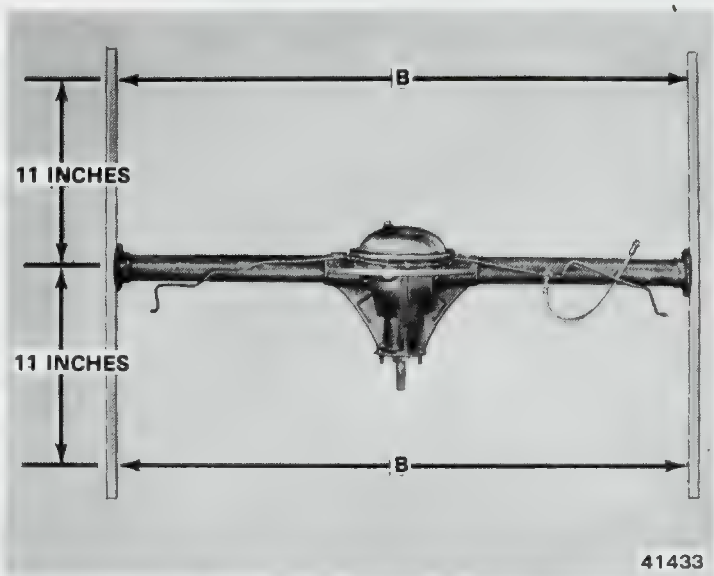

Fig. 2E-19 Checking Axle Housing Alignment

Inspect the housing for cracks and sand holes. Replace the housing if cracked or porous. Check for burrs and deep scratches or nicks on the gasket and oil seal surfaces. An oil stone or fine tooth file may be used to remove nicks or burrs. The bearing cup bores should be carefully inspected for nicks or burrs that may have been created during bearing cup removal. Inspect and clean the axle tubes and inspect the vent to be sure that is is not obstructed (fig. 2E-20).

Differential Pinion Shaft

Whenever one rear wheel is stationary and the opposite wheel is spinning, the differential pinion shaft is subjected to high torque loads. Inspect the shaft for scoring and wear. The shaft should be a press fit of 0.000-to-0.010 inch (0.00 to 0.25 mm) in the case. Replace the shaft if worn or scored.

Thrust Block

Inspect the thrust block for excessive wear, distortion, and cracks. A worn or distorted thrust block will affect axle shaft end play. Replace the thrust block if damaged.

Differential Pinions

Inspect the pinion teeth for excessive wear or chipping. Install a new pinion shaft in the pinion bores to see if they are worn or out-of-round. Replace the pinions if damaged or worn. Discard the old thrust washers. Use new thrust washers only during assembly.

Differential Side Gears

Inspect the side gears for worn, cracked, or chipped teeth. The gears should fit snugly on the axle shaft splines. Also inspect the fit of the gears in the differential case bore. With the gears installed, side clearance must not exceed 0.007 inch (0.18 mm). Excessive side

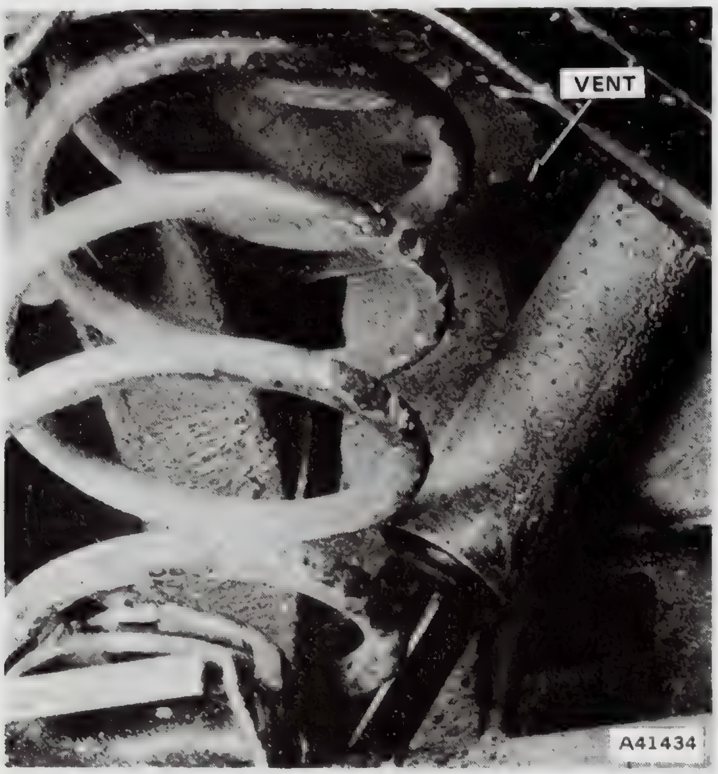

Fig. 2E-20 Axle Housing Vent Location

clearance must be corrected to avoid driveline backlash resulting in a "clunk" noise when the transmission is initially engaged in Drive or Reverse.

Differential Case

Inspect the bearing surfaces for nicks or burrs. Small nicks or burrs may be removed using an oil stone or fine tooth file. Inspect the thrust washer surfaces for excessive wear. If these surfaces are worn and grooved, replace the case.

Ring and Pinion Gears

Inspect the gears to be sure they are a matched set. The first number on the pinion and the number on the ring gear must be the same.

Inspect the gear teeth for wear, cracks, or chipping. Inspect all bearing surfaces for wear or roughness, and the pinion shaft splines for damage caused by a worn or loose axle yoke.

Whenever replacement of a ring or pinion gear is necessary, *always replace both gears*. They must be installed in matched sets only. Replacement ring and pinion sets also include new ring gear attaching bolts. Use these bolts during assembly.

Differential and Pinion Gear Bearings

Inspect the bearings and cups for excessive wear, overheating, chipping, scoring, or flat spotting. Replace both the cup and bearing if the preceding conditions are evident.

ASSEMBLY AND ADJUSTMENT

Pinion Gear Depth Measurement and Adjustment

Pinion gear depth must be measured and adjusted before final assembly installation of the gear. This adjustment must be performed correctly to ensure quiet, trouble-free operation.

Pinion depth is the distance (in inches) between the pinion gear end face and axle shaft centerline (fig. 2E-21). It is controlled by shims installed between the pinion rear bearing cup and axle housing (fig. 2E-21).

Ring and pinion sets are factory tested to detect machining variances. Tests are started at a standard setting which is varied until optimum tooth contact and quiet operation are obtained. When the optimum setting for a gear set is achieved, the gears are identified as a matched set with hand-etched numbers (fig. 2E-22).

The ring gear receives one number. The pinion receives two numbers separated by a plus or minus sign. The second pinion number indicates pinion position in relation to the axle shaft centerline, where tooth contact was best and operation quietest. This number represents *pinion depth variance* and is the amount (in thousandths of an inch) that the set varied from the standard setting.

The standard setting dimension for 7-9/16 axles is 2.095 inches (5.32 cm). The standard setting for 8-7/8 axles is 2.547 inches (6.47 cm). Refer to figure 2E-21 for an illustration of this dimension.

Pinion gears are marked plus or minus the amount, in thousandths of an inch, the gear varied from the standard setting.

For example; if a pinion is marked +2, the gear varied from standard by +0.002 inches (0.0508 mm) and will require less shims than a set marked zero. A plus marking means the distance from the pinion end face to axle shaft centerline must be more than standard.

If a pinion is marked -3, the set varied from standard by -0.003 inches (0.0762 mm) and will require more shims than a set marked zero. A minus marking means the distance from pinion end face to axle shaft centerline must be less than standard.

NOTE: *On some factory installed gear sets, an additional 0.010 or 0.020 inches (0.2540 or 0.5080 mm) may have been machined off the pinion end face. This does not affect gear operation but does affect pinion gear marking and depth adjustment. Pinion gears machined in this fashion have different identifying numbers. For example; if the pinion is marked +23, the number 2 indicates that 0.020 was removed from the end face and the number 3 is the pinion depth variance. If the pinion is marked +16, the number 1 indicates that 0.010 was removed from the pinion end face and the number 6 is the pinion depth variance. These gear sets are factory installed items exclusively. Service replacement sets are machined to standard settings only. In addition, service*

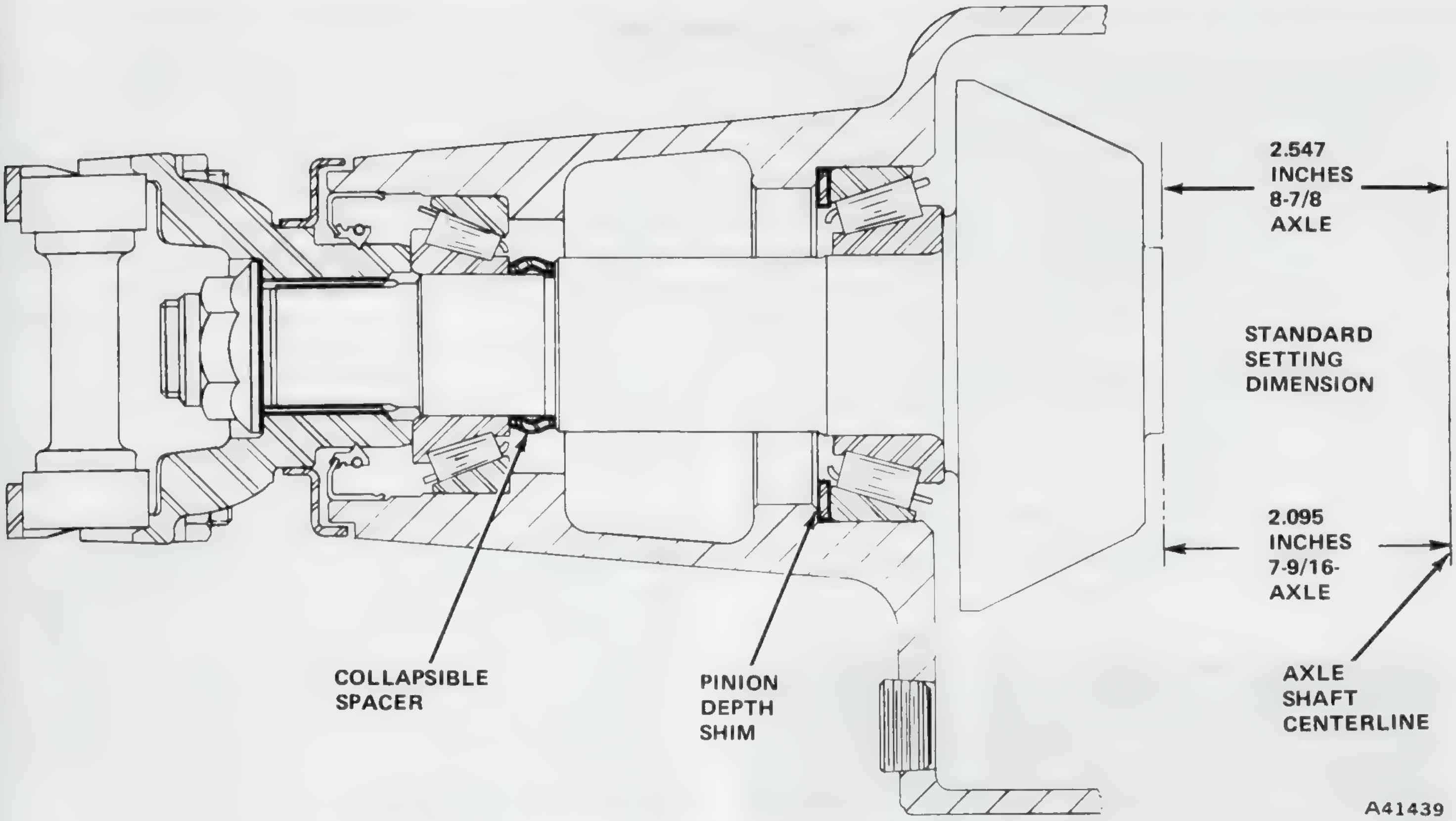

Fig. 2E-21 Pinion Depth Standard Setting Dimension and Depth Shim Location

replacement gear sets marked +9, or -9, or more, or sets with mismatched identifying numbers must be returned to the parts distribution center. Do not attempt to install these gear sets.

Fig. 2E-22 Ring and Pinion Identification Markings

Pinion Variance Chart

This chart will help determine the approximate starter shim thickness needed for initial pinion depth measurement. However, the chart will not provide the exact shim thickness required for final depth adjustment and must not be used as a substitute for an actual pinion depth adjustment.

To use the chart, proceed as follows:

(1) Measure thickness of original depth shim.

(2) Note pinion variance numbers marked on new and old pinion gears.

(3) Refer to New and Old Pinion Marking columns in chart. Number in chart box where old and new depth variances intersect will provide approximate amount of shim change needed for starter shim thickness.

For example; if the old pinion is marked -3 and the new pinion +2, procedure is as follows: Refer to Old Pinion Marking column (left side of chart) and locate -3 figure in this column. Then read to right (across chart) until under +2 figure in New Pinion Marking column. Number in box where two columns intersect is amount of shim thickness change required. In this case, the intersecting box number is -0.005 (-0.1270 mm) which represents the amount to be subtracted from the old shim thickness. If the number had been a + figure, this amount would be added to the old shim thickness.

Pinion Variance Chart

Old Pinion Marking	New Pinion Marking								
	−4	−3	−2	−1	0	+1	+2	+3	+4
+4	+0.008	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0
+3	+0.007	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001
+2	+0.006	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002
+1	+0.005	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003
0	+0.004	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004
−1	+0.003	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005
−2	+0.002	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006
−3	+0.001	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007
−4	0	−0.001	−0.002	−0.003	−0.004	−0.005	−0.006	−0.007	−0.008

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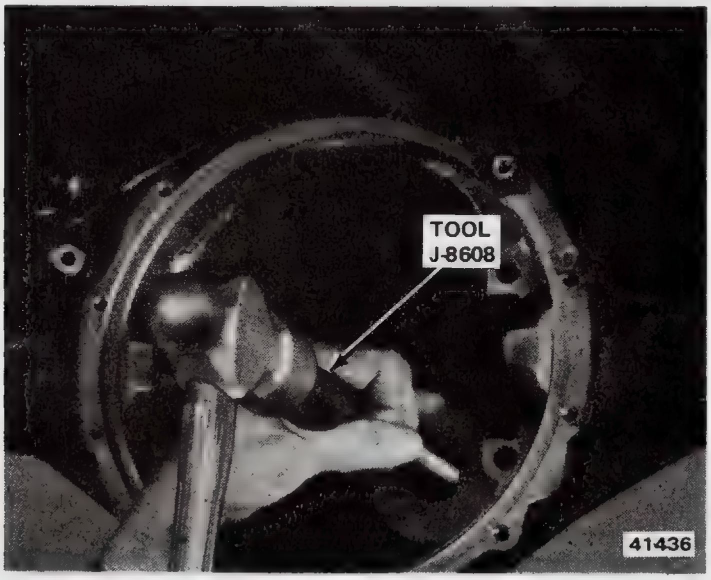

Fig. 2E-23 Pinion Rear Bearing Cup Installation

Pinion Depth Measurement and Adjustment Procedure

(1) Measure thickness of original pinion depth shim.

(2) Note pinion depth variance numbers marked on old and new pinion gears.

(3) Determine starter shim thickness. Refer to Pinion Variance Chart and determine amount to be added to or subtracted from original shim thickness for starter shim thickness.

NOTE: *The starter shim thickness must not be used as a final shim setting. An actual pinion depth measurement must be performed and the final shim thickness adjusted as necessary.*

(4) Install rear bearing on pinion gear with large diameter of bearing cage facing pinion head and press bearing against rear face of pinion head.

(5) Clean pinion bearing bores in axle housing thoroughly. This is important to correct depth measurement and adjustment.

(6) Install starter shim in housing bearing cup bore. Be sure shim is centered in bore.

NOTE: *If the shim is chamfered on one side, be sure the chamfered side faces the bottom of the bearing cup bore.*

(7) Install pinion rear bearing cup using tools J-8092 and J-8608 (fig. 2E-23).

(8) Install pinion front bearing cup using tools J-8092 and J-8611-01.

(9) Install pinion gear in rear bearing cup.

(10) Install pinion front bearing and axle yoke on pinion gear. Do not install oil seal or spacer at this time.

(11) Install original pinion nut on pinion. **Tighten nut only enough to remove bearing end play.**

NOTE: *Do not install a new pinion nut and collapsible spacer at this time as the pinion gear must be removed after depth measurement.*

(12) Note depth variance marked on pinion gear. If number is preceded by + sign, add number to standard setting. If number is preceded by - sign, subtract number from standard setting. Result of addition or subtraction is **desired pinion depth.**Record this figure for assembly reference.

(13) Measure existing pinion depth as outlined in following steps.

(14) Assemble Gauge Arbor J-5223-4 and Discs J-5223-23 on 8-7/8 axles, or J-6381-2 on 7-9/16 axles (fig. 2E-24).

(15) Install assembled gauge arbor and discs squarely in differential bearing bores (fig. 2E-24).

(16) Install differential bearing caps over discs and tighten cap bolts securely. Be sure gauge discs are completely seated before installing bearing caps.

(17) Position Gauge Block J-5223-20 on rear face of pinion gear. Do not allow gauge block anvil to contact pinion gear teeth.

(18) Loosen thumbscrew in end of gauge block and allow spring-loaded plunger to contact gauge arbor at center of arbor shaft.

(19) Lock plunger in gauge block by tightening thumbscrew. Be careful not to disturb plunger position.

(20) Remove differential bearing caps and remove gauge arbor and discs.

(21) Remove gauge block and measure distance from end of anvil to top of plunger head using 2 to 3 inch micrometer (fig. 2E-25). This dimension represents **measured pinion depth**. Record measurement for assembly reference.

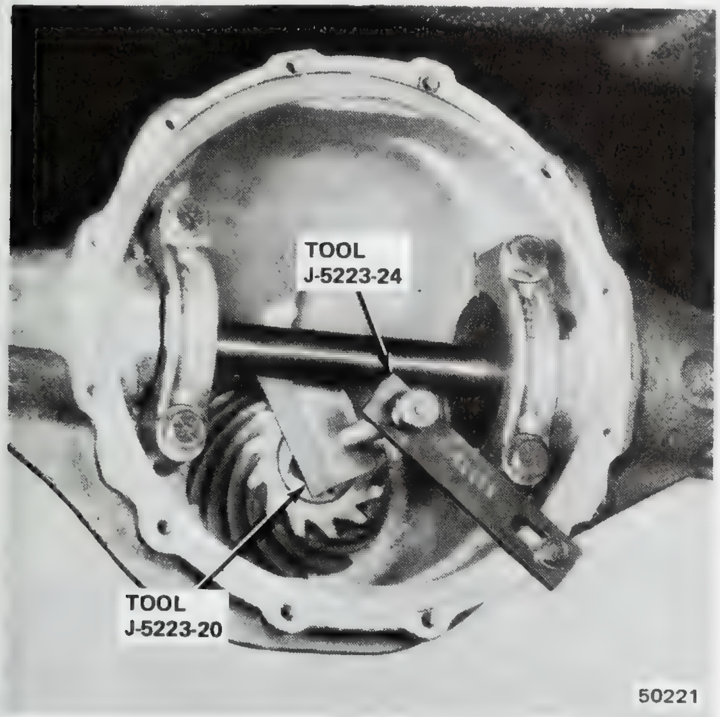

Fig. 2E-24 Installing Pinion Depth Measurement Tools

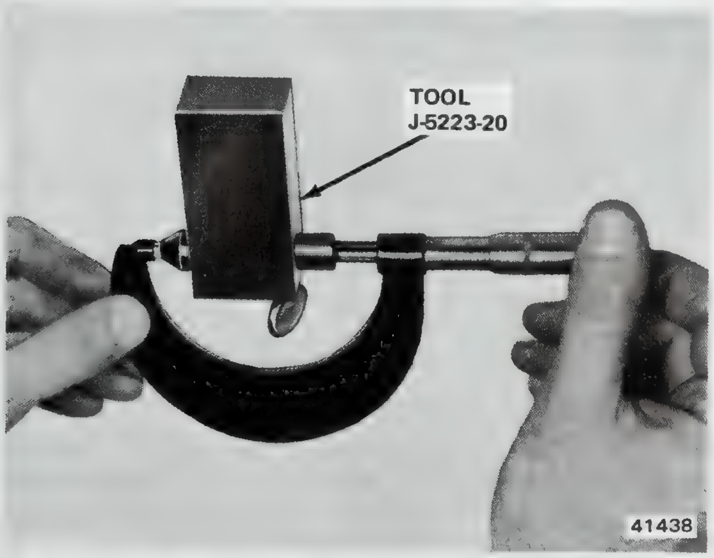

Fig. 2E-25 Measuring Gauge Block

(22) Remove pinion nut and axle yoke from pinion gear.

(23) Remove pinion gear and front bearing.

(24) Remove pinion rear bearing cup.

(25) Remove starter pinion depth shim from housing and measure shim thickness.

(26) Add starter shim thickness to measured pinion depth; then subtract desired pinion depth from this total. Result represents actual shim thickness needed for correct pinion depth adjustment.

NOTE: *Refer to the following examples for an illustration of how the measurement procedure is performed.*

Example I (8-7/8 Axle)

Step 1
Standard pinion depth setting 2.547
Add pinion depth variance .... +0.007
Desired pinion depth 2.554

Step 2
Measured pinion depth 2.550
Add starter shim thickness 0.101
Total thickness-depth 2.651

Step 3
Total thickness-depth 2.651
Subtract desired pinion depth 2.554
Correct shim thickness 0.097

Example II (8-7/8 Axle)

Step 1
Standard pinion depth setting 2.547
Subtract pinion depth variance .... -0.003
Desired pinion depth 2.544

Step 2
Measured pinion depth 2.553
Add starter shim thickness 0.096
Total thickness-depth 2.649

Step 3
Total thickness-depth 2.649
Subtract desired pinion depth 2.544
Correct shim thickness 0.105

Example III (7-9/16 Axle)

Step 1
Standard pinion depth setting 2.095
Pinion depth variance .... -0.004
Desired pinion depth 2.091

Step 2
Measured pinion depth 2.100
Add starter shim thickness 0.096
Total thickness-depth 2.196

Step 3
Total thickness-depth 2.196
Subtract desired pinion depth 2.091
Correct shim thickness 0.105

Example IV (7-9/16 Axle)

Step 1
Standard pinion depth setting 2.095
Pinion depth variance .... +0.002
Desired pinion depth 2.097

Step 2
Measured pinion depth 2.103
Add starter shim thickness 0.094
Total thickness-depth 2.197

Step 3
Total thickness-depth 2.197
Subtract desired pinion depth 2.097
Correct shim thickness 0.100

Pinion Gear Installation and Bearing Preload Adjustment

NOTE: *The pinion gear bearings must be preloaded to compensate for expansion caused by heat and load during operation. Preload is maintained by a collapsible spacer installed between the front bearing and a shoulder on the pinion gear (fig. 2E-21).*

(1) Install correct thickness pinion depth shim in rear bearing cup bore in housing. Be sure shim is centered in bore.

NOTE: *If one side of the shim is chamfered, install the shim so the chamfered side faces the bottom of the bearing cup bore.*

(2) Install pinion rear bearing cup in housing bearing cup bore (fig. 2E-23).

(3) Install pinion gear in rear bearing cup.

(4) Install collapsible spacer on pinion gear.

(5) Install front bearing on pinion gear.

(6) Install replacement pinion oil seal using Installer J-22661 (fig. 2E-12).

(7) Install axle yoke.

(8) Thread replacement pinion nut on gear.

(9) Tighten pinion nut **only enough to remove bearing end play** using tools J-8614-01 and J-22575 (fig. 2E-9). Rotate pinion when tightening nut to seat bearings evenly.

(10) Continue tightening pinion nut in small increments to collapse spacer and preload bearings. When a very slight increase in pinion turning effort is noted, stop tightening nut and remove tools.

(11) Check pinion rotating torque using inch-pound torque wrench. On 8-7/8 axles, rotating torque must be 17 to 28 inch-pounds (1.9 to 3.1 Nm). On 7-9/16 axles, rotating torque must be 15 to 25 inch-pounds (1.7 to 2.8 Nm).

CAUTION: *Do not exceed the specified preload torque and do not loosen the pinion nut to reduce preload if desired torque is exceeded.*

(12) If specified preload torque is exceeded, remove pinion nut, yoke, oil seal, and collapsible spacer and install replacement collapsible spacer and seal. Install yoke and replacement pinion nut and adjust preload torque again.

Differential Bearing Installation

Install the differential bearings on the case using Driver Handle J-8592 and Bearing Installer J-21784 on 8-7/8 axles or Installer J-21002 on 7-9/16 axles (fig. 2E-26).

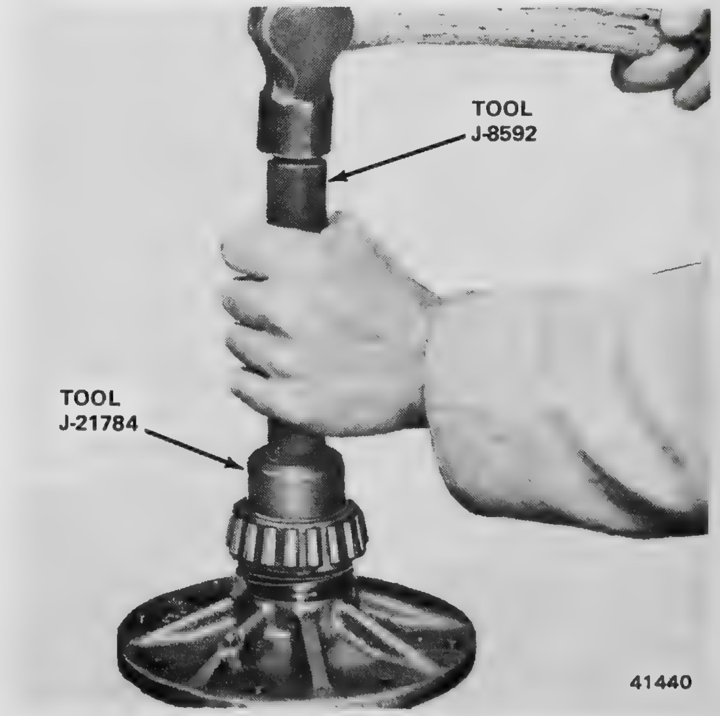

Fig. 2E-26 Differential Bearing Installation

Differential Pinion and Side Gear Installation

(1) Install thrust washers on side gears.

NOTE: *If the previously measured side gear clearance exceeded 0.007 inch (0.1778 mm), install replacement thrust washers.*

(2) Install assembled side gears and washers in case.

(3) Install replacement thrust washers on differential pinions. To ease installation, mate washer lips with shaft bores in pinions (to help maintain washer position during installation).

(4) Install assembled differential pinions and thrust washers. Mesh pinions with side gears so shaft bores in pinions are aligned.

(5) Recheck side gear-to-case clearance. If clearance still exceeds 0.007 inch (0.1778 mm) and replacement thrust washers have been installed, replace both side gears.

(6) Rotate side gears until shaft bores in pinions are aligned with shaft bores in case.

(7) Install thrust block. Align bore in block with pinion shaft bores in case .

(8) Install differential pinion shaft. Be sure to align lockpin bore in shaft with lockpin bore in case.

(9) Install lockpin.

Differential Bearing End Play Adjustment

(1) Place bearing cup over each differential bearing and install differential assembly in axle housing.

(2) Install shim on each side of differential between bearing cup and housing. Use 0.080-inch (2.03 mm) shims on 8-7/8 axles. Use 0.142-inch (3.60 mm) shims on 7-9/16 axles (fig. 2E-27).

(3) Install bearing caps and finger-tighten bolts.

(4) Mount dial indicator so indicator stylus contacts ring gear mounting face of case (fig. 2E-28).

(5) Using two screwdrivers, pry between shims and housing. Pry assembly to one side and zero dial indicator. Pry assembly to opposite side and read dial indicator. Do not attempt to zero or read indicator while prying.

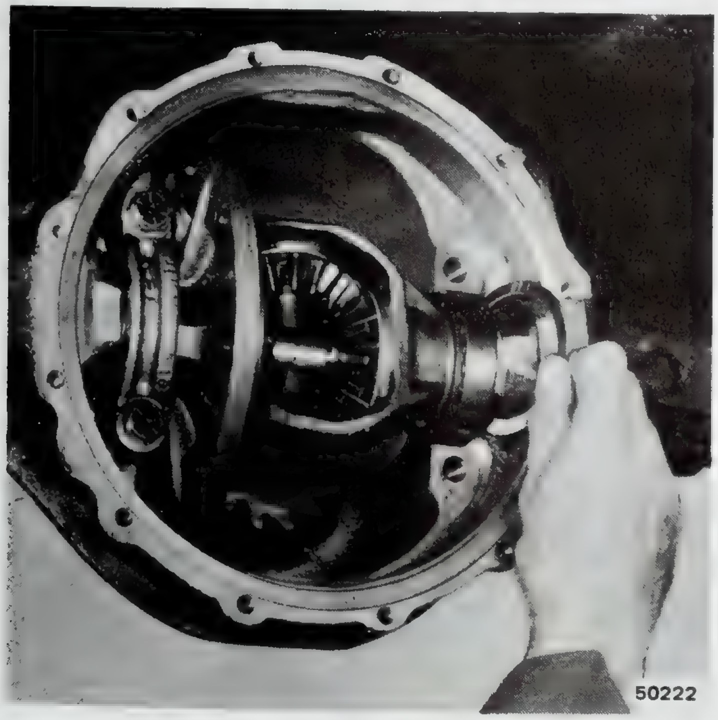

Fig. 2E-27 Differential Bearing End Play Adjustment

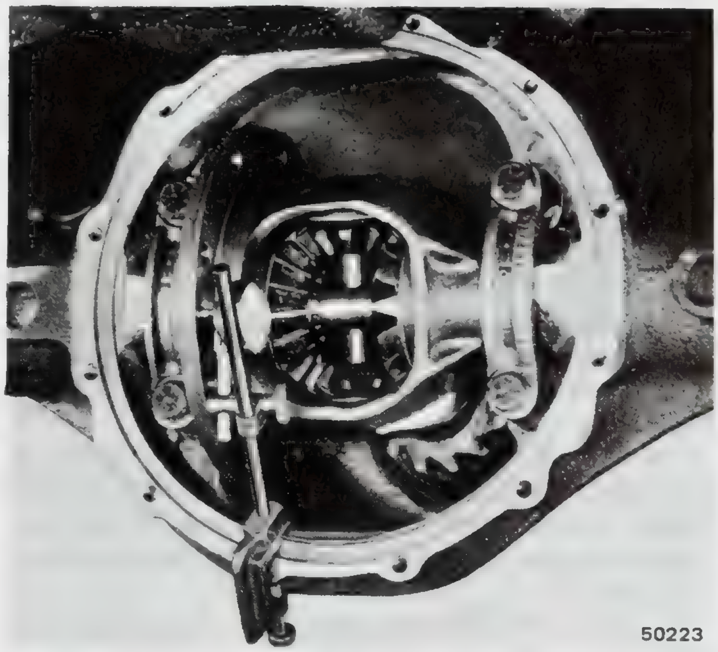

Fig. 2E-28 Checking Differential Case Runout

(6) Amount read on dial indicator is shim thickness that must be added to arrive at zero preload and zero end play. Repeat procedure for accuracy.

(7) Install shims as necessary to adjust bearing end play. Be sure to install same thickness shim at each bearing.

NOTE: *On 8-7/8 axles, end play adjustment shims are available in thickness ranges of 0.080 to 0.110 inch (2.03 mm to 2.79 mm) in 0.002 inch (0.0508 mm) increments. On 7-9/16 axles, end play shims are available in thickness ranges of 0.142 to 0.174 inch (3.60 to 4.41 mm) in 0.002 inch (0.0508 mm) increments.*

(8) When bearing end play is eliminated, a slight bearing drag should be noticed.

(9) Install bearing caps and tighten bolts to specified torque.

(10) Attach dial indicator to axle housing and check ring gear mounting face of differential case for runout (fig. 2E-28). Runout must not exceed 0.002 inch (0.0508 mm). Replace case if runout exceeds specified limit.

(11) Remove bearing caps and remove differential assembly. Retain shims used to eliminate bearing sideplay.

Ring Gear Installation

(1) Position ring gear on differential case and align bolt holes.

(2) Install ring gear attaching bolts and tighten bolts alternately and evenly to seat gear on case.

(3) On 8-7/8 axles, tighten ring gear bolts to 105 foot-pounds (142.3 Nm) torque. On 7-9/16 axles, tighten bolts to 52 foot-pounds (70.5 Nm) torque.

Ring Gear Backlash Adjustment

(1) Install differential assembly and previously selected bearing end play shims in housing.

(2) Install differential bearing cap bolts and tighten bolts to specified torque.

(3) Attach dial indicator to housing so indicator stylus contacts drive side of ring gear tooth and at right angle to tooth (fig. 2E-29).

(4) Move ring gear backward and forward and note backlash registered on dial indicator. Backlash must be 0.005 to 0.009 inch (0.1270 to 0.2286 mm), with 0.008 inch (0.2032 mm) desired.

(5) Adjust backlash as follows: To increase backlash, install thinner shim at ring gear side of case and thicker shim at opposite side. To decrease backlash, reverse procedure. However, do not change total thickness of shims.

Example: The bearing sideplay was removed with 0.090-inch (2.28 mm) shims on each side totaling 0.180 inch (4.57 mm). Backlash is checked and found to be 0.011 inch (0.2794 mm). To correct backlash, add 0.004 inch (0.1016 mm) to shims at ring gear side of differential and subtract same amount from shims at opposite side of differential.

Result is 0.094 inch (2.38 mm) shim on ring gear side and 0.086 inch (2.18 mm) shim on opposite side. Backlash will be approximately 0.007 to 0.008 inch (0.1778 to 0.2032 mm). However, the total shim thickness remains at 0.180 inch (4.57 mm).

(6) Remove differential assembly after adjusting backlash.

Differential Bearing Preload Adjustment

NOTE: *The differential bearings must be preloaded to compensate for heat and loads during operation. The bearings are preloaded by increasing the existing shim thickness at each bearing by 0.004 inch (0.1016 mm) for a total of 0.008 inch (0.2032 mm).*

(1) Install differential bearing preload and side play shims in axle housing bearing bores.

(2) Install bearing cups on differential bearings. Cups must cover bearing rollers completely.

(3) Position differential so that bearings just enter axle housing bearing bores (fig. 2E-30).

NOTE: *Tipping the bearing cups slightly will ease entry of the cups into the bores. Keep the differential assembly square in the housing and push it in as far as possible.*

(4) Using rawhide mallet, tap outer edge of bearing cups until differential assembly is seated in housing.

CAUTION: *Do not distort the shims by hammering them into the housing.*

(5) Install and align differential bearing caps using reference punch marks made at disassembly. Tighten bearing cap bolts to specified torque.

(6) Preloading differential bearings may change backlash setting. Recheck backlash and correct if necessary.

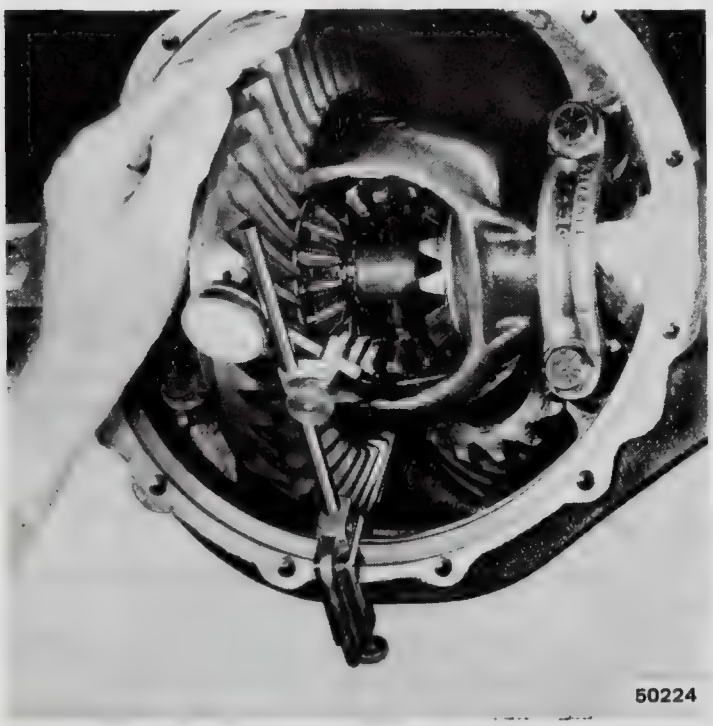

Fig. 2E-29 Checking Ring Gear Backlash

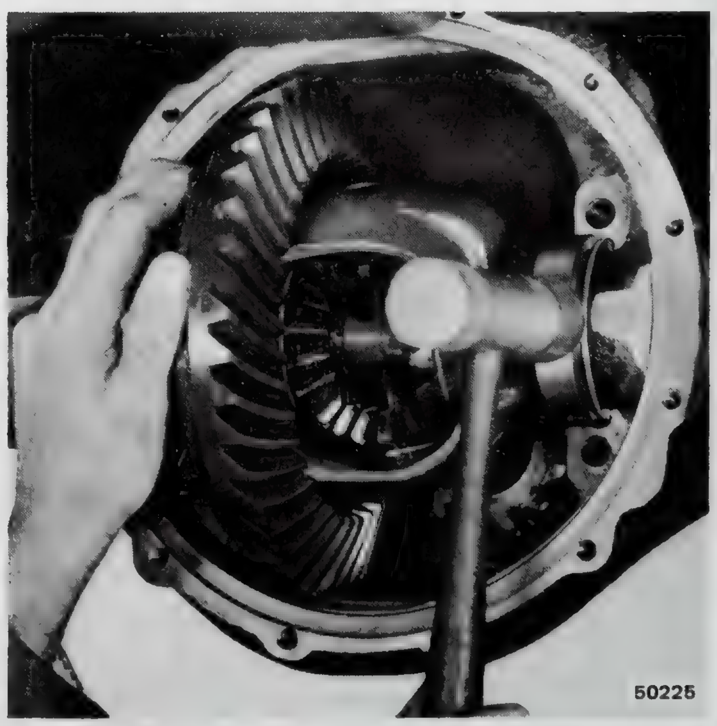

Fig. 2E-30 Differential Installation

Axle Assembly

(1) Install axle housing cover.

(2) Install propeller shaft. Align yoke and shaft using reference marks made at disassembly.

(3) Install axle shafts, oil seals and retainers, shaft bearing end play shims, brake support plates, hubs, drums and wheels.

(4) Check and correct axle shaft end play as necessary. Refer to adjustment procedure in Axle Service section.

(5) Fill axle with AMC Rear Axle Lubricant or equivalent.

(6) Connect all brake lines and bleed brakes.

(7) Remove supports and lower car.

SPECIFICATIONS

Axle Specifications

	7-9/16 Inch Dia. Ring Gear Axle		8-7/8 Inch Dia. Ring Gear Axle	
	(USA)*	(Metric)**	(USA)*	(Metric)**
Capacity	3 pts.	1.4 liters	4 pts.	1.9 liters
Pinion Depth Standard Setting (Shims)	2.095 inches	53.21	2.547 inches	64.69
Pinion Bearing Preload (Collapsible Sleeve)	15-25 in-lb	2-3 N-m	17-28 in-lb	2-3 N-m
Ring and Pinion Backlash (Shim)	.005-.009 inch (.008 inch desired)		.013-0.23 (0.20 preferred)	
Differential Bearing Preload (Shims)	.008 inch		0.20	
Differential Case Face Runout	.002 inch max.		0.05 max.	
Axle Shaft End Play (Shims — left side only)	.004-.008 inch (.006 inch desired)		0.10-0.20 (0.15 preferred)	
Axle Hub Installation Dimension	1-3/16 inch	30.16	1-5/16 inch	33.34
Differential Side Gear-to-Case Clearance (All Axles)	0.000-0.007 inches		0.000-0.018 mm	

*Add inches unless otherwise specified.
**Add mm unless otherwise specified.

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Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft.lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Brake Tubing-to-Rear Wheel Brake Cylinder	11	10-12	97 in-lb	90-105 in-lb
Differential Bearing Bolt (8-7/8-inch Axle)	118	109-129	87	80-95
Differential Bearing Bolt (7-9/16-inch Axle)	77	71-91	57	52-67
Ring Gear-to-Case Bolt (8-7/8-inch Axle)	142	129-156	105	95-115
Ring Gear-to-Case Bolt (7-9/16-inch Axle)	71	57-88	52	42-65
Rear Brake Support Plate Screw Nut	43	34-54	32	25-40
Rear Wheel Hub-to-Axle Shaft Nut	339 min.	339 min.	250 min.	250 min.
Axle Cover Screw	20	14-27	15	10-18
Clamp Strap Bolt	19	14-24	14	10-18

All torque values given in foot-pounds/newton-meters with dry fits unless otherwise specified.

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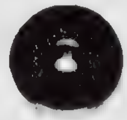
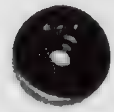
Special Tools

J-21787 – 8-7/8 AXLE PINION FRONT BEARING CUP REMOVER

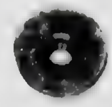
J-7817 – 7-9/16 AXLE PINION FRONT BEARING CUP INSTALLER



J-8608 – 8-7/8 AXLE PINION REAR BEARING CUP INSTALLER

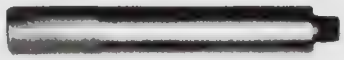


J-21786 – 8-7/8 AXLE PINION REAR BEARING CUP REMOVER



J-8611-01 – 8-7/8 AXLE PINION FRONT BEARING CUP INSTALLER

J-5223-20 GAUGE J-5223-24



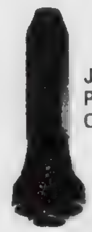
J-8092 7-9/16 OR 8-7/8 AXLE DRIVER HANDLE

J-21784 – 8-7/8 AXLE DIFFERENTIAL BEARING INSTALLER

J-21788 AXLE PINION OIL SEAL INSTALLER

J-9233 (J-7583) – 7-9/16 OR 8-7/8 AXLE PINION OIL SEAL REMOVER

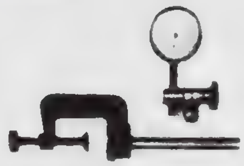
J-22697 – 8-7/8 AXLE REAR PINION BEARING INSTALLER



J-9349 – 7-9/16 AXLE PINION REAR BEARING CUP REMOVER

J-5223-4 ARBOR

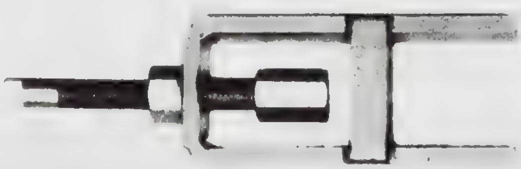
J-6381 OR J-5223-23 DISC



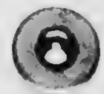
J-8001 DIAL INDICATOR SET

J-9349 – 7-9/16 AXLE PINION REAR BEARING CUP REMOVER

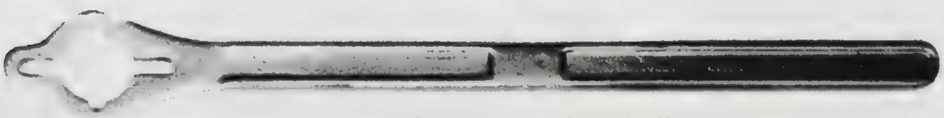
J-22661 – 8-7/8 AXLE SHAFT OIL SEAL INSTALLER



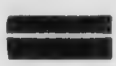
J-2498 – 7-9/16 OR 8-7/8 AXLE SHAFT REMOVER



J-7818 – 7-9/16 AXLE PINION REAR BEARING CUP INSTALLER

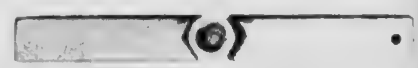


J-8614-01 – 7-9/16 OR 8-7/8 AXLE HOLDER AND REMOVER TOOL



J-1644-02 THREAD PROTECTOR

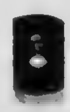
J-22575 – 7-9/16 OR 8-7/8 AXLE NUT SOCKET



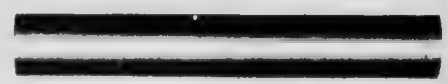
J-2092 – 7-9/16 OR 8-7/8 END PLAY CHECKING TOOL

J-22888-02 – 7-9/16 OR 8-7/8 DIFFERENTIAL SIDE BEARING PULLER

J-1644-02 – 7-9/16 OR 8-7/8 AXLE REAR HUB PULLER



J-9351 – 7-9/16 FRONT BEARING CUP REMOVER



J-2100-02 – 7-9/16 DIFFERENTIAL BEARING INSTALLER

DIFFERENTIAL OVERHAUL—TWIN-GRIP DIFFERENTIAL

GENERAL

A Twin-Grip limited-slip differential is available as an option in all AMC axles. Two different Twin-Grip units are used. The 7-9/16 axle is equipped with an unloading cone type-unit. The 8-7/8 axle is equipped with a torque loading-type unit containing multiple disc clutch packs.

The conventional type differential divides available torque equally between both driving wheels, causing the wheel with the least traction to slip first.

Twin-Grip provides many times the torque of the slipping wheel to the driving wheel, however the unit is not a positive-lock type design and will release before excessive driving force can be directed to one rear wheel.

Twin-Grip Operation—7-9/16 Axle

Locking action in this unit is accomplished through unloading clutch cones (fig. 2E-31). The cones are spring loaded to allow adequate driving force at the high traction wheel yet not interfere with steering characteristics or normal differential action. The locking action is produced by spring load which is automatically increased by differential pinion reaction when wheel traction increases.

Under extremely unbalanced traction conditions, such as with one wheel on dry pavement and the other on ice, wheel spin can occur if overacceleration is attempted. This spinnning produces a whirring sound caused by clutch overrun. This spinning condition or sound does not indicate failure of the unit.

The spring load is calibrated to be rendered ineffective by variable torque; that is, when turning corners, the torque created by wheel travel differential will overcome the spring load.

Twin-Grip Operation—8-7/8 Axles

Locking action in this unit is accomplished through multiple disc clutch packs installed between the differential side gears (fig. 2E-32). Belleville springs are used to maintain a constant preload on the clutches.

The concentrically grooved clutch discs are splined to the differential side gears. The clutch discs are primarily engaged by preload pressure exerted on the discs by the Belleville springs. Locking action is increased by a reaction between the differential pinions and side gears when torque and traction increase. When one wheel is spinning, the clutch packs automatically transfer more torque to the wheel having the most traction.

When turning corners, the torque created by wheel travel will overcome Belleville spring preload and permit normal differential action.

TWIN-GRIP SERVICE

7-9/16 Axle

The Twin-Grip differential used in 7-9/16-inch axles is **serviced as an assembly only**.

When replacement is required, follow the removal and installation procedures outlined in the Standard Differential Overhaul section. DO NOT DISASSEMBLE THIS DIFFERENTIAL.

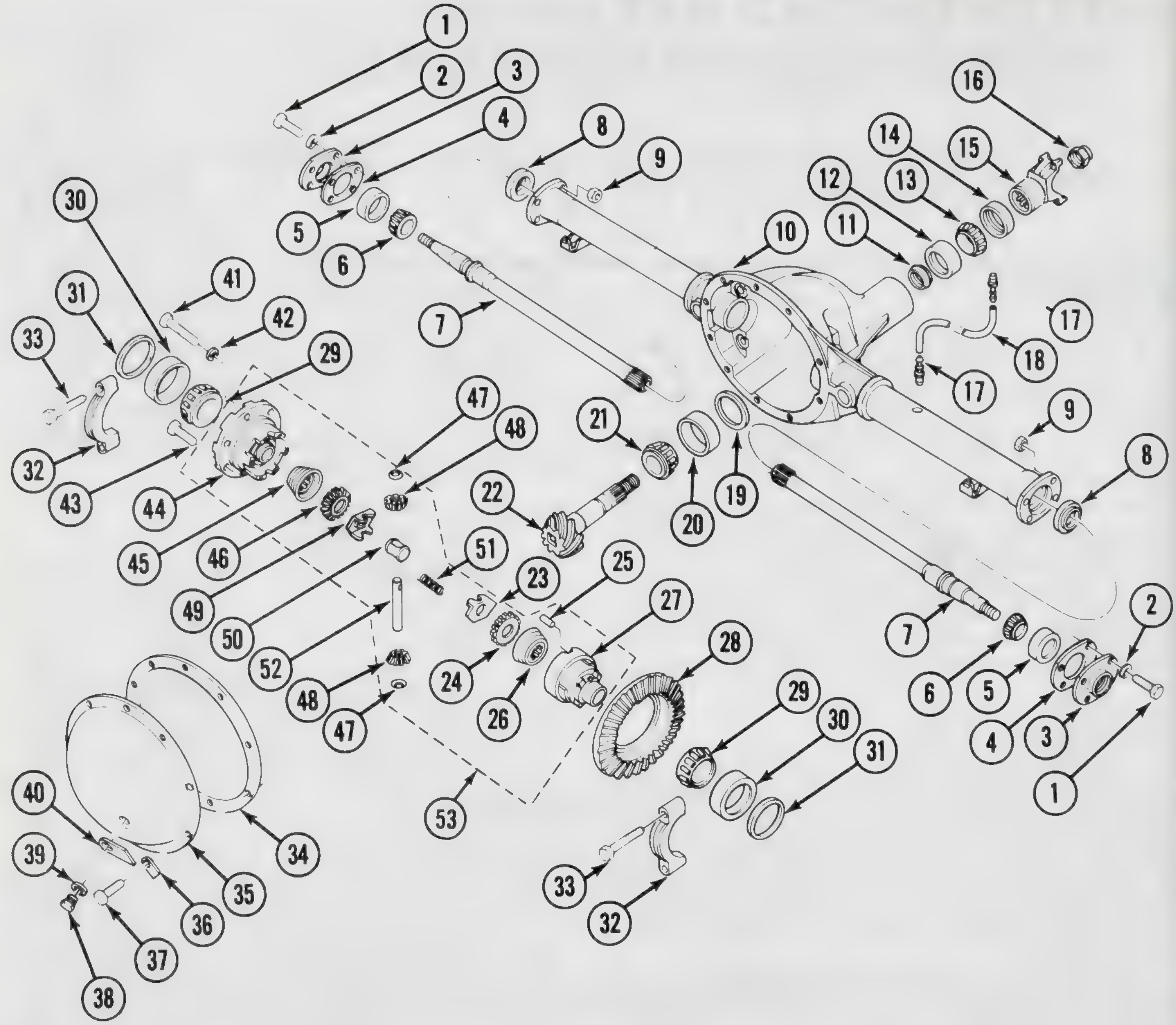
CAUTION: *After installing a Twin-Grip unit in the axle housing, do not attempt to rotate one axle shaft until both are in position. Rotating one axle shaft without the other axle shaft being installed will result in misalignment of the side gear hub and side gear splines and prevent installation of the second axle shaft.*

Always fill a Twin-Grip axle with AMC Rear Axle Lubricant or an equivalent limited slip axle lubricant only. Do not use lubricants containing sulfur at any time.

WARNING: *Do not use on-car type wheel balancers on the rear wheels of cars equipped with a Twin-Grip differential unless the wheel opposite the wheel being balanced is removed and the rear end of the car is raised.*

8-7/8 Axle

The Twin-Grip differential used in 8-7/8 axles is completely serviceable. The unit can be removed and disassenbled for inspection or overhaul if necessary. All of the service and overhaul procedures for the unit are contained in this section. Refer to the disassembly, cleaning and inspection, and assembly headings for 8-7/8 axle in this section.



1. BOLT
2. WASHER
3. AXLE SHAFT OIL SEAL
4. AXLE SHAFT BEARING SHIM
5. AXLE SHAFT BEARING CUP
6. AXLE SHAFT BEARING
7. AXLE SHAFT
8. AXLE SHAFT INNER OIL SEAL
9. NUT
10. AXLE HOUSING
11. COLLAPSIBLE SPACER
12. PINION BEARING CUP-FRONT
13. PINION BEARING-FRONT
14. PINION OIL SEAL
15. UNIVERSAL JOINT YOKE
16. PINION NUT
17. BREATHER
18. BREATHER HOSE
19. PINION DEPTH ADJUSTING SHIM
20. PINION BEARING CUP-REAR
21. PINION BEARING-REAR
22. PINION GEAR
23. RETAINER CLIP
24. DIFFERENTIAL SIDE GEAR
25. DIFFERENTIAL PINION SHAFT PIN
26. CLUTCH CONE
27. DIFFERENTIAL CASE
28. RING GEAR
29. DIFFERENTIAL BEARING
30. DIFFERENTIAL BEARING CUP
31. DIFFERENTIAL BEARING SHIM
32. DIFFERENTIAL BEARING CAP
33. DIFFERENTIAL BEARING CAP BOLT
34. AXLE HOUSING COVER GASKET
35. AXLE HOUSING COVER
36. AXLE IDENTIFICATION TAG
37. BOLT
38. AXLE HOUSING COVER FILL PLUG
39. WASHER
40. TWIN GRIP IDENTIFICATION TAG
41. DIFFERENTIAL CASE BOLT
42. WASHER
43. RING GEAR BOLT
44. DIFFERENTIAL CASE
45. CLUTCH CONE
46. DIFFERENTIAL SIDE GEAR
47. DIFFERENTIAL PINION THRUST WASHER
48. DIFFERENTIAL PINION
49. RETAINER CLIP
50. DIFFERENTIAL PINION SHAFT THRUST BLOCK
51. SPRING
52. DIFFERENTIAL PINION SHAFT
53. DIFFERENTIAL SERVICED AS ASSEMBLY ONLY.

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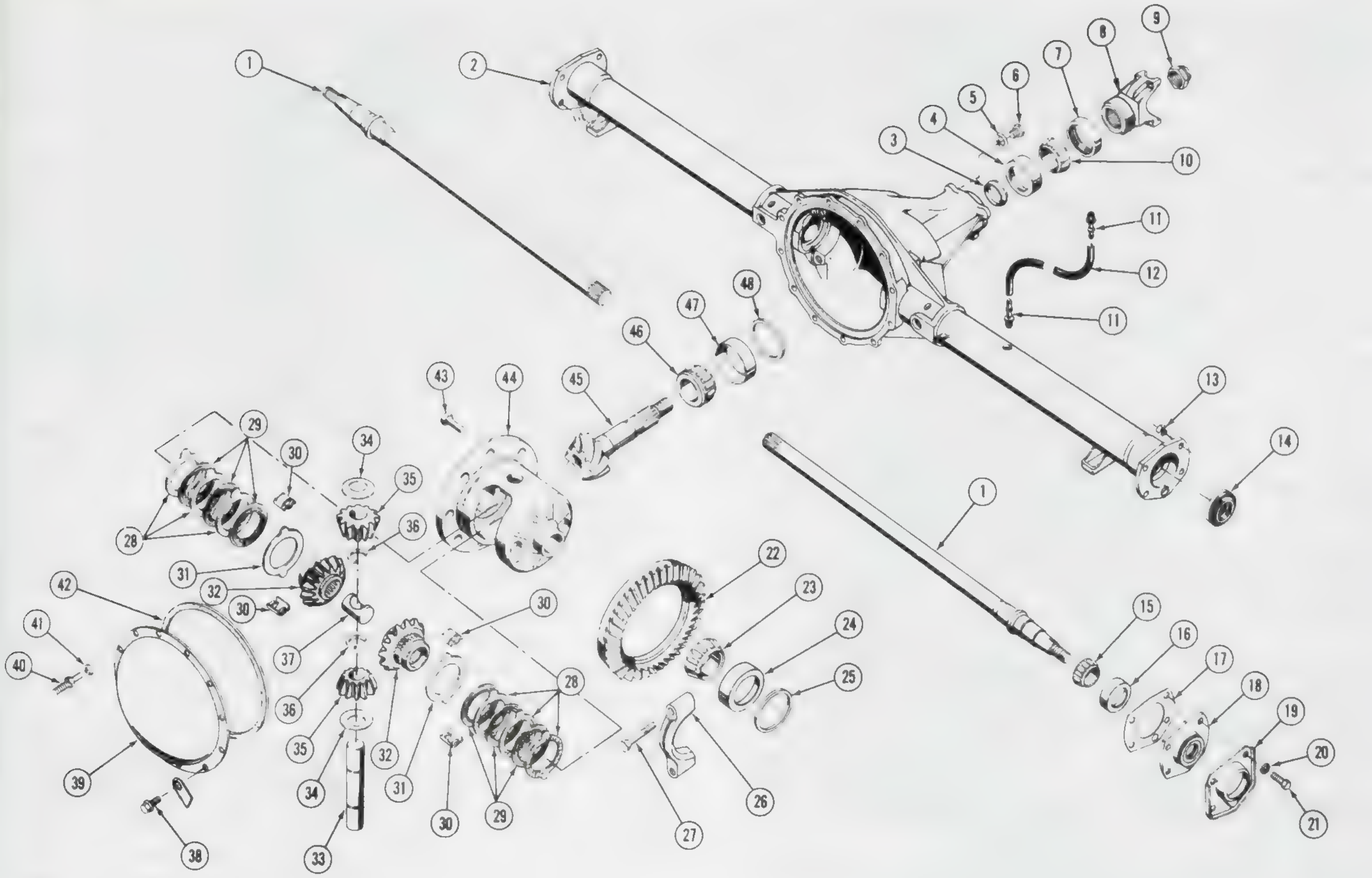
Fig. 2E-31 Twin-Grip Differential—7-9/16 Axle (Serviced as an Assembly Only)



1. AXLE SHAFT
2. REAR AXLE HOUSING
3. PINION FRONT BEARING CUP
4. COLLAPSIBLE SPACER
5. FILLER PLUG GASKET
6. FILLER PLUG
7. PINION OIL SEAL
8. UNIVERSAL JOINT YOKE
9. PINION NUT
10. FRONT PINION BEARING
11. BREATHER (2)
12. BREATHER HOSE
13. NUT
14. AXLE SHAFT INNER OIL SEAL
15. AXLE SHAFT BEARING
16. AXLE SHAFT BEARING CUP
17. AXLE SHAFT BEARING SHIM
18. AXLE SHAFT OIL SEAL
19. AXLE SHAFT OIL SEAL RETAINER
20. WASHER
21. BOLT
22. RING GEAR
23. DIFFERENTIAL BEARING
24. DIFFERENTIAL BEARING CUP
25. DIFFERENTIAL BEARING SHIM
26. DIFFERENTIAL BEARING CAP
27. BOLT
28. CLUTCH PLATES
29. CLUTCH DISCS
30. CLUTCH RETAINER CLIP
31. CLUTCH BELLEVILLE SPRING
32. DIFFERENTIAL SIDE GEAR
33. DIFFERENTIAL PINION SHAFT
34. DIFFERENTIAL PINION THRUST WASHER
35. DIFFERENTIAL PINION
36. DIFFERENTIAL PINION SHAFT SNAP RING
37. DIFFERENTIAL PINION SHAFT THRUST BLOCK
38. BOLT
39. HOUSING COVER
40. STUD
41. WASHER
42. HOUSING COVER GASKET
43. BOLT
44. DIFFERENTIAL CASE
45. PINION GEAR
46. REAR PINION BEARING
47. REAR PINION BEARING CUP
48. PINION DEPTH ADJUSTING SHIM

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Fig. 2E-32 Twin-Grip Differential—8-7/8 Axle

Whenever diagnosis indicates that Twin-Grip service may be necessary, follow the removal/installation/overhaul procedures outlined for standard differentials. Refer to the Standard Differential Overhaul section.

Always fill a Twin-Grip axle with AMC Rear Axle Lubricant or an equivalent grade limited slip axle lubricant. Do not use axle lubricants containing sulphur at any time.

SERVICE CHECK—ALL TWIN-GRIP AXLES

The following procedure for checking the effectiveness of the unit should be performed before attempting repairs. This is necessary to avoid unnecessary disassembly or replacement.

(1) Shift transmission into neutral.

(2) Stop engine.

(3) Raise one rear wheel only.

(4) Rotate axle shaft in forward direction using socket and torque wrench installed on axle shaft nut. If necessary, bend cotter pin to allow installation of socket.

(5) Torque required to rotate axle shaft should be 70 to 200 foot-pounds on 8-7/8 axle and 80 to 120 foot-pounds on 7-9/16 axles.

(6) Torque readings not within specified range indicates need for repair or replacement.

If repair or replacement of a Twin-Grip unit is required, remove and install the unit as outlined in Differential Overhaul-Standard Differential. Replace the unit used in 7-9/16 axles as an assembly. Repair the unit used in 8-7/8 axles as outlined in this section.

To eliminate chatter from a Twin-Grip unit, drain the original lubricant from the axle housing and refill using AMC Rear Axle lubricant or equivalent limited slip gear lubricant.

NOTE: *It is necessary to rotate the rear wheels by hand to cause the lubricant in the Twin-Grip unit to drain properly.*

In the event the above procedure is not effective after 200 miles of operation, it will be necessary to remove and service the unit.

DISASSEMBLY—8-7/8 TWIN-GRIP DIFFERENTIAL

NOTE: *Refer to figure 2E-32 as a guide to parts identification during service operations.*

(1) Mount one axle shaft in vise with splined end extending 2-3/4 inches above top of vise. Tighten vise firmly on shaft. Shaft will serve as holding fixture for drive gear removal and case disassembly.

(2) Mount differential on axle shaft and remove ring gear bolts (fig. 2E-33).

(3) Place shop towels over top of vise to protect ring gear teeth from being nicked when gear is removed.

(4) Remove ring gear using brass drift and hammer (fig. 2E-16).

(5) Remove differential from axle shaft and remove ring gear.

(6) Remount differential case on axle shaft.

(7) Tape shop towel around rear of case to prevent pinion shaft snap rings from flying out when removed.

(8) Using two screwdrivers, push pinion shaft snap rings off shaft (fig. 2E-34).

(9) Remove pinion shaft from case using hammer and punch (fig. 2E-35).

(10) Remove thrust block.

(11) Position Rotating Tools J-23781-3 and -6 in upper differential side gear (fig. 2E-36).

(12) Position Step Plate Tool J-23781-7 in lower side gear (fig. 2E-36).

(13) Insert Forcing Screw Tool J-8626-2 downward through top of case and thread it into Gear Rotating Tool J-23781-3.

NOTE: *Before using the forcing screw, lubricate the screw threads with oil and apply a small daub of grease to the centering hole in the step plate before it is contacted by the forcing screw.*

(14) Install tool J-8646-2 so it centers in tool J-23781-7. Tighten forcing tool screw until differential side gears move away from pinion gears to relieve load between gears.

(15) Remove conical washers using 0.030-inch (0.7620 mm) shim stock (fig. 2E-37).

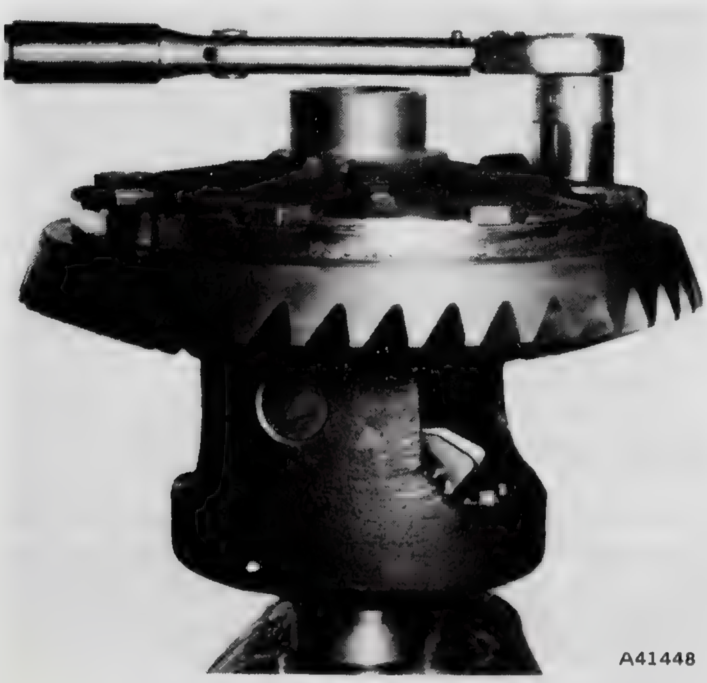

Fig. 2E-33 Ring Gear Bolt Removal

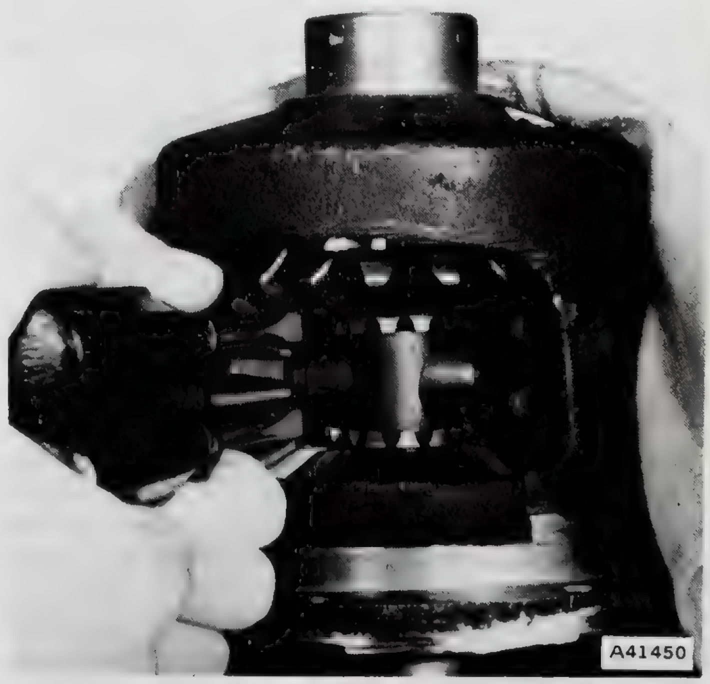

Fig. 2E-34 Pinion Shaft Snap Ring Removal

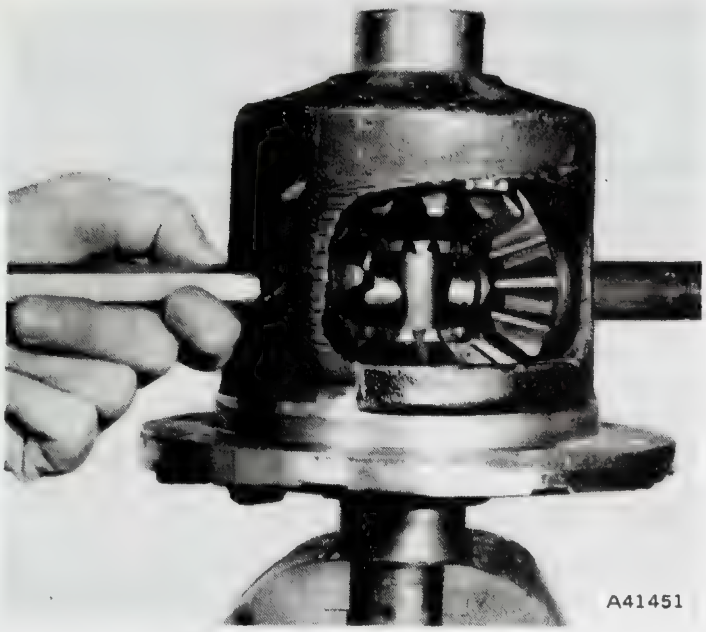

Fig. 2E-35 Pinion Shaft Removal

(16) Loosen and tighten Forcing Screw Tool J-8646-2 until very slight movement of differential pinions is detected.

(17) Insert pawl of gear rotating tool handle between two differential side gear teeth (fig. 2E-38). Pull on handle so upper gear will rotate and force pinions to rotate. Continue pulling tool handle until it stops against case.

(18) Remove pawl from between gear teeth and repeat previous step until pinions can be removed.

NOTE: *When attempting to rotate the differential side gear, adjust the forcing screw by very slightly tightening or loosening it until the required load is applied to the Belleville springs, allowing the side gears and pinions to rotate.*

(19) Retain upper differential side gear and clutch pack in case by hand while removing forcing screw. Remove tools, differential side gear and clutch pack.

(20) Remove case from axle shaft, and remove remaining differential side gear and clutch pack from case. Remove retainer clip from both clutch packs to allow separation of plates and discs (fig. 2E-39).

NOTE: *When inspecting the clutch plates, discs, and retainer clips, keep these parts in the same order as when removed.*

CLEANING AND INSPECTION—8-7/8 TWIN-GRIP DIFFERENTIAL

Cleaning

The clutch plates, clutch discs, retainer clips, and side gears must be cleaned with shop towels only. Do not immerse these parts in solvent at any time. Wipe them clean using lint-free shop towels or paper towels only. All other Twin-Grip differential components may be cleaned using solvent. Be sure to dry any parts cleaned in solvent thoroughly.

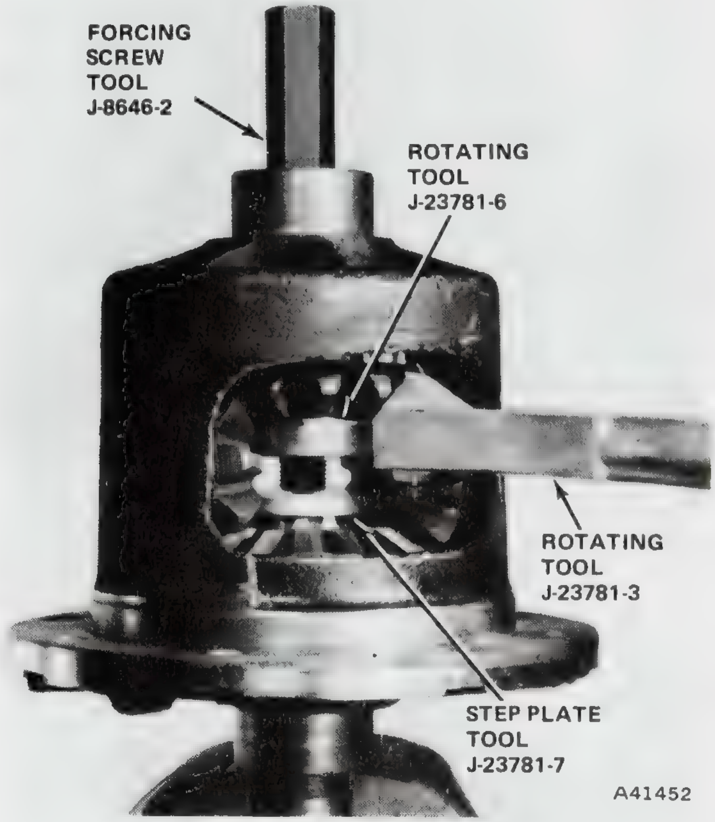

Fig. 2E-36 Installing Gear Rotating Tools

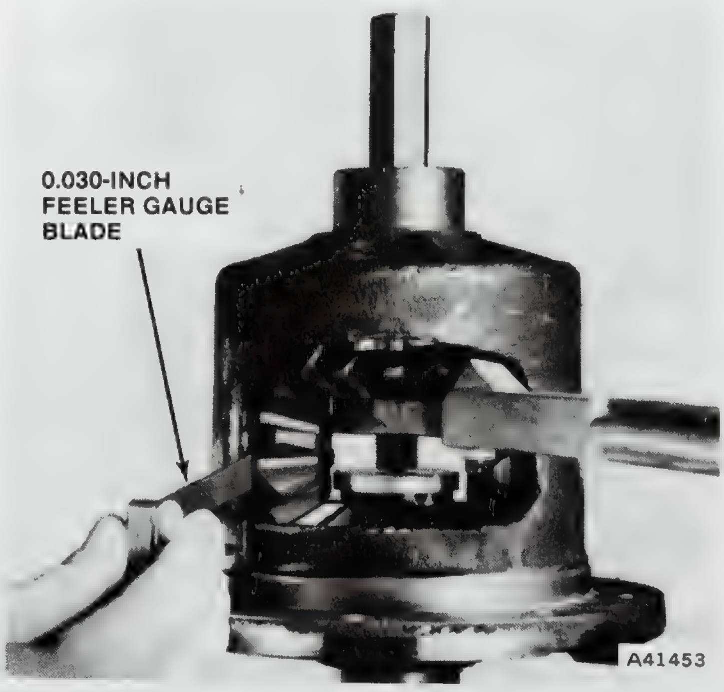

Fig. 2E-37 Conical Washer Removal

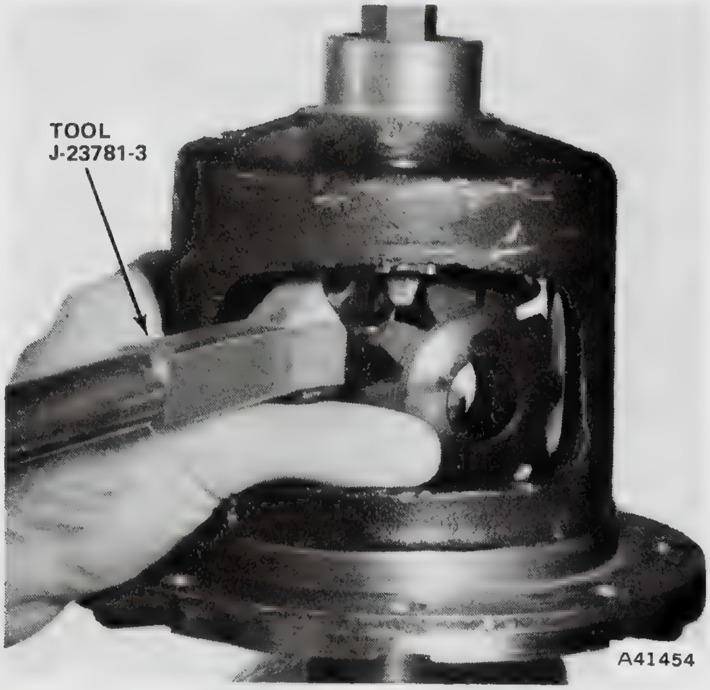

Fig. 2E-38 Rotating Gears

Fig. 2E-39 Side Gear and Clutch Pack Removal/Installation

Inspection

Clutch Pack

If any components in either clutch pack is scored or exhibits excessive wear, both clutch packs must be replaced as assemblies.

Differential Gears and Pinion Shaft

The mating surfaces of these parts should be checked for excessive wear or cracks. The external teeth on the side gears, which retain the clutch packs, must also be checked for wear or cracks. If replacement of any one component is required, the side gears, pinions, thrust washers, and pinion shaft must all be replaced also.

Thrust Block

Replace the thrust block if cracks, or excessive wear on the ends of the block are evident. If the block is replaced, be sure to correct axle shaft end play at assembly.

Differential Case

Replace the case if cracked, worn, or damaged in any way. If scoring, wear, or metal pickup is evident on the thrust washer surfaces, replace the case.

ASSEMBLY—8-7/8 TWIN-GRIP DIFFERENTIAL

(1) Lubricate all parts with AMC Rear Axle Lubricant, or equivalent limited slip axle lubricant.

(2) Assemble clutch plates and discs on differential side gear splines (fig. 2E-40). Be sure to lLubricate each part with specified gear lubricant.

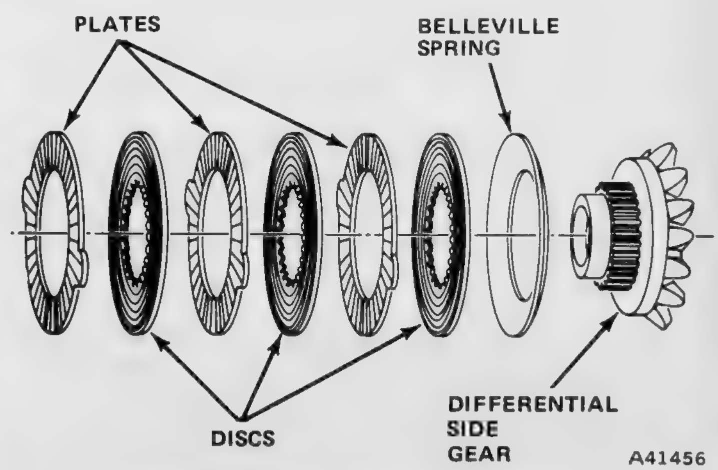

Fig. 2E-40 Clutch Pack Assembly Sequence

(3) Install retainer clips on clutch plate ears. Be sure clips are completely seated.

(4) Mount differential case on axle shaft (fig. 2E-33).

(5) Install one assembled clutch pack and side gear in case. Be sure clutch pack remains engaged in side gear splines and that retainer clips are completely seated in case pockets.

CAUTION: *When mounting the case on the axle shaft, be sure that the differential side gear splines are aligned with the axle shaft splines. Also, be sure that the clutch pack is still properly seated in the case.*

(6) Install remaining clutch pack and side gear. Be sure clutch pack remains engaged in side gear splines and that retainer clips are completely seated in case pockets.

(7) Install Step Plate Tool J-23781-7 in lower side gear. Apply small daub of grease to centering hole of step plate tool.

(8) Position gear rotating tools in upper side gear (fig. 2E-36).

(9) Hold gear and rotating tools in position by hand, insert Forcing Screw Tool J-8646-2 through top of case, and thread screw into Tool J-23781-6 (fig. 2E-36).

(10) Position differential pinions exactly as shown in figure 2E-37. Be sure shaft bores in pinions are aligned. Hold gears in place by hand.

(11) Tighten forcing screw to compress clutch pack Belleville springs and provide clearance between differential pinion and side gear teeth.

(12) Hold pinions in place and insert pawl of rotating tool handle between two teeth of one side gear (fig. 2E-38). Pull handle to rotate side gear and rotate pinions into case.

NOTE: *If necessary, adjust the forcing screw by very slightly loosening or tightening it until the required load is applied to the Belleville springs.*

(13) Pull rotating tool handle until it hits gear. Remove pawl from gear teeth and reposition handle and pawl. Repeat operation until shaft bores in pinions are aligned with shaft bores in case.

(14) Tighten forcing screw just enough to provide clearance for conical-shape pinion washers.

(15) Lubricate both sides of pinion washers with specified lubricant.

(16) Press washers into place using small screwdriver (fig. 2E-41). Be sure holes in washers and shaft bores in pinions are aligned with shaft bores in case.

(17) Remove forcing screw, rotating tools, and step plate.

(18) Install axle shaft thrust block.

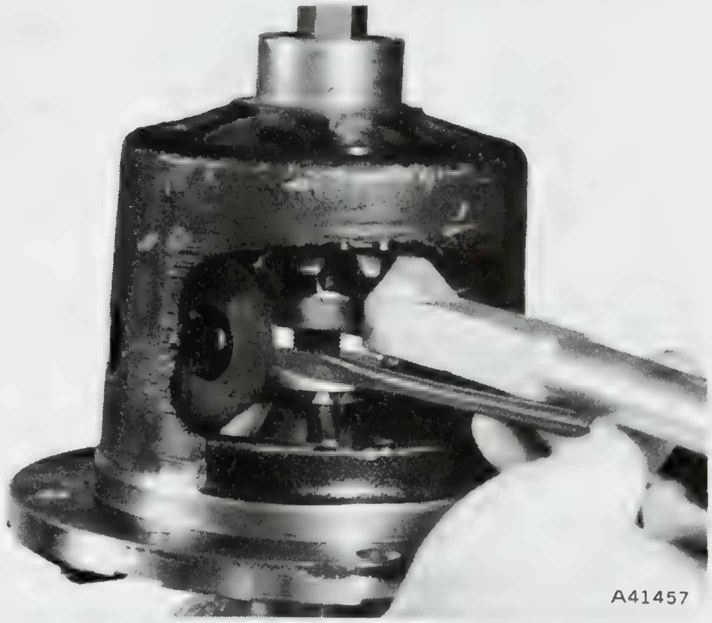

Fig. 2E-41 Conical Washer Installation

(19) Lubricate pinion shaft with specified lubricant and install shaft. Be sure shaft snap ring grooves are exposed to permit snap ring installation (fig. 2E-42).

(20) Install pinion shaft snap rings.

(21) Remove differential assembly from axle shaft.

(22) Position ring drive gear on differential case.

(23) Align ring gear and case bolt holes and install ring gear bolts finger-tight.

(24) Remount differential assembly on axle shaft.

(25) Tighten ring gear bolts alternately and evenly to 105 foot-pounds (142.3 Nm) torque.

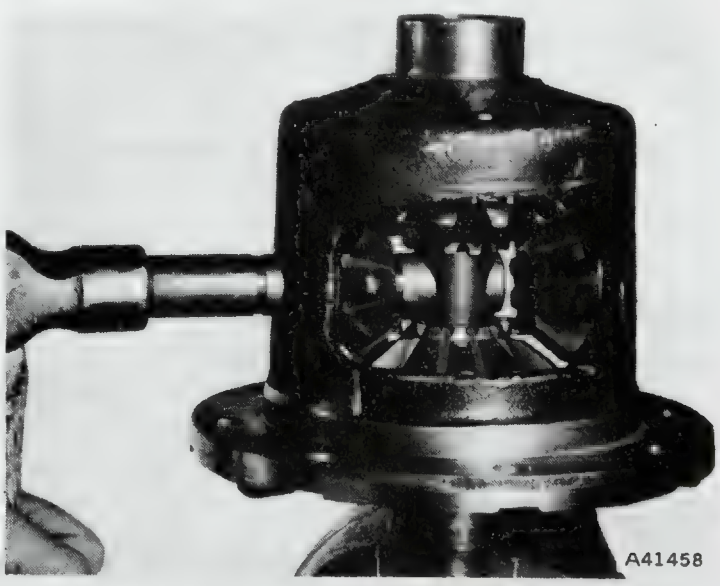

Fig. 2E-42 Pinion Shaft Installation

SPECIFICATIONS

Axle Specifications

	7-9/16 Inch Dia. Ring Gear Axle		8-7/8 Inch Dia. Ring Gear Axle	
	(USA)*	(Metric)**	(USA)*	(Metric)**
Capacity	3 pts.	1.4 liters	4 pts.	1.9 liters
Pinion Depth Standard Setting (Shims)	2.095 inches	53.21	2.547 inches	64.69
Pinion Bearing Preload (Collapsible Sleeve)	15-25 in-lb	2-3 N-m	17-28 in-lb	2-3 N-m
Ring and Pinion Backlash (Shim)	.005-.009 inch (.008 inch desired)		.013-0.23 (0.20 preferred)	
Differential Bearing Preload (Shims)	.008 inch		0.20	
Differential Case Face Runout	.002 inch max.		0.05 max.	
Axle Shaft End Play (Shims — left side only)	.004-.008 inch (.006 inch desired)		0.10-0.20 (0.15 preferred)	
Axle Hub Installation Dimension	1-3/16 inch	30.16	1-5/16 inch	33.34
Differential Side Gear-to-Case Clearance (All Axles)	0.000-0.007 inches		0.000-0.018 mm	

***Add inches unless otherwise specified.**
****Add mm unless otherwise specified.**

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Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft.lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Brake Tubing-to-Rear Wheel Brake Cylinder	11	10-12	97 in-lb	90-105 in-lb
Differential Bearing Bolt (8-7/8-inch Axle)	118	109-129	87	80-95
Differential Bearing Bolt (7-9/16-inch Axle)	77	71-91	57	52-67
Ring Gear-to-Case Bolt (8-7/8-inch Axle)	142	129-156	105	95-115
Ring Gear-to-Case Bolt (7-9/16-inch Axle)	71	57-88	52	42-65
Rear Brake Support Plate Screw Nut	43	34-54	32	25-40
Rear Wheel Hub-to-Axle Shaft Nut	339 min.	339 min.	250 min.	250 min.
Axle Cover Screw	20	14-27	15	10-18
Clamp Strap Bolt	19	14-24	14	10-18

All torque values given in foot-pounds/newton-meters with dry fits unless otherwise specified.

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Special Tools

J-21787 — 8-7/8 AXLE PINION FRONT BEARING CUP REMOVER

J-7817 — 7-9/16 AXLE PINION FRONT BEARING CUP INSTALLER

J-8608 — 8-7/8 AXLE PINION REAR BEARING CUP INSTALLER

J-21786 — 8-7/8 AXLE PINION REAR BEARING CUP REMOVER

J-8611-01 — 8-7/8 AXLE PINION FRONT BEARING CUP INSTALLER

J-8092 7-9/16 OR 8-7/8 AXLE DRIVER HANDLE

J-21784 — 8-7/8 AXLE DIFFERENTIAL BEARING INSTALLER

J-21788 — 7-9/16 OR 8-7/8 AXLE PINION OIL SEAL INSTALLER

J-5223-20 GAUGE

J-5223-24

J-9233 (J-7583) — 7-9/16 OR 8-7/8 AXLE PINION OIL SEAL REMOVER

J-22697 — 8-7/8 AXLE REAR PINION BEARING INSTALLER

J-9349 — 7-9/16 AXLE PINION REAR BEARING CUP REMOVER

J-8001 DIAL INDICATOR SET

J-9349 — 7-9/16 AXLE PINION REAR BEARING CUP REMOVER

J-5223-4 ARBOR

J-6381 OR J-5223-23 DISC

J-2498 — 7-9/16 OR AXLE SHAFT REMOVER

J-22661 — 8-7/8 AXLE SHAFT OIL SEAL INSTALLER

J-8614-01 — 7-9/16 OR 8-7/8 AXLE HOLDER AND REMOVER TOOL

J-7818 — 7-9/16 AXLE PINION REAR BEARING CUP INSTALLER

J-1644-02 THREAD PROTECTOR

J-22575 — 7-9/16 OR 8-7/8 AXLE NUT SOCKET

J-2092 — 7-9/16 OR 8-7/8 AXLE END PLAY CHECKING TOOL

J-9351 — 7-9/16 AXLE PINION FRONT BEARING CUP REMOVER

J-2995 — 7-9/16 AXLE PINION REAR BEARING INSTALLER

J-23781-7 STEP PLATE

J-22888-02 — 7-9/16 OR 8-7/8 AXLE DIFFERENTIAL SIDE BEARING PULLER

J-1644-02 — 7-9/16 OR 8-7/8 AXLE REAR HUB PULLER

J-8646-2 FORCING SCREW

J-23781-3 GEAR ROTATING TOOL

J-2100-02 — 7-9/16 AXLE DIFFERENTIAL BEARING INSTALLER

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NOTES

BRAKES 2F

SECTION INDEX

GENERAL INFORMATION

GENERAL

AMC cars are equipped with full-floating sliding caliper front disc brakes and duo-servo self energizing rear drum brakes.

The front disc brake caliper used on Matadors has a 3.1 inch (7.8 cm) diameter piston. The caliper used on Pacer, Gremlin, Concord and AMX models has a 2.6 inch (6.6 cm) diameter piston.

Nine inch (22.8 cm) diameter rear drum brakes are used on four-cylinder Gremlins. Ten inch (25.4 cm) diameter rear drum brakes are used on all other models.

A dual reservoir master cylinder is used for all applications. The Matador master cylinder has a 1.125 inch (28.5 mm) bore. The master cylinder used on Pacer, Gremlin, Concord and AMX models has a metric bore of 24 mm (0.94 inch).

Power brakes are standard equipment on all Matadors and are available as an option on all other models. Two power units are used. A nine and one-half inch, step tandem dual-diaphragm power unit is used on Matadors. An eight inch single diaphragm power unit is used on all other models. Refer to the Brake Size Chart for individual application and brake sizes.

Four-cylinder Gremlins are equipped with a combination pressure differential/rear brake proportioning valve. Pacer, Gremlin, Concord, AMX and Matador models use a pressure differential valve only.

DIAGNOSIS

Brake System preliminary diagnosis procedures are outlined in Preliminary Diagnosis Guides A and B. Use Guide A for all cars. Use Guide B for cars equipped with power brakes and only after completing the steps outlined in Guide A.

The procedures outlined in Guides A and B are provided as a method for determining the general problem area. After the general problem area has been defined, use the Service Diagnosis Charts to determine the specific causes of a particular brake problem.

BRAKELIGHT SWITCH

The brakelight switch is actuated by the brake pedal (fig. 2F-1). The switch is mounted on the pedal in tan-

Brake Size Chart

Series	Engine	Wheel Cylinder Bore Size		Master Cylinder Bore Size		Brake Size		Power Unit Type	Braking Area (Square Inches)
		Front	Rear	Non Power	Power	Front	Rear		
Gremlin	Four-Cylinder	2.6	.94	24 MM	24 MM	10.27 x .88 Disc	9 x 2.00 Drum	Single Diaphragm	95.2
Pacer Gremlin Concord	Six & Eight-Cylinder	2.6	.812	24 MM	24 MM	10.80 x .88 Disc	10 x 1.75 Drum	Single Diaphragm	103.3
AMX	Six-Cylinder	2.6	.812	24 MM	24 MM	10.80 x .88 Disc	10 x 2.50 Drum	Single Diaphragm	136.5
	Eight-Cylinder	2.6	.812	24 MM	24 MM	10.30 x .88 Disc	10 x 1.75 Drum	Single Diaphragm	103.3
Matador Coupe	Six & Eight-Cylinder	3.1	.875	*	1.125	Disc	10 x 2.50 Drum	Tandem Diaphragm	136.5
Matador Sedan	Six & Eight-Cylinder	3.1	.875	*	1.125	Disc	10 x 2.50 Drum	Tandem Diaphragm	136.5
Matador Wagon	Six & Eight-Cylinder	3.1	.938	*	1.125	Disc	10 x 2.50 Drum	Tandem Diaphragm	136.5

*Power Brakes are standard equipment on Matador Models.

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dem with the master cylinder push rod and is not adjustable. The switch and push rod are connected to the brake pedal by a bolt and locknuts. Bushings are used in the push rod eye and switch for smooth operation.

Removal

(1) On Gremlin, Concord, and AMX models, remove package tray if equipped.

(2) On Pacer models, remove steering column tube cover and intermediate duct (under dash) if equipped with air conditioning.

(3) Disconnect wires at brakelight switch.

(4) Remove stamped nut and locknut from brake pedal bolt. Discard stamped nut and locknut.

(5) Remove brake pedal bolt and spacers.

(6) Push brakelight switch bushing out of master cylinder push rod bushing and remove switch.

(7) Remove bushing from master cylinder push rod eye. Note position of bushing for assembly reference.

(8) Inspect brake pedal bolt and all bushings. Replace bushings if worn, cracked, or galled. Replace bolt if threads are torn, galled, or worn or if non-threaded surface is worn, grooved, or galled.

Installation

(1) Install bushing in master cylinder push rod eye (fig. 2F-1).

(2) Install brakelight switch on push rod and insert switch bushing through switch and push rod bushing (fig. 2F-1).

(3) Install spacers on each end of switch bushing.

(4) Position assembled switch and push rod on brake pedal and install brake pedal bolt.

CAUTION: *There are two mounting bolt holes in the brake pedal. On cars without power brakes, install the bolt in the upper hole. On cars with power brakes, install the bolt in the lower hole.*

Fig. 2F-1 Brake Pedal and Brakelight Switch—Automatic Transmission

Brake Diagnosis Guide A—All Cars

Test 1

Road test to confirm customer's description. Make several brake applications at about 20 mph to determine if car stops evenly and smoothly. Also check brake warning light operation by observing whether bulb lights during engine cranking.

Test 2

Check master cylinder fluid level.

If fluid level and type are correct.

If low, contaminated, or if pedal has a spongy feel when applying the brakes.

Bleed system.

If unable to bleed system properly, see Service Diagnosis.

Adjust brakes by making 10 to 15 hard brake applications alternating between forward and reverse stops.

Test 3

Depress brake pedal and hold foot pressure on pedal. If car is equipped with power brakes, stop engine and deplete all vacuum reserve in system. Hold pressure for three minutes.

If pedal is firm and maintains position, and car does not have power brakes.

Road test car. If problem still exists, see Service Diagnosis.

If pedal gradually falls away and the brake warning light comes on under foot pressure, the hydraulic system is defective.

See Service Diagnosis

If pedal is firm and maintains position, and car has power brakes, continue with Guide B.

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Brake Diagnosis Guide B—Cars With Power Brakes Only

Test 4

With engine stopped and transmission in neutral, apply brakes several times to deplete all vacuum reserve in system. Depress brake pedal, hold light foot pressure on pedal, and start engine.

If the vacuum system is operating, pedal will tend to fall away under foot pressure, and less pressure will be required to hold pedal in applied position.

If no action is felt, vacuum system is not functioning. Inspect vacuum system components for loose, broken, collapsed vacuum hose; faulty check valve; restriction in vacuum hose, fitting or manifold port.

See Service Diagnosis

Test 5

With engine running and brakes off, run to medium speed and turn off ignition,immediately closing throttle. This builds up vacuum. Wait no less than ninety seconds, then try brake action.

If vacuum-assisted for two or more applications.

If not vacuum-assisted for two or more applications, vacuum system is restricted or leaking or vacuum check valve is faulty.

See Service Diagnosis.

Road test car. If problem still exists, see Service Diagnosis.

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Service Diagnosis

Condition	Possible Cause	Correction
LOW BRAKE PEDAL (Excessive pedal travel required to apply brake)	(1) Excessive clearance between rear linings and drums caused by inoperative automatic adjusters.	(1) Make 10 to 15 alternate forward and reverse brake stops to adjust brakes. If brake pedal does not come up, repair or replace adjuster parts as necessary.
	(2) Worn rear brake lining.	(2) Inspect and replace lining if worn beyond minimum thickness specification.
	(3) Bent, distorted brakeshoes.	(3) Replace brakeshoes in axle sets.
	(4) Caliper pistons corroded.	(4) Repair or replace calipers.
LOW BRAKE PEDAL (pedal may go to floor under steady pressure)	(1) Leak in hydraulic system.	(1) Fill master cylinder to within 1/4-inch of rim; have helper apply brakes and check calipers, wheel cylinders, differential valve, tubes, hoses and fittings for leaks. Repair or replace parts as necessary.
	(2) Air in hydraulic system.	(2) Bleed air from system. Refer to Brake Bleeding.
	(3) Incorrect or non-recommended brake fluid (fluid boils away at below normal temp.).	(3) Flush hydraulic system with clean brake fluid. Refill with correct-type fluid.
LOW BRAKE PEDAL (pedal goes to floor on first application — o.k. on subsequent applications)	(1) Disc brakeshoe (pad) knock back; shoes push caliper piston back into bore. Caused by loose wheel bearings or excessive lateral runout of rotor (rotor wobble).	(1) Adjust wheel bearings and check lateral runout of rotor(s). Refinish rotors if runout is over limits. Replace rotor if refinishing would cause rotor to fall below minimum thickness limit of 1.12-inches for Matador or 0.81-inch for Pacer, Gremlin, Concord, AMX.
	(2) Calipers sticking on abutment surfaces of caliper and anchor plate. Caused by buildup of dirt, rust, or corrosion on abutment surfaces.	(2) Clean abutment surfaces and lubricate surfaces with molydisulphide grease.
FADING BRAKE PEDAL (pedal falls away under steady pressure)	(1) Leak in hydraulic system.	(1) Fill master cylinder reservoirs to within 1/4-inch of rim; have helper apply brakes, check calipers, wheel cylinders, differential valve, tubes, hoses, and fittings for leaks. Repair or replace parts as necessary.
	(2) Master cylinder piston seals worn, or master cylinder bore is scored, worn or corroded.	(2) Repair or replace master cylinder.

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Service Diagnosis

Condition	Possible Cause	Correction
DECREASING BRAKE PEDAL TRAVEL (pedal travel required to apply brakes decreases and may be accompanied by hard pedal)	(1) Caliper or wheel cylinder pistons sticking or seized.	(1) Repair or replace calipers, or wheel cylinders.
	(2) Master cylinder compensator ports blocked (preventing fluid return to reservoirs) or pistons sticking or seized in master cylinder bore.	(2) Repair or replace master cylinder.
	(3) Power brake unit binding internally.	(3) Test unit as follows: (a) Shift transmission into neutral and start engine. (b) Increase engine speed to 1500 RPM, close throttle and fully depress brake pedal. (c) Slowly release brake pedal and stop engine. (d) Have helper remove vacuum check valve and hose from power unit. Observe for backward movement of brake pedal. (e) If pedal moves backward, power unit has internal bind — replace power unit.
SPONGY BRAKE PEDAL (pedal has abnormally soft, springy, spongy feel when depressed)	(1) Air in hydraulic system.	(1) Bleed brakes. Refer to Brake Bleeding.
	(2) Brakeshoes bent or distorted.	(2) Replace brakeshoes.
	(3) Brake lining not yet seated to drums and rotors.	(3) Burnish brakes.
HARD BRAKE PEDAL (excessive pedal pressure required to stop car. May be accompanied by brake fade)	(1) Loose or leaking power brake unit vacuum hose.	(1) Tighten connections or replace leaking hose.
	(2) Brake lining contaminated by grease or brake fluid.	(2) Determine cause of contamination and correct. Replace contaminated brake lining in axle sets.
	(3) Incorrect or poor quality brake lining.	(3) Replace lining in axle sets.
	(4) Bent, broken, distorted brakeshoes.	(4) Replace brakeshoes and lining.

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Service Diagnosis

Condition	Possible Cause	Correction
HARD BRAKE PEDAL (continued)	(5) Calipers binding or dragging on anchor plate. Rear brakeshoes dragging on support plate.	(5) Sand or wire brush anchor plate and caliper abutement surfaces and lubricate surfaces lightly. Clean rust or burrs from rear brake support plate ledges and lubricate ledges. NOTE: If ledges are deeply grooved or scored, do not attempt to sand or grind them smooth — replace support plate.
	(6) Rear brake-drum(s) bell mouthed, flared, or barrel shaped (distorted).	(6) Replace rear drum(s).
	(7) Caliper, wheel cylinder, or master cylinder pistons sticking or seized.	(7) Repair or replace parts as necessary.
	(8) Power brake unit vacuum check valve malfunction.	(8) Test valve as follows: (a) Start engine, increase engine speed to 1500 RPM, close throttle and immediately stop engine. (b) Wait at least 90 seconds then try brake action. (c) If brakes are not vacuum assisted for 2 or more applications, check valve is faulty.
	(9) Power brake unit has internal bind.	(9) Test unit as follows: (a) With engine stopped, apply brakes several times to exhaust all vacuum in system. (b) Shift transmission into neutral, depress brake pedal and start engine. (c) If pedal falls away under foot pressure and less pressure is required to hold pedal in applied position, power unit vacuum system is working. Test power unit as outlined in item (3) under Decreasing Brake Pedal Travel. If power unit exhibits bind condition, replace power unit.
	(10) Master cylinder compensator ports (at bottom of reservoirs) blocked by dirt, scale, rust, or have small burrs (blocked ports prevent fluid return to reservoirs).	(10) Repair or replace master cylinder. CAUTION: Do not attempt to clean blocked ports with wire, pencils, or similar implements. Use compressed air only.

60354C

Service Diagnosis

Condition	Possible Cause	Correction
HARD BRAKE PEDAL (continued)	(11) Brake hoses, tubes, fittings clogged or restricted.	(11) Use compressed air to check or unclog parts. Replace any damaged parts.
	(12) Brake fluid contaminated with improper fluids (motor oil, transmission fluid, or poor quality brake fluid) causing rubber components to swell and stick in bores.	(12) Replace all rubber components and hoses. Flush entire brake system. Refill system with AMC brake fluid or equivalent.
GRABBING BRAKES (severe reaction to brake pedal pressure)	(1) Brake lining(s) contaminated by grease or brake fluid.	(1) Determine and correct cause of contamination and replace brakeshoes and lining in axle sets.
	(2) Parking brake cables incorrectly adjusted or seized.	(2) Adjust cables. Replace seized cables.
	(3) Power brake unit binding internally.	(3) Test unit as outlined in item (3) under Decreasing Brake Pedal Travel. If unit has internal bind, replace unit.
	(4) Incorrect brake lining or lining loose on brakeshoes.	(4) Replace brakeshoes in axle sets.
	(5) Brakeshoes bent, cracked, distorted.	(5) Replace brakeshoes in axle sets.
	(6) Caliper anchor plate bolts loose.	(6) Tighten bolts.
	(7) Rear brakeshoes binding on support plate ledges.	(7) Clean and lubricate ledges. Replace support plate(s) if ledges are deeply grooved. Do not attempt to smooth ledges by grinding.
	(8) Rear brake support plates loose.	(8) Tighten mounting bolts.
	(9) Caliper or wheel cylinder piston sticking or seized.	(9) Repair or replace parts as necessary.
	(10) Master cylinder pistons sticking or siezed in bore.	(10) Repair or replace master cylinder.
	(11) Master cylinder compensator ports (at bottom of reservoirs) blocked by dirt, scale, rust, or have small burrs (blocked ports prevent fluid return to reservoirs).	(11) Repair or replace master cylinder. CAUTION: Do not attempt to clean blocked ports with wire, pencils, or similar implements. Use compressed air only.
BRAKES GRAB, PULL, OR WON'T HOLD IN WET WEATHER	(1) Brake lining water soaked.	(1) Drive car with brakes lightly applied to dry out lining. If problem persists after lining has dried, replace brakeshoe lining in axle sets.
	(2) Rear brake support plate bent allowing excessive amount of water to enter drum.	(2) Replace support plate.

60354D

Service Diagnosis

Condition	Possible Cause	Correction
DRAGGING BRAKES (slow or incomplete release of brakes)	(1) Brake pedal binding at pivot.	(1) Free up and lubricate.
	(2) Power brake unit has internal bind.	(2) Inspect for internal bind as outlined in item (3) under Decreasing Brake Pedal Travel. Replace unit if internal bind exists.
	(3) Parking brake cables incorrectly adjusted or seized.	(3) Adjust cables. Replace seized cables.
	(4) Rear brakeshoe return springs weak or broken.	(4) Replace return springs. Replace brakeshoe if necessary in axle sets.
	(5) Automatic adjusters malfunctioning.	(5) Repair or replace adjuster parts as required.
	(6) Caliper, wheel cylinder or master cylinder pistons sticking or seized.	(6) Repair or replace parts as necessary.
	(7) Master cylinder compensating ports blocked (fluid does not return to reservoirs).	(7) Use compressed air to clear ports. Do not use wire, pencils, or similar objects to open blocked ports.
CAR PULLS TO ONE SIDE WHEN BRAKES ARE APPLIED	(1) Incorrect front tire pressure.	(1) Inflate to recommended cold (reduced load) inflation pressures.
	(2) Incorrect front wheel bearing adjustment or worn — damaged wheel bearings.	(2) Adjust wheel bearings. Replace worn, damaged bearings.
	(3) Brakeshoe lining on one side contaminated.	(3) Determine and correct cause of contamination and replace brakeshoe lining in axle sets.
	(4) Brakeshoes on one side bent, distorted, or lining loose on shoe.	(4) Replace brakeshoes in axle sets.
	(5) Support plate bent or loose on one side.	(5) Tighten or replace support plate.
	(6) Brake lining not yet seated to drums and rotors.	(6) Burnish brakes.
	(7) Caliper anchor plate loose on one side.	(7) Tighten anchor plate bolts.
	(8) Caliper piston sticking or seized.	(8) Repair or replace caliper.
	(9) Brakeshoe linings watersoaked.	(9) Drive car with brakes lightly applied to dry linings.
	(10) Loose suspension component attaching or mounting bolts, incorrect front end alignment. Worn suspension parts.	(10) Tighten suspension bolts. Replace worn suspension components. Check and correct alignment as necessary.
	(11) Corrosion or dirt buildup on abutment (sliding) surfaces or caliper and anchor plate.	(11) Remove caliper and clean abutment (sliding) surfaces using wire brush and crocus cloth and apply light film of molydisulphide grease to abutment surfaces.

60354E

Service Diagnosis

Condition	Possible Cause	Correction
CHATTER OR SHUDDER WHEN BRAKES ARE APPLIED (pedal pulsation and roughness may also occur)	(1) Front wheel bearings loose.	(1) Adjust wheel bearings.
	(2) Brakeshoes distorted, bent contaminated, or worn.	(2) Replace brakeshoes in axle sets.
	(3) Caliper anchor plate or support plate loose.	(3) Tighten mounting bolts.
	(4) Excessive thickness variation or lateral run out of rotor(s).	(4) Refinish or replace rotors in axle sets.
	(5) Rear drums(s) out of round, or have hard spots.	(5) Refinish or replace drums if out of round. Replace drums with hard spots.
	(6) Strut rods loose or bushings worn.	(6) Tighten jam nuts or replace bushings.
NOISY BRAKES (squealing, clicking, scraping sound when brakes are applied)	(1) Bent, broken, distorted brake-shoes.	(1) Replace brakeshoes in axle sets.
	(2) Brake lining worn out — shoes contacting drum or rotor.	(2) Replace brakeshoes and lining in axle sets. Refinish or replace drums or rotors.
	(3) Broken or loose holdown or return springs.	(3) Replace parts as necessary.
	(4) Rough or dry drum brake support plate ledges.	(4) Lubricate support plate ledges.
	(5) Cracked, grooved, or scored rotor(s) or drum(s).	(5) Replace rotor(s) or drum(s). Replace brakeshoes and lining in axle sets if necessary.
PULSATING BRAKE PEDAL	(1) Out of round drums or excessive thickness variation or lateral runout in disc brake rotor(s).	(1) Refinish or replace drums or rotors.
	(2) Bent rear axle shaft	(2) Replace axle shaft.

60354F

(5) Install brake pedal bolt locknut and stamped nut. Tighten locknut to 35 foot-pounds (47.4 Nm) torque and stamped nut to 75 inch-pounds (8.4 Nm) torque.

CAUTION: *Whenever the brake pedal bolt is removed or replaced during service operations, a replacement locknut and stamped nut must be installed. Do not reuse the nuts at any time and do not substitute any other type of fastener.*

(6) Connect wires to brakelight switch.

(7) Check switch operation. Press and release brake pedal several times. Brakelights should illuminate at approximately first 1/2 inch (12.7 mm) of pedal travel and go out when pedal is released.

(8) On Gremlin, Concord, and AMX models, install package tray if equipped.

(9) On Pacer models, install intermediate duct (under dash) if equipped with air conditioning, and install steering column tube cover.

Brakelight Circuit Test

Brakelights Do Not Operate

(1) Disconnect wires at brakelight switch.

(2) Check for battery voltage at pink wire in harness connector.

(3) If no voltage reading, check pink wire, 20-amp fuse, and fuse connections for continuity.

(4) If battery voltage reading is obtained at harness connector, jump terminals of connector. If brakelights now operate, switch is faulty.

Brakelights Do Not Operate—Fuse Blows

(1) Remove blown fuse, jump fuse terminals using ammeter, press brake pedal, and check amp draw. Normal draw is 4 amps for Pacer, Gremlin, Concord, AMX and Matador Wagon, and 8 amps for Matador Coupe and Sedan.

(2) If amp draw exceeds 20 amps, disconnect ammeter immediately.

(3) Disconnect wire connector at brakelight switch and jump connector wires. If amp draw is normal, brakelight switch is faulty.

(4) If amp draw is excessive, disconnect body harness connector at left A-pillar and check amp draw at switch wire connector again.

(5) If amp draw is now zero, short exists in white or orange wires leading to brakelights, incorrect bulb has been installed, or bulb socket is faulty.

(6) To determine whether left or right side body harness is faulty, reconnect body harness connector, move directional signal switch lever to left and right turn positions, and check amp draw in each position.

(7) If amp draw is excessive with body harness disconnected, short exists in dark green or black with yellow tracer wire in steering column harness.

Brakelights Remain On

(1) Disconnect wires at brakelight switch.

(2) If brakelights remain on, check for faulty harness connector, incorrect wire connection at steering column harness connector, or faulty turn signal switch.

Brakelight Bulb Replacement

Pacer

(1) On sedan models, remove taillamp lens to gain access to bulb.

(2) On wagon models, remove grille and speaker from rear quarter trim panel to gain access to bulb.

Gremlin

(1) Remove spare tire.

(2) Remove screws attaching rear quarter center panel to floor.

(3) Disengage plastic fasteners attaching center panel to body, and remove panel to gain access to bulb.

Concord-AMX

(1) On hatchback models, remove rear quarter upper trim panel extension to gain access to bulb.

(2) On wagon models, remove spare tire and left rear corner trim panel to gain access to bulb.

Matador

(1) On coupe and sedan models, bulbs are accessible from trunk compartment.

(2) On wagon models, remove taillamp lens to gain access to bulb.

Bulb Sockets

Pacer, Gremlin, Concord and AMX models use a double lock tab bulb socket with one tab larger than the other for indexing purposes. Remove this socket with a turn and pull motion. Install it with a push and turn motion.

Matadors use a spring loaded socket having a single lock tab. This single tab indexes the socket in the taillamp housing. Remove the socket by pulling it straight out of the housing. Reverse the procedure for installation.

BRAKE PEDAL

All cars are equipped with a suspended-type brake pedal (figs. 2F-1, and 2F-2). The pedal pivots on a bolt mounted in the pedal support bracket which is attached to the dash and instrument panels. On cars with manual transmission, the clutch pedal also pivots on this bolt. Bushings are installed in the brake pedal pivot bore for smooth pedal operation.

The tandem mounted master cylinder push rod and brakelight switch are connected to the pedal by a bolt and locknuts. Bushings are also used in the master cylinder push rod eye and brakelight switch.

Removal

(1) On Gremlin, Concord and AMX models, disconnect battery negative cable, remove package tray if equipped, remove fuse panel attaching screws, and move panel aside.

(2) On Pacer models, remove steering column tube cover, and remove intermediate duct (under dash) if equipped with air conditioning.

(3) On cars with manual transmission, disconnect clutch push rod at clutch pedal (fig. 2F-2).

(4) Remove brake pedal bolt and brakelight switch as outlined under Brakelight Switch—Removal.

(5) Remove and discard pedal pivot bolt locknut and remove pivot bolt and brake, or clutch and brake pedals (fig. 2F-2).

(6) Inspect brake pedal pivot bushings. Replace pedal if bushings are worn, cracked, galled, or cut.

Installation

(1) Align pivot bolt and pedal(s) and install pivot bolt.

(2) Install pivot bolt locknut and tighten it to 50 foot-pounds (67.7 Nm) torque.

CAUTION: *Do not attempt to reuse the pivot bolt locknut and do not substitute any other type of fastener for this locknut. Install a replacement locknut only.*

(3) Install brakelight switch and brake pedal bolt as outlined under Brakelight Switch—Installation.

(4) On cars with manual transmission, connect clutch push rod to clutch pedal.

(5) On Gremlin, Concord and AMX models, install fuse panel and panel attaching screws, and install package tray if equipped.

(6) On Pacer models, install intermediate duct and steering column tube cover.

(7) On Gremlin, Concord and AMX models, connect battery negative cable.

(8) Check brakelight switch operation as outlined under Brakelight Switch—Installation.

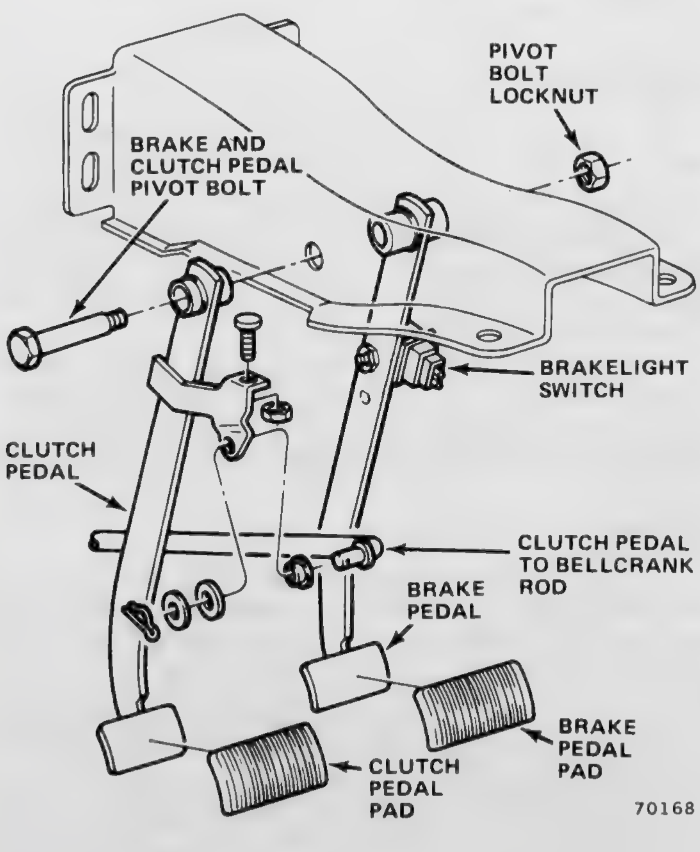

Fig. 2F-2 Brake and Clutch Pedals (Typical)

BRAKE WARNING LIGHT

A dual purpose warning light is located in the instrument cluster on all AMC cars. The primary function of this light is to alert the driver if a pressure differential between the front and rear brake hydraulic systems should ever occur.

On cars equipped with the optional parking brake warning system, the light also functions as an indicator to alert the driver when the parking brakes are applied.

In the parking brake warning mode, the light is activated by a mechanically operated switch mounted on the parking brake lever assembly. In the brake hydraulic system pressure differential warning mode, the light is activated by a plunger-type switch mounted in the pressure differential valve.

If a pressure loss should occur in either the front or rear brake hydraulic systems, a differential of 70 to 300 psi will cause a piston in the differential valve to shuttle toward the low pressure side of the valve activating the switch and warning light. Until the ignition lock is turned to the OFF position, the light will remain illuminated until the cause of the pressure differential is corrected. Refer to Pressure Differential Valve for details.

In normal operation, when the steering column ignition lock is turned to the start position, the warning light illuminates. The light will remain on until the engine is started and the ignition lock is returned to the ON position; or when the parking brake is released. This feature is provided as a means of checking warning light bulb and circuit operation.

Warning Light Bulb Replacement

Pacer

(1) Remove instrument cluster bezel. Grasp sides of bezel, press outward, and pull bezel straight out.

(2) Remove bulb from instrument cluster. Pull bulb straight out of socket using fingers or needlenose pliers. Pad plier jaws with tape before removing bulb.

(3) Install replacement bulb. Be sure bulb is properly seated.

(4) Install bezel. Press bezel in until clips in bezel sides engage in instrument panel.

Gremlin-Concord-AMX

(1) Remove package tray if equipped.

(2) On cars with hood release cable, remove screws attaching cable to instrument panel and move cable aside.

(3) Disconnect speedometer cable at rear of instrument cluster case.

(4) Reach behind case, turn bulb socket until lock tabs disengege, and remove socket.

(5) Remove bulb from socket.

(6) Install replacement bulb in socket. Be sure bulb is seated.

(7) Insert socket in instrument cluster case and turn socket until lock tabs engage.

(8) Connect speedometer cable.

(9) On cars with hood release cable, install cable and attaching screws.

(10) Install package tray if equipped.

Matador-Less Air Conditioning

(1) Reach behind instrument cluster case and turn socket until lock tabs disengege.

(2) Remove bulb from socket.

(3) Install replacement bulb. Be sure bulb is properly seated.

(4) Insert bulb socket in case and turn socket until lock tabs engage.

Matador-With Air Conditioning

(1) Disconnect battery negative cable.

(2) Remove radio control knobs and retaining nuts.

(3) On cars with passenger-side remote control mirror, remove mirror control attaching nut.

(4) Remove instrument cluster bezel attaching screws, tilt bezel outward, disconnect wiring terminals, and remove bezel.

(5) Remove clock or clock opening cover.

(6) Reach through clock opening to rear of case and turn bulb socket until lock tabs disengege.

(7) Remove bulb from socket.

(8) Install replacement bulb in socket. Be sure it is properly seated.

(9) Insert bulb socket in case and turn socket until lock tabs engage.

(10) Install clock or clock opening cover.

(11) Connect wiring terminals to instrument cluster bezel, position bezel on instrument panel, and install bezel attaching screws.

(12) On cars with passenger-side remote control mirror, install mirror control attaching nut.

(13) Install radio retaining nuts and control knobs.

(14) Connect battery negative cable.

PARKING BRAKE ADJUSTMENT

The foot-operated parking brake lever is attached to the instrument panel and dash panel.

When the pedal is pressed downward, it applies the rear brakeshoes by means of cables which connect the parking brake lever to the secondary brakeshoes on the rear brake units.

Adjustment—Gremlin-Concord-AMX-Matador

(1) Adjust service brakes by driving car in reverse and making 10 to 15 hard brake applications. Make one forward brake application between each reverse application to equalize adjustment.

(2) Raise car on axle-contact hoist.

(3) Inspect cables and equalizer for freedom of movement and proper operation. Cable condition should be especially noted at points where cables are routed close to exhaust system components.

(4) Fully apply and release parking brake lever approximately ten times.

(5) Place parking brake lever in first notch from fully released position.

(6) Install Parking Brake Cable Adjustment Gauge J-23462 on torque wrench calibrated in inch-pounds.

(7) Place gauge on front parking brake cable and position it between cable housing ferrule and cable equalizer (fig. 2F-3).

(8) Apply 50 inch-pounds (5.6 Nm) of torque to gauge and cable and observe gauge indicator reading. Indicator must fall within first green band from neutral position.

(9) Adjust front parking brake cable at equalizer to obtain desired reading. While performing adjustment, hold screw end of front parking brake cable to prevent cable from turning.

(10) Release parking brake lever and check for brake drag. Refer to Service Diagnosis Charts if brake drag occurs.

(11) Lower car.

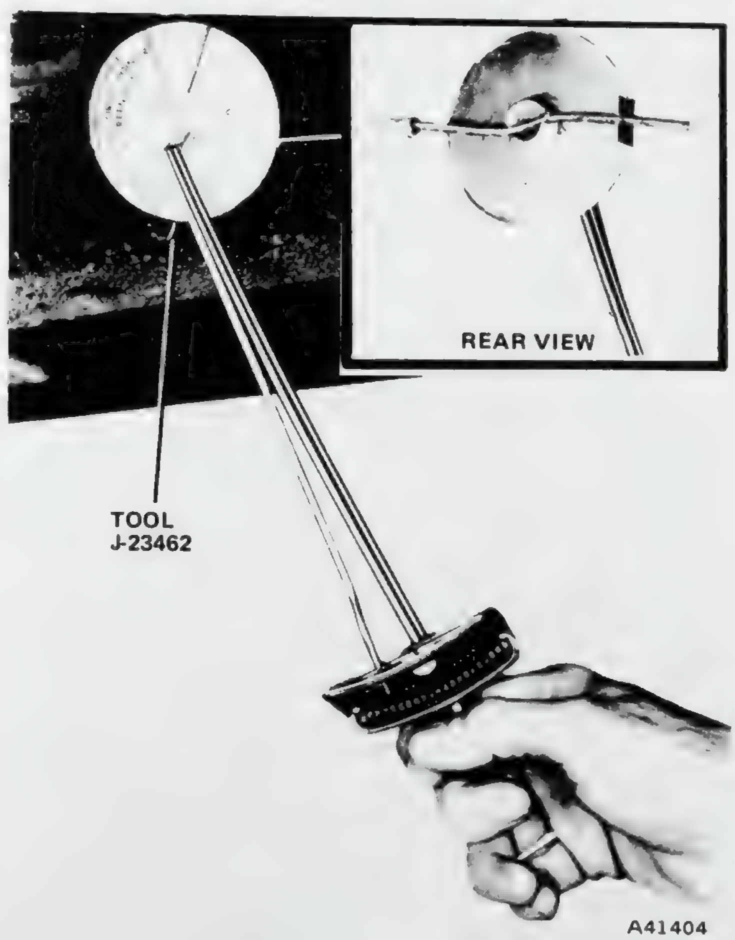

Fig. 2F-3 Parking Brake Cable Adjustment
Gremlin-Concord-AMX-Matador

Adjustment—Pacer

(1) Adjust service brakes by driving car in reverse and making 10 to 15 hard brake applications. Make one forward brake application between each reverse brake application to equalize adjustment.

(2) Apply and release parking brake lever several times.

(3) Place parking brake lever in first notch from fully released position.

(4) Place transmission in neutral.

(5) Raise car on axle-contact type hoist.

(6) Inspect cables and equalizer for freedom of movement and proper operation. Cable condition should be especially noted at points where cables are routed close to exhaust system components.

(7) Loosen locknut on cable adjuster (fig. 2F-4) and tighten cable adjuster until tension on rear brake cables is sufficient to cause heavy brake drag at rear wheels.

(8) Loosen adjuster until heavy brake drag is just eliminated and tighten adjuster locknut. Release parking brake. All drag must be eliminated. If drag persists, refer to Service Diagnosis charts.

(9) Lower car.

PARKING BRAKE LEVER ASSEMBLY REPLACEMENT—ALL MODELS

Removal

(1) On Gremlin, Concord and AMX models, disconnect battery negative cable and remove package tray if equipped.

(2) Raise and support car.

(3) Disconnect pull back spring at equalizer if equipped, and loosen cable adjusting nut until front cable is slack (figs. 2F-4 and 2F-5).

(4) Place front wheels in full right turn position.

(5) Remove nuts attaching lever assembly to dash panel.

NOTE: *On Pacer, Gremlin, Concord and AMX models, the nuts are accessible from inside the left wheel housing. On Matador models, the lower nut is accessible from inside the left wheel housing and the upper nut is accessible from the engine compartment.*

(6) Disconnect parking brake indicator switch wire at lever assembly.

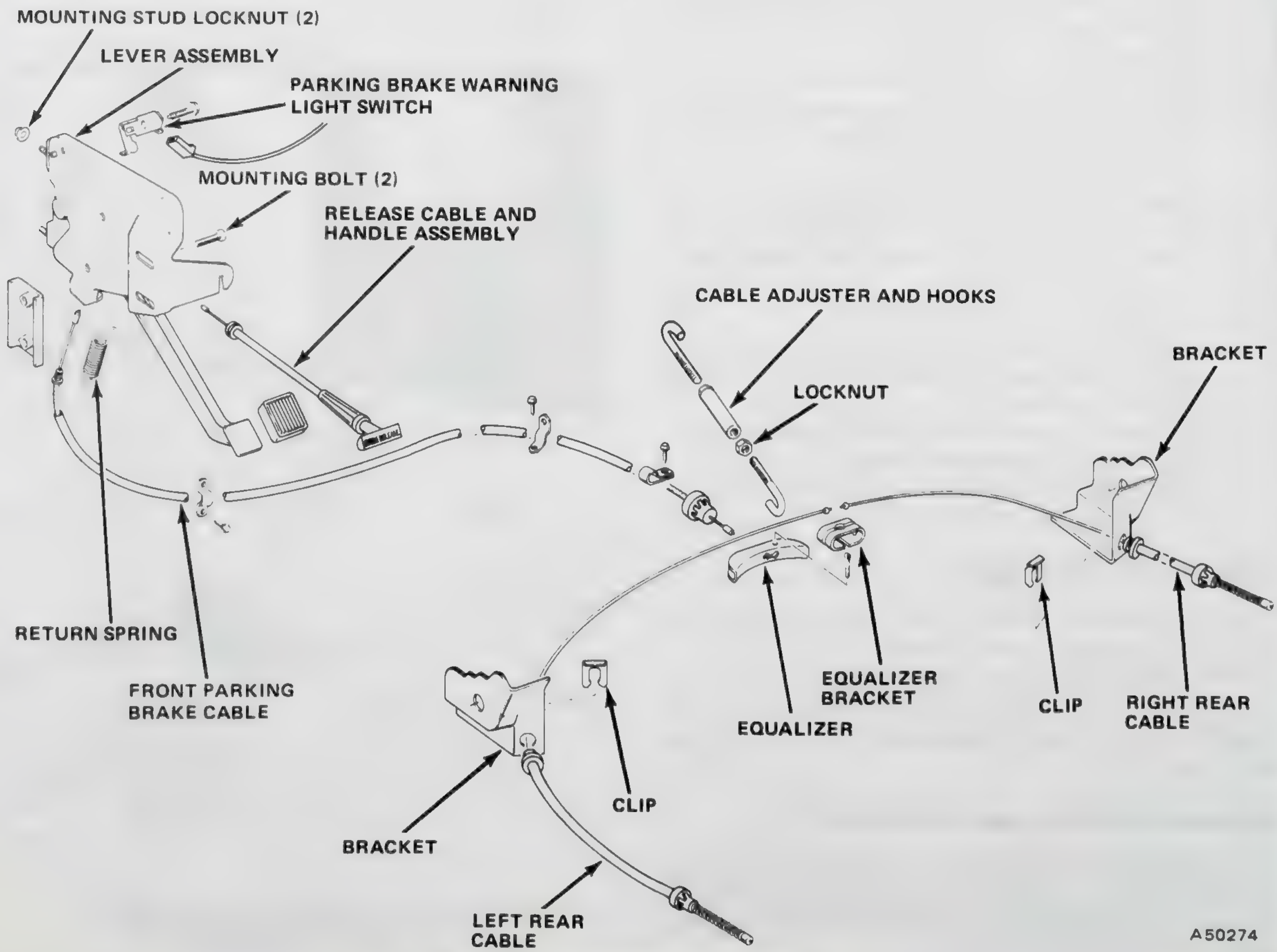

Fig. 2F-4 Parking Brake Assembly—Pacer

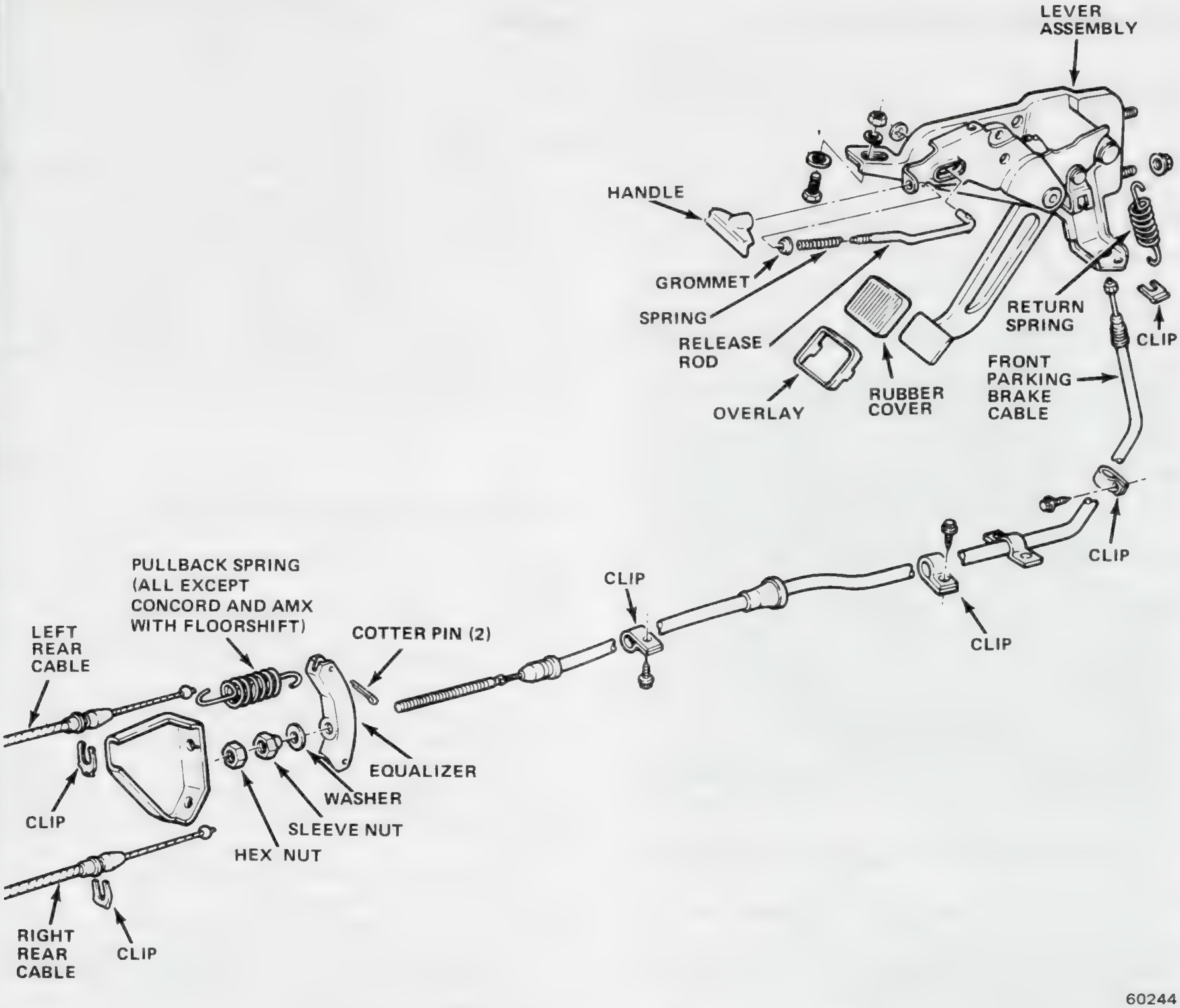

Fig. 2F-5 Parking Brake Assembly-Gremlin-Concord-AMX-Matador

(7) Apply and release parking brake lever.

(8) Disconnect parking brake lever return spring.

(9) On Pacer models, disconnect release handle cable at lever and remove cable grommet from bracket.

(10) Remove front cable retaining clip.

(11) Remove bolts attaching lever assembly to instrument or dash panels.

(12) Disengage front cable and remove lever assembly.

Installation

(1) Connect front cable to lever assembly.

(2) Position lever assembly on dash or instrument panels and install attaching bolts and locknuts.

(3) Install front cable retaining clip.

(4) On Pacer models, connect release cable to release handle and install cable grommet in bracket.

(5) Connect parking brake indicator light wire to switch and connect lever return spring.

(6) On Gremlin, Concord and AMX models, install package tray if equipped.

(7) Install lever assembly mounting stud nuts.

(8) On Gremlin, Concord and AMX models, connect battery negative cable.

(9) Tighten cable adjuster nuts and connect pull back spring if equipped.

(10) Adjust parking brake as outlined under Parking Brake Adjustment.

(11) Remove supports and lower car.

PARKING BRAKE CABLE REPLACEMENT

Pacer—Front Cable

Removal

(1) Raise car.

(2) Loosen cable adjuster locknut and disengage left rear cable at adjuster hook.

(3) Remove cotter pin and disengage front cable at equalizer.

(4) Remove left side cowl trim panel, left door scuff plate, and front seat.

(5) Disconnect parking brake lever assembly return spring and remove front cable retaining clip.

(6) Remove screw attaching left side of carpet to floorpan, roll back carpet, and remove cable mounting clips.

(7) Disengage cable at lever assembly, pull cable grommet out of floorpan, and remove cable.

Installation

(1) Install cable and press cable grommet into floopan.

(2) Engage cable in lever assembly, install cable retaining clip, and connect pull back spring.

(3) Install cable mounting clips.

(4) Reposition carpet and install attaching screw.

(5) Install front seat, left side cowl trim panel, and left door scuff plate.

(6) Insert front cable in equalizer and install cotter pin.

(7) Engage left rear cable in adjuster hook and tighten locknut.

(8) Adjust parking brake as outlined under Parking Brake Adjustment.

(9) Lower car.

Pacer—Rear Cables

Removal

(1) Raise car.

(2) Loosen cable adjuster locknut and disengage left rear cable at adjuster hook.

(3) Remove cotter pin from equalizer, remove left rear cable from equalizer, and disconnect both cables at equalizer bracket (fig. 2F-4).

(4) Remove cable-to-frame bracket retaining clip from cable to be replaced, and disconnect cable anti-rattle clip.

(5) Disassemble necessary rear drum brake unit as outlined in Chapter 2F under Brakeshoe Replacement—Drum Brakes.

(6) Compress rear cable lock tabs at brake support plate using worm drive hose clamp and remove cable.

Installation

(1) Insert cable in brake support plate and pull cable through plate until cable lock tabs engage in plate.

(2) Insert cable through frame bracket and install cable retaining clip.

(3) Assemble rear drum brake unit as outlined in Brakeshoe Replacement—Drum Brakes.

(4) Install cables in equalizer bracket, install left rear cable in equalizer, and install cotter pin in equalizer.

(5) Engage left rear cable in adjuster hook, tighten adjuster locknut, and connect cable anti-rattle spring.

(6) Adjust parking brake as outlined under Parking Brake Adjustment.

(7) Lower car.

Front Cable—Gremlin-Concord-AMX-Matador

Removal

(1) Raise car.

(2) Disconnect pullback spring if equipped, and remove cable adjuster nut at equalizer.

(3) Remove cable-to-frame bracket retaining clip.

(4) Remove cable-to-floorpan mounting clips.

(5) Remove left side cowl trim panel and scuff plate.

(6) On Matador models, remove screw attaching windshield left side interior moulding to back of A pillar.

(7) Disconnect return spring and remove front cable retaining clip at lever assembly.

(8) Roll back carpet and disengage front cable at lever assembly.

(9) Pull cable grommet out of floorpan and remove front cable.

Installation

(1) Install cable and install cable grommet into floorpan.

(2) Install cable in lever asembly, install cable retaining clip, and connect lever assembly return spring.

(3) Reposition carpet, and install cowl panel and scuff plate.

(4) On Matador models, install windshield side moulding attaching screw.

(5) Insert cable in frame bracket and install retaining clip.

(6) Install cable in equalizer and install cable adjusting nut.

(7) Adjust parking brake as outlined under Parking Brake Adjustment.

(8) Lower car.

Rear Cable—Gremlin-Concord-AMX-Matador

Removal

(1) Raise car.
(2) Loosen cable adjuster nut and disconnect pull back spring if equipped.
(3) Remove necessary cotter pin from equalizer, remove cable-to-frame bracket retaining clip, and disconnect cable to be removed at frame bracket.
(4) If right side cable is to be removed, remove bolts attaching cable to rear axle housing.
(5) Disassemble necessary rear drum brake unit as outlined in Brakeshoe Replacement—Drum Brakes.
(6) Compress cable lock tabs at brake support plate using worm drive hose clamp and remove cable.

Installation

(1) Insert cable in brake support plate and pull cable through plate until cable lock tabs engage in plate.
(2) Insert cable in frame mounting bracket and install cable retaining clip.
(3) Assemble rear drum brake unit as outlined in Brakeshoe Replacement—Drum Brakes.
(4) If left cable was removed, install bolts attaching cable to rear axle housing.
(5) Engage cable in equalizer and install cotter pin.
(6) Install adjuster nut and connect pull back spring if equipped.
(7) Adjust parking brake as outlined under Parking Brake Adjustment.
(8) Lower car.

SERVICE BRAKE ADJUSTMENT

If the wheel brake units have been disassembled for any reason, an initial adjustment must be made before installing the drum.

(1) To adjust rear brakeshoes with drums removed, use Brakeshoe-to-Drum Clearance Gauge Tool J-21177-01 to preset brakeshoe adjustment (fig. 2F-6).
(2) To adjust brakeshoes with drums in place, proceed to next step.
(3) Remove access slot covers at rear of support plates.
(4) Using brake adjusting tool or screwdriver, rotate adjuster screw until road wheel is locked. Tighten adjuster screw by rotating in direction shown in figure 2F-7.
(5) Mark adjuster screw and back off one complete revolution.
(6) Back off adjuster screw by inserting piece of 1/8-inch (3.1 mm) welding rod (or similar tool) past adjuster screw to force adjuster lever off screw, and rotate adjuster screw with tool.
(7) Install rubber access slot cover after adjustment.

WARNING: *After assembling and adjusting the brakes, check for proper brake operation before moving the car.*

(8) Check brake pedal travel. Drive car in reverse and make 10 to 15 firm brake applications. Make one forward brake application between each reverse application to equalize adjustment.

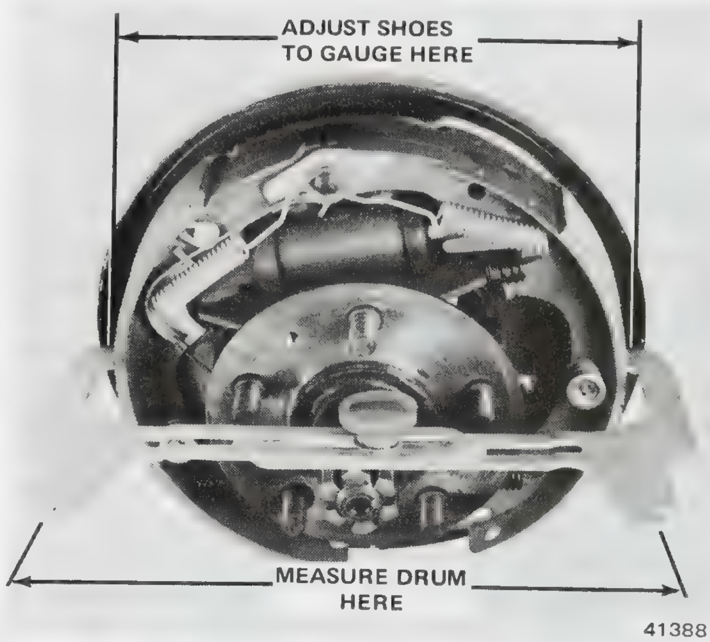

Fig. 2F-6 Brakeshoe-to-Drum Clearance Gauge Usage

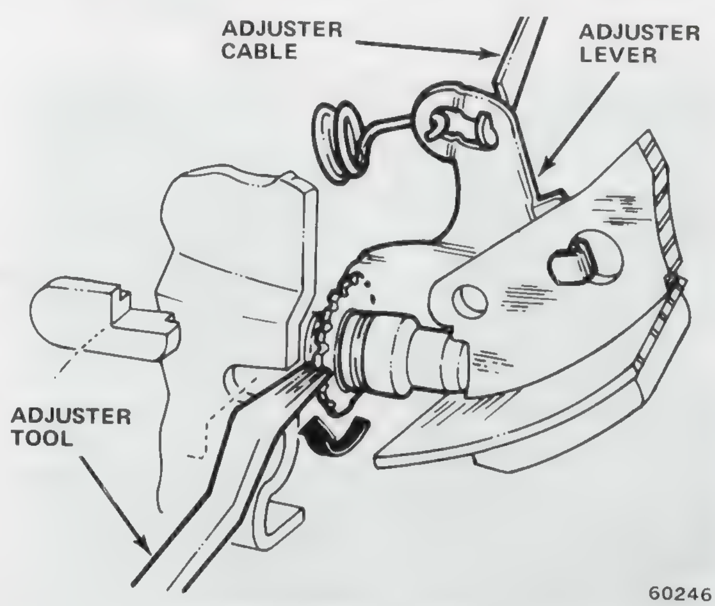

Fig. 2F-7 Brakeshoe Adjustment

BRAKE FLUID LEVEL

The master cylinder brake fluid level should be checked every 7,500 miles (12,070 km) and filled to within 1/4 inch (6.3 mm) of the reservoir rims. Use AMC brake fluid or equivalent marked DOT 3, or SAE J-1703 Motor Vehicle Brake Fluid only.

Always clean the master cylinder and cover before checking the fluid level. This is important in preventing dirt from entering the fluid reservoirs.

CAUTION: *Never use gasoline, kerosene, alcohol, motor oil, transmission fluid, or any fluid containing mineral oil in the hydraulic system or to clean system components. These fluids will cause rubber cups and seals to soften, swell and distort resulting in failure.*

BRAKE LINING INSPECTION

Disc Brakes

Inspect the brake linings any time that the wheels are removed for tire rotation, or at the intervals specified in the Maintenance Schedule.

The linings can be inspected without removing the calipers. Check both ends of the outboard lining by looking in at each end of the caliper. These are the points at which the highest rate of wear normally occurs. At the same time, check the lining thickness on the inboard shoe to be sure that it has not worn prematurely. Look down through the inspection port to view the inboard shoe and lining (fig. 2F-8).

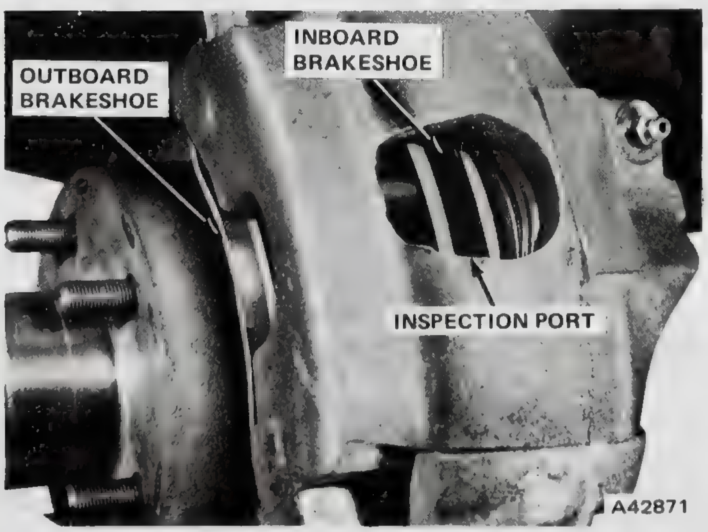

Fig. 2F-8 Disc Brake Lining Inspection

Whenever the thickness of any lining is worn to the approximate thickness of the metal shoe, all shoe and lining assemblies on both front brake assemblies should be replaced.

Drum Brakes

Inspect the brake linings any time the rear wheels and drums are removed, or at the intervals specified in the Mechanical Maintenance Schedule.

If the bonded-type lining is worn to a thickness of 1/32 inch (0.79 mm) or less, it must be replaced. If the riveted-type lining is worn to within 1/32 inch (0.79 mm) of the rivet heads, it must be replaced.

FRONT WHEEL BEARING ADJUSTMENT

When repacking and adjusting front wheel bearings, use an EP-type, lithium base wheel bearing lubricant. Pack the bearings with a generous amount of lubricant and place extra lubricant in the rotor hub cavity between the bearings. Always use a replacement grease seal during assembly and install it using Tool J-9348.

When inspecting, replacing, or repacking bearings, be sure the inner cones of the bearings are free to creep on the spindle. The bearings are designed to creep to allow a constantly changing load contact between the cones and the rollers. Polishing and applying lubricant to the spindle will permit this movement and prevent rust from forming.

Wheel Bearing Adjustment

(1) Raise and support front of car.

(2) Remove hub cap, grease cap and O-ring, cotter pin and nutlock. Discard cotter pin.

(3) On cars with styled wheels, remove wheel, remove hub cap and install wheel.

(4) Tighten spindle nut to 25 foot-pounds (33.9 Nm) torque while rotating wheel to seat bearings.

(5) Loosen spindle nut 1/3-turn and while rotating wheel, tighten spindle nut to 6 inch-pounds (0.68 Nm) torque.

(6) Install nutlock on spindle nut so cotter pin holes in nutlock and spindle are aligned.

(7) Install replacement cotter pin, grease cap and O-ring, and hub cap.

(8) On cars with styled wheels, remove wheel, install hub cap and install wheel.

(9) Lower car.

SPECIFICATIONS

Brake Specifications

Brake Fluid . . . . Use AMC Brake fluid or equivalent marked DOT 3 or SAE J-1703 only.

Brake Fluid Level . . . . Fill reservoirs to within 1/4 inch of rim.

Brake Lining Replacement Thickness

Front Disc Brake . . . . Replace when lining is worn to within 1/32 inch (0.794 mm) of rivet heads.

Rear Drum Brake . . . . Replace when lining is worn to within 1/32 inch (0.794 mm) of rivet heads.

Front Wheel Bearing Adjustment Torque . . . . . Tighten spindle nut to 25 foot-pounds torque (34 N-m), loosen nut 1/3 turn, then tighten nut to 6 inch-pounds torque (0.7 N-m) while rotating wheel without brake drag.

Parking Brake Adjustment

Gremlin, Concord, AMX, Matador . . . Indicator of Gauge J-23462 must fall within green band when 50 inch-pounds (6 N-m) torque is applied to front cable and Lever is in first notch from fully released position.

Pacer . . . . With lever in first notch from fully released position, adjust front cable until brake drag is just eliminated.

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Service In-Use Recheck Torques should be used for checking a pre-torqued item.

Special Tools

J-23462
PARKING BRAKE CABLE ADJUSTMENT GAUGE (OPEN GREMLIN, CONCORD, AMX AND MATADOR)

J-21177
DRUM TO BRAKESHOE CLEARANCE GAUGE (ALL)

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BRAKE HYDRAULIC SYSTEM

GENERAL

The brake hydraulic system consists of the dual reservoir master cylinder, combination valve or pressure differential valve, front disc brake calipers, rear drum brake wheel cylinders and the connecting brake lines, hoses and fittings. A typical system layout is shown in figure 2F-9.

NOTE: *On Pacer models, the coils in the brakeline connecting the differential valve to the left front brake are placed in the line to absorb vibration and flexing action (fig. 2F-9). If this line is replaced for any reason, the replacement line must also have the same number of coils in it.*

The hydraulic system must be kept free of dirt, moisture, improper fluids and any other type of contaminant. When servicing the system, cap all lines and ports to prevent entry of contaminants and clean system components using brake fluid or brake cleaning solvent only.

CAUTION: *Never use gasoline, kerosene, alcohol, motor oil, transmission fluid, or any fluid containing mineral oil to clean system components. These fluids will cause the rubber cups and seals to soften, swell and distort resulting in failure.*

If system contamination is suspected, drain off a sample and check for suspended dirt particles, unusual fluid discoloration, or separation of the fluid into distinct layers. If contamination should occur, drain and flush the system with clean brake fluid only.

BRAKE FLUID

Use AMC Brake Bluid or equivalent marked DOT 3 or, SAE J-1703 Motor Vehicle Brake Fluid only.

CAUTION: *Never fill or add reclaimed, used, or non-recommended brake fluid to the brake hydraulic system.*

MASTER CYLINDER FLUID LEVEL

The master cylinder fluid level should be checked every 7,500 miles (12,070 km) and filled to within 1/4 inch (6.3 mm) of the reservoir rims. Always clean the master cylinder and cover before checking the fluid level. This is important in preventing dirt from entering the fluid reservoirs. Do not allow the master cylinder cover seal to contact dirt, grease, or other foreign material which could be transferred to the fluid reservoirs. Also check the seal for cracks, cuts, distortion, or any condition that might allow dirt or moisture to enter the reservoirs.

MASTER CYLINDER

All models are equipped with a dual reservoir master cylinder (fig. 2F-10). The hydraulic systems for the front and rear brakes are independent. If a failure occurs in the rear brake hydraulic system, the front brakes will still operate. If a failure occurs in the front brake hydraulic system, the rear brakes will still operate.

The master cylinder used on Matadors has a 1.125 inch (28.5 mm) bore. The master cylinder used on Pacers, Gremlins, Concords, and AMX has a 24 mm (0.94 inch) bore.

The master cylinder has two fluid outlet ports, two fluid reservoirs, a piston bore, and two hydraulic piston assemblies which are operated in tandem by a push rod. The piston assemblies are located in the master cylinder piston bore.

Master Cylinder Removal

(1) Disconnect brake lines at master cylinder.

(2) Cover outlet ports in master cylinder and open ends of brake lines or hoses to prevent entry of dirt.

(3) On vehicles with manual brakes, disconnect master cylinder push rod at brake pedal.

(4) Remove bolts or nuts attaching master cylinder to dash panel or power brake unit and remove master cylinder. On Pacer and Matador models, remove mounting bracket and boot retainer plate.

Master Cylinder Disassembly

(1) Remove cover and seal and drain master cylinder.

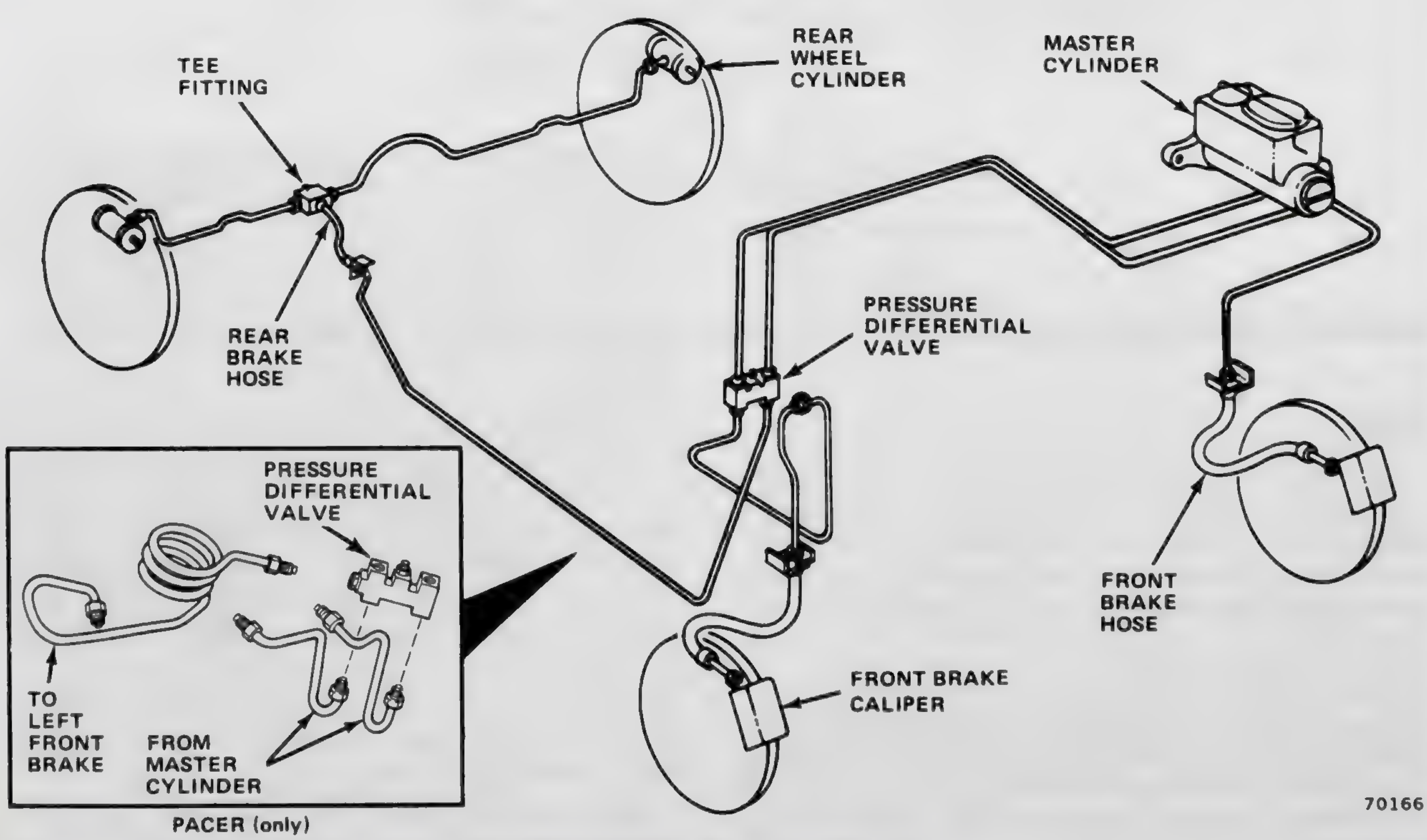

Fig. 2F-9 Brake Hydraulic System (Typical)

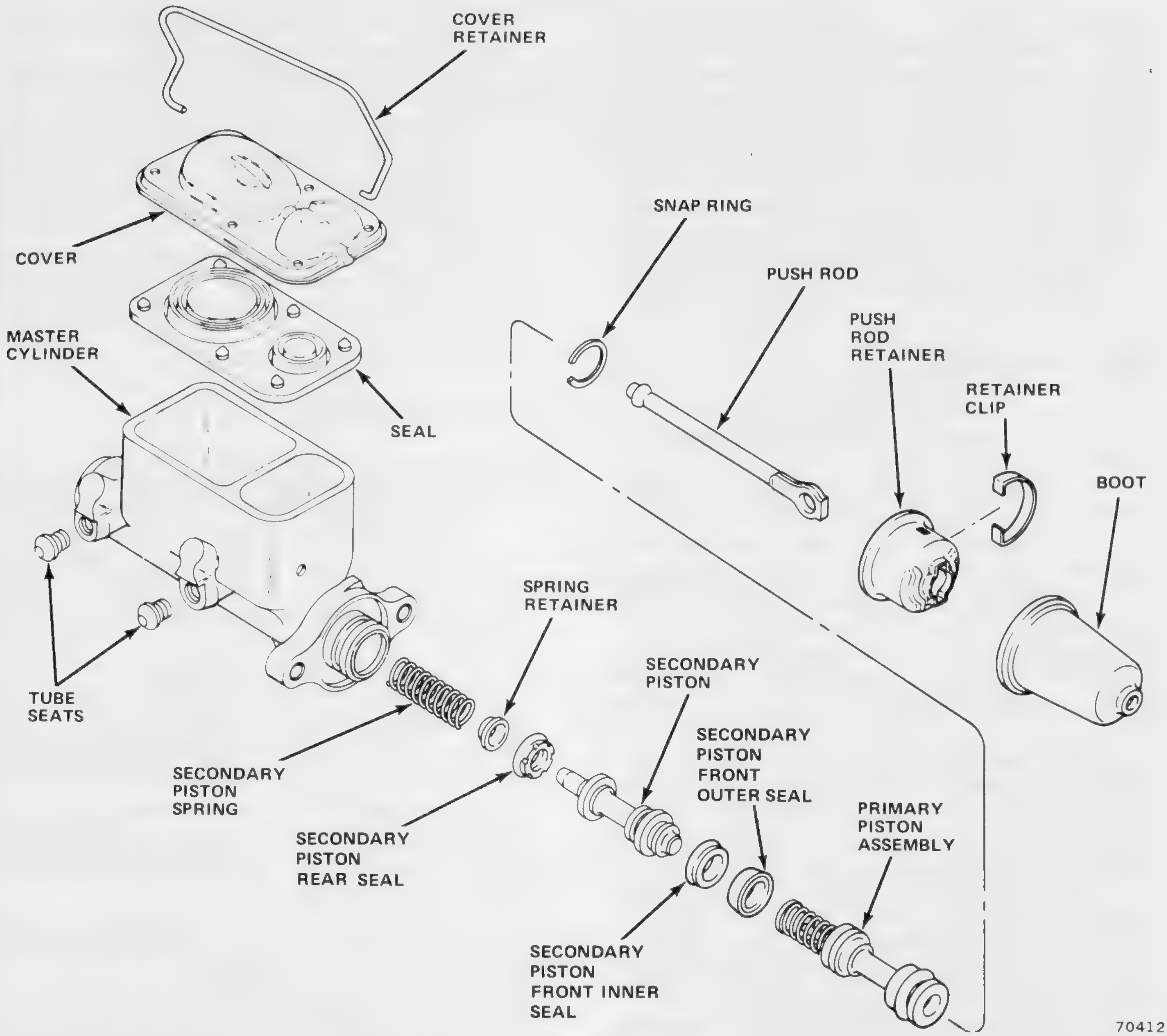

Fig. 2F-10 Master Cylinder Assembly

(2) Mount master cylinder in vise.

(3) On cars with manual brakes, slide boot rearward, remove C shaped retainer clip, and remove retainer, push rod, and boot (fig. 2F-10).

(4) Press primary piston inward using push rod and remove snap ring from groove in piston bore.

(5) Remove and discard primary piston assembly. Do not attempt to disassemble it. Piston is supplied as complete assembly in repair kit.

(6) Remove secondary piston assembly. Apply air pressure through compensator port at bottom of reservoir to remove piston assembly.

(7) Remove piston seals from secondary piston.

Cleaning and Inspecton

Clean the master cylinder components using brake fluid or brake cleaning solvent only. Use filtered compressed air to dry the parts and to blow out all passages and ports in the master cylinder.

CAUTION: *Clean the master cylinder components with brake fluid or brake cleaning solvent only. Do not use any solvent containing mineral oil such as gasoline, kerosene, alcohol, or motor oil. Mineral oil is very harmful to the rubber piston seals.*

Inspect the master cylinder. Replace the cylinder if the piston bore is severely scored, corroded, or pitted. Or, if the housing is cracked, porous, or has sustained other damage. Also check the compensator and bypass ports at the bottom of the reservoirs. If they are plugged or dirty, clean them using brake cleaning solvent and compressed air only. Do not use wire or similar implements to clean or open these ports. Wire could develop a burr in the port and also push it into the piston bore.

Inspect the piston assemblies and return springs. Replace the pistons if they are scored, galled, worn, cracked, or broken; or if the return springs are broken, bent, collapsed, distorted or lack tension.

Inspect the tube seats in the outlet ports. Replace the seats only if they are cracked, scored, loose, or cocked in the outlet port bore. If the seats must be replaced, remove and install them as outlined under Master Cylinder Assembly.

Master Cylinder Assembly

(1) Replace outlet port tube seats as follows:

(a) Enlarge hole in seats using 13/64-inch (5.1 mm) drill.

(b) Place flat washer on each outlet port and thread 1/4-20 x 3/4-inch screw into seat.

(c) Tighten screw until seat is loose and remove seat, screw, and washer.

(d) Remove chips using brake cleaning solvent and compressed air.

(e) Install seats using spare tube fitting nuts to press seats into place. Do not allow seats to become cocked during installation and be sure seats are bottomed.

(f) Remove tube fitting nuts, remove chips or burrs, rinse master cylinder in brake cleaning solvent and blow out all passages using filtered compressed air.

(2) Install rear seal on secondary piston with seal lip facing interior of piston bore (fig. 2F-10).

(3) Install front inner seal on secondary piston with seal lip facing interior of piston bore (fig. 2F-10).

(4) Install front outer seal on secondary piston with seal lip facing outward, or away from interior of piston bore (fig. 2F-10).

(5) Install return spring and retainer on secondary piston (fig. 2F-10).

(6) Lubricate master cylinder piston bore and all piston seals with brake fluid.

(7) Install secondary piston assembly, spring end first, in piston bore.

(8) Install primary piston assembly, spring end first, in piston bore.

(9) Press primary piston inward using push rod and install snap ring in groove of piston bore.

(10) On vehicles with manual brakes, assemble and install push rod, boot, and retainer; then install C-shaped retainer clip on retainer, and install boot over retainer.

CAUTION: *Before installing the boot, be sure the retainer clip is properly engaged in both the retainer and in the groove machined in the master cylinder boss. In addition, do not install a push rod, boot, retainer, and retainer clip if the car is equipped with power brakes.*

(11) Install seal on master cylinder cover.

(12) Bleed master cylinder as follows:

(a) Mount master cylinder in vise and fill reservoirs with brake fluid.

(b) Fabricate two bleed tubes and install tubes in master cylinder outlet ports (fig. 2F-11).

(c) Using push rod or wooden dowel, slowly compress and release piston assemblies. Allow pistons to return under spring pressure.

(d) Continue to compress and release pistons until air bubbles cease to appear in fluid. If necessary, lightly tap master cylinder with rubber mallet to facilitate bleeding.

(e) Remove bleed tubes and install cover.

Master Cylinder Installation

(1) Install master cylinder on dash panel or power brake unit and install attaching nuts and bolts. Tighten nuts or bolts to 30 foot-pounds (40.6 Nm) torque.

(2) Connect brake lines to master cylinder.

(3) Remove cover, fill master cylinder reservoirs to within 1/4-inch (6.3 mm) of rim with AMC Brake Fluid or equivalent marked DOT 3, or J-1703 Motor Vehicle Brake Fluid, and install cover.

(4) On vehicles with manual brakes, connect push rod and brakelight switch to brake pedal as outlined under Brakelight Switch—Installation. Tighten brake pedal bolt locknut to 35 foot-pounds (47.4 Nm) torque and stamped nut to 75 inch-pounds (8.4 Nm) torque.

CAUTION: *There are two mounting bolt holes in the brake pedal. On cars without power brakes, install the bolt in the upper hole. On cars with power brakes, install the bolt in the lower hole.*

(5) Bleed brake hydraulic system as outlined under Brake Bleeding.

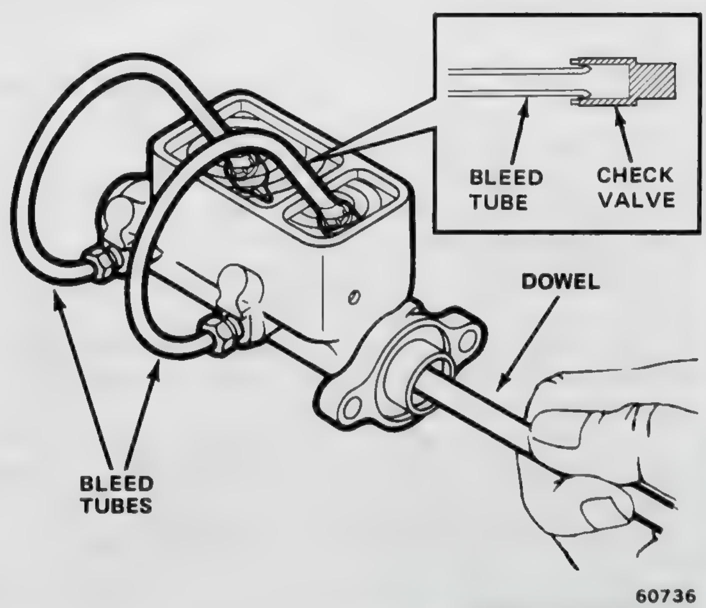

Fig. 2F-11 Bleeding Master Cylinder

WHEEL CYLINDER

The rear drum brake wheel cylinder consists of a cast iron housing containing two pistons, two rubber piston cups, and a compression spring with integral piston cup expanders (fig. 2D-12). A Rubber boot is used at each end of the cylinder to prevent entry of dirt and water. Each cylinder is also equipped with a bleeder screw to facilitate brake bleeding.

The compression spring holds the piston cups tightly against the pistons and the integral expanders hold the piston cups tightly against the cylinder walls to prevent the entry of air when the brakes are released.

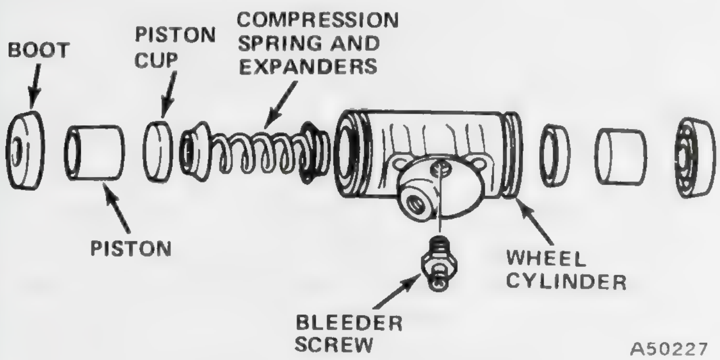

Fig. 2F-12 Wheel Cylinder Assembly

Wheel Cylinder Disassembly

(1) Remove boots from ends of cylinder.

(2) Remove pistons, piston cups, and compression spring. Discard piston cups.

Cleaning and Inspection

Clean all parts except the dust boots using brake fluid or brake cleaning solvent only. Wipe the dust boots clean using a shop cloth only. Use filtered compressed air to dry the parts and to blow out all passages in the wheel cylinder housing.

CAUTION: *Clean the wheel cylinder components with brake fluid or brake cleaning solvent only. Do not use any solvent containing mineral oil such as gasoline, kerosene, alcohol, or motor oil. Mineral oil is very harmful to the rubber piston cups.*

Inspect all components. Replace the cylinder if the piston bore is scored, scratched, or pitted, or if the bleeder screw threads are stripped, or galled. Replace the pistons if they are scored, worn, or corroded. Replace the compression spring and expanders if the spring is distorted, broken, lacks tension, or if the expanders have separated from the spring. Replace the dust boots if they are cut, cracked, torn, or distorted.

Wheel Cylinder Assembly

CAUTION: *Always install replacement piston cups to ensure proper brake action. Do not attempt to reuse the original cups at any time. In addition, use compression springs equipped with the integral expanders only. If expanders are not used, brake operation could be impaired.*

(1) Lubricate piston bore, pistons, and piston cups with hydraulic brake fluid but do not lubricate dust boots, install boots dry only.

(2) Position piston cups on compression spring expanders and install assembled spring and cups in piston bore. Be sure expanders are seated in piston cups and that cups are installed with lips facing one another (toward interior of cylinder bore).

(3) Install pistons in piston bore with flat sides of pistons facing interior of cylinder bore (fig. 2F-12).

(4) Install dust boots.

COMBINATION VALVE

A combination pressure differential/rear brake proportioning valve is used on four-cylinder Gremlins only.

The valve consists of a one-piece housing containing a rear brake portioning valve section and a pressure differential valve and switch (fig. 2F-13).

The valve is located on the right-side inner fender panel near the heater blower motor.

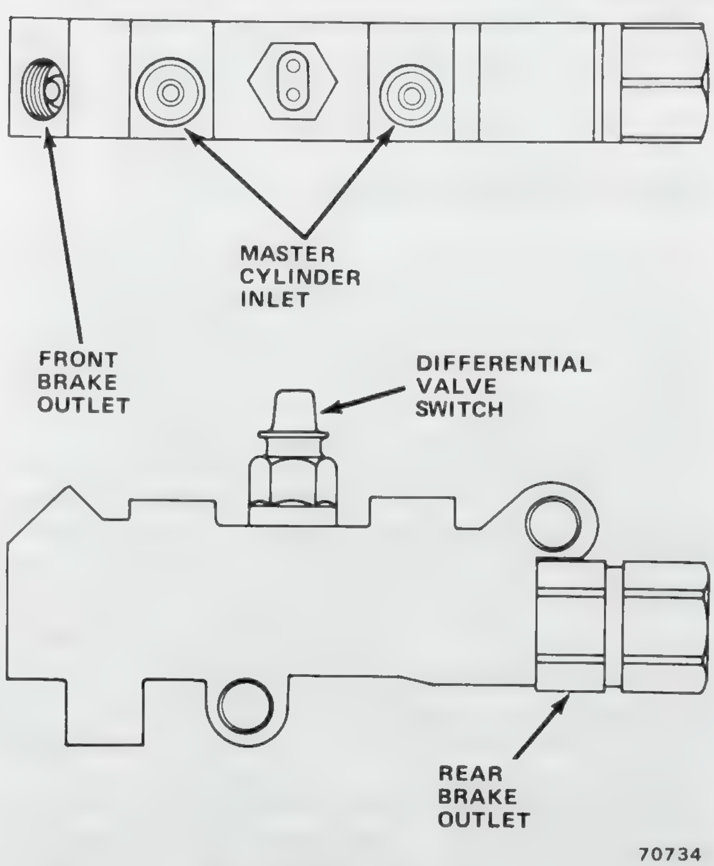

Fig. 2F-13 Combination Valve (Four-Cylinder Gremlin Only)

Valve Operation

The proportioner section of the valve provides balanced front-to-rear braking action during high pedal pressure stops. When the brakes are applied, the valve momentarily reduces full hydraulic system pressure to the rear drum brakes to balance operation and prevent excessive rear brake action.

The pressure differential valve section activates the brake warning light on the instrument panel if a pressure loss in the front or rear hydraulic system should occur. This feature is provided as a method for alerting the driver if such a system malfunction should ever occur.

The pressure differential valve section contains a piston and a plunger-type switch. If a pressure loss occurs in either the front or rear brake hydraulic system, a system differential of 70 to 300 psi will cause the piston to shuttle toward the low pressure side of the valve. As the piston moves toward the low pressure side, ramps on the piston push the switch contact plunger upward closing the switch contacts. This action completes the circuit between the switch and brake warning light causing the light to illuminate. Until the ignition lock cylinder is turned to the OFF position, the light will remain illuminated until the cause of the problem is corrected and the valve recentered.

The pressure differential valve is a hydraulic reset-type and does not require removal for brake bleeding.

Valve Service

The combination valve is serviced as an assembly only. Do not attempt to repair any combination valve.

PRESSURE DIFFERENTIAL VALVE

A pressure differential valve is used on Pacer, Concord, AMX, Matador, and six-cylinder Gremlin models.

On Pacer models, the valve is connected into the brakelines located adjacent to the master cylinder. On all other models, the valve is located at the lower rear corner of the right-side inner fender panel.

The valve activates the brake warning light if a pressure loss in the front or rear brake hydraulic systems should ever occur. This feature is provided as a method for alerting the driver if such a system malfunction should occur.

The valve consists of a one-piece housing containing a piston and plunger-type switch (fig. 2F-14). The switch contact plunger is actuated by ramps on the piston to open and close the switch-to-warning light electrical circuit.

The front and rear brake hydraulic systems are both connected to the valve. If a pressure loss in either system should occur, a pressure differential of 70 to 300 psi will cause the piston to shuttle toward the low pressure side of the valve. As the piston moves toward the low pressure side, the piston ramps push the switch contact plunger upward. This action completes the electrical circuit between the switch and warning light causing the light to illuminate. Until the steering column ignition lock is turned to the OFF position, the warning light will remain illuminated until the cause of the problem is corrected and the valve is recentered.

Centering The Pressure Differential Valve Piston

The pressure differential valve is a hydraulic reset type and does not require removal of the switch to bleed the brake hydraulic system. If the valve is activated, repair the cause of the malfunction and recenter the valve piston to deactivate the warning light as follows:

(1) Correct cause of system malfunction and bleed brakes.

(2) Turn steering column ignition lock to ON position.

(3) Check master cylinder reservoir fluid level and fill to within 1/4 inch of rim if necessary.

(4) Apply brake pedal several times. Valve piston will recenter itself and deactivate warning light.

(5) Turn ignition lock to OFF or LOCK position.

Pressure Differential Valve Service

The pressure differential valve is serviced as an assembly only. Do not attempt to repair any valve.

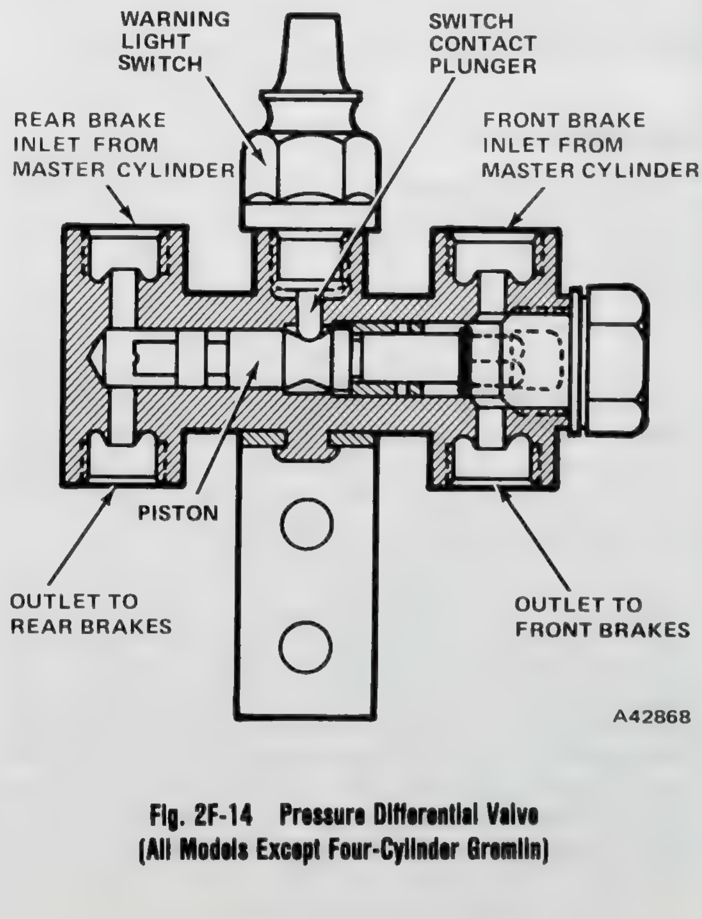

Fig. 2F-14 Pressure Differential Valve (All Models Except Four-Cylinder Gremlin)

Pressure Differential Valve Removal

(1) On Pacer models, disconnect switch wire and brakelines at valve and remove valve.

NOTE: *On Pacers, the coils in the brakeline connecting the valve to the left front brake are placed in the line to absorb vibration and flexing action. If this brake line is replaced for any reason, the replacement line must also have the same number of coils as the original.*

(2) On all other models, remove screws attaching pressure differential valve to dash panel.
(3) Disconnect switch wire and brake lines at valve and remove valve.

Pressure Differential Valve Installation

(1) On Pacer models, align valve ports with brakelines and connect lines and switch wire to valve.

NOTE: *On Pacers, the coils in the brakeline connecting the valve to the left front brakes are placed in the line to absorb vibration and flexing action. If the line is replaced for any reason, the replacement line must also have the same number of coils.*

(2) On all other models, connect brake lines and switch wire to valve.
(3) Install screws attaching valve to dash panel.
(4) On all models, bleed brakes. Refer to Brake Bleeding.

BRAKE BLEEDING

Bleed the brake system whenever diagnosis indicates that air has entered the system. If only the front or rear half of the system has been serviced, it is usually necessary to bleed only that half of the system. However, if a firm brake pedal cannot be obtained after bleeding, it will be necessary to bleed the entire system.

If the fluid is contaminated, flush the system with brake fluid until clear fluid only is withdrawn from the calipers and wheel cylinders. Use AMC Brake Fluid or equivalent marked DOT 3, or SAE J-1703 Motor Vehicle Brake Fluid only.

Before bleeding, fill the master cylinder reservoirs with the recommended brake fluid to within 1/4 inch (6.3 mm) of the reservoir rims.

CAUTION: *Clean the master cylinder and cover before adding fluid. This is important in preventing dirt from entering the fluid reservoirs.*

The brake hydraulic system can be bled manually or by using a pressure tank and adapters. Each method is outlined in the following procedures:

Pressure Bleeding

CAUTION: *When using a pressure bleeding tank, follow the manufacturers instructions for its use explicitly. Use clean AMC Brake Bluid or equivalent marked DOT 3, or SAE J-1703 only. Do not exceed the recommended working pressure (psi) when pressurizing the tank and release all air pressure from the tank after using it.*

(1) Release air from tank and remove valve core from tank air valve.
(2) Fill tank with brake fluid. Do not exceed stated fluid capacity of tank.
(3) Install valve core in tank air valve and close tank-to-master cylinder fluid supply valve.
(4) Reduce shop line air pressure, connect shop air line to tank and fill tank to manufacturers recommended working pressure.

NOTE: *A tank pressure of 15-20 psi will usually be more than sufficient to bleed the brake hydraulic system.*

(5) Install brake bleeding adapter assembly on master cylinder. Be sure air tight seal is formed between reservoir rim and adapter gasket.
(6) Connect fluid supply hose to fluid supply valve in tank.
(7) Remove hose fitting from master cylinder adaper and install it in quick-disconnect fitting of fluid supply hose.
(8) Place end of hose in clean container and slowly open fluid valve in tank to bleed air from tank and hose. Close valve when fluid flows clear and free of air bubbles.
(9) Refill tank if working pressure falls below recommended minimum.
(10) Remove adapter fitting from hose and install it in master cylinder adapter.
(11) Connect fluid supply hose to adapter fitting and open fluid supply valve in tank.
(12) Bleed brakes in following sequence: Right rear, left rear, right front, left front.
(13) Bleed one wheel at a time only.
(14) Install rubber hose on bleeder screw of caliper or wheel cylinder to be bled, and place free end of hose in container partially filled with brake fluid.
(15) Open bleeder screw 3/4 turn. Close screw when fluid flows clear and free of air bubbles. Be sure free end of rubber hose remains below surface of fluid in container.
(16) After bleeding brakes, disconnect fluid supply hose at adapter fitting and remove master cylinder adapter assembly.
(17) Fill master cylinder reservoirs to within 1/4 inch (6.3 mm) of rim.
(18) Release air pressure from tank and close fluid supply valve.
(19) Check brake operation before moving car.

Manual Bleeding

(1) Fill master cylinder to within 1/4 inch (6.3 mm) of reservoir rims.

(2) Bleed brakes in following sequence: Right rear, left rear, right front, left front.

(3) Bleed one wheel at a time only.

(4) Install rubber hose on bleeder screw of caliper or wheel cylinder to be bled and place free end of hose in container partially filled with brake fluid.

(5) Open bleeder screw 3/4 turn.

(6) Have helper press brake pedal to floor; then tighten bleeder screw and slowly release brake pedal.

(7) Repeat bleeding operation until fluid flows clear and free of air bubbles. Be sure free end of rubber hose remains below surface of fluid in container.

CAUTION: *Check the master cylinder fluid level frequently during the bleeding operation and refill the reservoirs as necessary. Do not allow the master cylinder to run out of fluid at any time or additional air will be drawn into the system.*

(8) Discard fluid withdrawn in bleeding operation.

(9) Fill master cylinder reservoirs to within 1/4 inch (6.3 mm) of reservoir rims.

(10) Check brake operation before moving car.

SPECIFICATIONS

Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Brake Line Fittings:				
Rear Wheel Cylinder	11	11-13	97	97-115
Master Cylinder	17	17-20	150	150-180
Front or Rear Hose to Tee Fitting	18	18-20	165	165-175
All Others	12	12-13	105	105-115
Brake Hose to Caliper:				
Pacer	11	11-13	100	100-115
Gremlin, AMX, Concord	34	34-38	25 ft-lb	25-28 ft-lb
Master Cylinder Mounting Bolts:				
(Power and Non-Power Brakes)	41	41-47	30	30-35
Wheel Cylinder Mounting Bolts	10	10-13	90	90-120

All Torque values given in newton-meters and inch-pounds with dry fits unless otherwise specified.

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Brake Fluid Specifications

Brake Fluid	Use AMC Brake Fluid or equivalent marked DOT 3 or, SAE J-1703 only.
Brake Fluid Level	Fill reservoirs to within 1/4 inch of rims.

POWER BRAKE UNITS

GENERAL

Two power brake units are used on AMC cars: an 8-inch (20.3 cm) single diaphragm unit and a 9-1/2-inch (24.1 cm), step tandem, dual diaphragm unit. The single disphragm unit is used on Pacer, Gremlin, Concord, AMX models equipped with optional power assist brakes (figs. 2F-15 and 2F-16). The dual diaphragm unit is standard equipment on all Matador models (fig. 2F-17).

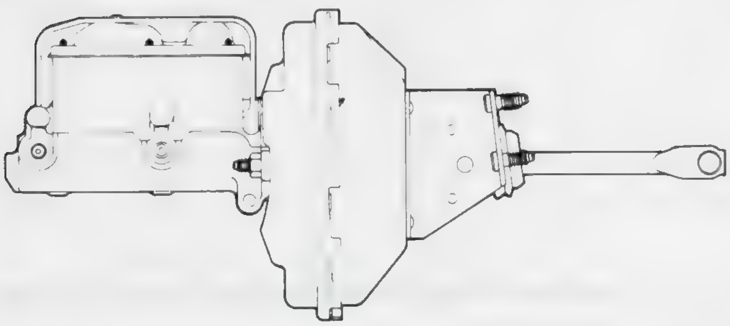

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Fig. 2F-15 Power Brake Unit—Pacer

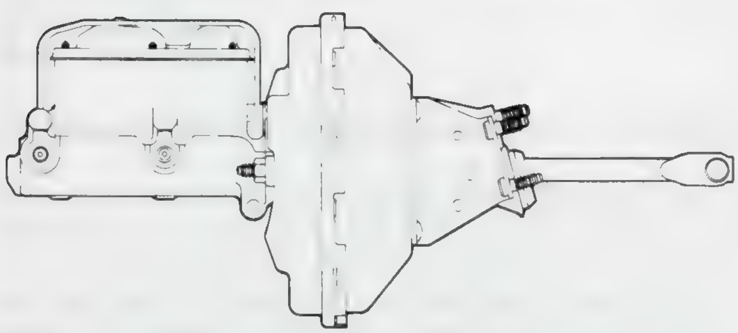

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Fig. 2F-16 Power Brake Unit—Gremlin-Concord-AMX

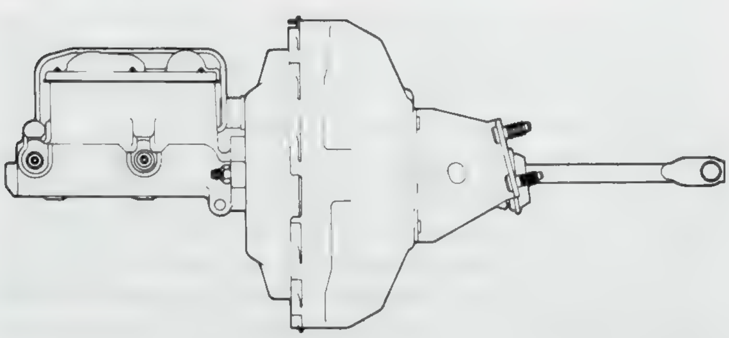

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Fig. 2F-17 Power Brake Unit—Matador

POWER BRAKE UNIT DIAGNOSIS

Power brake unit malfunctions should be diagnosed using Brake Preliminary Diagnosis Guide B and the Service Diagnosis Charts.

POWER BRAKE UNIT SERVICE

If diagnosis indicates an internal malfunction in the power brake unit, service the unit as an assembly only. Do not attempt to disassemble, repair or adjust any power brake unit. If a unit must be replaced, use the master cylinder push rod supplied with the replacement unit. This push rod has been preset and gauged for use with the replacement unit.

REMOVAL

(1) Disconnect power unit push rod and brakelight switch at brake pedal.

(2) Remove vacuum hose from power unit check valve.

(3) Remove nuts and lockwashers attaching master cylinder to power unit.

(4) Separate master cylinder from power unit and move cylinder aside. Do not disconnect brake lines.

(5) Remove nuts and lockwashers from mounting studs attaching power unit to dash panel and remove power unit.

INSTALLATION

(1) Mount power unit on dash panel. Tighten mounting stud nuts to 30 foot-pounds (40.6 Nm) torque.

(2) Install vacuum hose on power unit check valve.

(3) Connect power unit push rod and brakelight switch to brake pedal as outlined under Brakelight Switch—Installation. Tighten brake pedal bolt locknut to 35 foot-pounds (47.4 Nm) torque and stamped nut to 75 inch-pounds (8.4 Nm) torque.

CAUTION: *There are two mounting holes in the brake pedal. On cars with power brakes, install the brake pedal bolt in the lower hole.*

(4) Check brake operation before moving car.

SPECIFICATIONS

Power Brake Unit Specifications

Pacer, Gremlin, Concord AMX, ... 8-inch — single diaphragm
Matador . . . . 9-½ inch — step tandem dual diaphragm
Power Unit Service . . . . Replace assembly only

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Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Master Cylinder-to-Power Unit Mounting Bolts	41	41-48	30	30-35
Power Unit-to-Dash Mounting Bolts	41	41-48	30	30-35
Brake Pedal Bolt Locknut	48	48-54	35	35-40
Brake Pedal Bolt Stamped Nut	8	8-10	75 in-lb	75-90 in-lb

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

70236

DISC BRAKES

GENERAL

The front disc brake assembly used on AMC cars consists of a hub and rotor assembly, a caliper assembly, two brakeshoe and lining assemblies, a splash shield, an adapter, and a caliper anchor plate (figs. 2F-18 and 2F-19).

The one-piece cast iron hub and rotor assembly has integrally cast cooling fins between the two braking surfaces of the rotor. These fins ventilate and cool the rotor by circulating air between the braking surfaces. The rotor braking surfaces are protected from road splash by the wheel and tire on the outboard side and the splash shield on the inboard side.

Two different size caliper assemblies are used. The caliper used on Matador models has a 3.1-inch (7.8 cm) diameter piston. The caliper used on Pacer, Gremlin, Concord, and AMX models has a 2.6-inch (6.6 cm) diameter piston. However, service procedures are the same for both calipers.

The caliper is positioned in, and slides on abutment surfaces machined into the forward and rearward edges of the caliper anchor plate. A support key, installed between the forward edges of the caliper and anchor plate abutment surfaces, maintains caliper position. The support key is retained in the anchor plate by an Allen-head screw. A support spring, installed between the key and anchor plate, is also used to maintain caliper position.

The caliper is a one-piece casting containing a piston bore, piston, piston seal, and dust seal. A groove machined in the bore holds the square cut piston seal which provides the hydraulic seal between piston and bore-wall. The dust seal seats in a recess machined into the top of the piston bore and in a groove machined in the piston exterior surface. The dust seal protects the piston and bore from road splash and contamination which could impair piston operation. A bleeder screw is located above the piston bore to bleed air from the system when necessary.

The inboard brakeshoe is located in the caliper anchor plate. The inboard shoe anti-rattle spring is positioned

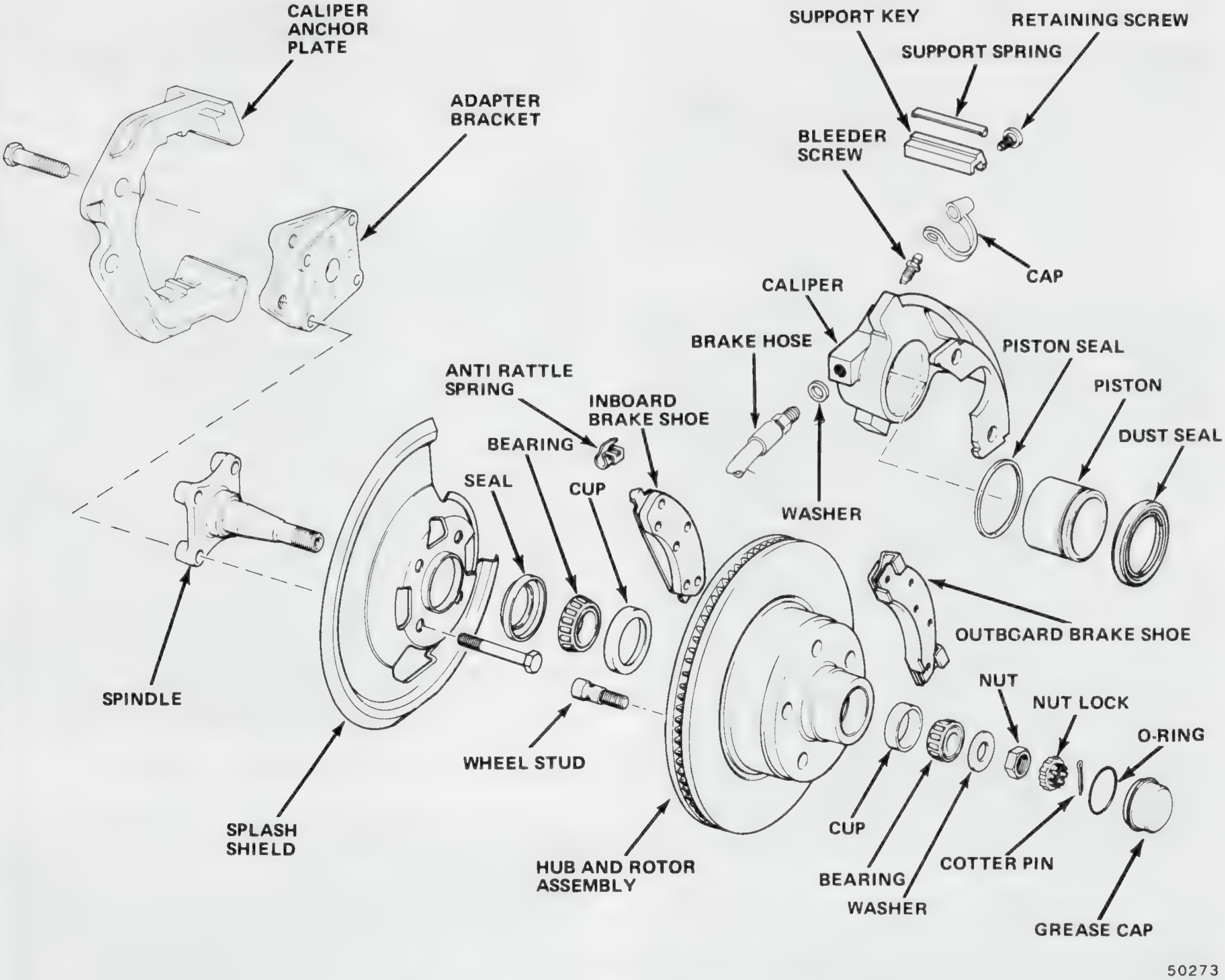


Fig. 2F-18 Disc Brake Components—Pacer-Gremlin-Concord-AMX

between the rear edge of the shoe and the caliper anchor plate. The outboard shoe is located in the caliper with the shoe flanges bearing against the outboard shoe location surfaces of the caliper. Brakeshoe linings are riveted to the shoes.

NOTE: *The inboard and outboard shoes are not interchangeable, nor are they interchangeable between the two different size calipers.*

OPERATION AND WEAR COMPENSATION

Operation

When the brakes are applied, fluid pressure developed by the master cylinder is exerted equally against the piston and bottom surface of the piston bore. Pressure applied to the piston is transmitted to the inboard shoe to press it against the rotor. Pressure applied to the bottom of the piston bore forces the caliper to slide inboard on the anchor plate. Since the caliper is a one-piece assembly, this movement also causes the outboard section of the caliper to apply pressure against the outboard shoe pressing the shoe against the rotor. As hydraulic pressure increases, the brakeshoes press against the rotor surfaces with increasing force to develop braking action.

Wear Compensation

The piston seal maintains operating clearance between the rotor and brakeshoes to compensate for wear. When the brakes are applied, the seal is deflected by hydraulic pressure and friction between the seal and piston. When hydraulic pressure is released, the seal reverts to its original shape and retracts the piston just

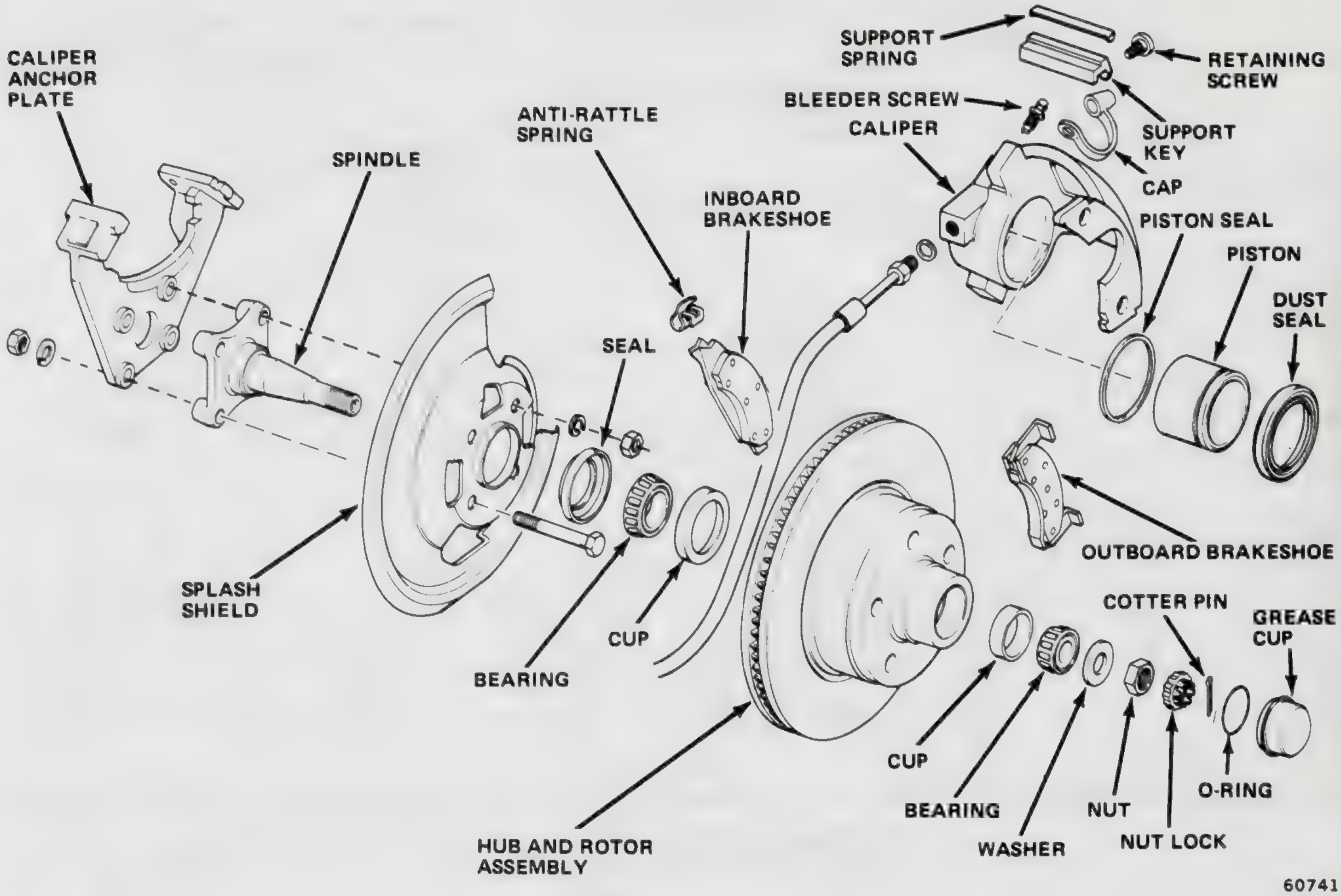


Fig. 2F-19 Disc Brake Components—Matador

enough to provide the necessary operating clearance. As the brakeshoes wear, piston travel tends to exceed the deflection limit of the seal. At this point, the piston moves outward through the seal just enough to compensate for lining wear (fig. 2F-20).

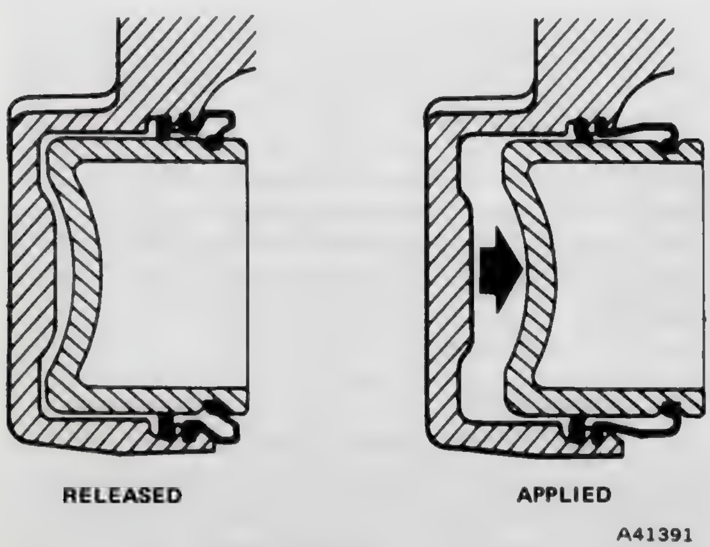


Fig. 2F-20 Piston and Seal Movement

BRAKESHOE REPLACEMENT

WARNING: *When servicing wheel brake parts, do not create dust by grinding or sanding brakelinings or by cleaning brake parts with a dry brush or with compressed air. Use a water dampened shop cloths only to remove dirt and dust from brake parts prior to disassembly. Many wheel brake parts contain asbestos fibers which can become airborne if dust is created during service operations. Breathing dust containing asbestos fibers may cause serious bodily harm.*

(1) Drain and discard two-thirds of brake fluid from master cylinder front brake reservoir. Do not drain reservoir completely.

NOTE: *The largest reservoir in the master cylinder supplies the front brakes.*

(2) Remove hub cap and loosen wheel retaining nuts.

(3) Raise and support car.

(4) Remove front wheels.

(5) Work on one caliper at a time only.

(6) Press caliper piston to bottom of piston bore using screwdriver (fig. 2F-21). If piston cannot be bottomed using screwdriver, use large C-clamp.

(7) Remove support key retaining screw using 1/14-inch hex or allen wrench (fig. 2F-22).

(8) Remove caliper support key and support spring using punch and hammer (fig. 2F-23).

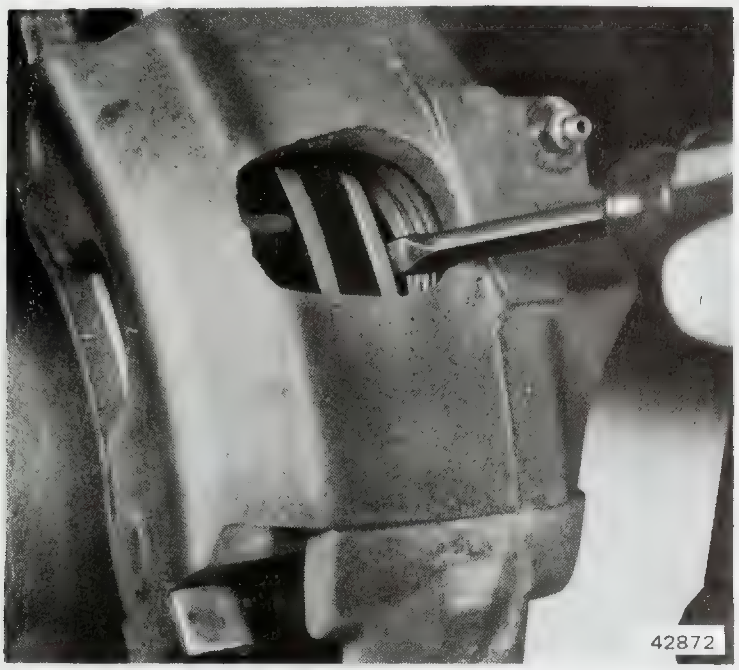


Fig. 2F-21 Bottoming Caliper Piston

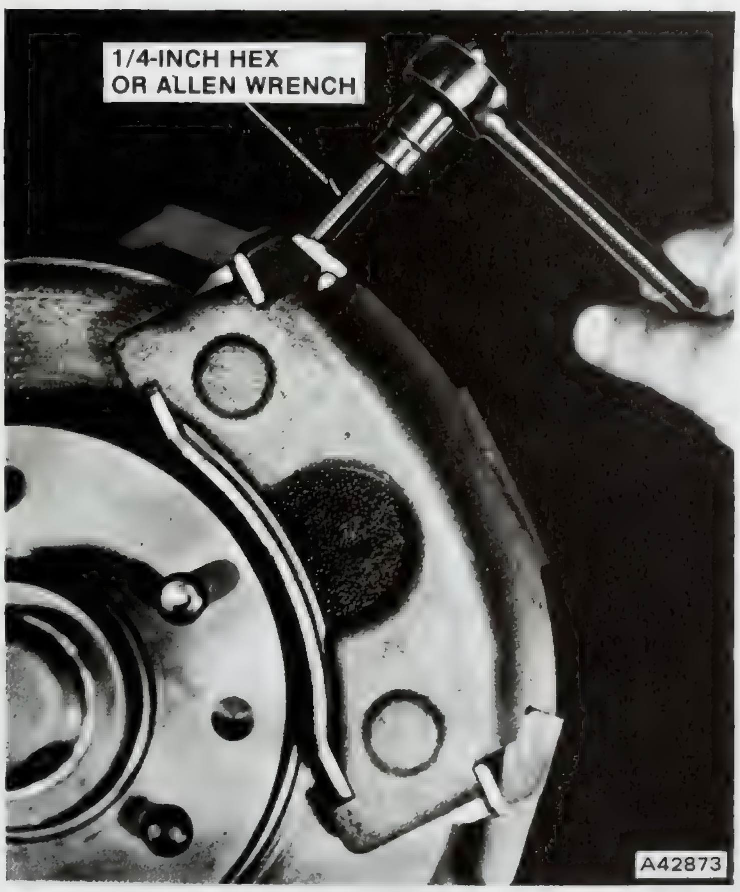


Fig. 2F-22 Retaining Screw Removal

(9) Lift caliper assembly out of anchor plate and off rotor (fig. 2F-24).

(10) Suspend caliper from coil spring using heavy wire. Do not let brake hose support weight of caliper.

(11) Remove inboard brakeshoe from anchor plate.

(12) Remove inboard brakeshoe anti-rattle spring from inboard shoe (fig. 2F-25). Note position of anti-rattle spring for assembly reference.

(13) Remove outboard brakeshoe from caliper (fig. 2F-26).

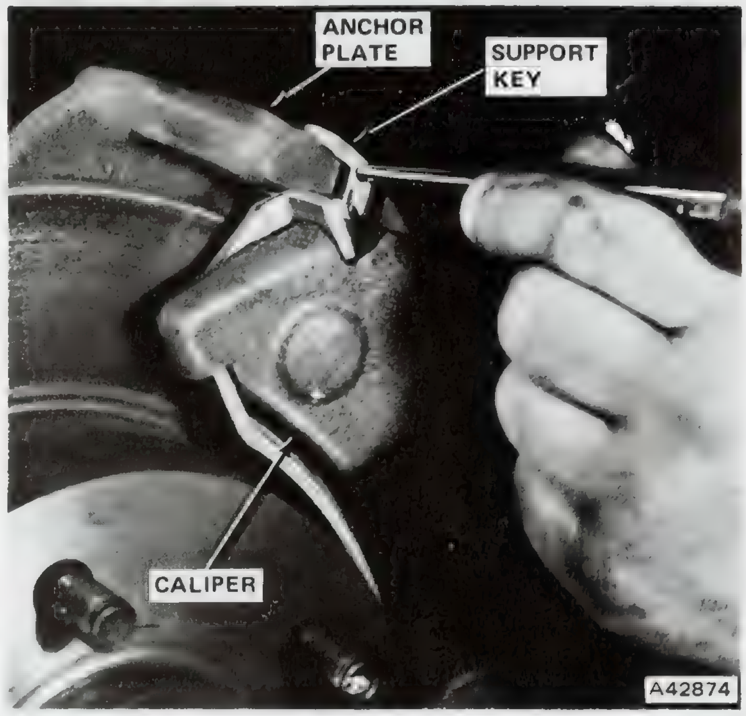


Fig. 2F-23 Support Key Removal

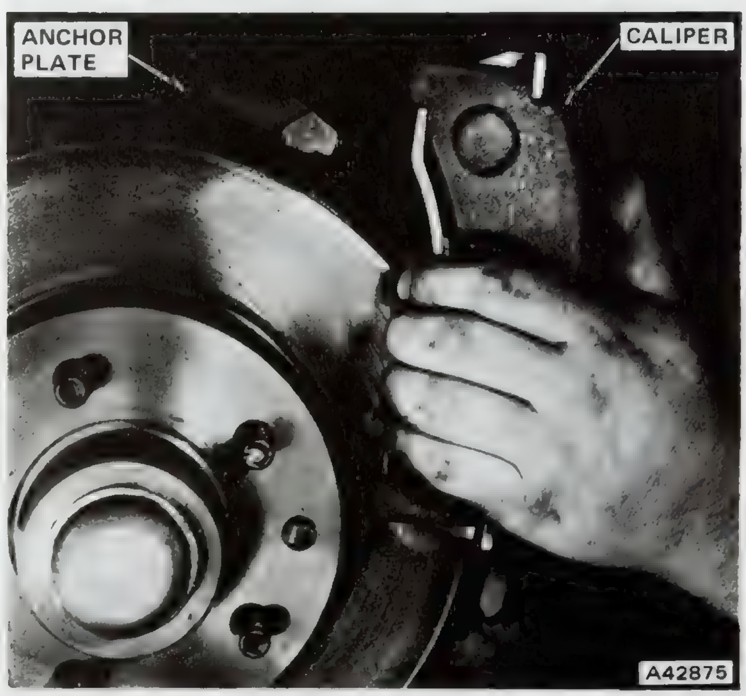


Fig. 2F-24 Caliper Removal/Installation

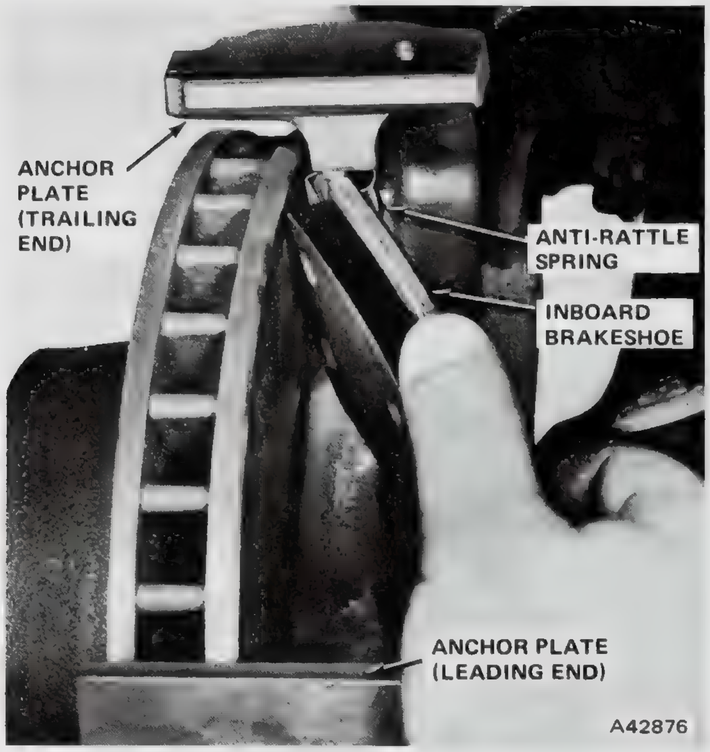


Fig. 2F-25 Inboard Brakeshoe Removal

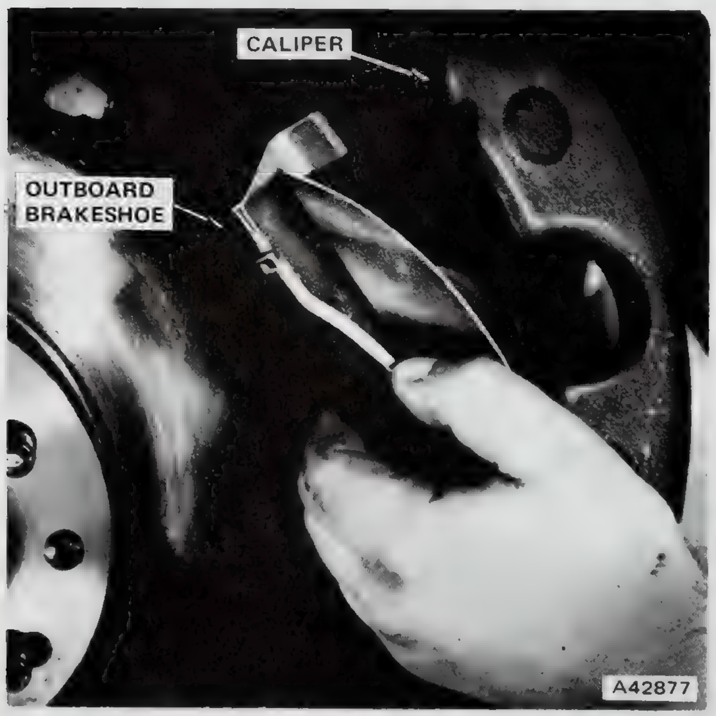


Fig. 2F-26 Outboard Brakeshoe Removal

Cleaning and Inspection

Wipe the inside of the caliper with a clean, dry shop cloth only.

CAUTION: *Do not use compressed air to clean the inside of the caliper. Compressed air will dislodge or damage the dust boot.*

Inspect the caliper for evidence of leakage from the piston bore. If leakage is evident, overhaul the caliper as described under Caliper Overhaul.

Inspect the abutment (sliding) surfaces of the caliper and anchor plate for rust or corrosion. Clean these surfaces thoroughly (using a wire brush and crocus cloth) and lubricate them liberally with molydisulphide grease (fig. 2F-27).

CAUTION: *The abutment surfaces of the caliper and anchor plate must be clean, smooth, and well-lubricated with molydisulfide grease before caliper installation. Rust, corrosion, or foreign material on the abutment surfaces will impair the sliding action of the caliper in the anchor plate.*

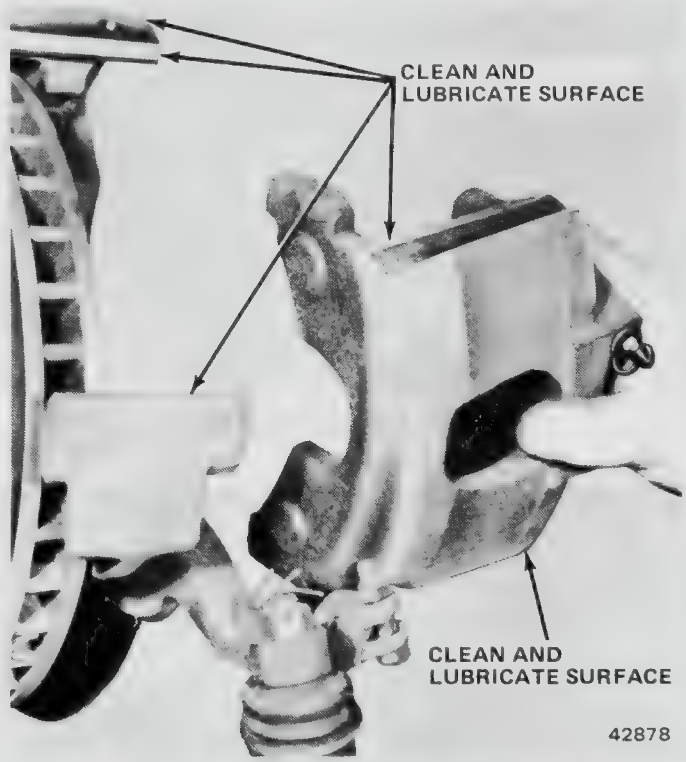


Fig. 2F-27 Caliper and Anchor Plate Abutment Surfaces

Caliper Installation

(1) Install inboard brakeshoe anti-rattle spring on rear flange of inboard brakeshoe. Be sure looped section of spring faces away from rotor (fig. 2F-28).

(2) Install assembled inboard brakeshoe and anti-rattle spring in caliper anchor plate (fig. 2F-29). Do not dislodge anti-rattle spring during shoe installation.

(3) Install outboard brakeshoe in caliper (fig. 2F-30).

(4) Install caliper over rotor and into position in anchor plate (fig. 2F-24).

CAUTION: *Be very careful to avoid tearing or dislodging the dust boot when installing the caliper. A damaged boot will expose the caliper piston to road splash resulting in corrosion and eventual piston seizure.*

(5) Align caliper with anchor plate abutment surfaces and insert support key and support spring between abutment surfaces at trailing end of caliper and anchor plate (fig. 2F-31).

(6) Complete installation of support key and support spring using hammer and punch.

(7) Install support key retaining screw and tighten it to 15 foot-pounds (20.3 Nm) torque. Be sure screw is properly seated.

(8) Fill master cylinder reservoirs to within 1/4 inch (6.3 mm) of rims.

(9) Press firmly on brake pedal several times to seat brakeshoes.

(10) Install wheels and tires and lower car.

(11) Check fluid level in master cylinder and correct if necessary.

CAUTION: *Check for firm brake pedal and proper brake operation before moving the car.*

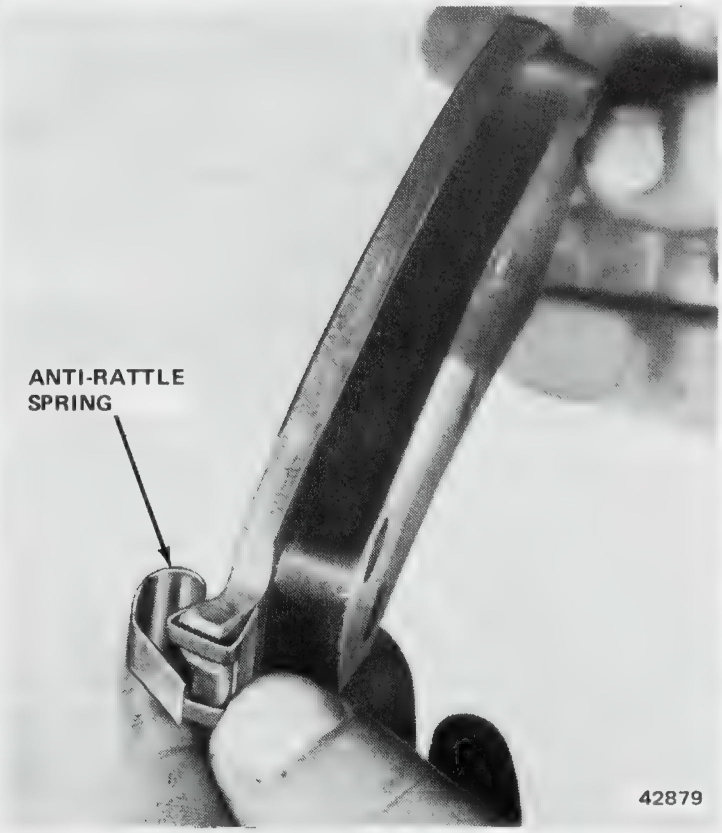


Fig. 2F-28 Anti-Rattle Spring Installation

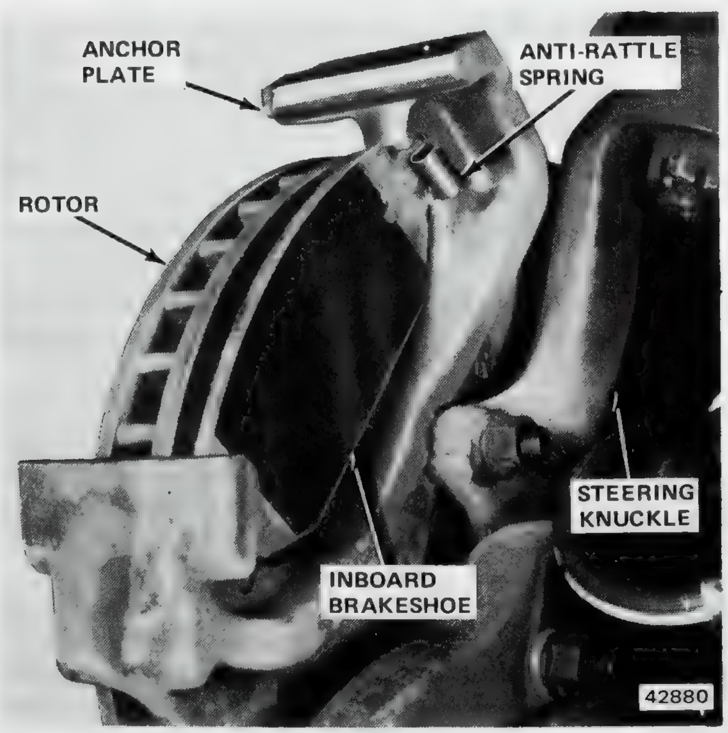


Fig. 2F-29 Inboard Brakeshoe Installation

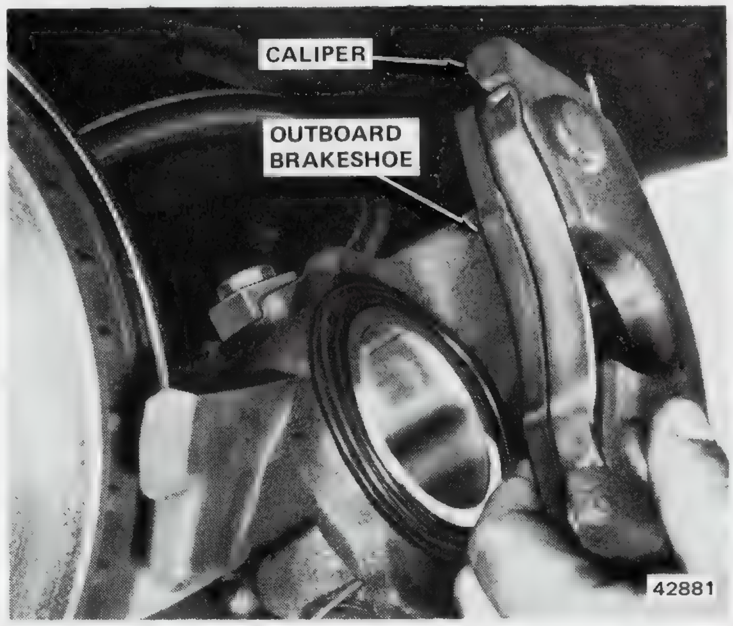


Fig. 2F-30 Outboard Brakeshoe Installation

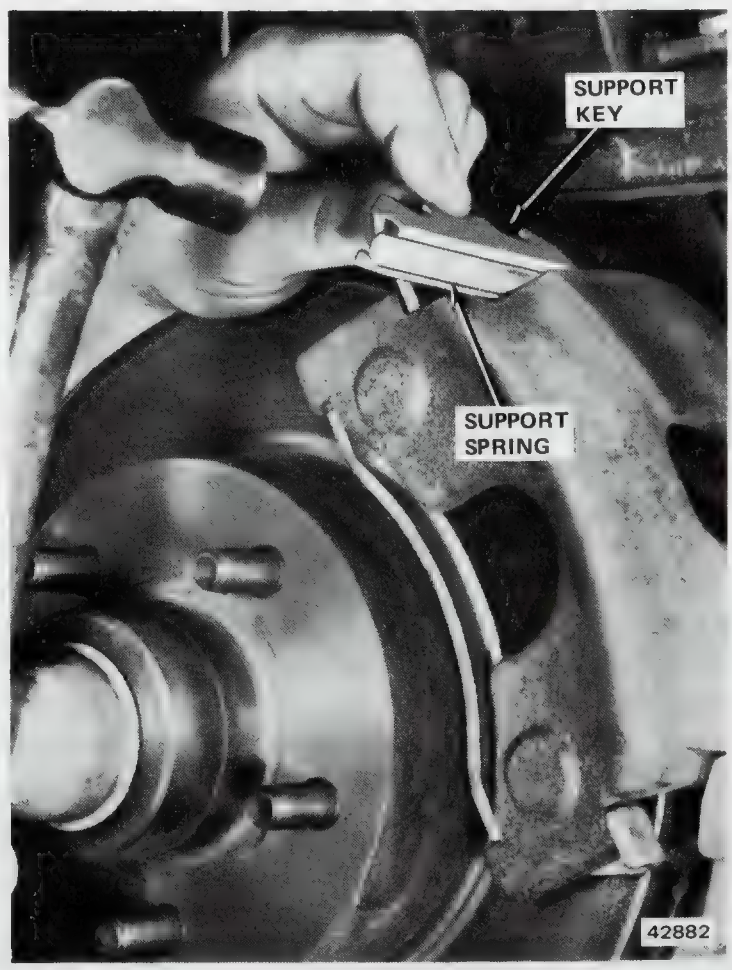


Fig. 2F-31 Caliper Support Key and Spring Installation

CALIPER OVERHAUL

WARNING: *When servicing wheel brake parts, do not create dust by grinding or sanding brakelinings or by cleaning brake parts with a dry brush or with compressed air. Use water dampened cloths only to remove dirt and dust from brake parts prior to disassembly. Many brake parts contain asbestos fibers which can become airborne if dust is created during servicing operations. Breathing dust containing asbestos fibers may cause serious bodily harm.*

Removal

(1) Drain and discard two-thirds of brake fluid from master cylinder reservoir serving front disc brakes. Do not drain reservoir completely.

(2) Remove hub cap and loosen wheel retaining nuts.

(3) Raise and support car.

(4) Remove front wheels.

(5) Work on one caliper at a time.

(6) Wipe all dirt and grease from caliper brake hose fitting using shop cloth.

(7) Disconnect brake line at caliper and discard hose fitting washer. Cover open end of hose with tape or clean shop cloth.

(8) Remove caliper and brakeshoes as outlined in Brakeshoe Replacement.

Disassembly

(1) Drain fluid from caliper.

(2) Pad interior of caliper with shop cloths (fig. 2F-32).

(3) Remove caliper piston using compressed air. Insert air nozzle in fluid inlet port and apply only enough air pressure to ease piston out of bore (fig. 2F-32).

WARNING: *Do not use an excessive amount of air pressure to remove the piston. Excessive pressure can force the piston out with enough force to cause personal injury. In addition, never attempt to catch the piston by hand as it comes out of the bore.*

(4) Remove dust seal from piston.

(5) Remove piston seal from piston bore using plastic or wooden tool only.

CAUTION: *Do not use any type of metal tool to remove the seal from the bore. Metal tools may scratch or score the piston bore or seal groove.*

(6) Remove bleeder screw and plastic cap.

Cleaning and Inspection

Remove rust and corrosion from the abutment surfaces of the caliper and anchor plate using a wire brush

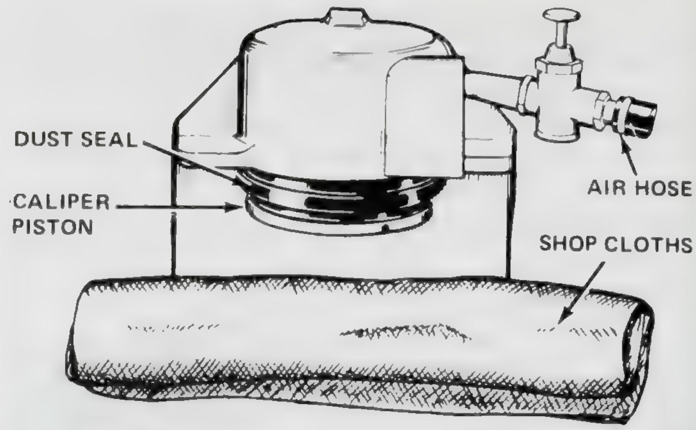


Fig. 2F-32 Caliper Piston Removal

and crocus cloth. Lubricate these surfaces liberally with molydisulfide grease.

NOTE: *The abutement surfaces must be lubricated to maintain proper caliper operation. If these surfaces become rusted, or corroded, the sliding action of the caliper can be impaired.*

Clean the caliper and piston with brake fluid or brake cleaning solvent only. Use filtered compressed air to clean and dry the caliper, piston, and all grooves and passages in the caliper.

Inspect the caliper piston for damage and wear. Replace the piston if worn, scored, pitted, or corroded.

Inspect the caliper for wear or damage. Replace the caliper if the piston bore, piston seal groove, or dust seal groove is worn, scored, nicked, pitted or heavily corroded. Light corrosion in the piston bore may be removed with a fiber brush only.

Inspect the anti-rattle spring, caliper support key, support spring, and support key retaining screw. Replace these parts if damaged or worn.

Replace the anti-rattle spring and support spring if they are distorted or lack tension. Replace the support spring if it is distorted or flattened.

Assembly

(1) Lubricate piston seal with clean brake fluid and install seal in piston bore groove. Work seal into groove using fingers only.

(2) Install bleeder screw and plastic cap.

(3) Install caliper piston and dust seal using Installer Tool J-24837 on Matadors or tool J-26795 on Pacer, Gremlin, Concord, and AMX models. Refer to Piston and Seal Installation—With Installer Tool.

NOTE: *If caliper piston installer tool is not available, refer to Piston and Seal Installation—Without Installer Tool.*

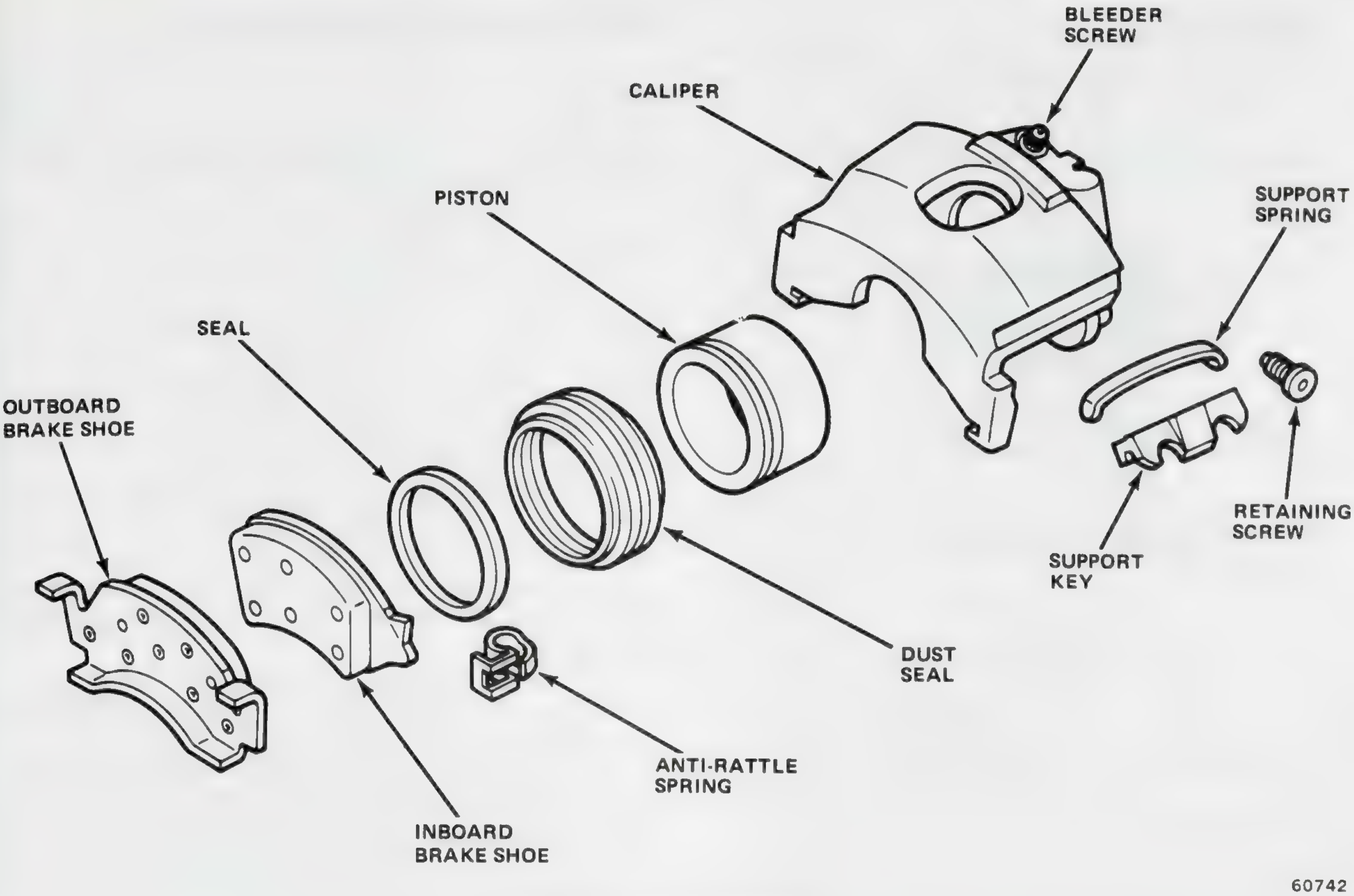


Fig. 2F-33 Caliper Components

Piston and Seal Installation—With Installer Tool

(1) Lubricate dust seal and installer tool with clean brake fluid.

(2) Mount dust seal on installer tool (fig. 2F-34). Allow approximately 1/4 inch (6.3 mm) of installer tool to extend beyond small lip of dust seal.

(3) Position assembled dust seal and installer tool over piston bore. Reach inside installer tool and work large lip of dust seal into seal groove at top of piston bore in caliper (fig. 2F-35). Be sure dust seal is completely seated in groove.

(4) Lubricate caliper piston with brake fluid.

(5) Insert piston through installer tool and center piston in bore.

(6) Using hammer handle, apply steady pressure to piston until it is installed halfway into bore (fig. 2F-36). Do not strike hammer handle or piston during installation. Piston must be pressed into bore only.

(7) Remove installer tool and seat small lip of dust seal in caliper piston groove.

(8) Press piston to bottom of bore using hammer handle.

(9) Check rotor for face runout, thickness variation, deep scores, cracks, and broken ventilating ribs. Refer to Rotor Service for procedures.

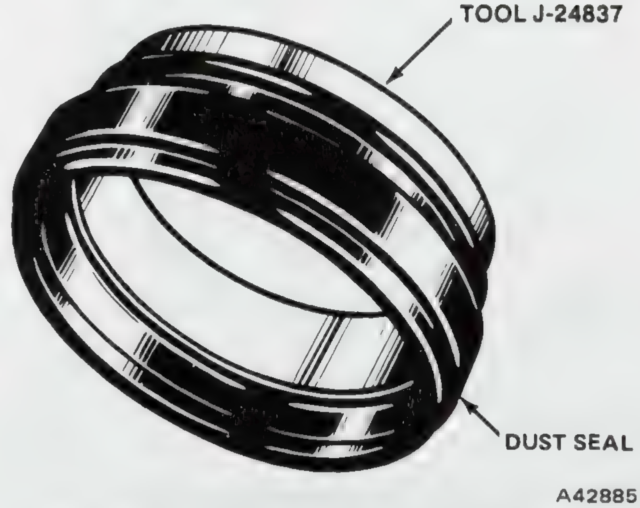


Fig. 2F-34 Mounting Dust Seal on Installer Tool

(10) Install brakeshoes and caliper as outlined under Brakeshoe Replacement and Caliper Installation.

(11) Install replacement washer on brake hose fitting and connect hose to caliper. Tighten fitting to 25 foot-pounds (33.9 Nm) torque.

(12) Fill master cylinder to within 1/4 inch (6.3 mm) of reservoir rims and bleed brakes as outlined under Brake Bleeding.

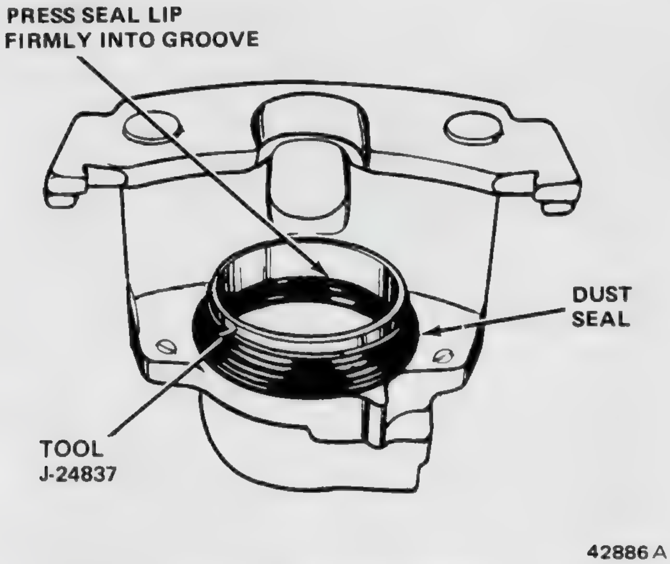


Fig. 2F-35 Dust Seal Installation

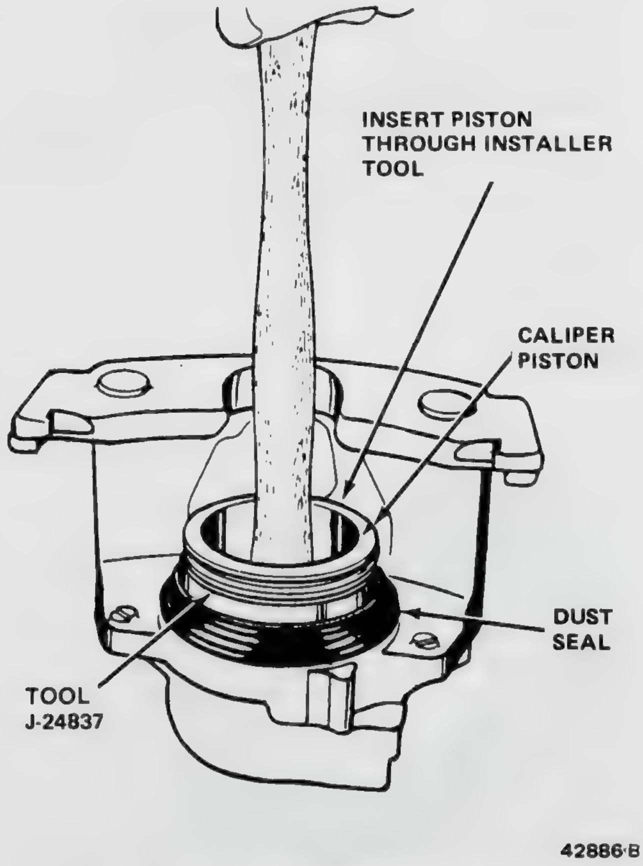


Fig. 2F-36 Caliper Piston Installation

(13) After bleeding, press brake pedal firmly several times to seat brakeshoes. Recheck master cylinder fluid level and correct if necessary.

(14) Install wheels and tighten retaining nuts to 75 foot-pounds (101.6 Nm) torque.

(15) Lower car.

CAUTION: *Check for a firm brake pedal and proper brake operation before moving the car.*

Piston and Seal Installation—Without Installer Tool

(1) Position dust seal on piston bore. Do not lubricate seal.

(2) Reach through top of seal and work large lip of seal into seal groove at top of piston bore. Be sure seal is completely seated in groove.

(3) Lubricate caliper piston and small lip of dust seal with brake fluid and position piston over seal lip.

(4) Hold piston in place on dust seal and direct reduced pressure compressed air into caliper brake fluid inlet port.

NOTE: *Reduce compressed air pressure to a maximum of 15 psi by closing air valve completely; then opening it approximately 1/4 to 1/2 turn.*

(5) As air pressure expands dust seal, carefully work caliper piston into dust seal until small lip of seal seats in caliper piston groove.

(6) When seal is seated in piston groove, release air pressure and press piston to bottom of bore using hammer handle.

(7) Check rotor for face runout, thickness variation, deep scores, cracks, and broken ventilating ribs. Refer to Rotor Service for procedures.

(8) Install brakeshoes and caliper as outlined under Brakeshoe Replacement and Caliper Installation.

(9) Install replacement washer on brake hose fitting and connect hose to caliper. Tighten hose fitting to 25 foot-pounds (33.9 Nm) torque.

(10) Fill master cylinder to within 1/4 inch (6.3 mm) of reservoir rim and bleed brakes as outlined under Brake Bleeding.

(11) After bleeding, press brake pedal firmly several times to seat brakeshoes. Recheck fluid level in master cylinder and correct if necessary.

(12) Install wheels and tighten retaining nuts to 75 foot-pounds (101.6 Nm) torque.

(13) Lower car.

CAUTION: *Check for a firm brake pedal and proper brake operation before moving the car.*

HUB AND ROTOR

The hub and rotor are cast as a single unit. The hub section contains the wheel bearings and wheel mounting studs. The rotor section is hollow cast, with integral cooling fins, and provides the contact surfaces against which the brakeshoes are applied. The integral hub and rotor are serviced as an assembly only. If either section is defective or seriously damaged, replace the entire assembly.

Rotor Service

Rotor service is extremely important because rotor tolerances must be accurate to ensure proper brake operation. Rotor service involves the following steps: inspection, measurement, refinishing, and replacement where indicated.

Inspection

(1) Raise car and remove wheels.

(2) If rotor braking services are heavily rusted or scaled, they must be cleaned before attempting inspection or measurement.

(a) Remove rotor and mount it in brake lathe.

(b) Clean surfaces using flat sanding discs while turning rotor in brake lathe.

(c) Reinstall rotor.

(3) Check braking surfaces for cracks, nicks, broken cooling fins, and scoring. Some scoring of surfaces may occur during norml use, however, scoring that is 0.009 inch (0.22 mm) deep or less is not detrimental to brake operation.

(4) Replace rotor if cracked or broken.

Rotor Measurement

(1) Tighten wheel bearing adjusting nut enough to remove all end play from wheel bearings

(2) Measure lateral (face) runout of rotor.

(3) Mount dial indicator on support stand or wheel spindle with indicator stylus contacting outboard surface one inch from outer edge of rotor (fig. 2F-37).

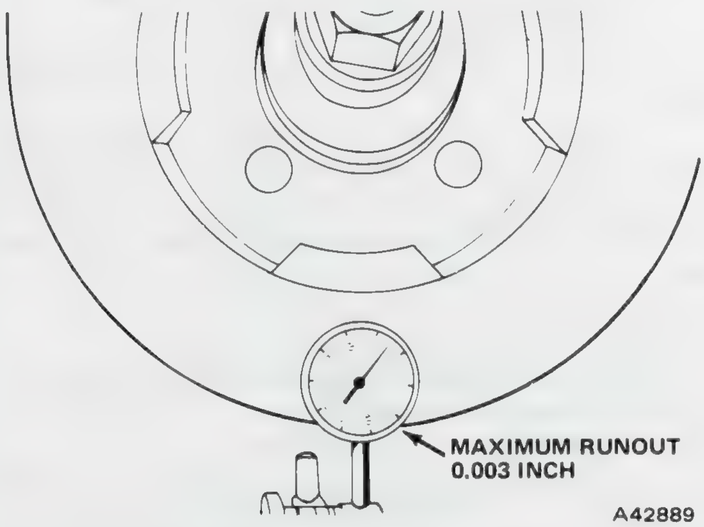


Fig. 2F-37 Checking Lateral Runout

(4) Turn rotor 360 degrees and note indicator reading.

(5) Lateral runout must not exceed 0.003 inch (0.07 mm). Lateral runout will cause rotor wobble, resulting in chatter, vibration, and pedal pulsation.

(6) If lateral runout exceeds tolerance, replace or refinish rotor.

(7) Measure thickness variation of rotor by measuring thickness at four or more equally spaced points around circumference of rotor (fig. 2F-38).

(8) Using micrometer or two dial indicators, measure thickness at four equally spaced points around rotor and one inch in from outer edge of rotor (fig. 2F-38).

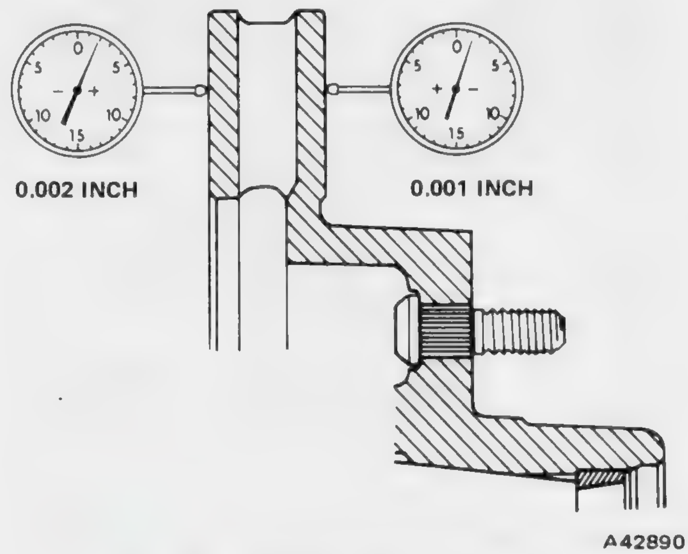


Fig. 2F-38 Checking Thickness Variation

(9) Thickness variation must not exceed 0.0005 inch (0.01 mm). Thickness variations can cause pedal pulsation and vibration when applying brakes.

(10) If thickness variation exceeds tolerance, replace or refinish rotor.

(11) Check hub-to-bore runout. Wheel mounting surface of hub must be square with centerline of bearing cup bore to within 0.010 inch (0.25 mm). Refer to figure 2F-39.

NOTE: *Although hub-to-bore runout does not affect brake operation or action, it can cause a mechanical-type vibration at high speed. Measure hub-to-bore runout only if the car has an unexplained high speed vibration or if there is exccesive lateral runout of the front wheels. Refer to Tire and Wheel Runout in Chapter 2G—Wheels and Tires.*

(12) Mount dial indicator on spindle with indicator stylus contacting wheel mounting surfaces of hub.

(13) Rotate hub and observe reading.

(14) Replace hub and rotor if runout exceeds tolerance.

NOTE: *If rotor braking surfaces are not scored or otherwise damaged and all measurements were within tolerace, rotor can be reused with no further servicing required.*

Rotor Refinishing

Resurface the rotor on a brake lathe using flat sanding discs only, if scoring is 0.009 inch deep (0.22 mm) or less, if rotor surfaces have heavy rust and scale, and only if the rotor meets all of the specifications outlined

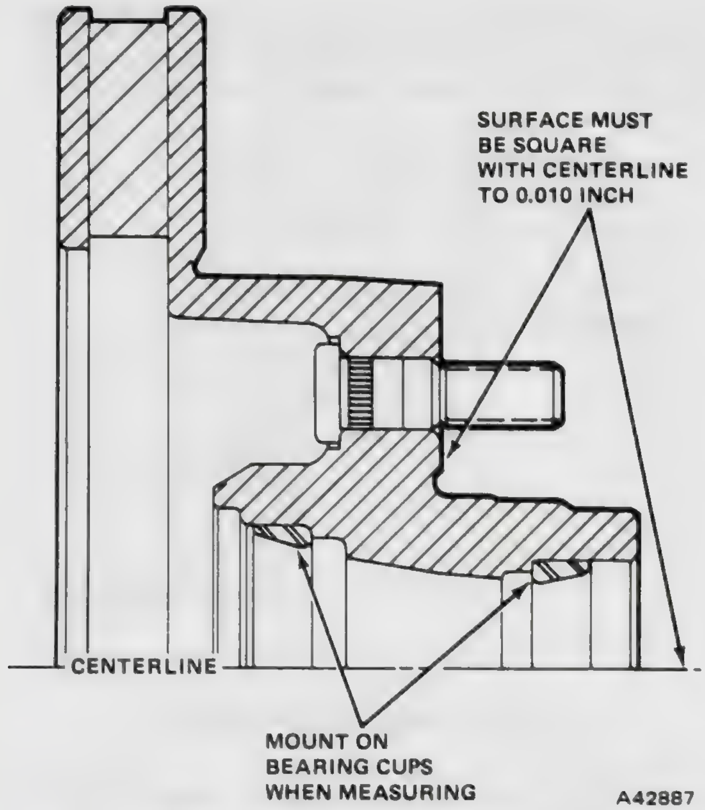


Fig. 2F-39 Checking Hub-to-Bore Runout

under Rotor Measurement. Be sure to follow the manufacturer's instructions when using the brake lathe. Rotor finish should be 15 to 80 micro inches and not be directional. After resurfacing the rotor in a disc brake lathe, flat sanding discs should be used as a final step in the refinishing procedure to provide the desired microfinish and crosshatch pattern on the rotor surface (fig. 2F-40).

Replace the rotor if refinishing will cause the rotor to fall below the minimum thickness specifications of 1.12 inches (28.44 mm) for Matadors, or 0.81 inches (20.57 mm) for Pacer, Gremlin, Concord, and AMX models.

Fig. 2F-40 Correct Surface Finish—Nondirectional Crosshatch Pattern

Rotor Replacement

Removal

(1) Remove hub cap and loosen wheel retaining nuts.

(2) Raise and support car.

(3) Remove front wheel.

(4) Remove caliper assembly but do not disconnect brake line unless caliper is to be removed for service. If caliper does not require servicing, suspend caliper from wire hook attached to front spring. Do not let brake hose support weight of caliper.

(5) Remove grease cap and O-ring seal, cotter pin, nut retainer, adjusting nut, and thrust washer from spindle. Discard cotter pin.

(6) Remove outer wheel bearing from hub.

(7) Remove hub and rotor from spindle.

(8) Remove grease seal from rotor and remove inner wheel bearing.

Installation

(1) Place small amount of wheel bearing grease in rotor hub cavity.

(2) Pack wheel bearings with wheel bearing grease.

(3) Install inner wheel bearing in rotor and install replacement grease seal using tool J-9348.

(4) Clean rotor braking surfaces if necessary.

(5) Install hub and rotor on spindle.

(6) Install outer bearing, thrust washer, and spindle nut.

(7) Adjust wheel bearing as outlined in Front Wheel Bearing Adjustment.

(8) Install nut retainer and replacement cotter pin.

(9) Clean grease cap and coat inside with wheel bearing grease. Do not fill cap.

(10) Install cap and O-ring seal.

(11) Install caliper assembly.

(12) Install wheel and tighten wheel retaining nuts to 75 foot-pounds (101.6 Nm) torque.

(13) Lower car and install hub cap.

SPECIFICATIONS

Disc Brake Specifications

Caliper Piston Diameter:	
Matador	3.1 inches (78.74 mm)
Pacer, Gremlin, AMX, Concord	2.6 inches (6.604 mm)
Rotor Diameter	10.82 inches (274.83 mm)
Rotor Hub-to-Bore Runout	0.010 inches (0.254 mm)
Rotor Lateral Runout	0.003 inches (0.076 mm)
Rotor Replacement Thickness:	
Matador	1.12 inches (28.45 mm)
Pacer, Gremlin, AMX, Concord	0.81 inches (20.57 mm)
Rotor Thickness:	
Matador	1.180 to 1.190 inches (29.972 to 30.227 mm)
Pacer, Gremlin, AMX, Concord	0.870 to 0.880 inches (22.098 to 22.352 mm)
Rotor Thickness Variation	0.0005 inches (0.013 mm)

70237A

Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

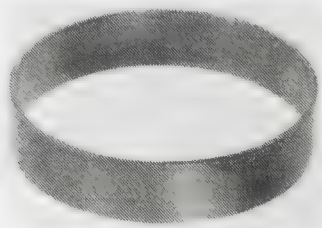
	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Caliper Anchor Plate Mounting Bolts	108	108-122	80	80-90
Caliber Anchor Plate and Adapter Bracket Bolts (01-40-60)	75	75-88	55	55-65
Caliper Support Key Retaining Screw	20	20-24	15	15-18
Caliper Brake Hose fitting:				
Pacer	11	11-13	100 in-lb	100-115 in-lb
Gremlin, Concord, AMX, Matador	34	34-38	25	25-28
Wheel-to-Hub Nut (Lug Nut)	102	102-122	75	75-90

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

70237B

Special Tools

J-9348
FRONT WHEEL
GREASE SEAL
INSTALLER



J-24837 (MATADOR) OR
J-26795 (PACER, GREMLIN,
AMX, CONCORD)
CALIPER PISTON
INSTALLER TOOL

70238

DRUM BRAKES

GENERAL

All models with six or eight-cylinder engines use 10-inch (25.4 cm) rear drum brakes. Four-cylinder Gremlins use 9-inch (22.8 cm) rear drum brakes.

Brake operation, wear compensation, assembly arrangement, and service procedures are basically the same for both size brake assemblies. Main differences are return spring, adjuster cable and rear axle seal position, and brakeshoe configuration. Ten inch brakeshoes require links to interconnect the shoe and wheel cylinder piston while nine inch brakeshoes do not.

Each brake unit consists of: a support plate, a primary and secondary brakeshoe, brakeshoe retaining pins and springs, return springs, a parking brake cable and linkage, automatic adjuster components, an adjuster screw assembly, a hydraulic wheel cylinder, and a brake drum (fig. 2F-41 and fig. 2F-42).

The brake components are mounted on the support plate which is bolted directly to the rear axle tube flange. An anchor pin mounted at the top of the support plate functions as the brakeshoe locating member and pivot point.

The primary brakeshoe is installed in the leading position facing the front of the car. The secondary brakeshoe is installed in the trailing position facing the rear of the car. The brakeshoes are identified by their respective lining thickness and length. The primary brakeshoe lining is thinner and slightly shorter than the secondary shoe lining. In addition, the primary shoe lining is grooved while the secondary shoe lining is not.

Each brakeshoe is attached to the support plate by a retaining pin, holddown spring, and pin retainers. The upper ends of the brakeshoes are fitted to the support plate pivot pin and are held in position by the primary and secondary return springs. The lower ends of the brakeshoes are interconnected by the adjuster screw assembly and spring (fig. 2F-41 and fig. 2F-42).

The parking brake cable and linkage and automatic adjuster components are mounted on the secondary brake shoe only.

OPERATION AND WEAR COMPENSATION

Operation

When the brakes are applied, fluid pressure developed in the master cylinder is transmitted to the wheel cylinders forcing the cylinder pistons outward. This motion is then transferred to the upper ends of the brakeshoes, by the pistons, causing the shoes to expand.

As the brakeshoes expand and contact the drum, they tend to rotate with the drum. This action causes the primary brakeshoe to pivot downward and away from the anchor pin and the secondary brakeshoe to pivot upward against the pin.

The primary brakeshoe, as it rotates with the drum and pivots downward, also exerts a rearward force on the adjuster screw assembly. Since the adjuster screw interconnects the lower ends of the brakeshoes, this additional force is transmitted directly to the secondary brakeshoe increasing its braking action. The additional force applied to the secondary brakeshoe accounts for the fact that the linings used on these shoes are generally thicker, and have more contact area.

When the brakes are released, the return springs overcome the diminishing fluid pressure and return the brakeshoes and wheel cylinder pistons to the neutral position.

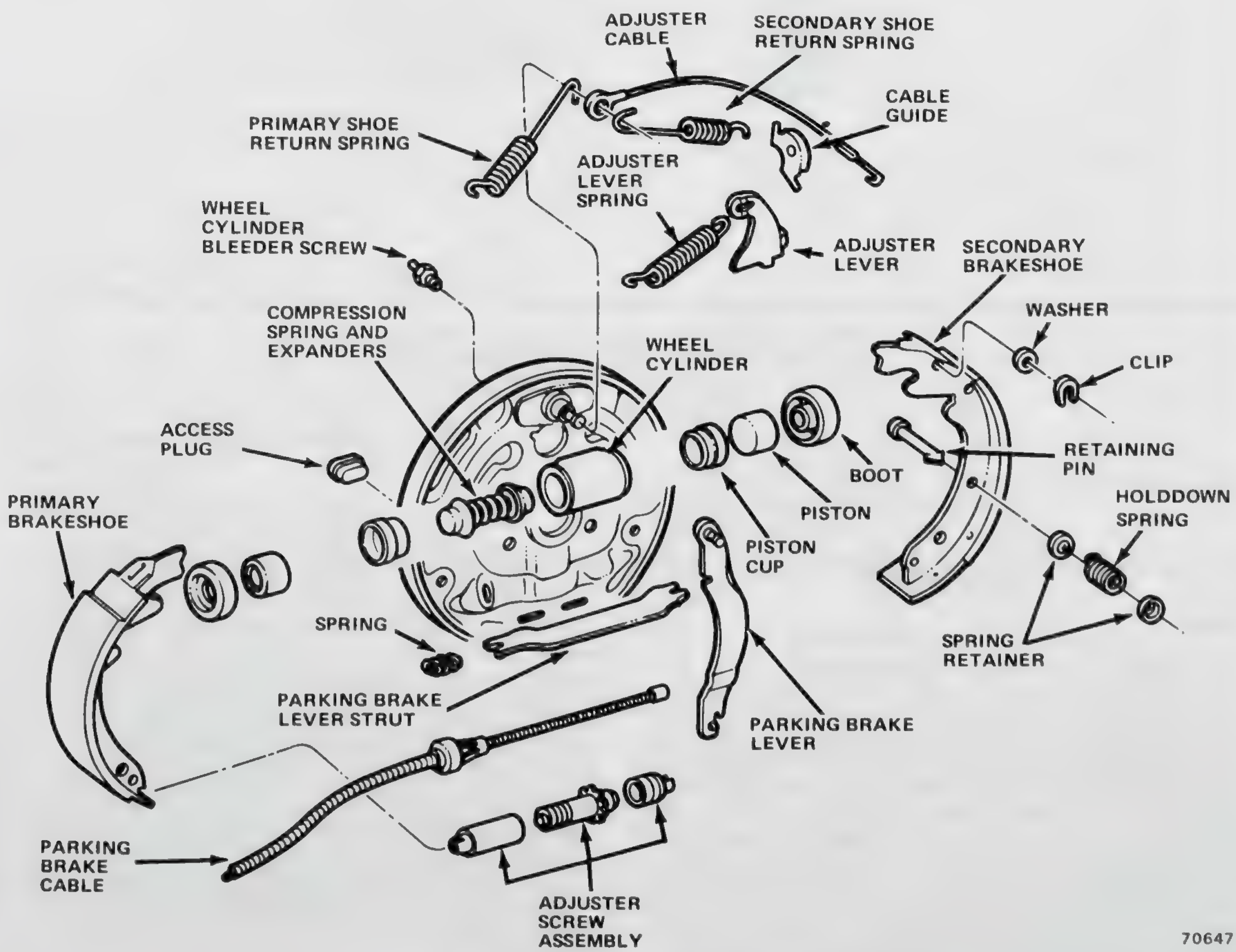


Fig. 2F-41 9-Inch Rear Drum Brake Assembly

During a reverse stop, the brakes operate in the same mode as for a forward stop. However, since the drum is rotating in the opposite direction, the secondary brakeshoe now functions, in effect, as the primary brakeshoe.

Parking Brake Mechanism

The parking brake lever is connected to the secondary brakeshoe. The lever is mounted on the back of the shoe and is connected to it by a pivot pin located in the upper end of the lever. The pivot pin is retained in the shoe by a washer and U-clip (fig. 2F-41 and fig. 2F-42). The parking brake cable is attached to the lower end of the lever. A strut, located below the lever pivot pin, connects the lever to the primary brakeshoe. The strut is notched at each end and is fitted into accomodating notches in the lever and primary brakeshoe. An oval-shaped spring, installed on the primary shoe end of the strut, is used to position the strut.

When the parking brake is applied, the cable pulls the lower end of the parking brake lever forward causing the connecting strut to push the primary brakeshoe forward also. At the same time, the upper end of the lever pushes the secondary brakeshoe rearward. The combined action of the lever and strut expands the brakeshoes forcing them against the drum to develop brake action.

Wear Compensation

The automatic adjuster mechanism maintains correct

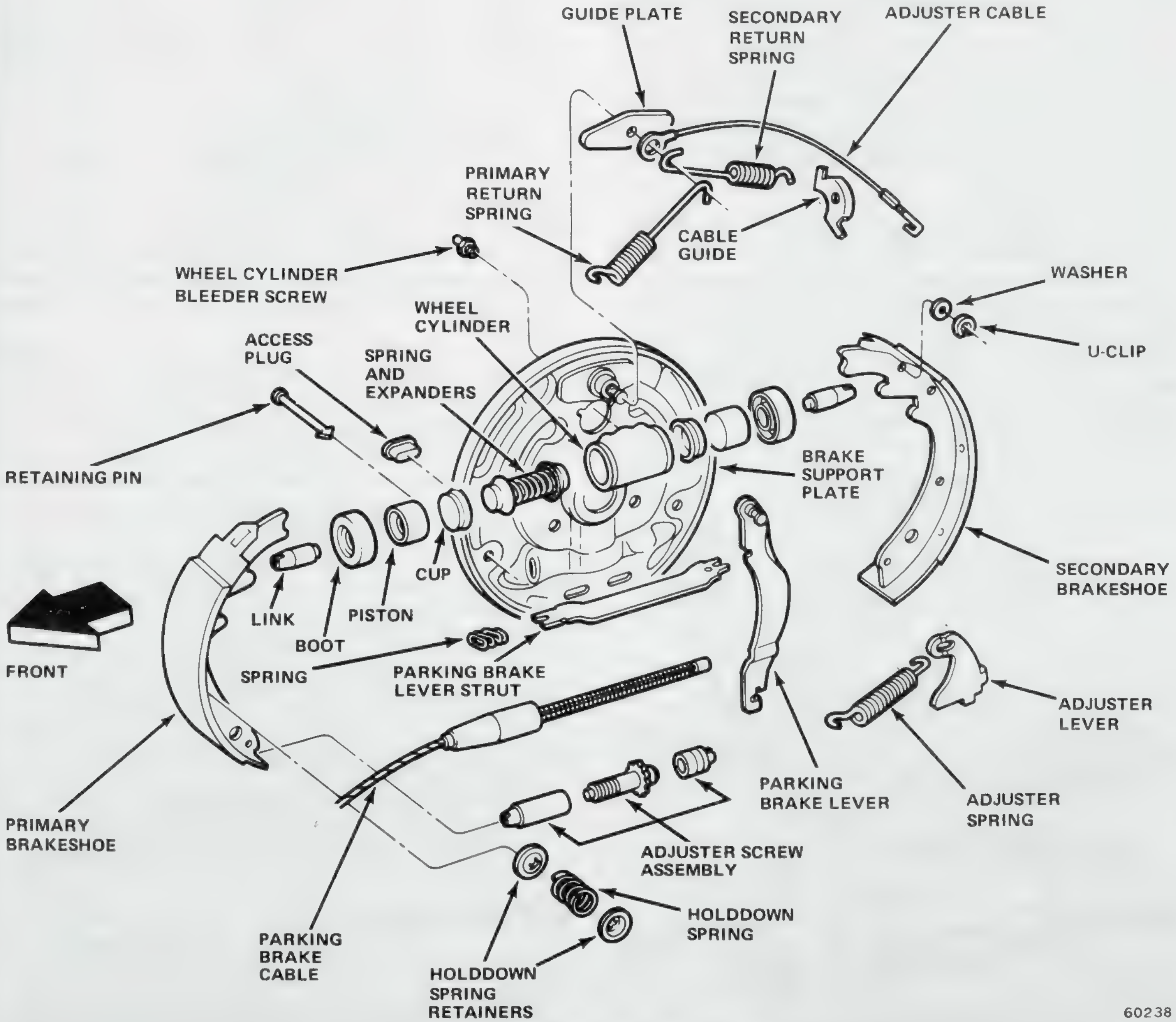


Fig. 2F-42 10-Inch Rear Drum Brake Assembly operating clearance between the brake lining and brake drum by adjusting the brakeshoes in direct proportion to lining wear. The adjuster mechanism is mounted on the secondary brakeshoe and is activated during reverse stops only. Adjustment occurs in small increments and prevents a gradual increase in brake pedal travel as the linings wear.

When the lining wears enough to require adjustment, the adjuster cable lifts the adjuster lever into engagement with the next tooth on the adjuster screw when the brakes are firmly applied in a reverse stop. When the brakes are released, the shoes return to the anchor pin.

The automatic adjuster lever is actuated by movement of the secondary brakeshoe during a reverse stop. This action will continue on subsequent reverse stops until the required lining-to-drum clearance is obtained. When brakeshoe movement is no longer sufficient to actuate the cable and adjuster lever, further adjustment will not occur.

The automatic adjuster mechanism consists of a steel cable with an eyelet on one end and a hook on the opposite end, a cable guide, adjuster lever, adjuster lever spring, and adjuster screw assembly (fig. 2F-43). The adjuster components are installed on the secondary brakeshoe only.

CAUTION: *The adjuster lever, adjuster screw assembly, and cable guide components are left-hand and right-hand parts and are not interchangeable. The left lever, stamped L, must be installed on the left assembly and the right lever, stamped R, installed on the right assembly. This also applies to the adjuster screw assemblies. Interchanging the adjuster screw assemblies would cause the brakeshoes shoes to retract rather than expand.*

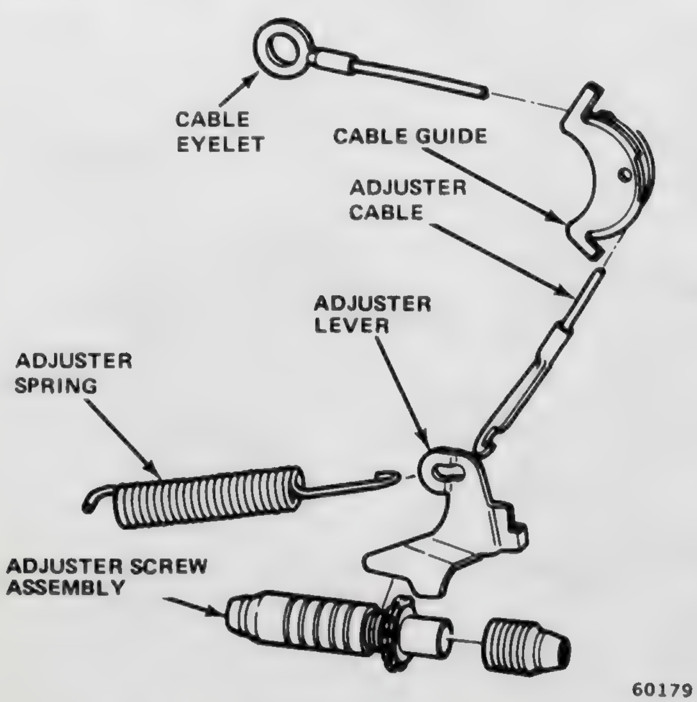


Fig. 2F-43 Automatic Adjuster Components

BRAKESHOE REPLACEMENT

WARNING: *When servicing wheel brake parts, do not create dust by grinding or sanding brakelinings or by cleaning brake parts with a dry brush or with compressed air. Use water dampened cloths only to remove dirt and dust from brake parts prior to disassembly. Many brake parts contain asbestos fibers which can become airborne if dust is created during service operations. Breathing dust containing asbestos fibers may cause serious bodily harm.*

Removal

NOTE: *It is not necessary to remove the rear axle shaft hubs to perform minor brake service. Remove the hubs only if the axle shaft oil seal or brake support plate must be removed. Refer to Hub Replacement in Chapter 2E.*

(1) Remove hub caps and loosen wheel retaining nuts.

(2) Raise and support car.

(3) Remove wheels and tires.

(4) Remove brakedrum retaining screws and remove drums.

NOTE: *If the brakedrums are difficult to remove, retract the brakeshoes. Remove the access plug at the rear of the support plate, unseat the automatic adjuster lever using a section of welding rod, and back off the adjuster screw.*

(5) Place Brake Cylinder Clamps J-8002 over wheel cylinder pistons.

(6) Remove U-clip and washer from parking brake lever pivot pin. Discard U-clip.

(7) On cars with 10-inch brakes, remove primary and secondary return springs from anchor pin using Brake Spring Pliers J-8057.

(8) On four-cylinder Gremlins with 9-inch brakes, remove secondary return spring, adjuster cable eyelet, and primary return spring from anchor pin. Use Brake Spring Pliers J-8057 to remove springs.

(9) Compress holddown springs and remove spring retainers, holddown springs, and retaining pins.

(10) On cars with 10-inch brakes, remove adjuster cable eyelet and guide plate from anchor pin.

(11) Remove brakeshoes.

(12) Remove return springs, cable guide, adjuster lever, and adjuster screw and spring from brakeshoes.

(13) Remove parking brake lever strut and spring.

Cleaning and Inspection

Cleaning

Clean all parts except the brake lining and brakedrums with brake cleaning solvent. For brake fluid contamination, clean all parts except the brakelining with denatured alcohol. Do not attempt to clean contaminated brakelining. Contaminated brake lining must be replaced. Final cleaning of brakedrums must be performed using a soap and water solution only .

Inspection

Pull back the wheel cylinder dust boots and check for evidence of leakage. If evidence of leakage is noted, the cylinder should be disassembled, inspected, and overhauled. Refer to the procedure outlined under Wheel Cylinder.

Polish the brake support plate ledges with fine emery cloth and inspect them for deep grooves that could restrict shoe movement. If grooves exist after polishing, the brake support plate must be replaced. Any attempt to remove the grooves by grinding may result in improper brakeshoe-to-drum contact.

Inspect the lining wear pattern. If wear across the width of the lining is uneven, the drums should be checked for distortion (e.g. flared, bellmouthed, barrel shaped), the shoes for correct positioning, and the support plate for distortion. Inspect all springs for evidence of overheating (discoloration) and fractures. The self-adjusting cables should be inspected for kinks, fraying, or elongation of the eyelet.

Inspect the adjuster screws for freedom of rotation. Also inspect the adjuster lever for wear and distortion. Replace any brake parts that are worn or damaged.

Installation

CAUTION: *When it is necessary to replace the brakeshoes and linings on one wheel, the shoes and linings must be replaced on the opposite side wheel to maintain proper braking balance.*

(1) Lubricate following parts with molydisulphide grease:

- Support plate ledges.
- Anchor pins.
- Adjuster cable guides.
- Adjuster screw and pivot.
- Parking brake lever and lever pivot pin.

(2) Remove retaining clamps from wheel cylinder pistons.

(3) Install parking brake lever on back of secondary brakeshoe, position shoe on support plate, and install retaining pin, retainers, and holddown spring.

(4) Install washer and replacement U-clip on parking brake lever pivot pin. Crimp ends of clip using pliers to retain it.

(5) Install spring on parking brake lever strut and position strut in parking brake lever.

(6) Position primary brakeshoe on support plate and install retaining pin, spring retainers, and holddown spring. Be sure parking brake lever strut engages in notches in lever and brakeshoe.

NOTE: *Different holddown spring retainers are used on 9 and 10-inch brakes. If replacement retainers are installed, be sure they are the correct type. Ten inch brake retainers have an identifying notch in the retainer flange. The correct retainers must be installed to maintain required holddown spring pressure.*

(7) On cars with 10-inch brakes, install guide plate on anchor pin and install adjuster cable eyelet on anchor pin (fig. 2F-44).

(8) On four-cylinder Gremlins with 9-inch brakes, first install primary return spring on brakeshoe and anchor pin; then install adjuster cable eyelet on anchor pin (fig. 2F-45). Install cable guide on secondary shoe and install secondary return spring on brakeshoe and anchor pin.

NOTE: *On 9-inch brakes, be sure the brakeshoe tangs are properly seated in the wheel cylinder pistons before installing the return springs.*

(9) On cars with 10-inch brakes, install primary return spring on brakeshoe and anchor pin. Install cable guide on secondary shoe and install secondary return spring on brakeshoe and anchor pin.

NOTE: *Be sure the brakeshoe-to-wheel cylinder interconnecting links are properly seated in the shoes and pistons before installing the return springs.*

(10) Install adjuster screw assembly.

(11) Install adjuster spring. Insert small hooked end of spring in large hole in primary shoe and insert large hooked end of spring in adjuster lever.

(12) Insert hooked end of adjuster cable in adjuster lever and install cable on cable guide.

(13) Install adjuster lever tang in large hole at bottom of secondary brakeshoe.

(14) Adjust brakes as outlined under Service Brake Adjustment.

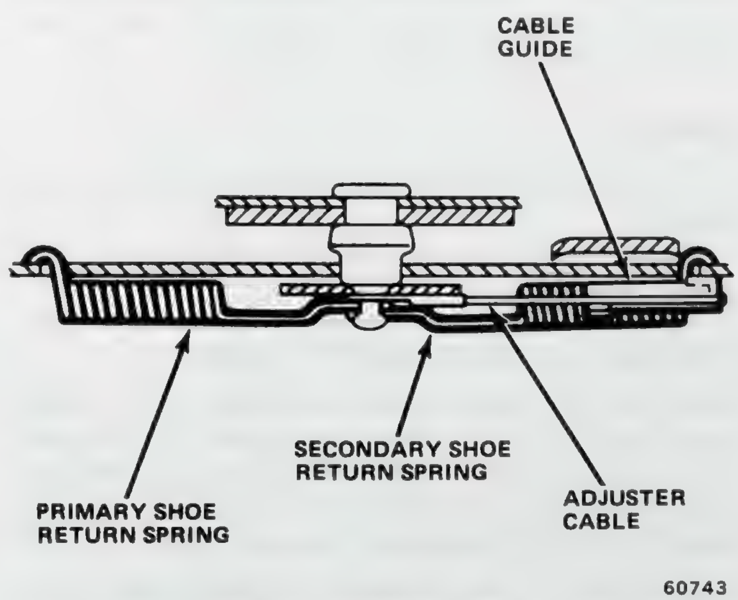


Fig. 2F-44 Adjuster Cable and Return Spring Installation—10-Inch Brake

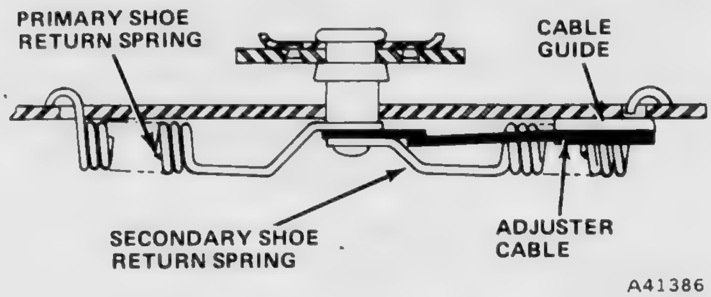


Fig. 2F-45 Adjuster Cable and Return Spring Installation—9-Inch Brake

BRAKE SUPPORT PLATE

Replace the brake support plate if it is warped, bent, or deeply grooved on the ledges. Do not attempt to reduce ridges or grooves on the support plate ledges by grinding.

Removal

(1) Raise and support car.

(2) Remove wheel and brakedrum. Refer to Brakeshoe replacement in this section.

(3) Remove axle shaft hub. Refer to Axle Hub Replacement in Chapter 2E.

(4) Remove brakeshoes. Refer to Brakeshoe Replacement in this section.

(5) Disconnect brake line and remove wheel cylinder.

(6) Compress parking brake cable lock tabs using hose clamp and pull cable out of support plate.

(7) Remove support plate attaching bolts and remove support plate and axle shaft end play shims if left side support plate is being removed.

CAUTION: *The axle shaft end play shims are located between the left side support plate and axle tube flange. Take care to avoid damaging or losing these shims when removing the support plate.*

Installation

(1) Clean axle flange and support plate mounting surfaces.

(2) Apply thin coat of silicone sealer to axle tube flange.

(3) Install axle shaft end play shims on axle tube flange if left side support plate was replaced.

CAUTION: *On four-cylinder Gremlins with 9-inch brakes, the axle shaft oil seal and retainer is installed between the axle tube flange and support plate. On cars with 10-inch brakes, the oil seal retainer is installed on the axle hub-side of the support support plate.*

(4) Mount support plate on axle flange and install attaching bolts. Tighten bolts to 32 foot-pounds (43.3 Nm) torque.

(5) Connect brake line to wheel cylinder and mount cylinder on support plate. Install and tighten wheel cylinder attaching bolts to 90 inch-pounds (10.1 Nm) torque.

(6) Lubricate support plate ledges with molydisulphide grease.

(7) Install brakeshoes. Refer to Brakeshoe Replacement in this section.

(8) Install axle hub and brakedrum. Refer to Axle Hub Replacement in Chapter 2E.

(9) Bleed rear brake hydraulic system. Refer to Brake Bleeding in this chapter.

(10) Install wheel and lower car. Tighten wheel retaining nuts to 75 foot-pounds (101.6 Nm) torque.

BRAKEDRUM SERVICE

Use alcohol to remove grease, brake fluid, and similar contaminants from the brakedrums. However, final cleaning of the drums must be performed using a soap and water solution only.

Inspect the drums for cracks, heat checking, and distortion. Mount the drum on a brake lathe and check runout of the braking surface using a dial indicator. Maximum radial runout should not exceed 0.007 inch (0.17 mm) total indicator reading at any point.

Measure the inside diameter of the drum. On 10-inch drums, maximum diameter is 10.060 inches (25.55 cm). On 9-inch drums, maximum diameter is 9.060 inches (23.01 cm). If the drum diameter exceeds the specified dimension, the drum must be replaced.

CAUTION: *The 10-inch brakedrums used on some models are not interchangeable. Drums used on AMX, Concord, and Matador models with eight-cylinder engine and 8-7/8 axle are not interchangeable with those used on Pacers, Gremlins, and Concords with six-cylinder engine and 7-9/16 axle. If drum replacement is necessary, install the drum specified for that particular model only.*

If the braking surface of the drum is only slightly rough, scored, or out of round and the car is no longer within warranty, the drum may be refinished using a brakedrum lathe. Do not attempt to machine the drum if the specified maximum diameter will be exceeded.

When making a finish cut on a drum, use a slow feed and the fastest lathe speed to produce the correct surface finish. Do not attempt to refinish a drum that has hard spots in it. Drums with hard spots should be replaced.

SPECIFICATIONS

Brake Specifications

Maximum Brake Drum Diameter (10-inch)	10.060 inches (25.55 cm)
Maximum Brake Drum Diameter (9-inch)	9.060 inches (23.12 cm)
Maximum Brake Drum Runout	0.007 inches (0.178 mm)

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Torque Specifications

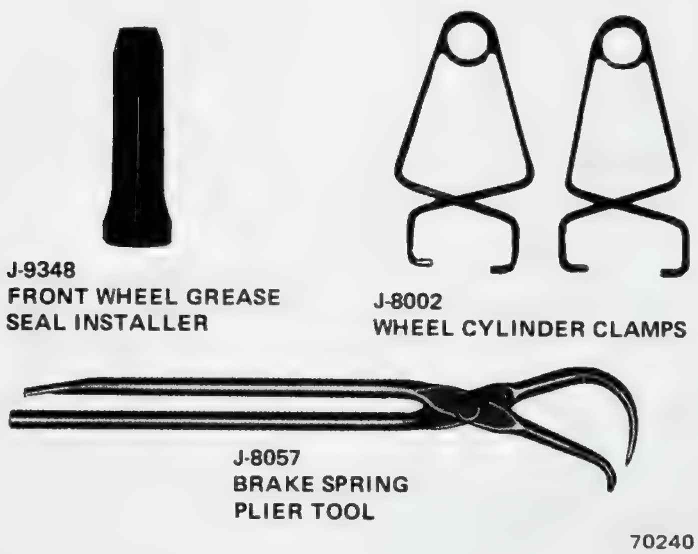
Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Brake Line-to-Wheel Cylinder fitting	11	11-13	97 in-lb	97-115 in-lb
Brake Support Plate Mounting Bolts	43	43-54	32	32-40
Wheel Cylinder Mounting Bolts	10	10-13	90 in-lb	90-120 in-lb
Wheel-to-Hub Nuts (Lug Nuts	102	102-122	75	75-90

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

70239B

Special Tools



NOTES

WHEELS AND TIRES 2G

SECTION INDEX

GENERAL

AMC cars are equipped with tubeless-type pneumatic tires that have a load-range B rating. The standard equipment tires are of bias-ply construction. Radial-ply tires are available as an option on all models.

The standard equipment wheel is a safety rim, drop center-type constructed entirely of steel. Forged aluminum wheels along with slotted and urethane styled steel wheels are available as an option on all models.

Original equipment wheels and tires are tested and selected to provide the best all around performance for normal operation. To obtain optimum performance, tire inflation pressures should be maintained at recommended levels and wheel and tire condition should be checked regularly.

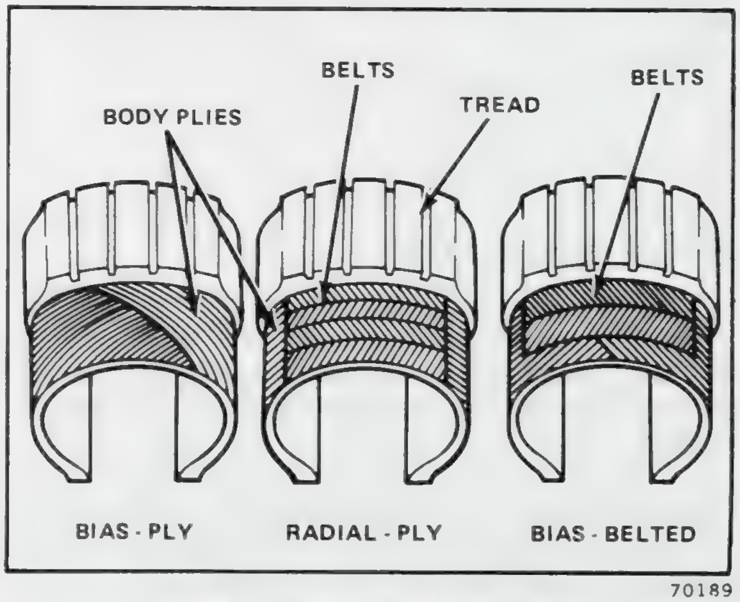


Fig. 2G-1 Types of Tire Construction

TIRE CONSTRUCTION

Three types of tire construction are currently in use. They are referred to as: bias-ply, bias-belted and radial-ply construction. The description for each construction-type is derived from the method used to position the tire body cord plies in relation to the centerline of the tread.

Bias-Ply Construction

Bias-ply tires are constructed with the body cord plies extending from bead-to-bead at an angle to the centerline of the tread (fig. 2G-1). Alternate plies overlap one another at opposing angles.

Bias-Belted Construction

Bias-belted tires are constructed basically the same as bias-ply tires. However, in addition to the angled body cord plies, they also have belts that encircle the tire. These belts are located under the tire tread and extend from tread shoulder to tread shoulder (fig. 2G-1).

Radial-Ply Construction

Radial-ply tires, like bias-belted tires, also have belts under the tread which encircle the tire and extend from tread shoulder to tread shoulder. However, these tires are constructed with the body cord plies at right angles to the centerline of the tread. The plies cross the tread centerline at an angle of approximately 90 degrees (fig. 2G-1). Because the body cord plies radiate from the tread centerline, this type of construction is designated radial-ply.

Identifying Tire Types

Radial-ply tires are readily identified by the code letter R which appears in the size description imprinted on the tire sidewall. Bias-ply and bias-belted tires do not have such a code letter. For example, DR78x14 for radial tires as compared to D78x14 for similar size bias-ply or bias-belted tires.

NOTE: *Because of their unique construction, radial-ply tires have a highly flexible sidewall. This flexibility is responsible for the characteristic sidewall "bulge" which makes the tire appear underinflated. This is a normal condition for radial-ply tires. Do not attempt to reduce this "bulge" by overinflating the tire. The only way to be sure a tire is properly inflated is to use an accurate and reliable tire pressure gauge. Check and adjust inflation pressures in accordance with the information provided in the Tire Inflation Pressure Charts which appear at the end of this chapter.*

TIRE SIZE AND LOAD RATING

Tire sizes and load ratings are indicated in the combination of numbers and letters imprinted on the tire sidewall such as H78-14 load-range B, or 6.95x14 load-range B.

The load range rating replaces the ply-rating system formerly used to denote tire load capacity. Original equipment tires on AMC cars have a load-range B rating.

Conventional size tires are identified with numbers only such as 6.95x14. The newer tire sizes which are based on tire profile ratio use letter/number combinations such as D78x14. For example, the letter D represents American Tire Industry specifications for the load and inflation schedule for tires in that particular letter classification. The number 78 indicates tire size as determined by the ratio of tire height to width. Height divided by width equals the size or profile ratio. In this case, a D78 tire is 78 percent as high as it is wide. This applies to all the various series profiles (fig. 2G-2). The number 14 denotes the bead diameter of the tire and the wheel size required.

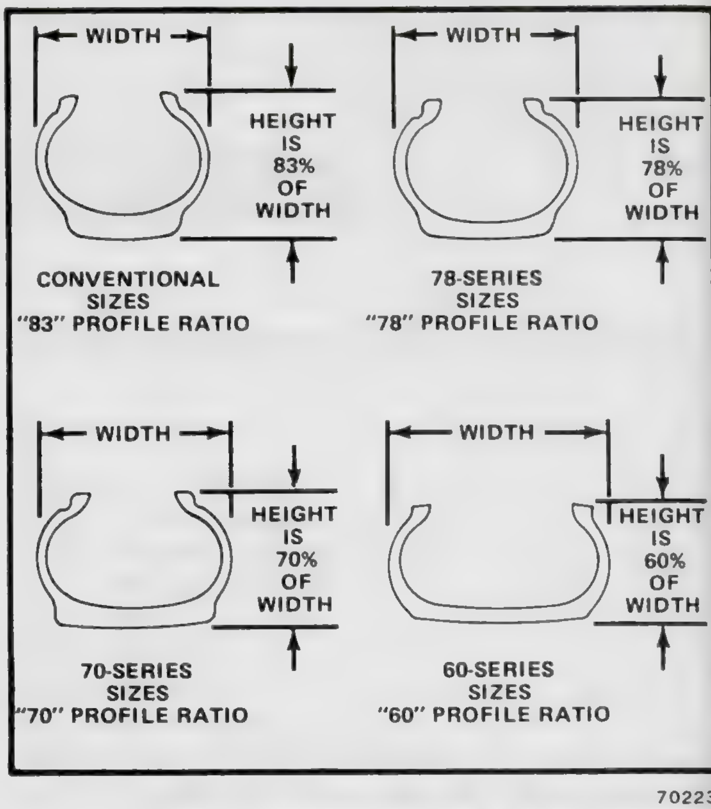


Fig. 2G-2 Tire Size and Profile Ratio

TIRE INFLATION PRESSURE AND CAPACITY

The original equipment load-range B tires are designed, tested and selected for their ability to meet normal operating requirements within capacity. The recommended vehicle load capacities and tire inflation pressures for full or reduced load operation are listed in the Tire Inflation Pressure Charts which appear at the end of this chapter. This information is also provided in the owners manual and on a label attached to the inside surface of the glove box door.

Tire inflation pressures are selected to be compatible with the ride and handling characteristics desired. If a softer ride is preferred, the driver may use the reduced load inflation pressures but must not exceed the reduced load vehicle capacity or 55 mph.

When sustained high-speed operation is anticipated, inflate the tires to the recommended full-load pressures plus an additional 4 psi but do not exceed 32 psi total pressure. This is the maximum recommended inflation pressure for load-range B tires.

Tire inflation pressures should be checked and adjusted to recommended levels on at least a monthly basis. This is especially important when extreme changes of 20 degrees or more in average seasonal temperatures occur.

Check and adjust tire inflation pressures only when the tires are cold, or driven for less than 2 miles at speeds below 40 mph and after the car has been parked for 3 hours or more.

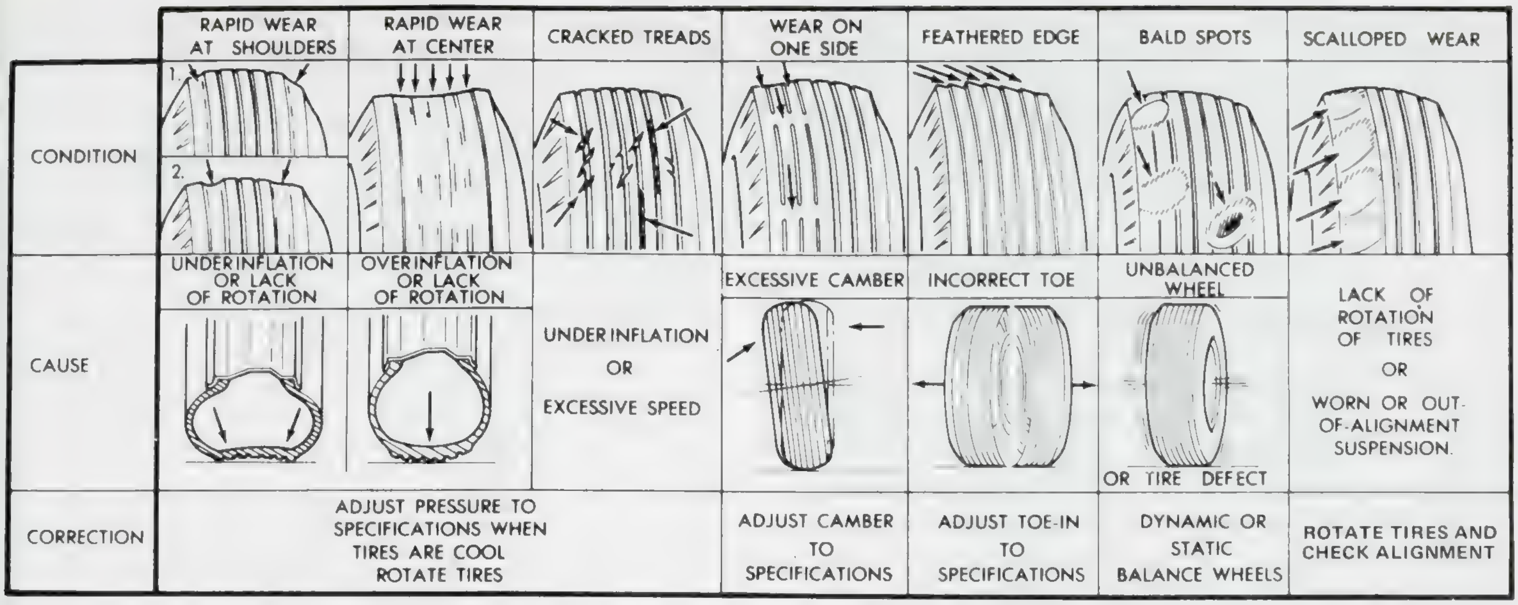


Fig. 2G-3 Tire Wear Patterns

Do not reduce inflation pressures if the tires are hot, or driven over 2 miles at speeds above 40 mph as pressures can increase as much as 6 psi over cold inflation pressures.

ABNORMAL TIRE WEAR

Abnormal tire wear may be caused by incorrect tire inflation pressures, tire-wheel unbalance, worn suspension components, improper brake operation or adjustment, bent wheels, front suspension misalignment and excessive speed on turns.

Inspection of the tire wear pattern will, in most cases, reveal the cause of abnormal wear. The various types of tire wear patterns and necessary corrective action are illustrated in figure 2G-3.

Rapid wear of the tread shoulders may be caused by tire underinflation or lack of rotation or a combination of both. If this type of wear is observed and the tires are serviceable, rotate the tires and inflate them to recommended pressures when they are cool.

Rapid wear at the tread center may be caused by overinflation or lack of rotation or a combination of both. If this type of wear is observed and the tires are serviceable, rotate the tires and inflate them to recommended pressures when they are cool.

Cracked tire treads are caused by underinflation, or excessive and sustained high speeds, or a combination of both. Tires with cracked treads should be replaced and the replacement tires properly maintained to avoid a reoccurence.

Excessive wear on one tread shoulder may be caused by excessive speed on turns or by an incorrect camber adjustment. Incorrect negative camber will wear the inboard tire shoulder while incorrect positive camber will wear the outboard shoulder. If this type of wear occurs, check and adjust camber as required. Or, if camber is within specifications, caution the owner about excessive speed on turns. If the tires are serviceable, rotate them and check and adjust inflation pressures when the tires are cool.

Incorrect toe-in will cause the tire tread surface to develop a feathered edge. One side of the tread will be rounded while the opposite side develops a sharp feathered edge. This type of wear indicates that the tire is side slipping and scuffing as it travels over the road surface. A feathered edge that faces the car is caused by excessive toe-in. A feathered that faces away from the car is caused by excessive toe-out. The direction in which a feathered edge has developed can be determined by slowly passing a hand over the tread surface of the tire. Bent steering arms will also cause this type of wear. If a feathered edge develops, check and correct toe-in as necessary and rotate the tires if they are serviceable.

Bald spots, scalloping, or cupping of the tire treads may be caused by wheel/tire unbalance, lack of rotation, worn or loose steering/suspension components, or front suspension misalignment. If the tires develop these types of wear, first check for loose or worn steering/suspension components. Then check and correct wheel/tire imbalance as required. Finally, if all other components are determined to be in good condition, check and correct the front suspension alignment. If the tires are serviceable, rotate them and adjust inflation pressures when they are cool.

Bias-Belted Wide Tread Tire Wear

Bias-belted wide tread tires have an initial wear characteristic that is unique to this type of tire only. It occurs in the form of a fairly rapid but even wear of the second and sixth tread ribs (fig. 2G-4). Wear may occur at only one of the ribs or at both ribs simultaneously. In some cases, a slight cupping of the tread ribs may also develop in addition to wear. Although the tread rib wear develops rapidly, the degree of wear is relatively light.

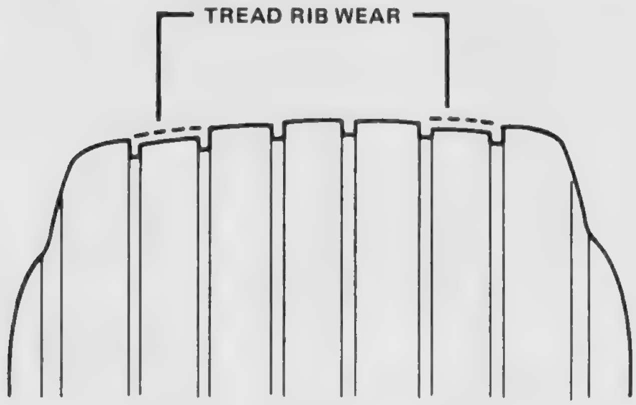


Fig. 2G-4 Wide Tread Bias-Belted Tire Wear

This wear characteristic is a normal condition with wide tread bias-belted tires and is related to the tread deflection properties of these tires. When the tread is pressed against the road surface, all tread ribs do not support equal portions of weight. The outer and center ribs support the most weight while the second and sixth ribs support the least. Because of the lighter load on the second and sixth ribs, they are able to deflect more and tend to slip and scrub slightly as the tire rotates. This slip and scrubbing action causes more wear on these tread ribs.

Wear of the second and sixth tread ribs cannot be reduced by over or under inflating the tires. Maximum benefit in minimizing this wear will be obtained only by adhering to the specifications recommended for tire inflation pressures, tire rotation, and front suspension alignment.

TIRE MAINTENANCE AND CONDITION

To maximize tire performance, inspect them frequently for signs of improper inflation and uneven wear, which may indicate a need for balancing, rotation, or front suspension alignment. Tires should also be checked frequently for cuts, stone bruises, abrasions, blisters and for objects that may have become imbedded in the tread. Five-thousand mile or monthly inspection intervals are recommended as minimum. More frequent inspections are recommended when rapid or extreme temperature changes occur or where road surfaces are rough or occasionally littered with debris.

As a further visible check of tire condition, tread wear indicators are molded into the bottom of the tread grooves. These indicators appear in the form of 1/2-inch wide bands across the tread when it has worn to a thickness of 1/16 (fig. 2G-5). The tire should be replaced when these indicator bands become visible.

A number of states have statutes concerning minimum permissable tread depths and use these indicators as the tire wear limit.

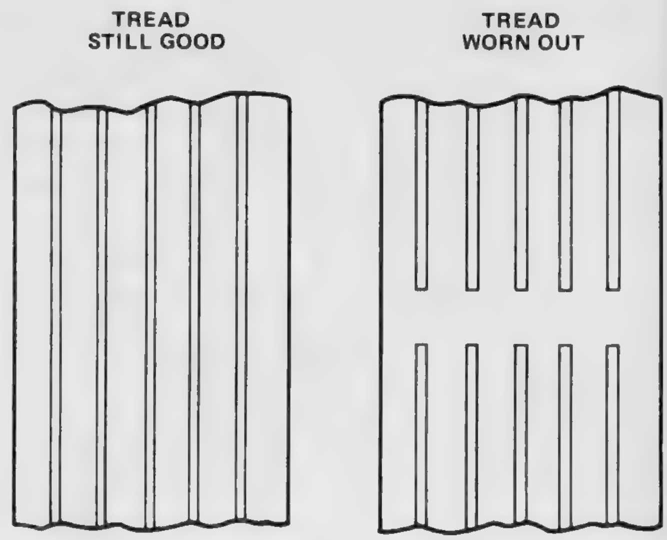


Fig. 2G-5 Tread Wear Indicators

To clean tires, use a mild soap and water solution only and rinse thoroughly with clear water. Do not use any caustic solutions or abrasive materials. To clean white sidewalls and raised letters and numbers, use an approved whitewall cleaner only. Do not use steel wool, wire brushes, or gasoline, paint thinner and similar materials having a mineral oil base. These materials are harmful to the tires and will discolor the whitewalls and raised letters.

TIRE REPAIR

Punctured tires should be removed from the wheel and permanently repaired from the inside using a combination repair plug and vulcanized patch. When repairing a puncture, always follow the manufacturers instructions for installation of the repair kit.

Punctures in the tread area only are repairable (fig. 2G-6). Never attempt to repair punctures in the tire shoulders or sidewalls. In addition, do not repair any tire that has sustained the following damage:

- Bulges or blisters
- Ply separation
- Broken or cracked beads
- Fabric cracks or cuts
- Tires worn to the fabric, or if wear indicators are visible
- Punctures larger than 1/4-inch in diameter

Externally applied repair plugs, blowout patches and aerosol-type sealants should be considered only as an emergency-type repair. Tires repaired in this fashion should not be driven over 40 m.p.h. or for more than a distance of 75 miles before permanent repair is made.

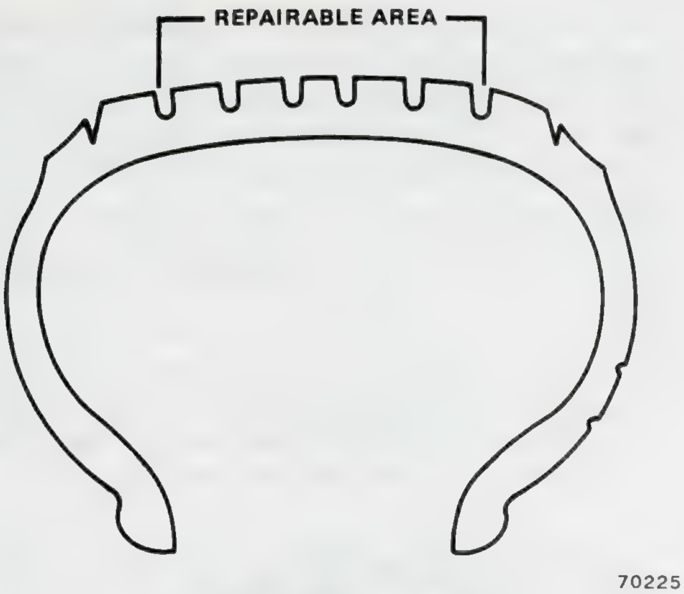


Fig. 2G-6 Tire Repair Area

TIRE ROTATION

To equalize tire wear, it is recommended that the tires be rotated every 5,000 miles (fig. 2G-7). The first rotation is by far the most important in setting the stage for long, even tread wear. Earlier and more frequent rotations may be desirable under certain conditions.

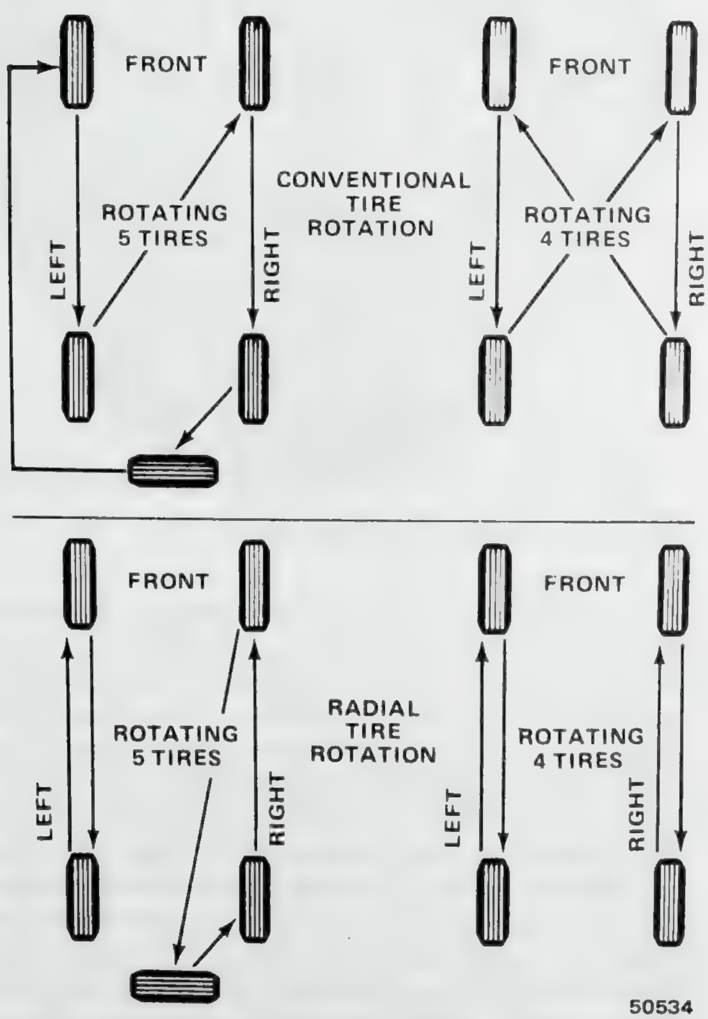


Fig. 2G-7 Tire Rotation

After rotation, adjust inflation pressures to the levels recommended in the Tire Inflation Pressure Charts.

Radial-ply and conventional bias-ply or bias-belted tires are not rotated the same way. Conventional tires are rotated in a crossing pattern. Radial tires are rotated on the same side front-to-rear (fig. 2G-7).

WIDE TREAD AND RADIAL-PLY TIRES

These types of tires must be installed in complete sets only.

Wide tread tires should be installed only when there is adequate clearance for the tire in the wheelwell. Refer to the Tire Inflation Pressure Charts at the end of this chapter for maximum sizes allowable for each model.

Radial ply tires must never be mixed with conventional bias-ply or bias-belted tires on any car. An emergency-type spare tire may be used on cars equipped with radial tires. However, its use must be limited to the duration of the emergency situation only.

If a car is equipped with radial-ply tires and snow tires are desired, the snow tires must also be of the radial-ply type. In addition, radial-ply snow tires must never be used if conventional bias-ply or bias-belted tires are already mounted on the front wheels. If the car is equipped with conventional tires and snow tires are desired, they also must be conventional tires.

Matador models with factory installed radial-ply tires are equipped with a vibration damper assembly to prevent audible-type vibrations. The assembly consists of two weights suspended from brackets attached to the floorpan tunnel. The weights are located at the approximate center of the tunnel and are positioned on each side of the propeller shaft (fig. 2G-8).

SNOW TIRES

Snow tires should be operated at full-load inflation pressures. If additional stability is desired, snow tires may be inflated to 4 psi over the recommended inflation pressure as long as a total of 32 psi is not exceeded.

COLLAPSIBLE SPARE TIRE

Do not rotate the collapsible spare tire. This tire has a tread life of approximately 2000 miles under normal use and must be used for emergencies only.

WARNING: *Do not inflate the collapsible spare tire until it has been installed on the car.*

When it is necessary to use this tire, always install the tire on the car before inflating it. Avoid speeds above 50 mph and distances over 150 miles for each installation. This is especially true when the car is equipped with the optional Twin-Grip axle.

When inflating the tire, follow the inflation instructions provided on the inflator bottle explicitly.

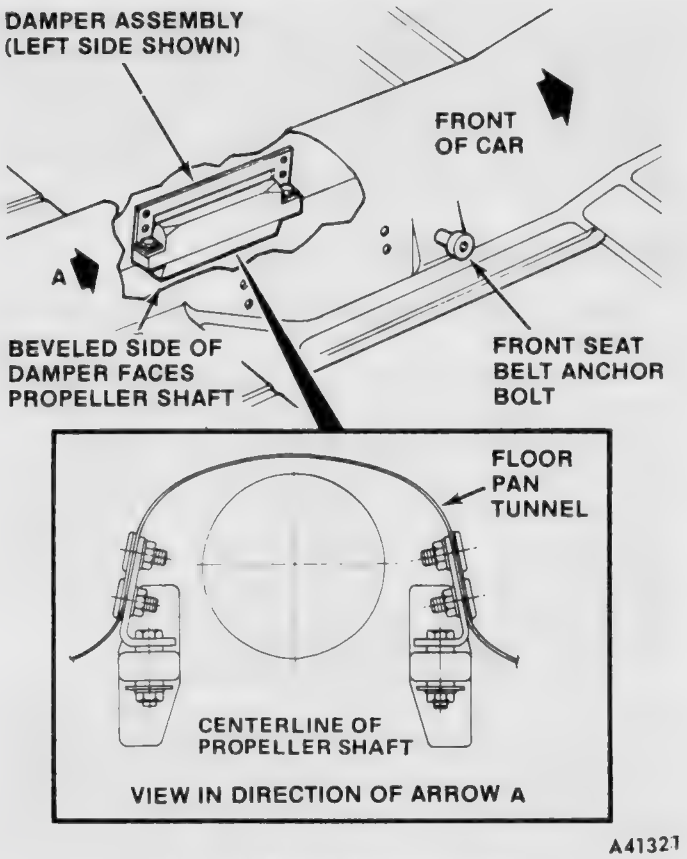


Fig. 2G-8 Vibration Damper—Matador

WARNING: *Collapsible spare tires must never be inflated using full shop line air pressure nor are they to be inflated when off the car. Inflate these tires to a maximum of 28 psi using the inflator bottle or greatly reduced shop line air pressure only. Failure to observe these precautions could result in personal injury and extensive damage to the tire.*

To stow the tire after use, remove the valve core and allow the tire to deflate. When fully deflated, install the valve core and cap and mount the tire in its compartment.

Replace the inflator bottle promptly after each use. The bottles are not rechargeable after using them.

CAUTION: *Use an AMC inflator bottle or equivalent only. Approved inflation gases are air, carbon dioxide, nitrogen, and Freon 22. The collapsible spare tire is warranted by the tire manufacturer as are all original equipment tires. However, the warranty is void if any inflator bottle containing sealants is used.*

COMPACT SPARE TIRE

WARNING: *The compact spare tire is designed for emergency use only. When the tire is used, do not exceed 50 mph or travel more than 50 continous miles. This is especially important if the car is equipped with a Twin-Grip rear axle.*

The compact spare tire is a unique narrow-profile spare tire (fig. 2G-9). It is designed to operate at higher inflation pressures (60 psi) and is mounted on a special wheel. The tire is air-inflated using standard inflation equipment. Special inflation methods are not required.

NOTE: *Inflation pressure for the compact spare tire is 60 psi. To maintain tire efficiency, inflation pressure should be checked regularly and maintained at the specified level.*

Do not rotate the compact spare. The tire has a tread life of approximately 2000 miles under normal use. Also, do not attempt to install standard size tires on the special wheel used with the compact spare.

Fig. 2G-9 Compact Spare Tire

The compact spare tire is used the same as a conventional spare. It is ready for use as is and should not require additional inflation if pressure has been maintained at the specified level. Do not attempt to install a wheel cover on this tire. Wheel covers do not fit the special wheel used with the compact spare.

WARNING: *To guard against bodily injury, use caution when inflating or adding air to the compact spare. Use a 100 psi capacity pressure gauge only to check inflation pressure and inflate the tire to a maximum of 60 psi. When inflating the tire, add air in very small amounts only and check pressure frequently as small amounts of air will increase pressure several psi.*

TRAILER TOWING

When towing trailers, use the recommended full-load tire inflation pressures. In addition, the allowable passenger and cargo loads must be reduced by an amount equivalent to the trailer tongue-load. Refer to the Tire Inflation Pressure Charts at the end of this chapter.

EXTERNAL LUGGAGE RACK

Luggage rack cargo weight should be limited as follows: 100 pounds on Pacer and Concord Wagons, 150 pounds on Matador Wagons, and 75 pounds on Gremlins and Pacer Sedans. The load should be distributed evenly and placed as far to the rear as possible. Because the rack does not increase overall load capacity of the car, internal cargo weight must be reduced by an amount equal to the weight carried on the rack.

WHEELS

General

Standard equipment wheels on AMC cars are a safety rim, drop-center design of all steel construction. The rim and center section (spider) are welded together to form a seamless, air tight assembly (fig. 2G-10). Optional wheels include: a forged aluminum wheel, a slotted styled steel wheel, a styled steel wheel with a non-removable finned Noryl insert which is bonded to the center section, and a steel wheel with a plastic cover that is bonded to the chrome center hub.

Wheel Rim Sizes

Three wheel rim widths are used. Standard steel wheels are available in 4.5, 5.0, and 6.0 inch rim widths. All optional wheels have a rim width of 6.0 inches. The 4.5 inch rim is used with B78 X 14 tires only. The 5.0-inch rim is used with C78 X 14 and D78 X 14 tires only. The 6.0-inch rim is used with D78 X 14 and larger size tires only.

Inspection And Cleaning

The condition of the wheels should be checked periodically. Replace any wheel that is bent, cracked, severely dented, or has excessive runout. Also check the condition of the tire inflation valve. Replace the valve if worn, cracked, loose, or leaks air.

When cleaning steel or aluminum wheels, use a mild soap and water solution only and rinse with clean water. Do not use any type of caustic solution or abrasive substance, especially on forged aluminum wheels. After cleaning aluminum wheels, apply a coating of protective wax to preserve the finish and retain the original lustre.

The finned Noryl inserts on styled wheels may be cleaned using a sponge or soft bristle brush. Do not press overly hard on the inserts to clean them. They are flexible to a degree but can be damaged if due care is not excercised.

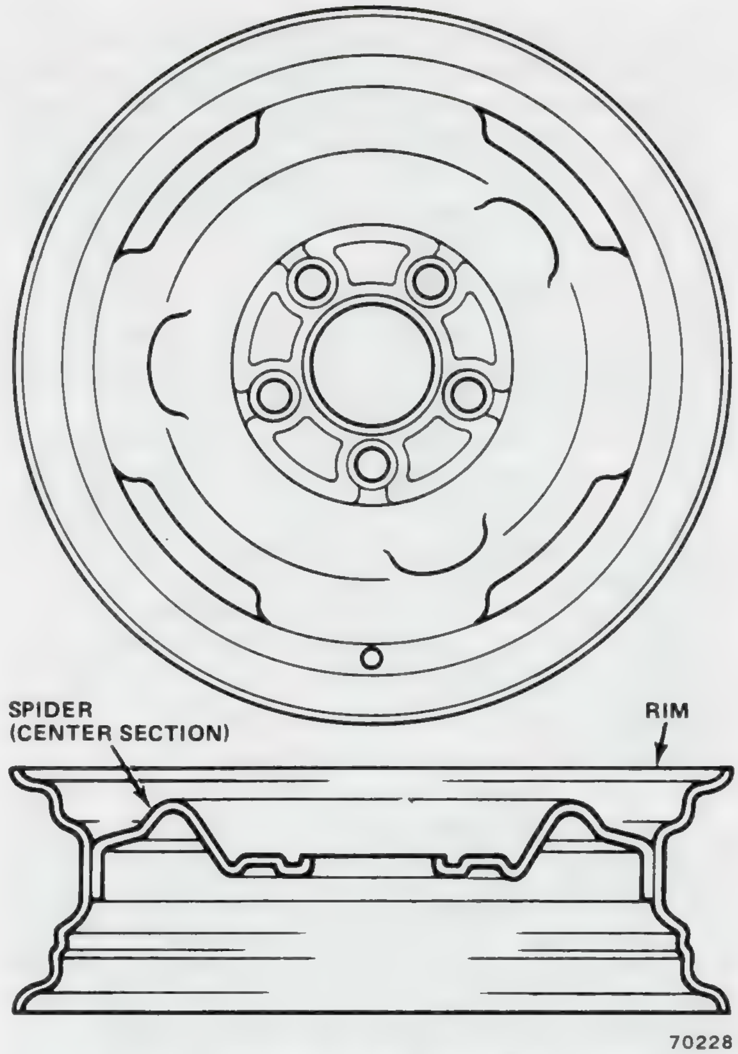


Fig. 2G-10 Standard Steel Wheel Construction (Typical)

Front Wheel Bearings

The front wheel bearings are a tapered roller design that provide a constantly changing load contact surface for improved life and smooth operation.

Correctly adjusted front wheel bearings are important to maximum tire life and vibration free operation. Incorrect adjustment can produce shimmy, vibration, tire wear, and improper brake operation. Bearing adjustment and lubrication should be performed at the intervals recommended in the Maintenance Schedule. Use an EP-type, lithium base, water-proof wheel bearing lubricant and pack the bearings with a generous quantity of this lubricant. Refer to Front Wheel Bearing Adjustment in Chapter 2F for the adjustment procedure.

TIRE ROUGHNESS AND VIBRATION

General

Vibration, roughness, tramp, shimmy and thump may be caused by excessive tire or wheel runout, worn or cupped tires, or wheel and tire unbalance. These problem conditions may also be caused by rough or undulating road surfaces. Driving the car on different types of road surfaces will indicate if the road surfaces are actually causing the problem.

Always road-test the car, preferably with the owner in the car, to determine the exact nature of the problem. The car should be driven at least seven miles to warm the tires and remove flat spots that may have formed temporarily while the car was parked. Note tire condition and wear, and check and adjust tire inflation pressures before road testing.

Radial Tire Performance Characteristics

Because of their unique construction, radial-ply tires produce ride, handling, and appearance characteristics noticeably different from conventional tires.

Radial-ply tire ride quality and feel may seem harsh particularly at low speeds. This is due to the stiff belts used in the construction of these tires. Harshness often leads to the assumption that the tires are overinflated. Inflate radial-ply tires to recommended levels only.

Radial-ply tires have a highly flexible sidewall which produces a characteristic sidewall bulge making the tire appear underinflated. This is a normal condition for radial-ply tires. Do not attempt to reduce this bulge by overinflating the tire. Always check tire inflation pressures using an accurate gauge and inflate the tires to recommended levels only. Refer to the Tire Inflation Pressure Charts at the end of this chapter.

Radial-ply tires also produce a side-to-side or waddle motion that is most noticeable at speeds of 15 mph or less. This motion is a normal characteristic of radial-ply tires and is a result of their unique construction. An objectionable waddle condition can sometimes be reduced by rotating the tires front-to-rear, however, do not attempt to correct a waddle condition by balancing.

Proper mounting and balancing of radial-ply tires is very important. Improper balancing or incomplete seating of the tire bead can produce a high frequency vibration that is noticeable throughout the car at speeds above approximately 45 mph. Improper bead seating can be checked by visually inspecting the tire. To correct unbalance, reseat the bead if necessary, and balance the tire using dynamic, two-plane balancing equipment. This type of balancing equipment is essential to solving radial-ply tire unbalance problems.

Tire Thump

Thump is a noise caused by the tire moving over irregularities in the road or by irregularities within the tire itself. The thump sound will coincide with each wheel revolution.

To determine which tire is causing thump, temporarily inflate all tires to 50 psi and drive over the same roads. If this procedure eliminates the problem, reduce the air pressure in one tire at a time and repeat the road test. Perform this procedure until all tires have been tested and each test is made with three tires at high pressure and one tire at recommended pressure. When thump again develops, the tire just deflated to the recommended pressure is the defective tire and should be replaced.

NOTE: *Although the procedure for diagnosing tire thump is quite effective with conventional tires, it is considerably less effective with radial tires.*

Tire Tramp

Tire tramp is caused by tire and wheel static unbalance or by excessive radial and lateral runout of the tire or wheel.

The most effective method for checking tire and wheel static balance is by using off-the-car balancing equipment.

Static balance is the result of an equal distribution of wheel and tire weight about the spindle in such a manner that the assembly lacks the tendency to rotate by itself when mounted on the arbor of a balancing machine.

Static unbalance occurs when an unequal portion of weight is concentrated at one point on the tire and wheel. It causes a vibratory-type pounding action which is referred to as tire tramp, wheel tramp, or wheel hop, (fig. 2G-11).

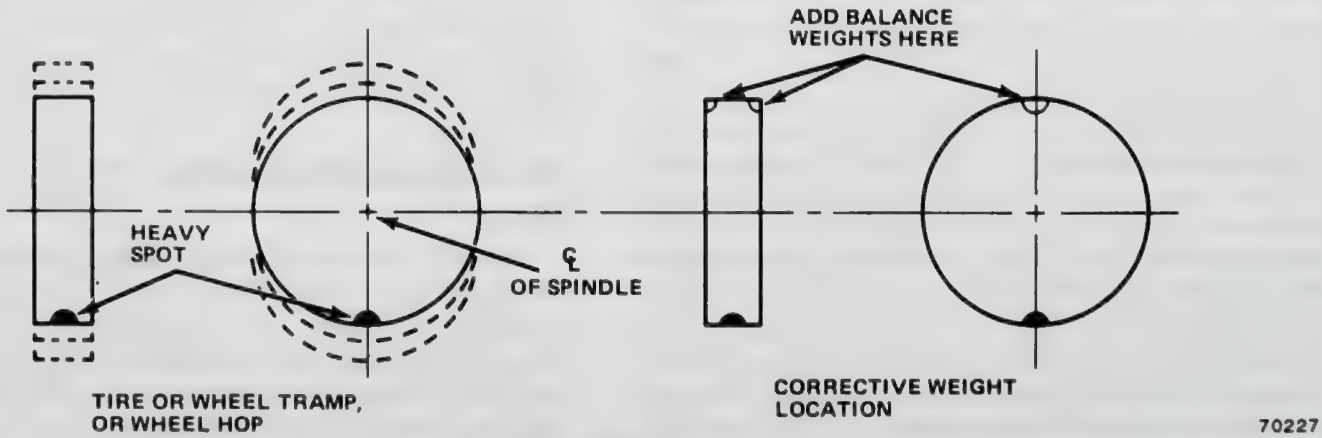


Fig. 2G-11 Static Unbalance

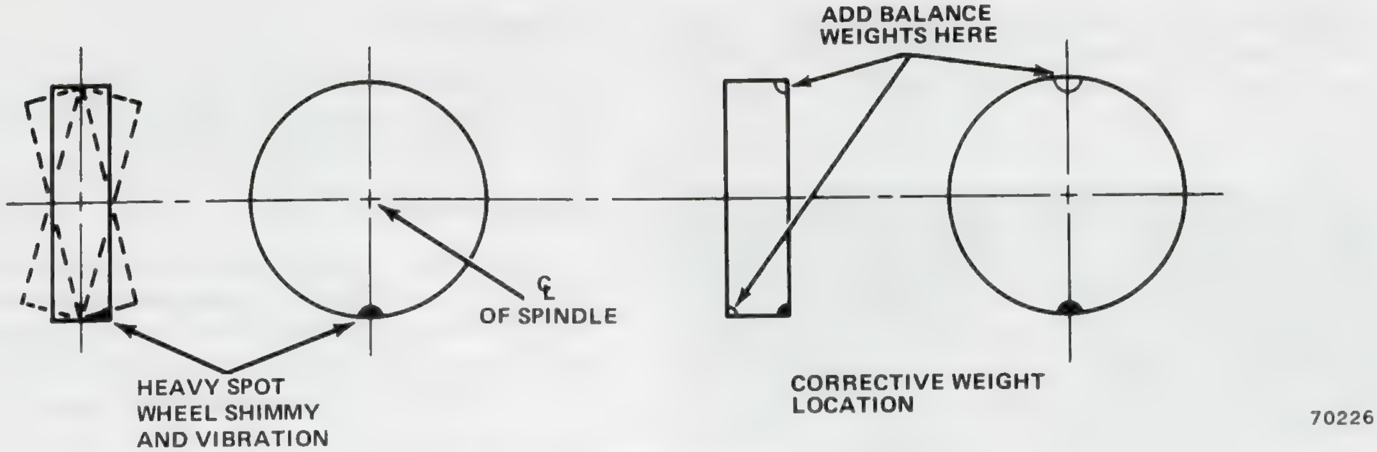


Fig. 2G-12 Dynamic Unbalance

Dynamic balance is the result of an equal distribution of wheel and tire weight around the plane of rotation, which causes the wheel to rotate smoothly about the axis that bisects the wheel and tire centerline.

Dynamic unbalance occurs when unequal forces are concentrated at opposing points on the tire circumference. It causes wheel shimmy and vibration at medium and high speeds (fig. 2G-12).

The most effective method for balancing wheels and tires is by using equipment that will correct both static and dynamic balance conditions. Dynamic, two-plane balancing equipment is preferable.

Since procedures vary with different machines, follow the equipment manufacturer's instructions explicitly.

WARNING: *On-car type wheel balancers may be used on the rear wheels of cars equipped with a Twin-Grip differential but only after removing the wheel opposite the one to be balanced. In addition, do not exceed 35 mph on the speedometer when spinning the rear wheels. As a result of differential action, actual wheel speed is approximately double the speed indicated by the speedometer. The centrifugal force generated by a tire spinning at high speed could cause personal injury and damage.*

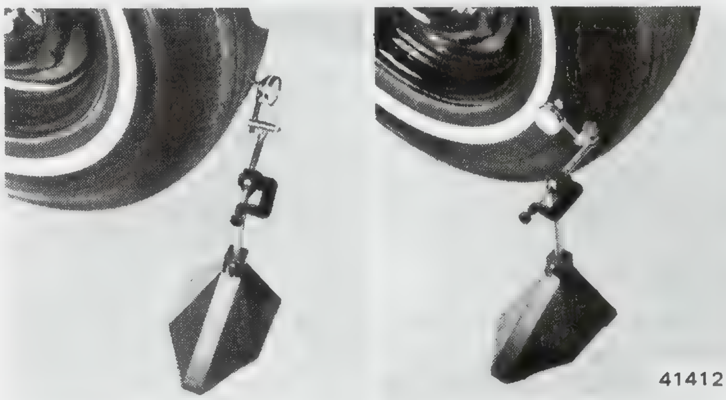
Wheel and Tire Runout

Excessive radial and lateral runout of a wheel and tire assembly can cause roughness, vibration, tramp, tire wear, and steering wheel tremor.

Before checking runout and to avoid false readings caused by temporary flat spots in the tires, check runout only after the car has been driven at least seven miles.

The extent of runout should be measured with a dial indicator. All measurements should be made on the car with the tires inflated to recommended reduced load inflation pressures and with the front wheel bearings adjusted to specifications.

Measure tire radial runout at the center and outside ribs of the tread face (fig. 2G-13). Measure tire lateral runout just above the buffing rib on the sidewall (fig. 2G-13). Mark the high points of lateral and radial runout for future reference. On conventional tires, radial runout must not exceed 0.105 inch (2.6670 mm) and lateral runout must not exceed 0.100 inch (2.5400 mm). On radial-ply tires, radial runout must not exceed 0.080 inch (2.0320 mm) and lateral runout must not exceed 0.100 inch (2.5400 mm).



RADIALLY LATERALLY

Fig. 2G-13 Measuring Tire Runout

If total radial or lateral runout of the tire exceeds specified limits, it will then be necessary to check wheel runout to determine whether the wheel or tire is at fault.

Wheel radial runout is measured at the wheel rim just inside of the wheel cover retaining nibs (fig. 2G-14).

Wheel lateral runout is measured at the wheel rim bead flange just inside of the curved lip of the flange (fig. 2G-14). Wheel radial runout should not exceed 0.035 inch (0.8890 mm) and wheel lateral runout should not exceed 0.045 inch (1.1430 mm). Mark the high points of radial and lateral runout for future reference.

If total tire runout, either lateral or radial, exceeds the specified limit but wheel runout is within the specified limit, it may be possible to reduce runout to an acceptable level by changing the position of the tire on the wheel so that the previously marked high points are 180° apart.

NOTE: *On cars equipped with disc brakes, excessive wheel lateral runout may be caused by excessive hub-to-bore runout. Refer to the rotor inspection procedure in chapter 2F.*

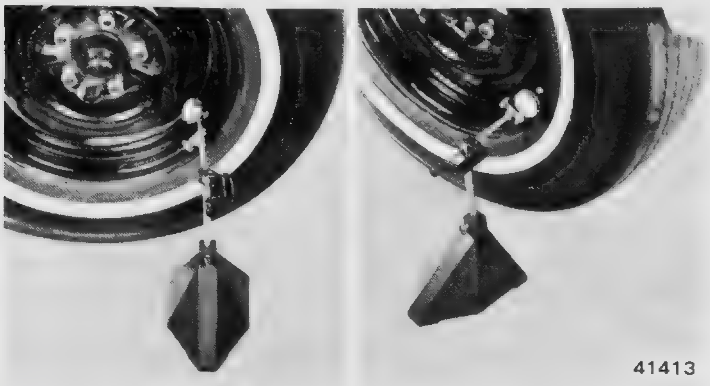


Fig. 2G-14 Measuring Wheel Runout

VIBRATION

General

Vibration may be caused by tire/wheel unbalance or runout, incorrectly adjusted front wheel bearings, loose or worn suspension or steering components, worn or defective tires, incorrect universal joint angles, worn universal joints, excessive propeller shaft or yoke runout, rotor or brakedrum runout, loose engine or transmission supports, or by engine driven accessories.

Vibration Categories

Vibrations can be divided into two categories: mechanical and audible.

Mechanical vibrations are felt through the seats, floorpan, or steering wheel and usually produce some visible motion in the rear view mirror, front fenders, dash panel, or steering wheel.

Audible vibrations are heard or sometimes sensed above normal road and background noise and may or may not be accompanied by a mechanical vibration. In some cases, they occur as a droning or drumming noise. While in other cases, they produce a buffeting sensation that is felt or sensed by the driver rather than heard.

Vibration Sensitivity

Mechanical and audible vibrations are sensitive to changes in engine torque, car speed, or engine speed. They usually occur within one, and sometimes two, well defined ranges in terms of car speed, engine rpm, and torque application.

Torque Sensitive

This means that the condition can be improved or worsened by accelerating, decelerating, coasting, or maintaining a steady car speed and application of engine torque.

Car Speed Sensitive

This means that the vibration always occurs at the same speed and is not affected by engine torque, engine speed, or transmission gear selected.

Engine Speed Sensitive

This means that the vibration occurs at varying car speeds when a different transmission gear is selected. It can sometimes be isolated by increasing or decreasing engine speed with the transmission in neutral, or by stall testing with the transmission in gear.

Vibration Diagnosis

A proper vibration diagnosis procedure should always begin with a road test. Corrective measures should not be attempted until the vibration type, magnitude, and speed range have been established during a road test.

Road Test

When road testing a car for a vibration condition, drive the car on a road that is smooth and free of undulations. If vibration is apparent, note and record the following:

- The speed range(s) in which the vibration occurs
- What type of vibration occurs in each speed range—mechanical or audible
- How is the vibration affected by changes in car speed, engine speed, and engine torque
- Establish the vibration sensitivity. Is it torque sensitive, car speed sensitive, or engine speed sensitive

Diagnosis Procedure

When the vibration type, sensitivity, and range has been determined, refer to the Vibration Diagnosis Charts for the probable causes.

Consider for correction only those items coded on the charts that are related to the problem condition.

Refer to the correction codes for a definition of the various correction procedures.

Vibration Diagnosis Chart Codes

TRR—Tire and Wheel Radial Runout. Not a cause of vibration below 20 mph. Speed required to cause vibration increases as runout decreases. Car speed sensitive vibration.

WH—Wheel Hop. Not a cause of vibration below 20 mph. Produces up-down movement in steering wheel and instrument panel along with mechanical vibration. Most noticeable between 20-40 mph. Caused by tires having radial runout of more than 0.045 inch (1.1430 mm). Do not attempt to correct by balancing; replace tire. Car speed sensitive vibration.

TB—Tire Balance. Static unbalance not a cause of vibration below 30 mph. Dynamic unbalance not a cause under 40 mph. Car speed sensitive vibration.

TLR—Tire and Wheel Lateral Runout. Not a cause of vibration below 55 mph unless runout is extreme. Car speed sensitive vibration.

TW—Tire Wear. Abnormal wear can cause vibration in 30 to 55 mph range and may also generate whine at high speed changing to growl at low speed. Car speed sensitive vibration.

W—Radial Tire Waddle. Normal Condition with radial-ply tires. Unique construction causes side-to-side waddle motion at speeds up to 15 mph. Rotating tires front-to-rear may reduce condition. Replace tire(s) if condition cannot be reduced satisfactorily. Car speed sensitive vibration.

UJA—Universal Joint Angles. Incorrect angles may cause mechanical vibration below 20 mph and mechanical or audible vibration at 35 to 55 mph. Torque sensitive vibration.

UJ—Universal Joints. If ends of bearing crosses or bearing cups are galled, worn excessively, brinnelled, or binding due to overtightened U-bolts or clamp strap bolts, they will cause vibration at any speed. Torque sensitive vibration.

PSY—Propeller Shaft and Yokes. Not a cause of vibration below 35 mph. Excessive runout, unbalance, loss of balance weights, or undercoating on shaft will cause vibration at 35 mph and above. Torque sensitive vibration.

WB—Front Wheel Bearings. If loose, can cause car speed sensitive mechanical vibration at 35 mph and above. If rough or damaged, can cause growl and grind noise at low speed or whine at high speed. Car speed sensitive vibration.

AN—Rear Axle Noise. Not a cause of vibration unless axle shaft is bent or shaft bearing has broken. Worn or damaged gears or bearings will cause noise in varying speed ranges in relation to amount of torque applied.

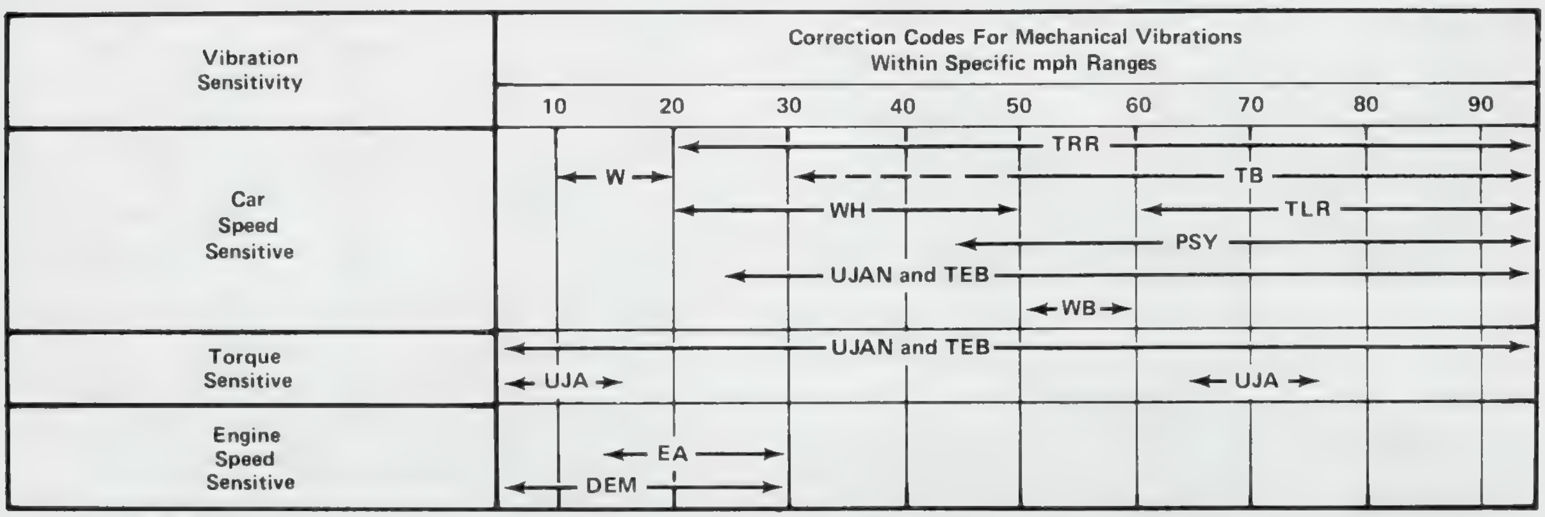
TEB—Transmission Extension Housing Bushing. If worn or loose, can cause torque sensitive mechanical vibration and oil leakage.

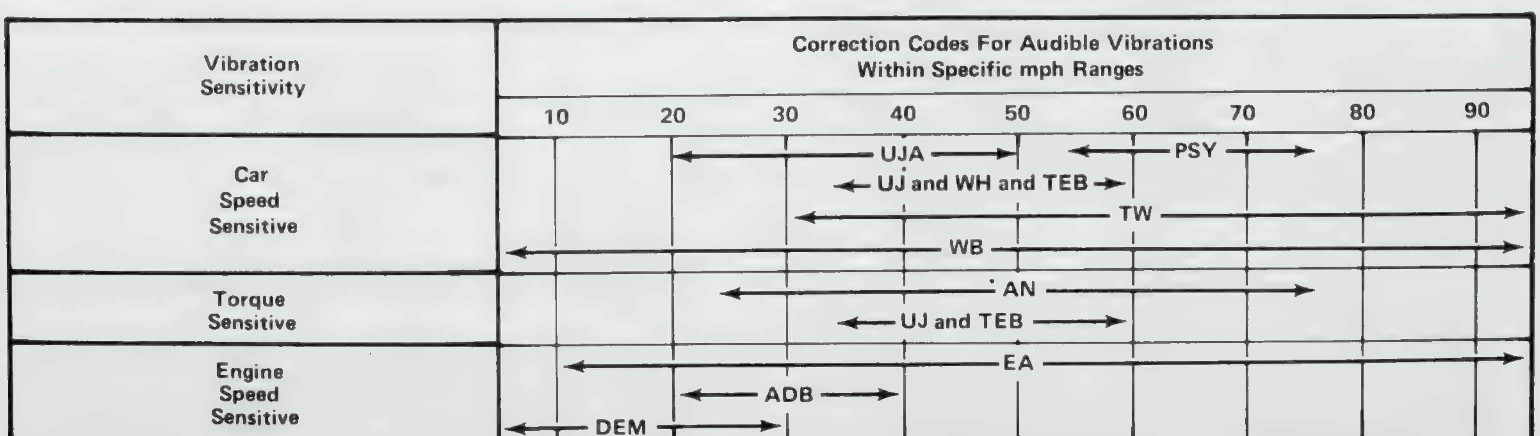
EA—Engine Driven Accessories. Loose or broken AC compressor, power steering pump, air pump, alternator, water pump, etc. can cause engine speed sensitive mechanical vibration. Usually apparent when transmission is placed in neutral and engine speed is increased.

ADB—Accessory Drive Belts. If excessively worn or loose can cause engine speed sensitive audible vibration that sounds like droning, flutter, or rumbling noise.

DEM—Damaged Engine Mounts. If worn or broken, may allow engine or accessories to contact body causing noise and vibration.

Vibration Diagnosis Charts





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SPECIFICATIONS

Wheel and Tire Specifications

Tire Radial Runout:
- Radial-Ply Tires . . . . 0.080 inch (2.032 mm)
- Conventional Tires . . . . 0.105 inch (2.667 mm)

Tire Lateral Runout:
- All Tires . . . . 0.100 inch (2.510 mm)

Wheel Runout (All):
- Radial . . . . 0.035 inch (0.889 mm)
- Lateral . . . . 0.045 inch (1.143 mm)

Wheel Bearing Lubricant . . . . EP, Lithium Base, Waterproof Type Lubricant

Wheel Bearing Adjustment . . . . Tighten spindle nut to 25 foot-pounds (34 N·m) torque then back nut off to 6 inch-pounds (0.68 N·m) torque while rotating wheel.

External Luggage Rack Capacity:
- Gremlin and Pacer Sedan . . . . 75 pounds (34 kg)
- Pacer and Concord Wagon . . . . .100 pounds (45 kg)
- Matador Wagon . . . . .150 pounds (68 kg)

Collapsible Spare Tire:
- Inflation Pressure . . . . 28 PSI (193.06 kPa)

Compact Spare Tire:
- Inflation Pressure . . . . 60 PSI

Wheel Retaining Nuts (All) . . . . .75 foot-pounds (102 N·m) set-to torque; 70-90 foot-pounds (8-10) N·m) service in-use recheck torque.

Tire Inflation Pressure Charts

PACER WAGON

TIRE SIZE	REDUCED LOAD [1] COLD INFLATION PRESSURES FRONT/REAR	FULL LOAD [2] COLD INFLATION PRESSURES FRONT/REAR
Six-Cylinder Wagon D78, DR78, DR70 — All	24/24	24/28
Eight-Cylinder Wagon E78, ER78 — All . .	24/24	24/26

[1] **REDUCED LOAD:** 1 to 4 passengers and luggage, or 600 pounds maximum.

[2] **FULL LOAD:** 4 passengers and luggage, or 850 pounds maximum, or 2 passengers front — 2 passengers rear and 250 pounds luggage.

80685F

MATADOR COUPE

TIRE SIZE	REDUCED LOAD [1] COLD INFLATION PRESSURES FRONT/REAR	FULL LOAD [2] COLD INFLATION PRESSURES FRONT/REAR
Six-Cylinder Coupe		
F78, FR78 — All . .	24/24	24/24
H78, HR78 — All . .	24/24	24/24
GR78, GR70 - All .	24/24	24/24
Eight-Cylinder Coupe		
F78, FR78 - LAC .	26/24	26/26
F78, FR78 - WAC .	26/24	28/26
G78, GR78, GR70 - All	24/24	24/24
H78, HR78 - All . .	24/24	24/24

[1] **REDUCED LOAD:** 1 to 4 passengers and luggage, or 600 pounds maximum.

[2] **FULL LOAD:** Bench Seat Models — 5 passengers and luggage, or 950 pounds maximum, or 3 passengers front — 2 passengers rear and 200 pounds luggage. Individual or Bucket Seat Models — 4 passengers and luggage or 800 pounds maximum, or 2 passengers front — 2 passengers rear and 200 pounds luggage.

80685G

MATADOR 4-DOOR SEDAN

TIRE SIZE	REDUCED LOAD [1] COLD INFLATION PRESSURES FRONT/REAR	FULL LOAD [2] COLD INFLATION PRESSURES FRONT/REAR
Six-Cylinder Sedan		
F78, FR78 - All . .	24/24	24/28
G78, GR78, GR70 - All	24/24	24/24
H78, HR78, HR70 - All	24/24	24/24
Eight-Cylinder Sedan		
F78, FR78 — All . .	26/24	26/28
G78, GR78, GR70 — All	24/24	24/24
H78, HR78 — All . .	24/24	24/24

[1] **REDUCED LOAD:** 1 to 5 passengers and luggage, or 750 pounds maximum.

[2] **FULL LOAD:** Bench Seat Models — 6 passengers and luggage, or 1100 pounds maximum, or 3 passengers front — 3 passengers rear and 200 pounds luggage. Individual or Bucket Seat Models — 5 passengers and luggage, or 950 pounds maximum, or 2 passengers front — 3 passengers rear and 200 pounds luggage.

80685H

MATADOR STATION WAGON

TIRE SIZE	REDUCED LOAD [1] COLD INFLATION PRESSURES FRONT/REAR	FULL LOAD [2] COLD INFLATION PRESSURES FRONT/REAR
Eight-Cylinder Wagon H78, HR78, HR70 — All	20/28	20/28

[1] **REDUCED LOAD:** 1 to 5 passengers and luggage, or 750 pounds maximum.

[2] **FULL LOAD:** 3-Seat Models — 8 passengers, or 6 passengers and luggage, or 1200 pounds maximum, or 3 passengers front — 3 passengers in second seat and 300 pounds luggage, or 3 passengers front seat — 3 passengers second seat and 2 passengers in third seat. 2-Seat Models — 6 passengers and luggage, or 1200 pounds maximum, or 3 passengers front seat — 3 passengers rear seat and 300 pounds luggage.

80685J

GREMLIN SEDAN

TIRE SIZE	REDUCED LOAD[1] COLD INFLATION PRESSURES FRONT/REAR	FULL LOAD[2] COLD INFLATION PRESSURES FRONT/REAR
Six-Cylinder Sedan		
B78 – All	26/24	26/24
C78 – All	24/24	24/24
D78, DR78, DR70 – All	24/24	24/24
Four-Cylinder Sedan		
B78, C78, D78 . . .	24/24	24/24
DR78, DR70	20/24	20/24

[1] REDUCED LOAD: 1 to 4 passengers and luggage, or 600 pounds maximum.

[2] FULL LOAD: 4 passengers and luggage, or 775 pounds maximum, or 2 passengers front – 2 passengers rear and 175 pounds luggage.

80685A

CONCORD SEDAN AND HATCHBACK

TIRE SIZE	REDUCED LOAD[1] COLD INFLATION PRESSURES FRONT/REAR	FULL LOAD[2] COLD INFLATION PRESSURES FRONT/REAR
Six-Cylinder 2-Door Sedan and Hatchback		
C78, D78 – LAC . .	24/24	24/24
C78, D78 – WAC . .	26/24	26/24
DR78, DR70 – All .	24/24	24/24
Six-Cylinder 4-Door Sedan		
C78 – All	26/24	26/26
D78, DR78, DR70 – All	24/24	24/24
Eight-Cylinder 2-Door Sedan and Hatchback		
D78, DR78, DR70 – All	26/24	26/24
Eight-Cylinder 4-Door Sedan		
D78, DR78, DR70 – LAC . . .	26/24	26/26
D78, DR78, DR70 – WAC . . .	26/24	28/26

[1] REDUCED LOAD: 1 to 4 passengers and luggage, or 600 pounds maximum.

[2] FULL LOAD: 2-Door Models – 4 passengers and luggage or 775 pounds maximum, or 2 passengers front – 2 passengers rear and 175 pounds luggage. 4-Door Models – 5 passengers and luggage, or 925 pounds maximum, or 2 passengers front – 3 passengers rear and 175 pounds luggage.

80685B

CONCORD WAGON

TIRE SIZE	REDUCED LOAD[1] COLD INFLATION PRESSURES FRONT/REAR	FULL LOAD[2] COLD INFLATION PRESSURES FRONT/REAR
Six-Cylinder Station Wagon		
C78 – LAC	24/24	26/28
C78 – WAC	26/24	26/28
D78, DR78, DR70 – All	24/24	24/24
Eight-Cylinder Station Wagon		
D78, DR78, DR70 – LAC . . .	26/24	26/26
D78, DR78, DR70 – WAC . .	26/24	28/26

[1] REDUCED LOAD: 1 to 4 passengers and luggage, or 600 pounds maximum.

[2] FULL LOAD: 5 passengers and luggage, or 925 pounds maximum, or 2 passengers front – 3 passengers rear and 175 pounds luggage.

80685C

AMX

TIRE SIZE	REDUCED LOAD[1] COLD INFLATION PRESSURES FRONT/REAR	FULL LOAD[2] COLD INFLATION PRESSURES FRONT/REAR
Six-Cylinder Hatchback		
C78, D78 – LAC . .	24/24	24/24
C78, D78 – WAC . .	26/24	26/24
DR78, DR70 – All .	24/24	24/24
Eight-Cylinder Hatchback		
D78, DR78, DR70 – All	26/24	26/24

[1] REDUCED LOAD: 1 to 4 passengers and luggage, or 600 pounds maximum.

[2] FULL LOAD: 4 passengers and luggage, or 775 pounds maximum, or 2 passengers front – 2 passengers rear and 175 pounds luggage.

80685D

PACER SEDAN

TIRE SIZE	REDUCED LOAD[1] COLD INFLATION PRESSURES FRONT/REAR	FULL LOAD[2] COLD INFLATION PRESSURES FRONT/REAR
Six-Cylinder Sedan		
D78, DR78, DR70 – All	24/24	24/24

[1] REDUCED LOAD: 1 to 4 passengers and luggage, or 600 pounds maximum.

[2] FULL LOAD: 4 passengers and luggage, or 775 pounds maximum, or 2 passengers front – 2 passengers rear and 175 pounds luggage.

80685E

NOTES

STEERING COLUMNS 2H

SECTION INDEX

GENERAL

Two steering column designs are used: a non-tilt column, which is standard equipment on all models, and an optional tilt column. All columns have anti-theft and energy-absorbing features. They are designed to compress in the event of a front end collision.

The ignition lock cylinder and ignition switch are mounted on the column. When the ignition lock cylinder is turned to the Lock position, an internal lock mechanism prevents operation of the ignition and starting systems and steering wheel. In addition, the column gearshift lever cannot be operated on cars equipped with column shift automatic transmission.

Steering columns used with floor shift manual or floor shift automatic transmission (except Matador models) are equipped with a key release lever. The lever is located on the right-hand side of the column jacket and must be raised in order to remove the ignition key. The column used in cars with column shift automatic transmission is not equipped with a key release lever.

On all columns, the steering column steering shaft is connected to the steering gear by an intermediate shaft. The shaft is flange-mounted to the gear and is connected to the steering shaft by a universal joint on Pacer models and by a coupling clamp and pinch bolt on all other models.

Each steering column has a lever-operated directional signal switch and hazard warning switch. On models with the Cruise Command option, a unique combination-type lever is used to operate both the signal switch and Cruise Command.

The tilt column has a spring loaded, movable upper housing providing six steering wheel positions in a vertical plane. A tilt release lever mounted in the column housing allows the driver to release the tilt lock mechanism and select the steering wheel position desired.

STEERING WHEEL REMOVAL

(1) Disconnect battery negative cable.

(2) Remove horn button and horn ring internal parts.

NOTE: *On steering wheels with center horn buttons, remove the button by first lifting it up and then pulling it out. On other types, remove the mounting screws at the back of the wheel, and pull the horn wire plastic retainer out of the turn signal canceling cam, and remove the button.*

(3) Remove steering wheel nut and washer. Note alignment marks on steering shaft and steering wheel (fig. 2H-1). Paint alignment marks on shaft and wheel if none are present.

(4) Remove steering wheel using Puller J-21232.

CAUTION: *Do not hammer on the end of the shaft. Hammering could shear or loosen the plastic retainers which maintain rigidity of the energy-absorbing feature of the column.*

Service Diagnosis—Standard Column

Condition	Possible Cause	Correction
NOISE IN COLUMN	(1) One click in OFF-Unlock and when steering wheel is moved.	(1) Normal seating of Lock Bolt.
	(2) Column not correctly aligned.	(2) Align column.
	(3) Flexible coupling pulled apart.	(3) Align column and replace flexible coupling.
	(4) Horn contact ring not lubricated.	(4) Lubricate with Lubriplate or equivalent.
	(5) Lack of grease on bearings or bearing surface.	(5) Lubricate with Lubriplate or equivalent.
	(6) Lower shaft bearing tight or frozen.	(6) Replace bearing. Check shaft and replace if scored.
	(7) Upper shaft bearing tight or frozen.	(7) Replace housing assembly.
	(8) Lock plate retaining ring not seated.	(8) Replace retaining ring. Check for proper seating in groove.
	(9) Steering shaft snap ring not seated.	(9) Replace snap ring. Check for proper seating in groove.
	(10) Shroud or housing loose.	(10) Tighten mounting screws.
ONE CLICK WHEN IN OFF-LOCK POSITION AND STEERING WHEEL IS MOVED	(1) Seating of lock bolt.	(1) None — normal — lock bolt seating; click is characteristic.
HIGH STEERING SHAFT EFFORT	(1) Column assembly misaligned in car.	(1) Align correctly.
	(2) Tight or frozen upper or lower bearings.	(2) Replace.
	(3) Binding intermediate shaft U-joint.	(3) Repair or replace intermediate shaft.
HIGH SHIFT EFFORT	(1) Column not aligned correctly in car.	(1) Realign.
	(2) Lower bowl bearing not aligned correctly.	(2) Assemble correctly.
	(3) Lack of grease on seal or bearing areas.	(3) Lubricate
	(4) Improper ignition switch mounting screws.	(4) Install correct screws.
	(5) Shift tube bent or broken.	(5) Replace shift tube.

70345A

Service Diagnosis—Standard Column

Condition	Possible Cause	Correction
IMPROPER TRANSMISSION SHIFTING	(1) Improper gearshift linkage adjustment. (2) Improper shift gate. (3) Loose lower shift lever. (4) Sheared shift tube joint.	(1) Adjust linkage. (2) Replace with correct part. (3) Replace shift tube assembly. (4) Replace shift tube assembly.
STEERING WHEEL OR COLUMN LOOSE	(1) Housing loose on jacket — will be noticed with ignition in "off-lock" and when torque is applied to the steering wheel.	(1) Tighten mounting screws to 60 inch-pounds torque.
LASH IN MOUNTED COLUMN ASSEMBLY	(1) Column mounting bracket bolts loose. (2) Column bracket capsule sheared. (3) Broken weld nuts on jacket.	(1) Tighten to 20 foot-pounds torque. (2) Replace bracket assembly. (3) Replace jacket assembly.
DRIVER CAN LOCK STEERING IN SECOND GEAR (Manual Transmission)	(1) Release lever mechanism damaged.	(1) Replace or repair.

70345B

Service Diagnosis—Tilt Column

Condition	Possible Cause	Correction
EXCESS PLAY IN MOUNTED COLUMN ASSEMBLY	(1) Column mounting bracket bolts loose. (2) Loose support screws. (3) Loose lock shoe pin in support. (4) Loose tilt head pivot pins.	(1) Tighten to 20 foot-pounds torque. (2) Tighten to 60 inch-pounds torque. (3) Replace pin. (4) Replace pivot pins.
HOUSING SCRAPING ON BOWL	(1) Bowl bent or not concentric with hub.	(1) Replace bowl.
HOUSING LOOSE	(1) Excessive clearance between holes in support or housing and pivot pin diameters. (2) Defective or missing anti-lash spring in centering spheres. (3) Upper bearing not seating in bearing race. (4) Upper bearing inner race seat missing.	(1) Replace either or both. (2) Add spring or replace both. (3) Replace both. (4) Install seat.

70345C

Service Diagnosis—Tilt Column

Condition	Possible Cause	Correction
HOUSING LOOSE (Continued)	(5) Loose support screws. (6) Bearing preload spring missing or broken.	(5) Tighten to 60 inch-pounds torque. (6) Replace repload spring.
STEERING WHEEL LOOSE — EVERY OTHER TILT POSITION	(1) Loose fit between shoe and shoe pivot pin.	(1) Replace both.
STEERING COLUMN WILL NOT LOCK IN ANY TILT POSITION	(1) Lock shoe grooves may have burrs or dirt. (2) Lock shoe lock spring weak or broken. (3) Lock shoe seized on its pivot pin.	(1) Replace lock shoes, clean grooves. (2) Replace lock spring. (3) Replace both lock shoes.
NOISE WHEN TILTING COLUMN	(1) Tilt spring rubbing in housing. (2) Tilt bumpers worn.	(1) Lubricate. (2) Replace tilt bumpers.

70345C

Service Diagnosis—Lock System

Condition	Possible Cause	Correction
WILL NOT LOCK	(1) Lock bolt spring broken or defective. (2) Damaged sector tooth. (3) Defective lock cylinder. (4) Burr on lock bolt or housing. (5) Damaged housing. (6) Damaged lock rack. (7) Interference between bowl and lock rack coupling.	(1) Replace lock bolt spring. (2) Replace sector. (3) Replace lock cylinder. (4) Remove burr. (5) Replace housing. (6) Replace lock rack. (7) Replace bowl or actuator rod as required.
HIGH LOCKING EFFORT (High effort required to turn ignition key and lock cylinder)	(1) Lock cylinder defective. (2) Ignition switch malfunction. (3) Rack preload spring broken or (4) Burrs on lock sector, lock rack, housing, support or remote rod coupling. (5) Bent sector shaft. (6) Defective lock rack. (7) Remote rod bent, deformed.	(1) Replace lock cylinder. (2) Replace ignition switch. (3) Replace preload spring. (4) Remove burrs. (5) Replace shaft. (6) Replace lock rack. (7) Straighten or replace.

70345D

Service Diagnosis—Lock System

Condition	Possible Cause	Correction
HIGH LOCKING EFFORT (Continued)	(8) Ignition switch mounting bracket bent.	(8) Straight or replace.
	(9) Distorted coupling slot in lock rack (tilt column).	(9) Replace lock rack.
KEY STICKS IN "START" POSITION	(1) Remote rod deformed.	(1) Straight or replace.
	(2) Ignition switch mounting bracket bent.	(2) Straighten or replace.
	(1) Ignition switch is not adjusted correctly.	(1) Adjust switch.
	(2) Burr over retainer slot in housing cover or on cylinder retainer.	(2) Remove burr.
KEY CANNOT BE REMOVED IN OFF-LOCK POSITION	(1) Ignition switch is not adjusted correctly.	(1) Readjust switch.
	(2) Defective lock cylinder.	(2) Replace lock cylinder.
LOCK CYLINDER CAN BE REMOVED WITHOUT DE-PRESSING RETAINER	(1) Lock cylinder with defective retainer.	(1) Replace lock cylinder.
	(2) Burr over retainer slot in housing cover or on cylinder retainer.	(2) Remove burr.

70345D

Service Diagnosis—Electrical

Condition	Possible Cause	Correction
ELECTRICAL SYSTEM WILL NOT FUNCTION	(1) Poor battery connection.	(1) Connect securely.
	(2) Harness connector loose or defective.	(2) Tighten or replace.
	(3) Defective wiring.	(3) Repair or replace.
	(4) Ignition switch not adjusted properly.	(4) Readjust.
	(5) Ignition switch malfunction.	(5) Replace ignition switch.
IGNITION SWITCH WILL NOT ACTUATE	(1) Ignition switch malfunction.	(1) Replace.
IGNITION SWITCH CANNOT BE ADJUSTED	(1) Switch remote rod deformed.	(1) Repair or replace.
	(2) Lock sector engaged in wrong lock rack tooth.	(2) Engage correctly.

70345E

Service Diagnosis—Turn Signal Switch

Condition	Possible Cause	Correction
TURN SIGNAL WILL NOT CANCEL	(1) Loose switch mounting screws.	(1) Tighten to specified torque.
	(2) Switch or anchor bosses broken.	(2) Replace switch.
	(3) Broken, missing or out of position detent, return or canceling spring.	(3) Reposition or replace springs as required.
TURN SIGNAL DIFFICULT TO OPERATE	(1) Turn signal lever is loose.	(1) Tighten mounting screw to 12 inch-pounds torque.
	(2) Cancelling cam or switch broken or distorted.	(2) Replace cam or switch.
	(3) Loose or misplaced switch springs.	(3) Reposition or replace springs.
	(4) Foreign material in switch.	(4) Remove foreign material and clean switch.
	(5) Switch mounted loosely.	(5) Tighten mounting screws to 35 inch-pounds torque.
TURN SIGNAL WILL NOT INDICATE LANE CHANGE	(1) Broken lane change pressure pad or spring hanger.	(1) Replace switch.
	(2) Broken, missing, or misplaced lane change spring.	(2) Replace or reposition as required.
	(3) Jammed wires.	(3) Loosen mounting screws, reposition base or wires and retighten screws to 35 inch-pounds torque.
TURN SIGNAL WILL NOT STAY IN TURN POSITION	(1) Foreign material or loose parts impeding movement of yoke.	(1) Remove foreign material. Tighten loose parts.
	(2) Worn or cracked switch.	(2) Replace switch.
HAZARD SWITCH CANNOT BE PULLED OUT	(1) Foreign material between support and canceling leg and yoke.	(1) Remove foreign material. If no foreign material is impeding function of hazard switch, replace turn signal switch.
NO TURN SIGNAL LIGHTS	(1) Inoperative turn signal flasher.	(1) Replace turn signal flasher.
	(2) Defective or blown fuse.	(2) Replace fuse.
	(3) Inoperative signal switch.	(3) Replace signal switch. Disconnect column-to-chassis connector. Connect new switch to chassis and operate switch by hand. If lights now operate normally, signal switch is inoperative.

70345F

Service Diagnosis—Turn Signal Switch

Condition	Possible Cause	Correction
NO TURN SIGNAL LIGHTS (Continued)	(4) Loose chassis-to-column connector.	(4) Connect securely.
	(5) If lights do not operate, check chassis wiring for opens, grounds, etc.	(5) Repair chassis wiring as required.
TURN INDICATOR LIGHTS ON, BUT NOT FLASHING	(1) Front or rear bulb burned out.	(1) Replace bulb.
	(2) If vehicle lights do not operate, check light sockets for high resistance connections, the chassis wiring for opens, grounds, etc.	(2) Repair chassis wiring as required.
	(3) Inoperative flasher.	(3) Replace flasher.
	(4) Loose chassis-to-column connection.	(4) Connect securely.
	(5) Inoperative turn signal switch.	(5) Replace turn signal switch. To determine if turn signal switch is defective, substitute new switch into circuit and operate switch by hand. If the vehicle lights operate normally, signal switch is inoperative.
STOP LIGHT NOT ON WHEN TURN INDICATED	(1) Loose column-to-chassis connection.	(1) Connect securely.
	(2) Inoperative signal switch or brake light switch.	(2) Replace signal switch. Disconnect column-to-chassis connector. Connect new switch into system without removing old. Operate switch by hand. If brake lights work with switch in the turn position, signal switch is defective.
	(3) If brake lights do not work check connector to stop light sockets for grounds, opens, etc.	(3) Repair connector to stoplight circuits.

70345G

Service Diagnosis—Turn Signal Switch

Condition	Possible Cause	Correction
TURN INDICATOR PANEL LIGHTS NOT FLASHING	(1) Burned out bulbs.	(1) Replace bulbs.
	(2) High resistance to ground at bulb socket.	(2) Replace socket.
	(3) Opens, grounds in wiring harness.	(3) Locate and repair as required.
TURN SIGNAL LIGHTS FLASH VERY SLOWLY	(1) High resistance ground at light sockets.	(1) Repair high resistance grounds at light sockets.
	(2) Incorrect capacity turn signal flasher.	(2) Replace turn signal flasher.
	(3) Ground in chassis wiring.	(3) Locate and repair as required. If the flashing rate is still extremely slow, check chassis wiring harness from the connector to light sockets for grounds, high resistance points, etc.
	(4) Loose chassis-to-column connection.	(4) Connect securely.
	(5) Inoperative signal switch.	(5) Replace signal switch. Disconnect column-to-chassis connector. Connect new switch into system without removing old. Operate switch by hand. If flashing occurs at normal rate, the signal switch is defective.
HAZARD SIGNAL LIGHTS WILL NOT FLASH — TURN SIGNAL FUNCTIONS NORMALLY	(1) Blown fuse.	(1) Replace fuse.
	(2) Inoperative hazard warning flasher.	(2) Replace hazard warning flasher.
	(3) Loose chassis-to-column connection.	(3) Connect securely.
	(4) Inoperative turn signal switch.	(4) Replace the turn signal switch. Disconnect column-to-chassis connector. Connect new switch into system without removing old. Depress the hazard warning button and observe the hazard warning lights. If they now work normally, the turn signal switch is defective.
	(5) Harness connector open.	(5) Replace harness connector. If the lights do not flash, check wiring harness K lead (brown) for open between hazard flasher and harness connector. If open harness connector is defective.

70345H

Service Diagnosis—Key Warning Buzzer

Condition	Possible Cause	Correction
BUZZER DOES NOT SOUND WITH KEY FULLY INSERTED IN LOCK CYLINDER WITH DRIVER'S DOOR OPEN	(1) Loose connection at buzzer.	(1) Connect securely.
	(2) Voltage not available to buzzer.	(2) Check continuity of chassis wiring and repair as required.
	(3) Defective buzzer.	(3) Replace buzzer.
	(4) Door jamb switch on driver's side maladjusted or inoperative.	(4) Readjust or replace as required.
Note 1: If buzzer fault has not yet been detected, connect a continuity meter (or light to the male E and F connector contacts. Insert the key the full depth into the lock cylinder.	(5) Short in chassis wiring.	(5) Check by separating chassis to column connector. Connect E and F female contacts on the chassis side (bent paper clip will work). If buzzer sounds, continue diagnosis. If not, locate and repair chassis wiring.
If contact is made with the key in, and is not made with it out, the function is normal. Retrace initial diagnostic steps.	(6) Short or fault in signal switch wiring.	(6) Connect male E and F contacts of connector with jumper. Check buzzer switch pads with ohmmeter. If contact is made, function is normal. If not, replace signal switch.
If contact is not established, the fault is in the column. Proceed to NOTE 2.	(7) Chips, burrs, foreign material preventing actuator tip function. **Caution:** Key must be removed or cylinder in "run" position before removing lock cylinder.	(7) Remove chips, burrs, etc. Reassemble and recheck. Refer to NOTE 3.
	(8) Defective lock cylinder.	(8) With the lock cylinder out (observing caution under 7), fully insert and remove the key. The actuator should extend and retract smoothly. Total extension of tip should be 0.050 inch. If not, replace lock cylinder.
	(9) Chips, foreign material affecting buzzer switch operation.	(9) Remove and clean as required — reassemble and recheck per NOTE 3.
	(10) Damaged or broken buzzer switch.	(10) Replace buzzer switch.
	(11) Inoperative buzzer switch (Switch appears good but will not make buzzer switch function check.)	(11) Connect ohmmeter leads to the buzzer switch probes. Press on the actuator pad until the interior points contact. If contact is not made, replace buzzer switch.
	(12) Buzzer switch contact gap too large.	(12) Reset contact gap.

70345 J

Service Diagnosis—Key Warning Buzzer

Condition	Possible Cause	Correction
NOTE 2: With the fault isolated in the column, disassemble the upper end of the column until the signal switch mounting screws have been removed. Lift the switch and check the probes of the buzzer switch to ensure good contact with the pads in the signal switch. Bend probes, if required, then reseat the signal switch and install the three screws. Check the function, as in NOTE 1.	NOTE 3: If the fault has not yet been isolated and repaired, connect ohmmeter to the buzzer switch probes. Fully insert and remove the key from the lock cylinder. If contact is made with the key in, and is broken with it out, the function is normal. Retrace diagnostic steps starting at NOTE 2. If contact is not made, the fault is in the lock cylinder or buzzer switch.	**NOTE 4: Setting the contact gap.** Press a 0.030 inch wire type spark plug gap wire with flat piece of stock on the actuator pad. If contact is not made adjust switch until positive contact is made (use ohmmeter). With positive contact a 0.030 inch use a 0.0025 inch plug gap wire beneath the flat stock. No contact should occur. Adjust. When the switch will make contact with the 0.030 inch wire and not with the 0.025 inch wire, the buzzer switch is set at the low limit.
BUZZER CONTINUES TO OPERATE WITH KEY IN THE LOCK CYLINDER WITH THE DRIVER'S DOOR EITHER OPENED OR CLOSED AND CEASES WHEN KEY IS REMOVED.	(1) Door jamb switch on driver's side maladjusted or inoperative. (2) Wire from signal switch to door jamb switch shorted.	(1) Adjust or replace as required. (2) If on signal switch side, replace signal switch. If on chassis side, find and repair. NOTE 5: This condition indicates the lock cylinder or buzzer switch is at fault. To verify, check for continuity at the E and F male connector contacts with the key removed from the cylinder. If continuity exists, the fault is in the column.
BUZZER CONTINUES TO OPERATE WITH KEY OUT, BUT STOPS WHEN DRIVER'S DOOR IS CLOSED.	(1) Lock cylinder binding (Turn lock toward start position. If buzzer stops in run position or when turned past run towards start, the problem is a sticky lock cylinder actuator). (2) Chips, foreign material in lock cylinder bore. (3) Sticky lock cylinder actuator tip. (4) Damaged or broken buzzer switch. (5) Buzzer switch contact gap too close.	(1) Replace lock cylinder. (2) Remove, assemble and recheck function. (3) Replace lock cylinder. (4) Replace buzzer switch. (5) Adjust as specified.

70345K

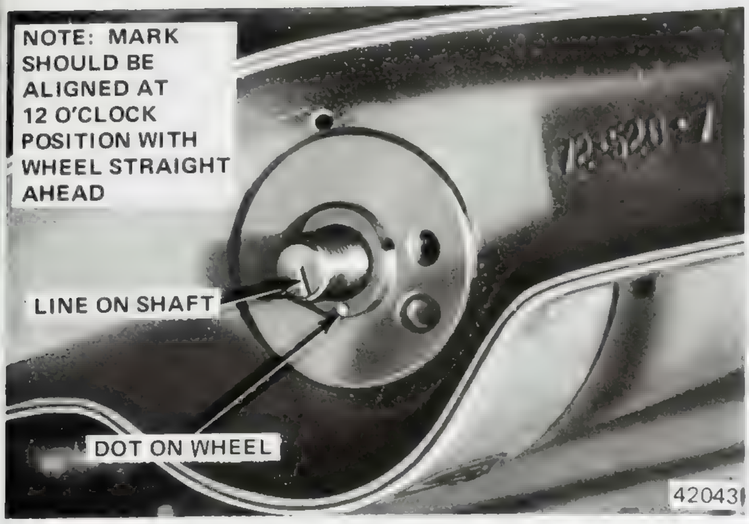


Fig. 2H-1 Steering Wheel Alignment Marks

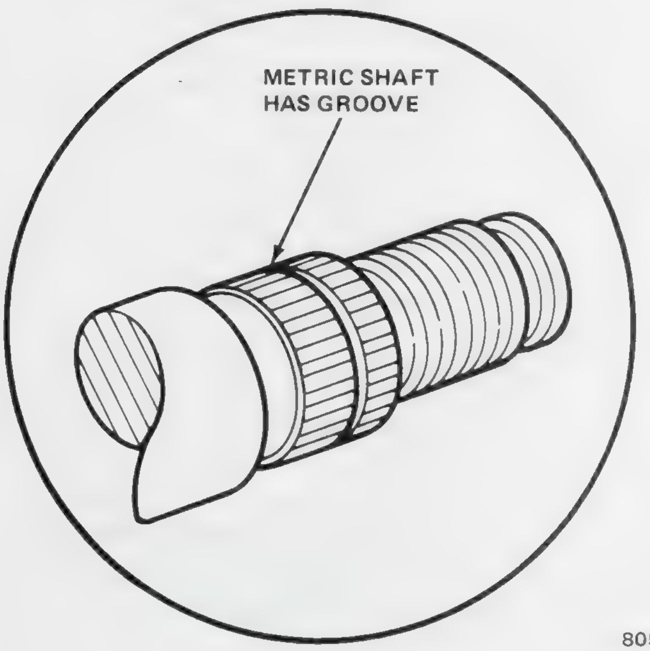


Fig. 2H-2 Metric Steering Shaft Identification

STEERING WHEEL INSTALLATION

CAUTION: *Some steering shafts have metric steering wheel nut threads. Inspect and identify the shaft nut thread-type before installing a replacement nut. Metric shafts have an identifying groove in the shaft steering wheel splines (fig. 2H-2). Metric nuts are color-coded blue for identification.*

(1) Align steering shaft and steering wheel marks, and install wheel on shaft (fig. 2H-1).

(2) Install washer and nut and tighten nut to 33.9 Nm (25 foot-pounds) torque.

CAUTION: *Verify the steering shaft nut thread-type before installing the nut (fig. 2H-2). Metric nuts are color-coded blue for identification.*

(3) Install horn ring parts and horn button.

(4) Install center-type horn button by indexing projection on rubber retaining ring with notch in cup and pushing cup down to engage ring.

(5) On screw-mounted horn buttons, install horn wire, press retainer in place, and install attaching screws.

(6) Connect battery negative cable.

(7) Reset clock if equipped.

STEERING COLUMN REMOVAL

CAUTION: *Handle the column carefully when it is removed from the car. A sharp blow on the end of the steering shaft or shift levers, leaning on the column assembly, or dropping the assembly could shear or loosen the plastic fasteners that maintain rigidity of the energy-absorbing feature of the column.*

(1) Disconnect battery negative cable.

(2) Paint identifying marks on intermediate shaft and gear to aid assembly.

(3) Remove flexible coupling nuts and disengage intermediate shaft from coupling.

(4) On column shift cars, disconnect shift rod from steering column shift lever (fig. 2H-3).

(5) Move seat to rear as far as possible.

(6) Remove lower finish panel or tube cover.

(7) Remove package tray, if equipped.

(8) Lift locking tab on steering column harness connector and separate column harness from instrument panel harness connector (fig. 2H-4).

(9) Press locking tabs on ignition switch harness connectors and disconnect harness from switch (remove black connector first).

(10) Disconnect Cruise Command harness connector, if equipped.

(11) On Pacer and Matador models, unhook quadrant cable from shift bowl (fig. 2H-5).

(12) Remove toeplate bolts from dash panel.

(13) Remove bolts attaching steering column mounting bracket to column.

CAUTION: *The column mounting bracket bolts are metric and are color-coded blue for identification. Keep these bolts with the bracket for assembly.*

(14) Support column assembly and remove nuts attaching column mounting bracket to instrument panel. Remove bracket and store in safe place to protect breakaway capsules (fig. 2H-6).

(15) Remove column assembly from car.

(16) Attach Holding Fixture J-23074 to column and mount column assembly in vise.

NOTE: *If the intermediate shaft is removed from the column, paint alignment marks on the column and shaft for assembly reference.*

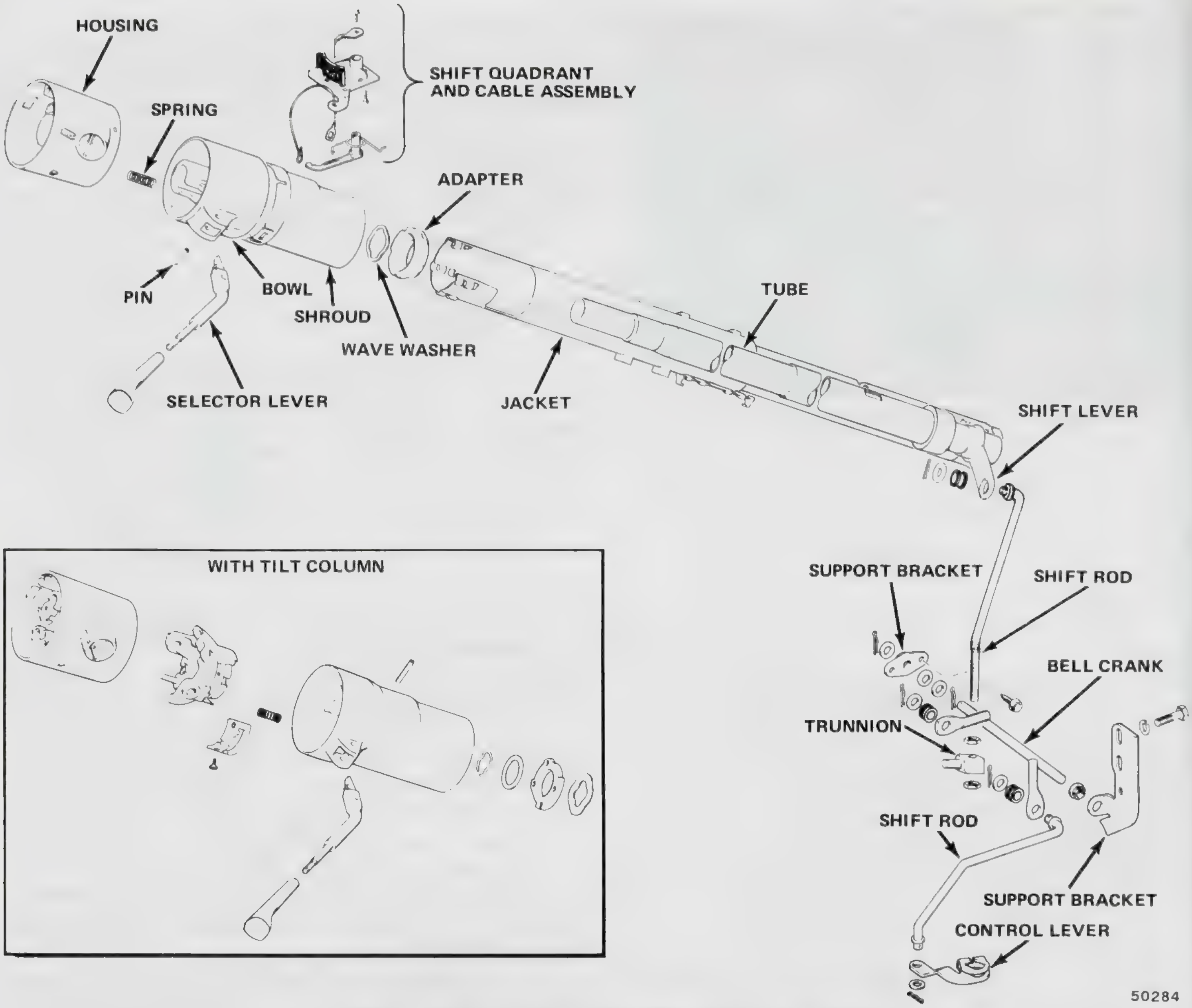


Fig. 2H-3 Gearshift Linkage—Column Shift Automatic Transmission

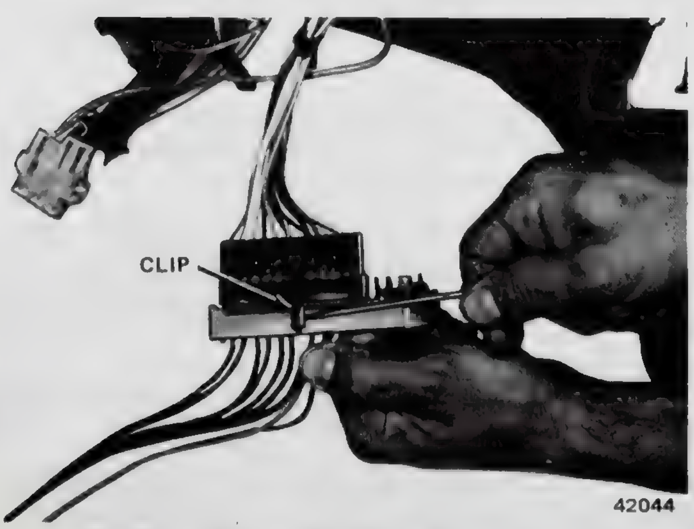


Fig. 2H-4 Disconnecting Column Harness Connector

STEERING COLUMN INSTALLATION

CAUTION: *Use only the specified screws, bolts, and nuts during assembly, and tighten them to the specified torque to maintain proper energy-absorbing action of the assembly. Over-length bolts must not be used as they may prevent a portion of the assembly from compressing under impact. The bolts or nuts attaching the column mounting bracket to the instrument panel must be tightened to the specified torque so the column mounting bracket will break away as designed under impact.*

(1) Remove column holding fixture and install mounting bracket on column. Tighten bracket attaching bolts to 27.1 Nm (20 foot-pounds) torque.

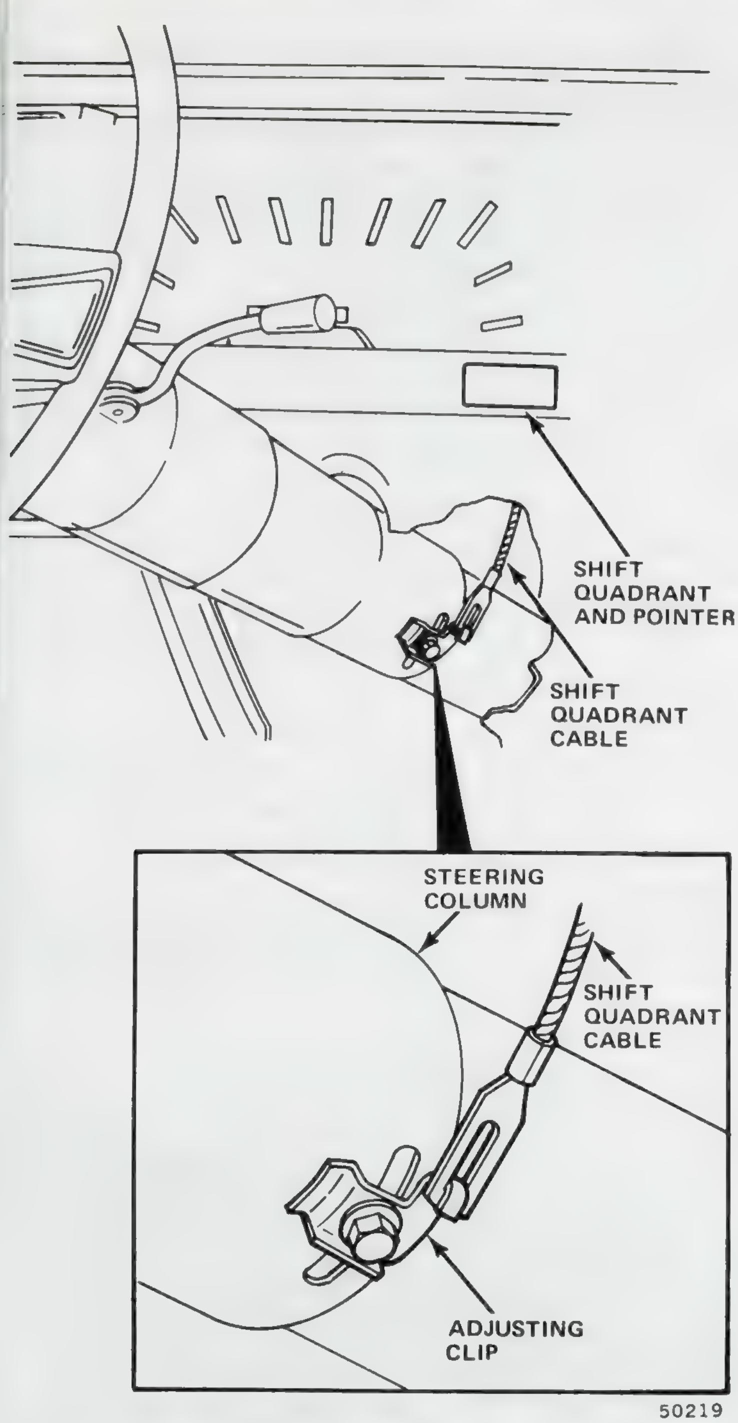


Fig. 2H-5 Quadrant Cable—Pacer-Matador

CAUTION: *The mounting bracket attaching bolts are metric and are color coded blue for identification. Be sure the correct bolts are installed.*

(2) If intermediate steering shaft was removed, install shaft on column using alignment marks made during removal.

(3) Install column in car.

(4) Engage intermediate shaft flange with steering gear flexible coupling, and loosely install two column mounting bracket-to-instrument panel attaching nuts. Finger-tighten nuts only.

(5) Install toeplate gasket, toeplate, and toeplate attaching bolts. Finger-tighten bolts only.

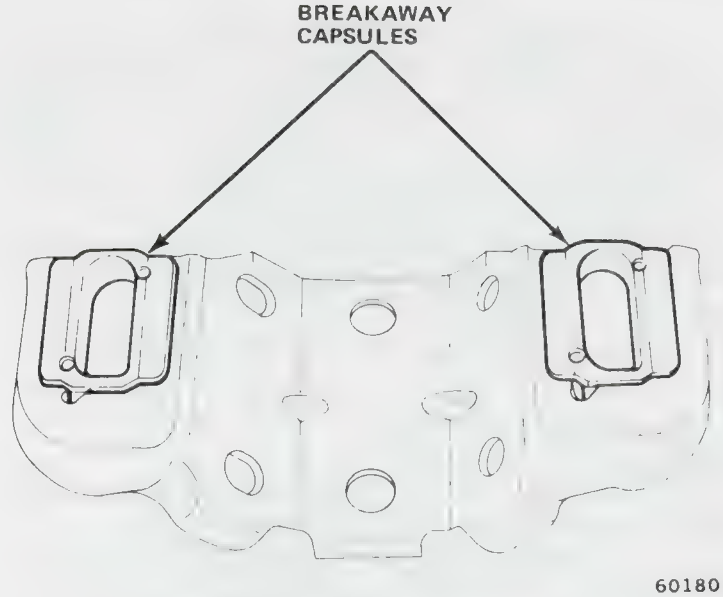


Fig. 2H-6 Column Mounting Bracket

(6) Install flexible coupling nuts and tighten to 30 foot-pounds (40.6 Nm) torque.

(7) Install remaining column mounting bracket-to-instrument panel attaching nuts. Finger-tighten nuts only.

(8) Position column so flexible coupling is flat and not distorted, and tighten column mounting bracket-to-instrument panel attaching nuts to 10 foot-pounds (13.5 Nm) torque.

(9) Align toeplate and clamp and tighten attaching bolts to 10 foot-pounds (13.5 Nm) torque.

(10) Connect shift linkage and check operation. Adjust if necessary.

(11) Connect quadrant cable to shift bowl, if equipped.

(12) Connect ignition switch harness, steering column harness, and Cruise Command connector, if equipped.

(13) Install lower finish panel, tube cover, or package tray, if equipped.

(14) Remove protective covering from column painted areas.

(15) Connect battery negative cable.

(16) Reset clock, if equipped.

STANDARD STEERING COLUMN OVERHAUL

Disassembly—Upper Section

NOTE: *Column removal is not necessary if only the upper section is to be serviced. However, if the complete column or lower section must be disassembled, remove the column, install Steering Column Support Fixture J-23074, and mount the column assembly in a vise. The following disassembly procedure applies to both column shift and floor shift standard steering columns, with minor differences noted where applicable.*

(1) Disconnect battery negative cable.
(2) Cover painted areas of column.
(3) Remove steering column tube cover or lower finish panel.
(4) Remove package tray, if equipped.
(5) Loosen toeplate attaching screws.
(6) On Pacer and Matador models, disconnect quadrant cable from flanged clip on lower right side of shift bowl (fig. 2H-5).
(7) Remove steering wheel. Refer to Steering Wheel Removal.
(8) Remove lockplate cover. Pry cover out of housing using two screwdrivers.
(9) Compress lockplate and unseat steering shaft snap ring as follows:

(a) Inspect and identify steering shaft nut thread type. Metric shafts have identifying groove in steering wheel locating splines (fig. 2H-2). American thread shafts do not have this groove.

(b) If shaft has American threads, use Lockplate Compressor Tool J-23653 as is to compress lockplate and unseat snap ring (fig. 2H-7).

(c) If shaft has metric threads, replace compressor tool forcing screw with Metric Forcing Screw J-23653-4 before installing tool on steering shaft (fig. 2H-7).

WARNING: *The lockplate is under considerable spring pressure. Do not attempt to remove the snap ring without using the compressor tool.*

(10) Remove lockplate compressor tool and snap ring. Discard snap ring.
(11) Remove lockplate, canceling cam, upper bearing preload spring, and thrust washer from shaft.

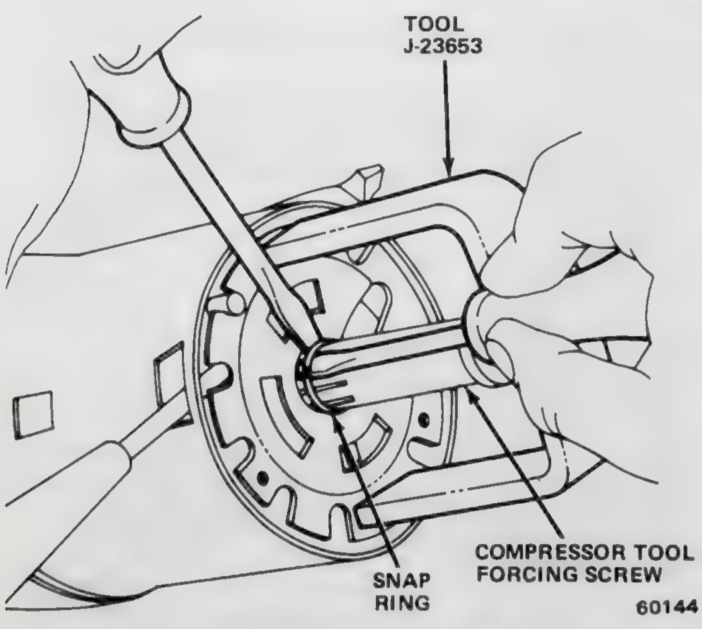


Fig. 2H-7 Steering Shaft Snap Ring Removal

(12) Place turn signal switch lever in right turn position and remove lever.
(13) Press hazard warning switch button inward and turn counterclockwise to remove.
(14) On cars with column shift automatic transmission, move gearshift lever to Park.
(15) Remove gearshift lever pivot pin using 1/4-inch (6.3 mm) punch and remove lever.
(16) Disconnect turn signal switch harness connector at mounting bracket on lower right side of column.
(17) Unhook plastic locking tab and disconnect turn signal switch harness from instrument panel harness (fig. 2H-4).
(18) On Gremlin, Concord, and AMX models with automatic transmission, depress lock tab which retains shift quadrant light wire in connector block using straightened paper clip and remove wire.
(19) Remove column mounting bracket attaching bolts and remove bracket.

CAUTION: *The mounting bracket attaching bolts are metric and are color code blue for identification. Keep these bolts with the bracket for assembly.*

(20) Remove plastic harness connector from bottom of column.
(21) Wrap tape around column harness connector to prevent snagging and remove harness (fig. 2H-8).

Fig. 2H-8 Turn Signal Switch Harness Removal

(22) Insert ignition key in lock cylinder, turn key to ON position, and remove key warning buzzer contacts. Use paper clip with right angle bend or needlenose pliers to remove switch and contacts (fig. 2H-9).

CAUTION: *Do not attempt to remove the switch and buzzer contacts separately, as the contacts can fall into the column assembly.*

(23) Turn key to LOCK position, press lock cylinder retaining tab inward and remove lock cylinder (fig. 2H-10).

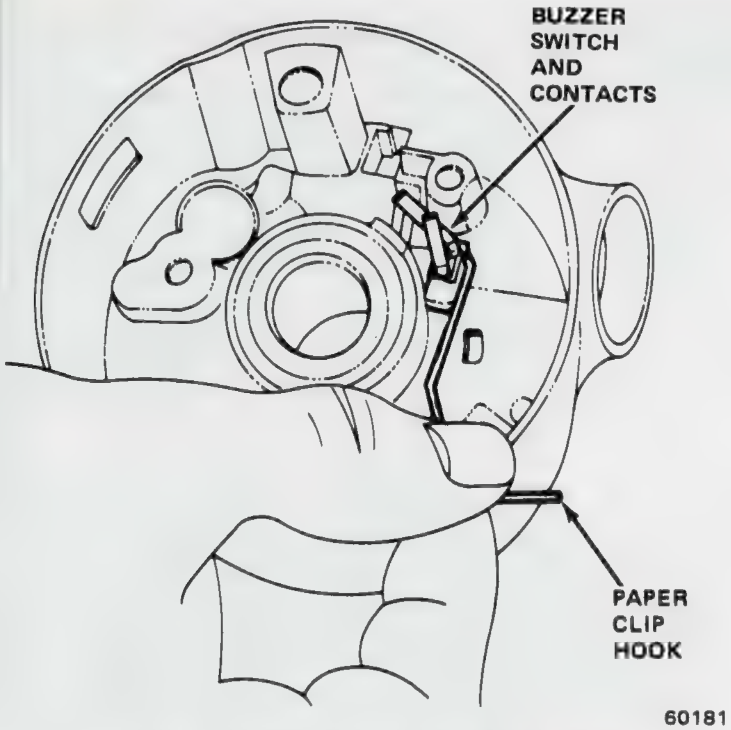


Fig. 2H-9 Removing Buzzer Switch and Contacts

NOTE: *If the tab is not visible through the access slot in the upper bowl, scrape or knock all flashing out of the slot (fig. 2H-10).*

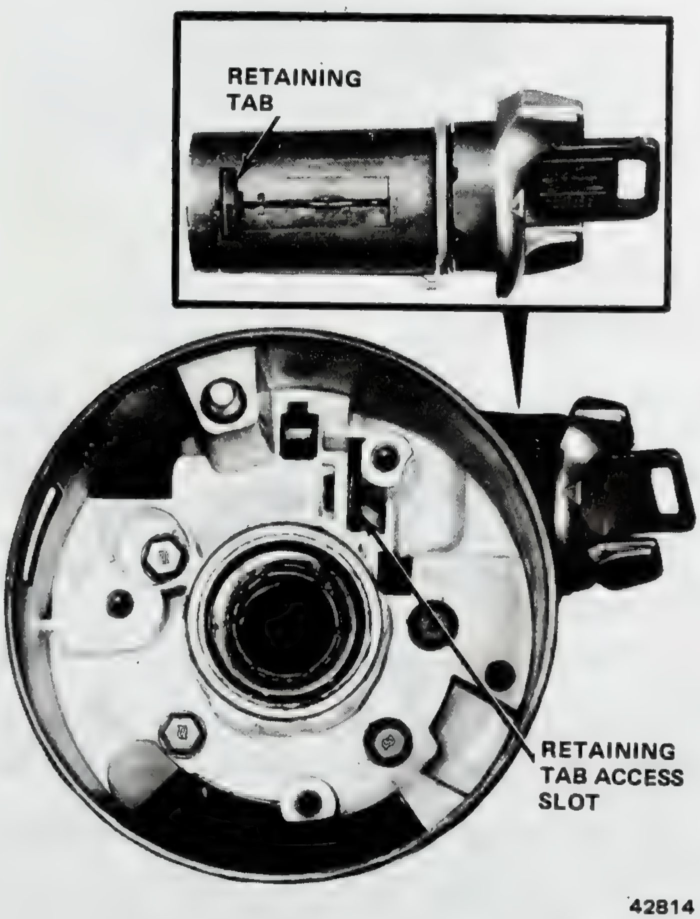


Fig. 2H-10 Lock Cylinder Retaining Tab Location

(24) Remove ignition switch from column.

(25) Remove upper housing retaining screws and remove upper housing, remote rod, and shift quadrant light wire, if equipped .

NOTE: *Proceed to the following steps if servicing a column shift column that is to be completely disassembled. If servicing a floor shaft column that is to be completely disassembled, proceed to step (36).*

(26) Remove thrust cup from upper housing (fig. 2H-11).

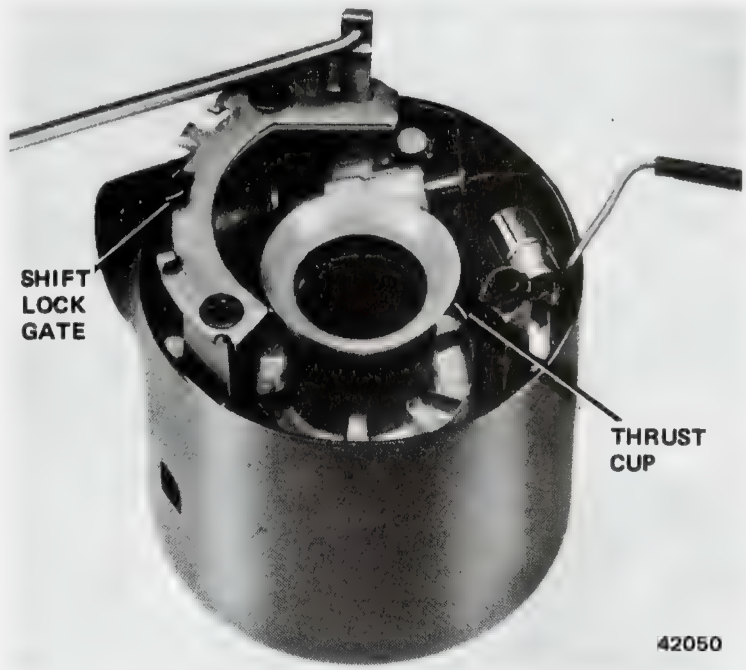


Fig. 2H-11 Thrust Cup Position

(27) Remove lock bolt and rack.

(28) Remove rack preload spring (fig. 2H-12).

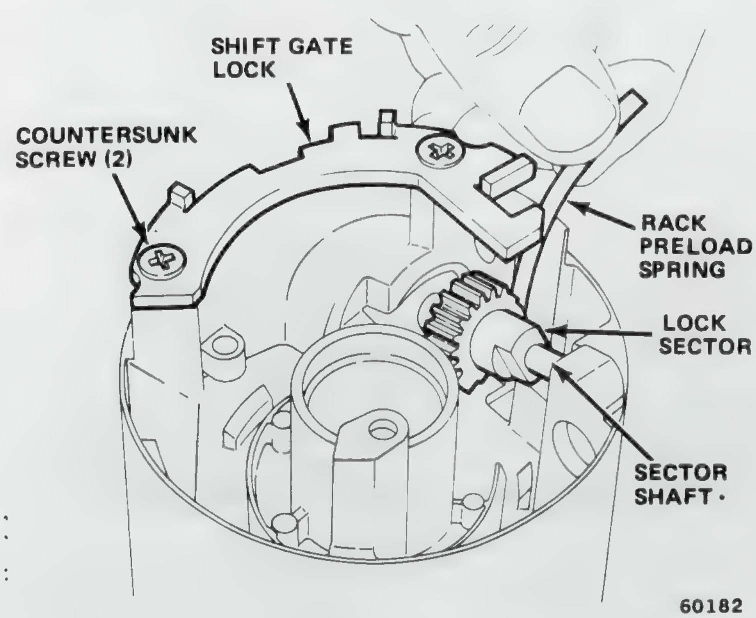


Fig. 2H-12 Rack Preload Spring Removal

(29) Note position of sector on shaft for assembly reference and remove sector using blunt punch.

(30) Remove shift gate lock from upper housing. Replace gate if excessively worn.

(31) On Gremlin, Concord, and AMX models, remove shift quadrant retaining clips using small punch to pry them out (fig. 2H-13).

(32) On Gremlin, Concord, and AMX models, remove shift quadrant light cover, remove screw which retains socket assembly, and remove assembly.

(33) Remove shift bowl from column.

(34) Remove nylon bearing from upper end of column jacket tube (fig. 2H-14).

NOTE: *If the lower section must also be disassembled, it is easier to remove the nylon bearing after the shift tube has been removed.*

Fig. 2H-13 Retainer Clip Removal—Gremlin-Concord-AMX

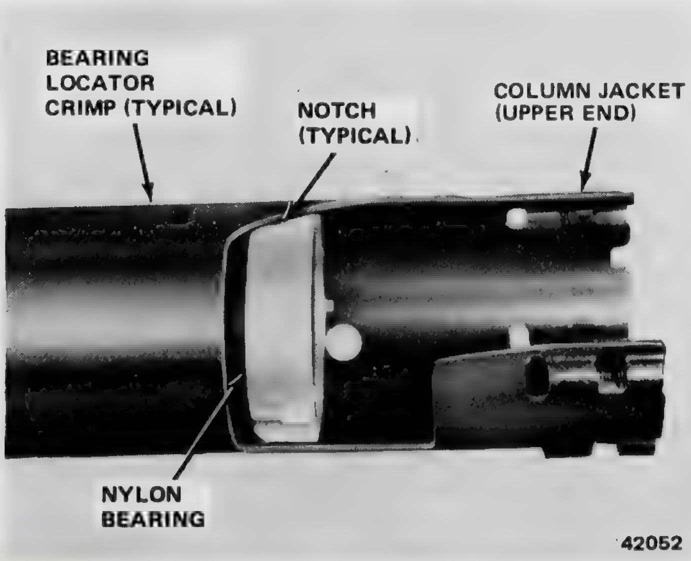


Fig. 2H-14 Nylon Bearing Position

(35) Remove screws attaching shroud to bowl (fig. 2H-15) and remove shroud.

(36) On key release columns, place rag over inhibitor lever pivot to prevent lever spring from flying out, and carefully remove inhibitor lever (fig. 2H-16).

(37) Remove inhibitor lever spring.

(38) Lift remote rod and rack assembly, and lock bolt and spring assembly out of housing. If rack preload spring requires service, remove it at this time.

(39) If lower section is to be disassembled, proceed to Lower Section Disassembly for Column Shift Steering Column or Floorshift Steering Column.

Fig. 2H-15 Shroud Removal

Lower Section Disassembly

Column Shift Steering Column

NOTE: *The steering column must be removed in order to service the lower section. If only the lower section is to be serviced, remove the lockplate cover, steering shaft snap ring, lock plate, canceling cam, upper bearing preload spring and thrust washer. Additional upper section disassembly is not necessary. Refer to Uper Section Disassembly.*

(1) Remove steering shaft from lower end of column.

(2) On column shift column, remove lower bearing retainer ring, lower bearing, preload spring, and nylon washer (fig. 2H-17).

(3) Remove shift tube bearing retaining screws and remove shift tube.

(4) If nylon shift tube bearing was not removed during upper section disassembly, remove it at this time.

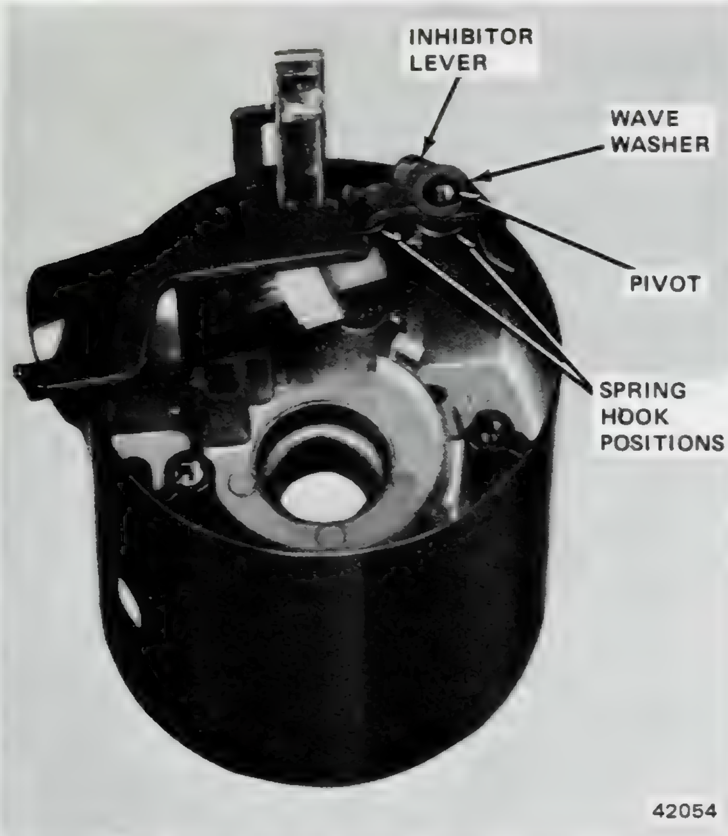


Fig. 2H-16 Key Release Column Inhibitor Lever

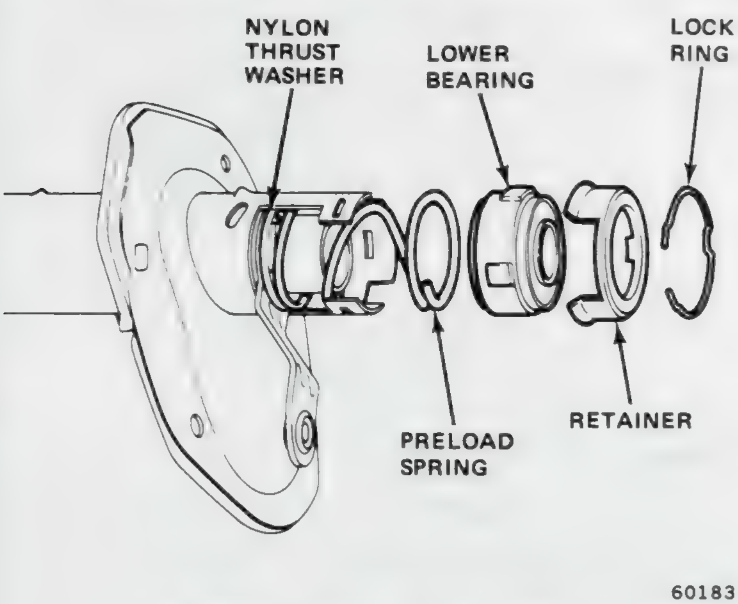


Fig. 2H-17 Lower Bearing Assembly

Floor Shift Steering Column

NOTE: *The steering column must be removed in order to disassemble the lower section. If only the lower section is to be serviced, remove the lockplate cover, steering shaft snap ring, lock plate, canceling cam, upper bearing preload spring and thrust washer. Additional upper section disassembly is not necessary.*

(1) Remove steering shaft from lower end of column.

(2) Remove lower bearing retaining clip retainer and lower bearing (fig. 2H-17).

Lower Section Assembly

NOTE: *Apply chassis grease to all friction and bearing surfaces before assembly.*

Floor Shift Steering Column

(1) Install nylon thrust washer.
(2) Install preload spring (fig. 2H-17).
(3) Install lower bearing with metal face of bearing toward retainer.
(4) Install bearing retainer and lockring.
(5) If complete column overhaul is being performed, continue with Upper Section Assembly
(6) If complete column overhaul is not being performed and lower section only was disassembled, install steering shaft, thrust washer and preload spring, upper bearing, canceling cam, lock plate, steering shaft snap ring, and lockplate cover. Refer to Upper Section Assembly.

Column Shift Steering Column

(1) Install shift tube (fig. 2H-19).
(2) Install nylon thrust washer on lower end of shift tube with flat side facing upper end of column (fig. 2H-17).
(3) Install preload spring.
(4) Install lower bearing with metal face toward retainer, and install retainer and lockring.
(5) If complete column overhaul is being performed, proceed to Upper Section Assembly.
(6) If complete column overhaul is not being performed and lower section only was disassembled, install steering shaft, thrust washer and preload spring, upper bearing, canceling cam, lock plate, steering shaft snap ring, and lockplate cover. Refer to Upper Section Assembly.

Upper Section Assembly

Floor Shift Steering Column

(1) Apply chassis grease to all friction and bearing surfaces.
(2) Install lock sector in upper housing. Insert large end of sector through lock cylinder hole and slide sector on shaft. Press sector onto shaft using blunt punch.
(3) If removed, insert rack preload spring into housing from lower end. Hook both ends of spring onto housing.
(4) Assemble lock bolt, rack, and remote rod (fig. 2H-20) and install in housing.

NOTE: *First tooth of rack must engage between first and second teeth of sector.*

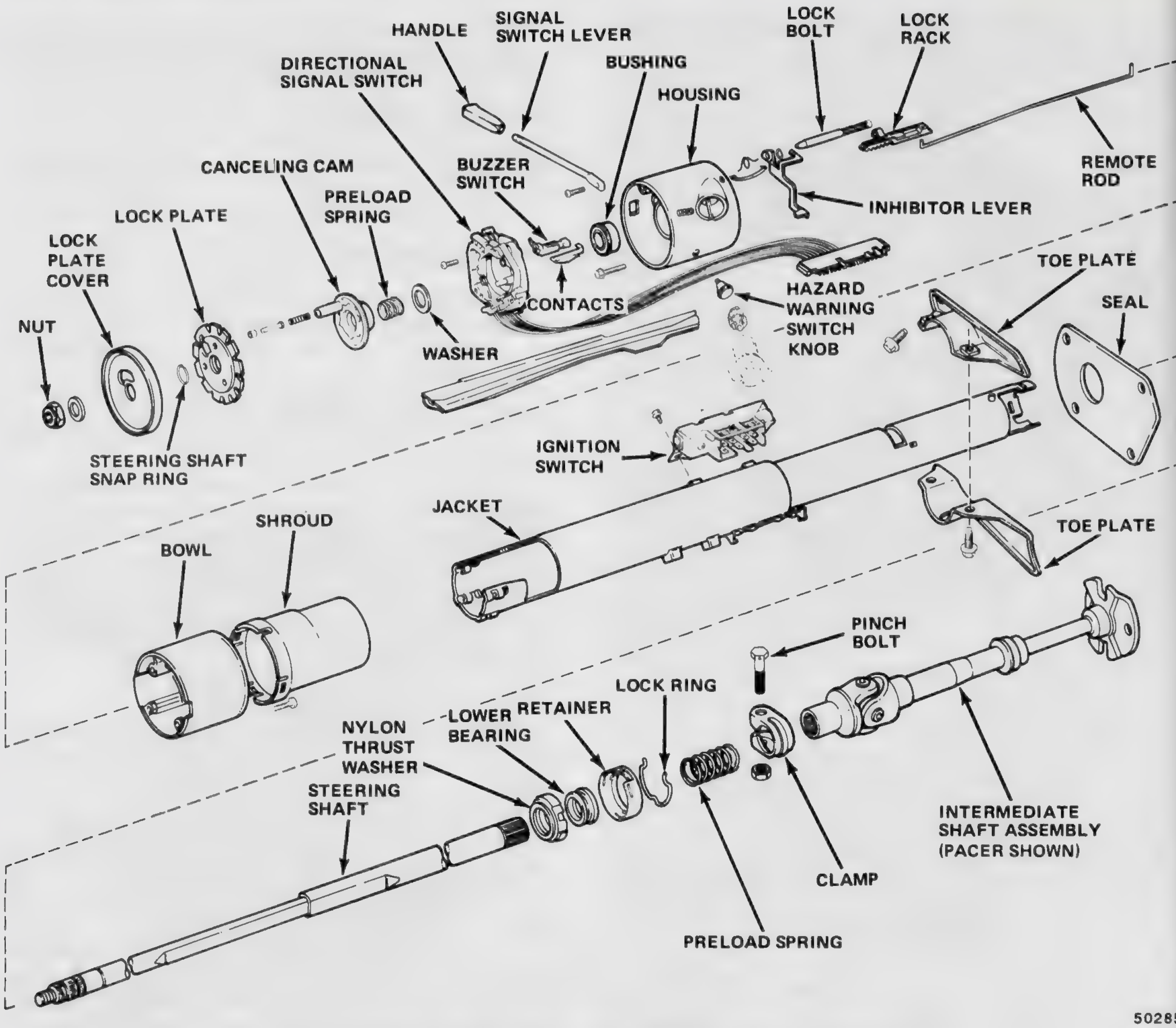


Fig. 2H-18 Standard Column—With Floorshift Manual or Automatic Transmission

(5) Place key release inhibitor lever spring over lever pivot on housing.

(6) Position inhibitor lever on pivot with one end of spring hooked on lever.

(7) Press inhibitor lever pivot down and insert opposite end of spring in housing slot.

(8) Install wave washer on pivot.

(9) Install shroud over remote rod and on housing.

(10) Install and tighten shroud attaching screws to 18 inch-pounds (2.0 Nm) torque.

(11) To complete assembly of floor shift column, refer to Column Shift Steering Column, steps (12) through (40).

Column Shift Steering Columns

(1) Insert lower bowl nylon bearing in upper end of jacket tube. Be sure bearing is installed with smaller inside diameter facing lower end of jacket tube and that bearing notches are engaged in three locator crimps in column (fig. 2H-14).

(2) Align shift bowl with shift tube spline and install bowl.

(3) Install rack preload spring in upper housing (fig. 2H-12).

(4) Place large end of sector on sector shaft and press sector on shaft using blunt punch.

(5) Install shift gate lock and install countersunk attaching screws.

(6) On Gremlin, Concord, and AMX models with column shift automatic transmission, install shift quadrant (fig. 2H-13).

(7) Align shift quadrant and install retainer clips with flat sides facing bowl.

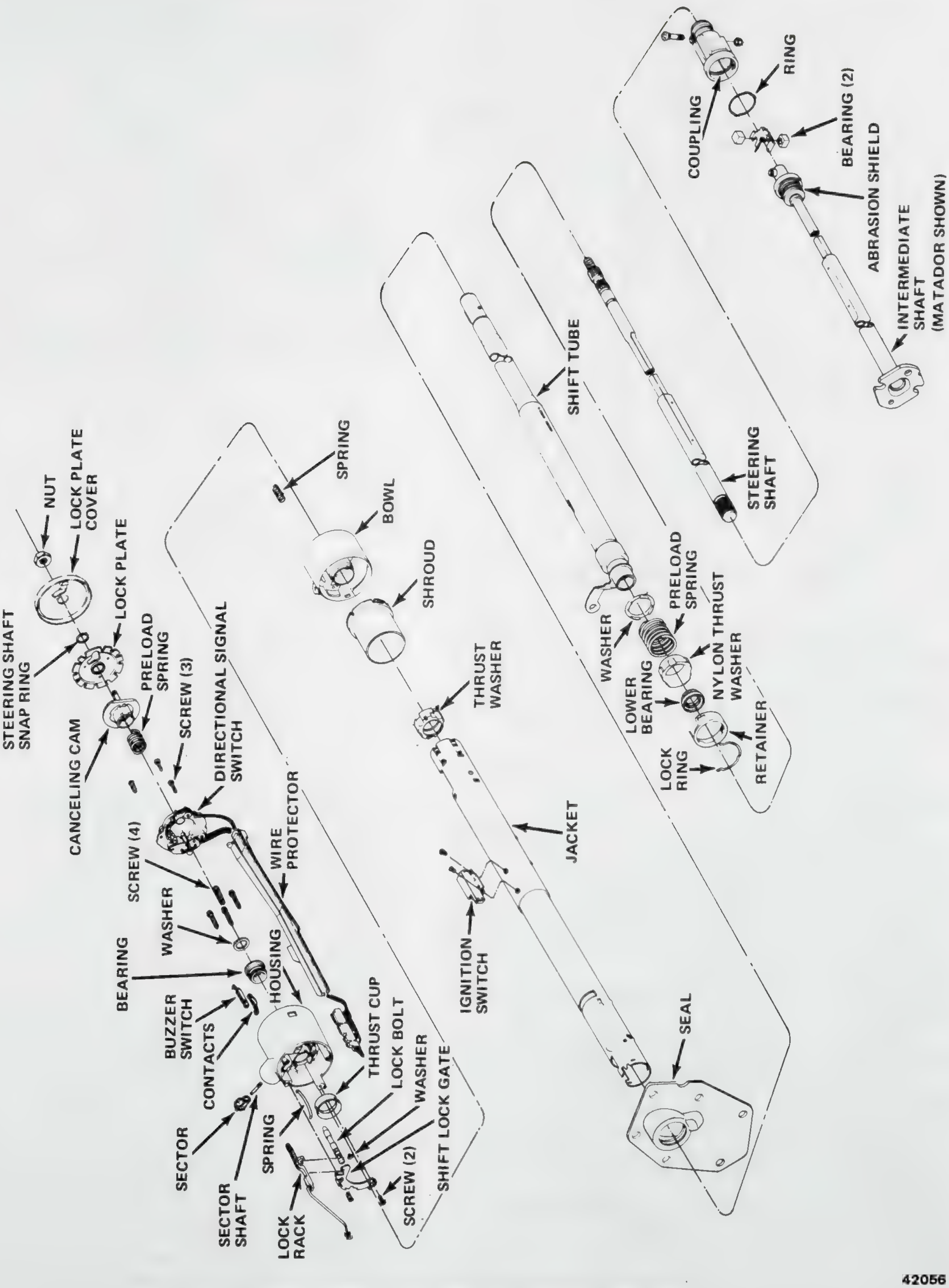


Fig. 2H-19 Standard Column—With Column Shift Automatic Transmission

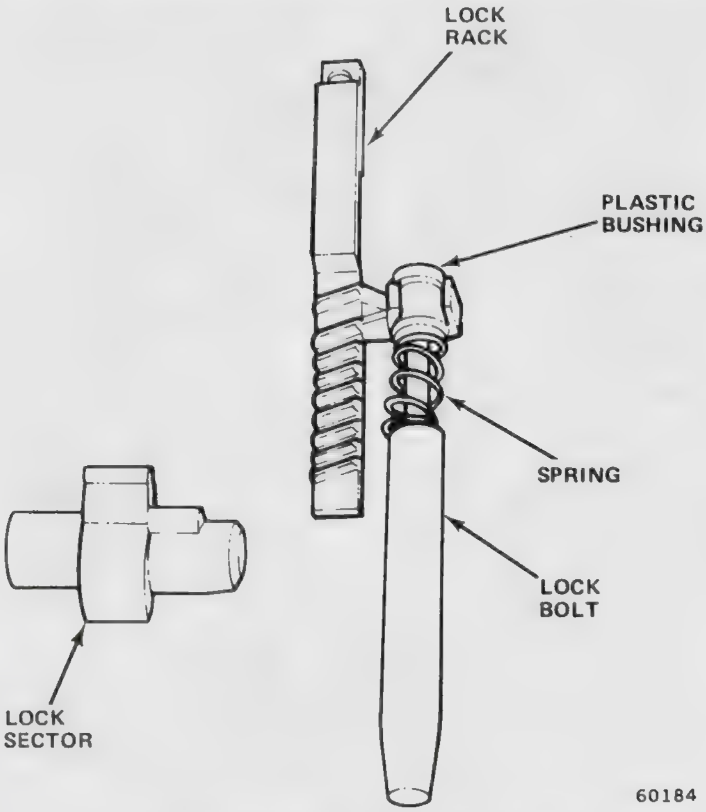


Fig. 2H-20 Lock Bolt, Lock Rack, and Sector

(8) Assemble lock bolt and rack (fig. 2H-20) and install assembly in bowl.

NOTE: *First tooth of rack must be engaged between first and second teeth of sector.*

(9) Install thrust cup in housing with flared end facing out (fig. 2H-11).

(10) Rotate bowl counterclockwise to stop, and install housing on column. Tighten housing screws to 60 inch-pounds (6.7 Nm) torque.

(11) On Gremlin, Concord, and AMX models with column shift automatic transmission, guide shift quadrant light wire and remote lock rod into position between bowl and column jacket.

(12) Assemble key warning switch and buzzer contacts.

(13) Install key warning buzzer switch with buzzer contact brass tabs pointing upward (fig. 2H-9).

(14) Install turn signal switch assembly. Guide wire harness into position and align switch .

(15) Remove tape from turn signal switch harness connector and position wires in column protector and jacket.

(16) Install and tighten turn signal switch retaining screws to 35 inch-pounds (3.9 Nm) torque.

NOTE: *Be sure the turn signal switch actuating lever pivot is correctly aligned and seated in the upper housing pivot boss before installing the retaining screws.*

(17) Install steering column mounting bracket. Tighten bolts to 20 foot-pounds (27.1 Nm) torque.

(18) Install intermediate shaft on steering shaft, if removed. Tighten pinch bolt to 48 foot-pounds (65.0 Nm) torque.

(19) Install steering column, if removed. Refer to Steering Column Installation.

(20) Install turn signal lever and actuate turn signal switch to check operation.

(21) Install steering shaft.

(22) Install thrust washer, spring, and canceling cam on upper end of steering shaft.

(23) Align lockplate with lock bolt and canceling cam shaft (fig. 2H-21).

(24) Install replacement steering shaft snap ring on forcing screw of Lockplate Compressor Tool J-23653 and install tool on steering shaft (fig. 2H-7).

CAUTION: *Identify the steering shaft nut thread type before installing the compressor tool. If the shaft has American threads, use the tool as is. However, if the shaft has metric threads (fig. 2H-2), replace the compressor tool forcing screw with Metric Forcing Screw J-23653-4 before using the tool.*

(25) Compress lockplate and seat snap ring in steering shaft groove.

(26) Remove compressor tool. Be sure snap ring is completely seated in steering shaft.

(27) Install lockplate cover.

(28) Align canceling cam and index marks on steering shaft with steering wheel and install wheel.

(29) Install and tighten steering wheel nut to 33.9 Nm (25.0 foot-pounds) torque.

CAUTION: *Some steering shafts have metric steering wheel nut threads. Identify the shaft thread-type before installing a replacement nut. Metric shafts have an identifying groove in the shaft nut thread splines (fig. 2H-2). American thread shafts do not have this groove.*

(30) Install hazard warning switch button and steering wheel trim cover.

(31) Install gearshift lever.

(32) Install ignition switch, if removed. Tighten switch screws to 35 inch-pounds (3.9 Nm) torque.

(33) Install ignition lock cylinder.

(34) On Pacer and Matador models, connect quadrant cable to adjusting clip on shift bowl.

(35) If quadrant cable requires adjustment, place shift lever in Neutral, loosen cable retaining nut, and move adjusting clip up or down to align pointer with Neutral detent on quadrant and retighten retaining nut.

(36) Install steering column tube cover or lower finish panel.

(37) Install package tray, if equipped.

(38) Remove protection from column painted areas.

(39) Connect battery negative cable.

(40) Reset clock, if equipped.

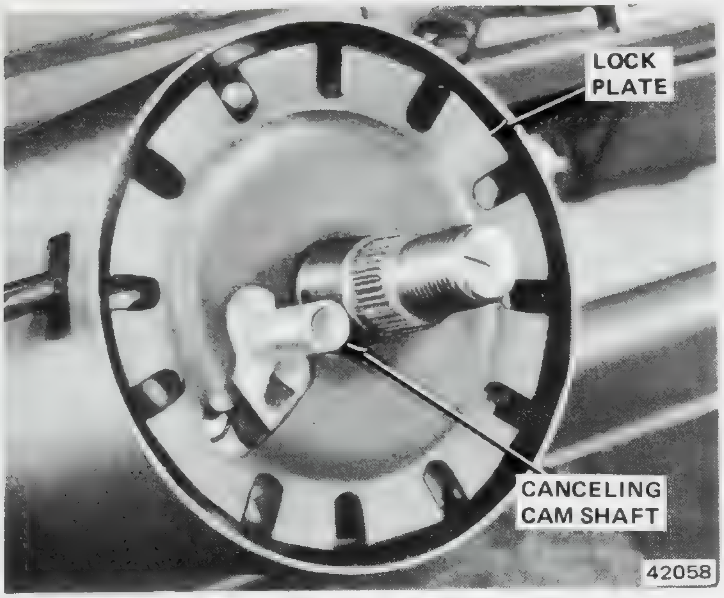


Fig. 2H-21 Lock Plate Alignment

SWITCHES—KEY BUZZER—LOCK CYLINDER REPLACEMENT

The following procedure covers replacement of the Cruise Command switch, turn signal switch, key buzzer contacts and switch, and ignition lock cylinder.

Removal

(1) Disconnect battery negative cable.

(2) Cover painted areas of steering column.

(3) On cars with tilt column, place column in neutral (straight) position.

(4) Remove steering wheel. Refer to Steering Wheel Removal.

(5) Remove lockplate cover.

(6) Compress lockplate and unseat steering shaft snap ring as follows:

(a) Identify steering shaft nut thread-type. Metric shafts have identifying groove in shaft steering wheel locating splines (fig. 2H-2). American thread shafts do not have this groove.

(b) If shaft has American threads, use compressor tool as is compress lockplate and unseat snap ring.

(c) If shaft has metric threads, replace compressor tool standard forcing screw with Metric Forcing Screw J-23653-4 before installing tool on steering shaft.

(7) Remove compressor tool and snap ring. Discard snap ring.

(8) Remove lockplate, canceling cam, and upper bearing preload spring and thrust washer.

(9) Place turn signal switch lever in right turn position and remove lever and switch retaining screws.

(10) Press hazard warning light switch button inward and remove it by turning counterclockwise.

(11) Remove package tray, if equipped.

(12) Remove lower finish panel or steering column tube cover.

(13) Loosen toeplate bolts.

(14) Disconnect turn signal switch wire harness connector from column connector. Lift locking tab, and separate signal switch harness from instrument panel harness.

(15) On Gremlin, Concord, and AMX models with column shift automatic transmission, use paper clip to depress locking tab retaining shift quadrant light wire in directional signal harness connector.

(16) Remove steering column mounting bracket bolts.

CAUTION: *The mounting bracket attaching bolts are metric and are color-coded blue for identification. Keep these bolts with the bracket for assembly.*

(17) Remove turn signal switch wire harness protector from bottom of column.

(18) Wrap tape around connector to prevent snagging, move gearshift lever to Park and remove signal switch harness.

(19) Insert ignition key in lock cylinder, turn key to On position, and remove key warning buzzer switch and contacts. Use paper clip with right-angle bend or needlenose pliers to remove switch and contacts (fig. 2H-9).

CAUTION: *Remove the switch and contacts as an assembly only. If removed separately, the contacts may fall into the column.*

(20) Turn ignition key to Lock position, compress lock cylinder retaining tab, and remove lock cylinder (fig. 2H-10) If tab is not visible through slot, scrape or knock casting flash out of slot.

Installation

(1) Apply chassis grease to all friction surfaces except lock bolt and lock bolt hole.

(2) Insert ignition key in lock cylinder and turn cylinder to full counterclockwise position.

(3) Align cylinder sleeve with housing keyway and insert cylinder in housing.

(4) Push cylinder into housing until it stops against lock sector.

(5) Turn key counterclockwise and push cylinder inward until it mates with lock sector and cylinder retainer snaps into place.

(6) Turn ignition key to Run position and install buzzer switch and contacts (fig. 2H-9).

(7) Install turn signal switch harness and install plastic protector around wires.

(8) On Gremlin, Concord, and AMX models, connect shift quadrant light wire to signal harness connector, and connect signal switch harness to instrument panel harness.

(9) Fasten harness connector to steering column bracket.

(10) Install column mounting bracket on column. Tighten bolts to 27.1 Nm (20 foot-pounds) torque.

CAUTION: *The mounting bracket bolts are metric and are color-coded blue for identification. Be sure the correct bolts are installed.*

(11) Attach column mounting bracket to instrument panel. Tighten bolts or nuts to 10 foot-pounds (13.5 Nm) torque.

(12) Install and tighten turn signal switch retaining screws to 35 inch-pounds (3.9 Nm) torque.

(13) Install hazard warning switch knob and install turn signal lever. Check operation after installation.

(14) Install thrust washer, spring, and canceling cam on steering shaft.

(15) Align lockplate splines with lock bolt and canceling cam and install lockplate with canceling cam shaft protruding through dogleg opening in plate (fig. 2H-21).

(16) Install replacement steering shaft snap ring on forcing screw of Lockplate Compressor Tool J-23653 and install tool on steering shaft (fig. 2H-7).

CAUTION: *Identify the steering shaft nut thread-type before installing the compressor tool. If the shaft has American threads, use the tool as is. However, if the shaft has metric threads (fig. 2H-2), replace the compressor tool forcing screw with Metric Forcing Screw J-23653-4 before using the tool.*

(17) Compress lockplate, install snap ring, and remove tool.

(18) Compress lockplate and install snap ring in steering shaft groove.

(19) Remove compressor tool. Be sure snap ring is completely seated.

(20) Install lockplate cover.

(21) Align canceling cam and steering wheel alignment marks with steering wheel and install wheel.

(22) Install and tighten steering wheel nut to 25 foot-pounds (33.9 Nm) torque.

CAUTION: *Some steering shafts have metric steering wheel nut threads. Identify the shaft nut thread-type before installing a replacement nut. Metric shafts have an identifying groove in the steering wheel locating splines (fig. 2H-2). Metric steering wheel nuts are color-coded blue for identification*

(23) Install horn cover.

(24) Tighten toeplate bolts to 10 foot-pounds (13.5 Nm) torque.

(25) Install steering column tube cover or lower finish panel.

(26) Install package tray, if equipped.

(27) Remove protection from painted areas of column.

(28) Connect battery negative cable.

(29) Reset clock, if equipped.
column.

(30) Reconnect battery negative cable.

TILT STEERING COLUMN OVERHAUL

Upper Section Disassembly

NOTE: *Although it is possible to disassemble the column down to the upper housing with the column in the car, the column must be removed if disassembly is to be more extensive. If the column is removed, remove the column mounting bracket, install Support Fixture J-23074 on the column, and mount the column in a vise.*

(1) Disconnect battery negative cable.

(2) Cover painted areas of column.

(3) Remove steering column tube cover or lower finish panel.

(4) Remove package tray, if equipped.

(5) On Pacer and Matador models, disconnect quadrant cable at steering column (fig. 2H-5).

(6) Remove steering wheel. Refer to Steering Wheel Removal.

(7) Remove gearshift lever retaining pin and gear shift lever.

(8) Remove lockplate cover.

(9) Compress lockplate and unseat steering shaft snap ring as follows:

(a) Identify steering shaft nut thread-type. Metric shafts have identifying groove in steering wheel locating splines (fig. 2H-2). American thread shafts do not have this groove.

(b) If shaft has American threads, use compressor tool as is to compress lockplate and unseat snap ring (fig. 2H-7).

(c) If shaft has metric threads, replace compressor tool standard forcing screw with Metric Forcing Screw J-23653-4 before installing tool on steering shaft (fig. 2H-7).

WARNING: *The lockplate is under considerable spring pressure. Do not attempt to remove it without using the compressor tool.*

(10) Remove compressor tool and snap ring.

(11) Remove lockplate, canceling cam, upper bearing preload spring, bearing race seat, and bearing race.

(12) Remove turn signal switch wire harness connector from mounting bracket on lower right side of column.

(13) Remove column mounting bracket from column.

CAUTION: *The mounting bracket bolts are metric and are color-coded blue for identification. Keep these bolts with the bracket for assembly.*

(14) Loosen toeplate bolts.

(15) Remove turn signal switch harness plastic protector from column jacket.

(16) Wrap length of tape around turn signal switch harness connector to prevent snagging (fig. 2H-8).

(17) Remove turn signal switch retaining screws and pull switch and wire harness out of column.

(18) Insert ignition key in lock cylinder, turn key to ON position, and remove key warning buzzer switch and contacts. Use paper clip with right angle bend or needlenose pliers to remove switch and contacts (fig. 2H-9).

CAUTION: *Do not attempt to remove the switch or contacts separately, as the contacts could separate from the switch and fall into the column.*

(19) Turn ignition key to LOCK position, press lock cylinder retaining tab inward, and remove lock cylinder (fig. 2H-10).

NOTE: *If the tab is not visible through the housing slot, scrape or knock all casting flash out of the slot.*

(20) On Gremlin Concord, and AMX models, remove shift quadrant. Quadrant is retained by spring clips which may be removed using long-nosed pliers (fig. 2H-13).

(21) Remove shift quadrant mounting bracket and light socket, if equipped.

(22) Remove tilt release handle.

(23) Unhook lock sector tension spring from lock bolt, remove lock sector tension spring retaining screw, and remove spring.

(24) Remove sector shaft snap ring and remove lock sector, sector shaft, and lockpin.

(25) Install tilt lever and place housing in full upward tilt position.

(26) Insert screwdriver in tilt spring retainer slot. Compress retainer approximately 3/16 inch (4.7 mm), rotate 1/8-turn counterclockwise, and remove retainer and spring.

WARNING: *Be careful when releasing the tilt spring. It has a high tension rate and is almost fully compressed in the installed position.*

(27) Place housing in neutral (straight) position.

(28) Remove pivot pins using Pivot Pin Remover Tool J-21854-1 (fig. 2H-22).

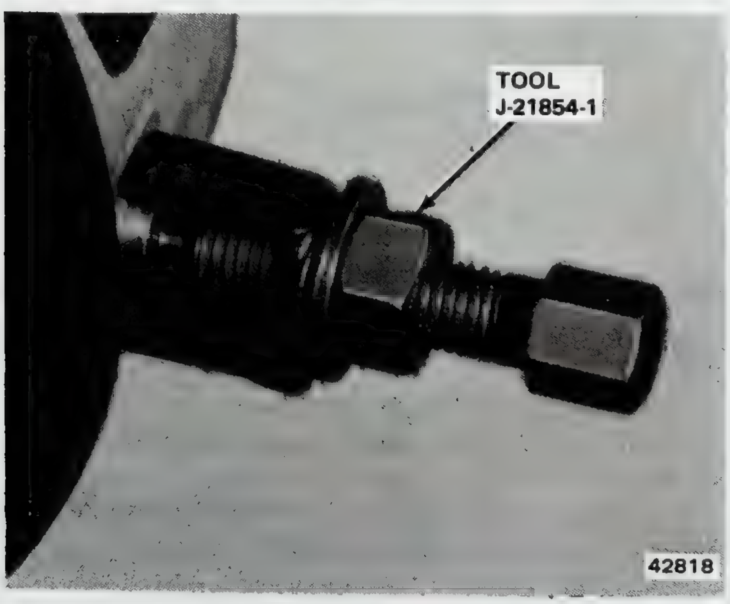


Fig. 2H-22 Pivot Pin Removal

(29) Lift tilt lever to disengage lock shoes and remove housing assembly.

(30) Place housing on bench and remove tilt release lever pin using punch or tool J-22635 (fig. 2H-23) and remove release lever.

(31) Remove lock shoe pin from housing using pin punch or tool J-22635 (fig. 2H-24).

NOTE: *To ease pin removal, hold the lock shoe springs in compression to relieve spring load on the pins.*

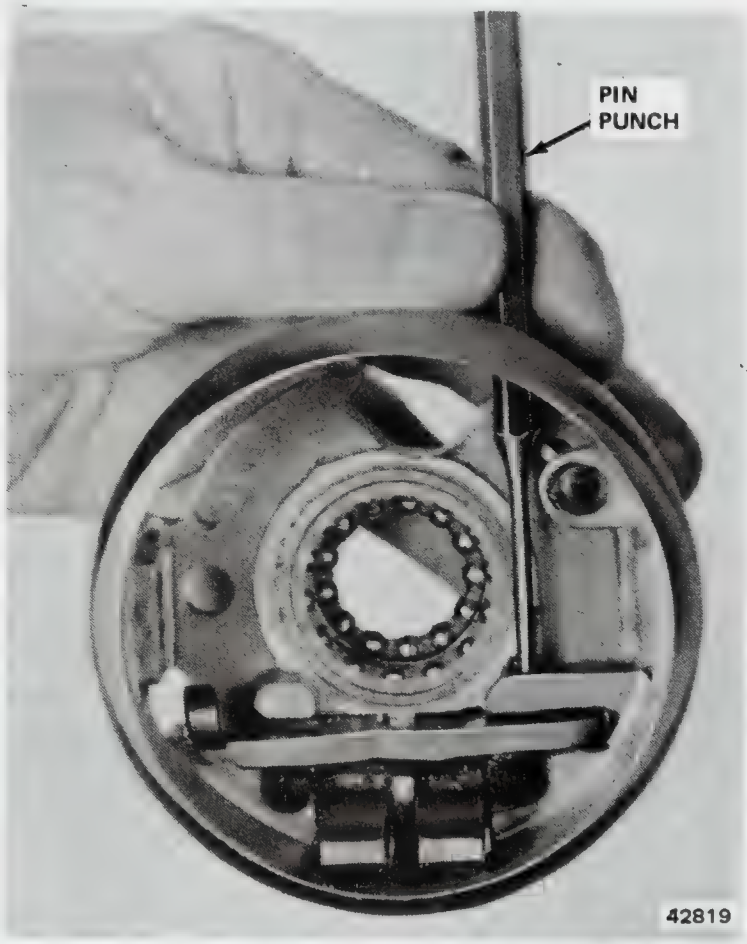


Fig. 2H-23 Release Lever Pin Removal

(32) Remove steering shaft from upper end of column.

(33) Disassemble shaft by bending it 90° at spherical joint and disengaging upper and lower shaft sections (fig. 2H-25).

(34) Remove ignition switch from base of column.

(35) Remove lock rack and remote rod.

(36) Remove lower bearing snap ring, retainer, bearing and adapter, and preload spring.

(37) Remove support attaching screws and remove support.

(38) Remove shift gate retaining pin and remove shift gate.

(39) Remove shift tube retainer ring and thrust washer.

(40) Remove shift tube using Remover Tool J-23072 (fig. 2H-26).

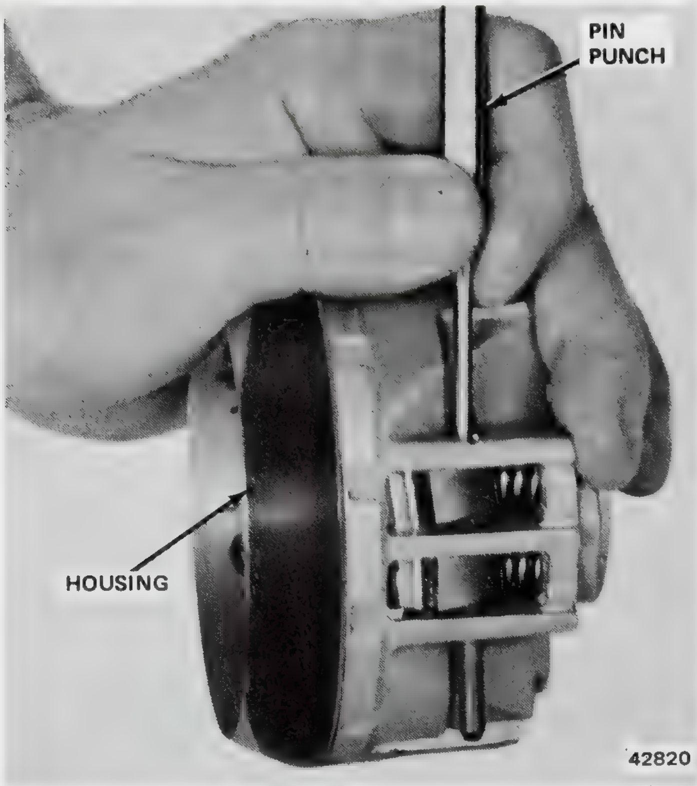


Fig. 2H-24 Lock Shoe Pin Removal

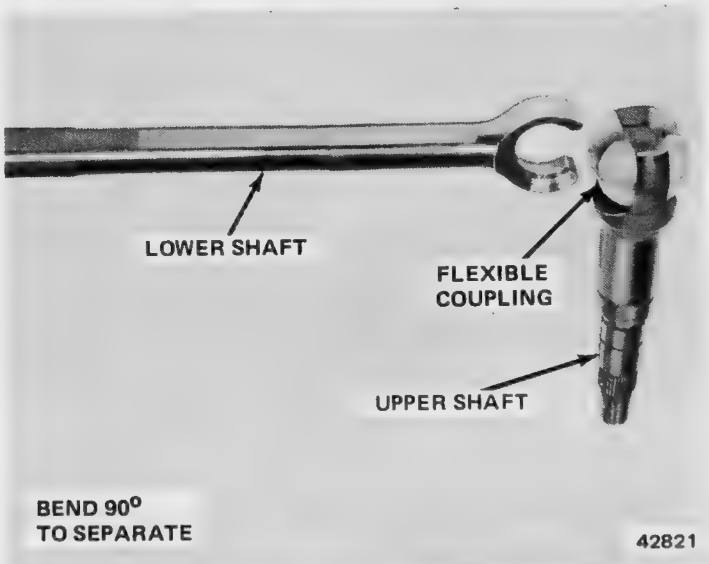


Fig. 2H-25 Steering Shaft Disassembly

(41) Remove retainer plate by rotating shift bowl clockwise, sliding plate out of jacket notches, tipping it down toward shift bowl hub at 12 o'clock position, and removing plate bottom side first (fig. 2H-27).

(42) Remove wave washer, preload spring, and shift bowl from column.

Lower Section Disassembly and Assembly

For disassembly and assembly of the tilt column lower section, refer to the procedures outlined in Lower Section Disassembly and Assembly—Standard Steering Column Overhaul.

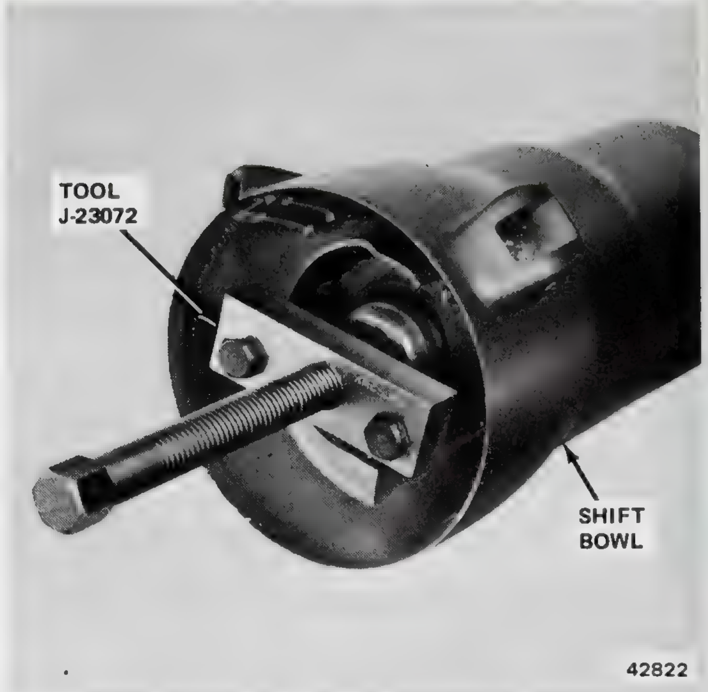


Fig. 2H-26 Shift Tube Removal

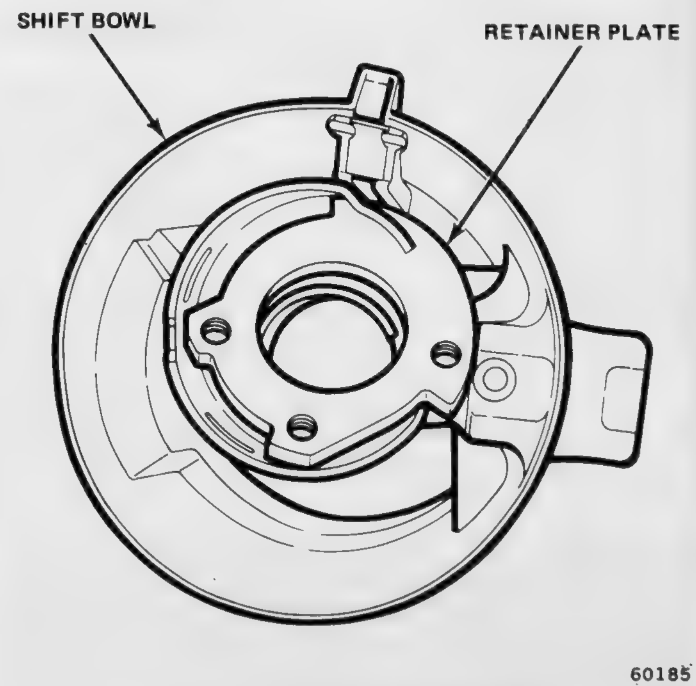


Fig. 2H-27 Retainer Plate Removal

Upper Section Assembly

(1) Apply chassis grease to all friction and bearing surfaces.

(2) Position shift bowl on column.

(3) Install wave washer and retainer plate in column.

(4) Install shift tube in lower end of column jacket and align tube spline with shift bowl keyway.

(5) Insert Installer Tools J-23073-2 and -4 into shift tube (fig. 2H-29).

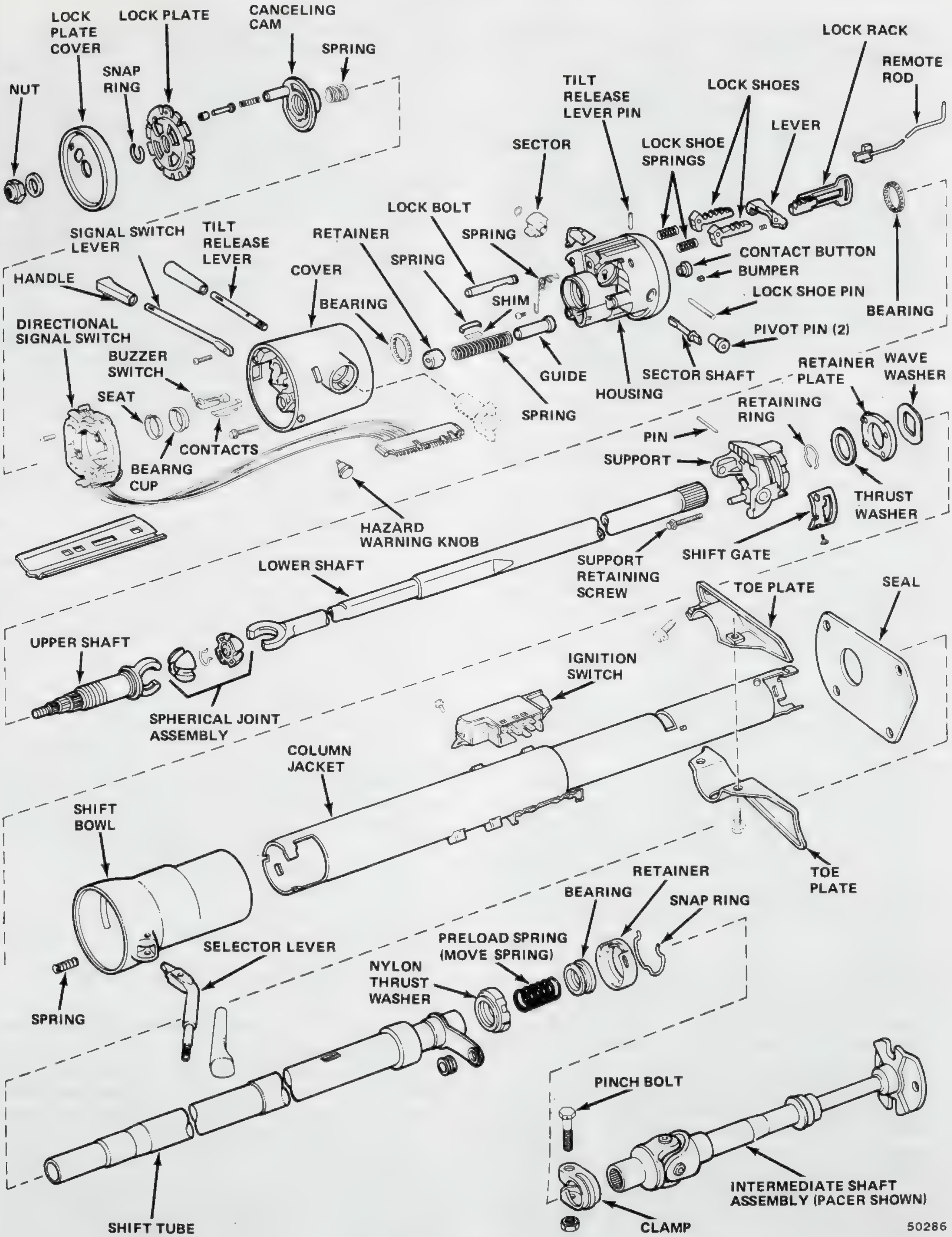


Fig. 2H-28 Tilt Steering Column

NOTE: *The spring-loaded lower foot of tool J-23073-4 must engage the shift tube inner shoulder and the guide on tool J-23073-2 must be seated in the tube.*

(6) Tighten spring tension nut of tool J-23073-4 to snug fit.

(7) Position Receiver Tool J-23073-3 over puller stud of tool J-23073-4 and install puller nut on stud (fig. 2H-30).

(8) Tighten puller nut to draw shift tube into bowl (fig. 2H-30). Remove shift tube installer tools when tube installation is completed.

(9) Install thrust washer and retaining ring at top of shift tube (fig. 2H-28).

(10) Install shift gate and gate retaining pin in support.

(11) Position support in shift bowl and on column jacket. Align V-notch in support with notch in column jacket (located at 9 o'clock position on jacket).

(12) Install and tighten support retaining screws to 60 inch-pounds (6.7 Nm) torque.

(13) Assemble upper and lower halves of steering shaft and install shaft in column.

(14) Install replacement bearings (14 balls in each) in housing if bearings were removed at disassembly. Lubricate bearings with chassis grease before installation.

(15) Install tilt bumpers, lock shoe springs, lock shoes, and lock shoe pin in housing.

(16) Install tilt release lever and lever retaining pin in housing.

(17) Install ignition switch.

(18) Insert remote rod between shift bowl and column jacket and into guide channel in left side of support.

(19) Engage lock rack in remote rod (fig. 2H-31).

(20) Engage remote rod in ignition switch.

(21) Install housing. Guide housing over steering shaft and lock rack, align lock shoes with support teeth, and lift tilt release lever to engage lock shoes in support.

(22) Align housing and support pivot pin holes and drive pivot pins into position using rawhide mallet or brass drift.

(23) Install sector shaft and lock sector in housing and install shaft retaining snap ring. Be sure large block tooth of sector is engaged in large slot in lock rack.

(24) Install lock sector tension spring. Hook spring on sector shaft, engage spring in sector, and install spring retaining screw (fig. 2H-32).

(25) Place housing in full forward tilt position.

(26) Install tilt spring guide, tilt spring, and spring retainer in housing. Insert screwdriver in retainer slot, press retainer inward approximately 3/16 inch (4.7 mm), and rotate retainer approximately 1/8 turn clockwise to seat retainer and secure spring. Be sure retainer locking lugs are firmly seated in housing before removing screwdriver.

(27) Install cover on housing and install cover retaining screws. Tighten screws to 100 inch-pounds (11.3 Nm) torque.

(28) Assemble and install key warning buzzer switch and contacts. Buzzer switch contacts should face in upward direction.

(29) On Gremlin Concord, and AMX models with column shift automatic transmission, guide shift quadrant light wire up through upper housing and down between shift bowl and jacket.

(30) Install shift quadrant mounting bracket and attach light socket.

(31) Install tilt lever.

(32) On Gremlin, Concord, and AMX models with column shift automatic transmission, hook base of shift quadrant over tabs on left side of retainer and install in position. Install shift pointer in shift bowl and engage it with quadrant.

(33) Install quadrant retainer clips with flat side of clips facing downward.

(34) Install turn signal switch assembly. Guide wire harness between cover and column jacket and seat switch in cover.

(35) Remove tape from turn signal switch harness connector, guide wires into protector on column jacket.

(36) Install and tighten turn signal switch retaining screws to 35 inch-pounds (3.9 Nm) torque. Be sure switch actuating lever pivot is correctly aligned and seated in housing pivot boss before installing retaining screws.

(37) Install turn signal switch lever and lever attaching screw. Tighten screw to 15 inch-pounds (1.6 Nm) torque. Actuate switch to check operation.

(38) Install upper bearing race, bearing race seat, preload spring, and canceling cam on steering shaft.

(39) Align lockplate splines with steering shaft splines and install lockplate with canceling cam shaft protruding through dogleg opening in lock plate (fig. 2H-21).

(40) Install replacement steering shaft snap ring on Lockplate Compressor Tool J-23653 and install tool on steering shaft (fig. 2H-7).

CAUTION: *Identify the steering shaft nut thread-type before installing the compressor tool. If the shaft has American Threads (fig. 2H-2), use the tool as is. However, if the shaft has metric threads, replace the compressor tool forcing screw with Metric Forcing Screw J-23653-4 before using the tool.*

(41) Compress lockplate, install snap ring, and remove compressor tool. Be sure snap ring is completely seated in shaft groove before removing tool.

(42) Install lockplate cover.

(43) Guide gear shift lever over tension spring and into shift bowl.

(44) Align gearshift lever pivot pin holes using pin punch and drive pivot pin into lever using plastic mallet or brass drift.

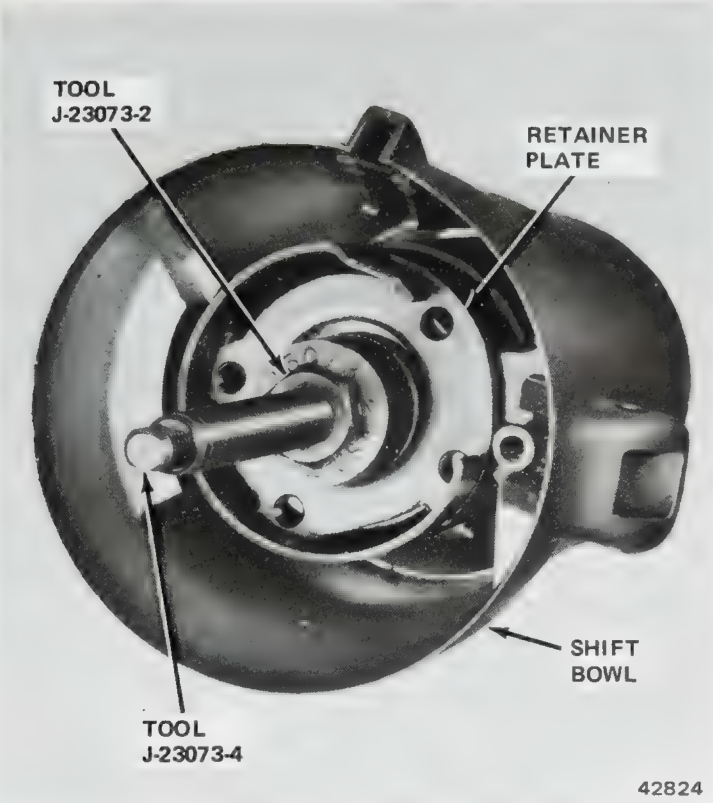


Fig. 2H-29 Shift Tube Installer Seated In Tube

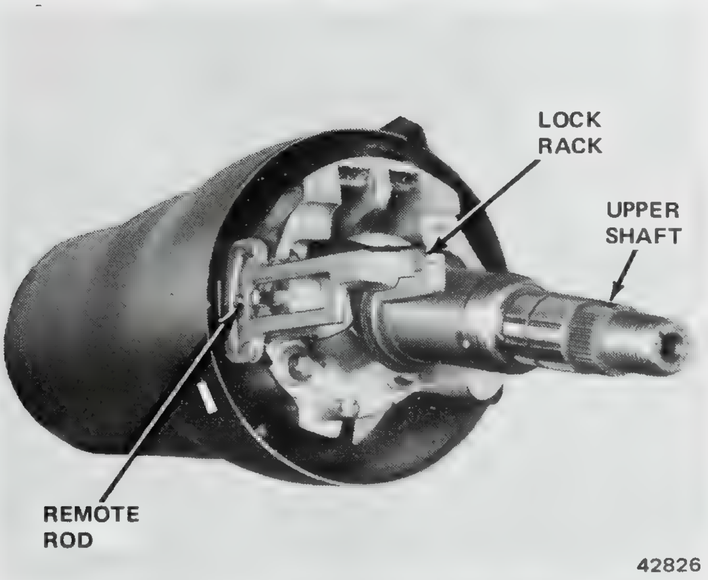


Fig. 2H-30 Lock Rack and Remote Rod Position

(45) Install ignition lock cylinder. Hold lock sleeve, rotate cylinder clockwise against stop and insert lock in housing. Retainer tab in lock sleeve must be aligned with housing keyway.

(46) Push ignition lock against sector and rotate lock counterclockwise until it mates with sector.

(47) Push lock inward until retainer tab snaps into place.

(48) On Pacer and Matador models with column shift automatic transmission, connect quadrant cable to adjusting clip on shift bowl (fig. 2H-5).

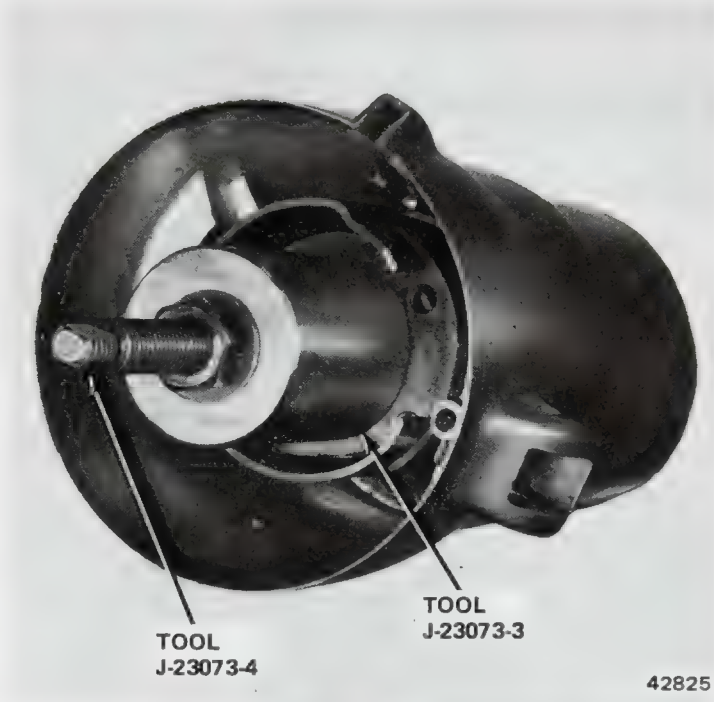


Fig. 2H-31 Pulling Shift Tube Into Bowl

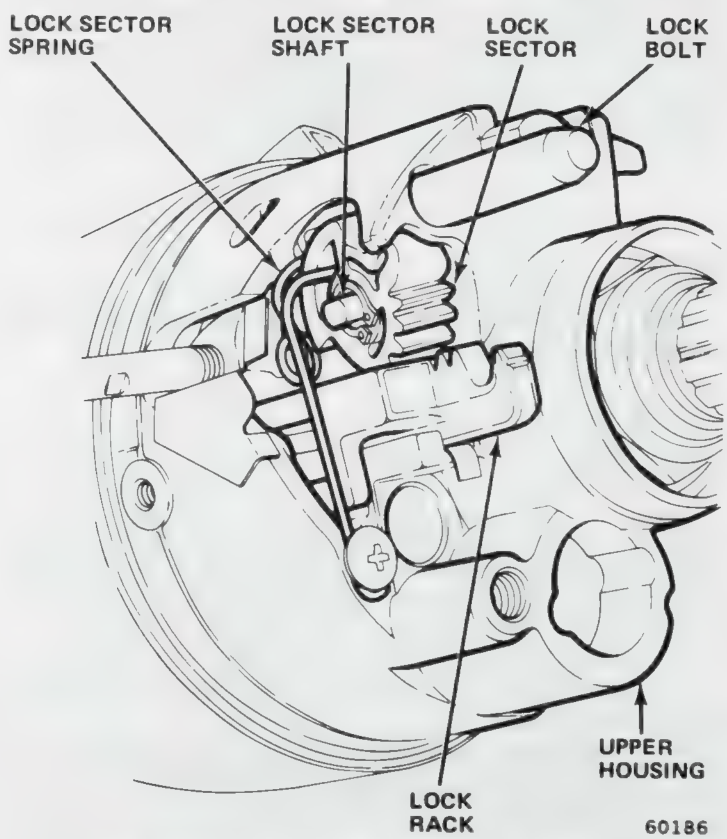


Fig. 2H-32 Lock Sector Tension Spring Position

(49) If cable requires adjustment, place shift lever in Neutral, loosen adjusting clip retaining nut, move clip up or down to align pointer with N detent on quadrant, and tighten retaining nut.

(50) Install steering column tube cover or lower finish panel, and install package tray if equipped.

(51) Remove protection from column painted areas.

(52) Reconnect battery negative cable.

(53) Reset clock, if equipped.

IGNITION LOCK CYLINDER SERVICE

Conditions Requiring Service

Key Lost—Key Code Number Known

The key code may be converted to a five-digit number to determine key bitting. This number can be obtained from the catalogs furnished by key cutting machine manufacturers or by contacting the AMC regional sales office.

Lock Cylinder Defective—Ignition Key Available—No Key Code Number

Service replacement lock cylinders are supplied as uncoded cylinders less tumblers only. Tumblers are ordered under five different part numbers, one for each depth of cut available. Refer to Key Coding and the key coding diagram (fig. 2H-36).

Key Lost—Key Code Lost

Contact an AMC dealer, preferably the selling dealer if possible, and provide the dealership personnel with the car VIN number. The selling dealer may still have a record of the key codes. If not, the key numbers assigned to that car may be obtained from the AMC regional sales office.

Removal

Refer to Switches, Buzzer Contacts, Ignition Lock Cylinder Replacement.

Disassembly

NOTE: *In the following procedure, all references to turning the key clockwise or counterclockwise are made as if viewed from the key end of the cylinder.*

(1) Insert ignition key in lock cylinder.

(2) Hold lock sleeve and turn lock cylinder to Lock position.

(3) Fabricate plunger pin compressor tool from paper clip. Make 90° bend in one end of cip about 1/4 inch from end (fig. 2H-33).

(4) Turn lock cylinder to ACC (accessory) position. Brass plunger pins in lock sleeve should now bear against stop lug on lock cylinder (fig. 2H-33).

(5) Compress brass plunger pin using paper clip compressor tool (fig. 2H-33).

NOTE: *There are two brass pins and two staking marks on the lock sleeve. The brass pin that must be compressed in order to separate the cylinder and sleeve is positioned just above the stake mark located just above and to the left of the retaining tab (fig. 2H-34).*

(6) Hold brass plunger pin in compressed position and turn lock cylinder clockwise.

(7) Stop turning lock cylinder when it springs upward slightly. Locking lugs on cylinder are now aligned with locking grooves in sleeve.

(8) Remove ignition key to allow buzzer pin to retract and to reset buzzer acutator.

(9) Turn lock cylinder and sleeve upside down.

(10) Using wire hook, lift nylon stop on lock sleeve (fig. 2H-34) and remove cylinder from sleeve.

(11) If lock cylinder does not release from sleeve easily, buzzer actuator has not retracted fully. Jarring cylinder on work bench will free actuator and permit removal.

(12) Pry tumbler retainer from lock cylinder and remove tumbler springs (fig. 2H-35).

(13) Pull side bar outward slightly and remove tumblers (fig. 2H-35).

Fig. 2H-33 Compressing Plunger Pin

Key Coding

To determine the tumblers needed when the key code is not available, use the key code diagram as follows (fig. 2H-36).

(1) Place key over coding diagram with uncut side of key aligned exactly with diagram. Each of five positions will align with a notch on key.

(2) Starting at head of key blade, determine and record lowest level (tumbler number) that is visible in position 1 and in remaining four positions.

(3) After tumbler number sequence has been determined, assemble lock cylinder.

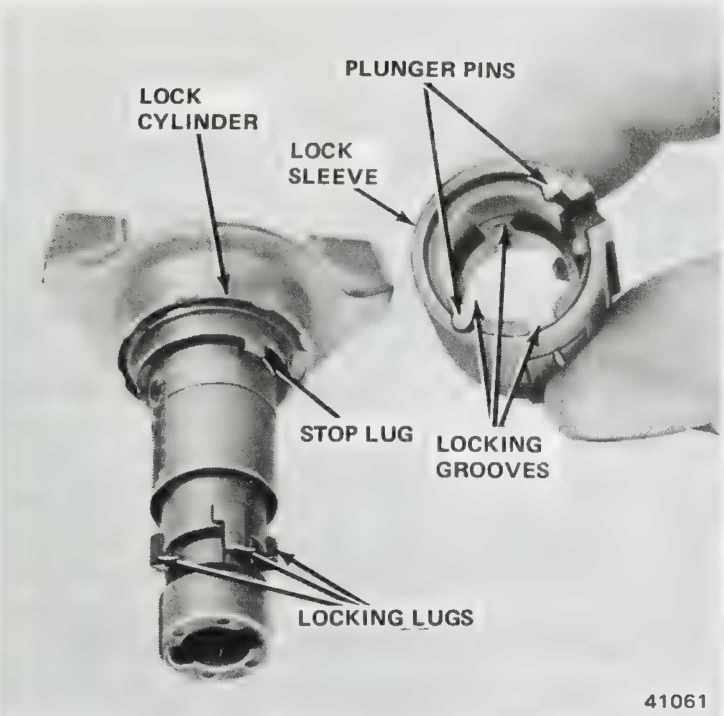


Fig. 2H-34 Lock Cylinder and Sleeve

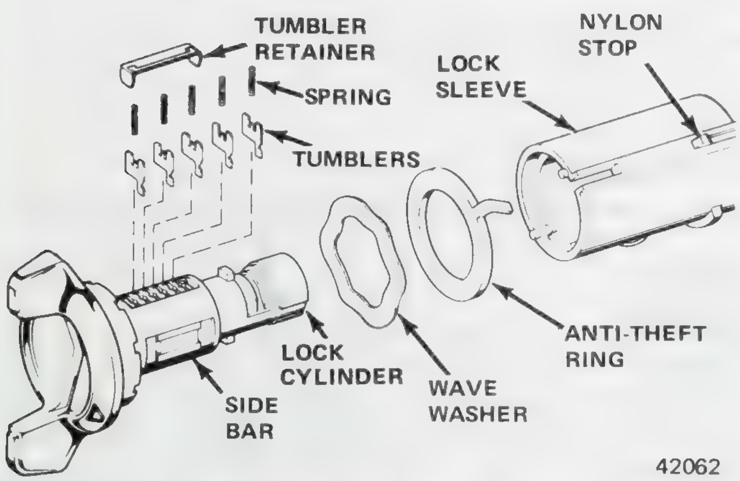


Fig. 2H-35 Ignition Lock Cylinder Assembly

(4) Starting at key end of lock cylinder, insert tumblers in proper slots in order required by key code.

(5) Pull side bar out only enough to allow tumblers to drop completely into place.

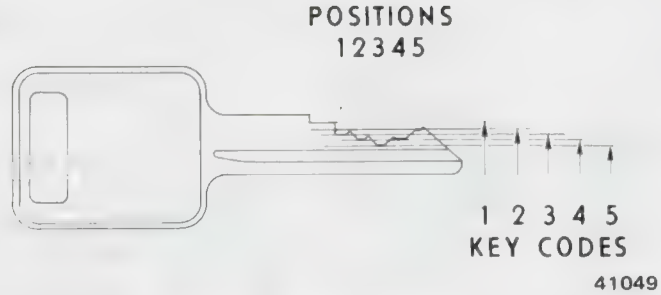
(6) Install one tumbler spring in hole above each tumbler.

(7) Insert tumbler retainer so two end prongs slide into slots of either end of cylinder.

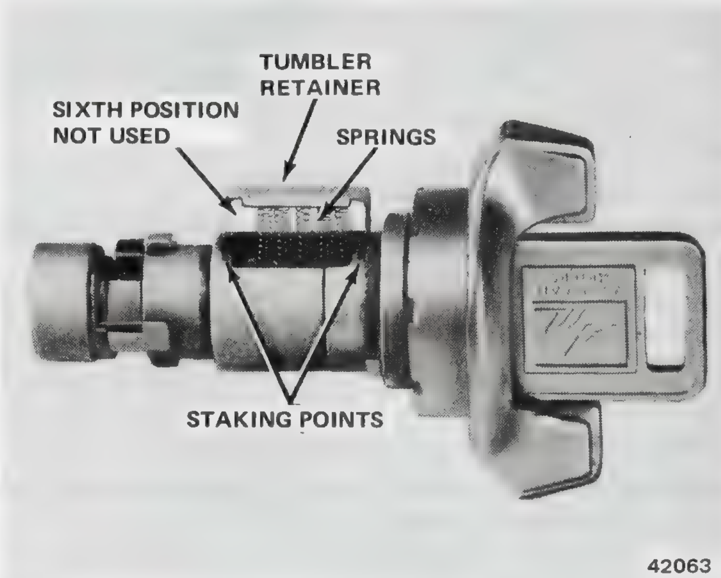
(8) Press retainer down (fig. 2H-37).

(9) To determine if tumblers have been assembled correctly, insert key into lock cylinder. If tumblers have been properly installed, side bar will drop down. If side bar does not drop down, remove key, spring retainer, springs and tumblers and recheck coding of key and tumbler asembly.

(10) When cylinder is correctly assembled, stake spring retainer at each end with punch to retain it (fig. 2H-37).



2H-36 Key Coding Diagram



2H-37 Installing Tumblers

Assembly

(1) Install key completely into cylinder then pull it out two notches.

(2) Place wave washers and anti-theft ring in position.

(3) Push nylon stop in lock cylinder downward and hold nylon stop in lock sleeve upward with left forefinger (fig. 2H-38).

(4) Align anti-theft ring tang and lock cylinder side bar with slot in wall of sleeve and install cylinder in sleeve.

(5) Push key in and turn clockwise to lock cylinder in sleeve.

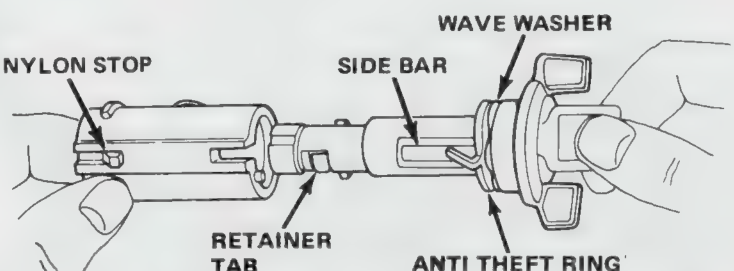


Fig. 2H-38 Assembling Lock Cylinder and Sleeve 50287

Installation

Refer to Switches, Buzzer Contacts, or Ignition Lock Cylinder Replacement for lock cylinder installation procedures.

SPECIFICATIONS

Steering Column Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Column Mounting Bracket-To-Instrument Panel Nuts	14	11-18	10	8-13
Cover Retaining Screws	11	10-12	100 in-lbs	90-105 in-lbs
Directional Signal Switch Retaining Screws	4	3-4	35 in-lbs	30-40 in-lbs
Flexible Coupling Nuts	34	20-48	25	15-35
Intermediate Steering Shaft To Column Pinch Bolts	65	54-74	48	40-55
Hazard Warning Knob	0.6	02-06	5 in-lbs	2-5 in-lbs
Housing Retaining Screws (Std. Col.)	7	6-7	60 in-lbs	55-65 in-lbs
Housing Retaining Screws (Tilt Col.)	11	10-12	100 in-lbs	90-105 in-lbs
Ignition Switch Mounting Screws	4	3-4	35 in-lbs	30-40 in-lbs
Lock Bolt Spring Retaining Screw (Tilt Col.)	4	3-4	35 in-lbs	30-40 in-lbs
Mounting Bracket-To-Column Bolts	27	20-41	20	15-30
Shroud Retaining Screws	2	2	18 in-lbs	14-22 in-lbs
Signal Switch Lever Retaining Screw	2	1-2	15 in-lbs	10-18 in-lbs
Steering Wheel Nut	34	30-38	25	22-28
Support Retaining Screws (Tilt Col.)	7	6-7	60 in-lbs	55-65 in-lbs
Tilt Release Lever Screw	3	3-4	30 in-lbs	25-35 in-lbs
Toeplate Retaining Screws	14	14-20	10	10-15

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

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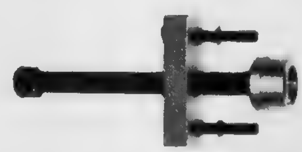
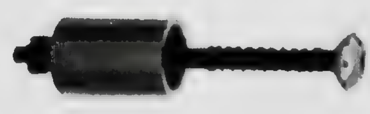
Special Tools

J-22635
PIN REMOVER AND INSTALLER



J-23072
SHIFT TUBE REMOVER

J-23653
LOCK PLATE COMPRESSOR



J-23073
SHIFT TUBE INSTALLER

J-23074
STEERING COLUMN HOLDING FIXTURE

J-21232
STEERING WHEEL PULLER

J-21854-1 PIVOT PIN PULLER

STEERING COLUMN TOOLS

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MANUAL STEERING GEAR 2J

SECTION INDEX

MANUAL STEERING GEAR—GREMLIN, CONCORD, AMX

GENERAL

The standard equipment manual steering gear used on Gremlin, Concord, and AMX models is a recirculating ball design (fig. 2J-1). The steering gear wormshaft and ball nut are in line with the steering shaft. The steering gear ratio is 24:1.

The wormshaft and column steering shaft are connected by a removable flexible coupling. The coupling permits independent removal of the steering gear or steering column.

The ball nut, which is mounted on the worm shaft, is driven through ball bearings which circulate in spiral grooves machined in both the wormshaft and ball nut. Return guides attached to the ball nut recirculate the ball bearings.

The ball bearings act as a rolling thread between the wormshaft and ball nut. The ball nut is directly engaged by the pitman shaft teeth.

The ball nut and pitman shaft are designed so a tighter fit exists between the two when the front wheels are straight ahead. An adjusting screw, located in the pitman shaft, controls overcenter drag torque adjustment. This screw moves the pitman shaft upward or downward to determine pitman shaft sector tooth engagement in the ball nut. The adjuster nut controls preload of the upper and lower wormshaft thrust bearings to provide worm bearing preload adjustment.

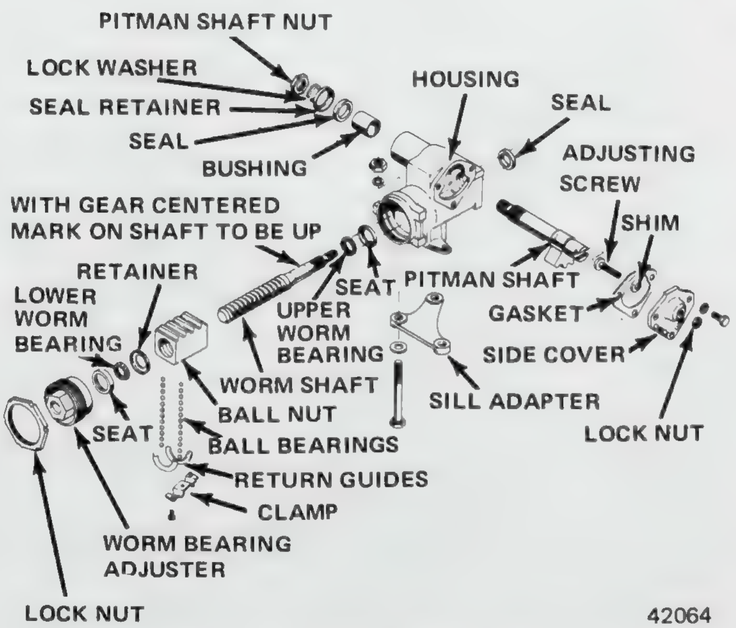

Fig. 2J-1 Manual Steering Gear—Gremlin-Concord-AMX

Service Diagnosis

Condition	Possible Cause	Correction
HARD OR ERRATIC STEERING	(1) Incorrect tire pressure	(1) Inflate tires to recommended pressures
	(2) Insufficient or incorrect lubrication	(2) Lubricate as required (refer to Maintenance Section
	(3) Suspension, or steering linkage parts damaged or misaligned	(3) Repair or replace parts as necessary
	(4) Improper front wheel alignment	(4) Adjust incorrect wheel alignment angles
	(5) Incorrect steering gear adjustment	(5) Adjust steering gear
	(6) Sagging springs	(6) Replace springs
PLAY OR LOOSENESS IN STEERING	(1) Steering wheel loose	(1) Inspect shaft splines and repair as necessary. Tighten attaching nut and stake in place
	(2) Steering linkage or attaching parts loose or worn	(2) Tighten, adjust, or replace faulty components
	(3) Pitman arm loose	(3) Inspect shaft splines and repair as necessary. Tighten attaching nut and stake in place
	(4) Steering gear attaching bolts loose	(4) Tighten bolts
	(5) Loose or worn wheel bearings	(5) Adjust or replace bearings
	(6) Steering gear adjustment incorrect or parts badly worn	(6) Adjust gear or replace defective parts
WHEEL SHIMMY OR TRAMP	(1) Improper tire pressure	(1) Inflate tires to recommended pressures
	(2) Wheels, tires, or brake rotors out-of-balance or out-of-round	(2) Inspect and replace or balance parts
	(3) Inoperative, worn, or loose shock absorbers or mounting parts	(3) Repair or replace shocks or mountings
	(4) Loose or worn steering or suspension parts	(4) Tighten or replace as necessary
	(5) Loose or worn wheel bearings	(5) Adjust or replace bearings
	(6) Incorrect steering gear adjustments	(6) Adjust steering gear
	(7) Incorrect front wheel alignment	(7) Correct front wheel alignment
TIRE WEAR	(1) Improper tire pressure	(1) Inflate tires to recommended pressures
	(2) Failure to rotate tires	(2) Rotate tires as outlined in Brake Chapter 2B
	(3) Brakes grabbing	(3) Adjust or repair brakes

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Service Diagnosis

Condition	Possible Cause	Correction
	(4) Incorrect front wheel alignment	(4) Align incorrect angles
	(5) Broken or damaged steering and suspension parts	(5) Repair or replace defective parts
	(6) Wheel runout	(6) Replace faulty wheel
	(7) Excessive speed on turns	(7) Make driver aware of condition
CAR LEADS TO ONE SIDE	(1) Improper tire pressures	(1) Inflate tires to recommended pressures
	(2) Front tires with uneven tread depth, wear pattern, or different cord design (i.e., one bias ply and one belted or radial tire on front wheels)	(2) Install tires of same cord construction and reasonably even tread depth, design, and wear pattern
	(3) Incorrect front wheel alignment	(3) Align incorrect angles
	(4) Brakes dragging	(4) Adjust or repair brakes
	(5) Pulling due to uneven tire construction	(5) Replace faulty tire

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ON-CAR SERVICE

Steering Gear Adjustment

Adjustments are generally made to compensate for normal wear in the steering gear or to correct a handling problem caused by improper adjustment. Correct adjustment results in a definite drag or preload, but does not cause excessive steering effort through any point of the turn.

CAUTION: *Adjust the steering gear in the following sequence* **only**. *Failure to do so could result in damage to the gear or improper steering response. Always adjust worm bearing preload first; then adjust pitman shaft overcenter drag torque last.*

Worm Bearing Preload and Pitman Shaft Overcenter Drag Torque Adjustment

(1) Raise and support car.

(2) Check steering gear mounting bolt torque and correct if necessary.

(3) Remove pitman arm nut and mark pitman arm and pitman shaft for assembly reference.

(4) Remove pitman arm using Puller J-5566-04 (fig. 2J-2).

(5) Loosen pitman shaft adjusting screw locknut and back off adjusting screw two or three turns.

(6) Remove horn button and cover.

(7) Slowly turn steering wheel in one direction until stopped by gear; then turn wheel back one-half turn.

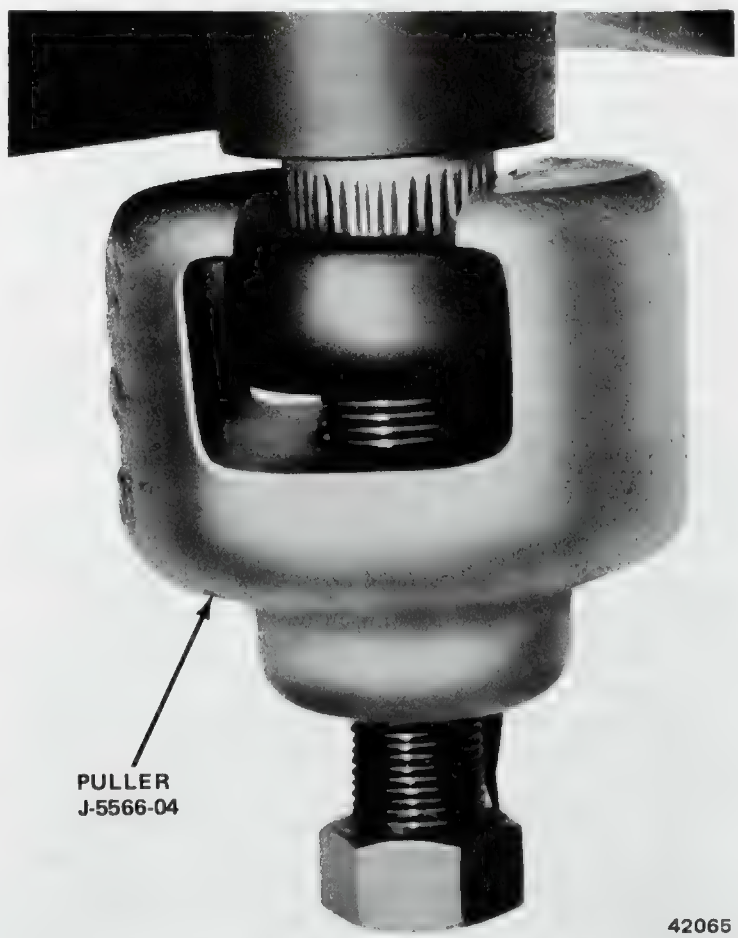

Fig. 2J-2 Pitman Arm Removal

CAUTION: *Do not turn the steering wheel hard against the stop when the linkage is disconnected. This could result in damage to the ball return guides.*

(8) Install socket and 50 inch-pound (5.65 Nm) capacity torque wrench on steering wheel nut.

(9) Measure worm bearing preload by rotating steering wheel through 90° arc (1/4 turn). Preload should be 5 to 8 inch-pounds (0.56 to 1.02 Nm) torque.

NOTE: *Steering column misalignment or damage can affect torque readings. If rotating torque is exceptionally high, inspect column alignment. If alignment is correct, remove the gear, determine the problem area, and repair as necessary.*

(10) If preload adjustment is required, loosen worm bearing adjuster locknut and turn adjuster clockwise to increase preload, or counterclockwise to decrease preload.

(11) When desired preload is obtained, tighten adjuster locknut to 50 foot-pounds (67.8 Nm) torque and check preload again. Correct preload as necessary.

(12) Adjust pitman shaft overcenter drag torque.

CAUTION: *Do not adjust pitman shaft overcenter drag torque until worm bearing preload has been adjusted.*

(13) Rotate steering wheel slowly from full right stop to full left stop, and count total number of steering wheel turns.

(14) Turn steering wheel back one-half number of turns to center steering gear; then turn wheel one-half turn off center.

(15) Install socket and 50 inch-pound (5.65 Nm) capacity torque wrench on steering wheel nut.

(16) Measure torque required to turn gear through center of travel (overcenter drag torque). Drag torque should equal worm bearing preload torque plus 4 to 10 inch-pounds (0.45 to 1.13 Nm) but must not exceed total of 18 inch-pounds (2.03 Nm) torque.

Example:

Worm bearing preload is adjusted to 6 inch-pounds (0.68 Nm). Overcenter drag torque is adjusted to 7 inch-pounds (0.79 Nm) in addition to worm bearing preload. This makes a total of 13 inch-pounds (1.47 Nm) which is acceptable.

(17) If adjustment is required, loosen or tighten pitman shaft adjusting screw to obtain desired overcenter drag torque.

(18) Tighten pitman shaft adjusting screw locknut to 25 foot-pounds (33.9 Nm) torque and check overcenter drag torque adjustment again. Correct adjustment as necessary.

(19) Install pitman arm. Index pitman arm to pitman shaft using alignment marks made during disassembly.

(20) Tighten pitman arm nut to 115 foot-pounds (155.9 Nm) torque and stake nut to shaft threads in one place.

(21) Remove supports and lower car.

(22) Correct steering wheel-to-steering shaft alignment if necessary and install horn button and cover.

On-Car Inspection

Before removing the steering gear, always check for leaks and worn or damaged parts. Failure to check the gear before removal may result in incomplete or unnecessary repairs.

Pitman Shaft Seal Replacement

(1) Raise and support car.

(2) Remove pitman arm using Puller J-5566-04 (fig. 2J-2).

(3) Turn steering wheel slowly from stop-to-stop, count number of turns, and turn wheel back 1/2 total number of turns to position gear on center.

(4) Remove side cover attaching bolts and remove pitman shaft and side cover assembly.

NOTE: *If the gear lubricant is contaminated, remove and overhaul the gear.*

(5) Remove pitman shaft seal from housing using screwdriver. Do not damage housing bushing during removal.

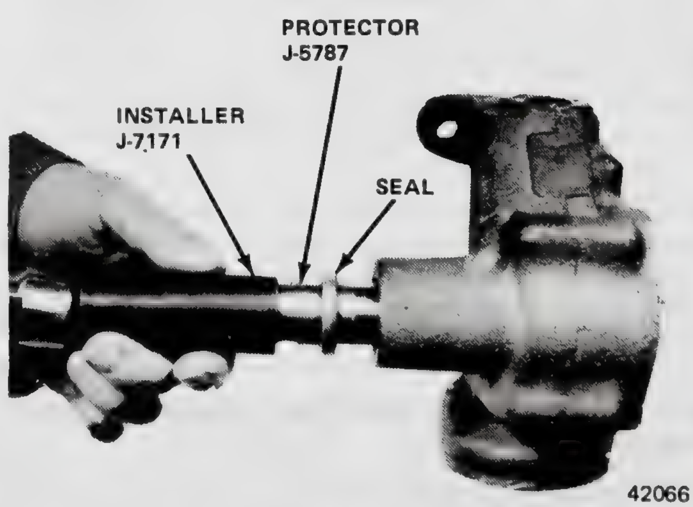

Fig. 2J-3 Pitman Shaft Seal Installation

(6) Separate side cover and pitman shaft.

(7) Check pitman shaft for pitting or scoring which could cause seal failure. Replace shaft if pitted or scored.

(8) Lubricate and install pitman shaft in gear.

(9) Engage center tooth of sector with center groove of ball nut.

(10) Fill gear housing with multipurpose chassis grease.

(11) Install side cover and replacement gasket. Turn pitman shaft adjuster screw counterclockwise, engage side cover on screw, turn screw until it bottoms, and back off 1/2 turn.

(12) Install locknut on adjuster screw finger-tight.

(13) Install side cover attaching bolts and tighten to 30 foot-pounds (40.6 Nm) torque.

(14) Lubricate and install replacement seal using Installer Tool J-7171 and Seal Protector J-5787 (fig. 2J-3).

(15) Adjust worm bearing preload and pitman shaft overcenter drag torque. Refer to Steering Gear Adjustment.

(16) Install pitman arm. Tighten nut to 115 foot-pounds (155.9 Nm) torque, and stake nut to shaft threads in place.

Side Cover and Bushing Replacement

NOTE: *The side cover and bushing are serviced as an assembly only.*

(1) Remove pitman shaft adjusting screw locknut.

(2) Remove side cover attaching bolts.

(3) Turn pitman shaft adjusting screw clockwise to remove cover.

(4) Install replacement cover, gasket, and bushing. Turn adjuster screw counterclockwise through threaded side cover hole to aid installation.

(5) Turn screw until it bottoms and back off 1/2 turn.

(6) Install side cover attaching bolts and tighten to 30 foot-pounds (40.6 Nm) torque.

(7) Check worm bearing preload and pitman shaft overcenter drag torque and correct if necessary. Refer to Steering Gear Adjustment.

(8) Remove supports and lower car.

STEERING GEAR REMOVAL

(1) Remove flexible coupling-to-intermediate shaft attaching nuts.

(2) Raise and support car.

(3) Remove pitman arm using Puller J-5566-04 (fig. 2J-2). Paint alignment marks on pitman arm and pitman shaft for assembly reference.

(4) Remove steering gear mounting bolts and remove steering gear.

STEERING GEAR INSTALLATION

(1) Align steering gear flexible coupling and intermediate shaft flange. Coupling has pointer which must align with flat on shaft (fig. 2J-4).

(2) Install steering gear and tighten mounting bolts to 65 foot-pounds (88.1 Nm) torque.

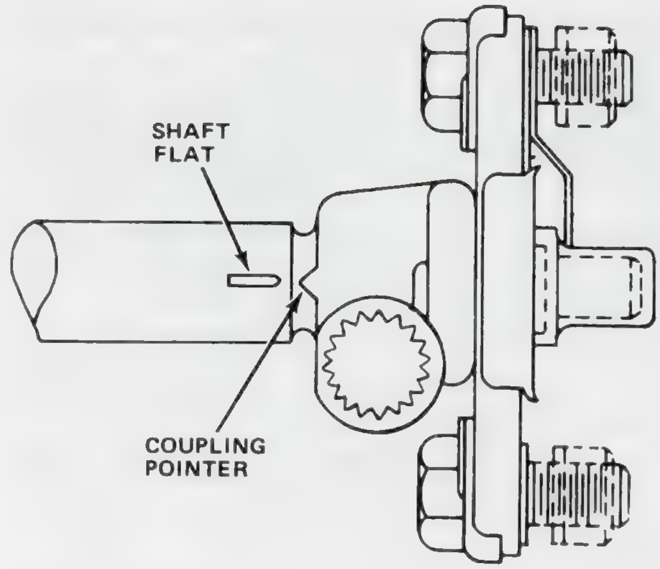

Fig. 2J-4 Shaft and Flange Alignment

(3) Install flexible coupling nuts and tighten to 25 foot-pounds (33.9 Nm) torque.

(4) Center steering gear and place road wheels in straight ahead position.

(5) Install pitman arm on pitman shaft. Index shaft to arm using alignment marks made during removal.

(6) Tighten pitman shaft nut to 115 foot-pounds (155.9 Nm) torque and stake nut to shaft threads in one place to retain it.

(7) Remove supports and lower car.

(8) Align flexible coupling. Loosen steering column-to-instrument panel mounting bolts and pull column out, or push it in to straighten flexible coupling. Tighten column mounting bolts to 15 foot-pounds (20.3 Nm) torque.

STEERING GEAR DISASSEMBLY

(1) Remove flexible coupling.

(2) Mount steering gear in vise with side cover facing upward. Do not damage gear mounting surfaces.

(3) Remove pitman shaft adjusting screw locknut.

(4) Remove side cover bolts.

(5) Remove side cover from pitman shaft adjusting screw by turning screw clockwise and out of cover. Separate screw and cover and discard cover gasket.

(6) Remove adjusting screw from slot in end of pitman shaft.

NOTE: *Be sure the adjusting screw shim is retained with the screw.*

(7) Remove pitman shaft from housing. Rotate wormshaft until pitman shaft teeth are aligned with housing notch and remove shaft.

(8) Remove worm bearing adjuster locknut and remove adjuster and lower worm bearing.

(9) Remove wormshaft and ball nut as assembly and remove upper wormshaft bearing.

CAUTION: *To avoid damaging the ball return guides during removal, do not allow the ball nut to rotate on the wormshaft until it strikes either end of the wormshaft.*

(10) Remove ball nut return guides, turn ball nut over, and remove all ball bearings. Rotate wormshaft slowly from side to side to remove bearings.

(11) Remove ball nut from wormshaft.

NOTE: *Do not attempt to remove the ball nut until all of the ball bearings have been removed.*

(12) Remove pitman shaft and wormshaft seals using screwdriver. Discard seal. Do not damage housing bore.

(13) Thread adjuster into housing with wormshaft lower bearing facing outward.

(14) Remove wormshaft lower bearing retainer from adjuster. Use screwdriver to pry retainer out of adjuster.

(15) Remove wormshaft lower bearing seat from adjuster using Puller J-5754, or J-5582 and Slide Hammer J-2619. Remove adjuster from housing (fig. 2J-7).

(16) Remove pitman shaft bushing using Puller J-5754 and Slide Hammer J-2619 (fig. 2J-5).

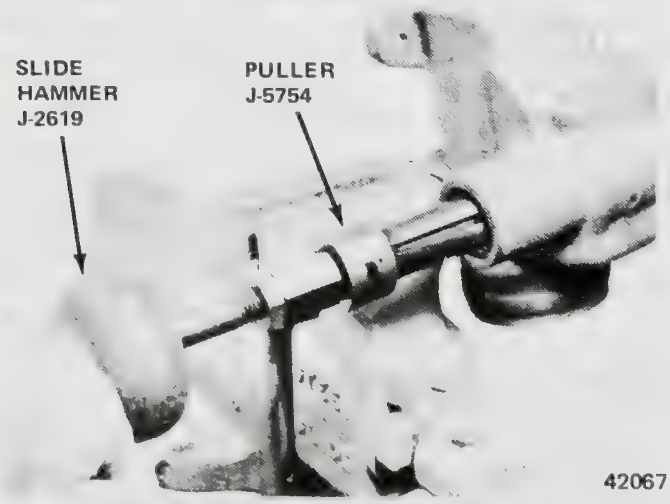

Fig. 2J-5 Pitman Shaft Bushing Removal

(17) Remove wormshaft upper bearing seat from housing using Puller J-5754 and slide hammer J-2619 (fig. 2J-6).

(18) Remove lower bearing seat from worm bearing adjuster using Puller J-5754 and Slide Hammer J-2619 (fig. 2J-7).

CLEANING AND INSPECTION

Wash all parts in clean solvent.

Inspect the bearings, bearing cups, wormshaft grooves, bushings, seals, and pitman shaft teeth for scoring, wear, or pitting. Replace any parts that exhibit these conditions.

Inspect the housing and cover for sand holes or cracks and inspect the bore for nicks, scores, corrosion, or other damage.

STEERING GEAR ASSEMBLY AND ADJUSTMENT

(1) Lubricate bearings, bushings, and seals with chassis grease.

(2) Install bearing seats using Installer J-7170 and Handle J-8092 (fig. 2J-8 and 2J-9).

(3) Install pitman shaft bushing using Installer J-7133 (fig. 2J-10). Install bushing until it is flush with shoulder of pitman shaft seal counterbore in housing.

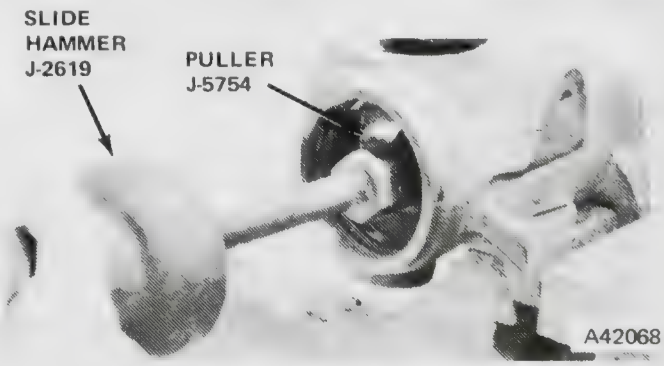

Fig. 2J-6 Removing Bearing Seat From Housing

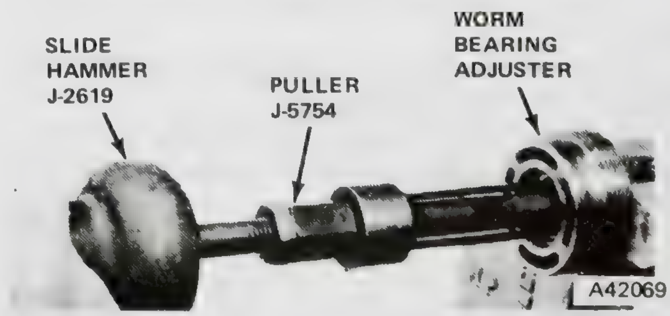

Fig. 2J-7 Removing Bearing Seat From Adjuster

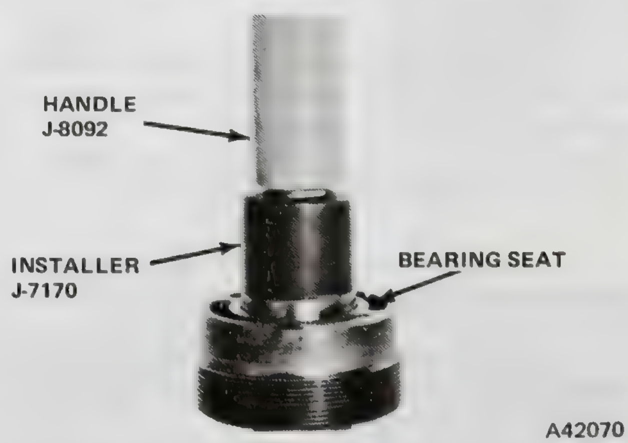

Fig. 2J-8 Installing Bearing Seat In Adjuster

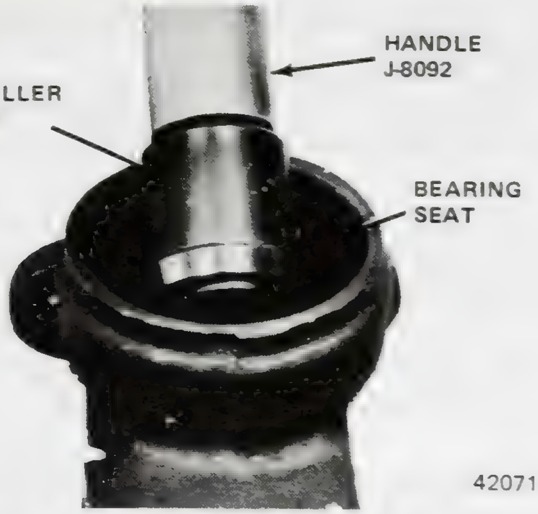

Fig. 2J-9 Installing Bearing Seat in Housing

Fig. 2J-10 Installing Pitman Shaft Bushing

(4) Install replacement wormshaft seal using socket and hammer. Install seal until it is flush with housing. Do not seat seal against wormshaft upper bearing seat.

(5) Place ball nut on work bench with ball return guides facing upward and narrow end of ball nut teeth facing away from edge of bench.

(6) Install wormshaft in ball nut from left side. Thread wormshaft into ball nut until equal number of wormshaft threads are visible at each end of ball nut (fig. 2J-11).

(7) Install one ball bearing in each ball return guide hole in ball nut.

(8) Raise and manuever wormshaft from side-to-side until ball bearings roll into ball nut threads under wormshaft and support wormshaft in ball nut.

(9) Install ball return guides in ball nut.

(10) Divide ball bearings to provide equal number for each circuit in ball nut.

(11) Install remaining ball bearings through holes in return guides. Be sure to install equal number of ball bearings in each guide.

NOTE: *Turning the wormshaft back and forth slightly will ease installation of the ball bearings.*

Fig. 2J-11 Installing Wormshaft in Ball Nut

(12) Install ball nut return guide clamp.

(13) Install upper bearing on wormshaft, above wormshaft threads, center ball nut on wormshaft , and install wormshaft, bearing, and ball nut in gear housing.

CAUTION: *Cover the wormshaft threads with tape to avoid damaging the wormshaft seal.*

(14) Install lower bearing in worm bearing adjuster, install bearing retainer, and install adjuster and locknut.

(15) Tighten adjuster only enough to hold bearings in place. Final adjustment will be made later.

(16) Install pitman shaft adjusting screw and selective shim in pitman shaft adjusting screw slot and check adjusting screw end play.

NOTE: *The adjusting screw must turn freely and have a maximum of 0.002-inch (0.051 mm) end play. If end play is incorrect, select a replacement shim that will provide the proper clearance. Shims are furnished in four thicknesses; 0.063-inch, 0.065-inch, 0.067-inch, and 0.069-inch (1.60, 1.65, 1.70, and 1.75 mm), and are available in kit form.*

(17) Lubricate steering gear with multipurpose chassis grease.

(18) Rotate wormshaft until ball nut is at end of its travel and pack as much lubricant into housing as possible without forcing it out of pitman shaft opening.

(19) Rotate wormshaft until ball nut is at opposite end of its travel and pack as much lubricant into this end of gear as possible.

(20) Lubricate and install pitman shaft. Engage center tooth of shaft with center groove of ball nut (fig. 2J-12).

(21) Fill gear housing with multipurpose chassis grease and pack grease in side cover bushing.

(22) Install side cover gasket on housing.

(23) Install side cover. Turn adjusting screw counterclockwise through threaded hole in side cover to install. Turn screw until it bottoms, then back off screw 1/2 turn.

(24) Install locknut on pitman shaft adjuster screw finger-tight.

(25) Install side cover mounting bolts and tighten to 30 foot-pounds (40.6 Nm) torque.

(26) Slowly turn wormshaft from stop-to-stop.

(27) Install Seal Protector J-5787 over pitman shaft threads and splines and install pitman shaft seal using Installer J-7171.

(28) Remove seal protector after installing seal.

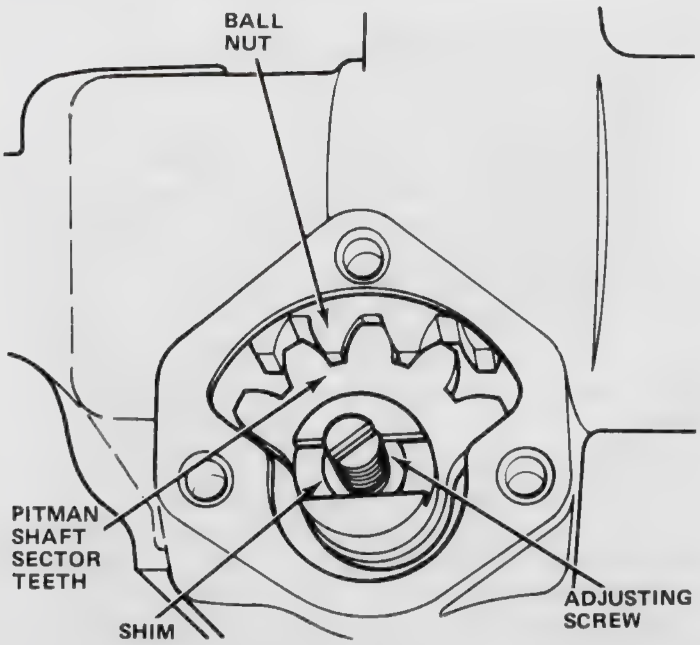

Fig. 2J-12 Pitman Shaft and Ball Nut Position

CAUTION: *Never allow the ball nut to strike the ends of the wormshaft ball seats. This could result in damage to the ends of the ball return guides.*

(29) Adjust worm bearing preload and pitman shaft overcenter drag torque as outlined in following procedures.

Worm Bearing Preload and Pitman Shaft Overcenter Drag Torque Adjustment

(1) Tighten worm bearing adjuster until all end play has been removed, then loosen adjuster 1/2 turn.

(2) Using socket and torque wrench with maximum capacity of 50 inch-pounds (5.65 Nm), turn wormshaft to right turn stop, then back 1/2 turn.

(3) Tighten adjuster to obtain preload of 5 to 8 inch-pounds (0.56 to 0.90 Nm) and record preload.

(4) Tighten adjuster locknut to 50 foot-pounds (67.7 Nm) torque and recheck adjustment.

(5) Turn wormshaft from stop-to-stop while counting total number of turns.

(6) Turn wormshaft back exactly 1/2 total number of turns to center gear; then turn wormshaft 1/2 turn off center.

(7) Adjust overcenter drag torque by turning pitman shaft adjuster screw clockwise. Correct drag torque equals worm bearing preload plus additional 4 to 10 inch-pounds (0.45 to 1.13 Nm), but must not exceed a total of 18 inch-pounds (2.03 Nm). Be sure all rotating torque measurements are taken while turning pitman shaft through center of gear travel.
Example: Worm bearing preload is adjusted to 8 inch-pounds (0.90 Nm). Overcenter drag torque is adjusted to 6 inch-pounds (0.68 Nm) in addition to worm bearing preload. This makes a total of 14 inch-pounds (1.58 Nm) which is is acceptable.

(8) Tighten pitman adjuster locknut to 25 foot-pounds (33.9 Nm) torque and recheck adjustment.

SPECIFICATIONS

Steering Gear Specifications

Manual Steering Gear Adjustments Worm Bearing Preload	5 to 8 inch-pounds (0.6-1 N-m)
Pitman Shaft Overcenter Preload Drag Torque	4 to 10 inch-pounds (0.5-1 N-m) (in addition to above)
Total Steering Gear Preload	18 inch-pounds (2.0 N-m) total (maximum)
Manual Steering Gear Lubricant	Multi purpose chassis grease
Manual Steering Gear Ratio	24:1
Manual Steering Gear Type	Recirculating Ball

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Pitman Arm Nut	115	102-129	85	75-95
Flexible Coupling Pinch Bolt	41	27-54	30	20-40
Flexible Coupling-To-Intermediate Shaft Nuts	34	20-48	25	15-35
Intermediate Steering Shaft To Column Pinch Bolt	65	54-75	48	40-55
Pitman Arm Nut (See Caution)	156	136-169	115	100-125
Pitman Shaft Adjustment Locknut	34	20-48	25	15-35
Side Cover Bolts	41	34-48	30	25-35
Steering Gear Adaptor-To-Gear Bolt	75	54-88	55	40 65
Steering Gear Mounting Bolt	88	75-102	65	55-75
Steering Wheel Nut	34	30-38	25	22-28
Worm Bearing Adjuster	68	54-81	50	40-60

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

Caution: Pitman arm nut must be securely staked to sector shaft threads in one place.

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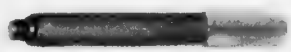
Special Tools

J-5754
PITMAN SHAFT BUSHING AND BEARING CUP PULLER

J-7170
PITMAN SHAFT BEARING SEAT INSTALLER



J-8092
DRIVER HANDLE

J-7171
PITMAN SHAFT SEAL INSTALLER

J-7133
PITMAN SHAFT BUSHING INSTALLER

J-5787
PITMAN SHAFT SEAL PROTECTOR

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MANUAL STEERING GEAR—PACER

GENERAL

The manual steering gear used on Pacer models is a rack and pinion design which combines the steering gear and steering linkage into one compact assembly (fig. 2J-13).

The steering gear consists of an integral tube and housing assembly containing the steering rack and pinion shaft. The tube and housing assembly are permanently connected during manufacture by a plastic injection-bonding process. Two thrust bearings and two nylon bushings support the pinion shaft in the housing. Two bushings support the steering rack in the tube and housing (fig. 2J-13). A preload spring maintains pinion bushing position and compensates for wear.

The steering linkage consists of two inner tie rod assemblies, two adjuster tube assemblies and two tie rod ends. The inner tie rods are attached to the steering rack ends by tie rod housings. The adjuster tube assemblies connect the inner tie rods and tie rod ends which are attached to the suspension steering arms.

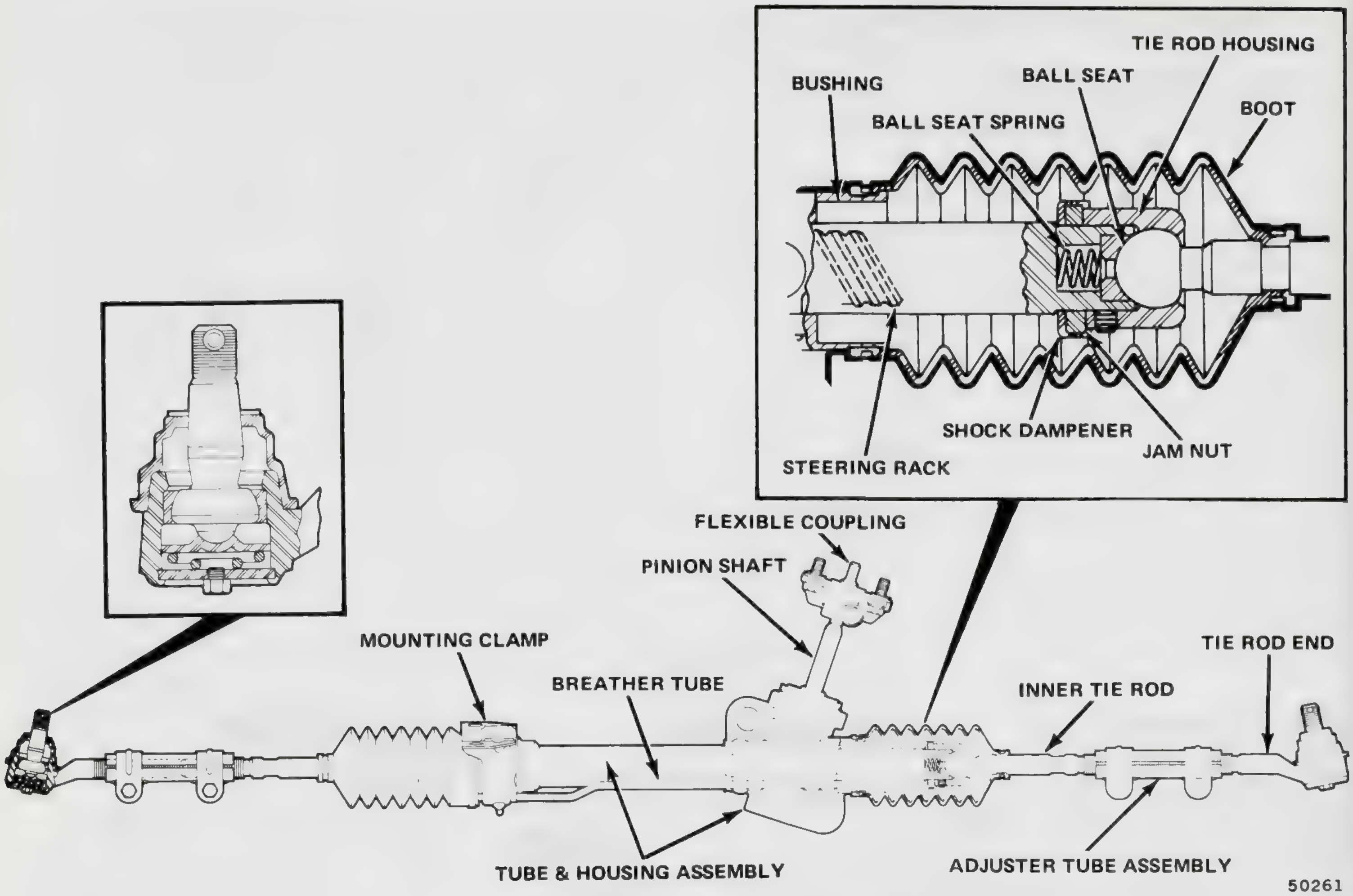


Fig. 2J-13 Manual Rack and Pinion Steering Gear

Rubber boots are used to cover and protect the inner tie rod assemblies from road splash (fig. 2J-14). The boots are attached to the tube and housing and tie rods by steel clamps. The breather tube interconnects the rubber boots to equalize internal pressures during steering manuevers.

The steering gear assembly is transverse mounted on the front crossmember. A flexible coupling is used to connect the pinion shaft to the intermediate steering shaft.

Operation

When the steering wheel is turned, pinion shaft rotary motion is converted to linear travel at the steering rack by meshing of the helical pinion teeth with the rack teeth. Since the suspension steering arms are connected to the steering rack by the tie rod ends, rack movement is transferred directly to the arms. Rack travel is 1.12 inches (2.849 cm) for every revolution of the pinion shaft.

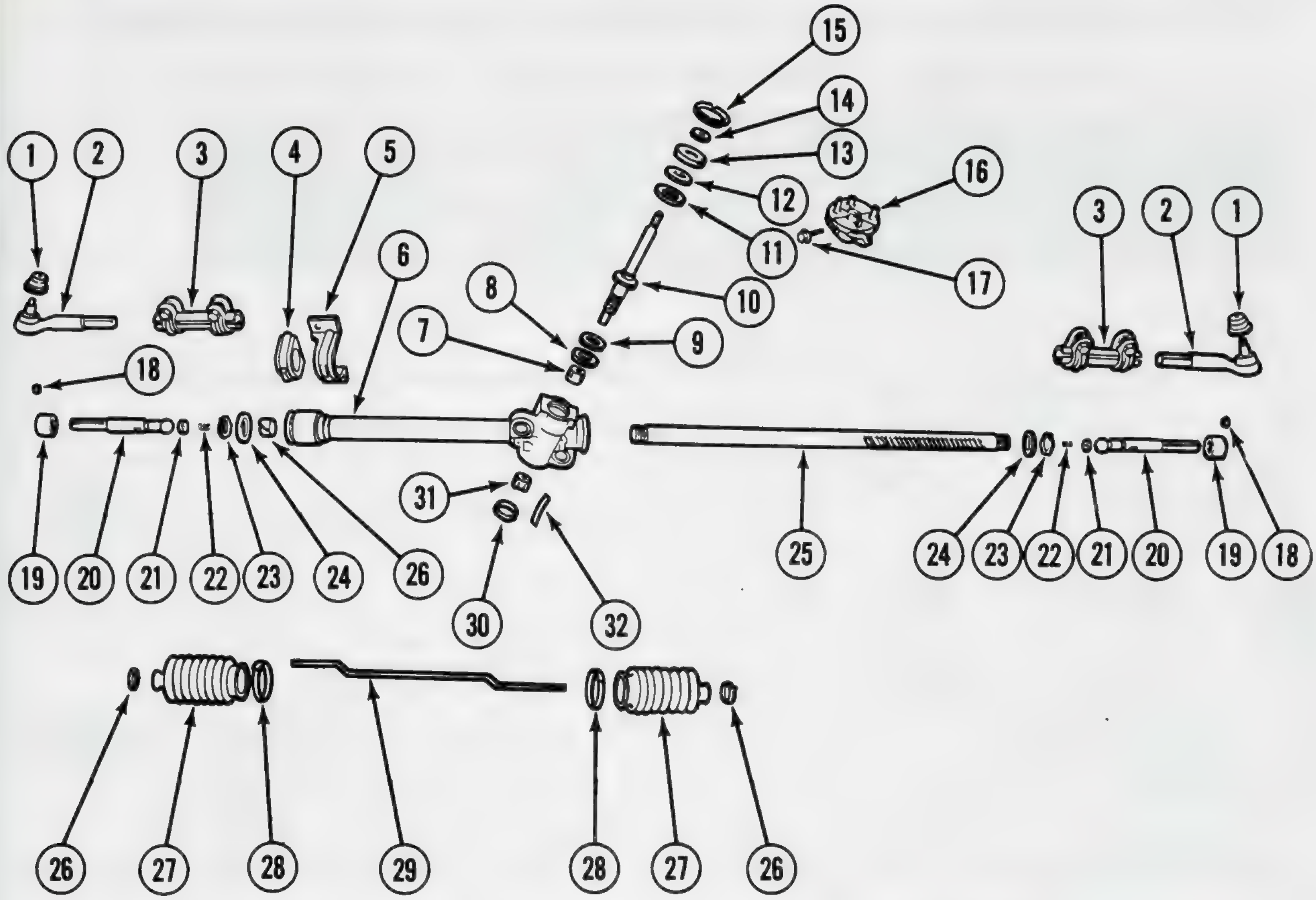
With the manual rack and pinion steering gear, the curb-to-curb turning radius is 37.0 feet (11.2 m). The total number of steering wheel turns lock-to-lock is 5.9.

Steering Gear Service

If the steering rack, pinion shaft, housing rack bushing, or tube and housing assembly should become damaged, the complete steering gear assembly, less linkage, must be replaced.

SERVICE DIAGNOSIS

Always drive the car to verify a complaint condition and check for obvious malfunctions first, such as uneven tire wear, incorrect tire pressure, or loose steering components. Visually check the flexible coupling and intermediate shaft universal joint for being loose, worn, or broken. Tighten or replace as required before road-testing. Raise the car on a hoist and inspect the undercarriage for loose or damaged parts. Rotate the front wheels and check for out-of-round tires or bent wheel rims. Check wheel bearings for looseness or having gravelly feel when wheel is rotated. If these preliminary checks do not reveal the problem cause, consult the following diagnosis charts for additional assistance.



1. TIE ROD SEAL
2. TIE ROD END
3. ADJUSTER TUBE
4. MOUNTING GROMMET
5. MOUNTING CLAMP
6. TUBE AND HOUSING ASSEMBLY
7. UPPER PINION BUSHING
8. LOWER THRUST BEARING RACE
9. LOWER THRUST BEARING
10. PINION SHAFT
11. UPPER THRUST BEARING
12. UPPER THRUST BEARING RACE
13. ADJUSTER PLUG
14. PINION SHAFT SEAL
15. ADJUSTER PLUG LOCKNUT
16. FLEXIBLE COUPLING
17. PINCH BOLT
18. SET SCREW
19. TIE ROD HOUSING
20. INNER TIE ROD
21. BALL SEAT
22. BALL SEAT SPRING
23. JAM NUT
24. SHOCK DAMPENER RING
25. STEERING RACK
26. BOOT RETAINER
27. BOOT
28. BOOT CLAMP
29. BREATHER TUBE
30. CONTRACTION PLUG
31. LOWER PINION BUSHING
32. PRELOAD SPRING

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Fig. 2J-14 Manual Rack and Pinion Steering Gear—Exploded View

ON-CAR SERVICE

The following components can be serviced with the steering gear installed in the car:

- Mounting clamp and grommet
- Breather tube
- Protective boots
- Tie rod ends and adjuster tubes
- Flexible coupling
- Inner tie rods, housings, ball seats, and springs.

All other components can be serviced only with the steering gear removed.

Protective Boot Replacement

(1) Raise and support front of car.

(2) Cut and remove boot clamps.

(3) Mark position of adjusting tubes and tie rods for assembly reference.

(4) Loosen adjusting tube clamp bolts and unthread tube from tie rods.

(5) Remove boot from housing end of gear.

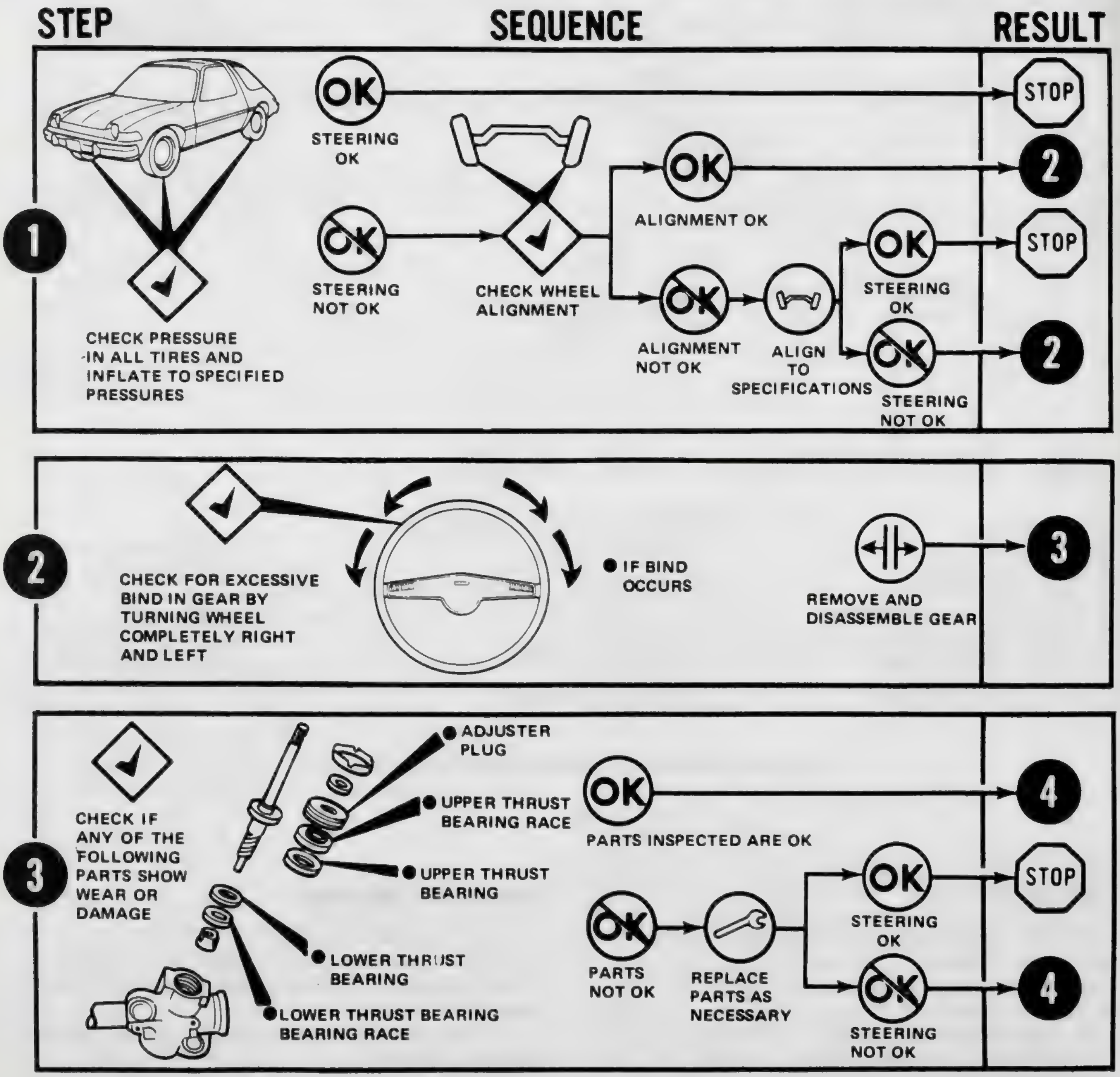
(6) Loosen steering gear mounting clamp bolts, move gear away from crossmember and remove boot from tube-end of gear.

MANUAL RACK AND PINION STEERING DIAGNOSIS AND REPAIR SIMPLIFICATION (DARS) CHARTS

Note: Refer to Chapter A — General Information for details on how to use this DARS chart.

PROBLEM: HARD STEERING — EXCESSIVE EFFORT REQUIRED AT STEERING WHEEL OR POOR RETURNABILITY OF STEERING WHEEL AFTER MAKING TURN

Chart 1



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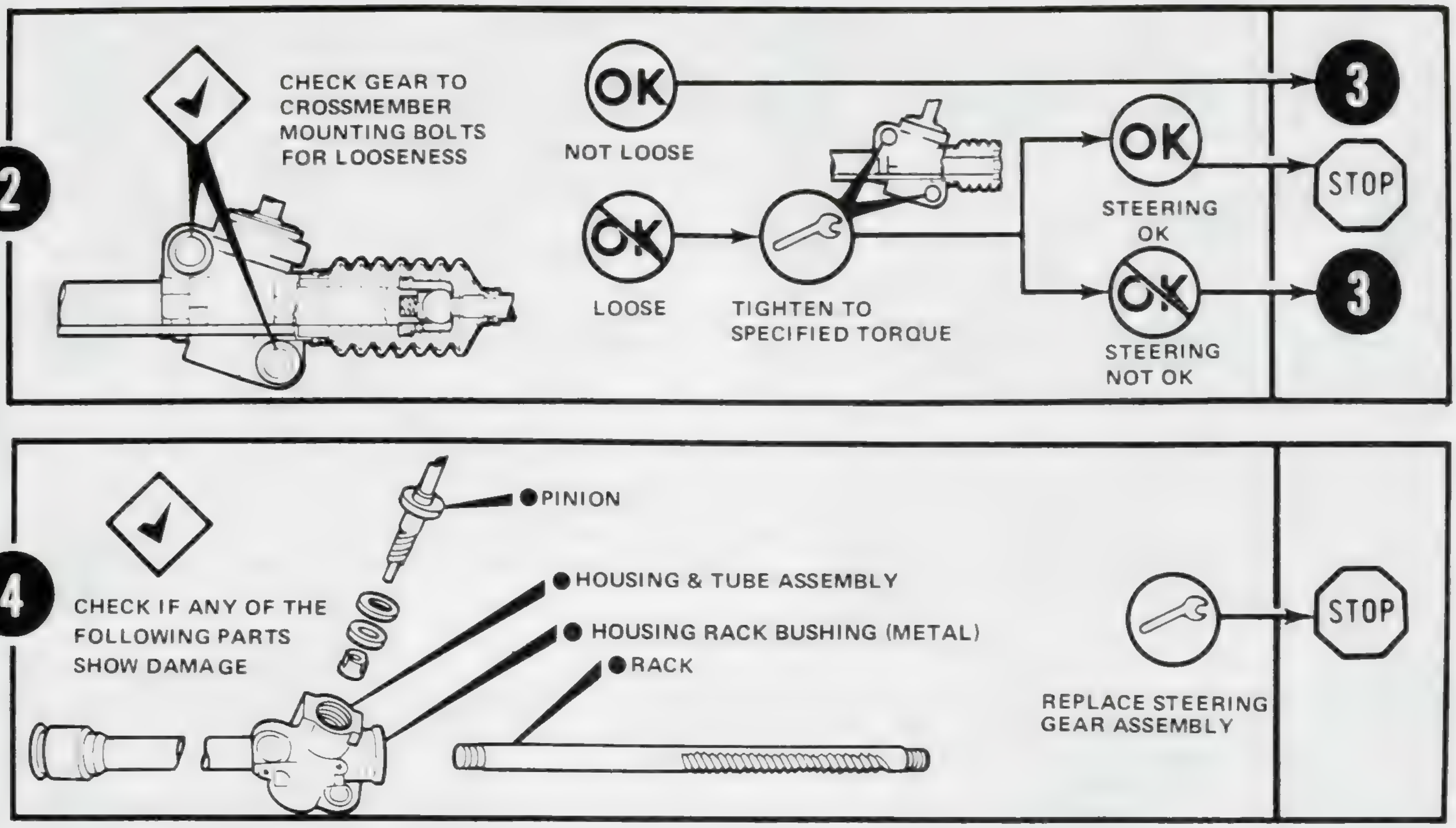
STEP | SEQUENCE | RESULT



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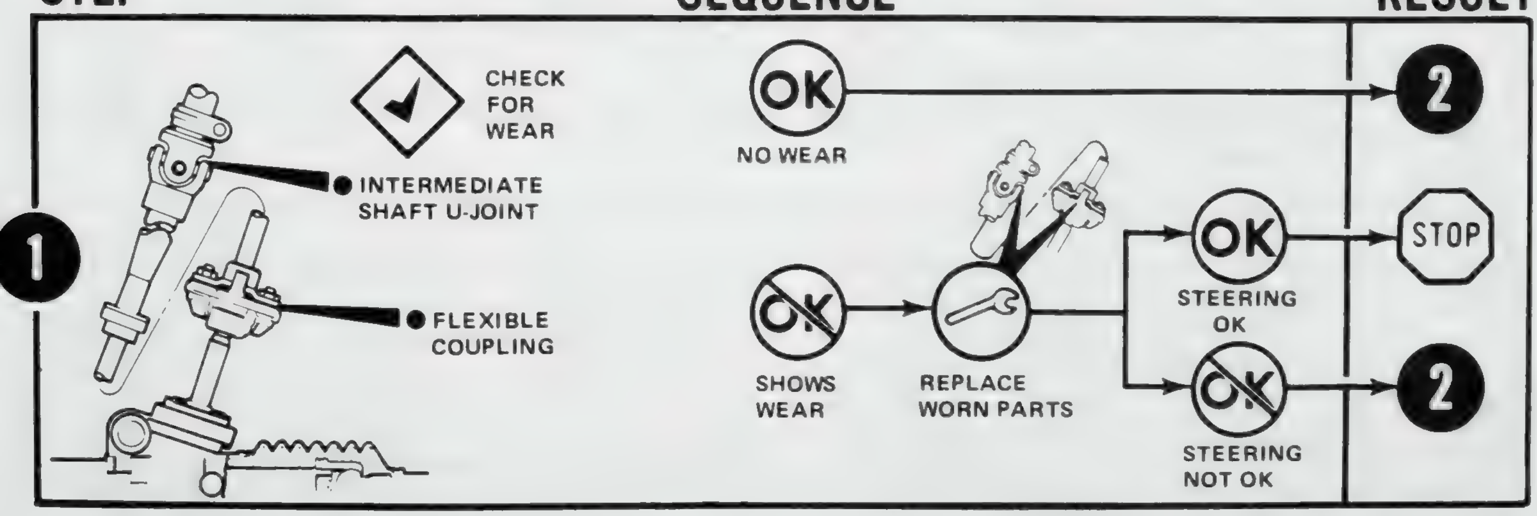
PROBLEM: EXCESSIVE PLAY OR LOOSENESS IN STEERING SYSTEM

Chart 2

STEP | SEQUENCE | RESULT



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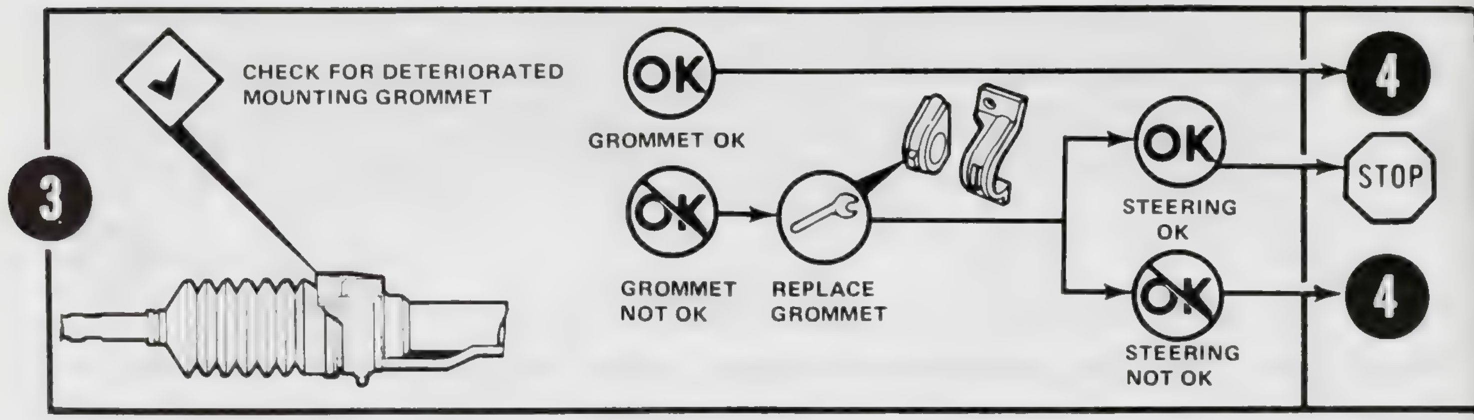
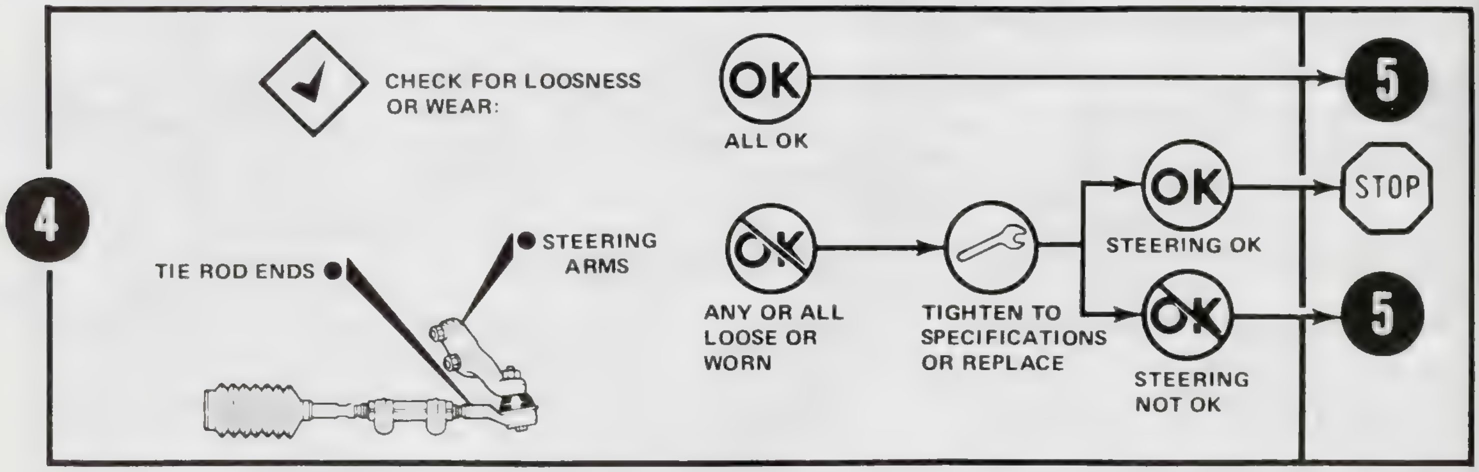
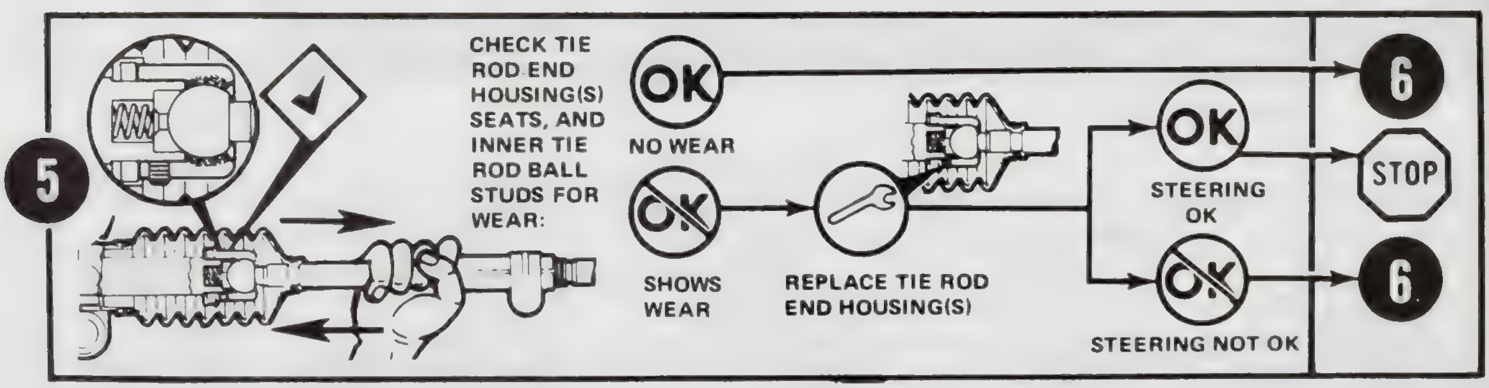
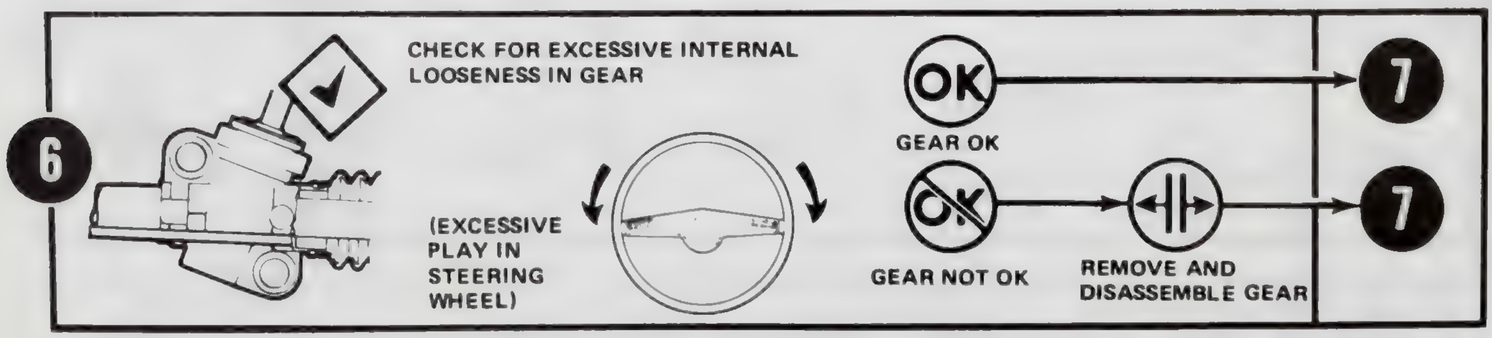
STEP **SEQUENCE** **RESULT**









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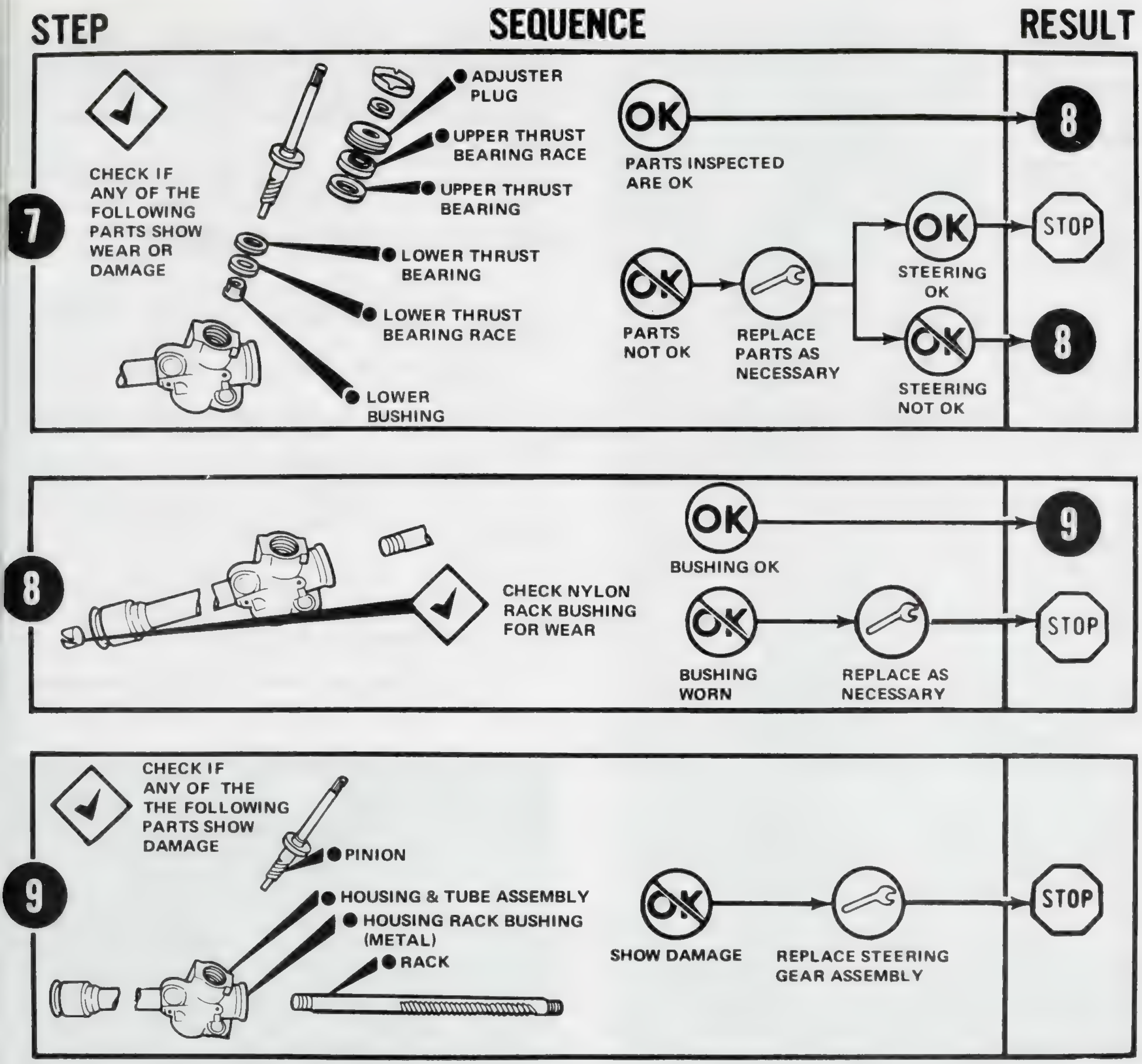

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(7) Install replacement boots. Align holes in boots with breather tube.

(8) Install boot clamps. Position ear of clamps 3/4 inch (19.05 mm) from breather tube. Compress clamps using tool J-22610.

(9) Install adjuster tubes on tie rods. and tighten clamp bolts to 22 foot-pounds (29.8 Nm) torque.

NOTE: *At least three threads should be visible at each end of adjuster tube. The number of threads per side should not differ by more than three.*

(10) Tighten steering gear mounting clamp bolts to 50 foot-pounds (67.7 Nm) torque.

(11) Remove supports, lower car, and correct toe-in as necessary.

Mounting Clamp and Grommet Replacement

(1) Raise and support front end of car.

(2) Cut and remove boot clamps from boot adjacent to mounting clamp.

(3) Mark position of adjuster tube and tie rod for assembly reference.

(4) Loosen adjuster tube clamp bolts and unthread tube from tie rod.

(5) Remove boot.

CAUTION: *Do not allow the protective boot to become cut or torn during service operations. A damaged boot will expose the gear internal components to dirt, foreign material, and road splash resulting in premature wear.*

(6) Remove bolts attaching mounting clamp to front crossmember. Loosen bolts before removing to minimize clamp distortion.

(7) Remove clamp and grommet using a twisting, pulling motion.

(8) Install replacement clamp and grommet. Align hole in grommet with breather tube.

(9) Install mounting clamp attaching bolts. Tighten bolts to 50 foot-pounds (67.7 Nm) torque.

(10) Install boot. Align hole in boot with breather tube.

(11) Install boot clamps. Position ear of clamps 3/4 inch (19.05 mm) from breather tube. Compress clamps using tool J-22610.

(12) Install adjuster tube on tie rod and tighten clamp bolts to 22 foot-pounds (29.8 Nm) torque.

NOTE: *At least three threads should be visible at each end of adjuster tube. The number of threads per side should not differ by more than three.*

(13) Remove supports, lower car, and correct toe-in as necessary.

Breather Tube Replacement

(1) Raise and support front of car.

(2) Cut and remove large diameter boot clamps from boots.

(3) Slide boots away from breather tube and remove tube.

CAUTION: *Do not allow the protective boots to become cut or torn during service operations. A damaged boot will expose the gear internal components to dirt, foreign material, and road splash resulting in premature wear.*

(4) Remove bolts attaching mounting clamp to front crossmember. Loosen bolts before removing to minimize clamp distortion.

(5) Remove clamp and grommet using a twisting-pulling motion.

(6) Install replacement breather tube. Align holes in boots with tube.

(7) Install mounting clamp and grommet. Be sure to align hole in grommet with breather tube.

(8) Install and tighten mounting clamp bolts to 50 foot-pounds (67.9 Nm) torque.

(9) Position boots on flanges at each end of tube and housing and install boot clamps. Position ear of clamps 3/4 inch (19.05 mm) from breather tube and compress clamps using tool J-22610.

(10) Remove supports and lower car.

Flexible Coupling Replacement

(1) Remove nuts attaching coupling to intermediate shaft flange and compress shaft to provide working clearance.

(2) Remove coupling pinch bolt using 7/16-inch, 12-point socket or box end wrench, and remove coupling.

(3) Install replacement coupling (flat-to-flat) and install pinch bolt. Tighten bolt to 30 foot-pounds (40.6 Nm) torque.

(4) Connect intermediate shaft to coupling and tighten nuts to 25 foot-pounds (33.9 Nm) torque.

Tie Rod Ends and Adjuster Tube Replacement

(1) Raise and support front of car.

(2) Disconnect tie rod ends using Tool J-26951 (fig. 2J-15).

(3) Mark position of adjuster tube and tie rod end for assembly reference.

(4) Remove and separate tie rod ends and adjuster tubes.

(5) Install replacement tie rod ends and adjuster tubes. Tighten tube-clamp bolts to 22 foot-pounds (29.8 Nm) torque and tie rod end nuts to 50 foot-pounds (67.9 Nm) torque.

NOTE: *At least three threads should be visible at each end of adjuster tubes. The number of threads per side should not differ by more than three.*

(6) Remove supports, lower car, and adjust toe-in as necessary.

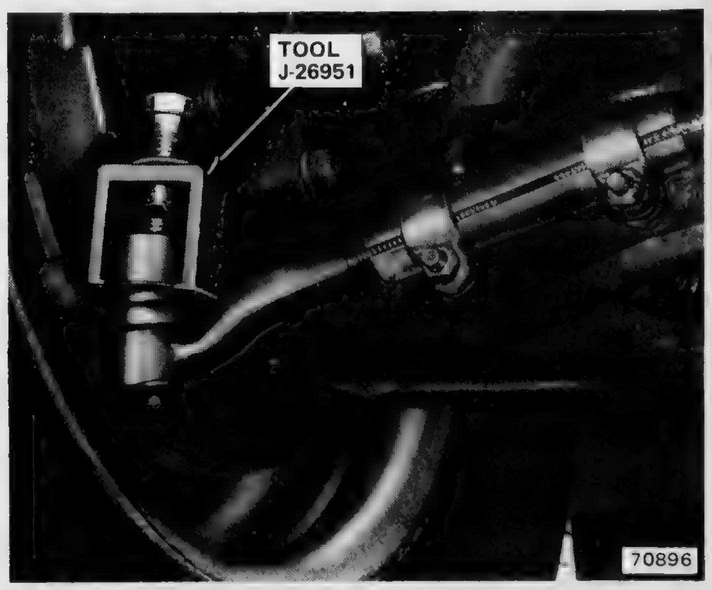

Fig. 2J-15 Disconnecting Tie Rod End

Inner Tie Rod Housing, Tie Rod, Ball Seat, and Spring Replacement

(1) Raise and support front of car.

(2) Disconnect tie rod end using Tool J-26951 (fig. 2J-15).

(3) Mark position of adjuster tube and inner tie rod for assembly reference.

(4) Loosen adjuster tube inboard clamp bolt and unthread adjuster tube and tie rod end from inner tie rod assembly.

(5) Cut and remove large boot clamp and move boot aside.

CAUTION: *Do not allow the protective boot to become cut or torn during service operations. A damaged boot will expose the gear internal components to dirt, foreign material, and road splash resulting in premature wear.*

(6) Slide shock dampener ring off jamnut.

(7) loosen jamnut. Use open end wrench to loosen jamnut and place another open end wrench on rack flat (adjacent to rack teeth) to prevent rack from turning.

CAUTION: *If the rack is allowed to turn when loosening the jamnuts, gear internal components could be damaged. An open end wrench must be used to hold the rack when loosening the jamnut.*

(8) Loosen setscrew in tie rod housing, unthread housing from rack and remove inner tie rod, tie rod housing, inner tie rod ball seat, and ball seat spring.

(9) Liberally apply a waterproof, EP-type, lithium base chassis lubricant to all replacement inner tie rod assembly wear surfaces. Pack tie rod housing with same lubricant.

(10) Install ball seat spring and ball seat in end of rack.

(11) Assemble inner tie rod and housing and install on rack.

(12) **Hand tighten tie rod housing** while rocking inner tie rod to prevent grease lock; then back housing off 1/8-turn (45°). Tie rod must rock and turn freely in housing.

(13) Tighten tie rod housing setscrew to 9 foot-pounds (12.2 Nm) torque.

(14) Tighten jamnut to 60 foot-pounds (81.3 Nm) torque. Use open end wrench to loosen jamnut and place another open and wrench on rack flat (adjacent to rack teeth) to prevent rack from turning.

CAUTION: *If the rack is allowed to turn when tightening the jamnut, gear internal components could be damaged. An open end wrench must be used to hold the rack when tightening the jamnut.*

(15) Check movement of inner tie rod after tightening jamnut. Tie rod must move freely in housing to ensure proper operation.

(16) Slide shock dampener ring over jamnut.

(17) Install boot on inner tie rod and tube or housing. Align breather tube with hole in boot and install boot clamps. Position ear of large clamp 3/4-inch (19.05 mm) from breather tube. Compress clamps using Tool J-22610.

(18) Thread adjuster tube and tie rod end assembly on inner tie rod. Refer to alignment marks made at disassembly.

(19) Tighten adjuster tube bolts to 22 foot-pounds (29.8 Nm) torque.

(20) Connect tie rod ends to steering arms. Tighten tie rod end nuts to 50 foot-pounds (67.7 Nm) torque and install replacement cotter pins.

(21) Remove supports, lower car, and adjust toe-in as necessary.

STEERING GEAR REMOVAL

(1) Unlock steering column.

(2) Raise and support front of car.

(3) Remove screws attaching reinforcement brace to front crossmember and left engine support bracket and remove brace.

(4) Remove flexible coupling pinch bolt and disengage flexible coupling from steering gear pinion shaft.

(5) Remove cotter pins and nuts from tie rod ends.

(6) Disconnect tie rod ends using tool J-26951 (fig. 2J-15).

(7) Remove bolts attaching steering gear mounting clamp to right side of front crossmember.

NOTE: *Before removing bolts, loosen them slightly to minimize clamp distortion.*

(8) Remove steering gear housing-to-crossmember nuts. Remove bolts, washers, sleeves, and grommets using blunt punch.

(9) Rotate bottom of gear housing toward front of car until pinion shaft is approximately parallel with skid plate. Slide gear assembly toward right side of car until housing and tube clear mounting plate and remove steering gear assembly.

STEERING GEAR INSTALLATION

(1) Assemble grommets, sleeves, and washers and install on steering gear (fig. 2J-16). Sleeves will hold grommets in place during assembly.

(2) Position steering gear assembly on crossmember. Install tube and housing from right side of car. During installation, keep pinion shaft approximately parallel with mounting plate.

(3) Install mounting clamp-to-crossmember attaching bolts. Hand tighten bolts only.

(4) Install steering gear housing-to-crossmember attaching bolts, washers, and nuts and tighten to 60 foot-pounds (81.3 Nm) torque.

(5) Tighten mounting clamp-to-crossmember attaching bolts to 50 foot-pounds (67.7 Nm) torque.

(6) Connect tie rod ends to steering arms. Tighten nuts to 50 foot-pounds (67.7 Nm) torque and install replacement cotter pins.

(7) Align flat spline on pinion shaft with flat on flexible coupling and install coupling on shaft. Install pinch bolt and tighten to 30 foot-pounds (40.6 Nm) torque.

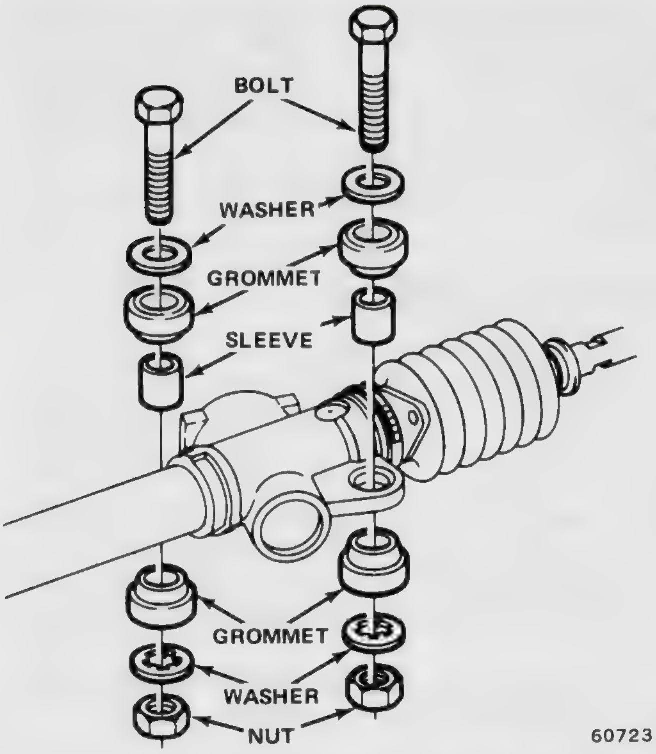

Fig. 2J-16 Steering Gear Housing Attaching Parts

(8) Install bolts attaching reinforcement brace to front crossmember and engine support bracket. Tighten bolts to 30 foot-pounds (40.6 Nm) torque.

(9) Remove supports and lower car.

(10) Check and correct toe-in adjustment if necessary.

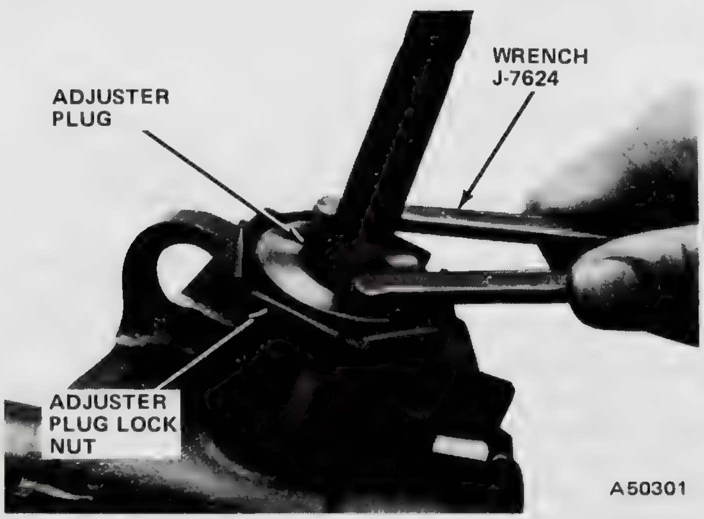

Fig. 2J-17 Adjuster Plug Removal

STEERING GEAR DISASSEMBLY

Inspection (Predisassembly)

(1) Mount steering gear in vise using protective vise jaws.

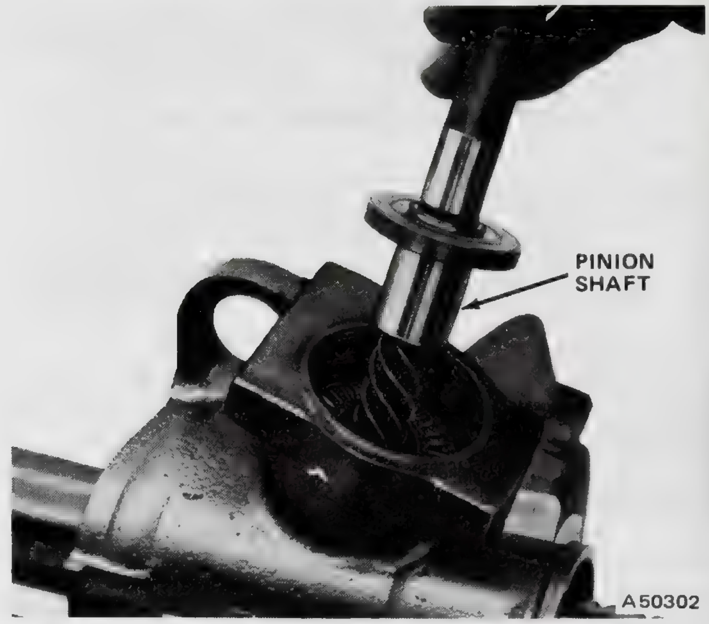

Fig. 2J-18 Pinion Shaft Removal

CAUTION: *Do not clamp any part of the tube in the vise. Clamp the housing only in a vise.*

(2) Cut and remove large diameter boot clamp from boot on housing end of steering gear.

(3) Slide boot away from housing to expose rack teeth.

(4) Turn pinion shaft to move rack toward housing end of steering gear and expose as many rack teeth as possible.

(5) Clean and inspect exposed rack teeth. If teeth are chipped, cracked, broken, worn excessively, or show signs of tooth flaking, replace steering gear assemby. If teeth are in good condition, proceed to next step.

NOTE: *Do not replace the steering gear if the rack teeth have machining marks on them or appear excessively bright or shiny. These are normal conditions.*

(6) Remove adjuster plug locknut (fig. 2J-17).

(7) Remove pinion shaft. Pull shaft upward and rotate it clockwise slightly to ease removal (fig. 2J-18).

(8) Clean and inspect pinion shaft. If teeth are chipped cracked, broken, worn excessively, or show signs of tooth flaking, replace steering gear assembly. If teeth are in good condition, proceed to next step.

NOTE: *Do not replace the steering gear if the rack teeth have machining marks on them or appear excessively bright or shiny. These are normal conditions.*

(9) Remove contraction plug from housing using 1/4-inch (6.35 mm) diameter brass rod (fig. 2J-19). Insert rod through upper and lower pinion bushings and tap on rod to dislodge plug.

CAUTION: *Do not damage the rack teeth when removing the plug.*

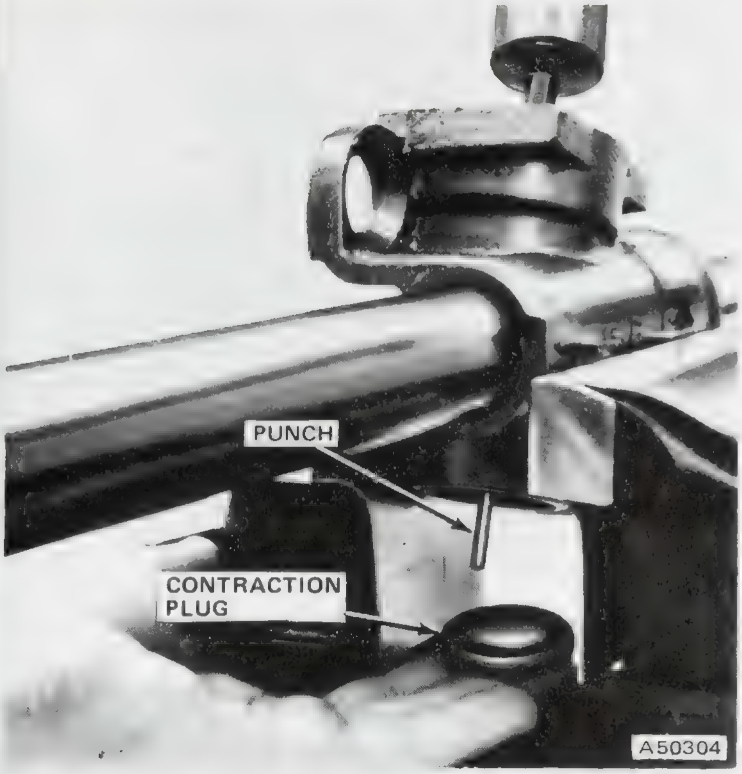

Fig. 2J-19 Contraction Plug Removal

(10) Remove lower pinion bushing and preload spring with brass rod used to remove contraction plug (fig. 2J-20).

(11) Move rack to centered position in tube and housing.

(12) Reinstall pinion shaft and adjuster plug in housing. Hand-tighten adjuster plug only.

(13) Mark position of adjuster tubes on inner tie rods for assembly reference.

(14) Loosen inboard clamp bolts on both adjuster tubes and remove tube/tie rod end assemblies from inner tie rods. Spray tube threads with penetrating oil to ease removal.

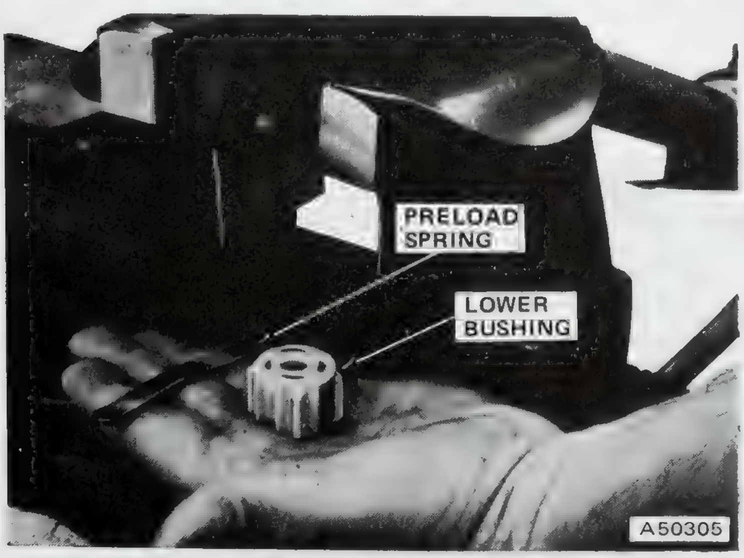

Fig. 2J-20 Lower Bushing and Preload Spring Removal

(15) Mark breather tube position on tube and housing assembly. Boots and breather tube must be installed in same position to ensure proper sealing.

(16) Cut and remove all boot clamps and remove boots.

CAUTION: *Do not allow the protective boots to become cut, torn, or damaged during service operations. A damaged boot will expose the gear internal components to dirt, foreign material, and road splash resulting in premature wear.*

(17) Remove mounting clamp and grommet.

(18) Loosen, but do not remove, tie rod housing setscrews and slide shock dampener rings off jamnuts (fig. 2J-21).

(19) Loosen inner tie rod housing jamnuts. Use open end wrench to loosen jamnuts and place another open end wrench on rack flat (adjacent to rack teeth) to prevent rack from turning (fig. 2J-22).

CAUTION: *If the rack is allowed to turn when loosening the jamnuts, gear internal components could be damaged. Do not attempt to loosen the jamnuts without using an open end wrench to hold the rack (fig. 2J-22).*

(20) Remove inner tie rod housings and remove ball seats, ball seat springs, jamnuts, and shock dampener rings (fig. 2J-23).

(21) Remove adjuster plug (fig. 2J-17).

(22) Remove pinion shaft by pulling upward and rotating counterclockwise (fig. 2J-18).

(23) Remove lower thrust bearing and race from housing (fig. 2J-24).

(24) Remove upper pinion bushing from housing (fig. 2J-25).

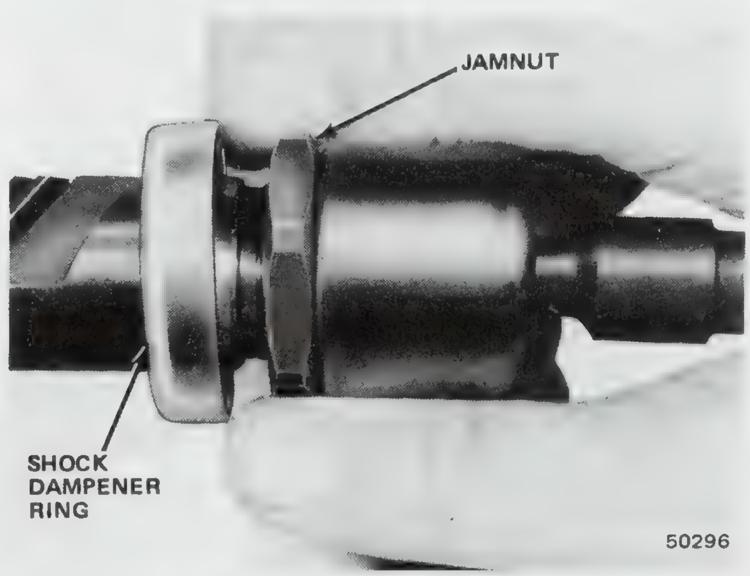

Fig. 2J-21 Shock Dampener Ring Removal

Fig. 2J-22 Loosening—Tightening Jamnut

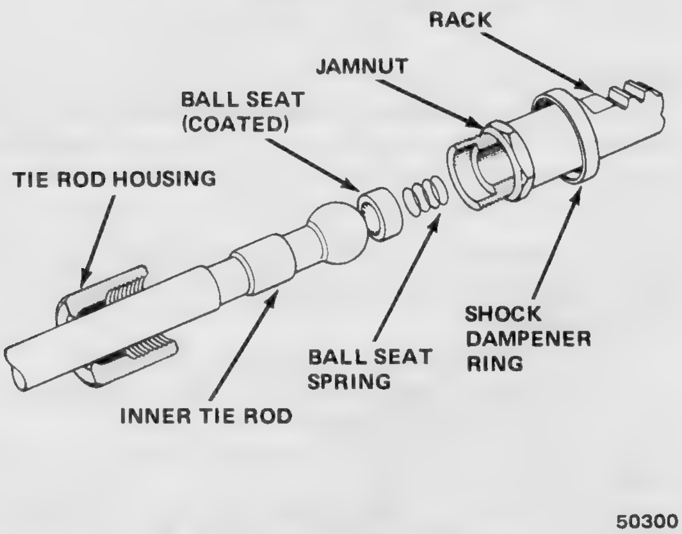

Fig. 2J-23 Inner Tie Rod Assembly

(25) Pull steering rack out of tube and housing assembly (fig. 2J-26).

NOTE: *The rack may be removed from either end.*

(26) Remove rack bushing from tube. Slip knife blade under bushing, grasp bushing with needlenose pliers, and pull it straight out of tube.

CAUTION: *Do not attempt to remove the rack bushing located in the gear housing. This bushing is permanently installed during manufacture and is not a removable part. If the bushing is severely worn or damaged, the complete steering gear assembly, less linkage, must be replaced.*

(27) Remove pinion shaft seal by threading adjuster plug into housing and prying seal out with screwdriver (fig. 2J-27).

CLEANING AND INSPECTION

Cleaning

Wash all parts, except nylon bushings and rubber boots, in clean solvent and dry all parts with filtered compressed air. Nylon bushings and rubber boots should be wiped clean with shop towels only.

NOTE: *When cleaning the tube and housing, be sure the alignment marks for the breather tube and mounting clamp are not removed.*

Inspection

Tube and Housing Assembly

Check the housing for cracks or porosity and check the tube for cracks, dents, distortion, or for being loose in the housing. If the tube or housing is damaged, replace the complete steering gear assembly, less the steering linkage components.

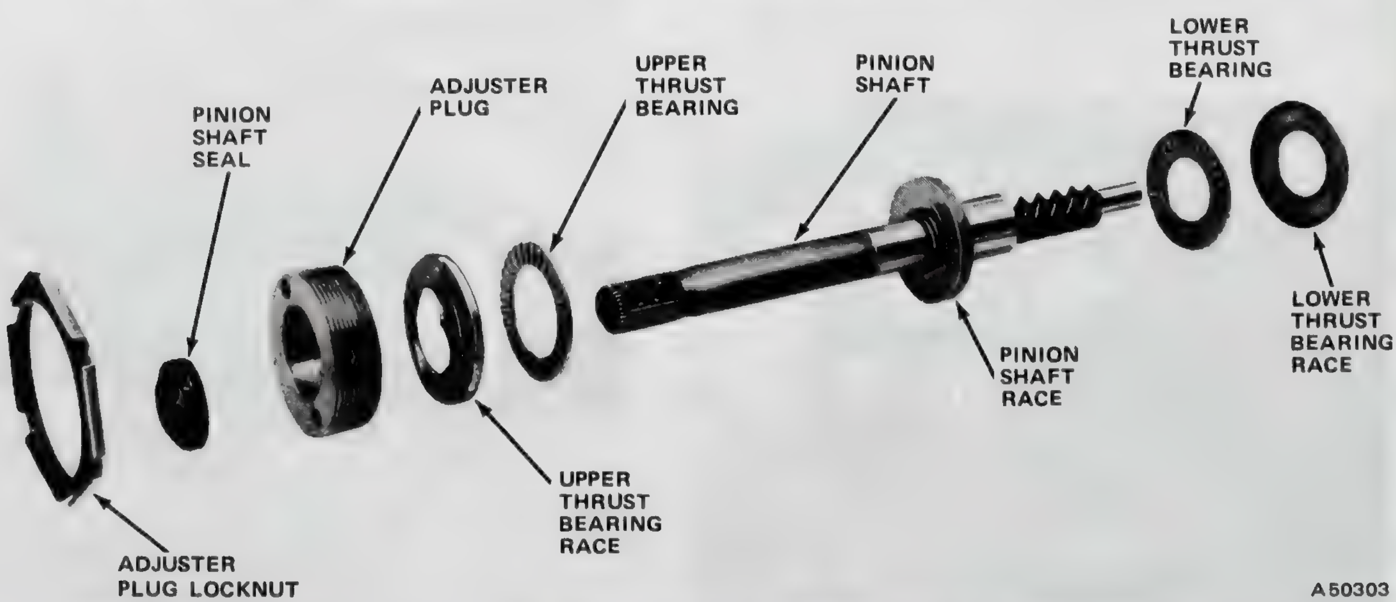

Fig. 2J-24 Pinion Shaft Bearings and Adjuster Plug Assembly

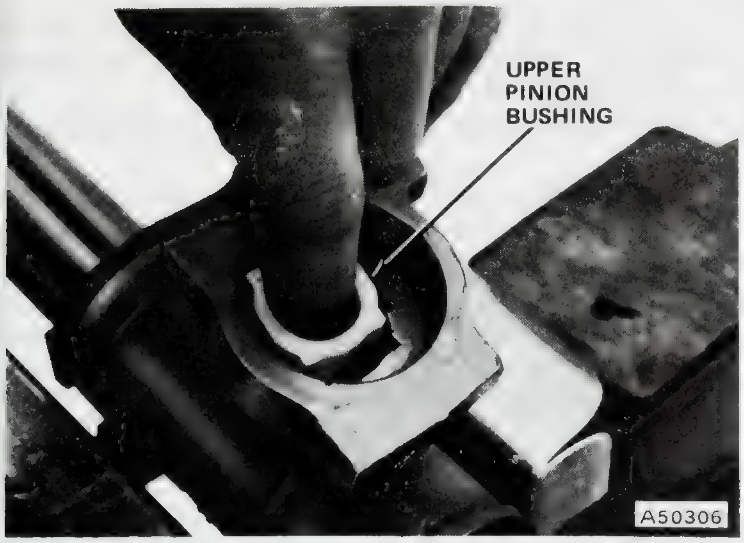

Fig. 2J-25 Upper Bushing Removal

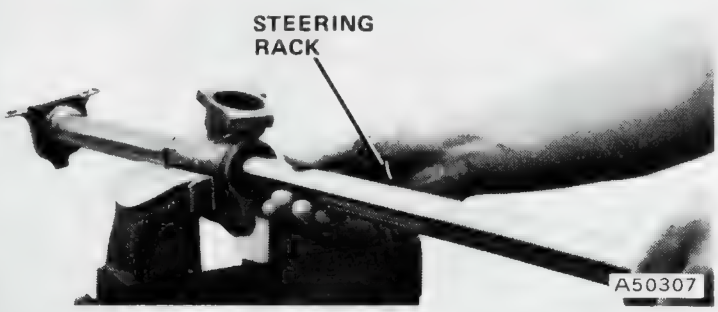

Fig. 2J-26 Steering Rack Removal

Steering Rack and Pinion Shaft

Check the rack and pinion shaft for cracked, chipped, broken, worn, or flaking teeth. Check the rack and shaft for scores, nicks, or burrs on bearing and bushing surfaces. Check the splines on the shaft and the threads on the rack for damage.

If either the pinion or rack require replacement, the complete steering gear assembly, less linkage, must be replaced.

Bushings

Check the pinion shaft bushings for cracks, excessive wear, or for being broken.

Check the rack bushings for excessive wear, nicks, or scores. Replace the bushing in the tube if it exhibits any of these conditions. However, replace the steering gear assembly, less linkage, if the rack bushing in the housing is severely worn or damaged.

CAUTION: *The rack bushing located in the housing is not a serviceable part. Do not attempt to remove it.*

Thrust Bearings

Check for galling, flat spots, pitting, or excessive wear of rollers. Check races for nicks, burrs, and excessive wear. Replace bearings as required.

Steering Linkage Components

Check the inner tie rod ball sockets, ball seats, and housings for cracks, scores, burrs, and excessive wear. Check the ball seat springs for loss of tension, distortion, or breakage. Check the adjuster tubes for damaged threads, distortion, or loose fit. Check the tie rod ends for damaged threads, torn rubber seals, and excessive wear or looseness of ball stud in socket. Replace parts as required.

Breather Tube and Boots

Check the tube for dents, cracks, splits, or bends. Check the boots for tears, holes, cracks, or loss of elasticity (hard-brittle feel). Replace parts as required.

Flexible Coupling

Check the coupling for wear, tears, rips, unraveling, worn bolts, or distortion. Check the clamp and pinch bolt for damage. Replace parts as required.

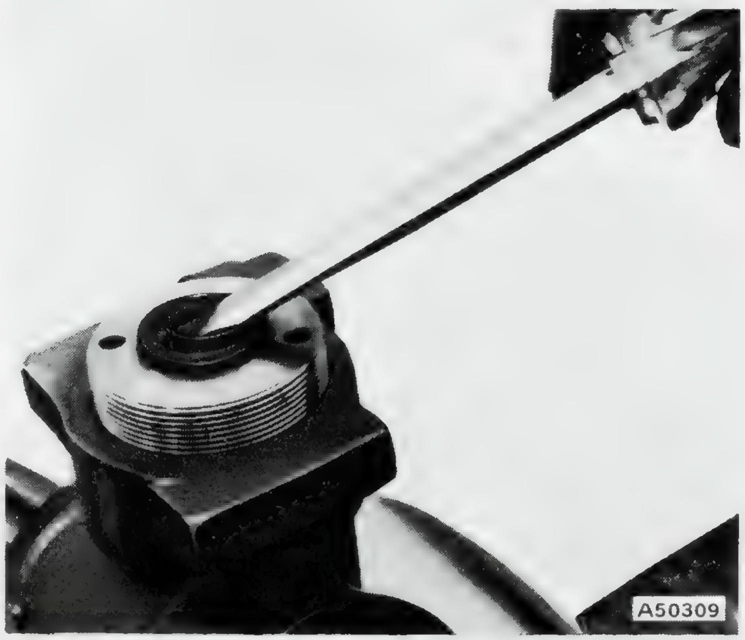

Fig. 2J-27 Pinion Shaft Seal Removal

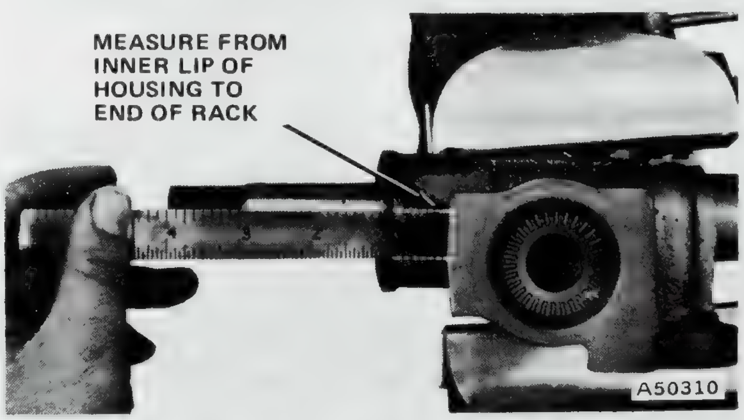

Fig 2J-28 Centering Steering Rack

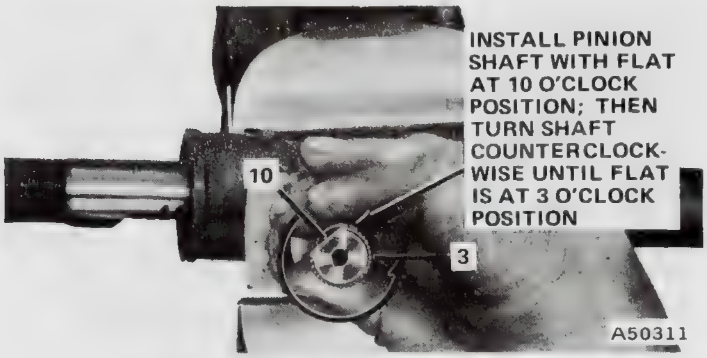

Fig. 2J-29 Engaging Pinion in Rack

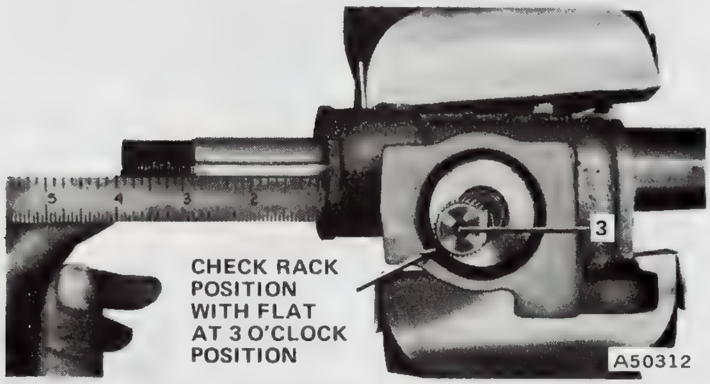

Fig. 2J-30 Checking Rack Position After Pinion Installation

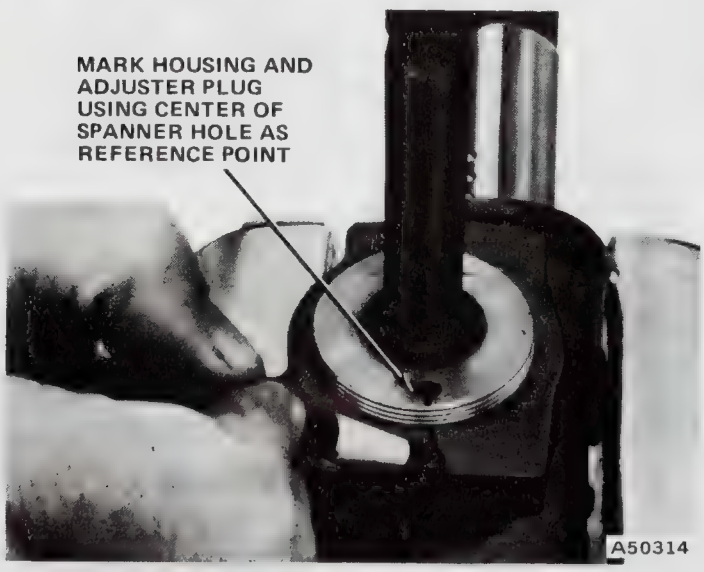

Fig. 2J-31 Marking Adjuster Plug and Housing

STEERING GEAR ASSEMBLY AND ADJUSTMENT

(1) Install pinion shaft seal in adjuster plug using suitable sized socket. Install seal until flush with face of adjuster plug. Do not press on seal lip.

(2) Install rack bushing in tube. Compress leading end of bushing with fingers and insert in tube opening. When it is past lip in tube, bushing will snap back to original shape.

(3) Coat rack teeth with liberal amount of EP-type, waterproof, lithium-base chassis lubricant and install rack in housing (fig. 2J-26).

(4) Install upper pinion bushing in housing (fig. 2J-25).

(5) Lubricate pinion shaft lower race and thrust bearing with EP-type, waterproof, lithium-base chassis lubricant and install race and thrust bearing in housing with flanged edge of race facing upward (fig. 2J-24).

(6) Center steering rack in housing. Set distance between end of steering rack and inner lip of housing at 4 inches (10.16 cm) (fig. 2J-27).

(7) Start pinion shaft into housing and rack with flat on splined end of pinion shaft at approximately 10 o'clock position. Turn pinion shaft counterclockwise and push down until pinion shaft race bottoms on thrust bearing (fig. 2J-29).

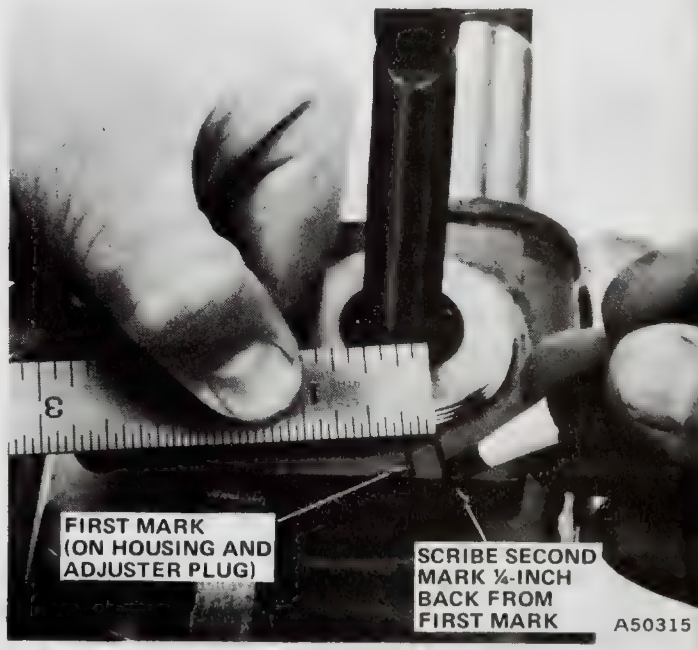

Fig. 2J-32 Remarking Housing

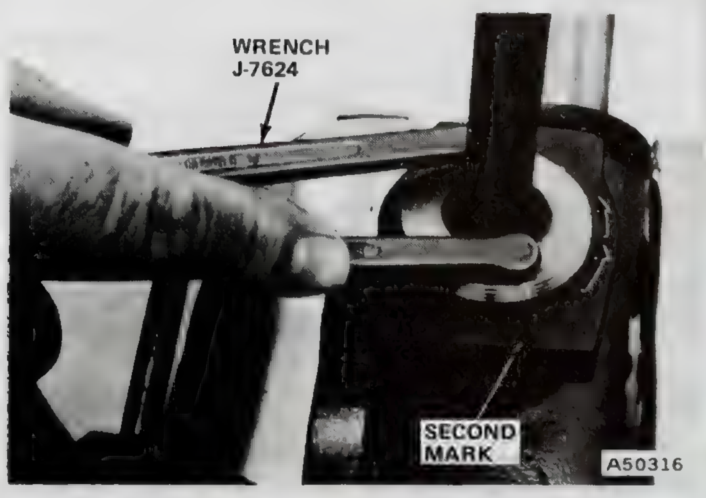

Fig. 2J-33 Backing Off Adjuster Plug

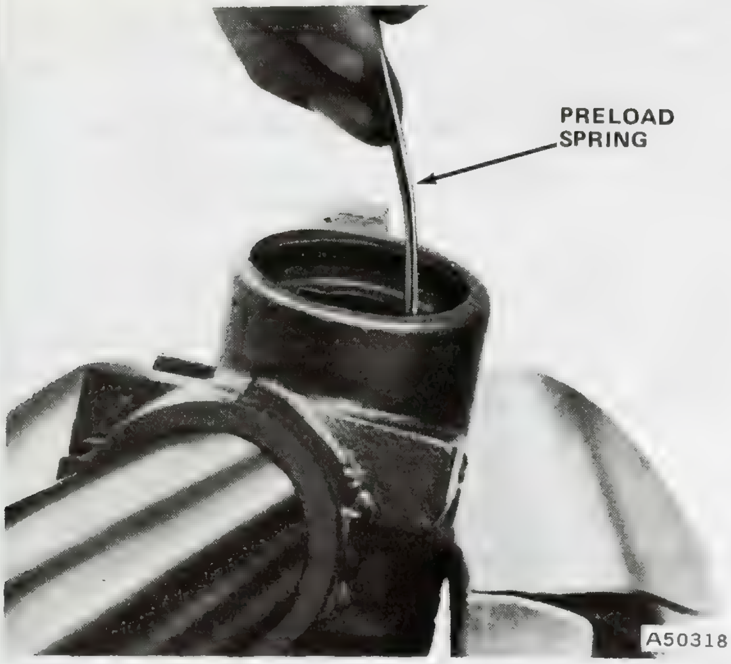

Fig. 2J-34 Rack Preload Spring Installation

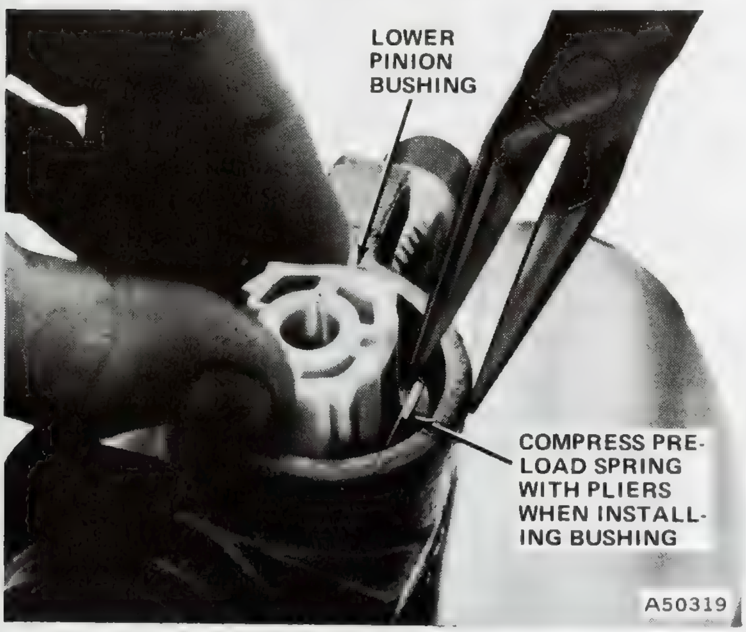

Fig. 2J-35 Lower Pinion Bushing Installation

(8) Reset distance between end of rack and housing as outlined in step (5). Flat on pinion shaft should now be at 3 o'clock position (fig. 2J-30). Be sure pinion race is bottomed in housing. If flat on pinion shaft is not at 3 o'clock with rack set at 4 inches (10.16 cm), start again at step (4).

(9) Install adjuster plug using Spanner Tool J-7624 and tighten plug until it bottoms.

(10) Mark both adjuster plug and gear housing at spanner hole (fig. 2J-31).

(11) Measure back (counterclockwise) 3/16 to 1/4 inch (4.76 mm to 6.35 mm) and remark housing (fig. 2J-32).

(12) Back adjuster plug off to second mark (fig. 2J-33) and install locknut. Tighten locknut to 50 foot-pounds (67.8 Nm) torque while holding adjuster plug.

(13) Turn assembly over and mount in vise. Fill cavity around pinion shaft with EP-type lithium based, waterproof, chassis lubricant. Do not overfill, as pinion bushing and spring must be installed.

(14) Install preload spring in housing with center hump of spring bearing against housing (fig. 2J-34). Allow spring to extend approximately 1/4 inch (6.35 mm) from end of housing.

(15) Hold top of preload spring against housing with needlenose pliers and install bushing in housing with chamfered end facing down (fig. 2J-35).

(16) Install and seat contraction plug in housing using brass rod or suitable size socket.

(17) Install shock dampener rings on each end of steering rack with open ends facing out (fig. 2J-21) and install jamnuts.

(18) Liberally apply waterproof, EP-type lithium-based chassis lubricant to all inner tie rod assembly wear surfaces and pack tie rod housings with same lubricant.

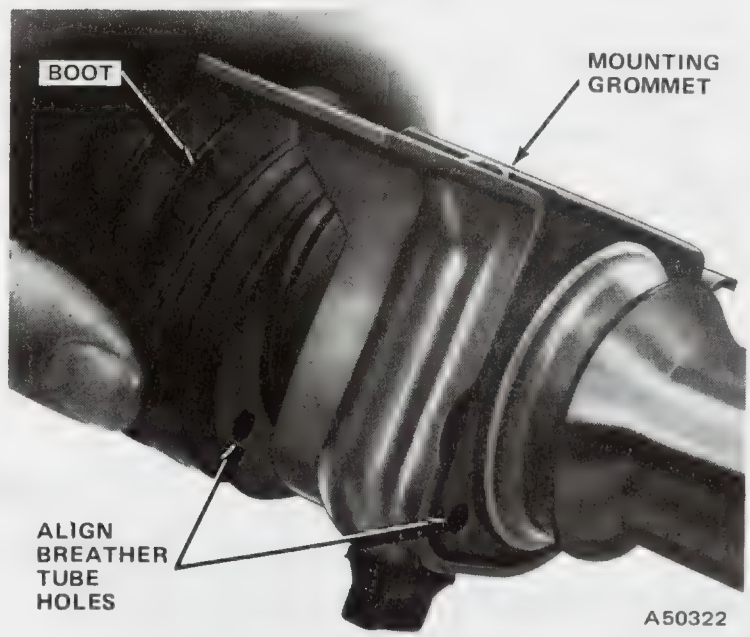

Fig. 2J-36 Protective Boot Installation

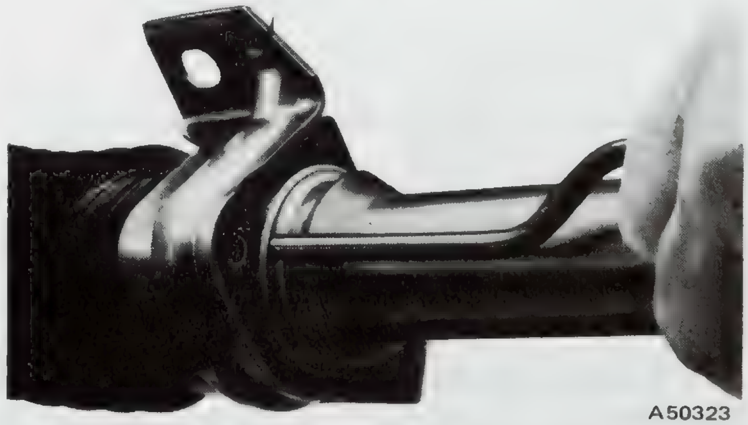

Fig. 2J-37 Breather Tube Installation

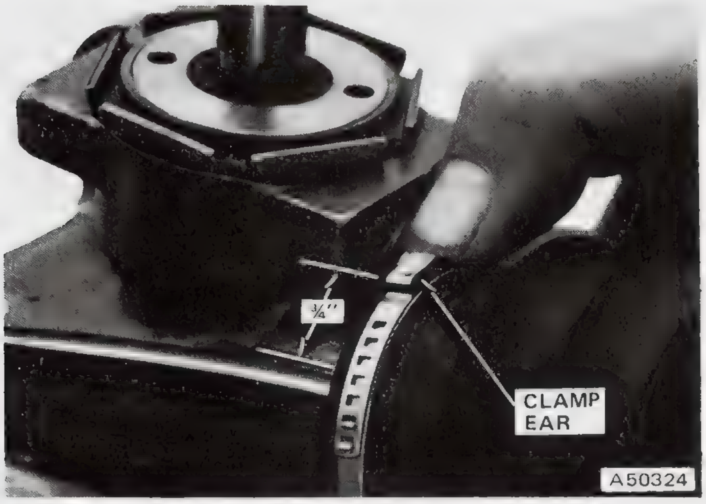

Fig. 2J-38 Boot Clamp Installation

(19) Assemble inner tie rods and tie rod housings and install assemblies on rack.

(20) **HAND TIGHTEN tie rod housing** while rocking inner tie rod to prevent grease lock; then back housing off 1/8-turn (45°). Tie rod must rock and turn freely in housing.

(21) Tighten housing setscrews to 9 foot-pounds (12.2 Nm) torque.

(22) Tighten jamnuts to 60 foot-pounds (81.3 Nm) torque. Use open end wrench to tighten jamnuts and place another open end wrench on rack flat (adjacent to rack teeth) to prevent rack from turning (fig. 2J-22).

CAUTION: *If the rack is allowed to turn when tightening the jamnuts, gear internal components could be damaged. Do not attempt to tighten the jamnuts without using an open end wrench to hold the rack (fig. 2J-22).*

(23) Check movement of inner tie rod after tightening jamnuts. Tie rod must move freely in housing to ensure proper operation.

(24) Slide shock dampener rings over jamnuts (fig. 2J-21).

CAUTION: *Operation of the breather tube is important in that it transfers air from one boot to the other during turning maneuvers. If the tube is plugged, pinched, or improperly installed, dust and water could be drawn into the inner tie rod assemblies.*

(25) Install mounting clamp and grommet on breather tube using alignment marks made at disassembly.

(26) Install boot on mounting bracket side of tube and housing. Hole in boot must align with hole in mounting grommet (fig. 2J-36).

(27) Slide short end of tube through grommet and boot breather tube holes (fig. 2J-37). Long end of tube should rest against tube and housing.

(28) Install opposite side boot with hole in boot aligned with breather tube (fig. 2J-38). Boot lip must fit into housing flange to seat tube properly.

(29) Slide small outer collars of boots over inner tie rod undercuts. Install small diameter boot clamps on boots and compress clamps using tool J-22610.

(30) Install adjuster tubes and tie rod ends on inner tie rods. Align tubes and tie rods using index marks made at disassembly. At least three threads should be visible at both ends of adjuster tubes. The number of threads per side should not differ by more than three.

SPECIFICATIONS

Steering Gear Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Adjuster Plug Locknut	68	54-81	50	40-60
Adjuster Tube Clamp Nuts	30	27-34	22	20-25
Flexible Coupling Pinch Bolt	41	34-47	30	25-35
Flexible Coupling-To-Intermediate Shaft Flange-Nuts	34	20-47	25	15-35
Inner Tie Rod Housing To Rack		Hand Tighten—(Only)		
Inner Tie Tod Housing Setscrew	12	11-14	9	8-10
Inner Tie Rod Housing Jamnuts	81	68-95	60	50-70
Steering Gear Mounting Clamp Bolt	68	61-75	50	45-55
Steering Gear Mounting Bolt (at Housing)	81	68-95	60	50-70
Tie Rod End Nut (Tie Rod to Steering Arm)	68	61-81	50	45-60

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

Refer to the Standard Torque Specifications and Capscrew Markings Chart in Chapter A of this manual for any torque specifications not listed above.

Lubrication . . . . **Lubricate inner tie rods, pinion shaft, all bearings, rack teeth and fill housing with an EP-Type, waterproof, lithium base chassis lubricant during gear assembly.**

70346C

Special Tools

J-7624
ADJUSTER PLUG
SPANNER WRENCH

J-26951
TIE ROD END
REMOVER TOOL

J-22610
BOOT CLAMP
PLIERS

50408B

NOTES

POWER STEERING GEAR AND PUMP

2K

SECTION INDEX

POWER STEERING GEAR—GREMLIN, CONCORD, AMX, MATADOR

GENERAL

AMC cars equipped with power assisted steering use a variable ratio, recirculating ball bearing-type power steering gear. Steel ball bearings within the gear act as a rolling thread between the steering gear wormshaft and rack piston. Power steering is standard on Matadors and is optional on all other models.

The power steering system consists of power steering gear, interconnecting hoses and fittings, and a belt-driven power steering pump. The system fluid supply is contained in a reservoir mounted on the pump. Fluid from the pump is supplied to the gear through interconnecting pressure and return hoses. The pump is operated by a drive belt mounted on pulleys attached to the pump shaft and engine crankshaft.

The power steering gear is designed to operate manually if a system malfunction should ever occur. This feature provides the driver with continued steering control of the car. In this condition, the gear operates the same as manual-type gear; hydraulic fluid is bypassed through the gear valve body to allow manual operation.

The power steering gear and pump form a closed system. Contaminants must not be allowed to enter the system at any point. If either the gear or pump become contaminated or incur damage extensive enough to produce debris, both components will have to be disassembled, cleaned and serviced.

Steering Gear Operation

Wormshaft fore and aft thrust is controlled by a thrust bearing and races at the wormshaft lower end and a thrust bearing, located in the adjuster plug, at the wormshaft upper end (fig. 2K-1). The lower thrust bearing races are conical in shape. This design maintains constant preload on the wormshaft to prevent loss of thrust bearing preload. The adjuster plug provides initial preload adjustment for service operations.

When the steering gear wormshaft is turned to the right, the rack piston is moved upward in the gear. Turning the wormshaft to the left moves the rack piston downward. The rack piston teeth mesh with the pitman shaft sector teeth. The sector teeth are forged integrally as part of the pitman shaft. Turning the wormshaft rotates the pitman shaft which, through mechanical linkage, turns the wheels.

Variable Ratio Steering

The ratio of a steering gear is the relationship of a steering wheel movement to that of the front wheels. It is described in terms of the number of degrees of steering wheel rotation required to turn the front wheels one degree.

Variable ratio steering is accomplished by using a pitman shaft sector having one long center tooth flanked by two shorter teeth (fig. 2K-2). This is different from a constant ratio gear which uses three sector teeth of equal length. To accomodate the long center tooth in variable ratio gears, companion changes are made to the rack piston teeth also (fig. 2K-2).

Since the pitman shaft sector teeth are basically a series of levers, any movement of the rack piston will cause the sector to turn the pitman arm in the same ratio. In other words, it will turn the pitman arm the same number of degrees with each sector tooth.

To increase or decrease steering ratio, it is only necessary to change the length of the sector teeth. A low numerical ratio (smaller radius sector with shorter teeth) produces greater pitman arm movement than would a high ratio sector with longer teeth and greater leverage.

On this basis, the variable ratio sector is in reality one long, high ratio lever at the center, flanked by two lower-ratio levers for left and right turns.

In the straight-ahead position, only the tip of the long center tooth is in contact with the rack piston. As a result, initial movement of the rack piston in either direction produces a relatively small response at the sector and pitman arm. This is due to the high ratio

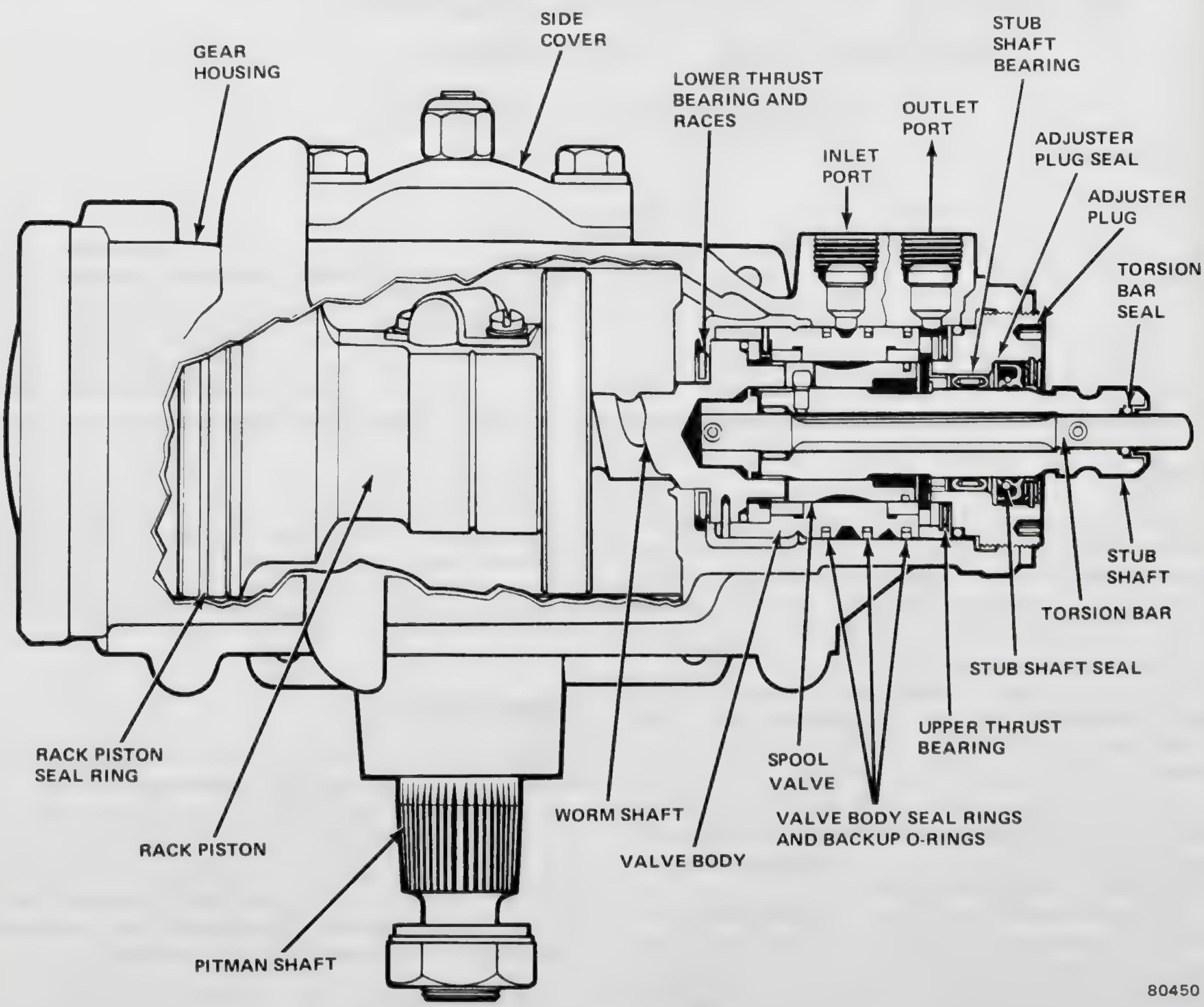

Fig. 2K-1 Power Steering Gear—Gremlin-Concord-AMX-Matador

produced by a long lever relationship.

Because of this relationship, the steering ratio remains a nearly constant 16:1 for the first 40 degrees of steering wheel movement in either direction from center. Turning the steering wheel further reduces the length of the lever. This moves the point of contact down the side of the long center tooth decreasing the radius and providing a steering ratio of 13:1 at full lock.

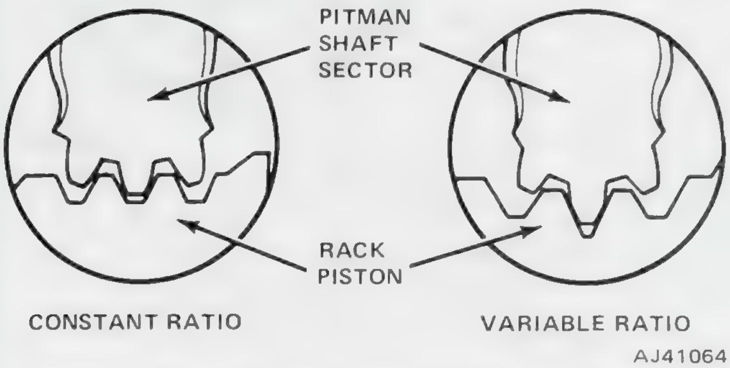

Fig. 2K-2 Rack and Sector Comparison

Hydraulic Assist

An open center, three-position, rotary valve is used to control hydraulic assist. Pump-supplied fluid enters the valve body through a pressure port in the gear housing. The valve then directs fluid to the rack piston through fluid passages in the housing.

The valve body, spool valve, torsion bar, and stub shaft (which is pinned to the torsion bar) are connected to the front wheels by a mechanical linkage.

Because of the pressure exerted on the front wheels by car weight, the wheels and valve body tend to resist any turning effort applied at the steering wheel. As front wheel resistance to turning effort increases, the torsion bar, which is pinned to the stub shaft, deflects. Since the spool valve is connected to the stub shaft by a locating pin, torsion bar deflection causes the spool valve to rotate within the valve body.

As the spool valve rotates, fluid directional passages in the valve are brought into alignment with matching passages in the valve body. When these passages are aligned, fluid at operating pressure from the pump is directed through the passages and against either side of the rack piston to provide hydraulic assist.

Torsion bar deflection provides the rquired amount of steering gear "road feel." If the bar should ever break, road feel would be lost but the steering system would still due to auxiliary locking tabs on the stub shaft. In this situation, the gear would operate as a manual-type recirculating ball gear.

Neutral (Straight-Ahead) Position

In this position, fluid does not enter the rack piston chamber. Fluid fromt the pump flows through the open-center valve body and back to the pump reservoir.

The valve body remains in the open-center position at all times, except when turning, to reduce fluid and pump losses to a minimum. The gear is always filled with fluid to lubricate internal components and absorb road shock.

Right Turn Position

The valve body is held in position by resistance to movement of the front wheels. When the steering wheel is turned right, the torsion bar deflects causing the spool valve to rotate within the valve body.

As the spool valve rotates, the valve fluid return grooves are closed off while the right-turn grooves are aligned with fluid pressure grooves in the valve body (fig. 2K-3). The valve left-turn grooves are closed off from fluid pressure and are aligned with the valve body return grooves (fig. 2K-3). In this position, the valve valve body directs high pressure fluid into the lower end of the rack piston chamber forcing the rack piston upward to apply additional turning effort to the pitman shaft.

As the valve body directs fluid against the lower end of the rack piston, fluid in the upper portion of the gear simultaneously flows back to the reservoir through valve body return grooves. When front wheel resistance to turning effort increases, torsion bar deflection causes additional spool valve rotation. This exposes more of the spool valve right-turn grooves to the valve body pressure grooves increasing fluid pressure exerted on the rack piston.

When the driver stops applying turning effort at the steering wheel, the torsion bar unwinds returning the spool valve to the neutral (straight-ahead) position. At this point, fluid pressure on each end of the rack piston is equalized once again and steering geometry tends to cause the front wheels to resume a straight-ahead position.

Left Turn Position

In the left turn position, the torsion bar, spool valve, and valve body operate the same as in a right turn except that valve body rotation is now reversed (fig. 2K-4). This causes the valve body to channel high pressure fluid into the upper end of the rack piston chamber forcing the piston downward (fig. 2K-4). Fluid in the lower end of the gear flows back to the pump reservoir through the valve body and steering gear fluid return port.

When the driver stops applying turning effort at the steering wheel, the torsion bar unwinds returning the spool valve to the neutral (straight-ahead) position. As in the right-turn position, fluid pressure on each end of the rack piston is equalized again and steering geometry tends to cause the front wheels to resume a straight-ahead position.

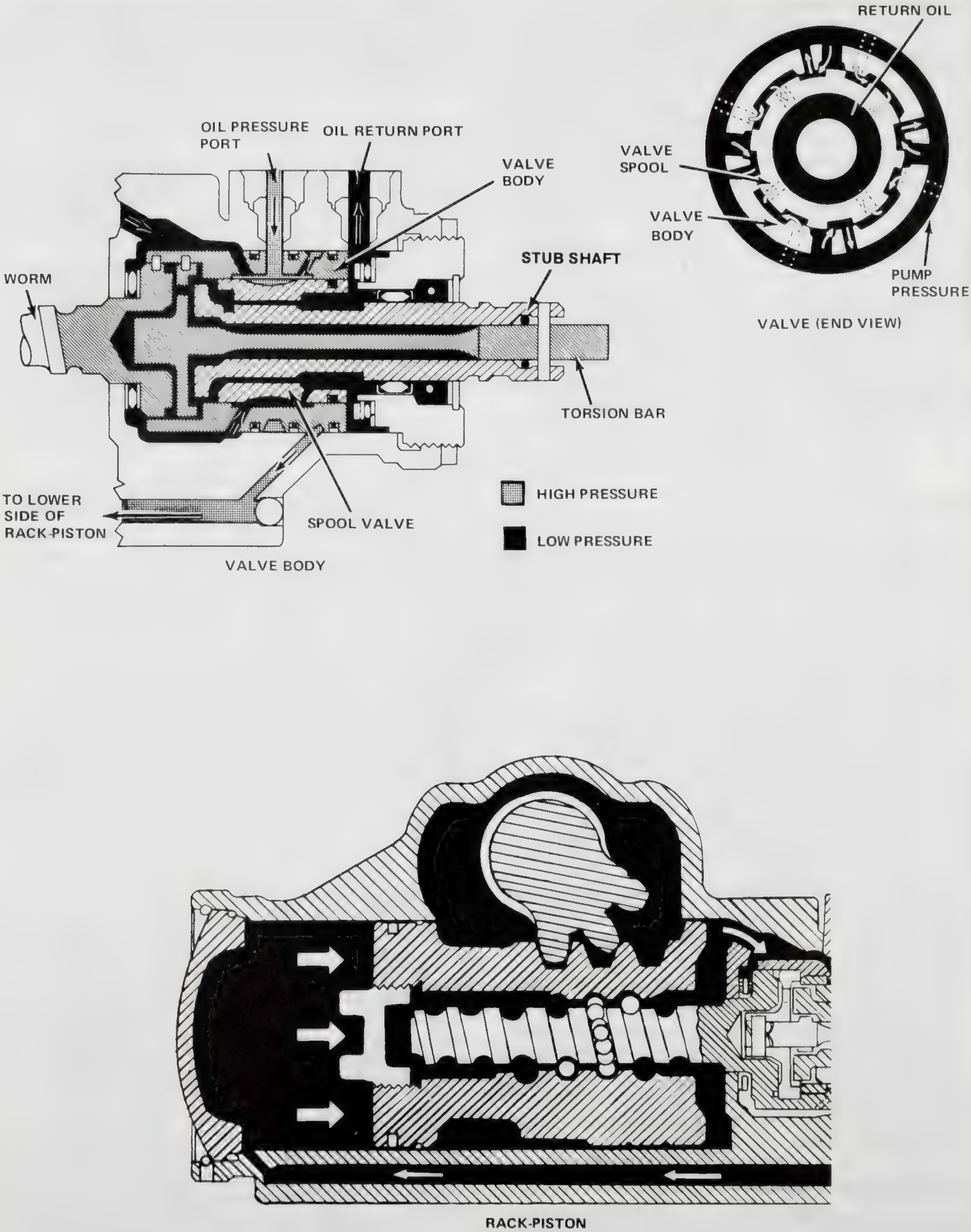

Fig. 2K-3 Valve Fluid Flow in Right-Turn Position

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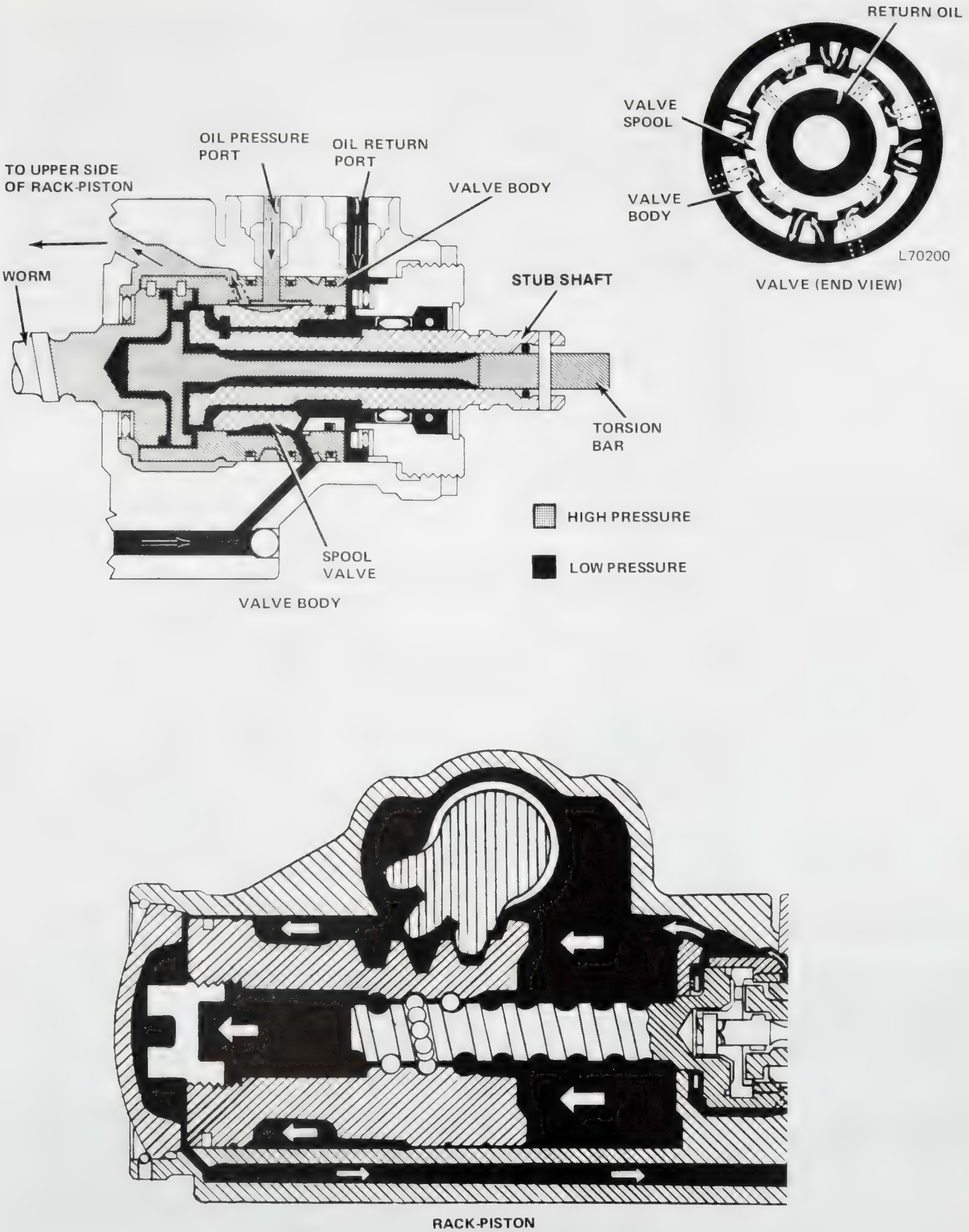

Fig. 2K-4 Valve Fluid Flow In Left-Turn Position

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Service Diagnosis

Condition	Possible Cause	Correction
HISSING NOISE IN STEERING GEAR	(1) There is some noise in all power steering systems. One of the most common is a hissing sound most evident at standstill parking. There is no relationship between this noise and performance of the steering. Hiss may be expected when steering wheel is at end of travel or when slowly turning at standstill.	(1) Slight hiss is normal and in no way affects steering. Do not replace valve unless hiss is extremely objectionable. A replacement valve will also exhibit slight noise and is not always a cure. Investigate clearance around flexible coupling rivets. Be sure steering shaft and gear are aligned so flexible coupling rotates in a flat plane and is not distorted as shaft rotates. Any metal-to-metal contacts through flexible coupling will transmit valve hiss into passenger compartment through the steering column.
RATTLE OR CHUCKLE NOISE IN STEERING GEAR	(1) Gear loose on frame.	(1) Check gear-to-frame mounting screws. Tighten screws to 65 foot-pounds (88 N·m) torque.
	(2) Steering linkage looseness.	(2) Check linkage pivot points for wear. Replace if necessary.
	(3) Pressure hose touching other parts of car.	(3) Adjust hose position. Do not bend tubing by hand.
	(4) Loose pitman shaft over center adjustment. **NOTE**: A slight rattle may occur on turns because of increased clearance off the "high point." This is normal and clearance must not be reduced below specified limits to eliminate this slight rattle.	(4) Adjust to specifications.
	(5) Loose pitman arm.	(5) Tighten pitman arm nut to specifications.
SQUAWK NOISE IN STEERING GEAR WHEN TURNING OR RECOVERING FROM A TURN	(1) Damper O-ring on valve spool cut.	(1) Replace damper O-ring.
POOR RETURN OF STEERING WHEEL TO CENTER	(1) Tires not properly inflated.	(1) Inflate to specified pressure.
	(2) Lack of lubrication in linkage and ball joints.	(2) Lube linkage and ball joints.
	(3) Lower coupling flange rubbing against steering gear adjuster plug.	(3) Loosen pinch bolt and assemble properly.
	(4) Steering gear to column misalignment.	(4) Align steering column.

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Service Diagnosis (continued)

Condition	Possible Cause	Correction
POOR RETURN OF STEERING WHEEL TO CENTER (Continued)	(5) Improper front wheel alignment.	(5) Check and adjust as necessary. With front wheels still on alignment pads of front-end machine, disconnect pitman arm of linkage from pitman shaft of gear. Turn front wheels by hand. If wheels will not turn or turn with considerable effort, determine if linkage or ball joints are binding.
	(6) Steering linkage binding.	(6) Replace pivots.
	(7) Ball joints binding.	(7) Replace ball joints.
	(8) Steering wheel rubbing against housing.	(8) Align housing.
	(9) Tight or frozen steering shaft bearings.	(9) Replace bearings.
	(10) Sticking or plugged valve spool.	(10) Remove and clean or replace valve.
	(11) Steering gear adjustments over specifications.	(11) Check adjustment with gear out of car. Adjust as required.
CAR LEADS TO ONE SIDE OR THE OTHER (KEEP IN MIND ROAD CONDITION AND WIND. TEST CAR IN BOTH DIRECTIONS ON FLAT ROAD)	(1) Front end misaligned.	(1) Adjust to specifications.
	(2) Unbalanced steering gear valve. **NOTE:** If this is cause, steering effort will be very light in direction of lead and normal or heavier in opposite direction.	(2) Replace valve.
MOMENTARY INCREASE IN EFFORT WHEN TURNING WHEEL FAST TO RIGHT OR LEFT	(1) Low oil level.	(1) Add power steering fluid as required.
	(2) Pump belt slipping.	(2) Tighten or replace belt.
	(3) High internal leakage.	(3) Check pump pressure. (See pressure test)
STEERING WHEEL SURGES OR JERKS WHEN TURNING WITH ENGINE RUNNING ESPECIALLY DURING PARKING	(1) Low oil level.	(1) Fill as required.
	(2) Loose pump belt.	(2) Adjust tension to specification.
	(3) Steering linkage hitting engine oil pan at full turn.	(3) Correct clearance.
	(4) Insufficient pump pressure.	(4) Check pump pressure. (See pressure test). Replace relief valve if defective.

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Service Diagnosis (continued)

Condition	Possible Cause	Correction
	(5) Pump flow control valve sticking	(5) Inspect for varnish or damage, replace if necessary.
EXCESSIVE WHEEL KICKBACK OR LOOSE STEERING	(1) Air in system.	(1) Add oil to pump reservoir and bleed by operating steering. Check hose connectors for proper torque and adjust as required.
	(2) Steering gear loose on frame.	(2) Tighten attaching screws to specified torque.
	(3) Steering gear flexible coupling loose on shaft or rubber disc mounting screws loose.	(3) Tighten flange pinch bolts to 30 foot-pounds (40.6 N·m), if serrations are not damaged. Tighten upper flange to coupling nuts to specified torque.
	(4) Steering linkage joints worn enough to be loose.	(4) Replace loose pivots.
	(5) Front wheel bearings incorrectly adjusted or worn.	(5) Adjust bearings or replace with new parts as necessary.
	(6) Worn poppet valve.	(6) Replace poppet valve.
	(7) Loose thrust bearing preload adjustment.	(7) Adjust to specification with gear out of vehicle.
	(8) Excessive overcenter lash.	(8) Adjust to specification with gear out of car.
HARD STEERING OR LACK OF ASSIST	(1) Loose pump belt.	(1) Adjust belt tension to specification.
	(2) Low oil level. **NOTE:** Low oil level will also result in excessive pump noise.	(2) Fill to proper level. If excessively low, check all lines and joints for evidence of external leakage. Tighten loose connectors.
NOTE: IF CHECKS (1) THROUGH (5) DO NOT REVEAL CAUSE OF HARD STEERING, REFER TO PRESSURE TEST	(3) Steering gear to column misalignment.	(3) Align steering column.
	(4) Lower coupling flange rubbing against steering gear adjuster plug.	(4) Loosen pinch bolt and assemble properly.
	(5) Tires not properly inflated.	(5) Inflate to recommended pressure.
	Further possible causes could be:	
	(6) Sticky flow control valve. (7) Insufficient pump pressure output. (8) Excessive internal pump leakage. (9) Excessive internal gear leakage.	In order to diagnose conditions such as listed in (6), (7), (8), (9) a test of the entire power steering system is required.

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Service Diagnosis (continued)

Condition	Possible Cause	Correction
FOAMING MILKY POWER STEERING FLUID, LOW FLUID LEVEL AND POSSIBLE LOW PRESSURE	(1) Air in the fluid, and loss of fluid due to internal pump leakage causing overflow.	(1) Check for leak and correct. Bleed system. Extremely cold temperatures will cause system aeriation should the oil level be low. If oil level is correct and pump still foams, remove pump from vehicle and separate reservoir from housing. Check welsh plug and housing for cracks. If plug is loose or housing is cracked, replace housing.
LOW PRESSURE DUE TO STEERING PUMP	(1) Flow control valve stuck or inoperative.	(1) Remove burrs or dirt or replace. Flush system.
	(2) Pressure plate not flat against cam ring.	(2) Correct.
LOW PRESSURE DUE TO STEERING GEAR	(1) Pressure loss in cylinder due to worn piston ring or badly worn housing bore.	(1) Remove gear from car for disassembly and inspection of ring and housing bore.
	(2) Leakage at valve rings, valve body-to-worm seal.	(2) Remove gear from car for disassembly and replace seals.

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LEAK INSPECTION

The actual source of steering gear fluid leaks should always be determined before attempting repairs. Because an inaccurate diagnosis can result in ineffective repair, a proper inspection procedure is necessary. The most common fluid leak sources are shown in figure 2K-5.

Leak Inspection Procedure

(1) Raise and support front of car.
(2) Clean exterior surfaces of gear, pump, hoses, and fittings thoroughly.
(3) Check and correct fluid level in pump reservoir.

NOTE: *If the pump is overfilled, drain excess fluid from the reservoir to the correct level before proceeding.*

(4) Check for aerated fluid (full of bubbles or milky in color). Aerated fluid can cause overflow from reservoir and be mistaken for leak.
(5) Check and tighten all hose connections at gear and pump. Do not exceed 30 foot-pounds (40.6 Nm) torque at any fitting.
(6) Start engine. Have helper turn wheel left and right several times while locating source of leak. Contact stops momentarily in each direction. Stop engine when source of leak is identified.

Refer to Figure 2K-6 View A and View B for a graphic representation of the various steering gear leak sources and necessary corrective action.

Steering gear leaks can develop in the following areas:

- Hose fittings and hoses.
- Adjuster plug O-ring.
- Stub shaft seals.
- Steering gear housing core plug.
- Torsion bar seal. Replace valve body assembly if seal leaks.
- Side cover locknut and cover gasket.
- Pitman shaft seals.
- End plug gasket.
- Cracked or porous gear housing.

Steering problems are often the result of problems not related to the steering gear or pump. Those areas of the steering system which can be easily checked and quickly corrected without disassembly and overhaul of any major components should be inspected first.

Conditions such as hard or loose steering, road shock or vibrations are not always due to the steering gear or pump, but are often related to such factors as low tire pressure or front end alignment.

After the leak source has been found, determine the cause. For example, if the oil level in the reservoir is low, refill and check the entire hydraulic system for leaks.

STEERING SYSTEM EXTERNAL LEAK POINTS

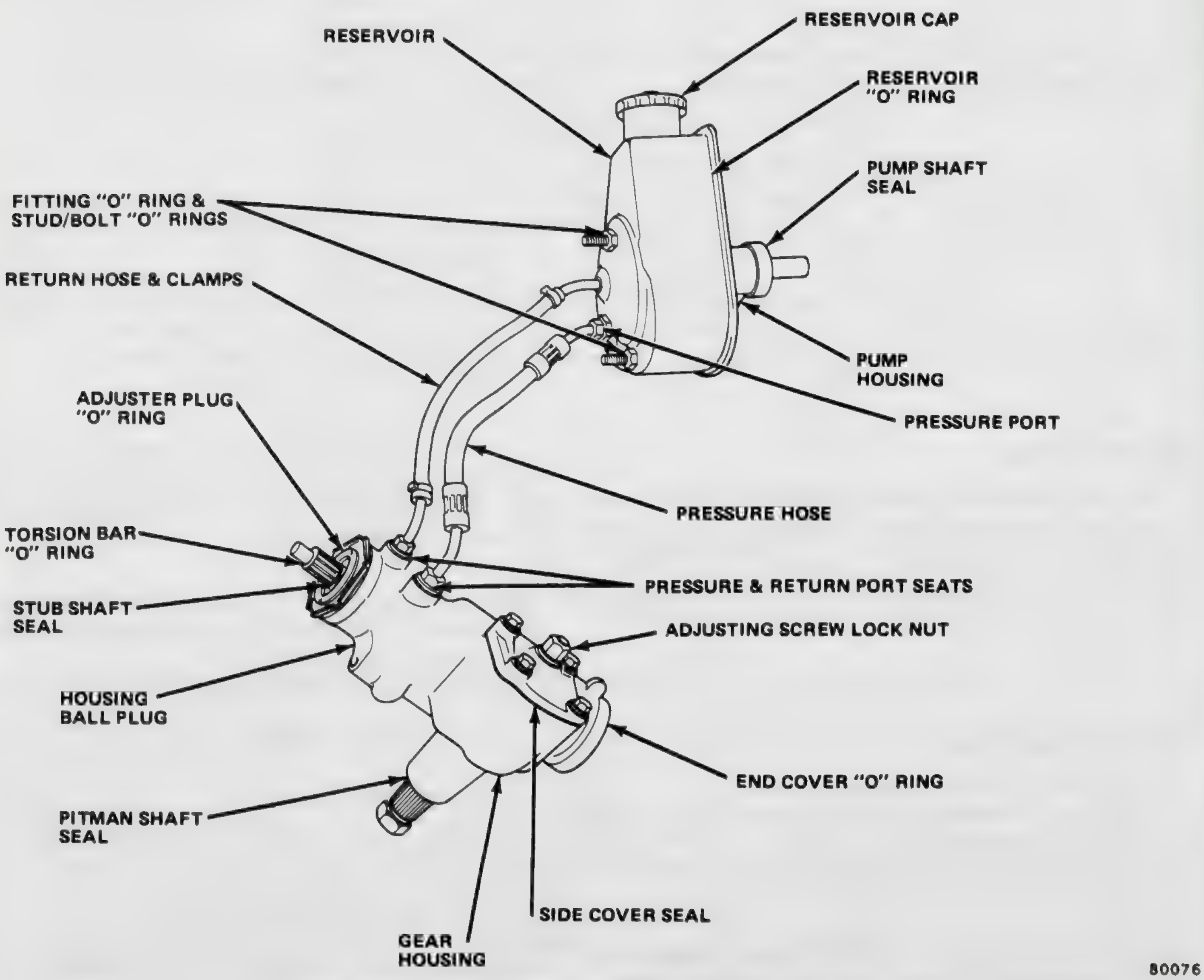
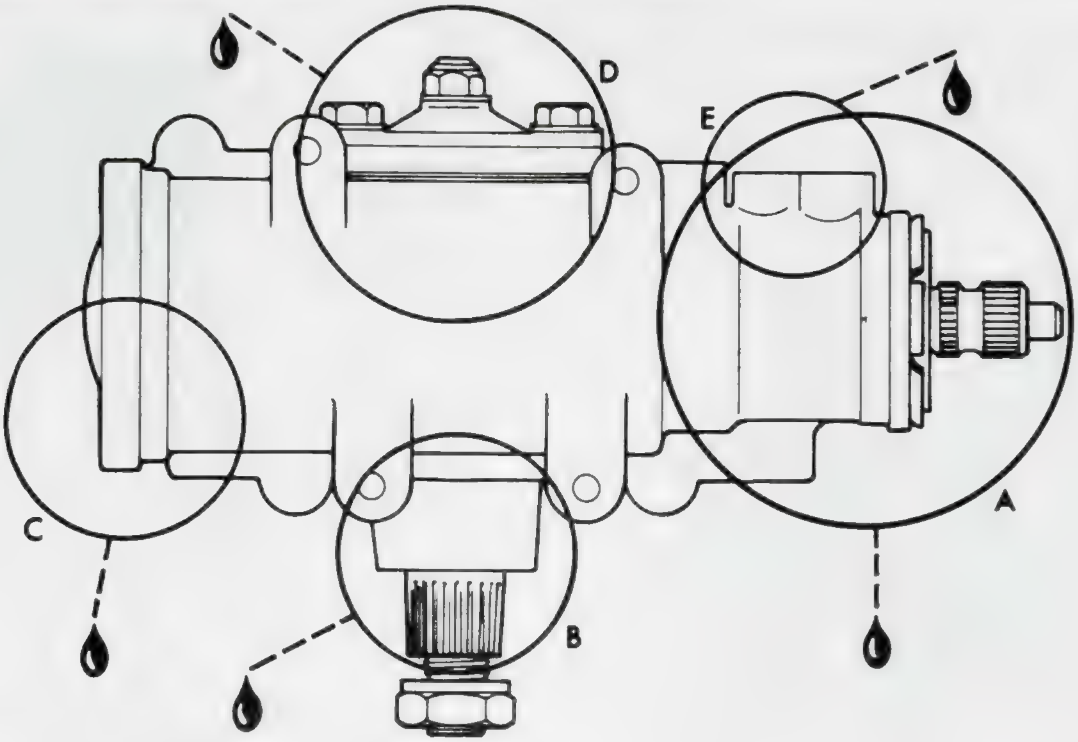


Fig. 2K-5 Power Steering System External Leak Points

STEERING GEAR LEAK POINTS AND CORRECTIVE ACTION



Leak Points

Pay particular attention to the exact source of leakage. Due to the proximity of the various seals, an incorrect diagnosis will result in ineffective repair.

Corrective Action

Replace adjuster plug "O" ring seal.

Replace dust and stub shaft seals.

If seepage is observed between the torsion bar and stub shaft, do not attempt to repair. The rotary valve assembly must be replaced.

Seat ball flush with punch and restake. If seepage persists, replace housing.

Replace both pitman shaft seals.

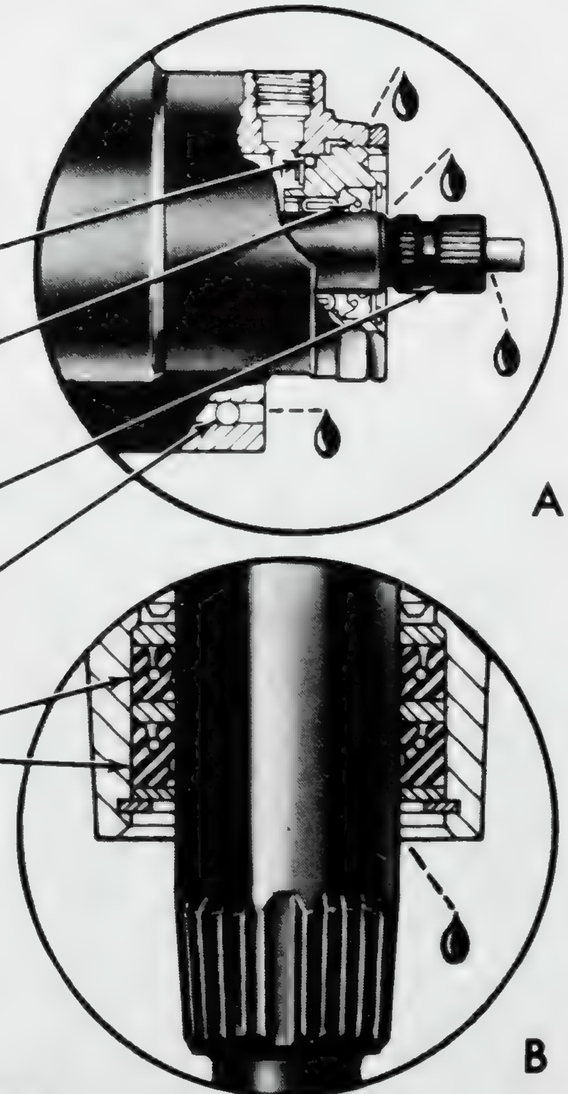


Fig. 2K-6 Steering Gear Leak Diagram (View A)

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Corrective Action (cont.)

Replace end plug "O" ring seal.

Tighten nut to 35 foot-pounds (48 N·m). Replace nut if leak persists.

Tighten side cover bolts to 50 foot-pounds (68 N·m) maximum. Replace side cover seal if leak persists. If side cover seal replacement is required, discard bolts and install replacement. Whenever the side cover is removed, install bolts supplied in overhaul kit.

If leak continues after tightening fitting nut to specified torque:

a. Loosen nut and rotate tubing to reseat. Tighten nut again and recheck. If leak persists, replace connector seats.
b. Remove hose and check sealing face for cracks. If flare is cracked, replace hose. If not cracked, replace connector seats.
c. Replace brass connector seats and reface hose flare. Check threads in housing and on fitting nut. If nut threads are damaged, replace nut. If housing threads are damaged, replace both housing and nut.

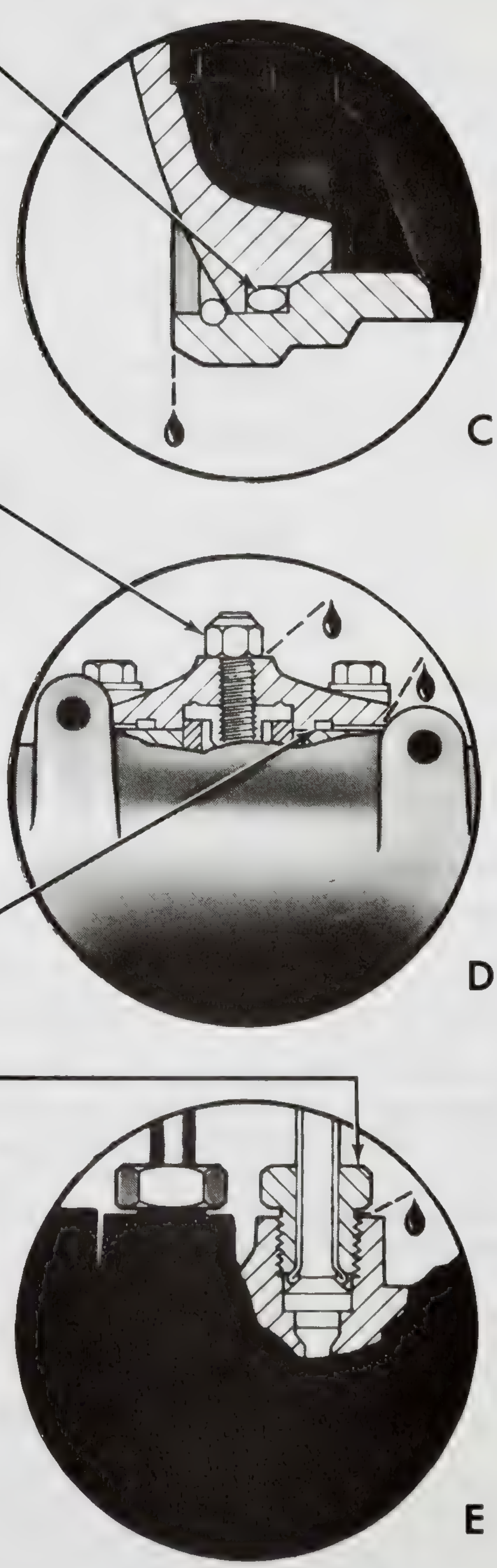

Fig. 2K-6 Steering Gear Leak Diagram (View B)

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ON-CAR SERVICE

Steering Gear Adjustment

Because of the complexity involved in adjusting worm bearing preload and pitman shaft overcenter drag torque plus the friction effect produced by hydraulic fluid, the power steering gear must be adjusted off the car only. Refer to Worm Bearing Preload and Pitman Shaft Overcenter Drag Torque Adjustment under Steering Gear Assembly and Adjustment.

Conditions such as shimmy and hard or loose steering may be caused by the following front suspension and steering components: steering shaft and coupling alignment, front end alignment, worn shock absorbers, loose wheel bearings, wheel unbalance, worn tires or incorrect tire pressures. These items should be checked before attempting power steering system repairs.

Before performing any service operations, check and correct fluid level and condition, belt adjustment, and pump pressure.

CAUTION: *Use power steering fluid only in the power steering system.*

Pitman Shaft Seal Replacement

(1) Remove pitman arm using Puller J-5566-04 (fig. 2K-7).

(2) Position drain pan under steering gear.

(3) Remove seal retaining ring using Plier Tool J-4245 and remove outer seal backup washer.

(4) Start engine and momentarily hold steering wheel in extreme left-turn position to actuate spool valve. This builds pressure on upper side of piston and in pitman shaft chamber to force pitman shaft seals and seal backup washers out of gear.

CAUTION: *To prevent excessive oil loss and pump wear, do not hold the steering gear in the extreme turn position for more than one or two seconds at a time.*

(5) Stop engine and remove seals and backup washers from pitman shaft.

(6) Inspect outside diameter of seals for damage to rubber coverings. If outside diameter appears scored, inspect housing for burrs and remove burrs before installing replacement seal.

(7) Inspect pitman shaft seal surfaces for roughness or pitting. If pitted, replace shaft.

(8) Clean all dirt, rust, and corrosion from pitman shaft and seal areas using crocus cloth.

(9) Lubricate replacement shaft seals with power steering fluid.

(10) Apply single layer of thin tape to pitman shaft splines to avoid damaging seals.

(11) Install single lip seal first, then backup washer (fig. 2K-8).

(12) Using Seal Installer Tool J-21553, install seal and washer into housing only enough to provide clearance for remaining seal backup washer and retaining ring. Do not allow seal to bottom on end of counterbore.

CAUTION: *To ensure proper sealing, be sure the seals are seated separately in the bore.*

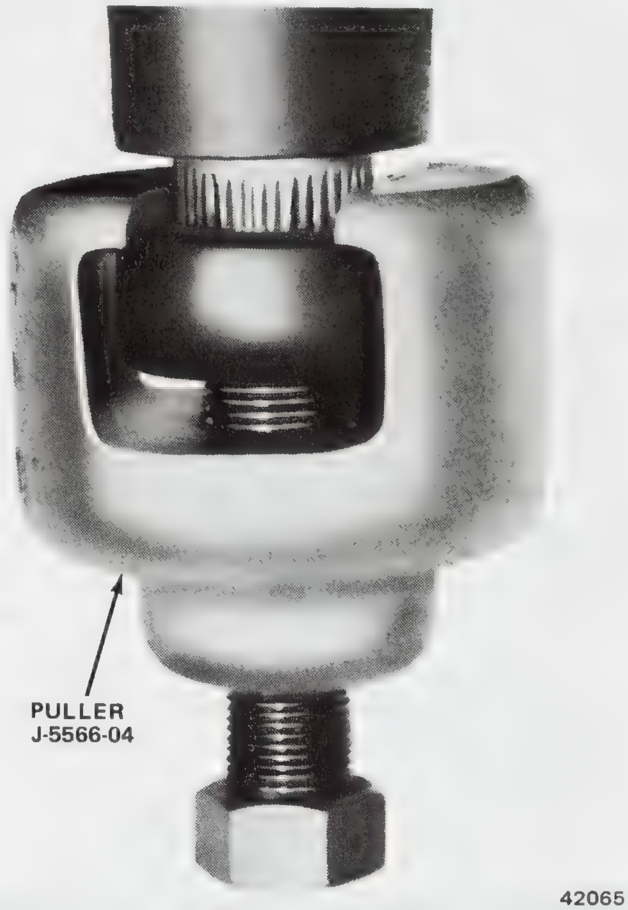

Fig. 2K-7 Pitman Arm Removal

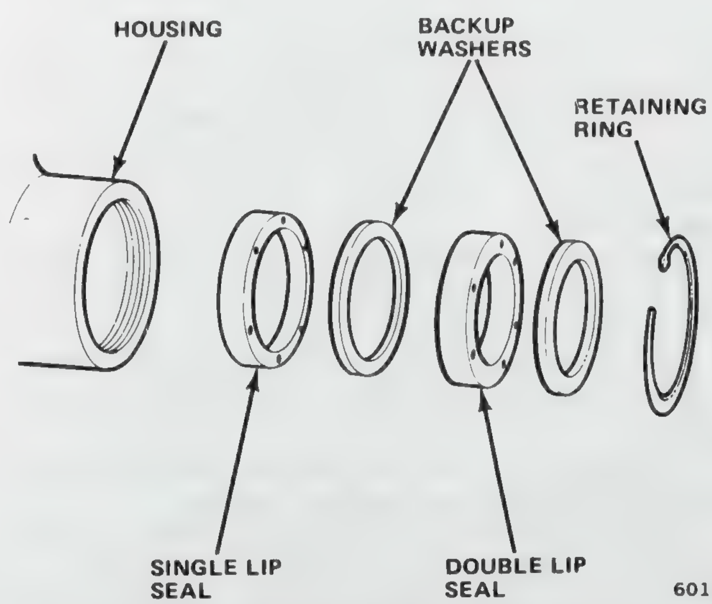

Fig. 2K-8 Pitman Shaft Seal Assembly Sequence

(13) Install double lip seal and second backup washer using Seal Installer Tool J-21553. Install seal and backup washer into housing only far enough to provide clearance for retaining ring.

(14) Install retaining ring using Snap Ring Plier Tool J-4245. Be sure ring is seated properly.

(15) Fill pump reservoir to correct level with power steering fluid.

(16) Start engine and allow engine to idle for at least three minutes. Do not turn steering wheel during this time.

(17) Turn steering wheel left and right and check for leaks. Add power steering fluid as required.

Housing End Plug Seal Replacement

(1) Rotate end cover retainer ring until one end of ring is positioned over hole in side of housing.

(2) Force ring from groove by inserting punch through hole in housing and unseating ring.

(3) Turn steering wheel slowly to left until rack piston forces end plug out of housing and turn wheel back to center position.

CAUTION: *Do not turn the wheel any farther than necessary or the ball bearings may drop out of the rack piston circuit and fall inside the rack piston chamber.*

(4) Remove and discard end plug O-ring seal.

(5) Lubricate replacement seal with power steering fluid and install seal on end plug.

(6) Install end plug.

(7) Install end plug retaining ring.

Flexible Coupling Adjustment—Gremlin-Concord-AMX

During operation, power steering systems produce a slight hissing noise. This noise is similar to the sound produced while slowly closing a water tap, such as "sshh." The noise is most evident when parking, or when the steering wheel is at the end of its travel.

Although a slight hissing noise is normal, metal-to-metal contact at the steering shaft flexible coupling may amplify the noise and transmit it directly to the passenger compartment.

Correction of excessive hissing noise involves moving the steering column rearward slightly to prevent metal-to-metal contact at the flexible coupling.

(1) Loosen steering column toeplate attaching bolts.

(2) Remove steering column bezel from instrument panel.

(3) Loosen nuts attaching steering column mounting bracket to brake pedal support bracket.

(4) Scribe line on steering column jacket at point where tube meets left side of upper toeplate flange.

(5) Pull steering wheel (and column) backward until scribe mark is 1/4 inch (6.3 mm) above toeplate flange.

(6) Tighten column mounting bracket nuts to 10 foot-pounds (13.5 Nm) torque.

(7) Install steering column-to-instrument panel bezel.

(8) Tighten upper and lower toeplate bolts to 10 foot-pounds (13.5 Nm) torque.

Flexible Coupling Position—All Models With Power Steering

The flexible coupling should be mounted on the steering gear stub shaft so there is 1/16 inch (1.5 mm) clearance between the coupling flange and gear housing. Insufficient clearance can result in a bind condition. The coupling pinch bolt should be tightened to 30 foot-pounds (40.6 Nm) torque.

The rubber portion of the coupling must be flat and not distorted. If distorted, refer to Steering Column Installation in Chapter 2H for alignment correction procedure.

STEERING GEAR REMOVAL

(1) Place wheels in straight ahead position.

(2) Position drain pan under steering gear.

(3) Disconnect hoses at gear. Raise and secure hoses above pump fluid level to prevent excessive oil spillage and cap ends of hoses to prevent entry of dirt.

(4) Remove flexible coupling-to-intermediate shaft attaching nuts.

(5) Raise car on hoist.

(6) Paint alignment marks on pitman arm and pitman shaft for assembly reference.

(7) Remove pitman arm using Puller Tool J-5566-04 (fig. 2K-7).

(8) Remove steering gear mounting bolts and remove steering gear.

STEERING GEAR INSTALLATION

(1) Center steering gear. Turn stub shaft (using flexible coupling) from stop-to-stop and count total number of turns; then turn back from either stop one-half total number of turns to center gear. At this point, flat on stub shaft should be facing upward.

(2) Align flexible coupling and intermediate shaftt flange.

(3) Install gear mounting bolts in gear, install spacer on gear, and mount gear on frame side sill. Tighten gear mounting bolts to 65 foot-pounds (88.1 Nm) torque.

(4) Install and tighten flexible coupling nuts to 25 foot-pounds (33.9 Nm) torque.

(5) Install pitman arm. Index arm to shaft using alignment marks made during removal.

(6) Install pitman arm nut. Tighten nut to 115 foot-pounds (155.9 Nm) torque and stake nut to pitman shaft in one place.

CAUTION: *The pitman arm nut must be staked to the shaft to retain it properly.*

(7) Lower car.

(8) On Gremlin, Concord, and AMX models, align flexible coupling if necessary. Refer to Flexible Coupling Adjustment—Gremlin-Concord-AMX.

(9) Connect hoses to gear and tighten fittings to 25 foot-pounds (33.9 Nm) torque.

(10) Fill pump reservoir with power steering fluid and bleed air from system as outlined in Fluid Level and Initial Operation.

STEERING GEAR DISASSEMBLY

NOTE: *Cleanliness is of the utmost importance when overhauling the power steering gear. Keep the bench, tools, and component parts clean at all times. Thoroughly clean the exterior of the gear with solvent before disassembly and drain as much of the fluid as possible. During disassembly/assembly operations, refer to figure 2K-9 for parts sequence and nomenclature. Use protective vise jaws at all times when mounting subassemblies in a vise. At assembly, lubricate all parts with power steering fluid except where noted otherwise.*

(1) Drain fluid and mount gear in vise with pitman shaft pointing downward. Use unmachined housing boss as mounting pad (fig. 2K-10).

(2) Remove flexible coupling.

(3) Rotate gear housing end plug retaining ring until one end is positioned over hole in housing.

(4) Unseat one end of ring using punch and remove ring (fig. 2K-11).

(5) Remove housing end plug by rotating stub shaft counterclockwise (using 12-point deep socket and ratchet handle) until rack piston forces end plug out of housing.

CAUTION: *Do not rotate the stub shaft any further than necessary or the ball bearings will drop out of the circuits and cause the pitman shaft and rack piston teeth to disengage. If the teeth become disengaged, remove the side cover and pitman shaft assembly and engage the teeth.*

(6) Remove O-ring seal from end plug. Discard seal.

(7) Turn stub shaft clockwise 1/2 turn, and remove rack piston end plug. Strike plug sharply with plastic-tip hammer and use 1/2-inch (12.7 mm) square drive socket handle to remove plug. Do not use square drive that is worn or rounded on bottom corners.

CAUTION: *The end plug may break during removal if it is not unseated first by striking it with a plastic-tip hammer.*

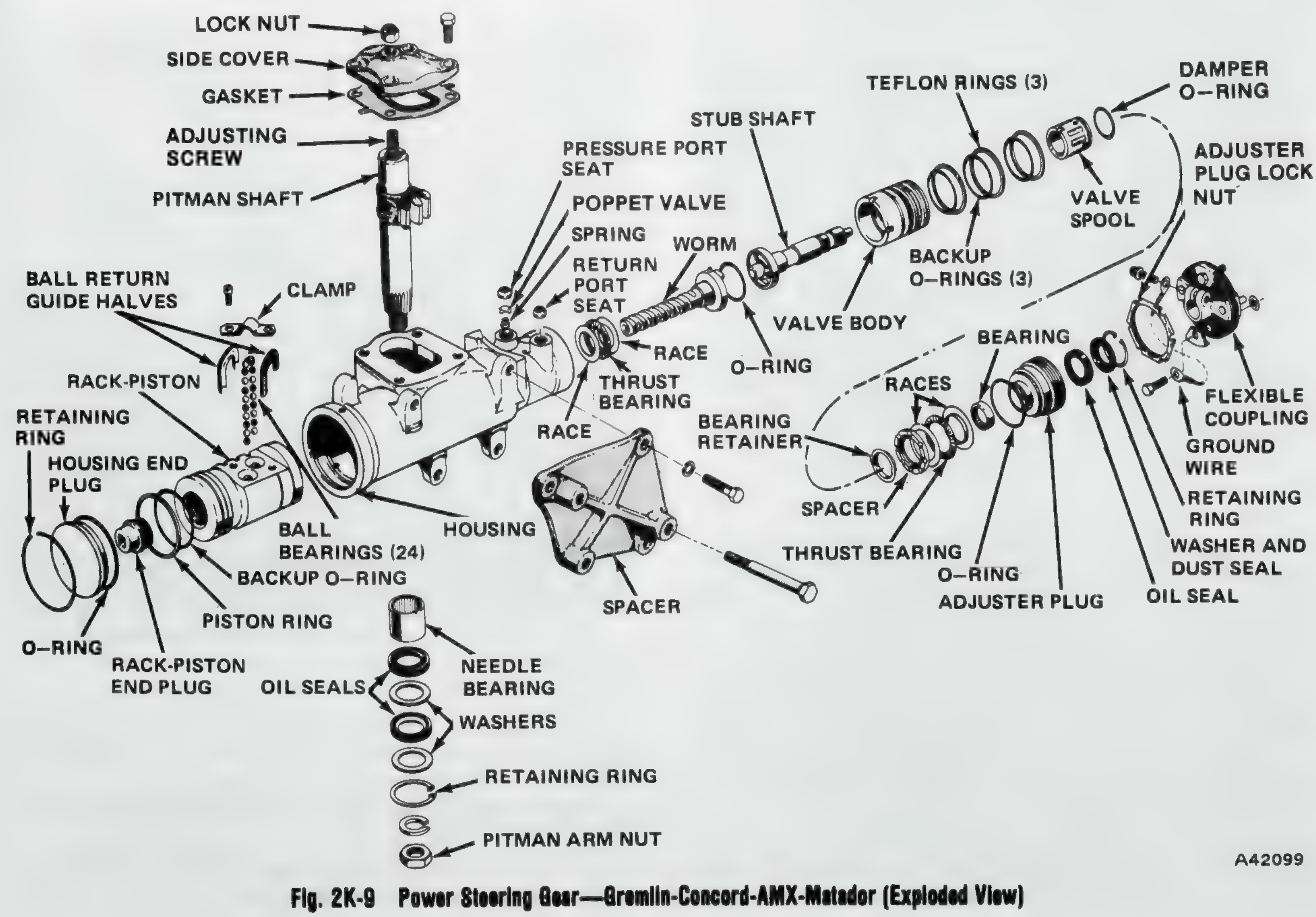

Fig. 2K-9 Power Steering Gear—Gremlin-Concord-AMX-Matador (Exploded View)

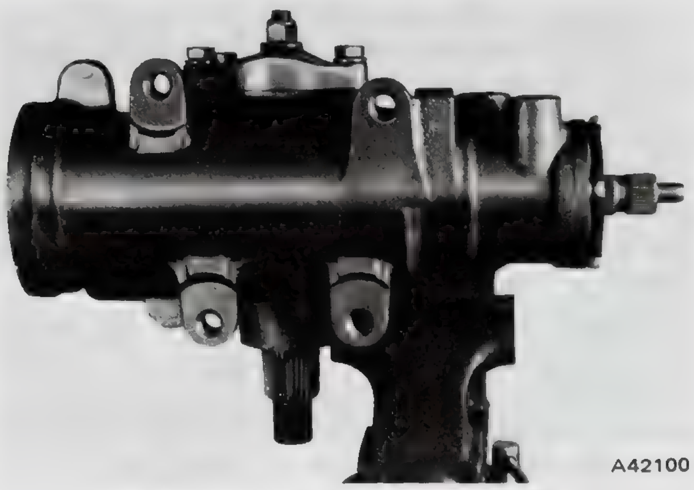

Fig. 2K-10 Steering Gear Mounted in Vise

Fig. 2K-11 End Plug Retaining Ring Removal

(8) Hold pitman shaft adjuster screw with allen wrench to prevent screw from turning and remove adjuster screw locknut. Discard locknut.

(9) Remove side cover bolts and lockwashers.

(10) Remove side cover. Rotate pitman shaft adjuster screw using allen wrench until side cover can be removed from screw. Discard side cover gasket.

(11) Turn stub shaft until pitman shaft teeth are centered in housing. Tap end of pitman shaft with plastic-tip hammer and remove from housing.

NOTE: *Do not disassemble the pitman shaft component parts. They are serviced as an assembly only.*

(12) Insert Arbor Tool J-21552 into rack piston until tool stops against end of wormshaft. Grip tool firmly, turn stub shaft counterclockwise to force rack piston onto arbor tool, and remove assembled tool and rack piston from housing (fig. 2K-12).

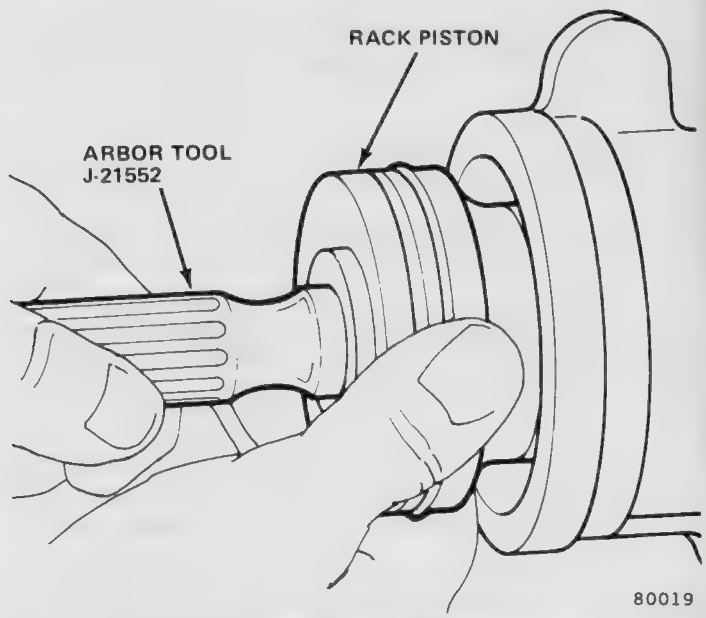

Fig. 2K-12 Rack Piston Removal/Installation

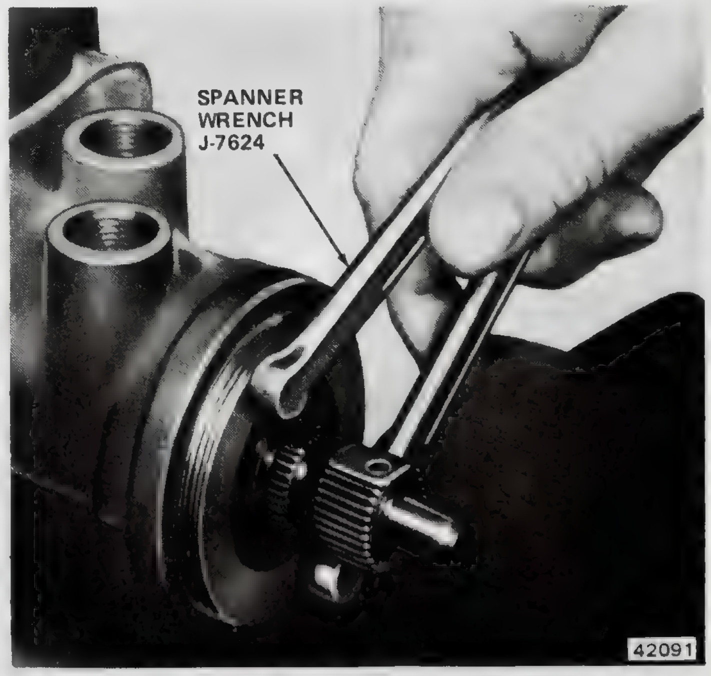

Fig. 2K-13 Adjuster Plug Removal/Installation

(13) Loosen adjuster plug locknut using brass drift and remove locknut.

(14) Remove adjuster plug assembly using Spanner Tool J-7624 (fig. 2K-13).

(15) Remove valve body assembly by pulling outward on splined end of stub shaft.

(16) Remove wormshaft lower thrust bearing and conical bearing races. Note position of races for assembly reference (fig. 2K-14).

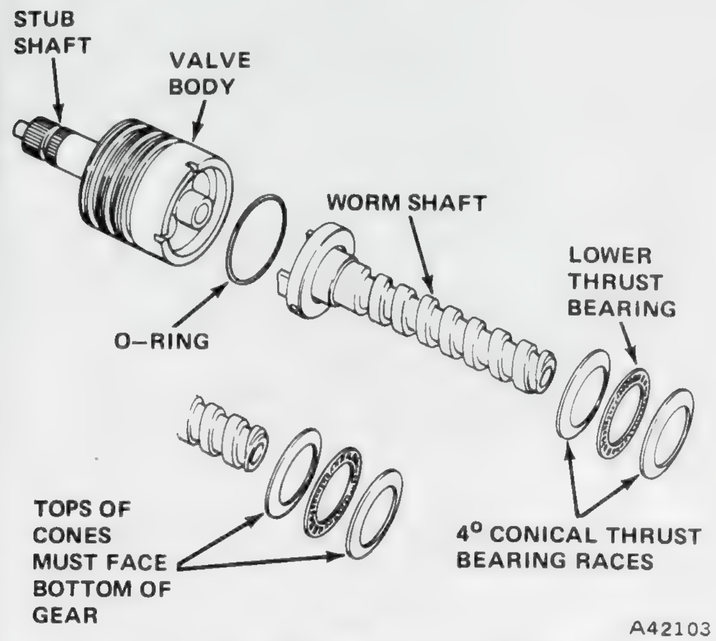

Fig. 2K-14 Valve Body-Stub Shaft-Wormshaft Assembly

SUBASSEMBLY OVERHAUL

Gear Housing

Disassembly

(1) Remove pitman shaft seal retaining ring using Snap Ring Pliers J-4245 and remove backup washer.

(2) Remove pitman shaft seals. Insert screwdriver between inner seal and housing shoulder to pry out seals.

NOTE: *If the inner seal is difficult to remove, drive it out from the upper end of the housing. In extreme cases, it may be necessary to drive out both the needle bearing and inner seal at the same time. Discard the seal and needle bearing if removed in this fashion.*

(3) Remove needle bearing from housing bore using Remover/Installer Tool J-21551 and Driver Handle J-8092 (fig. 2K-15).

Inspection

Inspect the housing bore. If it is badly scored or worn, replace the housing. However, slight scratches in the bore usually will not cause any problem at assembly.

Inspect the hose connector seats and poppet check valve. If they are deeply scored, cracked or worn, replace them as described in Hose Connector Seat Replacement.

Inspect the poppet check valve located under the pressure connector seat. Replace the valve if it is scored cracked, chipped or deformed.

Inspect the ball plug in the housing (fig. 2K-16). If leakage past the ball occurred before disassembly or if it is raised above the housing surface, drive it into the housing until flush with, or 1/16 inch (1.5 mm) below the housing surface. Secure the ball by staking the housing around it in at least two places.

Inspect the retaining ring grooves and seal surfaces. If they are chipped, scored, cracked, or worn, replace the housing.

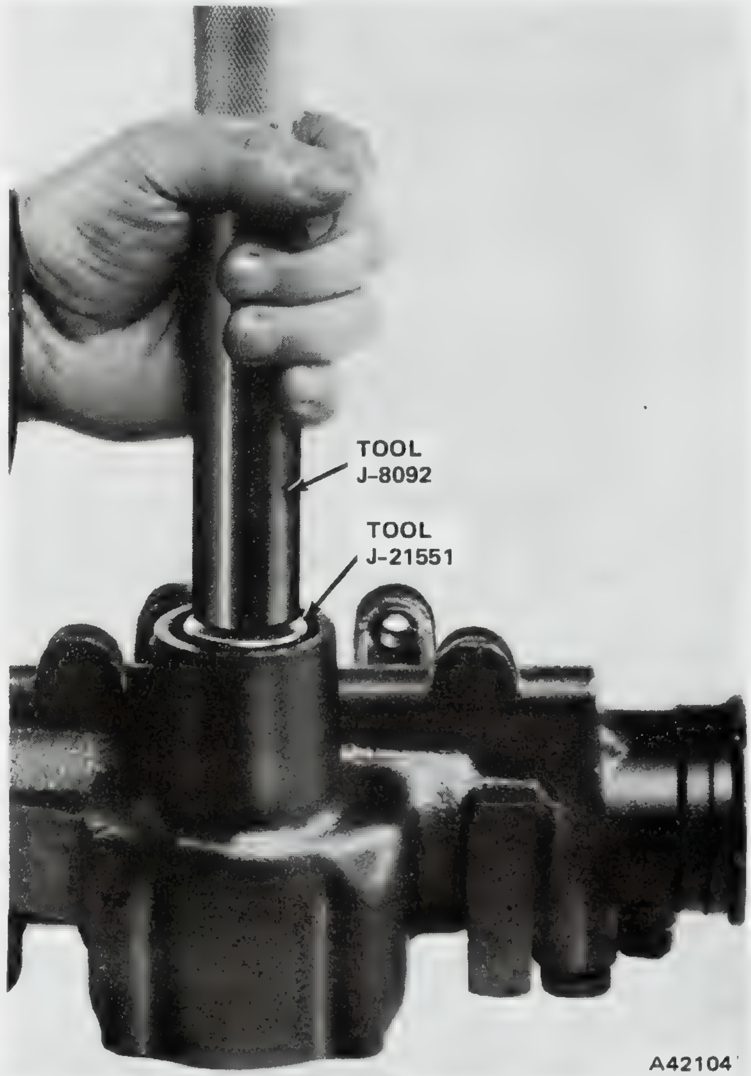

Fig. 2K-15 Pitman Shaft Needle Bearing Removal/Installation

Assembly

(1) Clean housing thoroughly in solvent.

(2) Lubricate housing bore, bearings, seals, and washers with power steering fluid.

(3) Install needle bearing using Bearing Remover-Installer Tool J-21551 and Driver Handle J-8092 (fig. 2K-15). Install bearing in housing bore until it is approximately 0.030 inch (0.76 mm) below shoulder in housing bore.

(4) Insert single lip seal and backup washer in housing bore (fig. 2K-17). Using Seal Installer Tool J-21553, install seal and washer in bore only far enough to provide clearance for double lip seal, backup washer, and retaining ring (fig. 2K-18).

Fig. 2K-16 Gear Housing Ball Plug Location

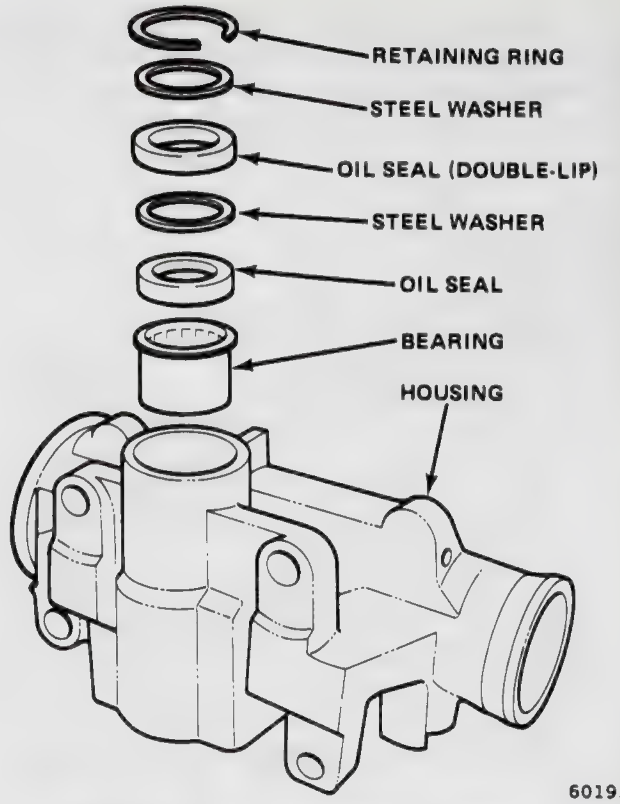

Fig. 2K-17 Pitman Shaft Bearing and Seals

CAUTION: *Do not bottom the seal against the end of the housing counter bore.*

(5) Install double lip seal and second backup washer using tool J-21553. Install seal and backup washer in bore only far enough to allow clearance for retaining ring.

(6) Install retaining ring using Snap Ring Pliers Tool J-4245. Be sure ring is completely seated in housing groove.

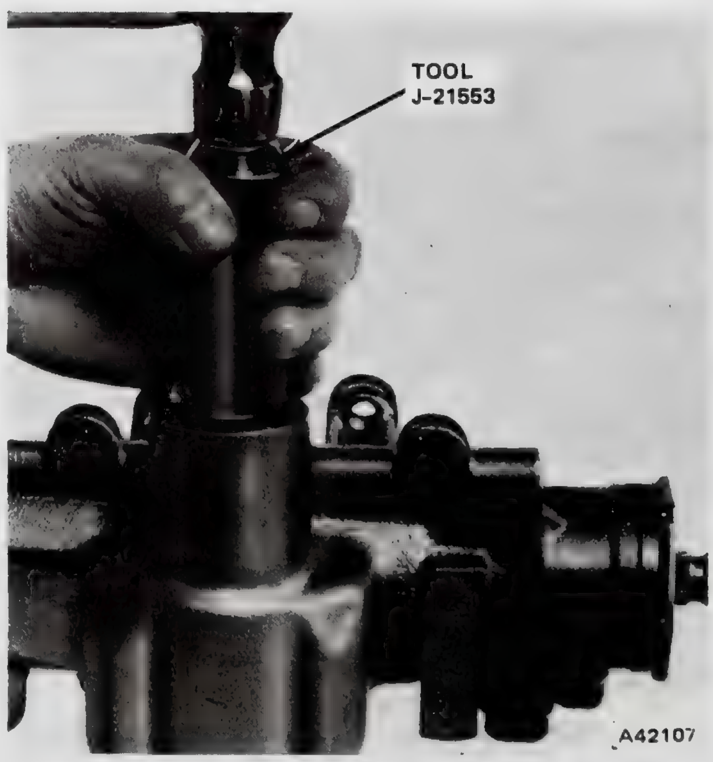

Fig. 2K-18 Pitman Shaft Seal Installation

Adjuster Plug

Disassembly

(1) Remove thrust bearing retainer using screwdriver and discard retainer (fig. 2K-19). Do not damage needle bearing bore.

(2) Remove thrust bearing spacer, thrust bearing, and bearing races.

(3) Remove and discard adjuster plug 0-ring seal.

(4) Remove stub shaft seal retaining ring using Snap Ring Plier Tool J-4245.

(5) Remove and discard stub shaft dust seal and oil seal. Use screwdriver to pry seals out.

(6) Remove needle bearing using Bearing Remover-Installer Tool J-6621 (fig. 2K-20).

Inspection

Inspect the adjuster plug components (fig. 2K-21) for wear, scoring, nicks, cuts, or distortion. Replace any component that exhibits these conditions.

Fig. 2K-19 Thrust Bearing Retainer Removal

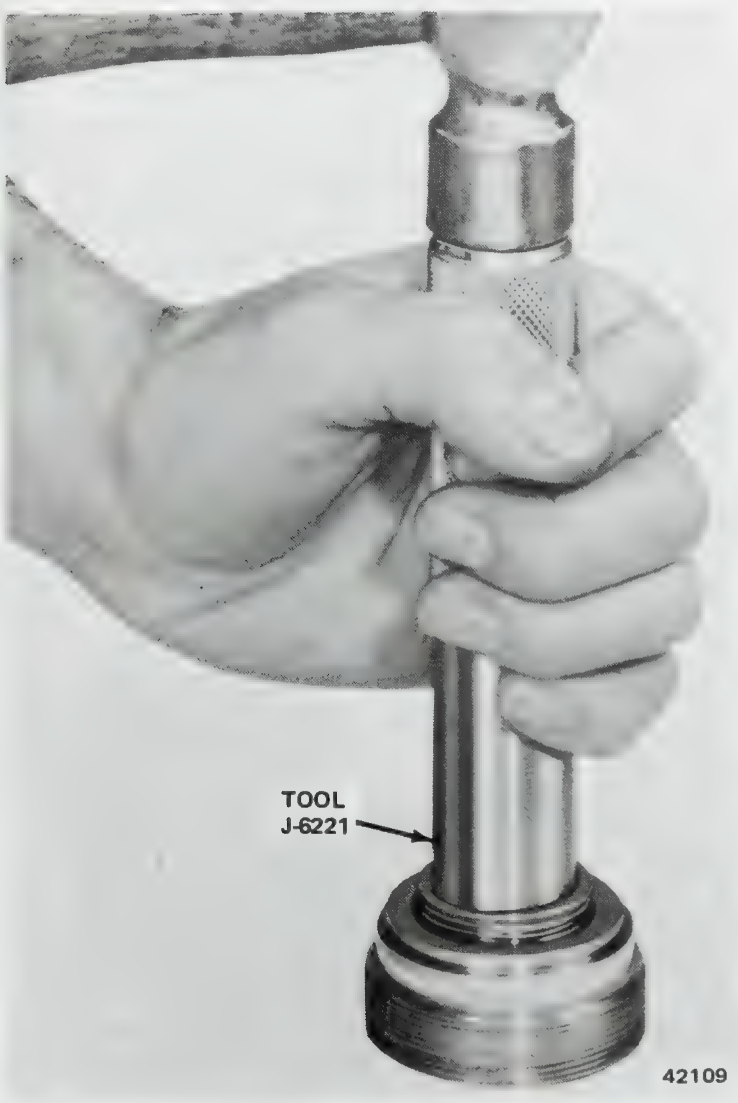

Fig. 2K-20 Adjuster Plug Needle Bearing Removal/Installation

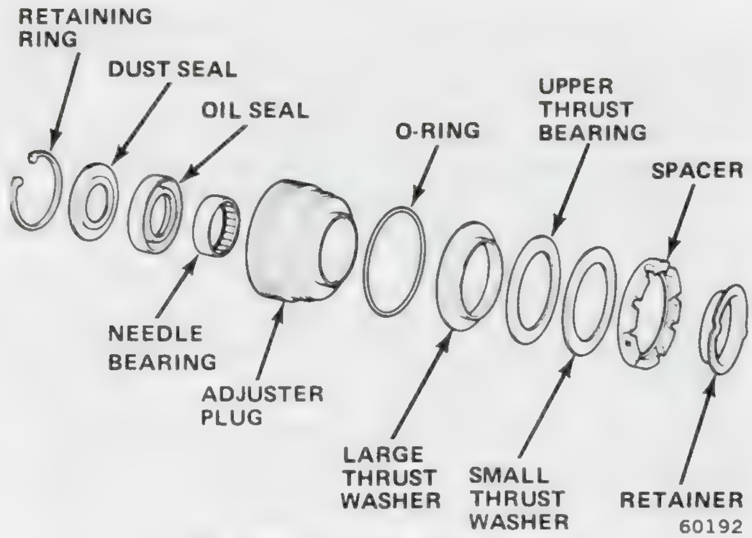

Fig. 2K-21 Adjuster Plug Assembly

Assembly

(1) Place needle bearing on Remover/Installer Tool J-6221 with bearing manufacturer's identification number facing tool.

(2) Position bearing and tool in bore and install bearing in plug until flush with bottom surface of stub shaft seal bore (fig. 2K-20).

(3) Lubricate stub shaft seal and install it using tool J-21554. Install seal deep enough to provide clearance for dust seal and retaining ring (fig. 2K-22).

Fig. 2K-22 Adjuster Plug Seal Installation

(4) Lubricate dust seal with petroleum jelly and install seal in adjuster plug with seal rubber face outward.

(5) Install retaining snap ring using Snap Ring Pliers J-4245. Be sure ring is properly seated.

(6) Lubricate O-ring with petroleum jelly and install in groove of adjuster plug.

(7) Install large thrust washer, upper thrust bearing, small thrust washer, and spacer in plug.

(8) Press bearing retainer into needle bearing bore using brass or wooden drift.

NOTE: *The radial location of the spacer notches are not important. However, do not damage the notches during installation.*

Valve Body and Stub Shaft

NOTE: *The complete valve body assembly is a precision manufactured unit with parts selectively fitted to tolerances as close as 0.0004 inch (0.00082 mm). The assembly is hydraulically and mechanically balanced during assembly.* **If replacement of any valve part other than seals or rings is necessary, the complete valve body assembly must be replaced.** *To avoid possible damage to the assembly, the valve body should not be disassembled unless absolutely necessary. If the valve spool damper O-ring requires replacement, remove the valve spool only as described in the following procedure.*

Disassembly

(1) Remove and discard stub shaft cap-to-worm-shaft O-ring.

(2) Hold valve assembly in both hands with stub shaft pointing downward and tap end of stub shaft lightly against workbench until shaft cap separates from valve body (fig. 2K-23).

(3) Pull outward on cap end of stub shaft until it clears valve body by approximately 1/4 inch (6.3 mm) (fig. 2K-24).

CAUTION: *Do not pull the shaft out too far or the spool valve may become cocked in the valve body.*

(4) Carefully disengage stub shaft locating pin from spool valve locating hole and remove stub shaft assembly (fig. 2K-24).

(5) Push spool valve out steering column end of valve body while rotating valve. If valve becomes cocked, carefully realign valve, then remove.

(6) Remove damper O-ring from spool valve (fig. 2K-25). Discard O-ring.

(7) Remove teflon rings and backup O-rings (located under teflon rings) from valve body. To remove rings, carefully cut them using knife or diagonal pliers.

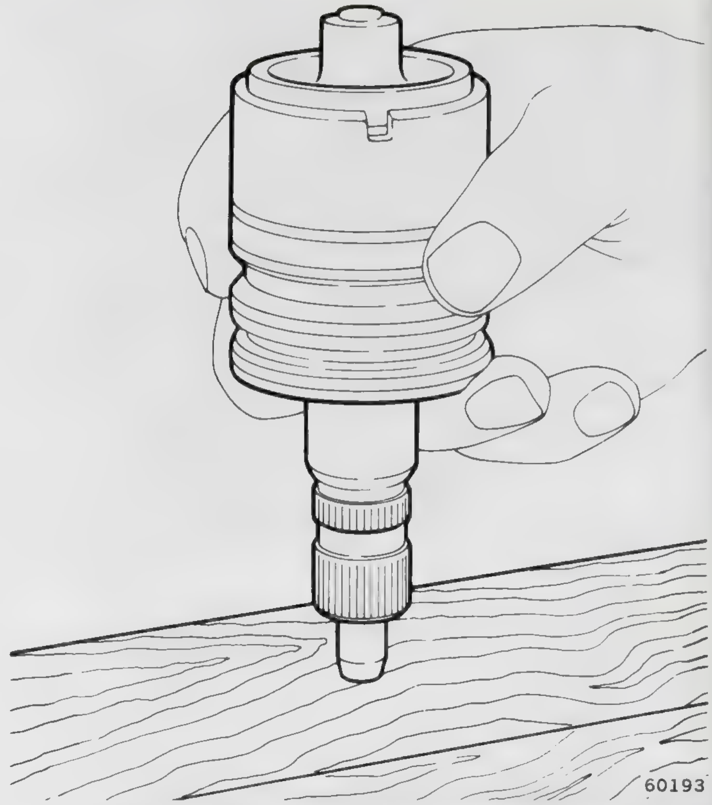

Fig. 2K-23 Removing Stub Shaft from Valve Body

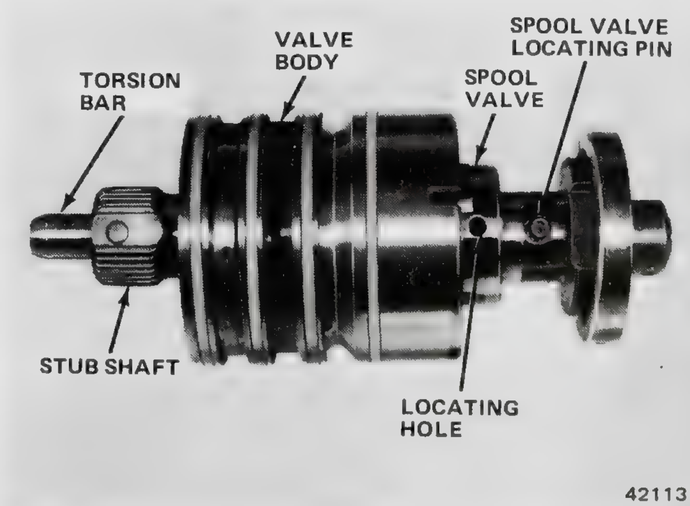

Fig. 2K-24 Valve Body/Spool Valve Disassembly

Inspection

Wash all parts in clean solvent and blow out all fluid passages with compressed air. If the spool valve locating pin in the stub shaft or valve body is cracked, excessively worn or broken, replace the entire valve body assembly.

NOTE: *Tiny flat spots on either side of the spool valve locating pin-head are normal.*

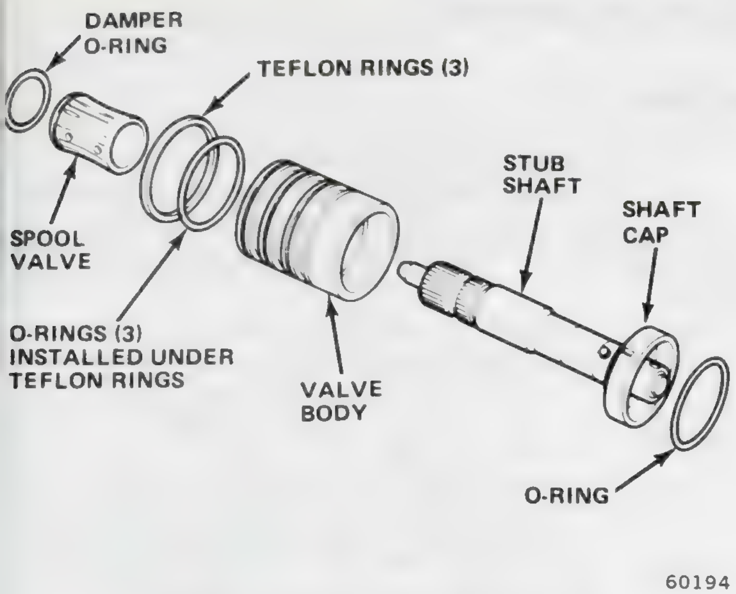

Fig. 2K-25 Valve Body/Stub Shaft Assembly

If there are scores, nicks, or burrs on the ground surfaces of the stub shaft that cannot be cleaned up with crocus cloth, replace the entire valve body assembly. Inspect the outside diameter of the spool valve and the inside diameter of the valve body for nicks, burrs, or wear spots. If irregularities cannot be cleaned up with crocus cloth, replace the entire valve body assembly. A slight polishing is normal on valve surfaces. If the small notch in the skirt of the valve is excessively worn, replace the entire valve body assembly (fig. 2K-26).

Lubricate the spool valve with power steering fluid and check the fit of the spool valve in the valve body with the spool valve damper O-ring removed. If the spool valve does not rotate freely within the valve body, replace the entire valve body assembly.

Fig. 2K-26 Valve Body

Assembly

(1) Lubricate backup O-rings and teflon rings with power steering fluid.

(2) Install backup O-rings in valve body ring grooves and install teflon rings over O-rings. Take care to avoid damaging teflon rings during installation (fig. 2K-27).

NOTE: *The teflon rings may appear slightly distorted when installed, however, during operation the heat generated by the power steering fluid will cause them to straighten.*

(3) Lubricate spool valve damper O-ring with petroleum jelly and install O-ring in spool valve groove.

(4) Lubricate spool valve and valve body with power steering fluid and carefully insert spool valve in valve body.

(5) Push spool valve through valve body until stub shaft pin locating hole is visible from opposite end of valve body and spool valve is flush with notched end of valve body.

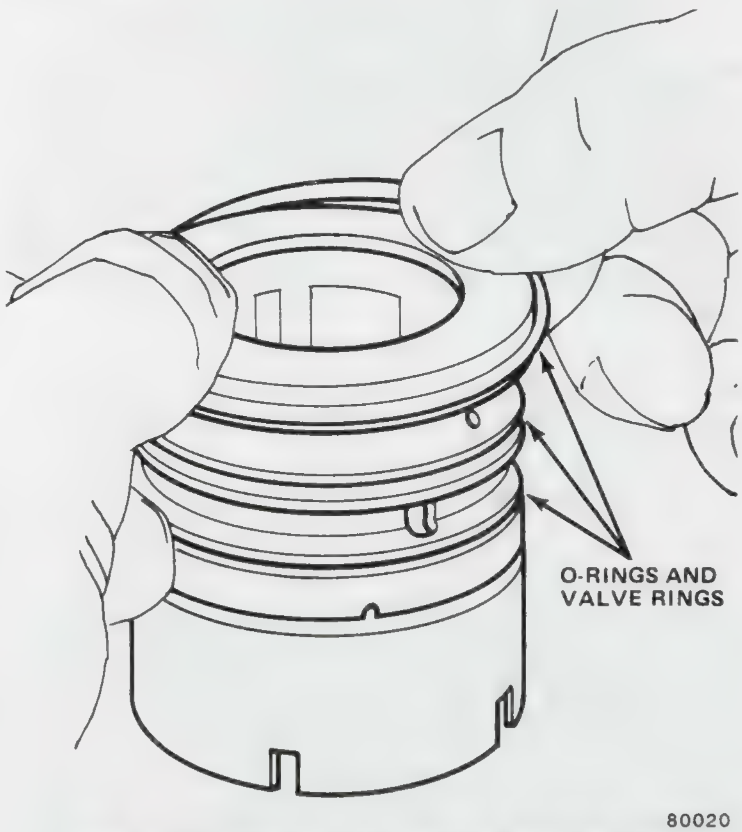

Fig. 2K-27 Installing Backup O-Rings and Teflon Rings

(6) Install stub shaft assembly carefully into spool valve until stub shaft locating pin is aligned with spool valve locating hole (fig. 2K-24).

(7) Align notch in shaft cap with locating pin in valve body and press spool valve and stub shaft assembly into valve body (fig. 2K-28).

CAUTION: *Make sure that the shaft cap notch is mated with the valve body pin before installing the valve body in the gear housing.*

(8) Lubricate stub shaft cap-to-wormshaft O-ring and install in valve body.

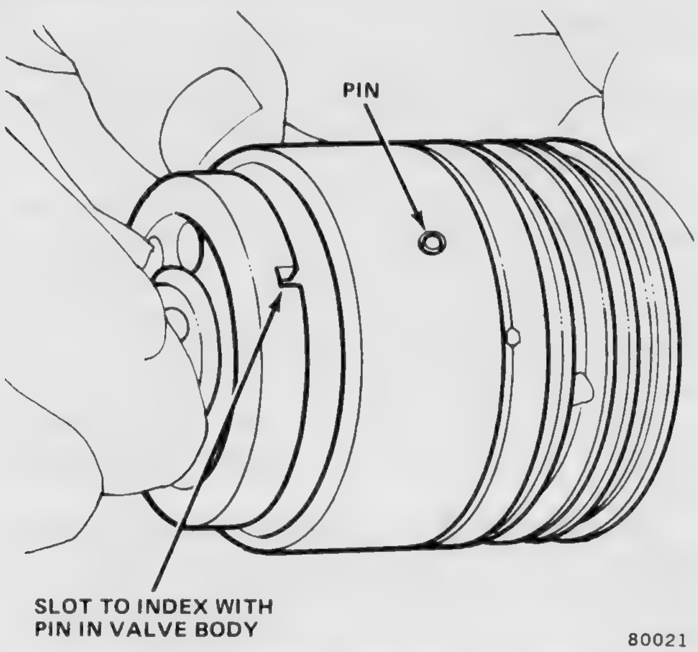

Fig. 2K-28 Installing Stub Shaft in Valve Body

Pitman Shaft and Side Cover Inspection

Inspect the bearing surface in the side cover and inspect the pitman shaft sector teeth, bearing surfaces, and seal surfaces. Replace the cover or shaft if severely worn, scored, or pitted (fig. 2K-29). If the pitman shaft adjuster screw is loose or worn, replace the pitman shaft assembly.

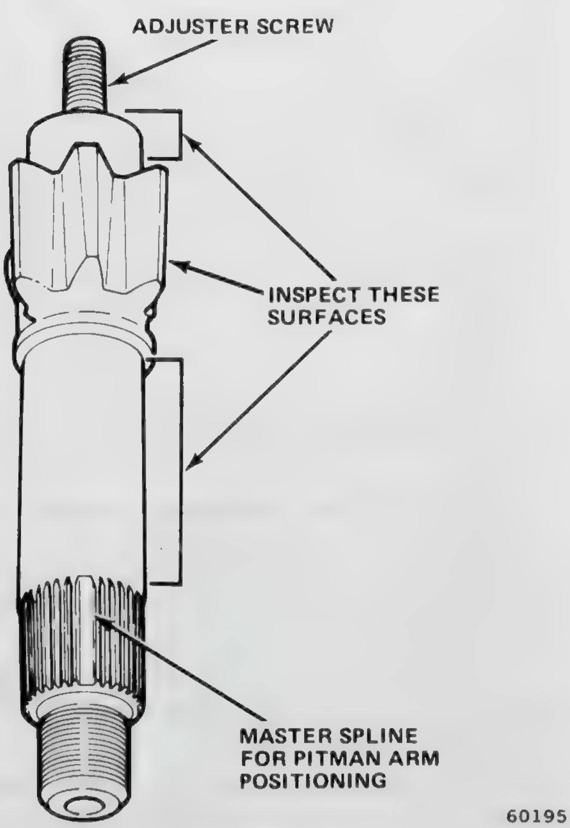

Fig. 2K-29 Pitman Shaft Inspection

Rack Piston—Wormshaft

Disassembly

(1) Remove return guide clamp.

(2) Place assembly on clean paper and remove ball return guides, Arbor Tool J-21552 and wormshaft, and ball bearings. Be sure all 24 ball bearings remain on paper.

(3) Remove arbor tool from wormshaft.

(4) Remove piston ring and O-ring from rack piston.

Inspection

Inspect the wormshaft, rack piston grooves, and ball bearings for severe wear or scoring. If the wormshaft or rack piston must be replaced, they must be replaced as a matched assembly only.

Inspect the ends of the ball return guides, lower thrust bearing, bearing races, wormshaft, rack piston teeth and outer surfaces, and the piston ring and grooves. Replace the complete assembly if any components are worn, scored, or pitted.

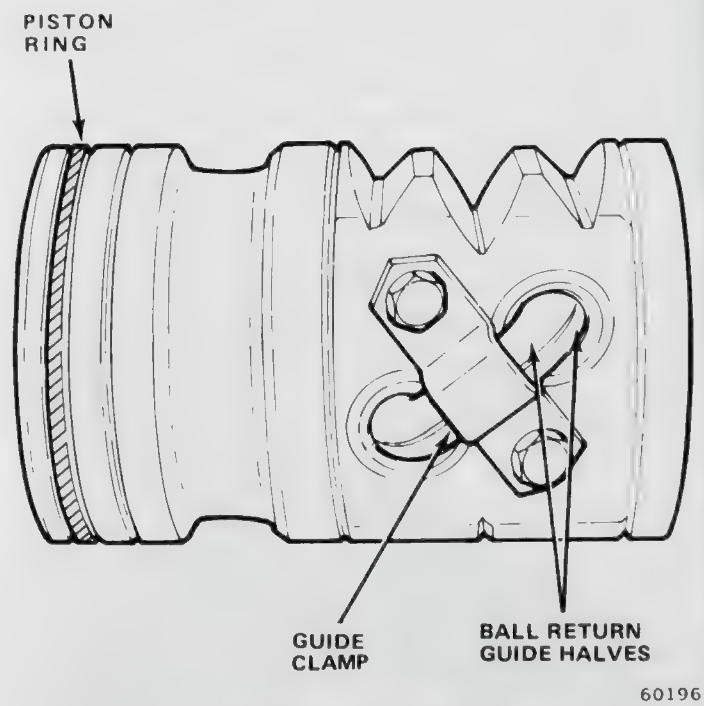

Fig. 2K-30 Rack Piston

Assembly

(1) Clean and lubricate all components with power steering fluid.

(2) Install O-ring in rack piston groove. Do not allow O-ring to become twisted during installation.

(3) Install piston ring over O-ring (fig. 2K-30).

(4) Install wormshaft completely into rack piston.

(5) Install ball bearings in rack piston. Alternately install one black ball bearing followed by one silver ball bearing until a total of 18 ball bearings have been in-

stalled through return guide hole nearest rack piston ring (fig. 2K-31).

(6) Rotate wormshaft counterclockwise (viewed from steering shaft end), to feed ball bearings into circuit. After installing each ball bearing, press it downward to provide room for following ball bearing.

NOTE: *The wormshaft will back out of the rack piston as it is rotated and the ball bearings are installed.*

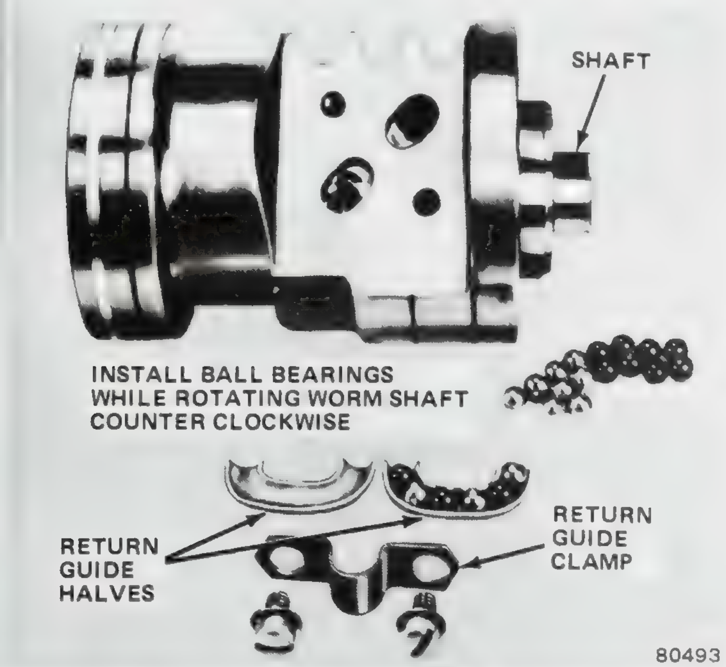

Fig. 2K-31 Rack Piston Ball Bearing Installation

(7) Fill one ball return guide half with petroleum jelly and install six remaining balls in guide. Place other half of guide in position and insert assembled guides into guide return holes in rack piston. Be sure ball bearings in guide are installed alternately (black bearing followed by silver bearing) and are in sequence with bearings in rack piston.

(8) Install ball return guide clamp screws and lockwashers and tighten screws to 10 foot-pounds (13.5 Nm) torque.

(9) Insert Arbor Tool J-21552 into wormshaft and position assembled rack piston and tool on end (fig. 2K-32). Do not permit tool to separate from wormshaft until rack piston is fully installed on wormshaft (fig. 2K-32). Be sure to support rack piston with wood blocks after it is inverted.

Hose Connector Seats and Poppet Check Valve Replacement

CAUTION: *Because of the possibility of metal chips entering the gear, this procedure must be performed only when the steering gear is removed and disassembled.*

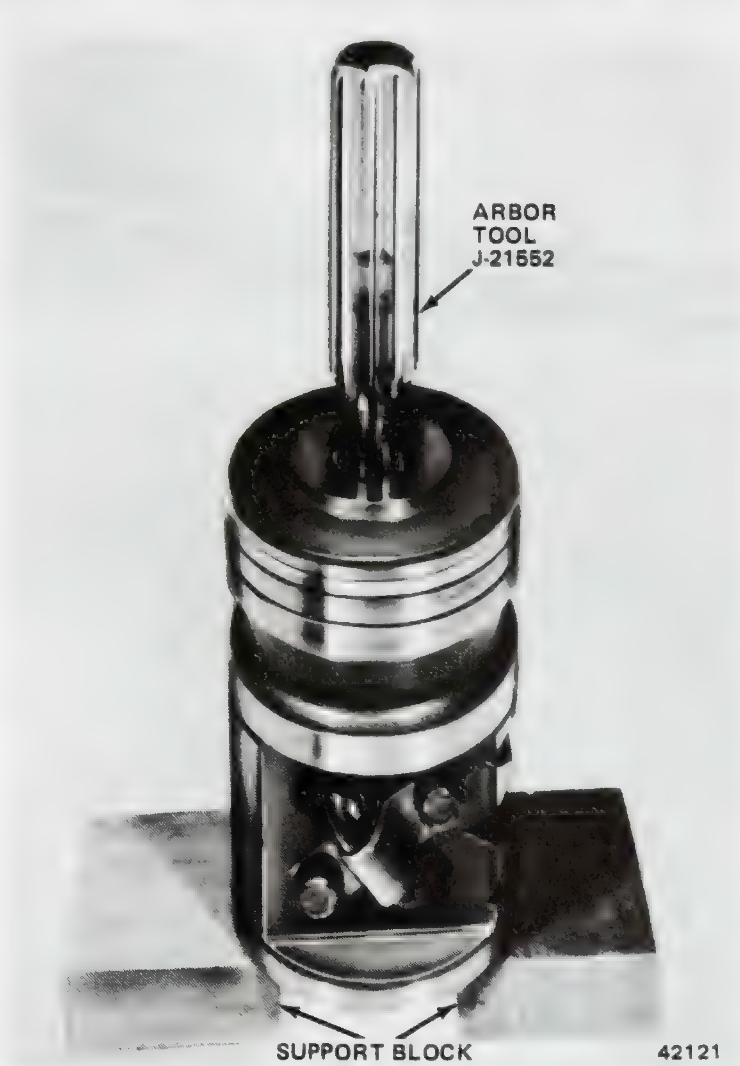

Fig. 2K-32 Arbor Tool Installed In Rack Piston

(1) Pack inside of connector seats in pressure and return ports with petroleum jelly to prevent chips from lodging in ports.

(2) Tap threads in connector seats using 5/16-18 tap (fig. 2K-33).

CAUTION: *Do not tap the threads too deeply in either hose connector seat or the tap will contact the poppet valve, force it against the housing, and damage it. It is necessary to tap two or three threads deep only.*

(3) Thread 5/16-18 bolt, with nut and flat washer installed on bolt, into tapped hole (fig. 2K-34).

(4) Use wrench to prevent bolt from rotating and turn nut clockwise on bolt to remove seat. Discard connector seat.

(5) Clean housing thoroughly to remove metal chips, dirt, and petroleum jelly.

(6) Remove poppet valve and spring from pressure port and discard both parts.

(7) Install replacement poppet valve spring in pressure port with large end facing downward. Be sure spring is seated in counterbore in pressure port.

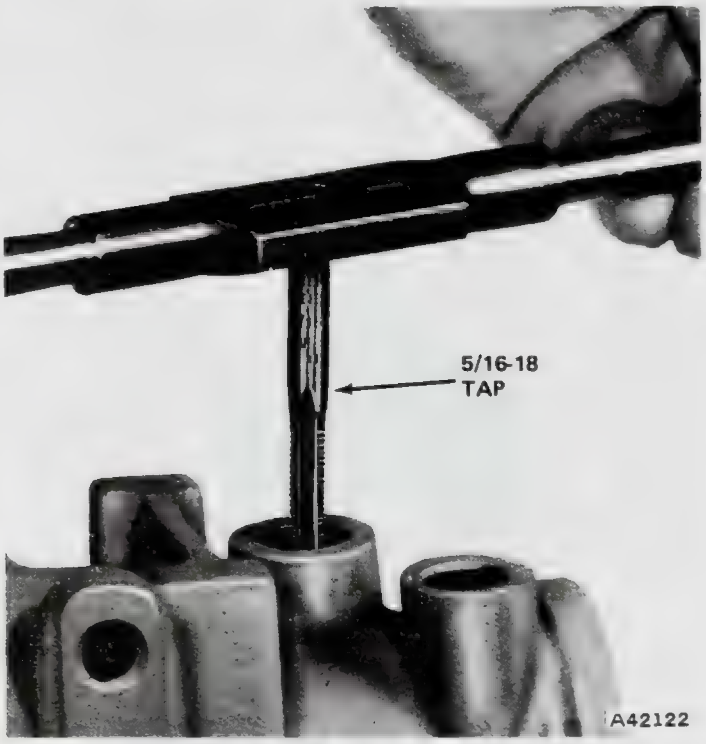

Fig. 2K-33 Threading Hose Connector Seat for Removal

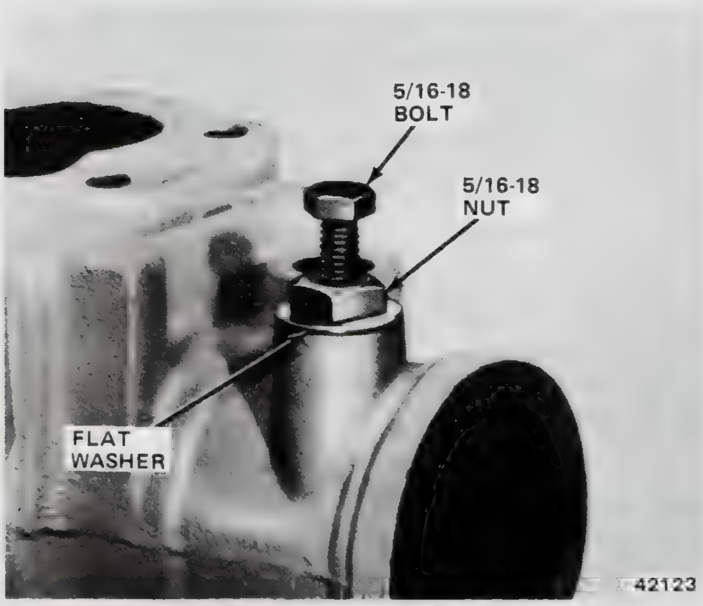

Fig. 2K-34 Hose Connector Seat Removal

Fig. 2K-35 Hose Connector Seat Installation

(8) Install replacement poppet valve over spring with valve tangs pointing downward. Be sure valve is centered on small end of spring.

(9) Install replacement connector seats. Use petroleum jelly to hold connector seat on poppet valve in pressure port and install connector seats using tool J-6217 (fig. 2K-35).

(10) Check operation of poppet valve by pushing lightly against valve using pencil or small punch. Valve should reseat itself again when pressure against it is removed.

STEERING GEAR ASSEMBLY AND ADJUSTMENT

NOTE: *All parts must be clean and lubricated with power steering fluid (except where noted otherwise) before assembly.*

(1) Position gear housing in vise with pitman shaft bore facing downward. Use unmachined housing boss as mounting pad (fig. 2K-10).

(2) Install wormshaft lower thrust bearing and bearing races. Install first bearing race followed by thrust bearing and second bearing race (fig. 2K-14).

NOTE: *Both of the conical bearing races must be installed so that the top of each cone faces the bottom of the gear housing (fig. 2K-14).*

(3) Install stub shaft cap-to-valve body O-ring in valve body so it is seated against inner edge of shaft cap.

(4) Align narrow notch in valve body with pin in wormshaft and insert valve body assembly in gear housing (fig. 2K-36).

(5) Seat valve body assembly in housing.

CAUTION: *Do not press against the stub shaft to seat the valve body. This could cause the stub shaft and cap to separate from the valve body and allow the spool valve damper O-ring to slip into the valve body fluid grooves. Seat the valve body only by pushing on the outer diameter of the valve body itself using the fingertips (fig. 2K-36). Be sure the teflon rings do not bind inside the housing. The valve body assembly is corrected seated when all or most of the fluid return hole in the gear housing is visible (fig. 2K-37).*

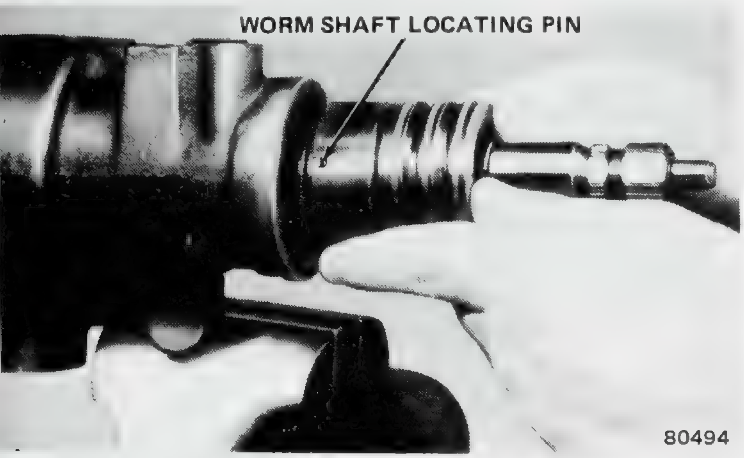

Fig. 2K-36 Valve Body Installation

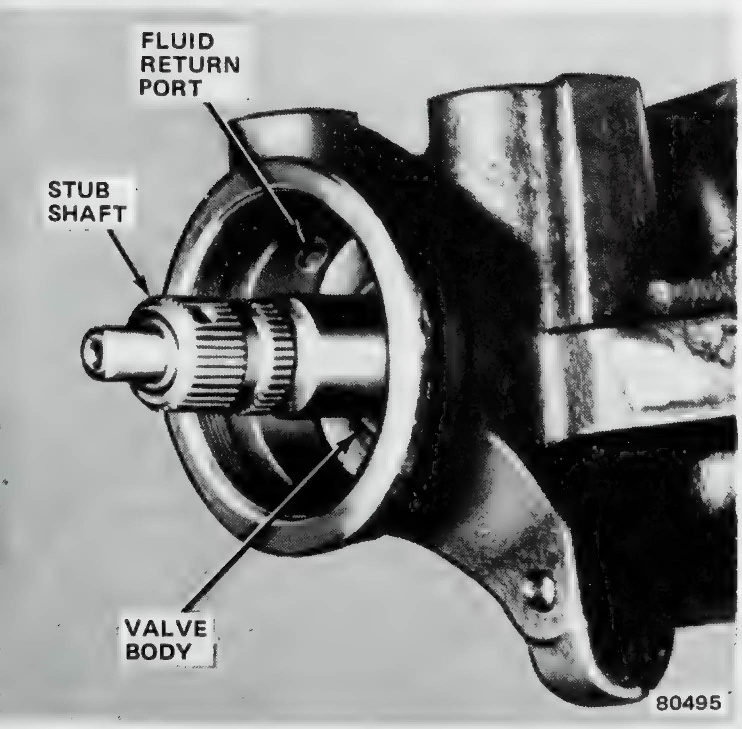

Fig. 2K-37 Seating Valve Body

(6) Install adjuster Plug Seal Protector Tool J-6222 over end of stub shaft (fig. 2K-38).

(7) Install adjuster plug assembly over end of stub shaft. Using Spanner Wrench J-7624, tighten plug until it seats against valve body. Approximately 20 foot-pounds (27.1 Nm) torque is required to seat plug. Remove seal protector tool J-6222 after installing adjuster plug.

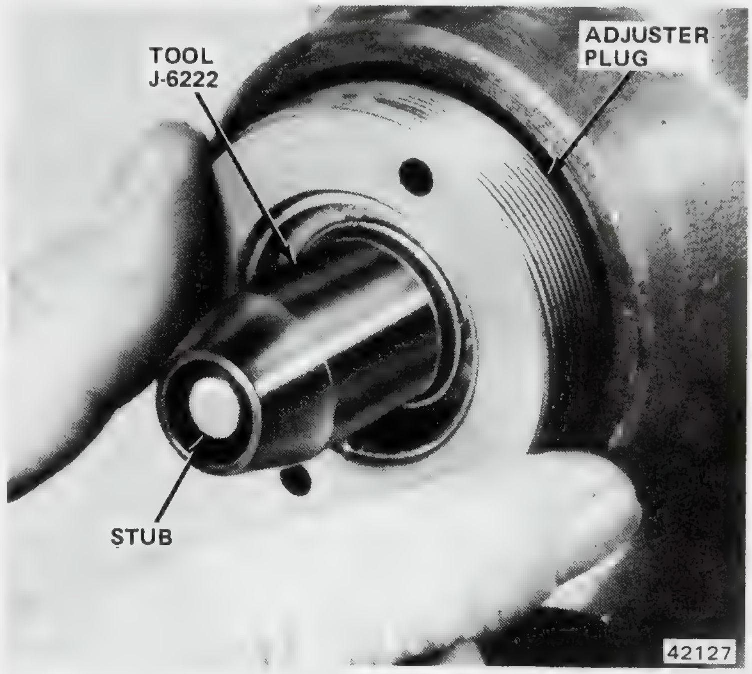

Fig. 2K-38 Adjuster Plug Installation

(8) Insert rack piston in housing until wormshaft engages in valve body and stub shaft. Do not damage piston ring during installation.

(9) Turn stub shaft clockwise to draw rack piston into housing. Do not remove arbor tool until valve body piston ring has entered housing bore.

(10) Turn stub shaft until rack piston center groove is aligned with center of pitman shaft bearing bore.

(11) Lubricate side cover gasket and install on side cover. Be sure rubber seal in gasket is seated in side cover groove.

(12) Install side cover on pitman shaft by threading cover onto adjuster screw until cover bottoms against pitman shaft.

(13) Install pitman shaft so long center sector tooth meshes with rack piston center groove. Be sure side cover gasket is in place before installing side cover on housing.

(14) Install side cover bolts and lockwashers. Tighten bolts to 45 foot-pounds (61.0 Nm) torque.

(15) Install adjuster screw locknut halfway on adjuster screw. Install allen wrench in adjuster screw to prevent screw from turning while installing nut.

(16) Install end plug in rack piston. Tighten plug to 50 foot-pounds (67.7 Nm) torque.

(17) Lubricate and install housing end plug O-ring on end plug.

(18) Install and seat end plug in housing. If necessary, tap end plug lightly with plastic mallet to seat it properly.

(19) Install end plug retainer ring so ring end gap is not aligned with hole in side of gear housing. Tap lightly on plug to be sure ring is seated properly.

(20) Adjust worm bearing preload and pitman shaft overcenter drag torque as outlined under Steering Gear Adjustment.

Steering Gear Adjustment

The power steering gear requires two adjustments which are: worm bearing preload and pitman shaft overcenter drag torque.

Worm bearing preload is controlled by the amount of compression force exerted on the conical worm bearing thrust races by the adjuster plug.

Pitman shaft overcenter torque is controlled by the pitman shaft adjuster screw which determines the clearance between the rack piston and pitman shaft sector teeth.

CAUTION: *The following adjustment procedures must be performed exactly as described and in the sequence outlined. Failure to do so can result in damage to the gear internal components and improper steering response. Always adjust worm bearing preload first; then adjust pitman shaft overcenter drag torque.*

Worm Bearing Preload

(1) Seat adjuster plug firmly in housing using Spanner Tool J-7624. Approximately 20 foot-pounds (27.1 Nm) torque is required to seat housing.

(2) Place index mark on gear housing opposite one of the holes in adjuster plug (fig. 2K-39).

(3) Measure back (counterclockwise) 3/16 to 1/4 inch (4.7 to 6.3 mm) from index mark and remark housing (fig. 2K-40).

(4) Turn adjuster plug counterclockwise until hole in plug is aligned with second mark on housing.

(5) Install adjuster plug locknut and tighten it to 85 foot-pounds (115.2 Nm) torque. Be sure adjuster plug does not turn when tightening locknut.

(6) Turn stub shaft clockwise to stop, then turn shaft back 1/4 turn.

(7) Using inch-pound torque wrench with maximum capacity of 50 inch-pounds (5.6 Nm) and twelve-point deep socket, measure torque required to turn stub shaft. Take reading with beam of torque wrench at, or near, vertical position while turning stub shaft at an even rate (fig. 2K-41).

(8) Record torque reading. Torque required to turn stub shaft should be 4 to 10 inch-pounds (0.45 to 1.13 Nm) torque. If reading is above or below indicated torque, adjuster plug may not be tightened properly or may have turned when locknut was tightened, or the gear may be assembled incorrectly, or the thrust bearings and races may be defective.

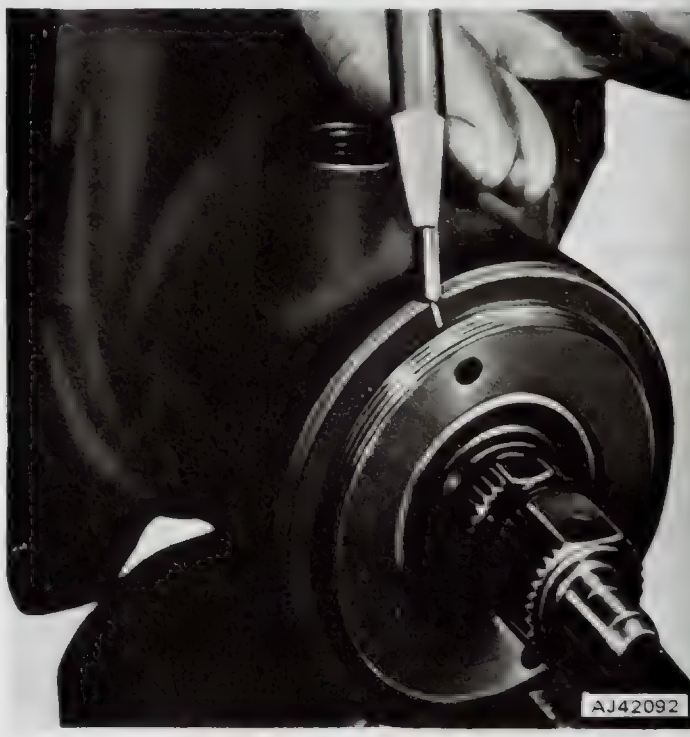

Fig. 2K-39 Marking Gear Housing

Fig. 2K-40 Remarking Gear Housing

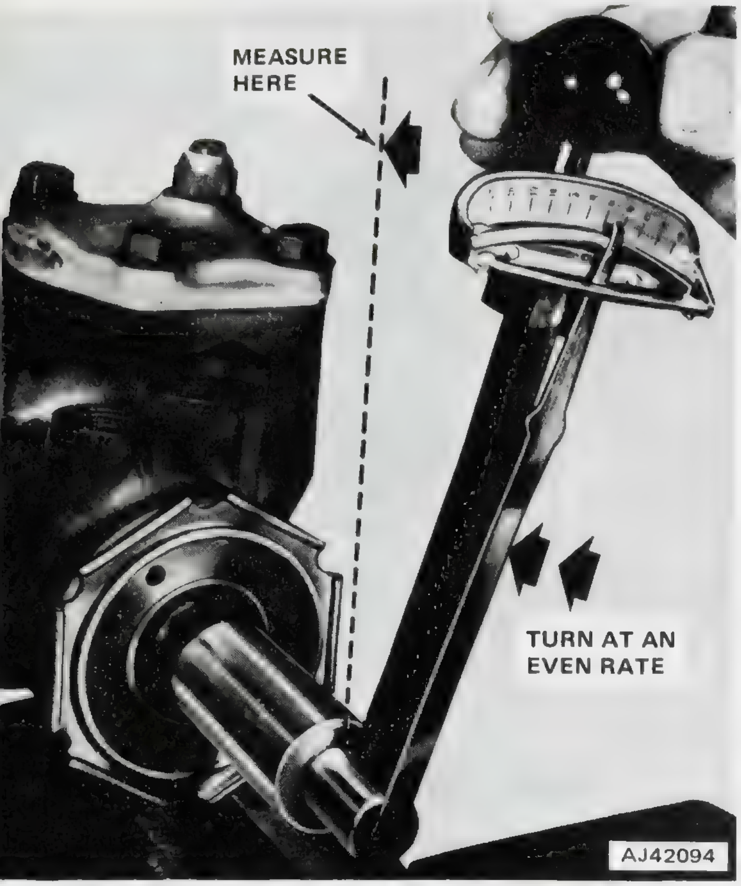

Fig. 2K-41 Measuring Worm Bearing Preload Torque

Pitman Shaft Overcenter Drag Torque

(1) Turn pitman shaft adjuster screw counterclockwise until fully extended, then turn it back 1/2 turn clockwise.

(2) Rotate stub shaft from stop-to-stop and count total number of turns.

(3) Starting from either stop, turn stub shaft back 1/2 total number of turns. This is gear center.

NOTE: *When the gear is centered, the flat on the stub shaft should face upward and be parallel with the side cover (fig. 2K-42) and the master spline on the pitman shaft should be in line with the adjuster screw (fig. 2K-43).*

(4) Install inch-pound torque wrench with maximum capacity of 50 inch-pounds (5.6 Nm) and twelve-point deep socket on stub shaft. Place torque wrench in vertical position to take reading (fig. 2K-44).

(5) Rotate torque wrench 45 degrees each side of center and record highest drag torque measured on or near center (fig. 2K-44).

(6) Adjust overcenter drag torque by turning pitman shaft adjusting screw clockwise until desired drag torque is obtained. Adjust drag torque to following limits:

On **new** steering gears, add 4 to 8 inch-pounds (0.45 to 0.90 Nm) torque to previously measured worm bearing preload torque **but do not exceed a combined total of 18 inch-pounds (2.03 Nm) drag torque**.

On **used** steering gears (400 or more miles), add 4 to 5 inch-pounds (0.45 to 0.56 Nm) torque to previously measured worm bearing preload torque **but do not exceed a combined total of 14 inch-pounds (1.58 Nm) drag torque**.

(7) Tighten pitman shaft adjusting screw locknut to 35 foot-pounds (47.4 Nm) torque after adjusting overcenter drag torque (fig. 2K-45).

(8) Install gear as outlined in Steering Gear Installation.

(9) Fill pump reservoir and bleed gear and pump as outlined in Fluid Level and Initial Operation after completing overcenter drag torque adjustment.

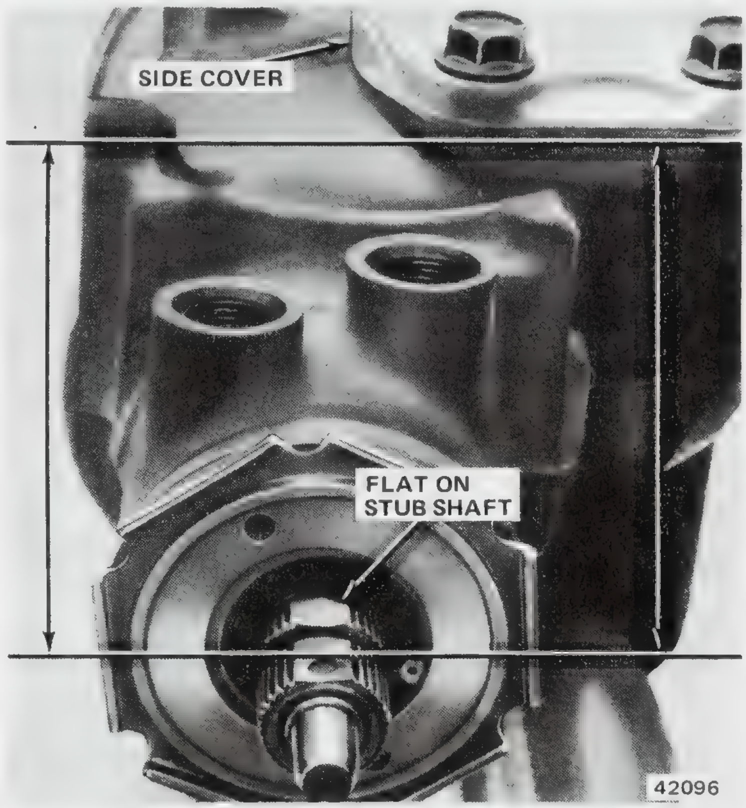

Fig. 2K-42 Stub Shaft Position on Center

FLUID LEVEL AND INITIAL OPERATION

(1) Fill pump reservoir.

(2) Operate engine until power steering fluid reaches normal operating temperature of approximately 170°F, then stop engine.

(3) Turn wheels to full left turn position and add power steering fluid to COLD mark on dipstick.

(4) Start engine, operate it at hot idle speed, and recheck fluid level. Add fluid, if necessary, to COLD mark on dipstick.

(5) Bleed system by turning wheels from side to side without hitting stops. Maintain fluid level just above pump housing. Fluid with air in it will have a milky appearance. Air must be eliminated from fluid before normal steering action can be obtained.

(6) Return wheels to center position and operate engine for additional 2-3 minutes, then stop engine.

(7) Road-test car to make sure steering functions normally and is free of noise.

(8) Check fluid level. Add fluid as required to raise level to HOT mark on dipstick after system has stabilized at its normal operating temperature.

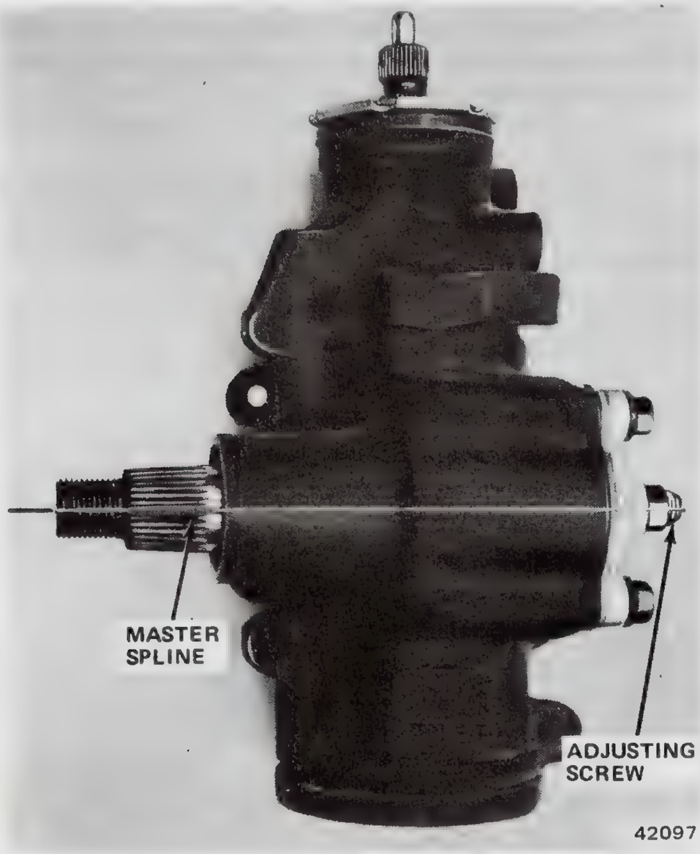

Fig. 2K-43 Master Spline Position on Center

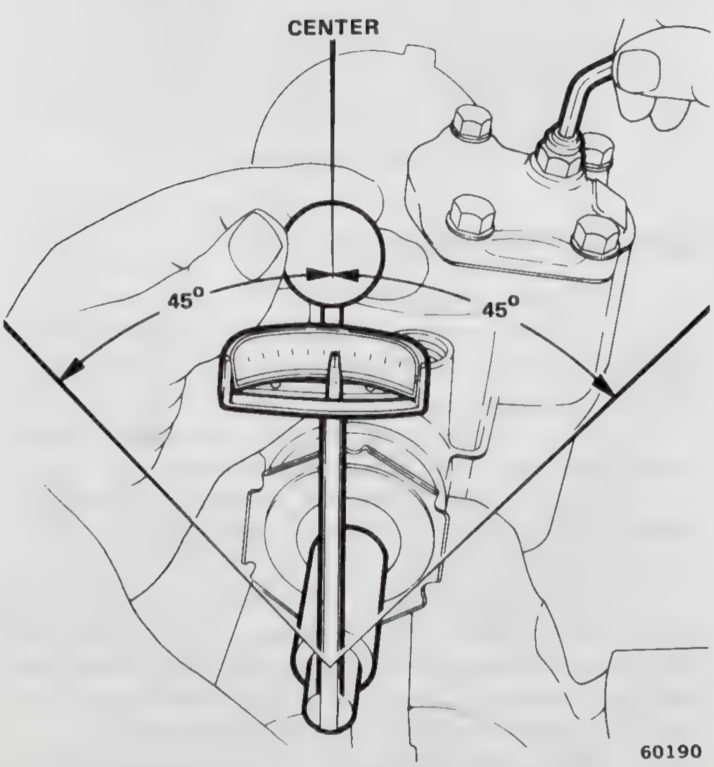

Fig. 2K-44 Measuring Overcenter Drag Torque

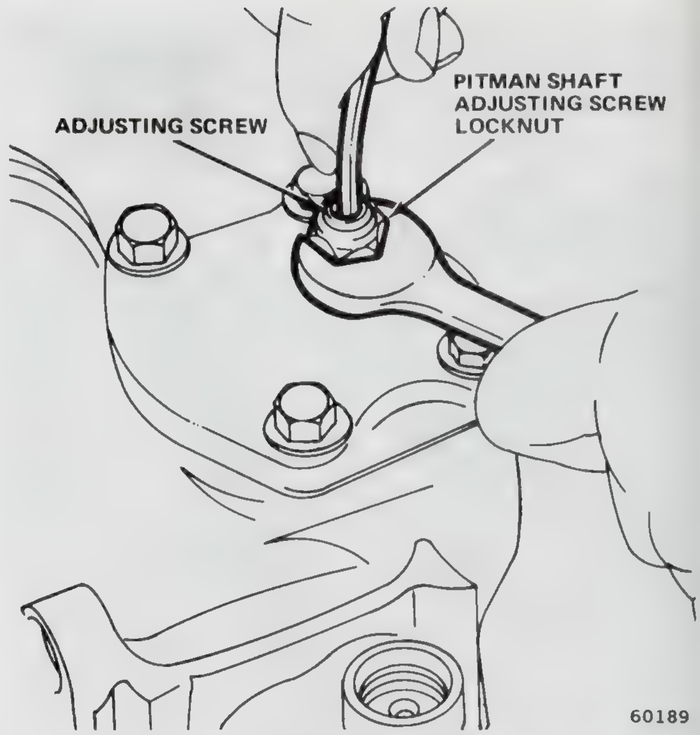

Fig. 2K-45 Tightening Adjuster Screw Locknut

SPECIFICATIONS

Steering Gear Specifications

Steering Gear Type	Recirculating ball with hydraulic assist.
Steering Gear Ratio	Variable ratio — 16:1 on center 13:1 at full lock.
Steering Gear Hydraulic Fluid	Use AMC power steering Fluid, Dexron, or equivalent.
Steering Gear Lubricants	Lubricate pitman shaft seals, bearings, races, and rack piston nut ball bearings with petroleum jelly. Lubricate all other parts with power steering fluid.
Steering Gear Adjustment:	
Worm Bearing Preload	4 to 10 inch-pounds (0.5-1 N-m) drag torque. Refer to Steering Gear Adjustment.
Pitman Shaft Overcenter drag torque:	
New Gear (less than 400 miles)	4 to 8 inch-pounds (0.5-1 N-m) in addition to worm bearing preload but not to exceed combined total of 18 inch-pounds. (2 N-m)
Used Gear (over 400 miles)	4 to 5 inch-pounds (0.5 N-m) in addition to worm bearing preload but not to exceed combined total of 14 inch-pounds. (2 N-m)

Caution: Gears must be adjusted exactly as outlined in Steering Gear Adjustment. Failure to adhere to the recommended procedures may result in gear damage or improper steering response.

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Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Adjuster Plug Locknut	115	102-129	85	75-95
Flexible Coupling Nuts	34	20-47	25	15-35
Flexible Coupling Pinch Bolt	41	27-47	30	20-40
Pitman Arm Nut (See Caution)	156	136-170	115	100-125
Power Steering Return Hose Fitting	34	27-41	25	20-30
Power Steering Pressure Hose Fitting	48	41-54	35	30-40
Steering Gear Mounting Bolt (All)	88	75-102	65	55-75
Steering Shaft Pinch Bolt Nut (All)	65	54-75	48	40-55
Steering Gear Side Cover Bolt	61	54-68	45	40-50
Steering Gear Rack Piston End Plug	68	61-75	50	45-55

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

Caution: Pitman arm nut be securely staked to pitman shaft threads in one place for proper retention.

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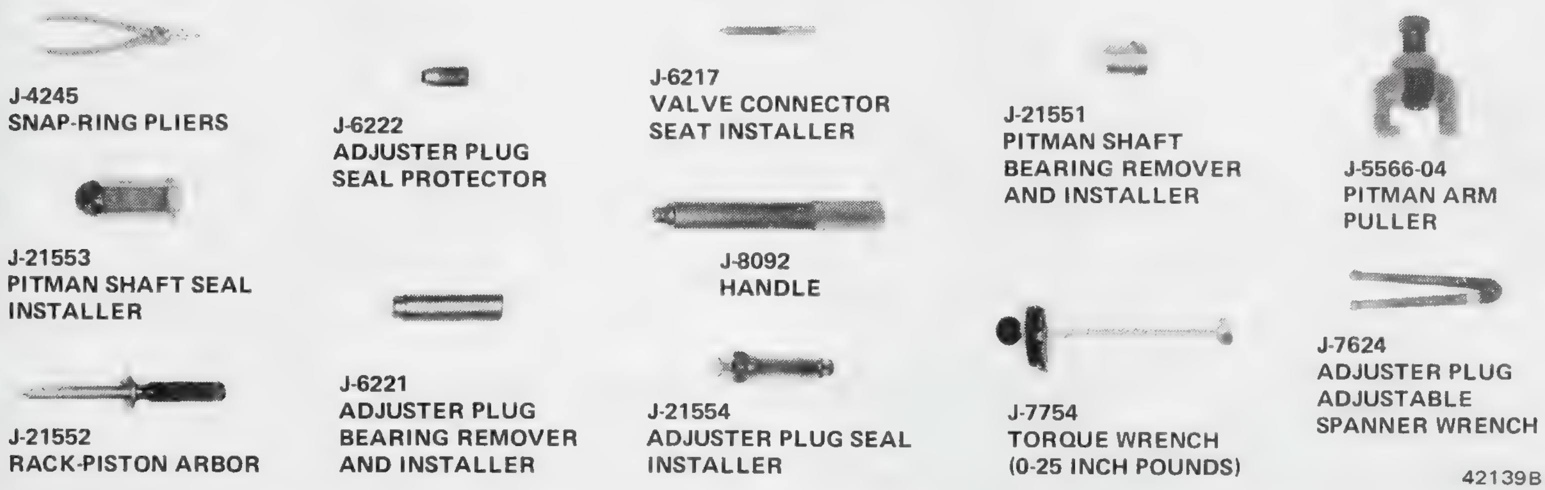
Special Tools



POWER STEERING GEAR–PACER

GENERAL

The power steering gear used on Pacer models is a rack and pinion design combining the steering gear and linkage into one compact assembly (fig. 2K-46).

The gear consists of a tube and housing containing the steering rack and piston, pinion shaft and valve body assembly, and adjuster plug assembly. The tube and housing are permanently connected during manufacture by a plastic injection-bonding process. Thrust bearings and bushings are used to support the pinion shaft in the

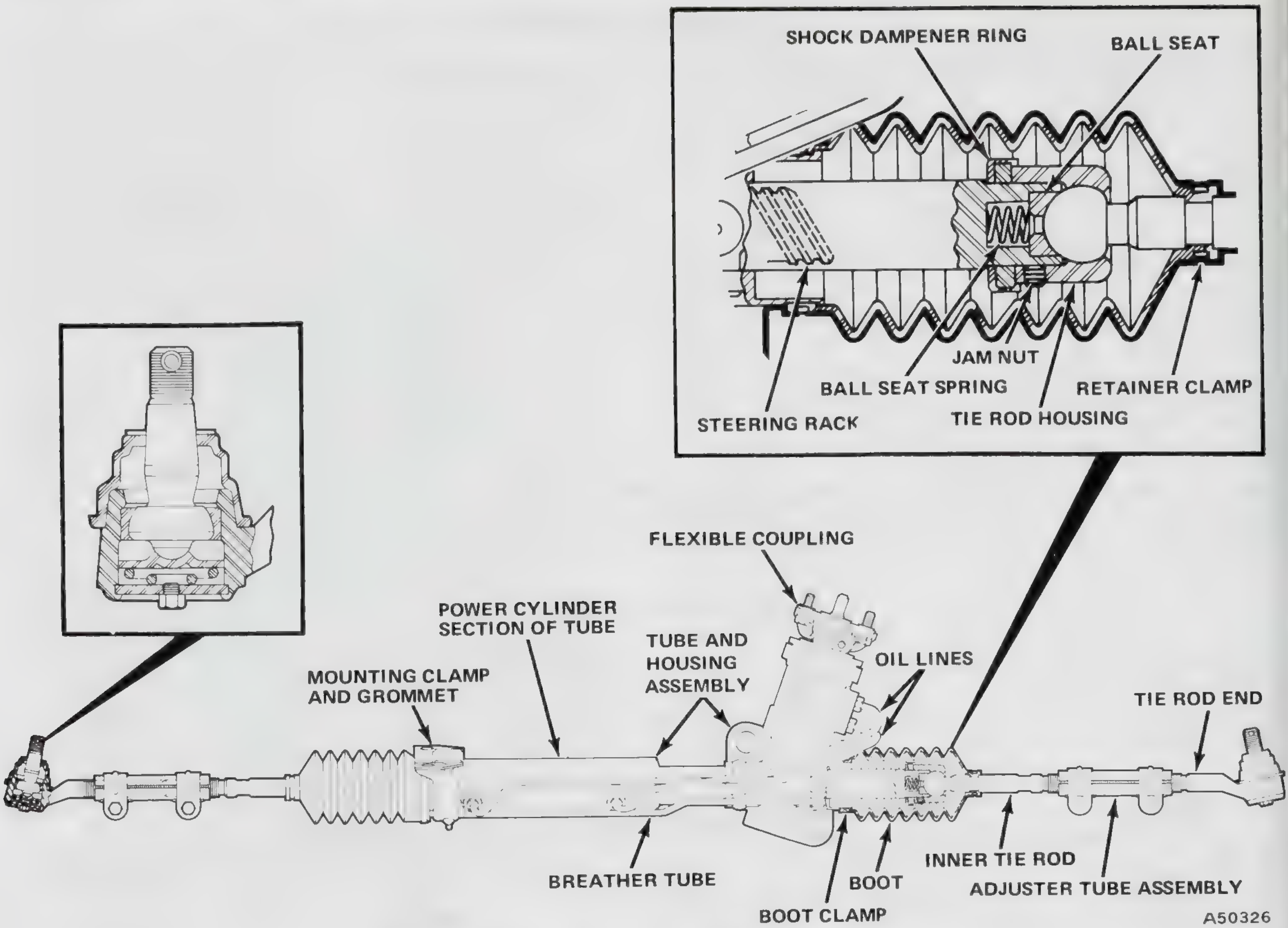


Fig. 2K-46 Power Rack and Pinion Steering Gear—Pacer

housing. A bushing and bulkhead assembly support the steering rack in the tube. The protective rubber boots, breather tube, and steering linkage components used with the power steering gear are similar to those used with manual rack and pinion steering gear assemblies.

The steering rack piston is permanently attached to the rack and operates within the power cylinder (large diameter) section of the tube (fig. 2K-46). The piston is positioned on the rack so it is centered between the oil line fitting bosses when the wheels are straight-ahead. A single square-cut seal is used on the piston.

Operating pressure in the power cylinder is maintained by O-ring and lip-type seals. A lip-type seal is located in a seat formed in the housing end of the power cylinder. An O-ring and lip-type seal with compression spring is located in the two-piece bulkhead assembly at the opposite end of the cylinder.

The externally mounted oil lines (fig. 2K-46) installed between tube and housing, conduct power steering fluid from the valve body to the tube power cylinder section.

An open center, three-position, rotary-type valve body assembly is used. The valve body assembly consists of a stub shaft and torsion bar, spool valve, and valve body and O-rings and teflon rings. Locating lugs on the pinion shaft engage with locating slots in the stub shaft and torsion bar to connect the pinion shaft and valve body.

Pinion shaft preload is controlled by conical thrust bearing races. The adjuster plug assembly determines the degree of preload applied to the thrust bearings and also retains the pinion shaft and valve body in the housing. A preload spring maintains pinion bushing position and compensates for bushing wear. Seal rings on the valve body and lip-type seals in the adjuster plug and housing maintain operating pressure within the housing.

Steering Gear Operation

The valve body controls hydraulic steering assist. In operation, fluid from the pump is routed through the inlet hose to the steering gear housing and into the valve body. The valve body directs fluid to either side of the power cylinder to provide hydraulic steering assist.

The valve body, spool valve, torsion bar, and stub shaft which is pinned to the torsion bar, are, in effect, attached to the front wheels through mechanical connections. Because of the pressure exerted on the front wheels by car weight, the wheels and valve body tend to resist any turning effort applied at the steering wheel. As resistance to turning by the wheels and valve body increases, the torsion bar which is pinned to the stub shaft, deflects. Since the spool valve is connected to the stub shaft by a locating pin, torsion bar deflection causes the spool valve to rotate within the valve body. As the spool valve rotates, fluid directional passages machined into the valve are aligned with matching passages in the valve body. Fluid from the pump is then directed through the aligned passages and into either side of the power cylinder through one of the externally mounted oil lines.

Neutral (Straight-Ahead) Position

When the steering wheel is in the straight-ahead position, the matching fluid directional passages in the valve body and spool valve are closed off.

Fluid from the pump is routed through the power steering pressure hose to the inlet hole in the steering gear housing and into the valve body. Since the fluid directional passages in the valve body and spool valve are closed off, fluid passes through the open center valve and into the housing exhaust port. After leaving the exhaust port, the fluid returns to the pump reservoir through the return hose.

Right and Left Turn Positions

When the steering wheel is turned, the resistance to turning effort by the front wheels and valve body cause the torsion bar to deflect. As it deflects, the stub shaft and spool valve rotate within the valve body causing the matching fluid directional passages in the spool valve and valve body to become aligned.

Fluid from the pump is routed through the power steering pressure hose to the inlet port in the steering gear housing and into the valve body. Since the fluid directional passages are now aligned, the valve then directs fluid into either side of the power cylinder through one of the externally mounted oil lines. As the fluid enters the power cylinder, it acts upon the rack piston forcing the piston and rack to move left or right to provide hydraulic steering assist.

Steering Gear Service

If the steering rack and piston, pinion shaft, or tube and housing assembly should become damaged, the complete steering gear assembly, less the steering linkage components and flexible coupling, must be replaced. Do not interchange components from one gear to another in an attempt to effect repairs. The pinion, rack, and tube and housing are assembled as matched components only.

SERVICE DIAGNOSIS

The following Diagnosis and Repair Simplification (DARS) charts provide a graphic method for diagnosing the power rack and pinion steering gear. The procedural steps provided in the charts should be followed exactly as outlined. Do not remove and disassemble the gear without a proper diagnosis to avoid unnecessary or incorrect repairs. For problems related to fluid leaks, refer to Leak Inspection and Diagnosis.

LEAK INSPECTION AND DIAGNOSIS

NOTE: *The actual source of steering gear fluid leaks should always be determined before attempting repairs. Because an inaccurate diagnosis can result in ineffective repair, a proper inspection procedure is necessary. The most common fluid leak sources are shown in Figure 2K-47, View A and View B.*

Leak Inspection

(1) Raise and support car.

(2) Wipe leak area dry.

(3) Check for overfilled reservoir. If overfull, drain fluid from reservoir to correct level.

(4) Check for aerated fluid (full of bubbles and milky in color). Aerated fluid can cause overflow from reservoir and be mistaken for leak.

(5) Check and tighten all hose connections and union fittings at pump and gear. Do not exceed 30 foot-pounds (40.6 Nm) torque at any fitting.

(6) Start engine. Have helper turn steering wheel left and right several times while locating exact source of leak. Contact steering stops in each direction. Stop engine when source of leak is determined (fig. 2K-47).

Leak Diagnosis

(1) If leak occurs between housing and adjuster plug, replace adjuster plug O-ring seal.

(2) If leak occurs between stub shaft and stub shaft seal, replace seal and check stub shaft seal contact surface for nicks, gouges, or burrs.

(3) If leak occurs between stub shaft and torsion bar, replace complete valve body assembly.

(4) If leak occurs at oil line or hose fittings, first tighten fittings; then if leakage persists, replace oil lines, tube connector fittings, or hoses. If leak persists, replace steering gear assembly.

(5) If leak occurs from tube or housing due to cracks or porosity, replace steering gear assembly. If leak occurs at junction where tube joins housing, internal seals are leaking.

POWER RACK AND PINION STEERING DIAGNOSIS AND REPAIR SIMPLICATION (DARS) CHARTS

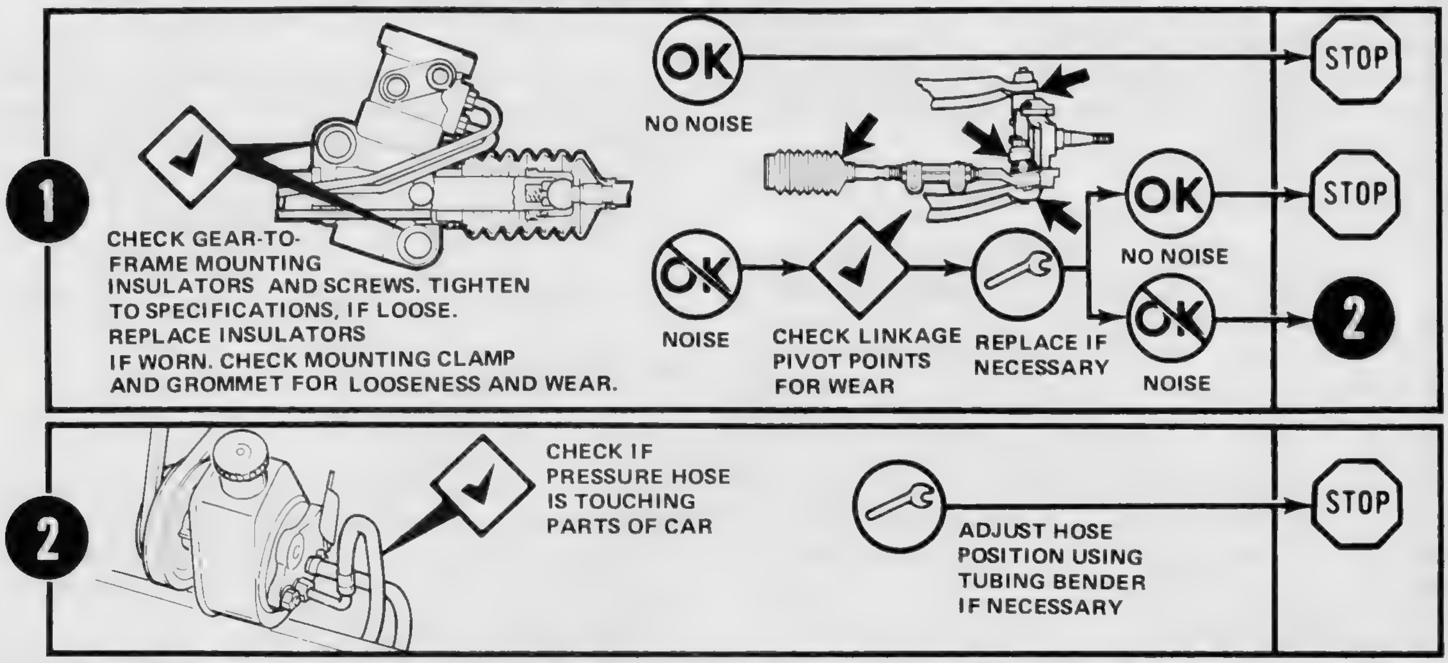
Note: Refer to Chapter A — General Information for details on how to use this DARS chart.

PROBLEM: HISSING NOISE — Chart 1

THERE IS SOME NOISE IN ALL POWER STEERING SYSTEMS. ONE OF THE MOST COMMON IS A HISSING SOUND MOST EVIDENT WHILE AT PARKING. HISS IS A NOISE THAT SOUNDS LIKE SLOWLY CLOSING A WATER TAP. THE NOISE IS PRESENT IN EVERY VALVE AND RESULTS FROM HIGH VELOCITY FLUID PASSING VALVE ORFICE EDGES. THERE IS NO RELATIONSHIP BETWEEN THIS NOISE AND PERFORMANCE OF THE STEERING. HISS MAY BE EXPECTED WHEN STEERING WHEEL IS AT END OF TRAVEL OR WHEN SLOWLY TURNING AT STANDSTILL. TRANSMITTING THIS NOISE INTO THE PASSENGER COMPARTMENT IS PREVENTED BY THE USE OF THE FLEXIBLE STEERING SHAFT COUPLING.

PROBLEM: RATTLE OR CHUCKLE NOISE IN STEERING GEAR — Chart 2

STEP — SEQUENCE — RESULT



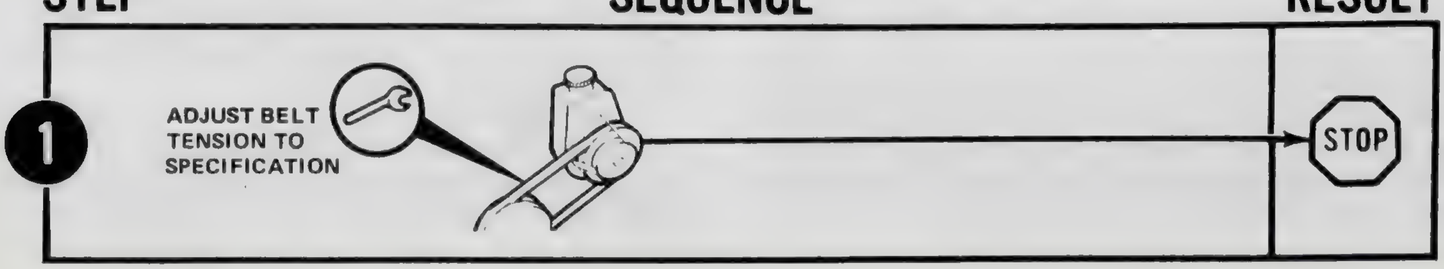
PROBLEM: SQUAWK NOISE IN STEERING GEAR WHEN TURNING OR RECOVERING FROM TURN — Chart 3

STEP — SEQUENCE — RESULT

PROBLEM: CHIRP OR SQUEAL NOISE — Chart 4

[Particularly noticeable at full wheel travel and while parking]

STEP — SEQUENCE — RESULT



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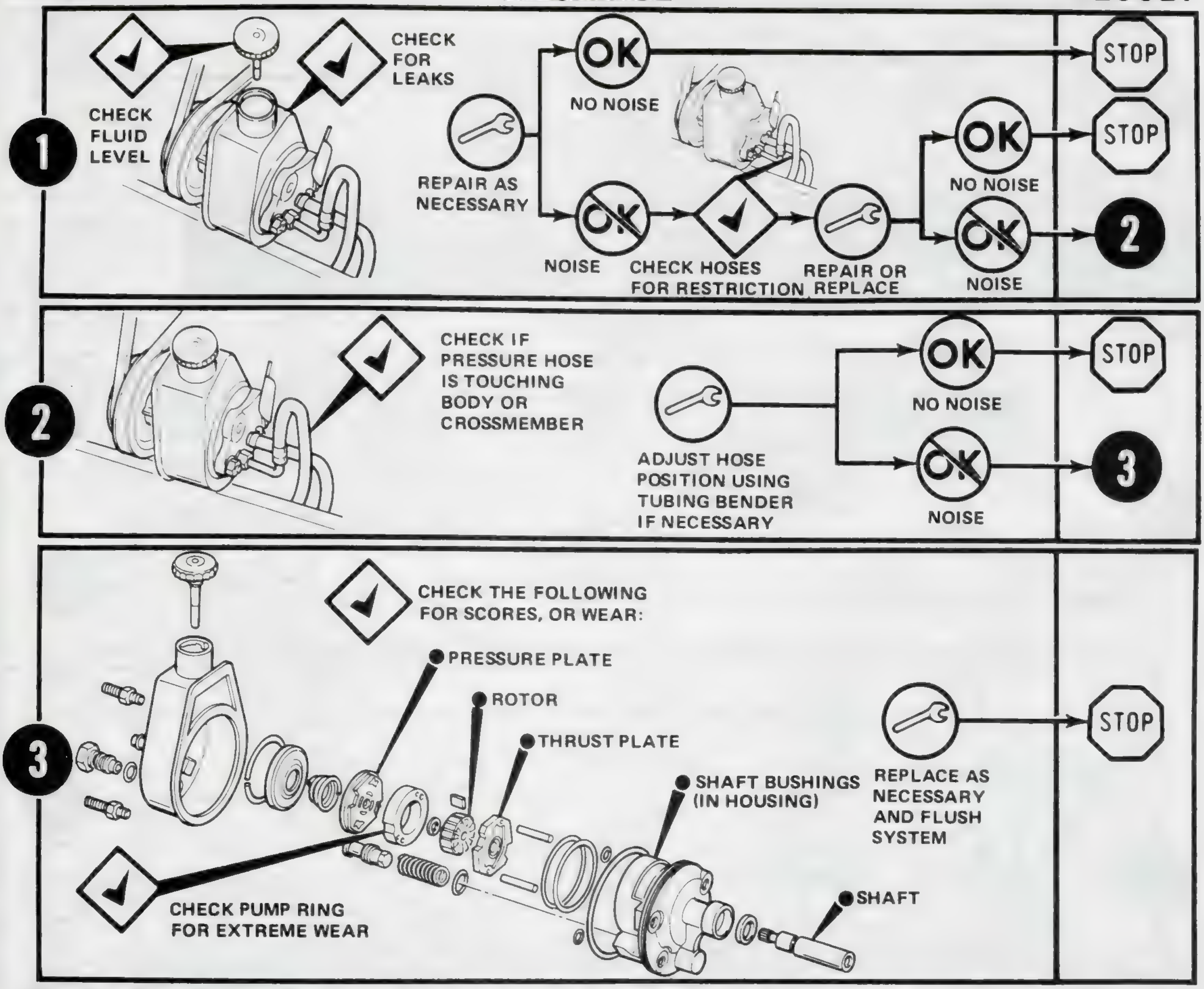
PROBLEM: WHINE OR GROWL NOISE IN PUMP

Chart 5

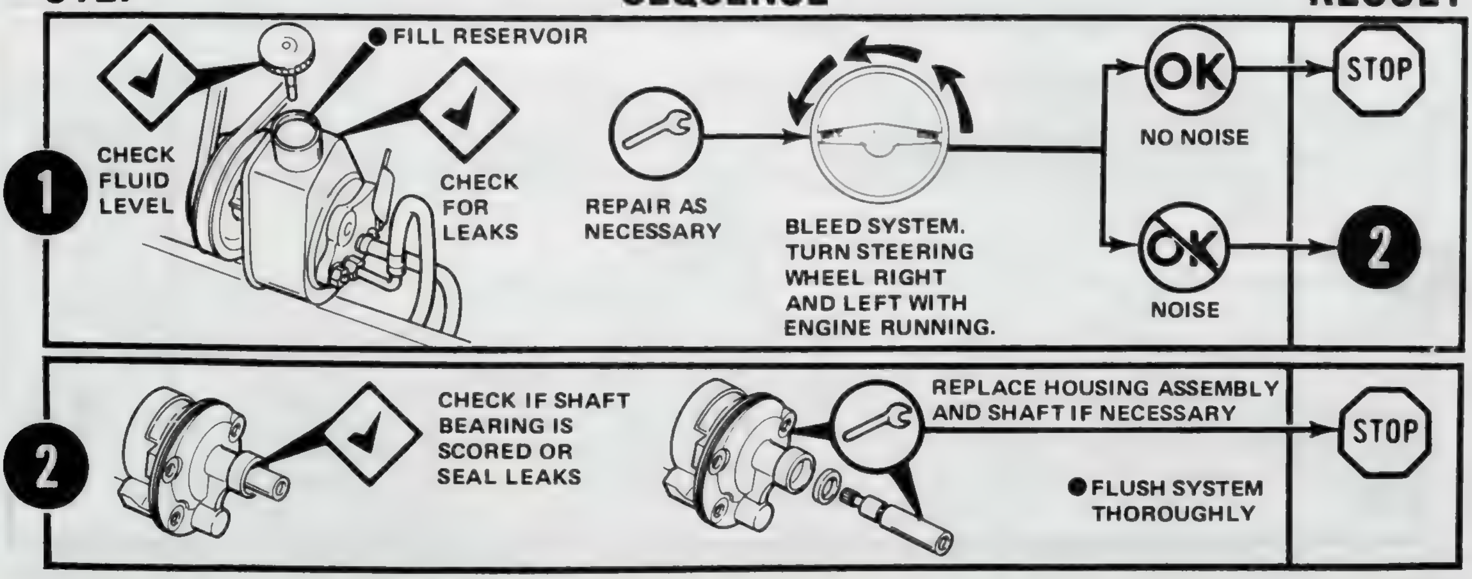
STEP **SEQUENCE** **RESULT**



PROBLEM: GROAN NOISE IN PUMP

Chart 6

STEP **SEQUENCE** **RESULT**



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PROBLEM: RATTLE NOISE IN PUMP

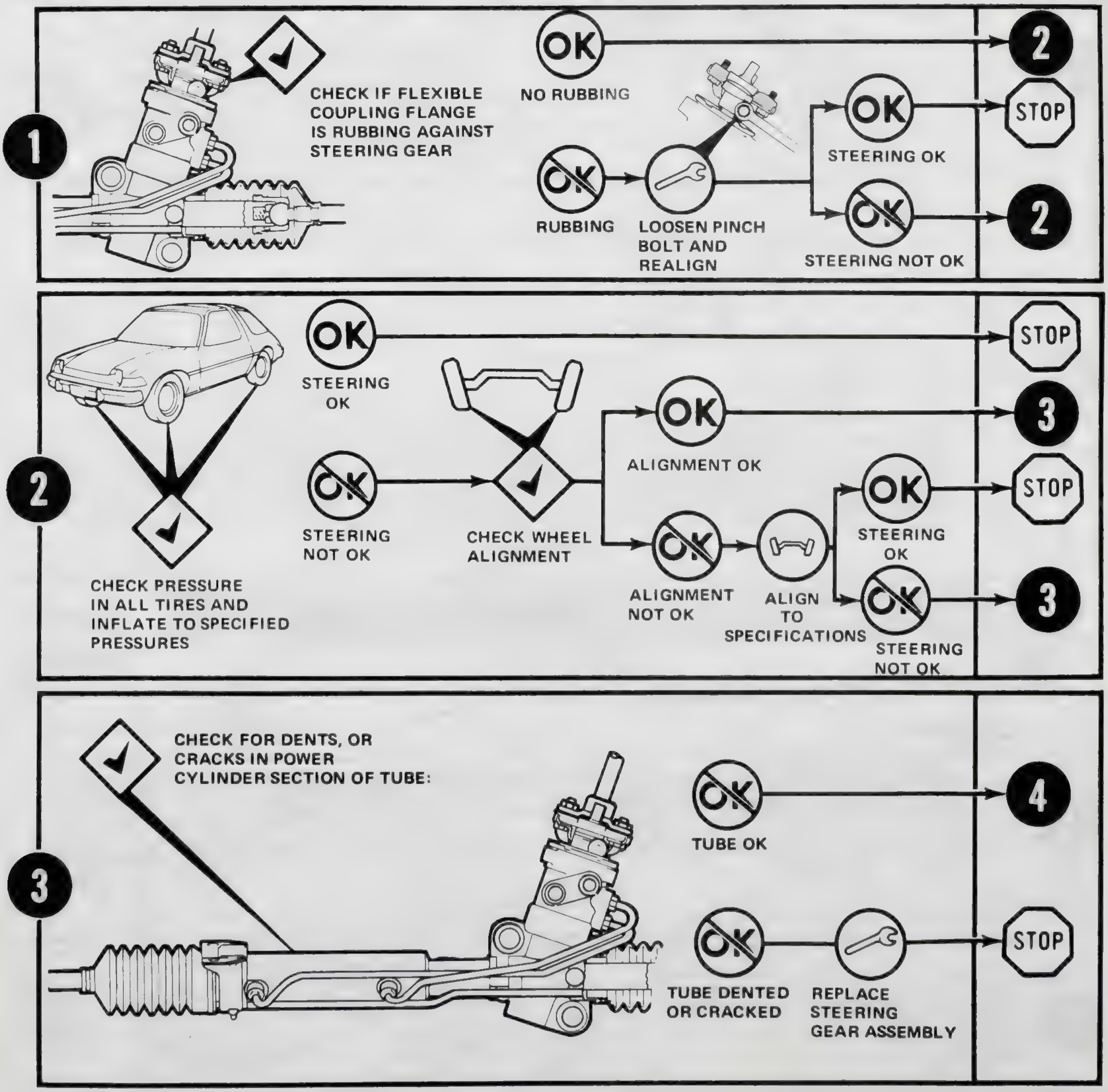
Chart 7

STEP | SEQUENCE | RESULT

PROBLEM: POOR RETURN OF STEERING WHEEL TO CENTER AFTER TURN

Chart 8

STEP | SEQUENCE | RESULT



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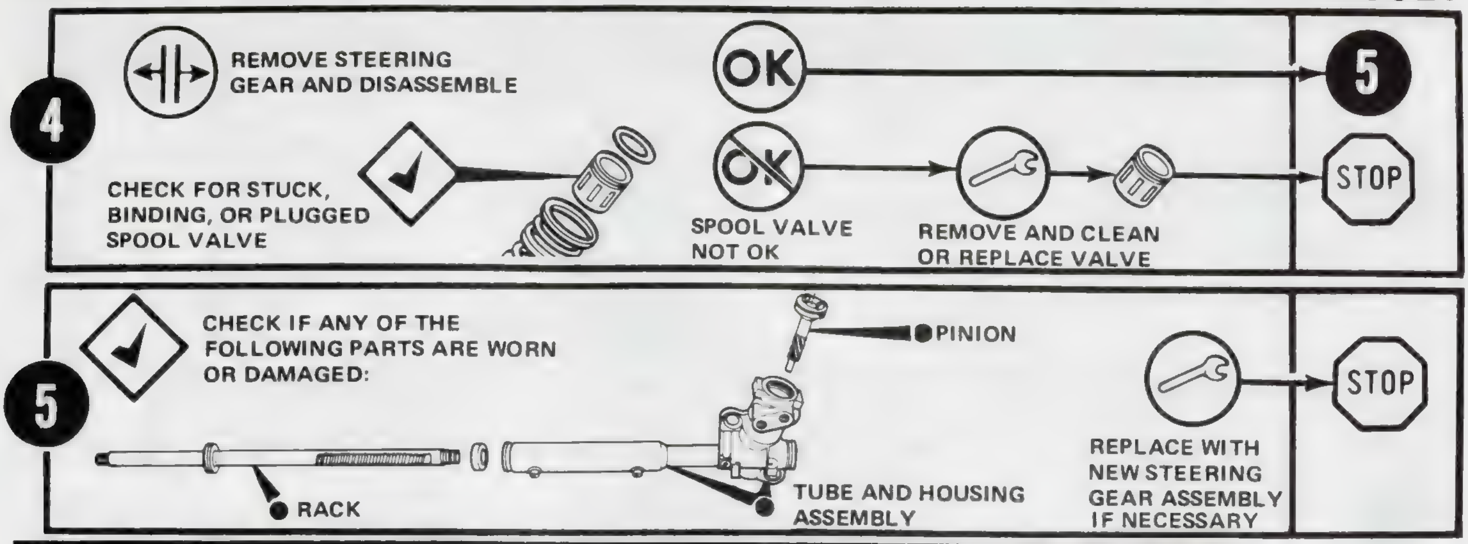
STEP | SEQUENCE | RESULT

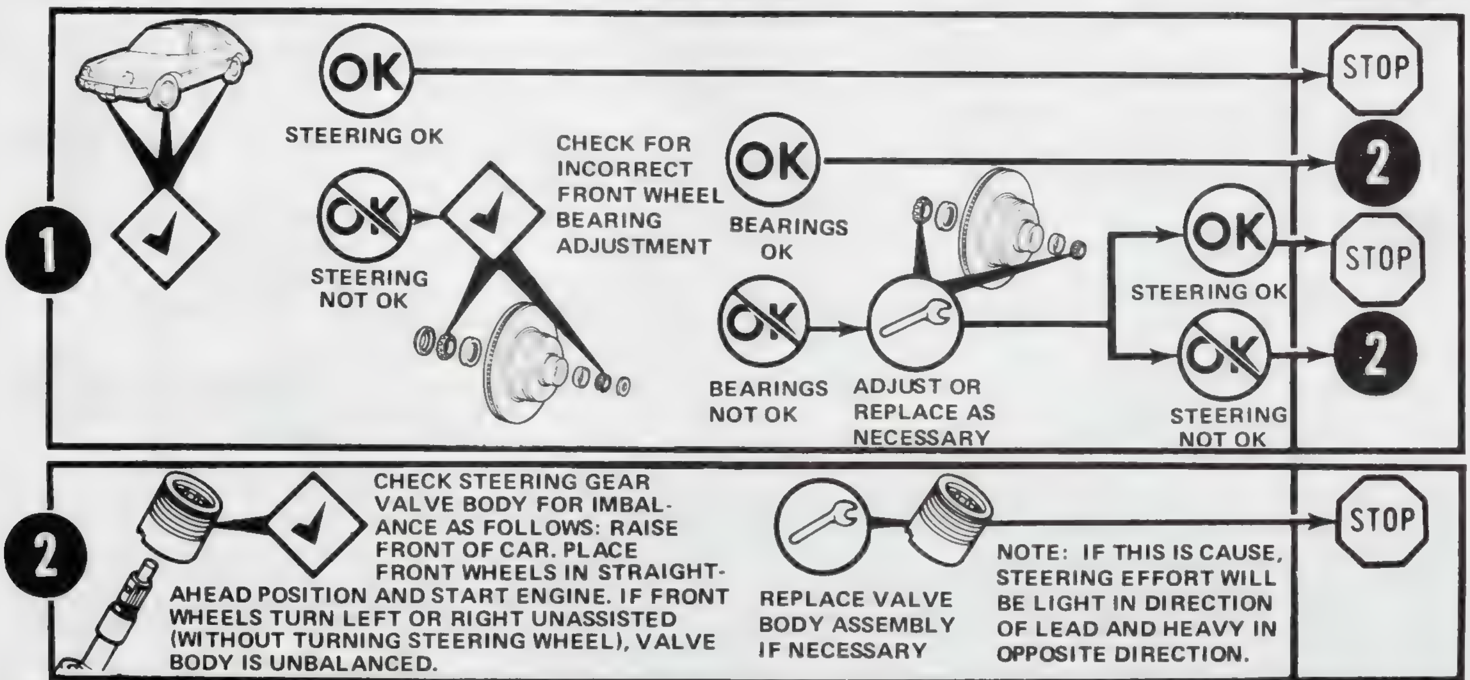


PROBLEM: CAR LEADS TO ONE SIDE OR THE OTHER

Chart 9

[Keep in mind road conditions and wind. Test car in both directions on flat road]

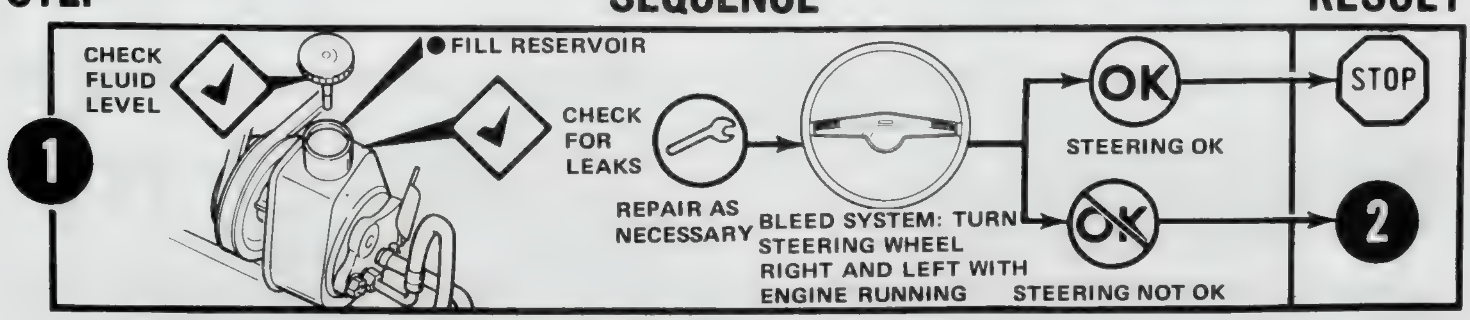
STEP | SEQUENCE | RESULT



PROBLEM: MOMENTARY INCREASE IN EFFORT WHEN TURNING WHEEL FAST TO RIGHT OR LEFT

Chart 10

STEP | SEQUENCE | RESULT



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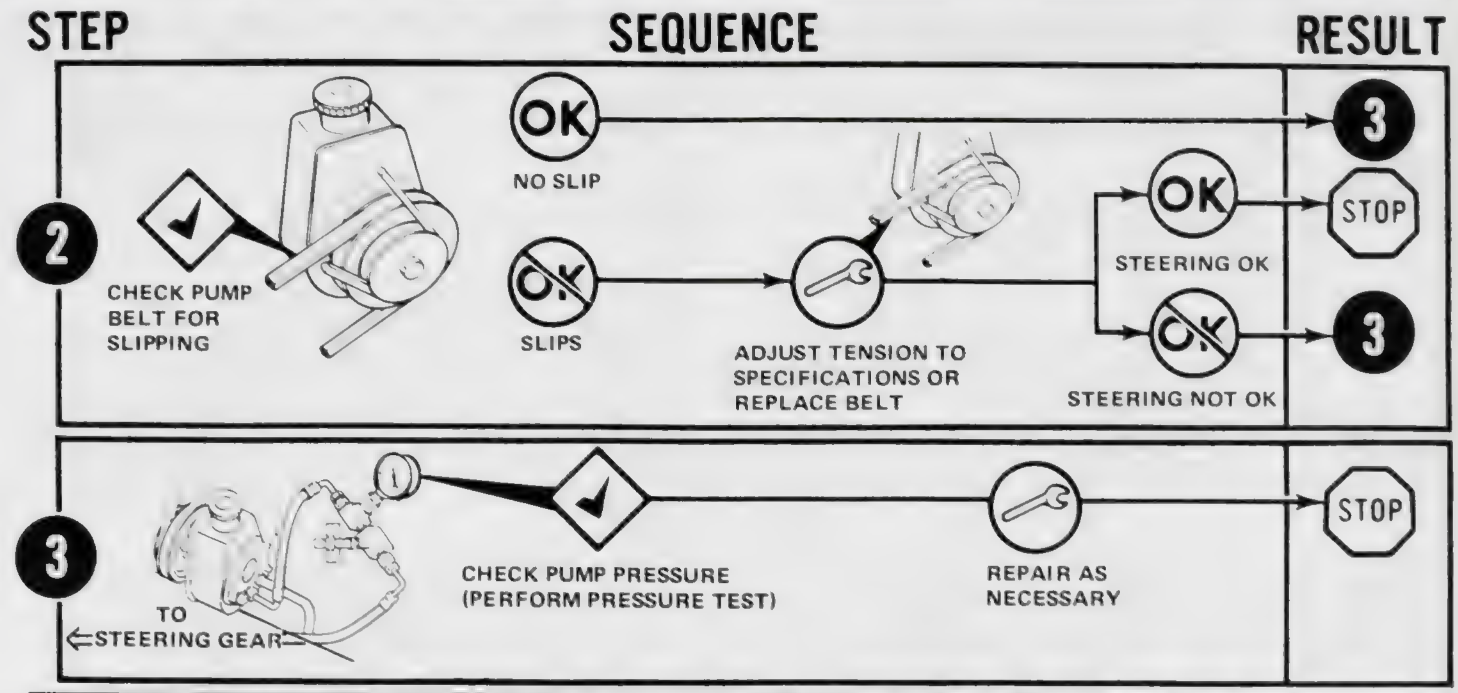
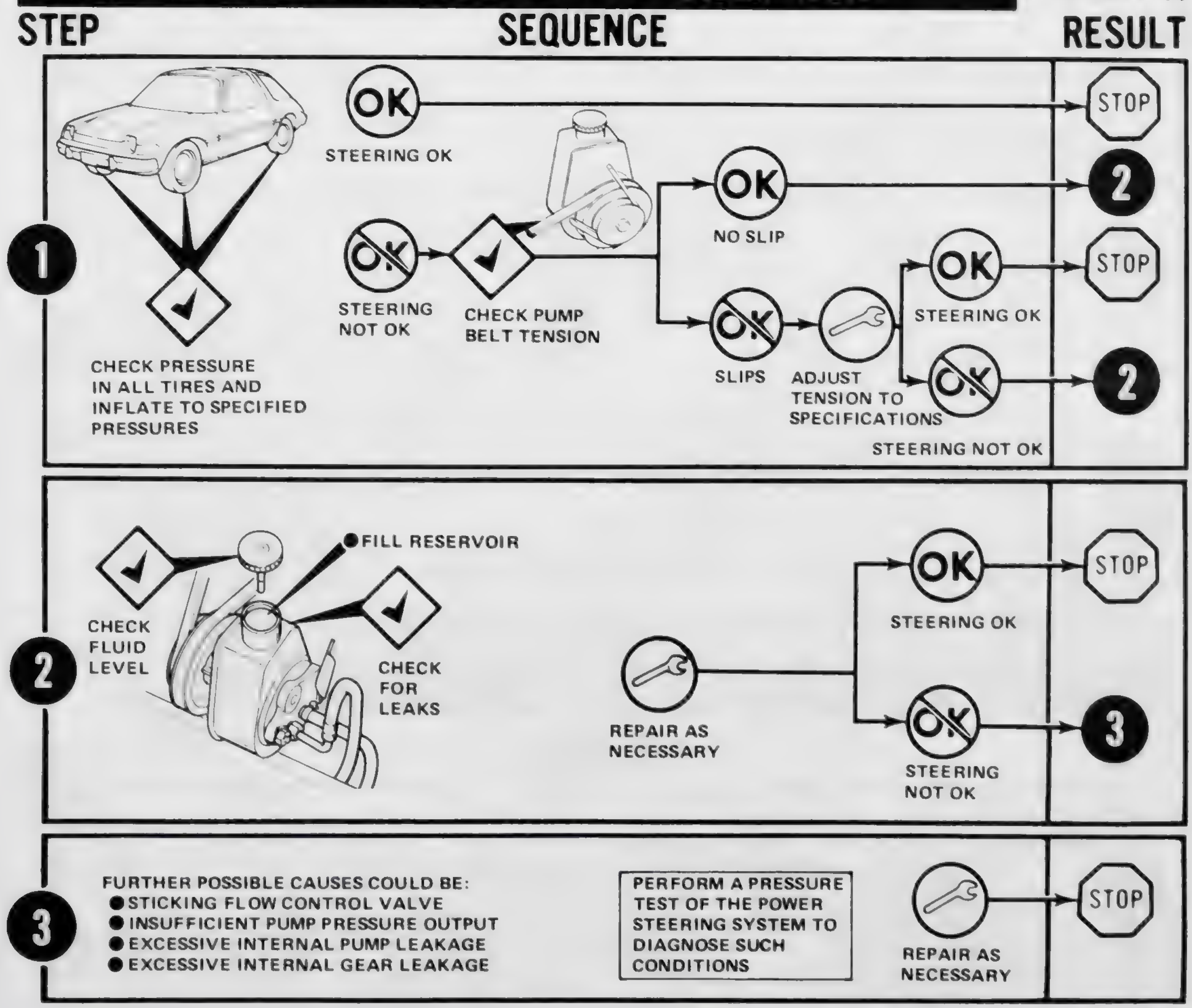


PROBLEM: HARD STEERING OR LACK OF POWER ASSIST

Chart 11



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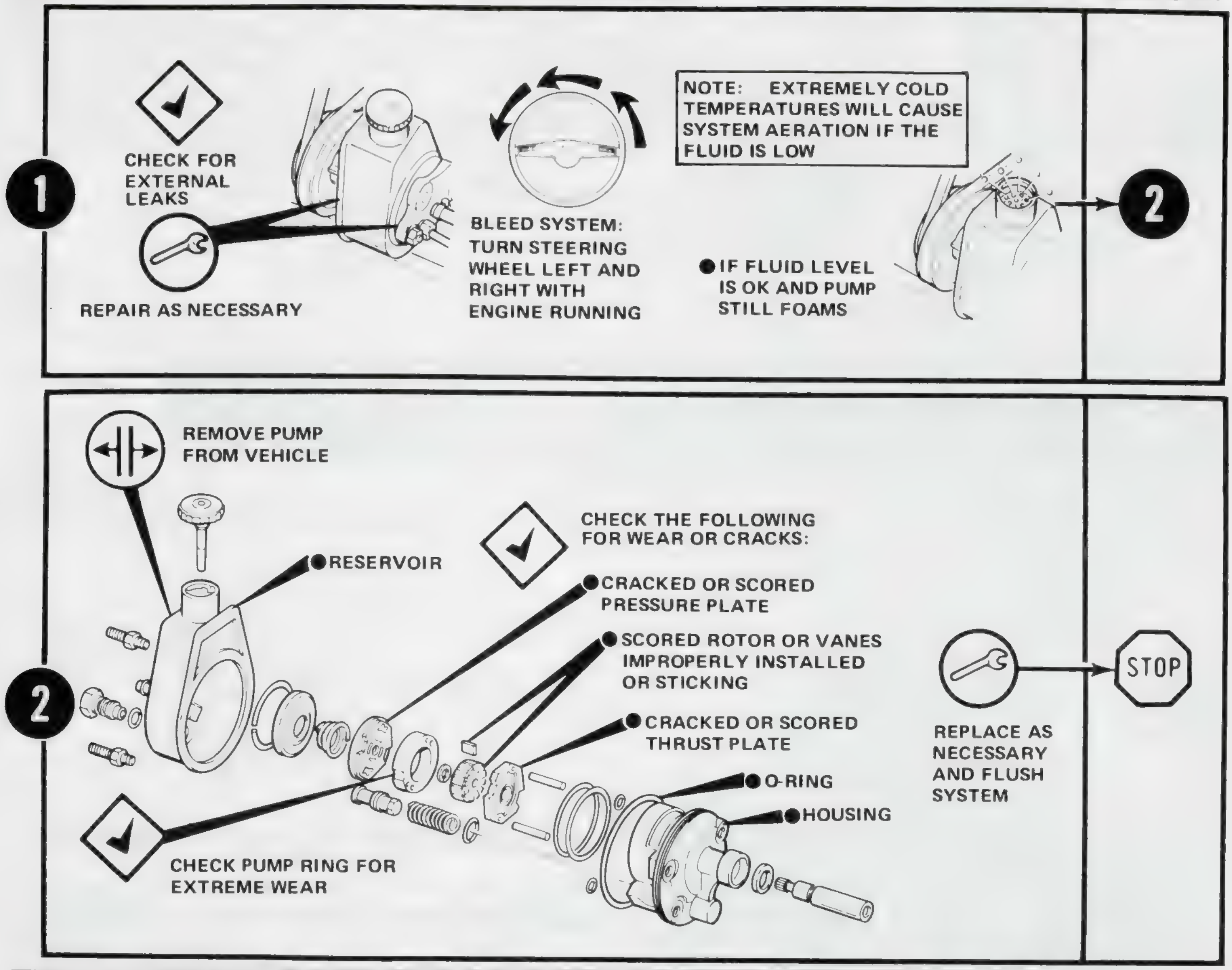
PROBLEM: AERATED OR FOAMING POWER STEERING FLUID, LOW FLUID LEVEL

Chart 12

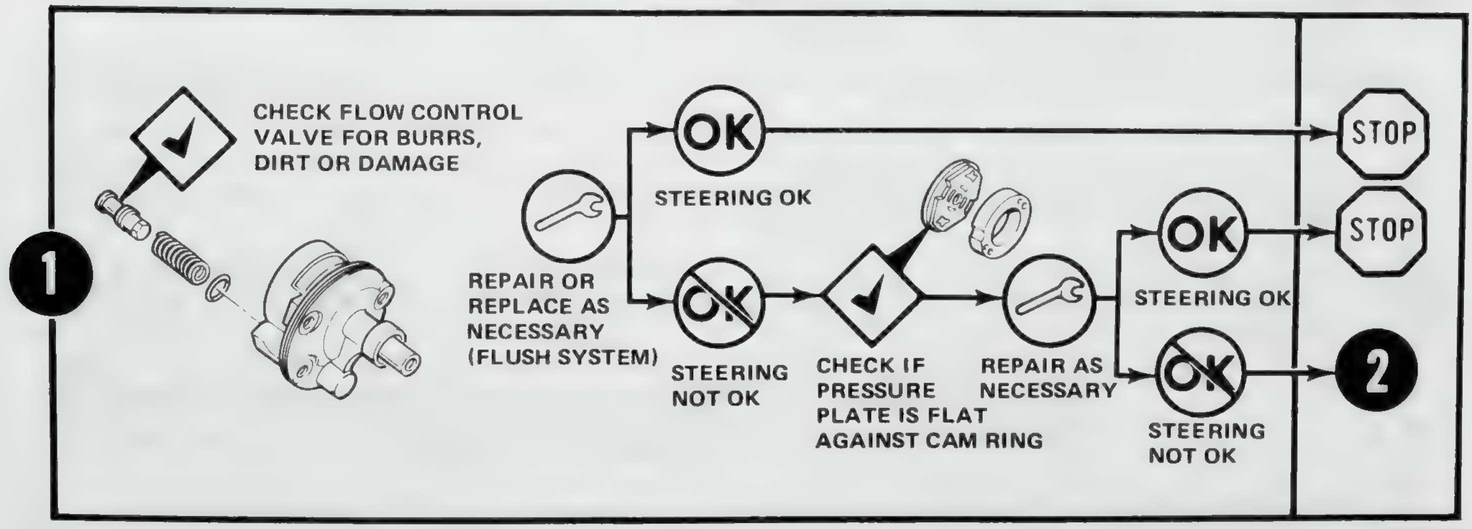
STEP SEQUENCE RESULT



PROBLEM: LOW PRESSURE

Chart 13

STEP SEQUENCE RESULT



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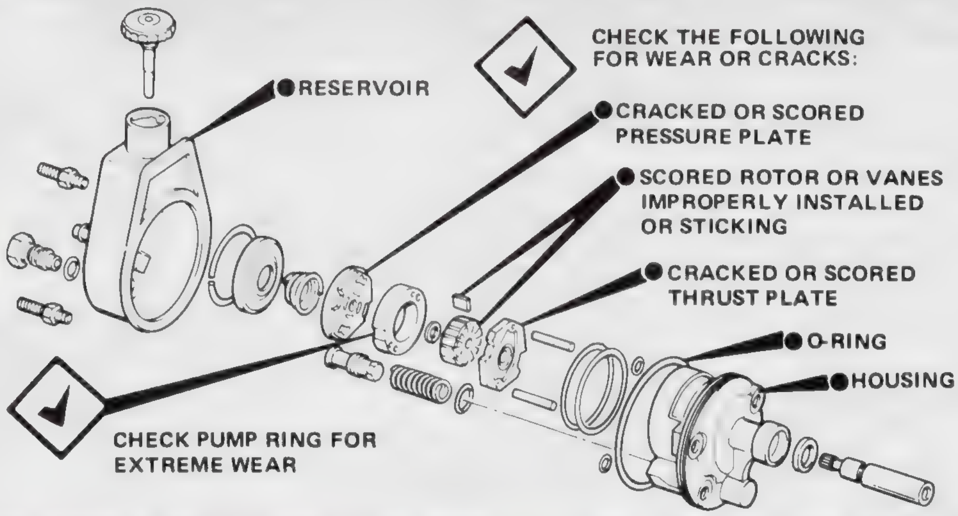
STEP	SEQUENCE	RESULT

2



REPLACE AS NECESSARY AND FLUSH SYSTEM → STOP

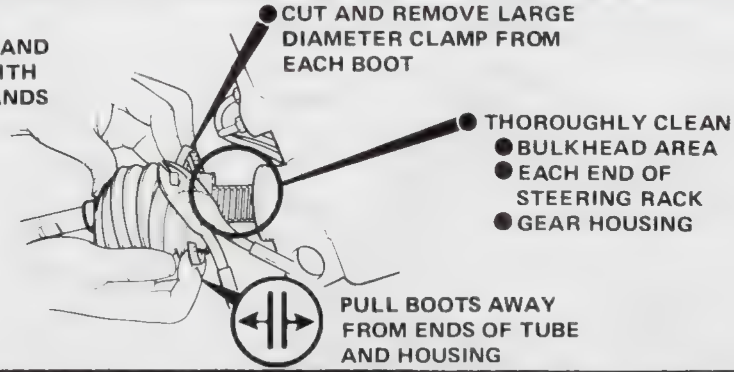
PROBLEM: LACK OF POWER ASSIST DUE TO FLUID LEAKS AT STEERING GEAR

Chart 14

STEP	SEQUENCE	RESULT

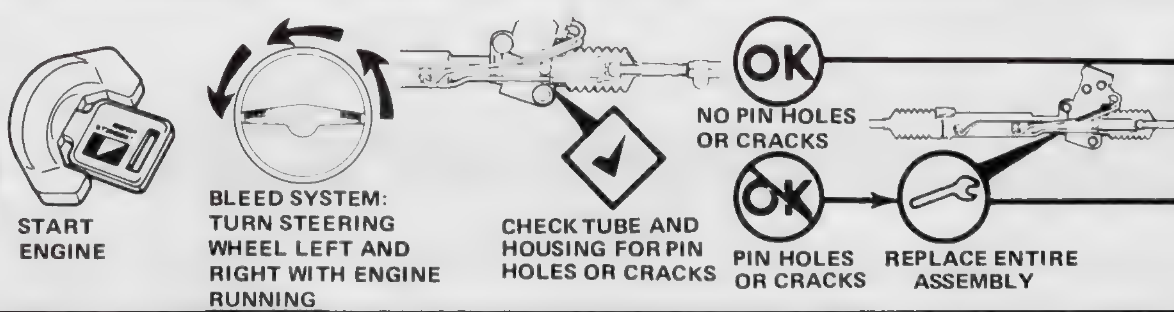
1

RAISE CAR AND SUPPORT WITH FRAME STANDS



WIPE ALL AREAS COMPLETELY DRY → 2

2

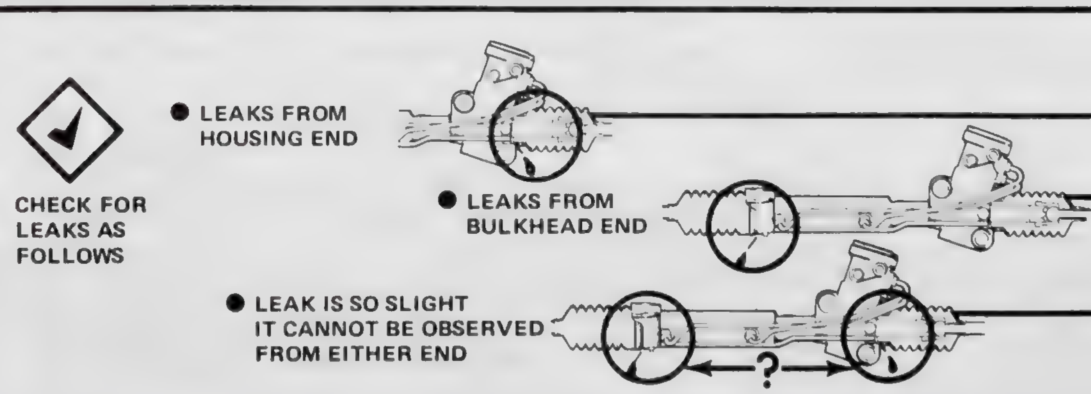


OK (NO PIN HOLES OR CRACKS) → 3

PIN HOLES OR CRACKS → REPLACE ENTIRE ASSEMBLY → STOP

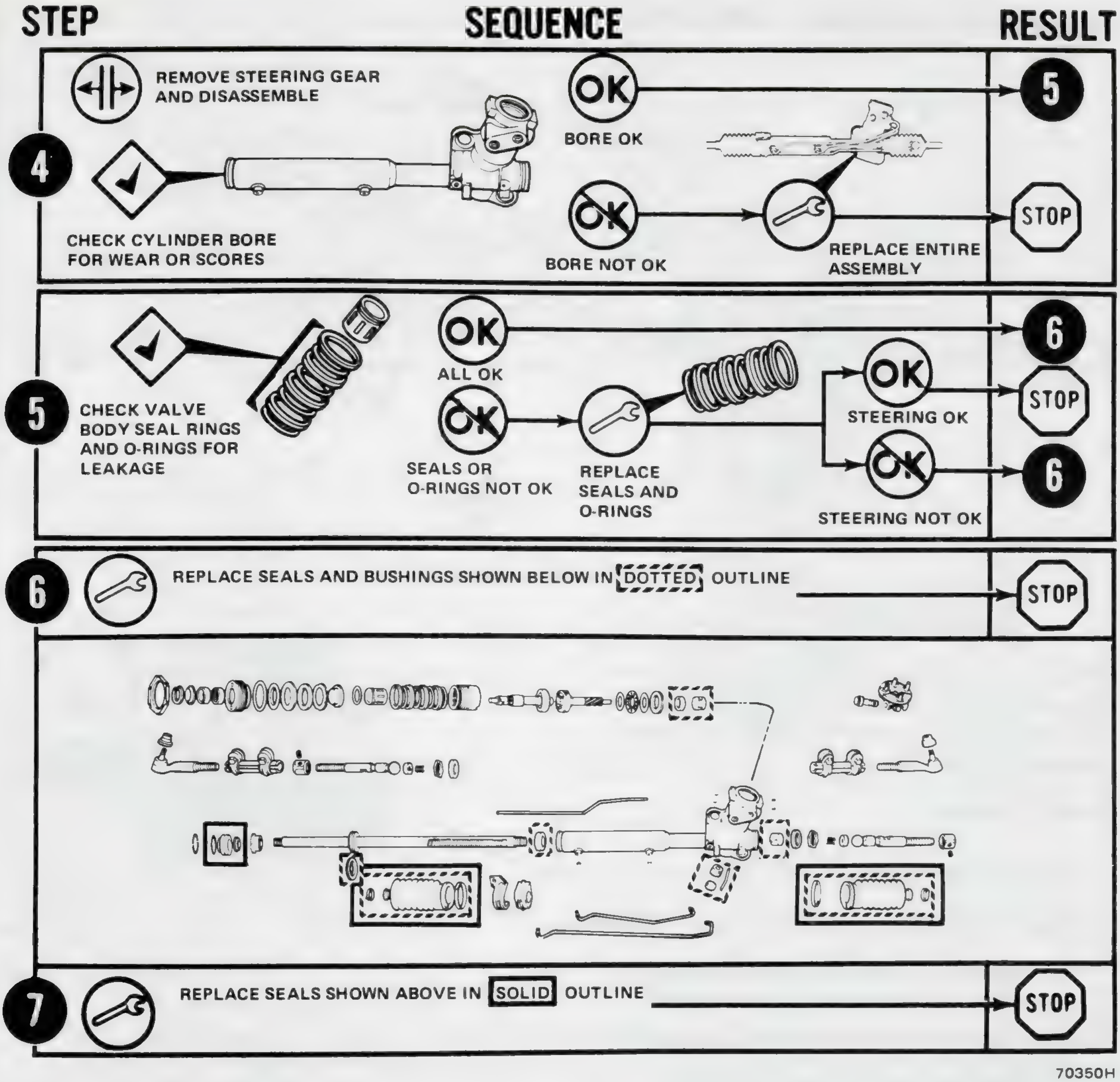
3

CHECK FOR LEAKS AS FOLLOWS



- LEAKS FROM HOUSING END → 4
- LEAKS FROM BULKHEAD END → 7
- LEAK IS SO SLIGHT IT CANNOT BE OBSERVED FROM EITHER END → 7

70350G



(6) Check for internal seal leaks as follows:

(a) Cut and remove large diameter clamp from each protective boot. Pull boots away from ends of tube and housing and thoroughly clean bulkhead area of tube, each end of steering rack, and gear housing. Wipe all areas completely dry.

(b) Start engine and turn steering wheel full left and full right several times. Be sure to contact stops in each direction.

(c) Return steering wheel to center and check for leaks as follows:

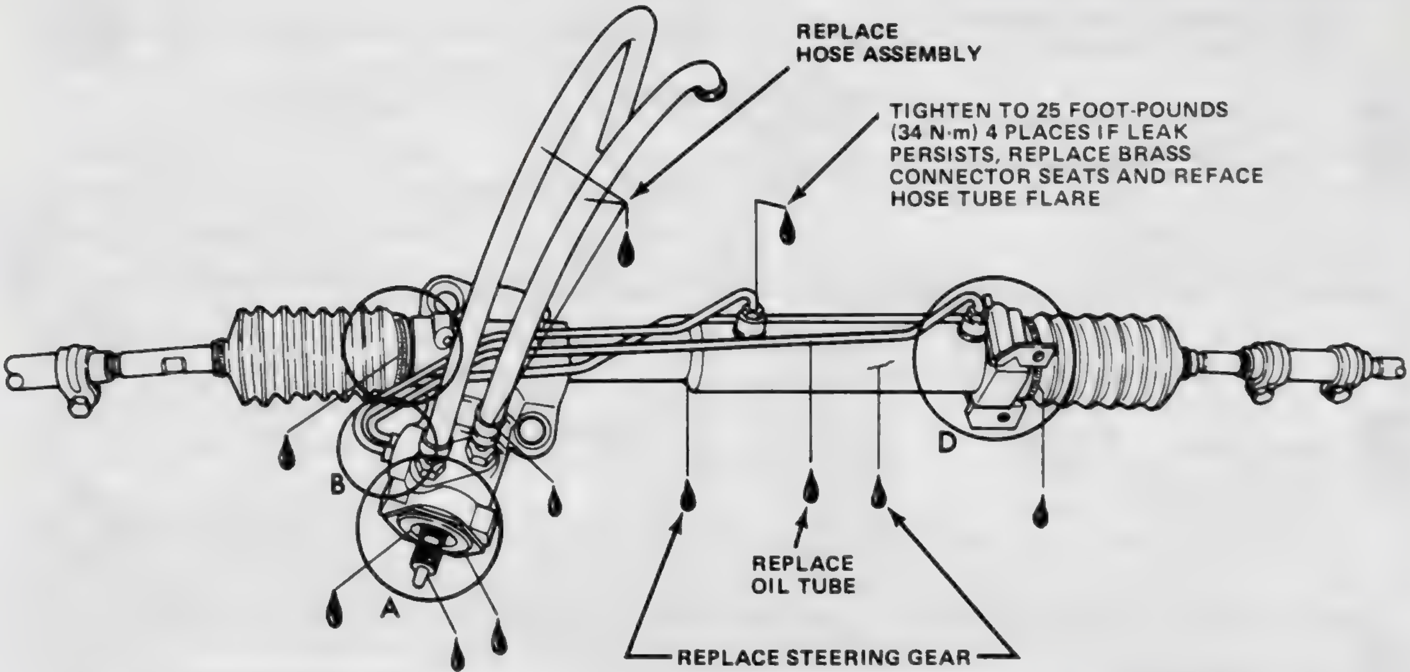
(d) If oil leaks from steering rack end of housing assembly, inner rack seal or pinion shaft seal is leaking. Remove gear and replace all seals.

(e) If oil leaks from bulkhead end of housing assembly, outer bulkhead O-ring and lip-type seal are leaking. Refer to Bulkhead Seal Replacement Procedure.

(f) If oil leak is so slight it cannot be observed from either end of housing assembly, outer bulkhead lip-type seal is leaking. Refer to Bulkhead Seal Replacement Procedure.

(g) Stop engine.

STEERING GEAR LEAK POINTS AND CORRECTIVE ACTION



NOTE: Pay particular attention to the exact source of leakage in circled areas. Due to the closeness of the various seals, an incorrect diagnosis will result in ineffective repair.

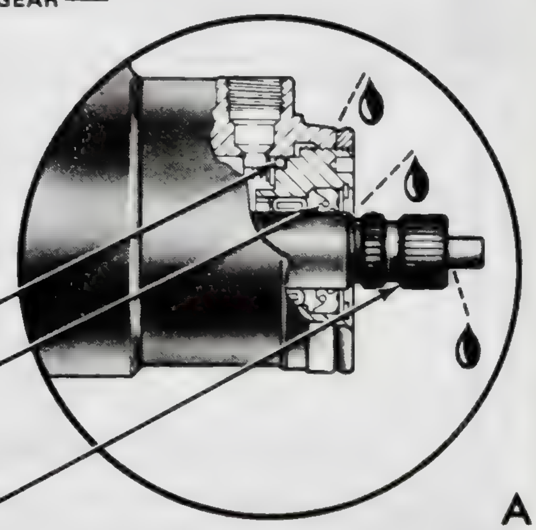
Corrective Action

Replace adjuster plug "O" ring seal.

Replace dust and stub shaft seals.

If seepage is observed between torsion bar and stub shaft, do not attempt repair. Replace valve.

If leak persists after tightening fitting nut, replace brass connector seats and reface hose tube flare. If leak is due to damaged threads, repair fitting nut or replace hose as required. If housing threads are badly damaged, replace steering gear assembly.



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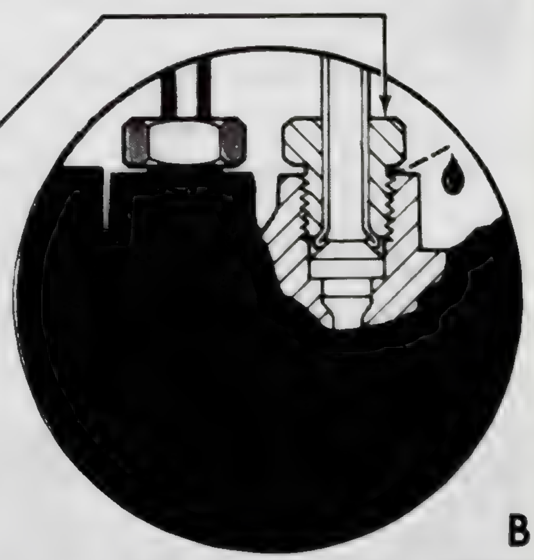

B

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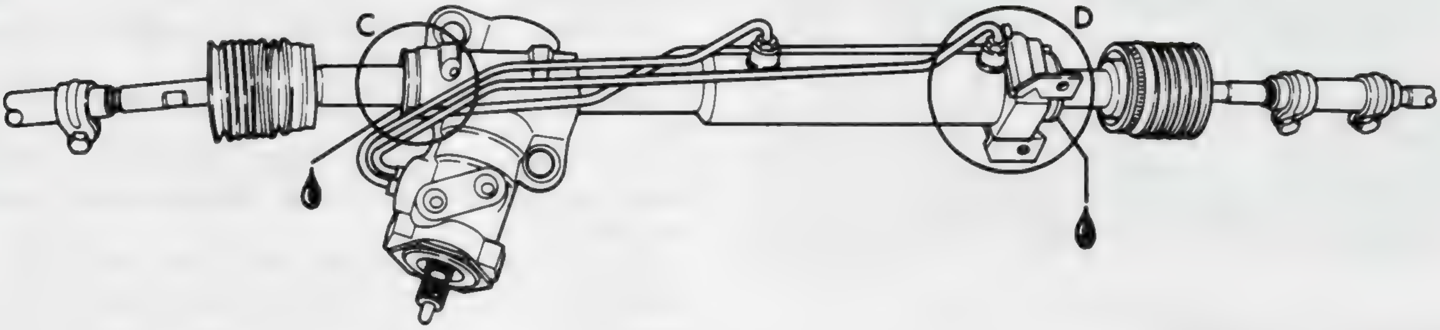
Fig. 2K-47 Rack and Pinion Steering Gear Leak Diagram (View A)

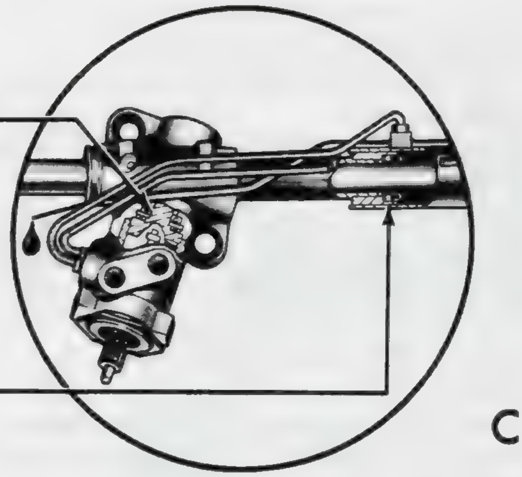
NOTE: If power steering fluid is seeping out of one rack boot, cut both large boot clamps (gear still on vehicle) and pull boots away from both housing and tube ends. Restart engine and turn steering wheel turned from stop to stop.



If a seepage type leak is observed at housing end and is not affected by direction of turn, replace pinion shaft seal.

If leakage is observed at housing end and spurts when bottomed in right turn, replace inner rack seal. to get at rack seal, bulkhead seal and pinion seal must also be removed and replaced.

If leakage is observed at tube end, it will be necessary to remove bulkhead.



CAUTION: *If the rack piston is used to remove the bulkhead, the inner rack seal must be replaced also.*

Replace outer bulkhead and seals. Inner bulkhead need not be removed to replace seals.

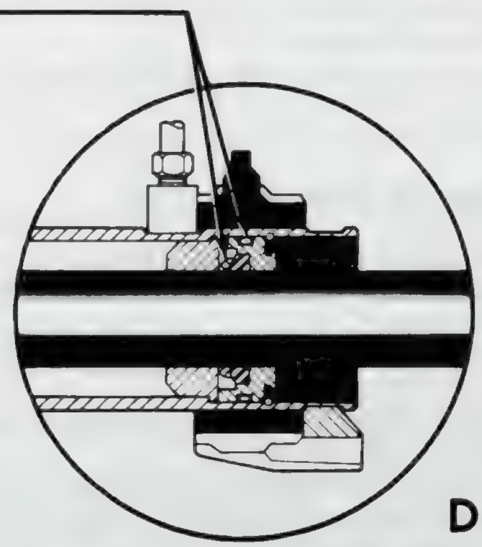


Fig. 2K-47 Rack and Pinion Steering Gear Leak Diagram (View B)

ON-CAR SERVICE

The following components can be serviced with the steering gear installed in the car:

- Mounting clamp and grommet
- Breather tube
- Protective boots
- Tie rod ends and adjuster tubes
- Flexible coupling
- Oil lines
- Bulkhead seals
- Inner tie rod housing, inner tie rod, tie rod end, ball seat, and ball seat spring

All other components are serviced with the steering gear removed only.

Protective Boot Replacement

(1) Raise and support front of car.

(2) Cut and remove boot clamps.

(3) Mark position of adjuster tube on inner tie rod for assembly reference.

(4) Loosen adjuster tube inboard clamp bolt and unthread tube from inner tie rod.

(5) If right-side boot is to be replaced, loosen mounting clamp bolts, pull tube-end of gear away from crossmember, and remove boot. If left-side boot is to be replaced, simply remove boot.

(6) Install replacement boot. Align holes in boot with breather tube.

(7) Install boot clamps. Position clamp ear 3/4 inch (19.05 mm) from breather tube. Tighten clamps using tool J-22610.

(8) Install adjuster tube on inner tie rod and tighten clamp bolt to 14 foot-pounds (18.9 Nm) torque.

NOTE: *At least three threads should be visible at each end of adjuster tube. The number of threads per side should not differ by more than three.*

(9) Tighten mounting clamp bolts to 48 foot-pounds (65.0 Nm) torque if loosened.

(10) Remove supports, lower car, and correct toe-in if necessary.

Mounting Clamp and Grommet Replacement

(1) Raise and support front end of car.

(2) Cut and remove boot clamps from boot adjacent to mounting clamp.

(3) Mark position of adjuster tube on inner tie rod for assembly reference.

(4) Loosen adjuster tube inboard clamp bolt and unthread tube from inner tie rod.

(5) Remove bolts attaching mounting clamp to front crossmember. Loosen both bolts before removing to minimize clamp distortion.

(6) Remove protective boot.

CAUTION: *Do not allow the protective boot to become cut, torn, or damaged during service operations. A damaged boot will expose the gear internal components to dirt, foreign material and road splash resulting in premature wear.*

(7) Remove clamp and grommet using twisting, pulling motion.

(8) Install replacement clamp and grommet. Align hole in grommet with breather tube.

(9) Install boot. Align hole in boot with breather tube.

(10) Install boot clamps. Position clamp ear 3/4 inch (19.05 mm) from breather tube. Tighten clamps using tool J-22610.

(11) Install adjuster tube on tie rod and tighten clamp bolts to 14 foot-pounds (18.9 Nm) torque.

NOTE: *At least three threads should be visible at each end of adjuster tube. The number of threads per side should not differ by more than three.*

(12) Install and tighten mounting clamp bolts to 48 foot-pounds (65.08 Nm) torque.

(13) Remove supports, lower car, and correct toe-in as necessary.

Breather Tube Replacement

(1) Raise and support front of car.

(2) Cut and remove large diameter boot clamps from boots.

(3) Slide boots away from breather tube and remove tube.

(4) Install replacement breather tube. Align holes in boots with tube.

(5) Position boots on flanges at each end of tube and housing and install boot clamps. Position clamp ear 3/4 inch (19.05 mm) from breather tube. Tighten clamps using tool J-22610.

(6) Remove supports and lower car.

Flexible Coupling Replacement

(1) Remove nuts attaching coupling to intermediate shaft flange and compress shaft to provide working clearance.

(2) Remove coupling pinch bolt using 7/16-inch, 12-point socket or box end wrench and remove coupling.

(3) Install replacement coupling (flat-to-flat) and install pinch bolt. Tighten bolt to 30 foot-pounds (40.6 Nm) torque.

(4) Connect intermediate shaft to coupling. Tighten nuts to 25 foot-pounds (33.9 Nm) torque.

Tie Rod End and Adjuster Tube Replacement

(1) Raise and support front of car.

(2) Disconnect tie rod ends using Tool J-26951 (fig. 2K-48).

(3) Mark position of tie rod end, adjuster tube, and inner tie rod for assembly reference.

(4) Loosen adjuster tube inboard clamp bolt.

(5) Remove and separate tie rod end and adjuster tube.

(6) Install replacement tie rod end and adjuster tube. Tighten adjuster tube clamp bolt to 14 foot-pounds (18.9 Nm) torque and tie rod end nut to 50 foot-pounds (67.7 Nm) torque.

NOTE: *At least three threads should be visible at each end of adjuster tubes. The number of threads per side should not differ by more than three.*

(7) Remove supports, lower car, and correct toe-in as necessary.

Oil Line Replacement

(1) Raise and support front of car.

(2) Remove oil lines.

(3) Install replacement oil lines. Tighten fittings to 30 foot-pounds (40.6 Nm) torque.

(4) Apply parking brake, shift transmission into Park or Neutral (on manual transmission) and start engine. Turn steering wheel right and left several times and check for leaks at oil line fittings. If leaks are not evident, proceed to next step. If leaks are evident, tighten fittings and check again. If leaks persist, remove and replace steering gear assembly.

(5) Remove supports and lower car. Add power steering fluid as necessary.

Bulkhead Seal Replacement

(1) Raise and support front of car.

(2) Disconnect tie rod end connected to tube side of rack from steering arm using tool J-26951 (fig. 2K-48).

(3) Remove mounting clamp bolts.

(4) Remove clamps from boot at tube-end of gear and slide boot away from end of tube.

CAUTION: *Do not allow the protective boot to become cut or torn during service operations. A damaged boot will expose the gear internal components to dirt, foreign material and road splash resulting in premature wear.*

(5) Remove large boot clamp at housing end of gear.

(6) If flat on rack teeth is not visible, pull back boot at housing end of gear and turn steering wheel (to rotate pinion) and extend rack until rack flat is accessible.

(7) Slide shock dampener ring off jamnut.

(8) Loosen jamnut using open end wrench. Also use open end wrench on rack flat to prevent rack from turning (fig. 2K-49).

CAUTION: *Do not allow the rack to turn when loosening the jamnut. If the rack turns, gear internal components could be damaged. Place an open end wrench over the flat adjacent to the rack teeth to prevent the rack from turning (fig. 2K-49).*

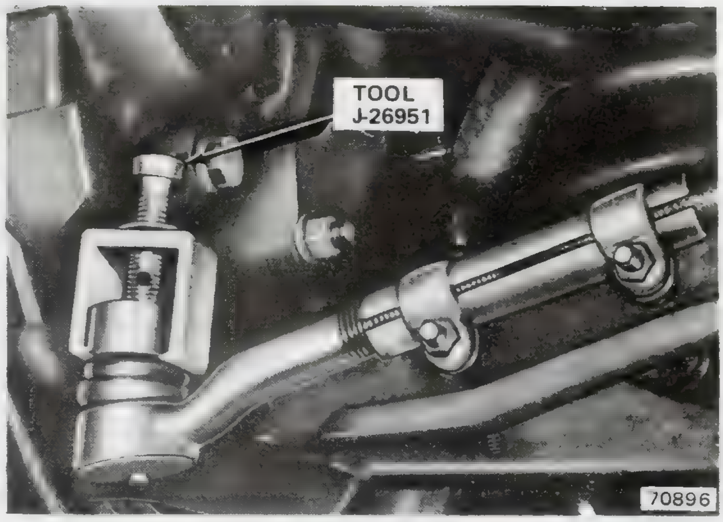


Fig. 2K-48 Disconnecting Tie Rod End

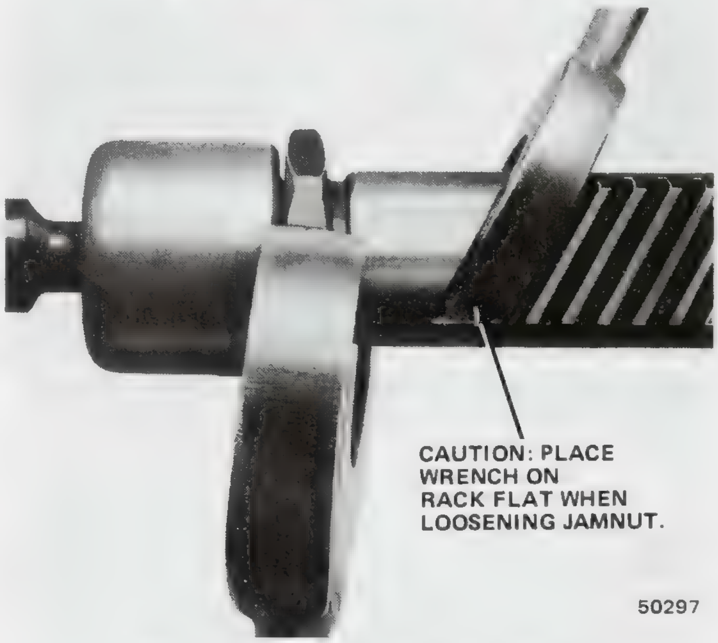


Fig. 2K-49 Loosening/Tightening Jamnut

(9) Loosen setscrew in tie rod housing, unthread housing from rack and remove tie rod assembly, inner tie rod ball seat, and ball seat spring.

(10) Turn jamnut counterclockwise until it is one thread away from end of rack (fig. 2K-50 and reinstall shock dampener ring on jamnut.

CAUTION: *Do not remove the jamnut and shock dampener ring from the rack at this time. The jamnut and shock dampener ring will function as a stop when the bulkhead is removed.*

(11) Remove bulkhead retaining ring from end of tube by inserting pin punch through access hole in end of tube to force retaining ring out of its groove. Place screwdriver blade under ring and pry ring from tube.

(12) Remove bulkhead assembly as follows:

(a) Clean rack and bulkhead area of tube with shop cloth.

(b) Position small piece of rubber over access hole in tube and secure rubber with wormdrive-type hose clamp (fig. 2K-50).

(c) Position drain pan under tube end of gear and wrap shop cloths around rack and tube to prevent excessive oil spillage (fig. 2K-50).

(d) Start engine and turn steering wheel to left until stop is contacted. Oil pressure will force outer bulkhead out of tube. Stop engine immediately when oil pressure forces bulkhead out of tube (fig. 2K-51).

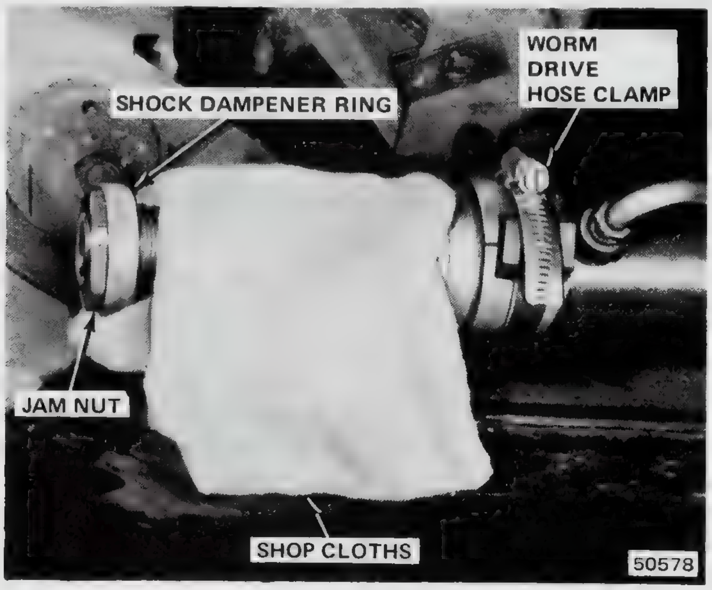


Fig. 2K-50 Installing Hose Clamp, Rubber Seal, and Shop Cloths

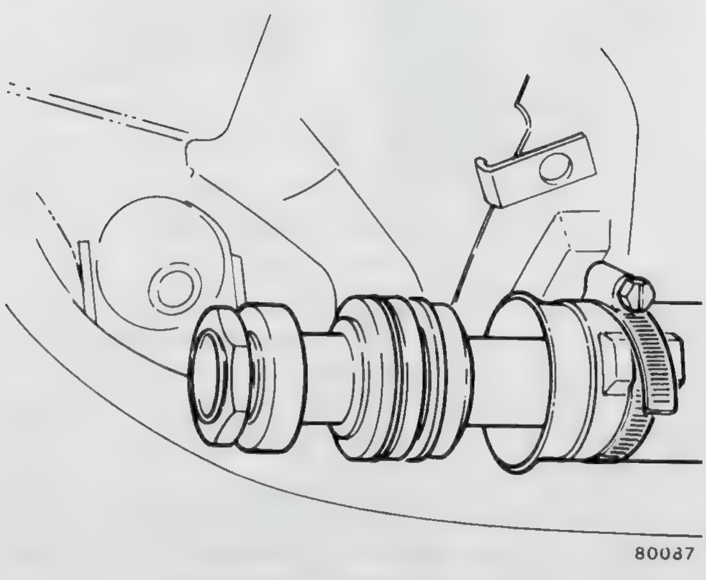


Fig. 2K-51 Bulkhead Removal

(13) Remove jamnut and shock dampener ring.

(14) Remove and discard outer bulkhead.

NOTE: *Do not remove the inner bulkhead and do not remove the seals from the outer bulkhead. The outer bulkhead, bulkhead seal, and O-ring are serviced as an assembly only.*

(15) Remove hose clamp and small piece of rubber from tube.

(16) Inspect tube bore and bulkhead snap ring groove area in tube for nicks and scratches. Remove nicks and scratches using crocus cloth or 600-grit emery cloth. Remove burrs and sharp edges from shoulder at threaded end of rack, using emery cloth, crocus cloth, or small fine-tooth file. Burrs must be removed to avoid damaging bulkhead seal during installation.

(17) Lubricate replacement outer bulkhead and bulkhead seal with power steering fluid.

(18) Lubricate replacement outer bulkhead O-ring seal with power steering fluid and install seal on bulkhead.

(19) Place Seal Protector Tool J-25509 over rack threads and install outer bulkhead on rack (fig. 2K-52).

(20) Install outer bulkhead in tube using 1-1/4-inch open end wrench and plastic hammer (fig. 2K-53).

(21) Seat outer bulkhead in tube using brass drift.

(22) Install bulkhead retaining ring. Position gap in retaining ring 1/2 inch (6.3 mm) away from access hole in tube.

CAUTION: *Do not scratch or damage the surface of the rack when using the open end wrench to seat the bulkhead.*

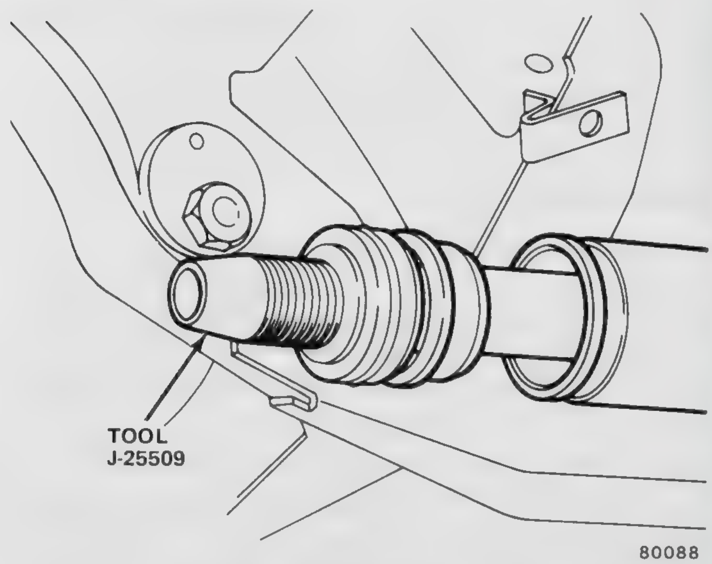


Fig. 2K-52 Installing Bulkhead on Rack

(23) Wipe bulkhead area dry.

(24) Fill power steering pump reservoir with fluid and start engine.

(25) Turn steering wheel left and right several times and check for leaks. If leaks are not evident, proceed to next step.

(26) Install shock dampener ring and jamnut on rack.

(27) Install mounting clamp and grommet on tube. Position clamp on crossmember and install clamp but do not tighten clamp attaching bolts.

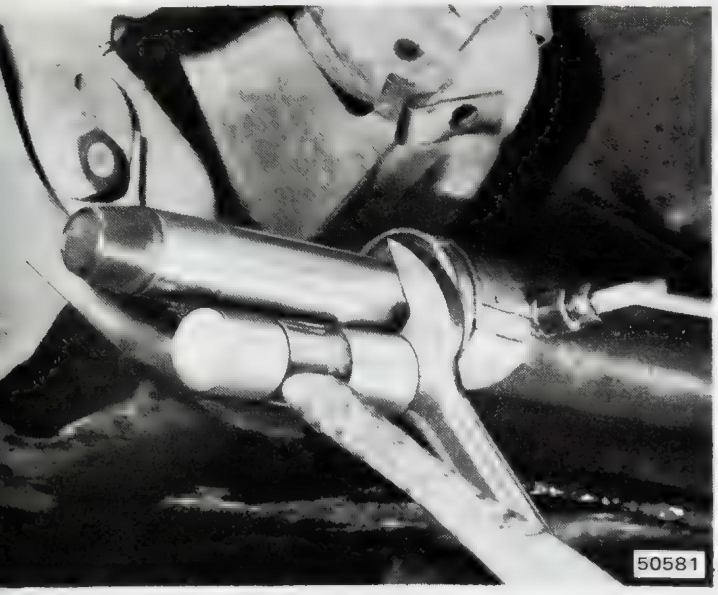


Fig. 2K-53 Seating Bulkhead

(28) Apply liberal quantity of waterproof, EP-type, lithium-base chassis lubricant to inner tie rod ball seat and ball end of inner tie rod. Pack tie rod housing with same lubricant and apply heavy coat of lubricant to rack teeth.

(29) Install ball seat spring in end of rack and install ball seat.

(30) Assemble inner tie rod and tie rod housing and install on rack.

(31) **Hand tighten** tie rod housing on rack while rocking tie rod to prevent grease lock.

(32) Back tie rod housing off approximately 1/8-turn.

(33) Tighten tie rod housing setscrew to 9 foot-pounds (12.2 Nm) torque.

(34) Tighten jamnut to 60 foot-pounds (81.3 Nm) torque. Use open end wrench on rack flat to prevent rack from turning (fig. 2K-49).

CAUTION: *Do not allow the rack to turn when tightening the jamnut. If the rack turns, gear internal components could be damaged. Place an open wrench over the flat adjacent to the rack teeth to prevent the rack from turning (fig. 2K-49).*

(35) Check inner tie rod movement. Tie rod must rock and turn freely in housing to ensure proper operation.

(36) Install shock dampener ring over jamnut.

(37) Position breather tube in mounting grommet.

(38) Install protective boot over end of tube. Be sure boot is fully seated in tube undercut and that hole in boot is aligned with breather tube.

(39) Install boot clamps. Tighten clamps using tool J-22610.

(40) Tighten mounting clamp bolts to 48 foot-pounds (65.08 Nm) torque.

(41) Connect tie rod end to steering arm and install tie rod end nut. Tighten nut to 50 foot-pounds (67.7 Nm) torque and install replacement cotter pin.

(42) Remove supports and lower car.

(43) Check and correct power steering system fluid level as necessary. Refer to Fluid Level and Initial Operation.

Tie Rod Housing, Inner Tie Rod, and Ball Seat and Spring Replacement

(1) Raise and support front of car.

(2) Mark position of tie rod end, adjuster tube and inner tie rod for assembly reference.

(3) Disconnect tie rod end using tool J-26951 (fig. 2K-48) if tie rod end is to be replaced.

(4) Loosen adjuster tube inboard clamp bolts and unthread adjuster tube and tie rod end from inner tie rod.

(5) Remove boot clamps and move boot aside.

CAUTION: *Do not allow the protective boot to become cut or torn during service operations. A damaged boot will expose the gear internal components to dirt, foreign material and road splash resulting in premature wear.*

(6) Remove large boot clamp at housing end of gear.

(7) Slide shock dampener ring off jamnut.

(8) If flat on rack teeth is not visible, pull back boot and turn steering wheel (to rotate pinion) and extend rack until rack flat is accessible.

(9) Loosen jamnut using open end wrench. Also install open end wrench on rack flat to prevent rack from turning (fig. 2K-49).

CAUTION: *Do not allow the rack to turn when loosening the jamnut. If the rack turns, gear internal components could be damaged. Place an open end wrench over the flat adjacent to the rack teeth to prevent the rack from turning (2K-49).*

(10) Loosen setscrew in tie rod housing, unthread housing from rack and remove inner tie rod, tie rod housing, inner tie rod ball seat, and ball seat spring.

(11) Apply liberal quantity of waterproof, EP-type, lithium-base chassis lubricant to replacement inner tie rod assembly wear surfaces. Pack tie rod housing with same lubricant.

(12) Install ball seat spring and ball seat in end of rack.

(13) Assemble inner tie rod and housing and install on rack.

(14) **Hand tighten** tie rod housing while rocking inner tie rod to prevent grease lock.

(15) Back housing off approximately 1/8-turn.

(16) Tighten tie rod housing setscrew to 9 foot-pounds (16.2 Nm) torque.

(17) Tighten jamnut to 60 foot-pounds (81.3 Nm) torque. Use open end wrench on rack flat to prevent rack from turning.

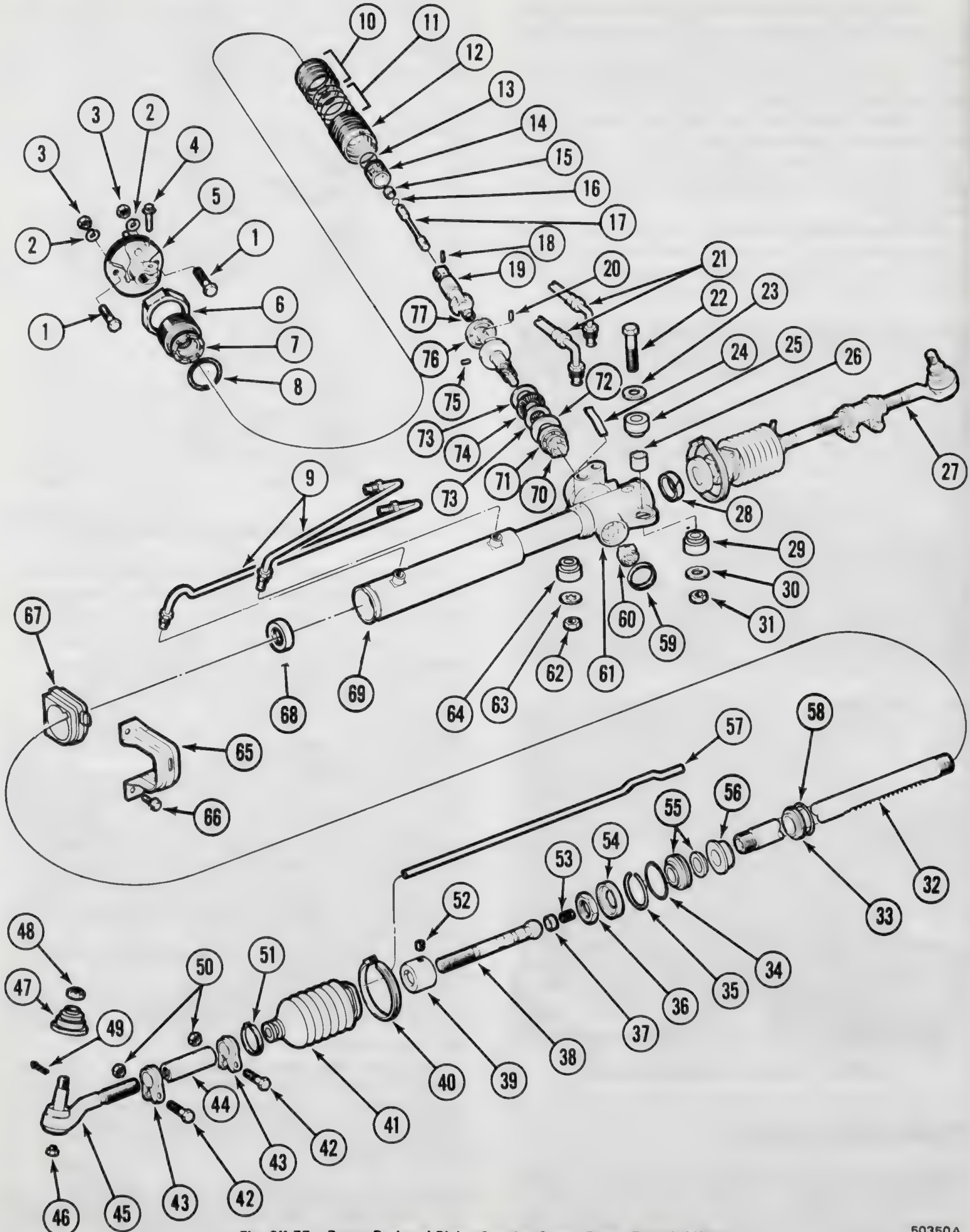


Fig. 2K-57 Power Rack and Pinion Steering Gear—Pacer (Exploded View)

1. FLEXIBLE COUPLING - TO - INTERMEDIATE SHAFT ATTACHING BOLT
2. LOCKWASHER
3. NUT
4. PINCH BOLT
5. FLEXIBLE COUPLING
6. ADJUSTER PLUG LOCKNUT
7. ADJUSTER PLUG ASSEMBLY
8. ADJUSTER PLUG O-RING
9. OIL LINES
10. VALVE BODY SEAL RINGS
11. VALVE BODY O-RINGS
12. VALVE BODY
13. SPOOL VALVE DAMPER O-RING
14. SPOOL VALVE
15. TORSION BAR BUSHING (INCLUDED IN STUB SHAFT)
16. TORSION BAR SEAL RING (INCLUDED IN STUB SHAFT)
17. TORSION BAR (INCLUDED IN STUB SHAFT)
18. DRIVE PIN (INCLUDED IN STUB SHAFT)
19. STUB SHAFT
20. DRIVE PIN (INCLUDED IN STUB SHAFT)
21. POWER STEERING HOSES
22. MOUNTING BOLT
23. WASHER
24. PRELOAD SPRING
25. GROMMET
26. BUSHING
27. STEERING LINKAGE (ASSEMBLED
28. RACK BUSHING
29. GROMMET
30. WASHER
31. NUT
32. STEERING RACK
33. RACK PISTON
34. OUTER BULKHEAD O-RING
35. BULKHEAD RETAINING RING
36. JAM NUT
37. BALL SEAT
38. INNER TIE ROD
39. INNER TIE ROD HOUSING
40. BOOT CLAMP
41. BOOT
42. ADJUSTER TUBE CLAMP BOLT
43. ADJUSTER TUBE CLAMP
44. ADJUSTER TUBE
45. TIE ROD END
46. LUBE PLUG
47. TIE ROD END SEAL
48. TIE ROD END-NUT
49. COTTER PIN
50. ADJUSTER TUBE CLAMP NUT
51. BOOT CLAMP
52. TIE ROD HOUSING SET SCREW
53. BALL SEAT SPRING
54. SHOCK DAMPENER RING
55. OUTER BULKHEAD AND SEAL ASSEMBLY
56. INNER BULKHEAD
57. BREATHER TUBE
58. RACK PISTON SEAL RING
59. CONTRACTION PLUG
60. LOWER PINION BUSHING
61. HOUSING (INCLUDED IN TUBE AND HOUSING ASSEMBLY)
62. NUT
63. WASHER
64. GROMMET
65. MOUNTING CLAMP
66. BOLT
67. MOUNTING GROMMET
68. INNER RACK SEAL
69. TUBE AND POWER CYLINDER (INCLUDED IN TUBE AND HOUSING ASSEMBLY)
70. UPPER PINION BUSHING
71. PINION SHAFT SEAL (LIP TYPE)
72. SUPPORT WASHER
73. CONICAL THRUST BEARING RACE
74. THRUST BEARING
75. DRIVE PIN (INCLUDED IN STUB SHAFT)
76. SHAFT CAP (INCLUDED IN STUB SHAFT)
77. TORSION BAR BUSHING (INCLUDED IN STUB SHAFT)

50350B

(6) Loosen adjuster plug locknut using brass drift and hammer.

(7) Remove adjuster plug using Spanner Tool J-7624 (fig. 2K-58).

(8) Remove valve body assembly by pulling straight up on stub shaft (fig. 2K-59). Do not disassemble valve body.

(9) Remove pinion shaft from housing. Using pliers, grip pinion shaft at drive tang, rotate shaft counterclockwise and pull upward to remove (fig. 2K-60).

(10) Clean and inspect pinion shaft. If teeth are chipped, cracked, broken, worn excessively, or show signs of tooth flaking, replace steering gear assembly—do not disassemble any further. If teeth are in good condition, proceed to Disassembly.

NOTE: *Do not replace the steering gear if the rack teeth have machining marks on them or appear excessively bright or shiny. These are normal conditions.*

Disassembly

(1) Remove contraction plug from housing using 1/4-inch (6.3 mm) diameter brass rod (fig. 2K-61). Insert rod through upper and lower pinion bushings and tap on rod to dislodge plug.

CAUTION: *Do not damage the rack teeth when removing the contraction plug.*

(2) Remove lower pinion bushing and preload spring from housing with brass rod used to remove contraction plug (fig. 2K-62).

(3) Move rack to centered position in tube and housing.

(4) Reinstall pinion shaft in housing. Be sure pinion is fully seated.

(5) Reinstall valve body and adjuster plug in housing. Hand-tighten adjuster plug only.

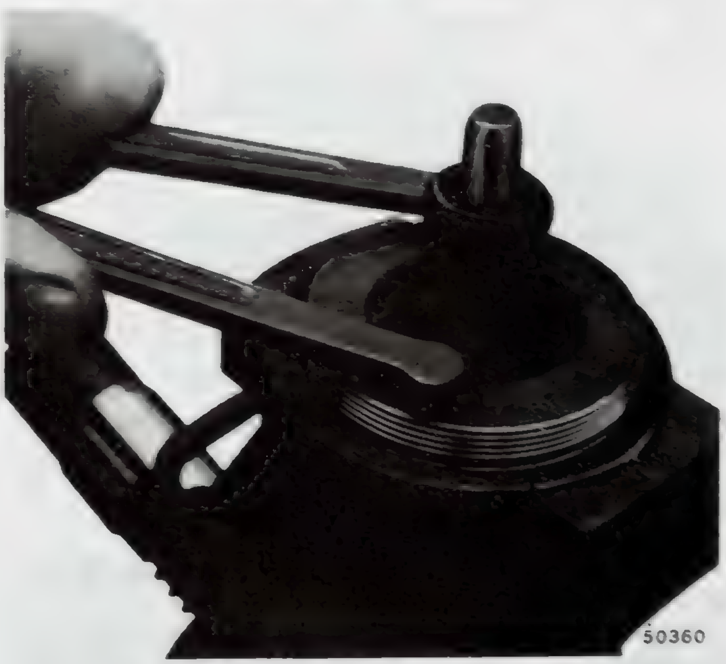


Fig. 2K-58 Adjuster Plug Removal/Installation

Fig. 2K-59 Valve Body Removal/Installation

Fig. 2K-60 Pinion Shaft Removal

CAUTION: *Be sure the valve body is seated in the housing. Do not press on the stub shaft to seat the valve body. Press directly on the valve body only using the thumbs.*

(6) Mark position of adjuster tubes and inner tie rods for assembly reference.

(7) Loosen, but do not remove, adjuster tube clamp nuts and remove tie rod ends and adjuster tubes as assemblies. Use penetrating oil to loosen tubes if threads are corroded and hold inner tie rod with 9/16 wrench while removing tie rods and tubes.

NOTE: *The tie rod adjuster tube bolts/nuts are metric.*

(8) Remove clamps from protective boot at tube-end of gear.

(9) Remove both protective boots.

(10) Slide shock dampener rings off jamnuts (fig. 2K-63).

(11) Loosen jamnuts using open end wrench. Also use open end wrench on rack flats to prevent rack from turning (fig. 2K-64).

Fig. 2K-61 Contraction Plug Removal

Fig. 2K-62 Lower Bushing and Preload Spring Removal

CAUTION: *Do not allow the rack to turn when loosening the jamnuts. If the rack turns, gear internal components could be damaged. Place an open end wrench over the flat adjacent to the rack teeth to prevent the rack from turning (fig. 2K-64).*

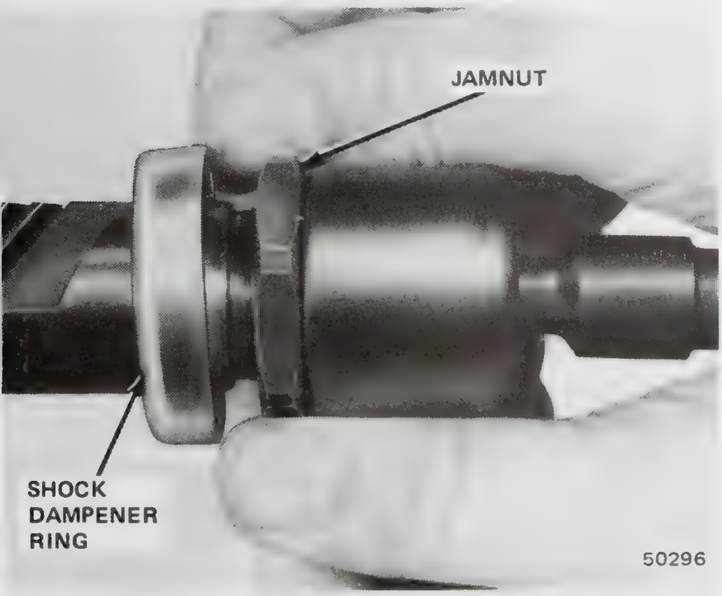


Fig. 2K-63 Shock Dampener Ring Removal

(12) Loosen, but do not remove, setscrew in each tie rod housing.

(13) Remove tie rod housings, inner tie rods, ball seats, ball seat springs, jamnuts, and shock dampener rings.

(14) Remove adjuster plug and valve body assembly. Pull straight up on stub shaft to remove valve body assembly (fig. 2K-59).

(15) Remove pinion shaft using pliers (fig. 2K-60). Grip pinion shaft at drive tang and rotate shaft counterclockwise while pulling upward to remove.

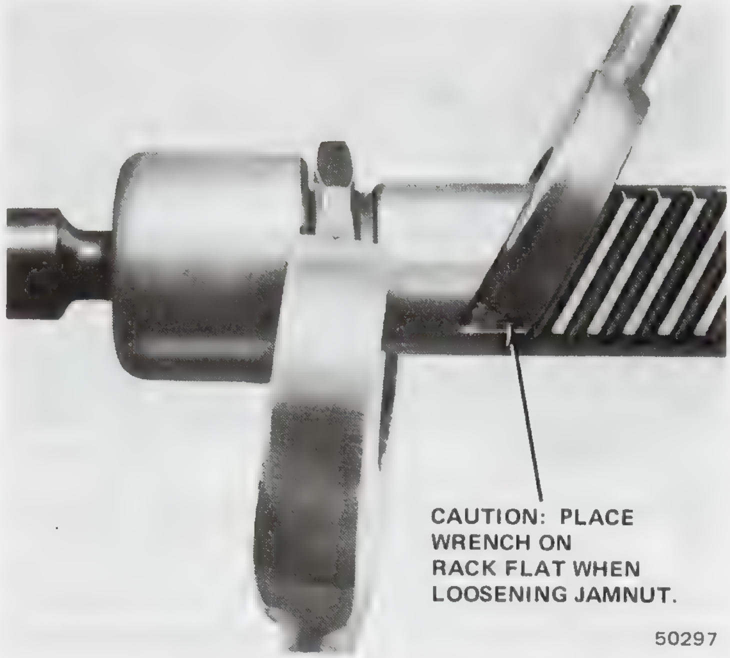


Fig. 2K-64 Loosening/Tightening Jamnuts

(16) Remove pinion shaft thrust bearing, conical thrust bearing races, and support washer from housing using fingers, magnet, or external-type snap ring pliers (fig. 2K-65).

(17) Mark position of breather tube, mounting clamp and grommet on each end of tube and housing for assembly reference (fig. 2K-66). Breather tube, mounting clamp and grommet must be installed in same position to ensure proper seating and sealing of breather tube in rubber boots at assembly.

(18) Remove breather tube and remove mounting clamp and grommet with a twisting, pulling motion.

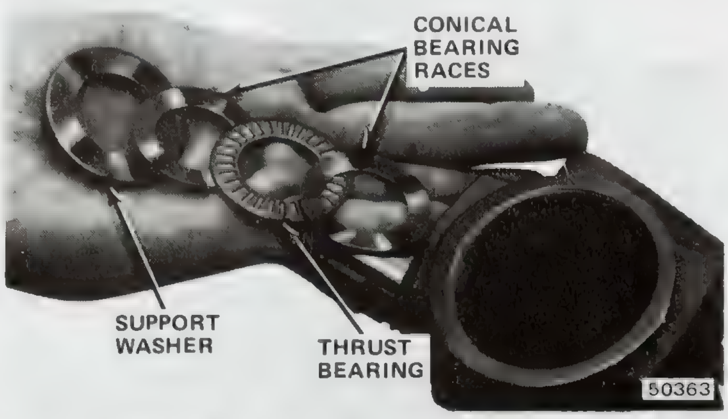


Fig. 2K-65 Removing Thrust Bearing and Races

(19) Remove bulkhead retaining ring from end of tube (fig. 2K-67). Insert pin punch through access hole in end of tube and force retaining ring out of groove; then place screwdriver blade behind ring and pry ring out of tube.

Fig. 2K-66 Marking Position of Breather Tube and Mounting Clamp

CAUTION: *Do not scratch the tube bore when removing the retaining ring. If any burrs or sharp edges are raised in the retaining ring groove or bulkhead seat during removal, remove them using an oil stone, crocus cloth, or a very fine file.*

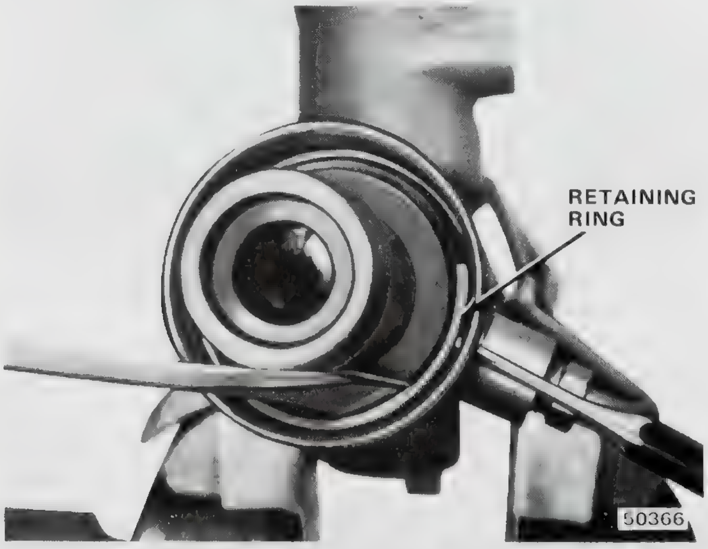


Fig. 2K-67 Bulkhead Retaining Ring Removal

(20) Pull steering rack and inner and outer bulkheads out of tube-end of gear. As rack is removed, rack piston will push bulkheads out of tube at same time (fig. 2K-68).

CAUTION: *Do not remove the rack unless a replacement outer bulkhead and inner rack seal are available. The seal lip will be severely cut by the rack teeth during removal.*

(21) Remove outer and inner bulkheads from steering rack.

(22) Remove rack bushing from housing (fig. 2K-69). Insert knife blade under bushing, pry upward, grasp bushing with needlenose pliers and pull bushing out of housing.

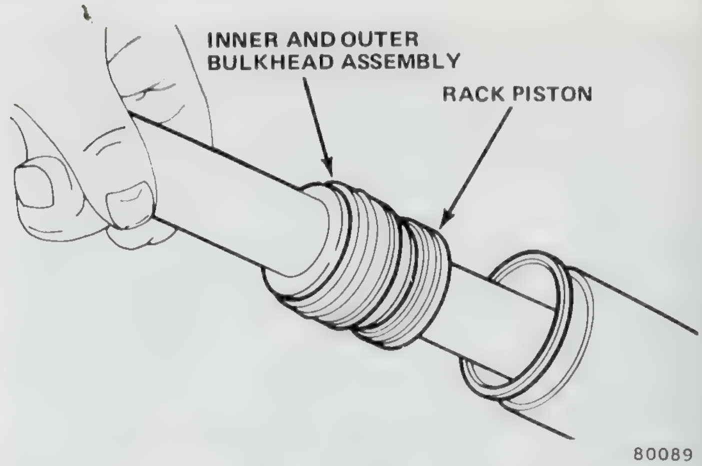


Fig. 2K-68 Removing Steering Rack and Bulkheads

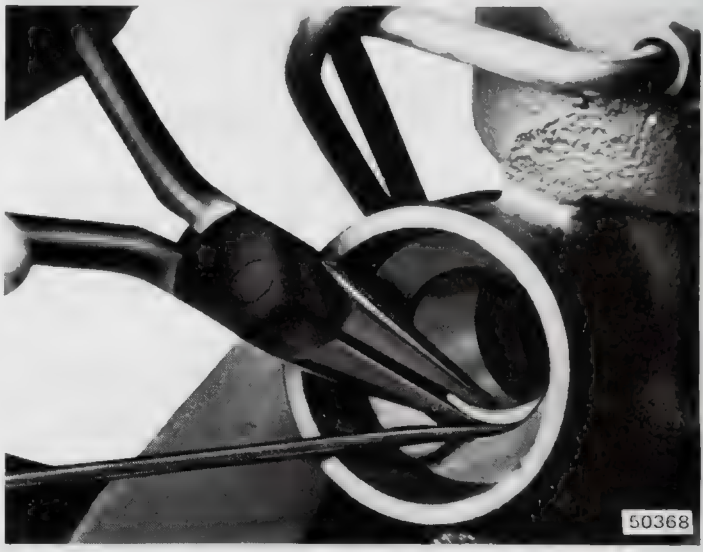


Fig. 2K-69 Rack Bushing Removal

(23) Remove inner rack seal using Seal Remover Tool J-25507. Insert tool into housing bore with legs of tool toward seal (fig. 2K-70). Push tool into bore until it rests on seal. Remove seal by striking tool using hammer and drift that is approximately 14 inches (35.56 cm) long.

Fig. 2K-70 Inner Rack Seal Removal

(24) Loosen vise, turn gear over, and remount gear in vise.

(25) Remove upper pinion bushing and pinion shaft seal using 5/8 socket and extension. As bushing separates from housing, it will also force seal out (fig. 2K-71).

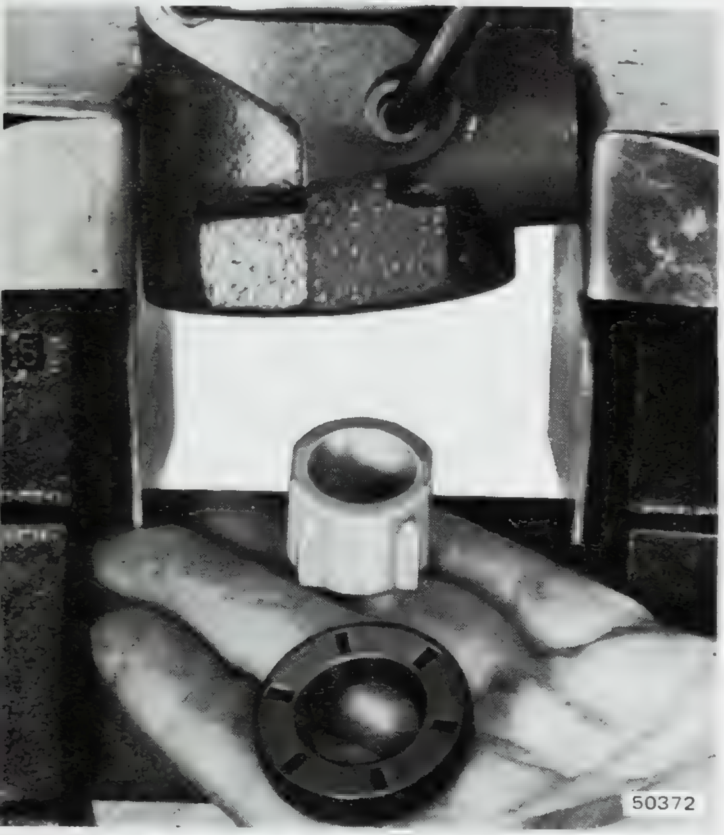


Fig. 2K-71 Upper Pinion Bushing and Pinion Shaft Seal Removal

SUB-ASSEMBLY OVERHAUL

Bulkhead

Separate the outer bulkhead from the inner bulkhead (fig. 2K-72). Discard the outer bulkhead and seals. The outer bulkhead and inner rack seal and O-ring seal are serviced as an assembly only.

Rack Piston

Remove the seal from the rack piston using a knife blade or small screwdriver (fig. 2K-73). Take care not to score or the scratch piston when removing the seal.

Adjuster Plug Assembly

(1) Remove thrust bearing retainer using screwdriver and discard retainer (fig. 2K-74). Be careful not to damage needle bearing bore.

(2) Remove thrust bearing spacer, thrust bearing and bearing races (fig. 2K-75).

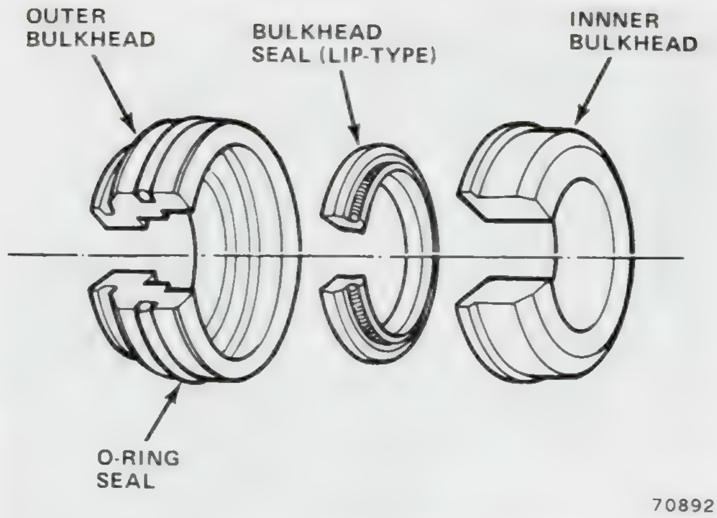


Fig. 2K-72 Inner and Outer Bulkhead Assembly

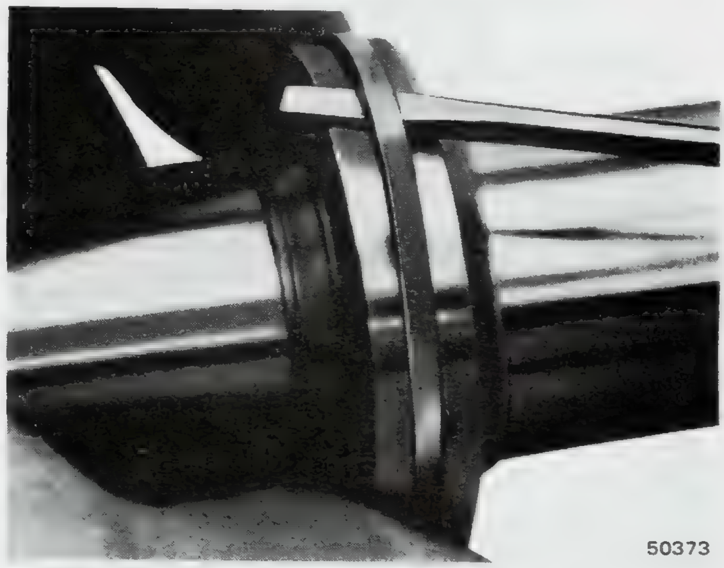


Fig. 2K-73 Rack Piston Seal Removal

Fig. 2K-74 Thrust Bearing Retainer Removal

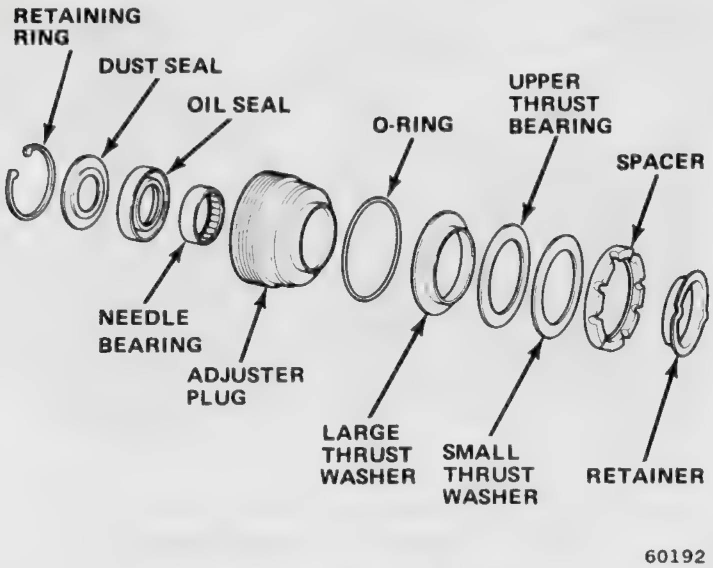


Fig. 2K-75 Adjuster Plug Assembly

(3) Remove and discard adjuster plug O-ring seal.

(4) Remove stub shaft seal retaining ring using Snap Ring Plier Tool J-4245.

(5) Remove stub shaft dust seal and oil seal by prying seals out using screwdriver. Discard both seals.

(6) Remove needle bearing using Remover/Installer Tool J-6221 (fig. 2K-76).

Valve Body

NOTE: *The valve body assembly is a precision manufactured unit with parts selectively fitted as close as 0.0004 inch (0.00082 mm) and is hydraulically balanced during manufacture. Do not disassemble the valve body for any reason other than to replace the seals. If the seals are in good condition, do not disassemble the valve body. If replacement of any valve part other than seal rings or O-rings is necessary, the complete valve body assembly must be replaced.*

(1) Hold valve body in hand with stub shaft pointing downward and tap stub shaft lightly against work bench until stub shaft cap is free of valve body (fig. 2K-77).

(2) Pull stub shaft outward until shaft cap clears valve body by approximately 1/4 inch (6.3 mm).

CAUTION: *Do not pull the stub shaft out any farther than 1/4 inch (6.3 mm) at this point, as the spool valve may become cocked in the valve body.*

(3) Disengage spool valve locating pin and remove stub shaft (fig. 2K-78).

(4) Remove spool valve from valve body by pushing and rotating spool valve. If valve becomes cocked, carefully realign valve, then remove.

(5) Remove damper O-ring from spool valve and discard O-ring (fig. 2K-79).

Fig. 2K-76 Adjuster Plug Needle Bearing Removal/Installation

(6) Remove four teflon rings and backup O-rings, located under teflon rings, from valve body (fig. 2K-79). Carefully cut and remove rings using knife or diagonal pliers.

NOTE: *Do not remove the seal rings from the valve body unless they are damaged or severely worn.*

Gear Housing Hose Connector Seats

Do not replace the hose connector seats unless they are loose, cracked, distorted, cocked in the housing, or did not provide proper seating for the hose fitting causing leakage.

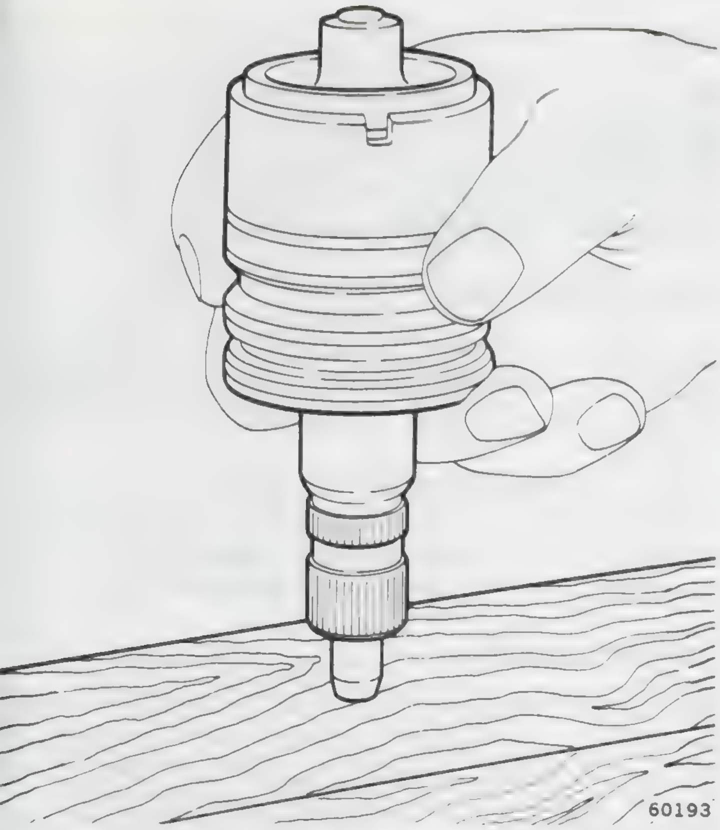


Fig. 2K-77 Removing Stub Shaft from Valve Body

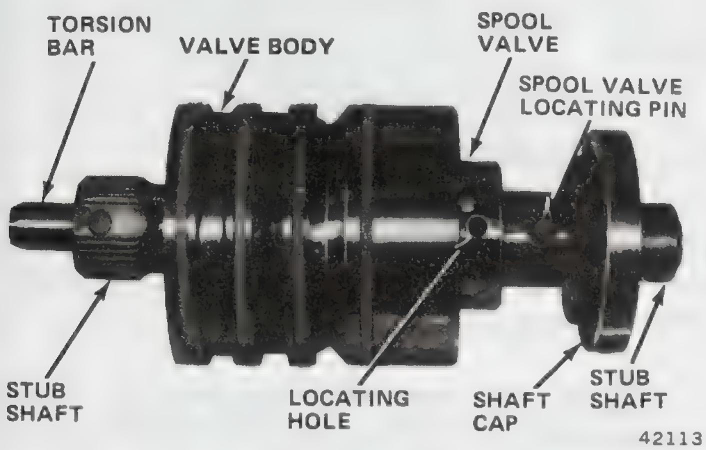


Fig. 2K-78 Valve Body/Stub Shaft Disassembly

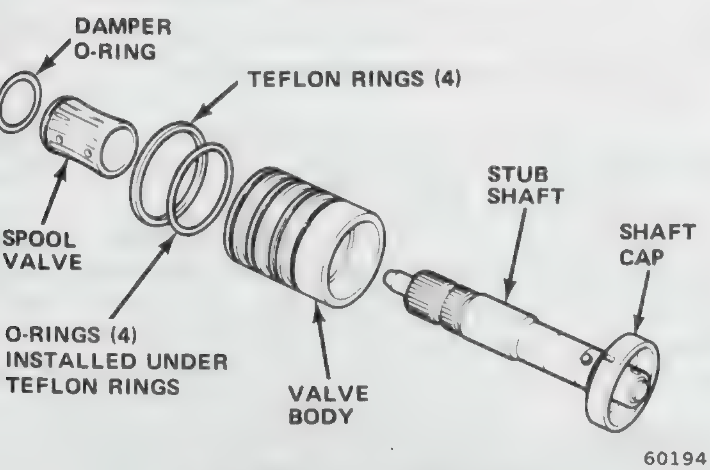


Fig. 2K-79 Valve Body Assembly

If the seats must be replaced, remove them as follows:

(1) Insert No. 4 screw extractor into seat and turn extractor counterclockwise to remove seat (fig. 2K-80).

(2) Install replacement connector seats in housing using tool J-6217 (fig. 2K-81). Be sure seats are bottomed in housing and are not cocked.

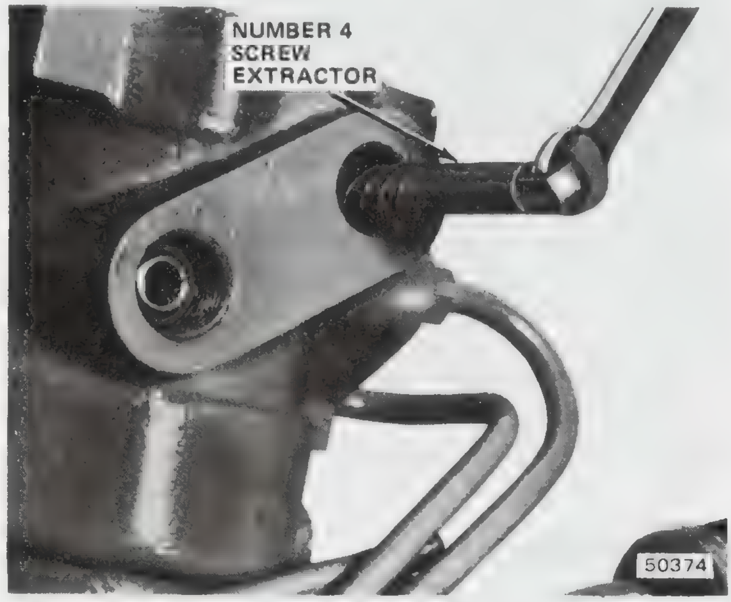


Fig. 2K-80 Hose Connector Seat Removal

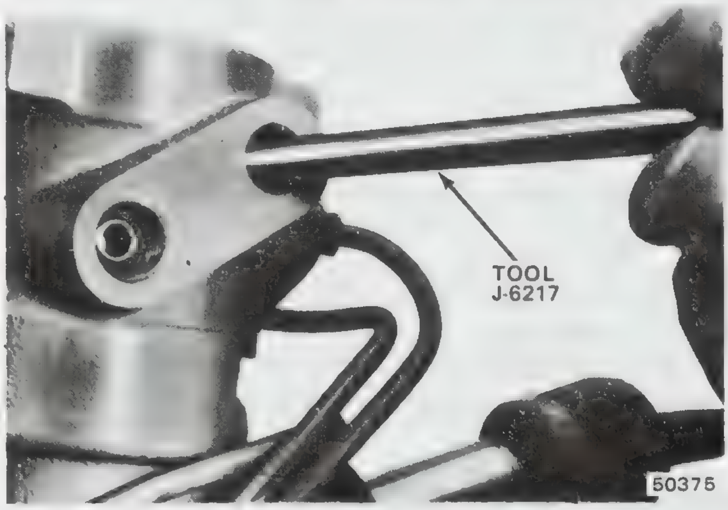


Fig. 2K-81 Hose Connector Seat Installation

Cleaning and Inspection

Cleaning

Wash all parts thoroughly in clean solvent and dry them with filtered compressed air.

CAUTION: *Do not immerse the O-rings, seal rings, pinion seals, pinion bushings or protective boots in cleaning solvent. Wipe these parts clean using a shop cloth only. In addition, if the hose connector seats were removed, be sure to flush any remaining chips from the housing and clean out all feed holes and fluid passages in the housing and valve body assembly using compressed air.*

Tube and Housing

Check for cracks, porosity, or worn valve body bore in the housing. Check the tube for cracks, dents, distortion, or for being loose in the housing. Check the bore in the power cylinder section of the tube for nicks, scratches, pitting, or excessive wear. If the tube or the housing is damaged, replace the complete steering gear assembly.

Steering Rack and Pinion Shaft

Check the rack and pinion shaft for cracked, chipped, broken, or worn teeth. Check the rack and rack piston for burrs, nicks, scratches, or excessive wear. Check each piston for being loose on the rack. Check the rack threads for wear, galling, or being stripped. Check the seal and bearing surfaces on the rack and pinion shaft for burrs, nicks, pitting, galling, or excessive wear. If either the rack or pinion shaft are damaged, replace the complete steering gear assembly.

Valve Body and Stub Shaft Assembly

If the drive pin in either the stub shaft or valve body (fig. 2K-79) is cracked, excessively worn or broken, replace the complete valve and shaft assembly.

If there is evidence of leakage between the torsion bar and the stub shaft or there are scores, nicks, or burrs on the ground surface of the stub shaft that cannot be cleaned up with crocus cloth, replace the complete valve and shaft assembly.

Check the outside diameter of the valve spool and the inside diameter of the valve body for nicks, burrs, or wear spots. If slight surface irregularities cannot be removed with crocus cloth, replace the complete valve and shaft assembly.

If the small notch in the skirt of the valve body is excessively worn, replace the complete valve and shaft assembly.

Lubricate the valve spool with power steering fluid and check the fit of the valve spool in the valve body (with the valve spool dampener O-ring removed). If the spool does not rotate freely, replace the complete valve and shaft assembly.

NOTE: *Tiny flat spots on either side of the spool valve drive pin head are normal.*

Adjuster Plug Assembly

Check the needle bearing and thrust bearing races for pitting, galling, flat spots, or excessive wear. Check the seals and O-ring for cuts, tears, wear, or distortion. Check the plug threads for stripping, galling, or tearing. Check the retaining ring for distortion or loss of tension. Replace parts as required.

Bulkhead

Check the inner bulkhead for scores, nicks, pitting, or for being loose in the power cylinder. Replace the inner bulkhead if it exhibits any of these conditions. Discard the outer bulkhead and rack seal as they are not reuseable and are serviced as an assembly only.

Steering Linkage Components

Check the inner tie rod ball sockets, ball seats, and housings for cracks, scores, wear, corrosion, or pitting. Check the ball seat springs for loss of tension, distortion, or breakage.

Check the adjuster tubes for damaged threads, or distortion. Check the tie rod ends for damaged threads, torn seals, and excessive wear or looseness of the ball stud in its socket. Replace parts as required.

Breather Tube and Boots

Check the tube for dents, cracks, or splits. Check the boots for tears, holes, cracks, or loss of elasticity (hard-brittle feel). Replace parts as required.

Flexible Coupling

Check the coupling for wear, tears, rips, unravelling, distortion, or worn bolts. Check the clamp and pinch bolt for damage. Replace parts as required.

STEERING GEAR ASSEMBLY AND ADJUSTMENT

(1) Install rack bushing in housing. Compress leading edge of bushing with fingers and insert into housing. Once bushing is past lip of housing and seated in groove, bushing will snap back into proper shape.

(2) Install inner rack seal as follows:

(a) Slide Seal Protector Tool J-25509 over steering rack threads (fig. 2K-82).

(b) Cut 2-1/2 x 4 inch (6.3 x 10.1 cm) section from shipping tag, manila envelope, or similar thickness cardboard-type paper. Form paper over rack teeth (fig. 2K-82). Paper will protect seal from rack teeth when seal is installed.

(c) Dip inner rack seal in power steering fluid, and slide seal over tool J-25509, onto rack, and onto paper protector (fig. 2K-82).

(d) Slide seal and paper seal protector over rack teeth. When seal is past rack teeth, remove paper protector and slide seal along rack until seal is against rack piston.

CAUTION: *Do not attempt to install the seal without using the paper protector or the rack teeth will cut the seal lip causing leakage after assembly.*

Fig. 2K-82 Inner Rack Seal Installation

(3) Lightly coat outside diameter of inner rack seal and bulkhead retaining ring groove of tube with petroleum jelly.

(4) Apply liberal quantity of waterproof, lithium-base, EP-type chassis lubricant to rack teeth (fig. 2K-83).

Fig. 2K-83 Lubricating Rack Teeth

(5) Dip rack piston seal ring in power steering fluid and install seal ring on piston (fig. 2K-84). Do not overstretch or twist seal ring when installing.

(6) Install Seal Protector J-25508 in open end of tube. Push protector in until shoulder of protector seats against end of tube.

(7) Insert rack through seal protector and into tube (fig. 2K-85).

CAUTION: *Do not remove the seal protector until the rack piston is well within tube bore.*

(8) Push rack into tube as far as possible so rack piston will start inner rack seal into seal seat at end of tube.

(9) Bottom inner rack seal in tube seat using rack piston as seal driver. Grasp rack firmly, keep rack level, and use a sliding motion to bottom seal.

(10) Install upper pinion bushing with chamfered side facing downward and start pinion shaft seal (with seal lip facing bore) into seat in housing (fig. 2K-86).

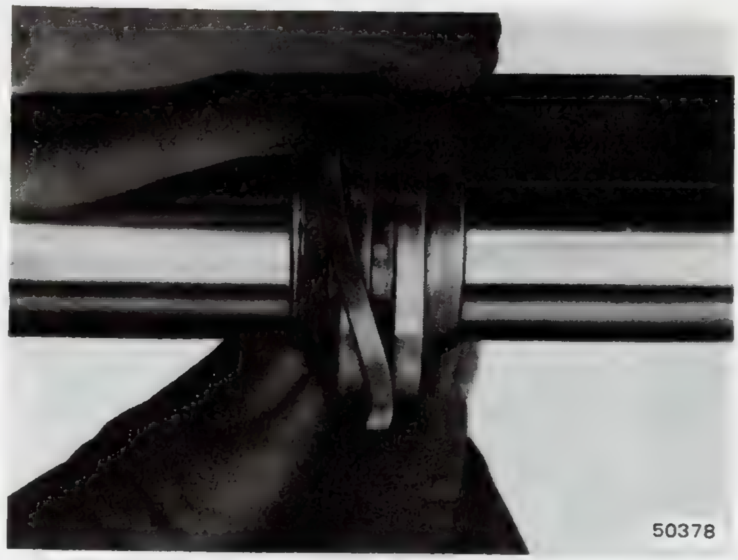


Fig. 2K-84 Rack Piston Seal Ring Installation

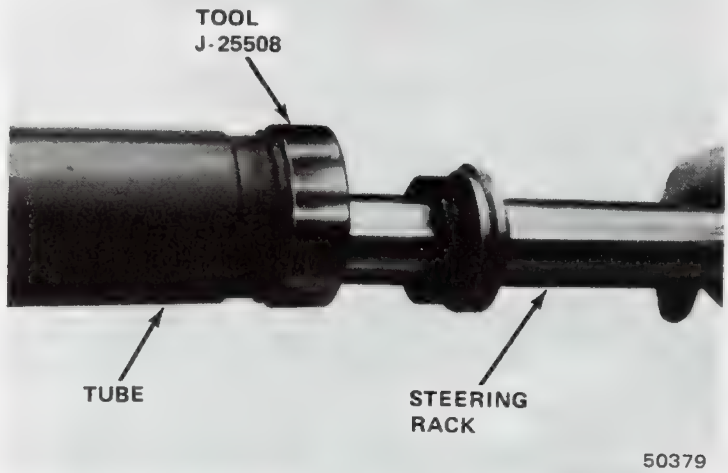


Fig. 2K-85 Steering Rack Installation

(11) Place support washer on top of pinion shaft seal (fig. 2K-87).

(12) Using 1-1/4 socket, extension, and hammer, tap lightly on support washer until pinion shaft seal and support washer are fully seated in housing (fig. 2K-88).

(13) Lubricate pinion shaft thrust bearing and thrust bearing races with petroleum jelly and install on pinion shaft. Assembly sequence is race—bearing—race. Use enough petroleum jelly to retain parts on pinion during installation.

CAUTION: *Perform the following three steps accurately and in sequence to be sure steering rack and pinion shaft are centered correctly.*

(14) Center steering rack in tube and housing. Position rack teeth parallel to housing bore and position end of rack 4 inches (10.1 cm) from machined inner face of housing (fig. 2K-89).

(15) Install pinion shaft in housing bore with pinion shaft drive pin located between 3 and 4 o'clock position (fig. 2K-90).

Fig. 2K-86 Pinion Shaft Seal Installation

Fig. 2K-87 Support Washer Installation

(16) Push pinion shaft downward until it bottoms in housing.

(17) Center steering rack to 4 inch (10.1 cm) setting (fig. 2K-90). With rack centered, pinion shaft drive pin should now be located at 12 o'clock position (fig. 2K-90). If drive pin position is incorrect (e.g., 11 or 1 o'clock position), remove pinion shaft and start again at step (14).

(18) Assemble valve body and stub shaft as follows.

(a) If valve body O-rings and teflon rings were removed, install replacement O-rings in oil ring grooves and lubricate them with power steering fluid.

(b) Lubricate teflon seal rings with power steering fluid and install over O-rings.

NOTE: *The teflon rings may appear to be distorted, but heat generated by the power steering fluid during gear operation will straighten them.*

Fig. 2K-88 Seating Support Washer and Pinion Shaft Seal

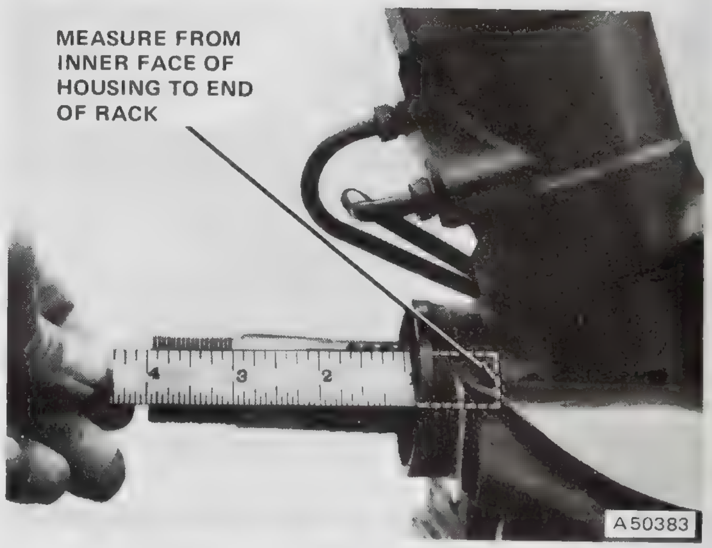


Fig. 2K-89 Centering Steering Rack

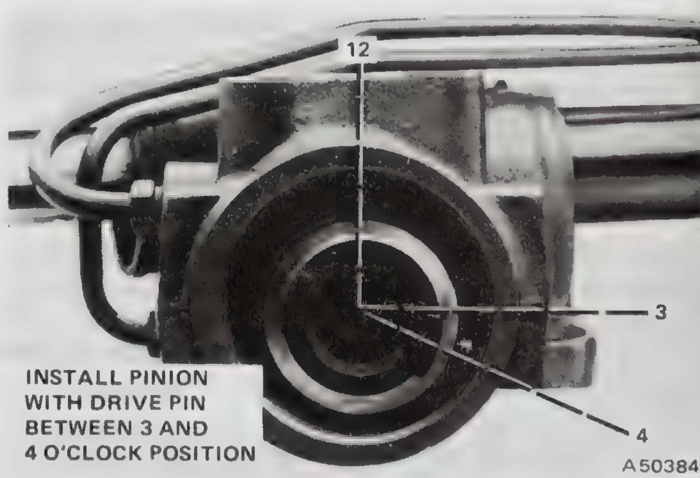


Fig. 2K-90 Centering Pinion Shaft

(c) Lubricate spool valve damper O-ring with power steering fluid and install over spool valve (fig. 2K-79).

(d) Lubricate spool valve and valve body with power steering fluid and slide spool valve into valve body. Rotate spool valve while pushing it into valve body. Push spool valve on through valve body until shaft pin hole is visible from opposite end (spool valve flush with stub shaft cap end of valve body).

(e) Lubricate stub shaft assembly with power steering fluid and carefully insert shaft in spool valve. Install stub shaft until shaft pin can be inserted in spool valve (fig. 2K-78).

(f) Align notch in shaft cap with pin in valve body and press spool valve and shaft assembly into valve body (fig. 2K-91).

CAUTION: *Be sure that the stub shaft cap-notch is mated with the valve body pin before installing the valve body in the housing.*

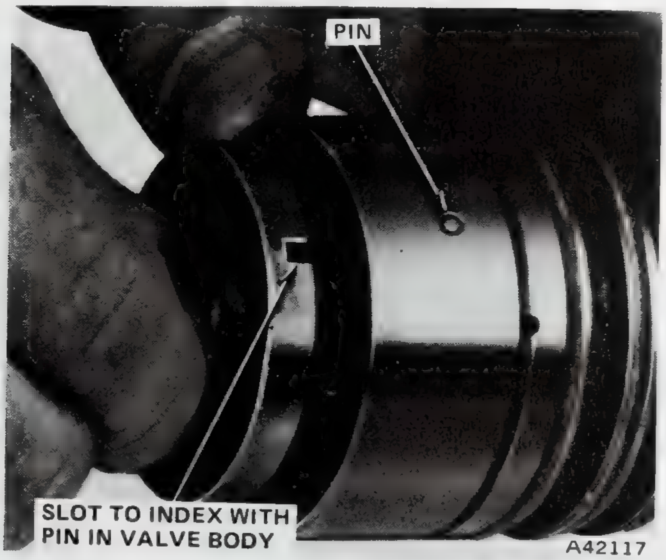


Fig. 2K-91 Installing Stub Shaft In Valve Body

(19) Align notch in valve body with locating drive in pinion shaft and install valve body in housing. Be sure drive lugs on pinion shaft are engaged in slots in stub shaft cap. When valve body is correctly installed, fluid return hole in housing will be exposed (fig. 2K-93). If hole is not visible, pinion shaft is not seated, spool valve locating pins are misaligned or valve body stub shaft locating pins are misaligned.

CAUTION: *Do not press on the stub shaft to seat the valve body. Press directly on the valve body only using thumbs.*

(20) Assemble adjuster plug components as follows:

(a) Install needle bearing using Tool J-6221. Install bearing on tool with bearing manufacturer's identification number facing tool. Position bearing and tool in adjuster plug bore and drive bearing into plug until tool bottoms (fig. 2K-76).

Fig. 2K-92 Valve Body Installation

(b) Lubricate stub shaft oil seal with petroleum jelly and install seal using Tool J-21554. Install seal far enough to allow clearance for dust seal and retaining ring (fig. 2K-93).

(c) Lubricate dust seal with petroleum jelly and install seal in adjuster plug with seal manufacturer's identification number facing outward.

(d) Install retaining snap ring using Snap Ring Plier Tool J-4245. Be sure ring is properly seated.

(e) Lubricate O-ring seal with petroleum jelly and install in groove of adjuster plug.

(f) Assemble large diameter thrust bearing race, thrust bearing, small diameter bearing race, and spacer on plug. Press bearing retainer into needle bearing bore using a brass or wooden driver. Radial location of retainer dimples is unimportant, but do not damage them during installation (fig. 2K-94).

(21) Install adjuster plug in housing using Spanner Tool J-7624. Tighten plug until completely seated.

(22) Adjust worm bearing preload as follows:

(a) Using spanner hole in adjuster plug for reference, mark plug and housing (fig. 2K-95).

(b) Measure back (counterclockwise) 3/16 to 1/4 inch (4.7 to 6.3 mm) and remark housing (fig. 2K-96).

(c) Back adjuster plug off to second mark (fig. 2K-97).

(d) Install adjuster plug locknut and tighten to 85 foot-pounds torque (115.2 Nm).

CAUTION: *Be sure the adjuster plug does not move as the locknut is tightened.*

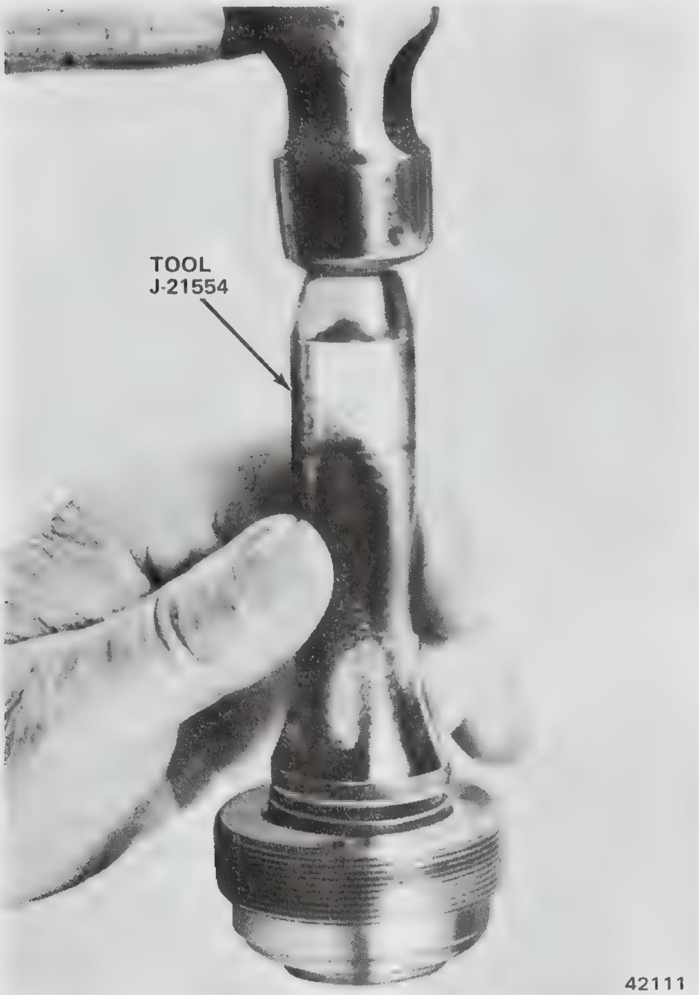


Fig. 2K-93 Adjuster Plug Oil Seal Installation

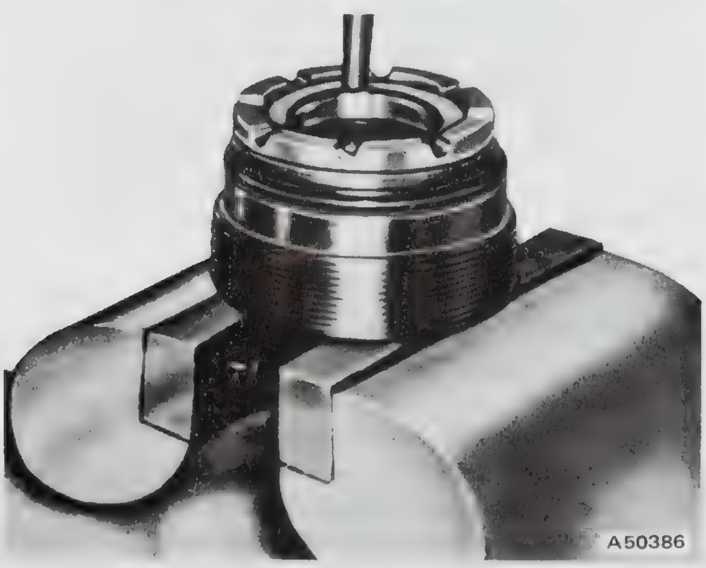


Fig. 2K-94 Adjuster Plug Bearing Retainer Installation

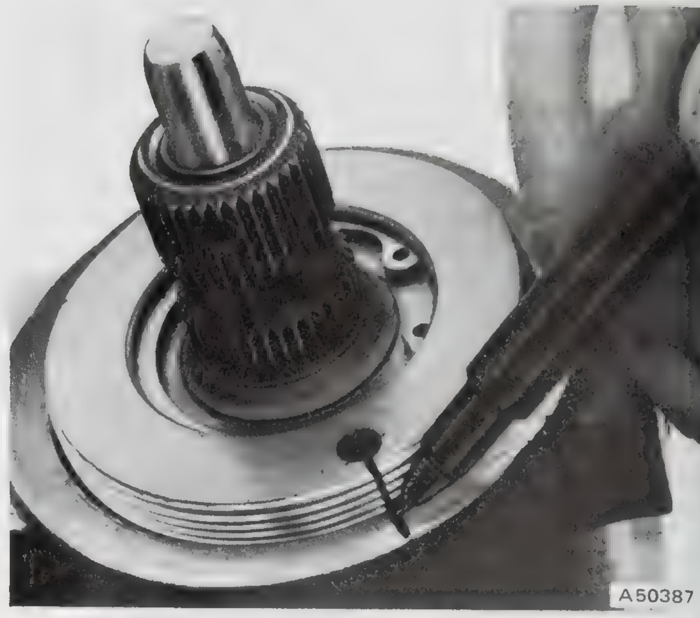


Fig. 2K-95 Marking Plug and Housing

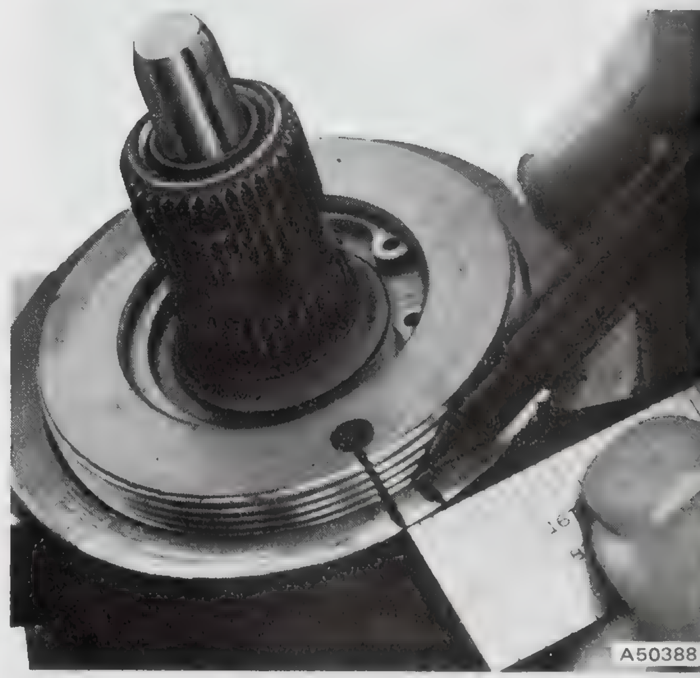


Fig. 2K-96 Remarking Housing

(23) Install Seal Protector J-25509 over rack threads (fig. 2K-98).

(24) Lubricate inner bulkhead with power steering fluid and slide bulkhead over seal protector and onto rack (fig. 2K-98). Be sure small diameter end of inner bulkhead is facing tube bore.

(25) Install O-ring on outer bulkhead.

(26) Lubricate outer bulkhead and seals with power steering fluid and slide bulkhead over seal protector and onto rack (fig. 2K-97).

(27) Seat outer and inner bulkhead assembly in tube by tapping on outer bulkhead with brass drift.

(28) Install bulkhead retaining ring. Opening in ring must be 1/4 inch (6.3 mm) away from access hole in tube (fig. 2K-67).

(29) Loosen vise, turn steering gear over and remount gear in vise.

(30) Fill housing bore with EP-type, waterproof, lithium base chassis lubricant but do not overfill.

Fig. 2K-97 Backing Off Adjuster Plug

(31) Install preload spring in housing with center hump of spring contacting side of housing bore (fig. 2K-99). End of spring must enter upper pinion bushing. Allow approximately 1/4 inch (6.3 mm) of spring to extend past edge of housing.

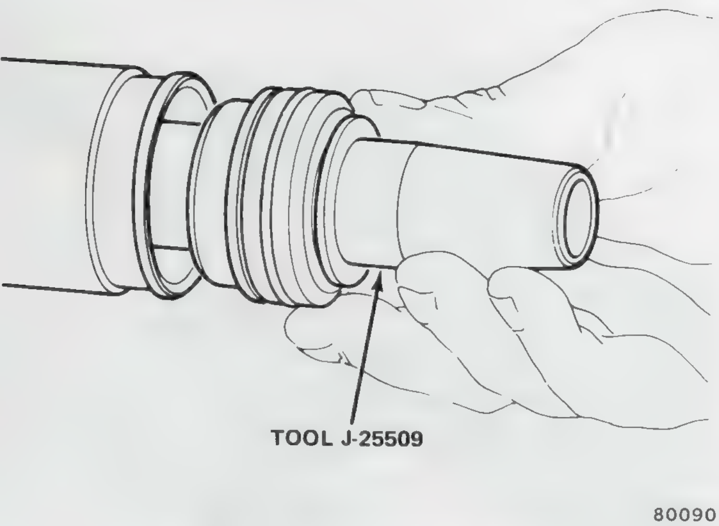


Fig. 2K-98 Bulkhead Assembly Installation

(32) Using needlenose pliers, hold preload spring against housing bore and install lower pinion bushing. Chamfered end of bushing faces inward and toward pinion shaft and flat end faces out (fig. 2K-100). Lightly tap bushing and spring until both are seated in housing.

(33) Install contraction plug in housing and seat plug using brass drift or suitable size socket.

(34) Install mounting clamp and grommet on tube. Position clamp according to alignment marks made at disassembly.

(35) Install shock dampener rings on each end of steering rack with open end of each ring facing outward.

Fig. 2K-99 Preload Spring Installation

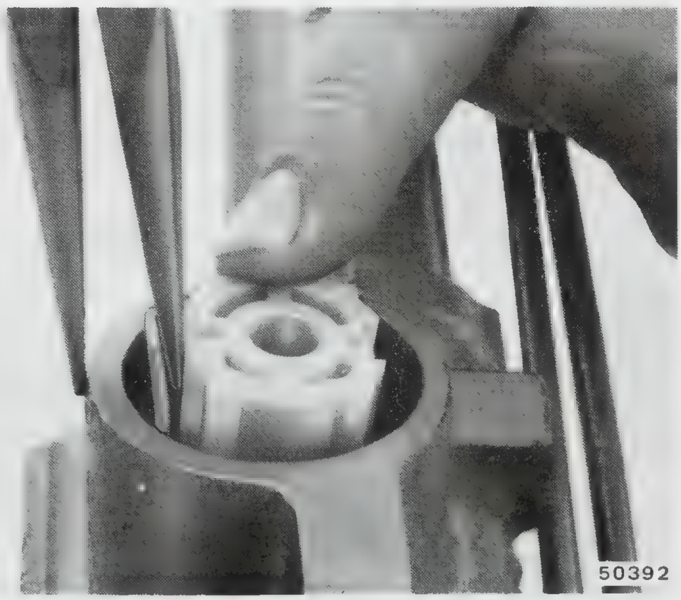


Fig. 2K-100 Lower Pinion Bushing Installation

(36) Install jamnuts on rack. Thread jamnuts completely onto rack.

(37) Apply liberal quantity of waterproof, EP-type lithium base chassis lubricant to all inner tie rod assembly wear surfaces. Pack tie rod housings with same lubricant.

(38) Install ball seat springs in ends of rack and install ball seats on springs.

(39) Assemble and install tie rod housings and inner tie rods on steering rack.

(40) **Hand tighten** inner tie rod housings while rocking inner tie rods to prevent grease lock.

(41) Back tie rod housings off 1/8 turn.

(42) Tighten tie rod housing setscrews to 9 foot-pounds (12.2 Nm) torque.

POWER STEERING PUMP

GENERAL

A constant displacement, vane-type power steering pump is used on AMC cars equipped with power assist steering. The pump housing and internal parts are combined with the reservoir to form a single assembly. When in operation, all pump components function while submerged in power steering fluid (fig. 2K-104).

The reservoir is sealed against the pump housing, and the pump shaft and pump face are exposed. The pump shaft is supported in the housing by a bushing. The bushing and a shaft seal are installed in the front of the housing (fig. 2K-104).

The pump ring, rotor, vanes, and plates are contained in the pump cavity. The flow control valve and pressure relief spring are located in a bore machined into the pump housing (fig. 2K-104).

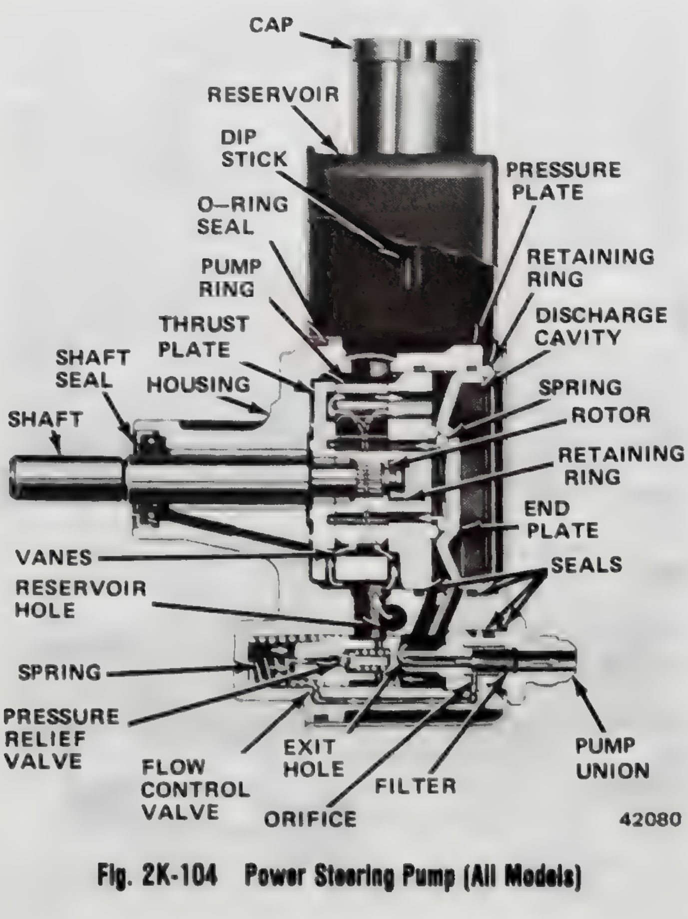


Fig. 2K-104 Power Steering Pump (All Models)

The pump reservoir is for fluid storage. It receives and directs the return fluid back to the makeup passage in the pump.

The pump shaft is fitted with a pulley which is pressed onto the shaft and is belt-driven from the crankshaft. The pump rotor is splined to the pump shaft and secured with a retaining ring. The shaft is centrally located within the ring and between the thrust and pressure plates. The ten rotor vanes are mounted in radial slots machined in the rotor (fig. 2K-105).

Operation

As the pump shaft turns the rotor, the vane tips follow the inner cam surface of the pump ring and move out-and-in twice each revolution. This produces a complete pumping cycle in every 180 degrees of rotation. As the vane tips move outward, fluid is drawn into the intervane spaces through intake ports in the pressure and thrust plates. Fluid is discharged from the pump ring as the vane tips move inward. High-pressure fluid flows into the discharge cavity through two open ports in the pressure plate, and through two blind ports in the thrust plate. The ports are connected by crossover holes in the pump ring. Part of this fluid is circulated through the central port system in the pressure plate forcing the vanes to follow the pump ring cam surface. The ring-rotor leakage fluid is used for bushing lubrication.

It is desirable to limit the temperature rise of the fluid. This is done by flow controlling. The steering gear control valve is an open-center rotary valve. When this valve is in the straight-ahead position, fluid flows back to the pump reservoir without traveling through the power cylinder. When flow exceeds predetermined system requirements, fluid is bypassed within the pump by the flow control valve (fig. 2K-104).

When the steering gear valve is actuated in either direction to the point of cutoff, the flow of fluid from the pump is blocked. This condition occurs when the front wheels contact the wheel stops, or when wheel movement is otherwise blocked by a curb, deep sand, or mud. The pump is equipped with a pressure relief valve. The relief valve is contained inside the flow control valve plunger. When pressure exceeds a predetermined amount, greater than maximum system requirements, the pressure relief valve opens allowing a small amount of fluid to flow into the pressure relief bypass orifice.

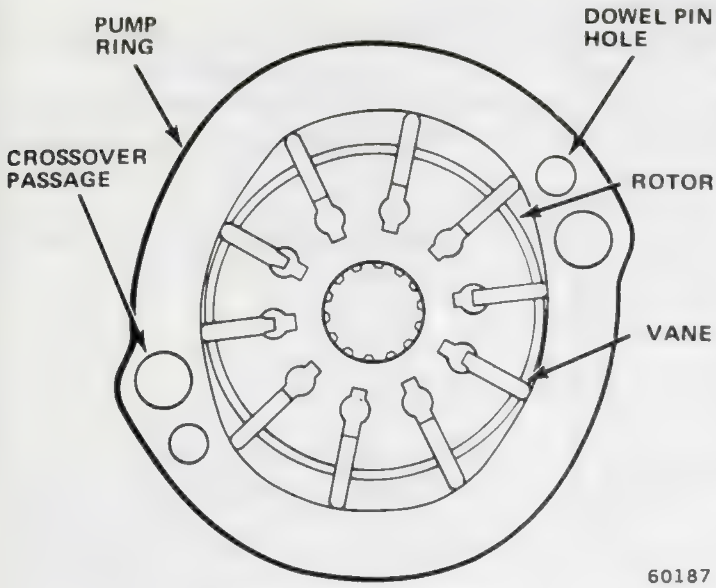


Fig. 2K-105 Pump and Rotor Vanes

Fluid passing through this orifice causes a pressure drop through the orifice, resulting in a lower pressure on the bottom end of the control valve.

This pressure imbalance causes the valve to compress the spring allowing most of the fluid to flow into the pressure relief orifice.

LEAK INSPECTION AND DIAGNOSIS

The location and source of fluid leaks should always be determined before attempting repair. Because an inaccurate diagnosis can result in ineffective repair, a proper inspection procedure is necessary. Refer to figure 2K-106, View A and View B for the most common pump leak sources.

Leak Inspection Procedure

(1) Raise and support car.

(2) Wipe leakage area dry.

(3) Check for overfilled reservoir. If overfull, drain fluid from reservoir to correct level.

(4) Check for aerated fluid (full of bubbles and milky in color). Aerated fluid can cause overflow from reservoir and be mistaken for leak.

(5) Check and tighten all hose connections and union fittings at pump and gear. Do not exceed 30 foot-pounds (55.5 Nm) torque at any fitting.

(6) Start engine. Have helper turn steering wheel to left and right several times while locating exact source of leak. Contact stops in each direction. Stop engine when leak source is determined.

Leak Diagnosis

(a) If leak occurred between pump union fitting and hose fitting, tighten or replace union fitting and hose.

(b) If leak occurred between pump union fitting and pump body, replace both union O-rings.

(c) If leak occurred between reservoir and pump body, replace reservoir O-ring seal.

(d) If leak occurred between pump shaft and seal, replace seal. Also check pump shaft seal contact area for nicks, gouges, burrs, or pitting, all of which can damage seal.

(e) If leak is caused by reservoir overflow due to overfill condition, drain fluid to correct level. If fluid is aerated, check for overfill condition, or air getting into fluid through hose connection or reservoir seal, or check for sticking flow control valve.

HYDRAULIC PRESSURE TEST

The power steering system hydraulic pressure test is performed using Test Gauge Set J-21567 (fig. 2K-107). When performimg a pressure test, refer to the Hydraulic Pressure Test Procedure charts. These charts outline the sequence of steps required for test gauge connection, pressure test procedure, and system diagnosis.

The test set gauge and valve assembly have 1/4 pipe threads at each end. Any combination of hose fittings is acceptable for gauge connection at the pump or gear, whichever is most convenient. However, the gauge must, at all times, be connected in the pump pressure line circuit only. Refer to the Hydraulic Pressure Test Procedure charts and figures 2K-107 and 2K-108.

Test Procedure

(1) Check and adjust pump belt tension as necessary.

(2) Position drip pan beneath engine.

(3) Disconnect power steering pump pressure hose at pump, or at steering gear (whichever is most convenient). Keep hose end raised to prevent fluid loss.

(4) Connect pump pressure hose to Test Gauge J-21567.

(5) Connect test gauge hose to power steering pump or steering gear (fig. 2K-108).

CAUTION: *Be sure the test gauge is connected into the pressure line circuit between pump and gear.*

Service Diagnosis

Condition	Possible Cause	Correction
CHIRP NOISE IN STEERING PUMP	(1) Loose belt	(1) Adjust belt tension to specification
BELT SQUEAL (PARTICULARLY NOTICEABLE AT FULL WHEEL TRAVEL AND STAND STILL PARKING)	(1) Loose belt	(1) Adjust belt tension to specification
GROWL NOISE IN STEERING PUMP	(1) Excessive back pressure in hoses or steering gear caused by restriction	(1) Locate restriction and correct. Replace part if necessary
GROWL NOISE IN STEERING PUMP (PARTICULARLY NOTICEABLE AT STAND STILL PARKING)	(1) Scored pressure plates, thrust plate or rotor	(1) Replace parts and flush system
	(2) Extreme wear of cam ring	(2) Replace parts
GROAN NOISE IN STEERING PUMP	(1) Low oil level	(1) Fill reservoir to proper level
	(2) Air in the oil. Poor pressure hose connection	(2) Tighten connector to specified torque. Bleed system by operating steering from right to left - full turn
RATTLE NOISE IN STEERING PUMP	(1) Vanes not installed properly	(1) Install properly
	(2) Vanes sticking in rotor slots	(2) Free up by removing burrs, varnish, or dirt
SWISH NOISE IN STEERING PUMP	(1) Defective flow control valve.	(1) Replace part
WHINE NOISE IN STEERING PUMP	(1) Pump shaft bearing scored	(1) Replace housing and shaft. Flush system
HARD STEERING OR LACK OF ASSIST	(1) Loose pump belt	(1) Adjust belt tension to specification
	(2) Low oil level in reservoir NOTE: Low oil level will also result in excessive pump noise	(2) Fill to proper level. If excessively low, check all lines and joints for evidence of external leakage. Tighten loose connectors.
	(3) Steering gear to column misalignment	(3) Align steering column
	(4) Lower coupling flange rubbing against steering gear adjuster plug	(4) Loosen pinch bolt and assemble properly
	(5) Tires not properly inflated	(5) Inflate to recommended pressure

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Service Diagnosis (Continued)

Condition	Possible Cause	Correction
	Further possible causes could be:	
	(6) Sticking flow control valve (7) Insufficient pump pressure output (8) Excessive internal pump leakage (9) Excessive internal gear leakage	In order to diagnose conditions such as listed in (6), (7), (8), (9) a pressure test of the entire power steering system is required.
FOAMING MILKY POWER STEERING FLUID, LOW FLUID LEVEL AND POSSIBLE LOW PRESSURE	(1) Air in the fluid, and loss of fluid due to internal pump leakage causing overflow	(1) Check for leaks and correct. Bleed system. Extremely cold temperatures will cause system aeration should the oil level be low. If oil level is correct and pump still foams, remove pump from vehicle and separate reservoir from body. Check welsh plug and body for cracks. If plug is loose or body is cracked, replace body
LOW PUMP PRESSURE	(1) Flow control valve stuck or inoperative.	(1) Remove burrs or dirt or replace. Flush system.
	(2) Pressure plate not flat against cam ring	(2) Correct
MOMENTARY INCREASE IN EFFORT WHEN TURNING WHEEL FAST TO RIGHT OR LEFT	(1) Low oil level in pump.	(1) Add power steering fluid as required
	(2) Pump belt slipping	(2) Tighten or replace belt
	(3) High internal leakage	(3) Check pump pressure. (See pressure test)
STEERING WHEEL SURGES OR JERKS WHEN TURNING WITH ENGINE RUNNING ESPECIALLY DURING PARKING	(1) Low oil level	(1) Fill as required
	(2) Loose pump belt	(2) Adjust tension to specification
	(3) Steering linkage hitting engine oil pan at full turn	(3) Correct clearance
	(4) Insufficient pump pressure	(4) Check pump pressure. (See pressure test). Replace flow control valve if defective
	(5) Sticking flow control valve	(5) Inspect for varnish or damage, replace if necessary
EXCESSIVE WHEEL KICKBACK OR LOOSE STEERING	(1) Air in system	(1) Add oil to pump reservoir and bleed by operating steering. Check hose connectors for proper torque and adjust as required

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Service Diagnosis (Continued)

Condition	Possible Cause	Correction
LOW PUMP PRESSURE	(1) Extreme wear of cam ring	(1) Replace parts. Flush system.
	(2) Scored pressure plate, thrust plate, or rotor	(2) Replace parts. Flush system
	(3) Vanes not installed properly	(3) Install properly
	(4) Vanes sticking in rotor slots	(4) Freeup by removing burrs, varnish, or dirt
	(5) Cracked or broken thrust or pressure plate	(5) Replace part

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(6) Open test gauge valve completely. Turn valve counterclockwise to open.

(7) Fill pump reservoir with power steering fluid as necessary.

(8) Operate engine until power steering fluid reaches normal operating temperature.

(9) Record initial gauge pressure with valve open. Initial pressure should be 80 to 125 psi. If pressure is 200 psi or more, check hoses for restrictions.

(10) Close test gauge valve fully; then open it. Perform this procedure three times and record highest pressure reading each time gauge valve is closed.

CAUTION: *Do not hold the test gauge valve closed for more than five seconds at a time as pump damage could occur.*

(11) If pressures are within 1100 to 1200 psi, and range of three readings are within 50 psi, pump is functioning within specifications.
For example, if pressures are 1150-1160-1170 psi, ranges are within 50 psi allowable variance and pump operation is OK.
If pressures recorded are high but do not repeat within 50 psi, flow control valve is sticking. Remove and clean valve and remove any burrs with crocus cloth or fine grit hone. If system contains dirt, flush system.

CAUTION: *The power steering system is a closed system. Contamination of fluid in either the pump or gear will be circulated into the other unit. If the system is exceptionally dirty, the pump and gear must be disassembled and cleaned and all hoses removed and flushed.*

(12) If pump performance is within specifications with valve open, turn steering wheel to left and right stops and record highest pressure. Compare readings with maximum pump output. If pump output cannot be repeated at either side of gear, gear is leaking internally and must be disassembled and repaired.

CAUTION: *Do not hold the steering wheel against the stops for more than five seconds at a time as pump damage may occur.*

(13) Stop engine and remove test gauge.
(14) Connect pressure hose to pump (or gear).
(15) Make necessary repairs and correct fluid level.
(16) Remove drip pan.

ON-CAR SERVICE

Pump Drive Belt Adjustment

Eight-Cylinder Engine

(1) Loosen air pump drive belt.

(2) Loosen two power steering pump mounting stud attaching nuts located at rear of pump mounting bracket.

(3) Inspect condition of drive belt and pump pulley. Replace belt if cracked, frayed, or torn. Replace pulley if bent, cracked, has rough V-groove, or is loose on pump shaft.

(4) Install ratchet handle on power steering pump adjusting bracket, pull drive belt taut, and tighten mounting stud nuts.

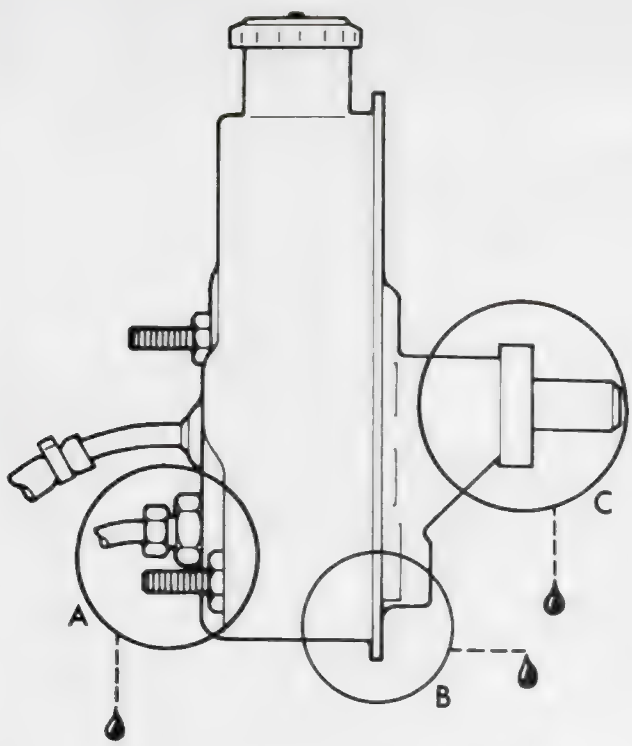
(5) Check belt tension using Gauge J-23600 and adjust belt tension as necessary (fig. 2K-109).
With used belt, set tension at 90 to 115 pounds (122.0 to 155.9 Nm). With new belt, set tension at 125 to 155 pounds (169.4 to 210.1 Nm).

(6) Tighten power steering pump mounting stud attaching nuts to 30 foot-pounds (40.6 Nm) torque.

(7) Adjust air pump drive belt. Check tension with Gauge J-23600 and adjust if necessary.
With used belt, set tension at 40 to 60 pounds (54.2 to 81.3 Nm) with new or used belt.

(8) Tighten air pump bracket bolt to 30 foot-pounds (40.6 Nm) torque. Tighten air pump adjusting bolt to 20 foot-pounds (27.1 Nm) torque.

PUMP LEAK POINTS AND CORRECTIVE ACTION



Corrective Action

If leak persists after tightening fitting nut to specified torque:

a. Loosen nut and rotate tubing to reseat. Tighten nut again and recheck. If leak persists, replace connector seats and hose.

b. Remove hose and check sealing face for cracks. If flare is cracked, replace hose. If not cracked, replace connector seats.

c. Replace brass connector seats and reface tube flare. Check threads in pump housing and on fitting nut. If nut threads are damaged, replace both housing and nut.

Tighten fitting to specified torque. If leak persists, replace both "O" ring seals.

Replace reservoir "O" ring.

Replace pump shaft seal.

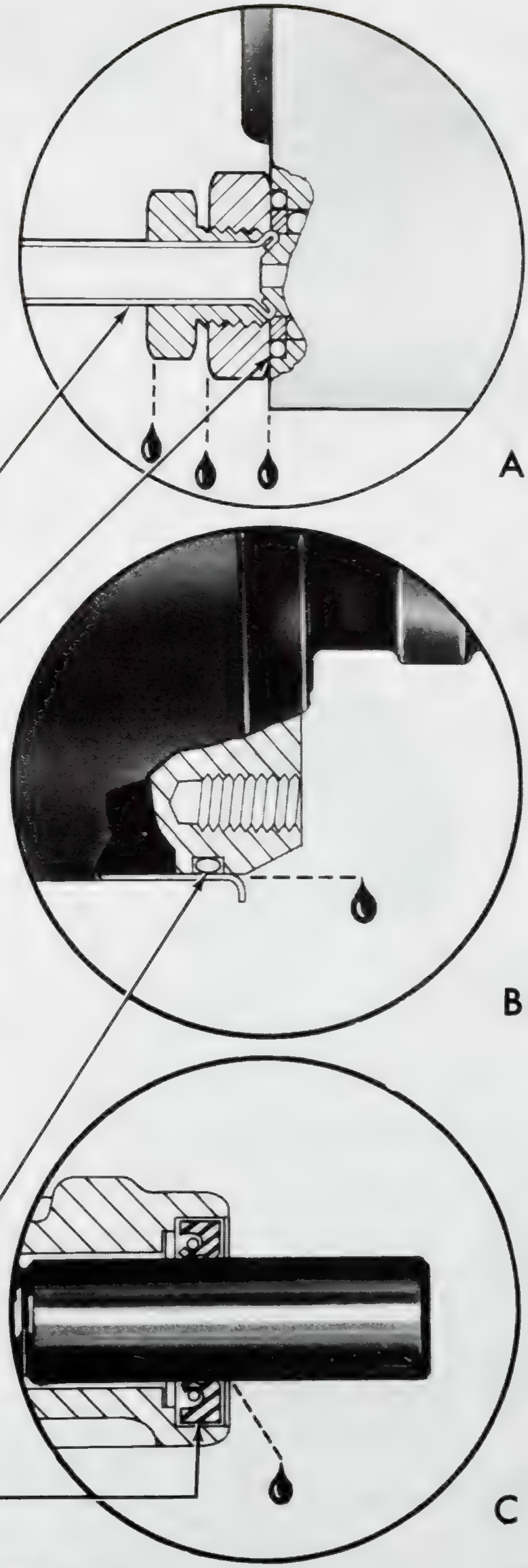
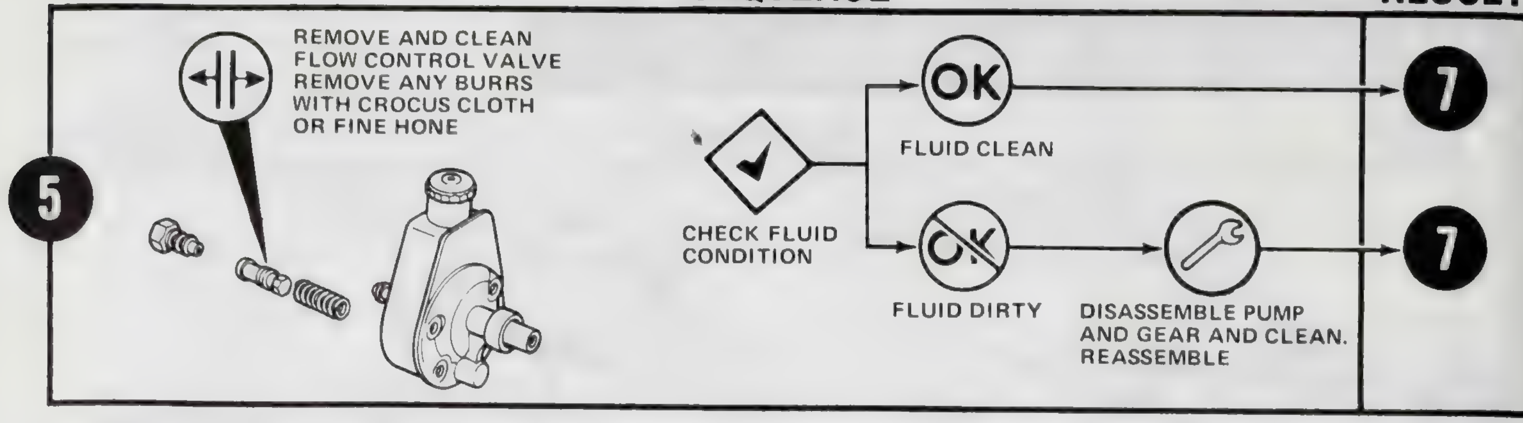
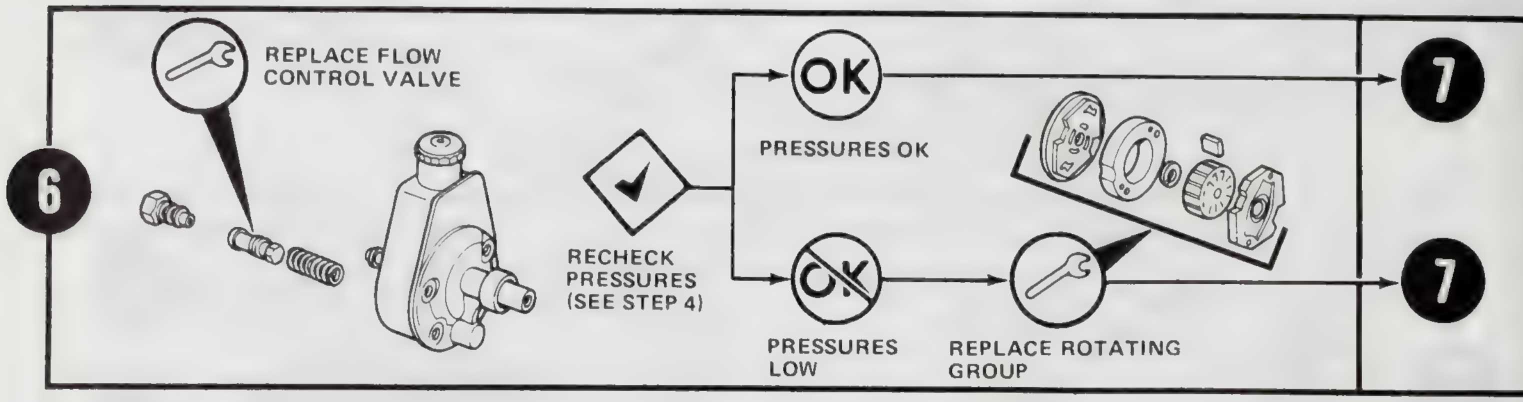
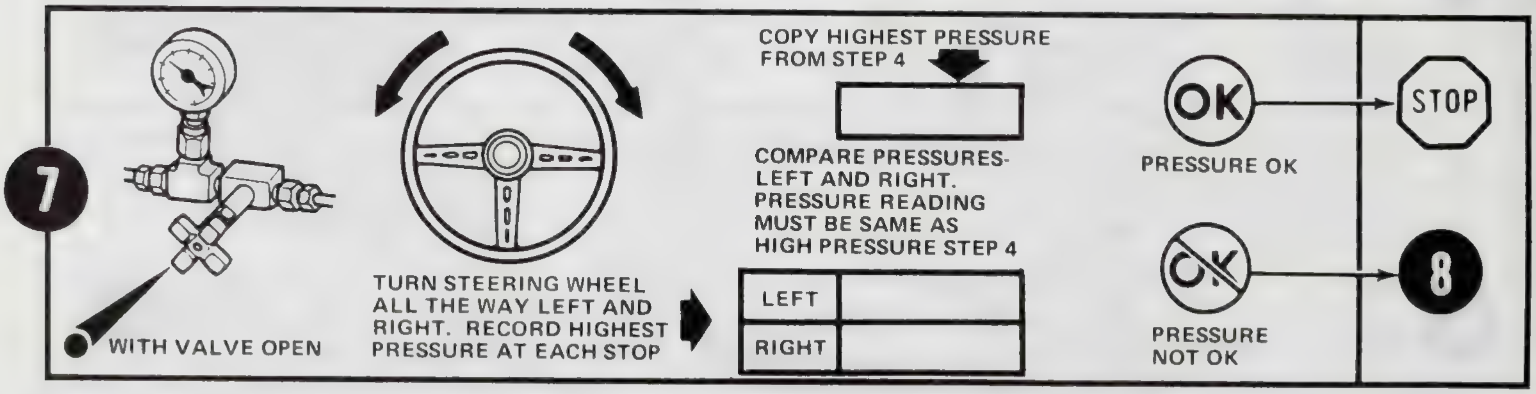


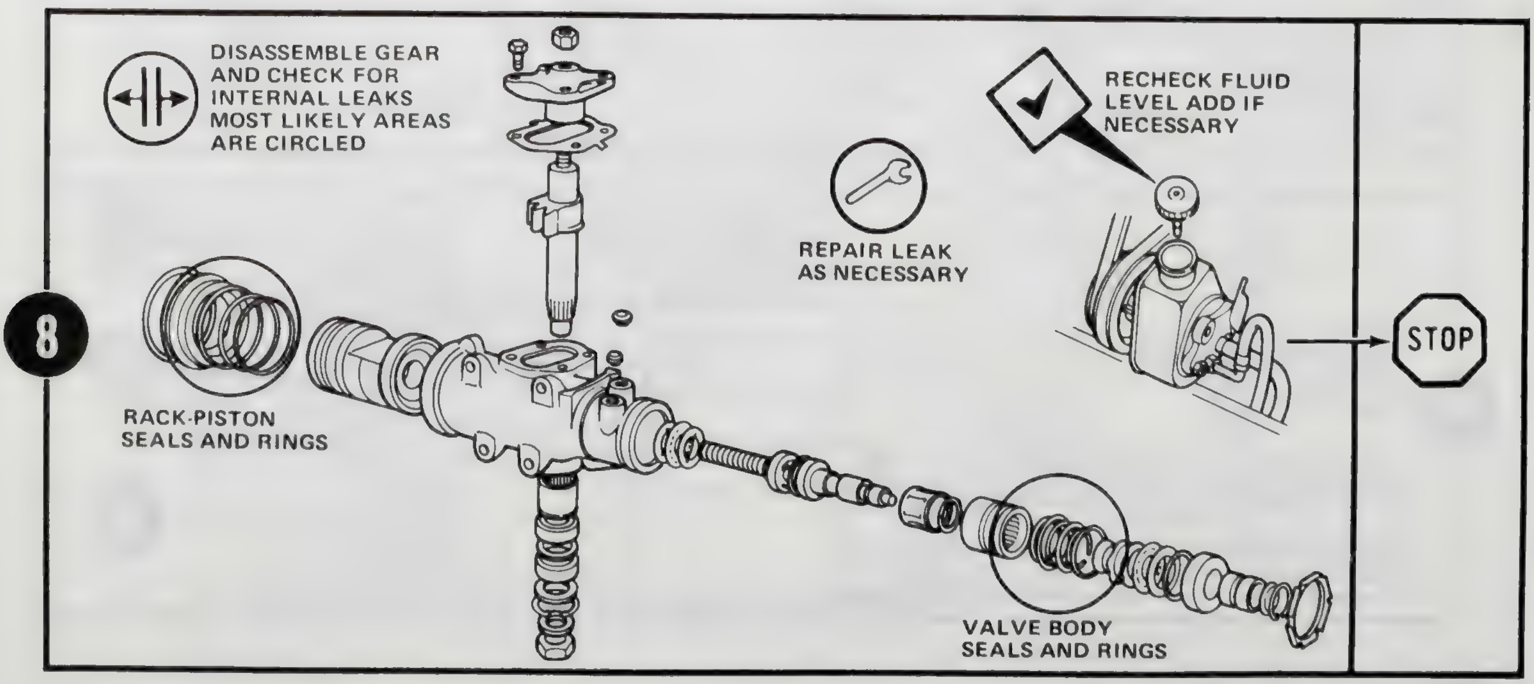
Fig. 2K-106 Pump Leak Diagram (View A)

STEP SEQUENCE RESULT









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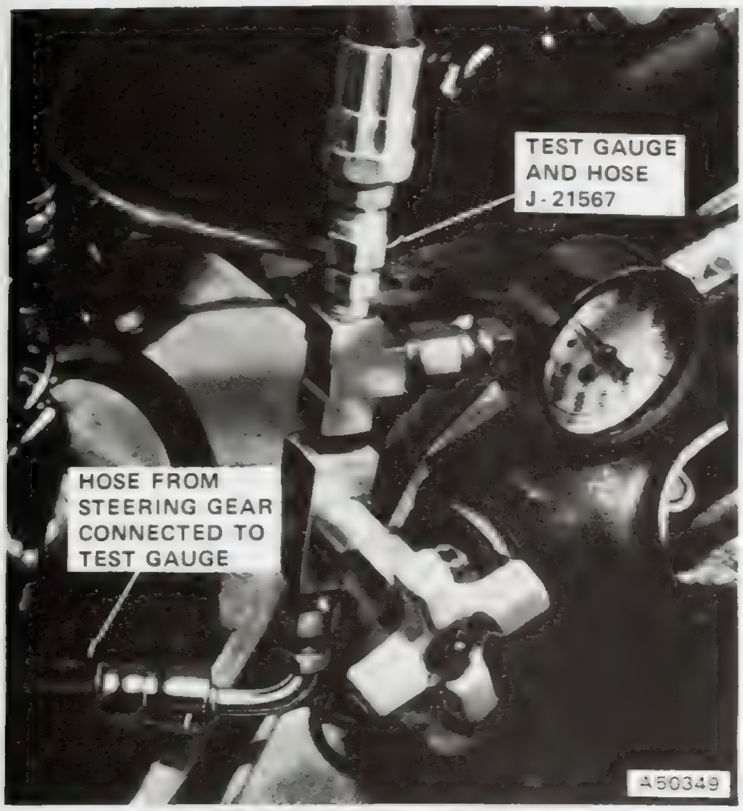


Fig. 2K-107 Test Gauge Set J-21567

Fig. 2K-108 Test Gauge Hose Connected To Pump Pressure Outlet

Six-Cylinder Engine

(1) Loosen air pump drive belt, if equipped.

(2) Loosen adjustment bolts attaching pump aluminum mounting bracket to pump front and rear stamped steel adapter plates (fig. 2K-110).

NOTE: *The bolt that attaches the pump adapter bracket to the rear mounting plate is located behind a flange in the rear mounting plate.*

(3) Inspect condition of drive belt and pump pulley. Replace belt if cracked, frayed, or torn. Replace pulley if bent, cracked, has rough V-groove, or is loose on pump shaft.

(4) Tighten belt using 1/2-inch (12.7 mm) drive ratchet handle. Insert ratchet handle drive lug in square adjusting lug hole in rear half of adapter pump bracket (fig. 2K-111), pull belt taut and tighten adapter bracket-to-mounting plate bolts.

(5) Check belt tension using Gauge J-23600 and readjust tension as necessary (fig. 2K-109). With used belt, set tension at 90 to 115 pounds (122.0 to 155.9 Nm). With new belt, set tension at 125 to 155 pounds (169.4 to 210.1 Nm).

(6) When belt tension is correct, tighten power steering pump to mounting bracket bolts to 30 foot-pounds (40.6 Nm) torque.

(7) Adjust air pump drive belt, if equipped. Check tension with Gauge J-23600 and readjust if necessary. With used belt, set tension at 40 to 60 pounds (54.2 to 81.3 Nm) with new or used belt.

(8) Tighten air pump bracket bolt to 30 foot-pounds (40.6 Nm) torque. Tighten air pump adjusting bolt to 20 foot-pounds (27.1 Nm) torque.

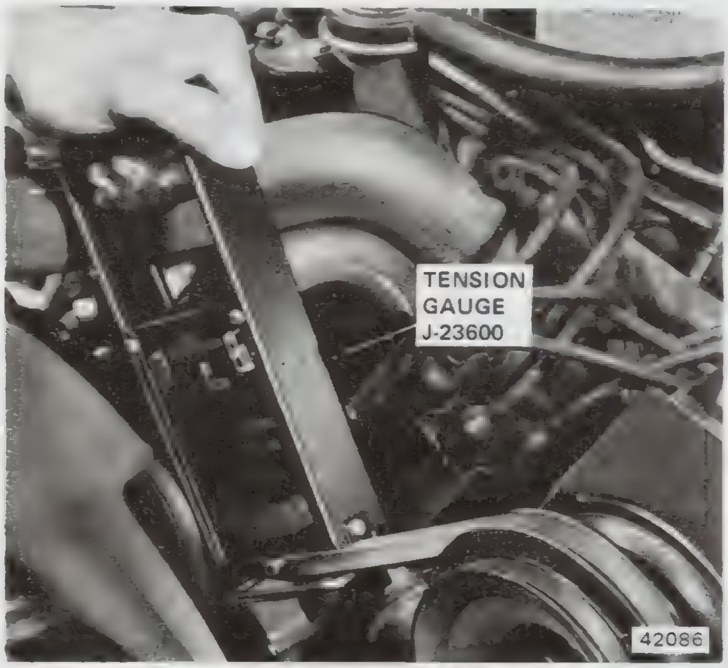


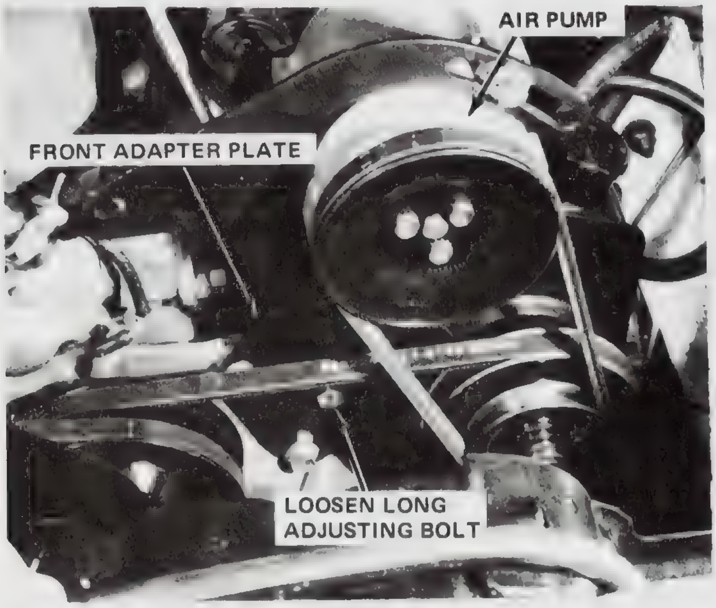
Fig. 2K-109 Checking Belt Tension

Four-Cylinder Engine

(1) Loosen adjuster locknuts retaining pump pivot bracket to rear mounting bracket (fig. 2K-112). Lower adjuster locknut is accessible from underneath car.

NOTE: *Except for the adjuster locknuts, all of the pump mounting bolts are metric sizes. The adjuster locknuts are loosened and tightened using a 9/16 box-end wrench having a 45° offset.*

(2) Insert square drive lug of ratchet handle in pivot bracket and move pump away from engine to tighten belt (fig. 2K-113).



VIEW-A

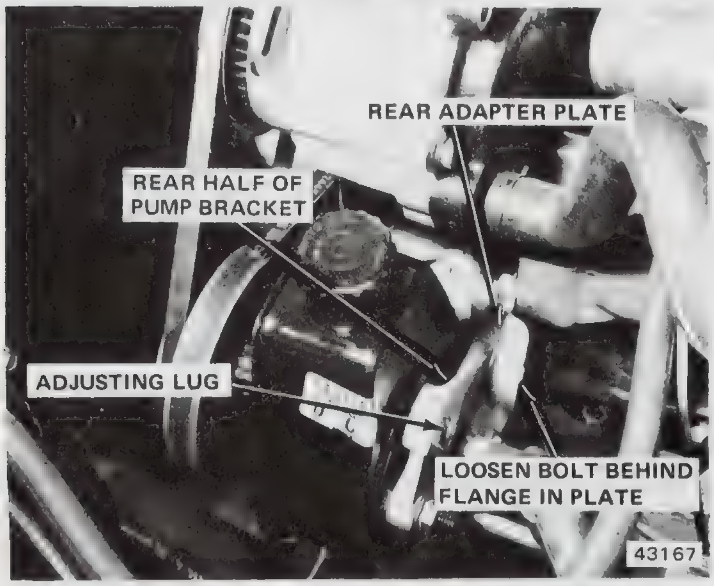


Fig. 2K-110 Adjustment Bolt Location—Six-Cylinder

VIEW-B

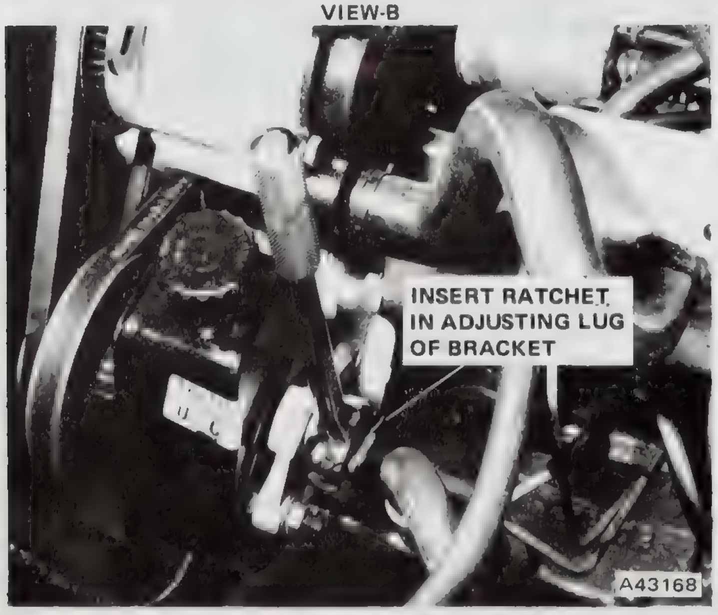


Fig. 2K-111 Belt Adjustment—Six-Cylinder

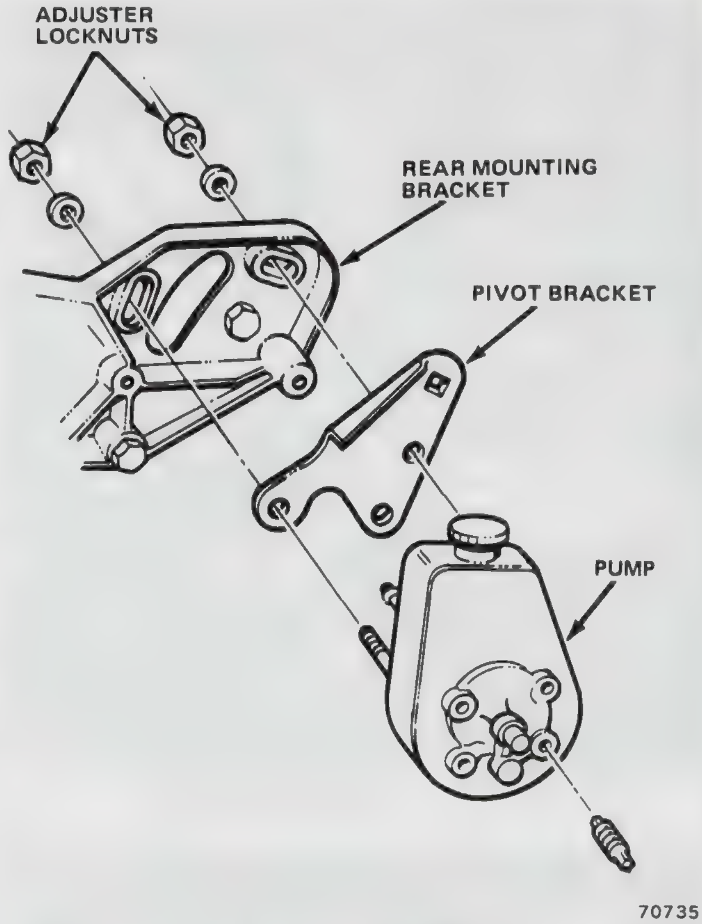


Fig. 2K-112 Belt Adjustment Components—Four-Cylinder

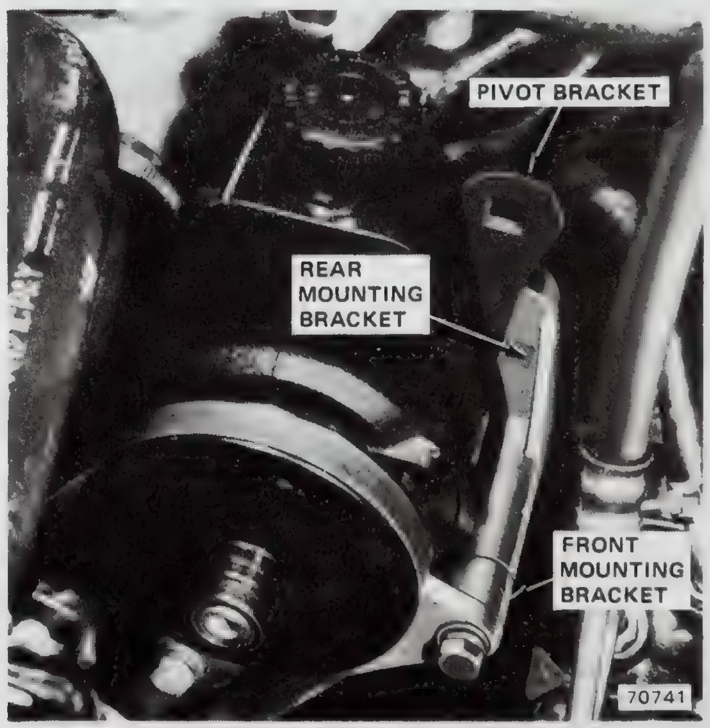


Fig. 2K-113 Belt Adjustment—Four-Cylinder

(3) Tighten locknuts securely and check belt tension using Gauge J-23600. With used belt, tension should be 90 to 115 pounds (122.0 to 155.9 Nm). With new belt, tension should be 125 to 155 pounds (169.4 to 210.1 Nm).

(4) Readjust belt tension as necessary and tighten locknuts to 28 foot-pounds (37.9 Nm) torque.

Pump Shaft Seal and Pump Pulley Replacement

NOTE: *On cars equipped with six-cylinder engines, the power steering pump must be removed in order to replace the shaft seal or pump pulley. Replacement procedures for the seal and pulley are outlined in the following procedure:*

(1) Position drip pan under power steering pump.

(2) Remove air pump drive belt, if equipped.

(3) On eight-cylinder models loosen pump mounting stud nuts (at rear of pump mounting bracket), move pump toward engine and remove belt.

(4) On four-cylinder models, loosen adjuster locknuts, move pump toward engine and remove belt.

(5) Remove pump pulley using Remover Tool J-25034 (fig. 2K-114).

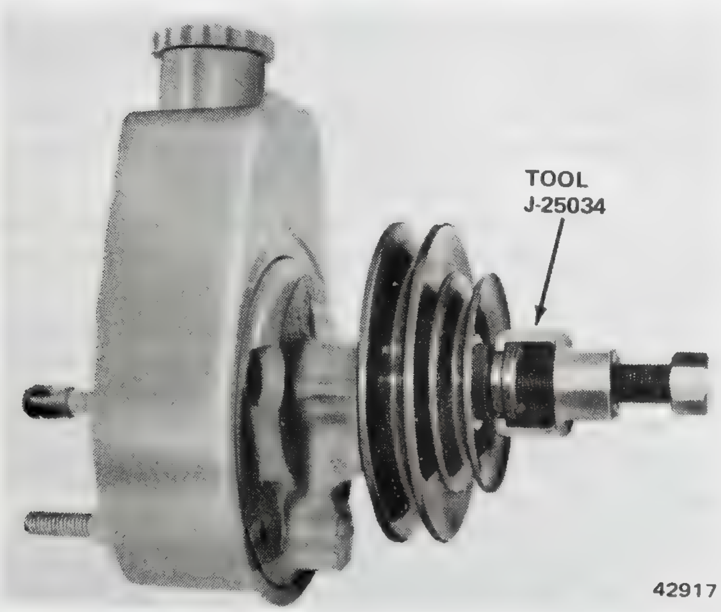


Fig. 2K-114 Pump Pulley Removal

(6) Install seal Remover Tool J-8842 over pump shaft, thread tool into seal, and turn tool bolt to remove seal.

(7) Lubricate replacement seal with power steering fluid and install seal using Installer Tool J-8841.

(8) Install pulley using Installer Tool J-25033 (fig. 2K-115).

(9) Install pump belt. Adjust belt tension as outlined under Power Steering Pump Drive Belt Adjustment.

(10) Install air pump drive belt, if equipped. Adjust belt tension as outlined under Power Steering Pump Drive Belt Adjustment.

Fig. 2K-115 Pump Pulley Installation

(11) Refill power steering pump reservoir.

(12) Start engine and check for leaks. If leaks are not evident, stop engine and add fluid to reservoir if necessary.

(13) Remove drip pan.

Flow Control Valve Replacement

(1) Position drip pan under engine.

(2) Disconnect and cap pump pressure hose.

(3) Remove pump union and union seal.

(4) Using magnet, remove flow control valve and spring.

(5) Insert replacement flow control valve in valve spring and install assembly in pump housing.

(6) Install pump union and replacement seal and tighten union to 35 foot-pounds (47.4 Nm) torque.

(7) Connect hose and tighten fitting to 35 foot-pounds (47.4 Nm) torque.

(8) Refill reservoir, start engine, and check for leaks. If leaks are not evident, stop engine and remove drip pan.

PUMP REMOVAL

Eight-Cylinder Engine

(1) Position drain pan under power steering pump.

(2) Remove fuel vapor storage canister.

(3) Disconnect both hoses at power steering pump. Cap hoses and pump fittings to prevent dirt entry and oil drainage.

(4) Remove air pump belt adjusting strap and remove air pump drive belt.

(5) Remove two power steering pump mounting stud nuts located at rear of two-piece pump mounting bracket and remove drive belt from pump pulley.

(6) Remove bolts that attach air pump support strap to air pump and front half of power steering pump mounting bracket.

(7) Remove nut from stud in water pump housing that supports front half of power steering pump bracket.

(8) Remove power steering pump and front half of pump mounting bracket.

Six-Cylinder Engine With A/C

(1) Remove ambient air induction flexible hose.

(2) Remove air pump belt adjusting bolt and pivot stud.

(3) Remove air pump drive belt.

(4) Loosen A/C compressor drive belt and slide belt off idler pulley.

(5) Remove A/C compressor drive belt pulley and pulley bracket as assembly.

(6) Remove power steering pump pivot bolt.

(7) Remove bolt attaching lower edge of pump mounting bracket to engine block.

(8) Remove pump adjusting bracket stud nuts.

(9) Remove bolt attaching pump to rear mounting bracket.

(10) Slide pump drive belt off pulley.

(11) Pull pump and pump front mounting bracket assembly forward until bracket clears air pump pivot stud.

(12) Remove air pump pivot stud and move pump aside.

(13) Disconnect power steering pump hoses and remove pump.

(14) Position drain pan under power steering pump.

Six-Cylinder Engine Less A/C

(1) Remove air pump drive belt.

(2) Remove air pump pivot stud nut.

(3) Remove power steering pump adjusting stud nuts.

(4) Remove power steering pump pivot bolt and remove pump drive belt.

(5) Disconnect power steering pump hoses.

(6) Remove bolts attaching power steering pump bracket to engine and remove pump.

Four-Cylinder Engine

(1) Remove adjuster locknuts and lockwashers retaining pump and pivot bracket to pump mounting bracket. Lower adjuster is accessible from underneath car.

NOTE: *Except for the adjuster locknuts, all of the pump mounting bolts are metric sizes. The adjuster locknuts are loosened and tightened using a 9/16 box-end wrench having a 45° offset.*

(2) Move pump toward engine and remove pump belt.

(3) Loosen return hose clamp and slide clamp back along hose.

(4) Pull pump forward and disconnect both hoses.

(5) Remove bolts attaching pump front mounting bracket to rear mounting bracket and engine block. Remove pump, pivot bracket, and front mounting bracket as assembly.

PUMP INSTALLATION

Eight-Cylinder Engine

(1) Install front half of pump mounting bracket on locating stud on power steering pump and install pump and bracket.

(2) Install lockwashers, nuts, and bolts that attach pump and mounting brackets to engine. Tighten pump mounting stud nuts finger-tight only. Tighten all other mounting bolts and nuts to 30 foot-pounds (40.6 Nm) torque.

(3) Install air pump support and adjusting straps. Tighten adjusting strap bolt finger-tight only. Tighten other bolts to 30 foot-pounds (40.6 Nm) torque.

(4) Remove caps from hoses and power steering pump fittings and connect hoses to pump. Tighten pressure hose to 35 foot-pounds (47.4 Nm) torque.

(5) Fill pump with power steering fluid and bleed air from pump by rotating pump pulley counterclockwise until bubbles cease to appear in fluid.

(6) Install air pump and power steering pump drive belts and adjust tension as outlined under Power Steering Pump Belt Adjustment.

(7) Install fuel vapor storage canister.

(8) Check pump operation as outlined under Fluid Level and Initial Operation.

(9) Remove drain pan.

Six-Cylinder Engine With A/C

(1) Connect hoses to power steering pump.

(2) Install air pump pivot stud and air pump.

(3) Position power steering pump on engine block and install bolt attaching pump to rear mounting bracket.

(4) Install power steering pump adjusting stud nuts.

(5) Install power steering pump belt on pump pulley.

(6) Install bolt attaching lower edge of power steering pump mounting bracket to engine block.

(7) Install power steering pump pivot bolt.

(8) Install A/C compressor drive belt pulley and bracket assembly.

(9) Install drive belt on in compressor pulley.

(10) Install drive belt on air pump pulley.

(11) Install nut on air pump pivot stud.

(12) Install air pump belt adjusting bolt.

(13) Adjust all drive belts. Refer to Pump Drive Belt Adjustment for procedure and belt tension specifications.

(14) Install ambient air induction flexible hose.

(15) Fill power steering pump to correct level and bleed air from system. Refer to Fluid Level and Initial Operation.

(16) Install front adapter plate and aluminum mounting bracket on power steering pump, if removed.

Six-Cylinder Engine Less A/C

(1) Position pump on engine and mounting bracket and install adjusting stud nuts.

(2) Install bolts attaching pump mounting bracket to engine.

(3) Connect hoses to pump.

(4) Install pump pivot bolt and install pivot bolt nut.

(5) Install air pump and power steering pump drive belts on pump pulleys.

(6) Fill power steering pump to correct level and bleed air from system. Refer to Fluid Level and Initial Operation.

Four-Cylinder Engine

(1) Position pump, front mounting bracket, and pivot bracket on rear mounting bracket and connect pressure and return hoses to pump. Tighten pressure hose fitting to 38 foot-pounds (51.5 Nm) torque.

(2) Install front bracket-to-rear bracket bolts. Tighten bolts to 25 foot-pounds (33.9 Nm) torque. Tighten front bracket-to-engine block bolt to 16 foot-pounds (21.6 Nm) torque.

(3) Slide return hose clamp into position and tighten hose clamp.

(4) Install adjuster locknuts and lockwashers.

(5) Adjust pump belt as outlined in Pump Drive Belt Adjustment.

PUMP DISASSEMBLY

(1) Remove pump mounting brackets as necessary.

(2) Remove reservoir filler cap and drain oil from pump reservoir.

(3) Reinstall reservoir filler cap and wash pump exterior in solvent to remove dirt.

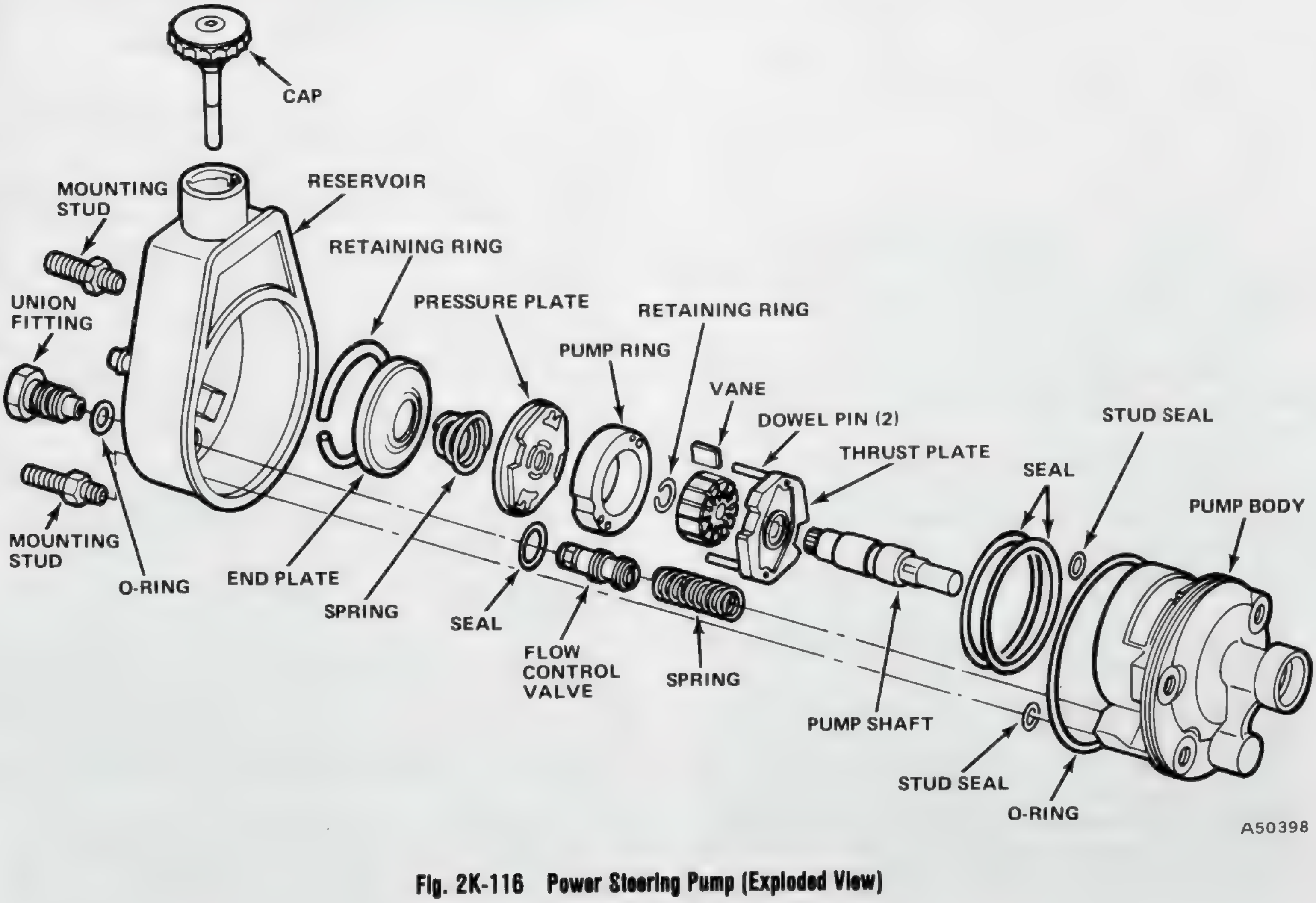


Fig. 2K-116 Power Steering Pump (Exploded View)

(4) Remove pump pulley using tool J-25034 (fig. 2K-114).

(5) Clamp pump front hub in vise so pump shaft is pointing downward. Do not overtighten vise as bearing may be distorted.

(6) Remove pump union and mounting studs and discard seals and O-rings (fig. 2K-116).

(7) Remove reservoir by rocking it lightly back and forth to unseat O-ring.

(8) Remove reservoir O-ring.

(9) Remove mounting stud and union seals from counterbored spaces in housing and discard seals.

(10) Remove end plate retaining ring. Insert small punch in 1/8-inch (3.1 mm) diameter hole in housing opposite flow control valve hole, compress retaining ring using punch, and remove ring by inserting screwdriver under ring and twisting screwdriver (fig. 2K-11.

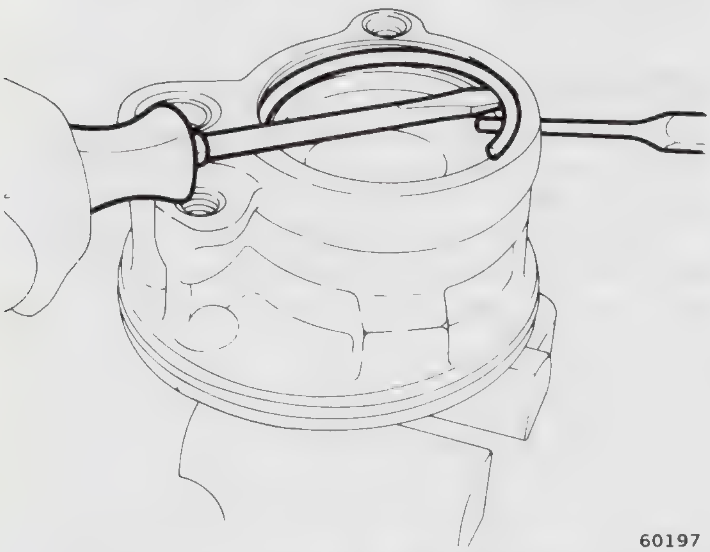


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Fig. 2K-117 End Plate Retaining Ring Removal

(11) Remove end plate. If plate should stick, rock it lightly or tap it with plastic hammer to loosen.

(12) Remove pump from vise.

(13) Remove flow control valve and valve spring. Turn pump over and let valve and spring slide out of bore.

(14) Tap end of pump shaft using plastic hammer untip pressure plate, pump ring, rotor assembly, and thrust plate can be removed as assembly (fig. 2K-118).

(15) Remove snap ring from pump shaft and remove rotor and thrust plate from shaft. Do not drop rotor blades.

(16) Remove end plate O-rings and shaft seal. Do not damage pump body bore.

CLEANING AND INSPECTION

Clean all metal parts in solvent. Air dry the parts or wipe them dry with a clean lint-free cloth. Inspect the flow control valve to be sure it slides freely in the pump body bore. If the valve sticks check for dirt or burrs. Burrs may be removed using crocus cloth.

Fig. 2K-118 Pump Shaft Assembly Removal

NOTE: *The flow control valve is serviced as an assembly only and must not be disassembled.*

Check the capscrew in the end of the flow control valve for looseness. If loose, tighten the screw but be careful to avoid damaging machined surfaces.

Inspect the pressure plate and pump plate surfaces for flatness and for being parallel with the pump ring. Check all parts for cracks and scoring.

NOTE: *A high polish is always present on the rotor pressure plate and thrust plate as a result of normal wear. Do not confuse this with scoring.*

Inspect all rotor vanes for free movement in the rotor slots and check the pump drive shaft for worn splines, cracks, or other defects.

PUMP ASSEMBLY

NOTE: *Do not allow dirt to enter the pump during assembly. All parts must be clean and lubricated with power steering fluid. Install replacement seals, snap rings and O-rings only during assembly. Used, damaged, or worn seals will cause leaks, noise, and rapid wear after assembly.*

(1) Install pump shaft seal using tool J-8841 (fig. 2K-119).

Fig. 2K-119 Pump Shaft Seal Installation

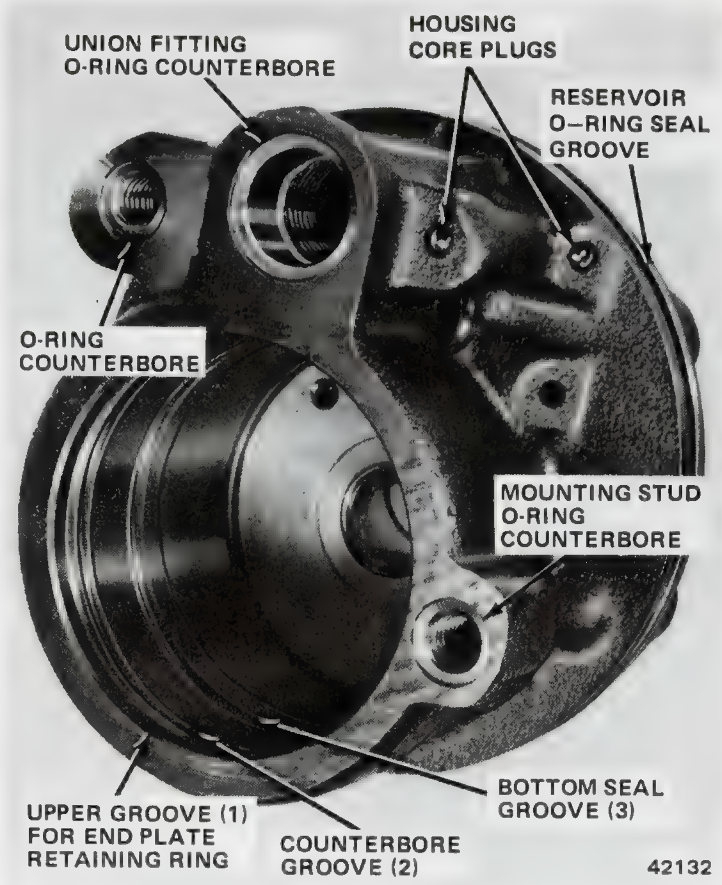

Fig. 2K-120 Pump Housing

(2) Install pressure plate and install seal in third groove of pump body bore (fig. 2K-120).

(3) Clamp pump body in vise with shaft end facing downward. Do not overtighten vise as bearing could be damaged.

(4) Insert both dowel pins in thrust plate (fig. 2K-121).

(5) Insert splined end of pump shaft through thrust plate and rotor and install snap ring on shaft. Open snap ring only enough to slide it over end of shaft (fig. 2K-122). Rotor must move freely on splines.

(6) Install pump shaft assembly in pump body. Be sure dowel pins are properly engaged in.

(7) Install pump ring on dowel pins with pump rotation arrow facing upward (fig. 2K-122 and 2K-123).

(8) Install all 10 rotor vanes in rotor slots with rounded edges of vanes facing outward (fig. 2K-124).

(9) Lubricate outside diameter and chamfered edge of pressure plate with petroleum jelly.

(10) Install plate on dowel pins with plate spring groove facing upward.

(11) Place large socket on top of pressure plate and press plate downward about 1/16 inch (1.5 mm) to seat plate.

(12) Lubricate end plate seal with petroleum jelly and install in second groove of pump body bore (fig. 2K-120).

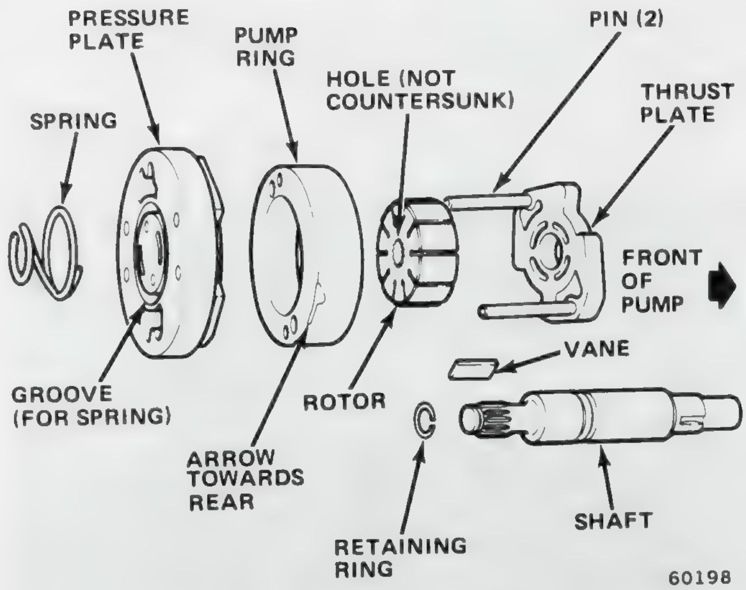

Fig. 2K-121 Pump Shaft Assembly Sequence

(13) Install spring in center groove of pressure plate.

(14) Lubricate end plate outside diameter with petroleum jelly and install plate in pump body.

(15) Press end plate downward and install end plate retaining ring (fig. 2K-125).

(16) Install spring on hex-end of flow control valve.

(17) Install flow control valve assembly in pump bore with hex-end of valve facing interior of bore (fig. 2K-116).

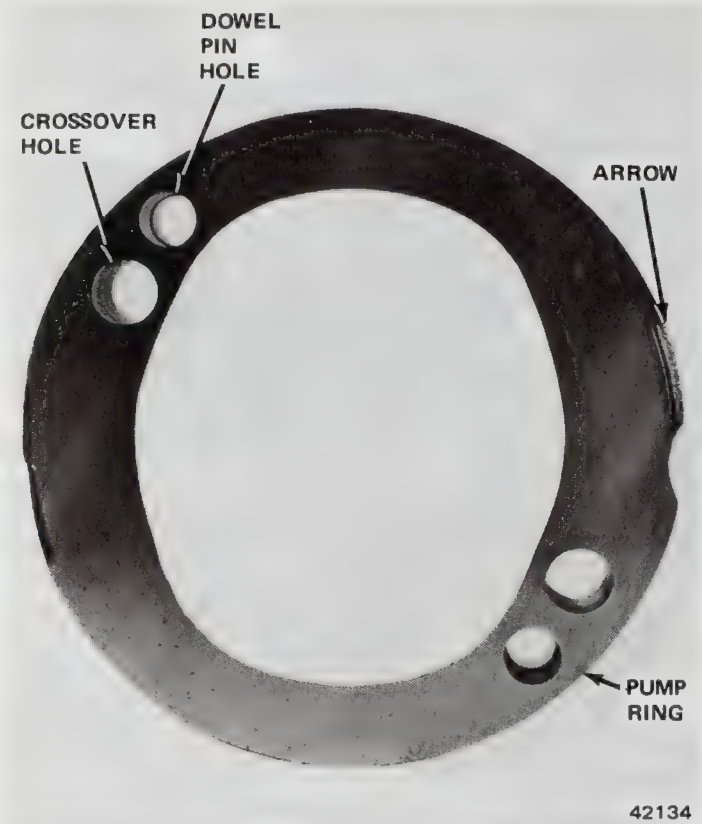

Fig. 2K-122 Pump Ring Dowel Hole Identification

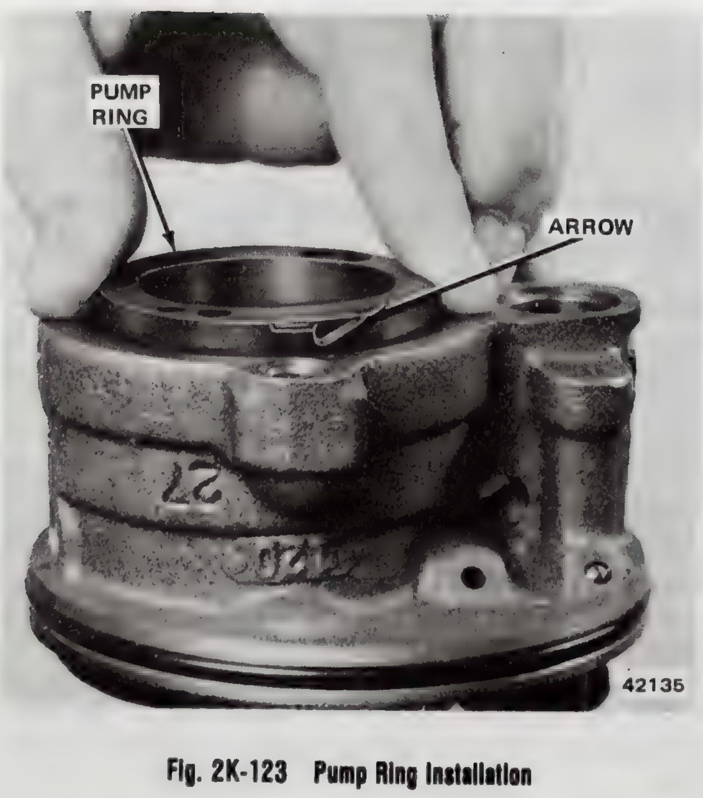

Fig. 2K-123 Pump Ring Installation

(18) Install mounting stud seals and pump union seal in counterbored holes in pump body (fig. 2K-120).

(19) Install reservoir O-ring on pump body.

(20) Lubricate inner edge of reservoir with petroleum jelly and position reservoir on pump body. Press reservoir downward to seat it on pump body.

NOTE: *When installing the reservoir, take care to avoid damaging the O-ring seal. While applying pressure to the reservoir to seat it, guide the seal into the seal grooves using a wooden or plastic tool.*

(21) Check alignment of mounting stud seals after seating reservoir. Realign seals if necessary.

(22) Install mounting studs and tighten studs to 35 foot-pounds (47.4 Nm) torque.

(23) Install seal on pump union and install union in flow control valve bore. Tighten union to 35 foot-pounds (47.4 Nm) torque.

(24) Install pump pulley using tool J-25033 (fig. 2K-115).

FLUID LEVEL AND INITIAL OPERATION

(1) Fill pump reservoir with power steering fluid.

(2) Operate engine until fluid reaches normal operating temperature of approximately 170°F (76.6°C).

(3) Operate engine at curb idle speed and add fluid to reservoir until level is at COLD mark on dipstick.

(4) Turn wheels to full left-turn position and add fluid to reservoir until level is at COLD mark on dipstick.

(5) Bleed system by turning wheels to left and right without contacting steering stops. Maintain reservoir fluid level just above pump body. Aerated fluid will have a milky color. Continue to turn wheels to left and right until air is purged from fluid.

(6) Return wheels to straight-ahead position and operate engine for additional 2-3 minutes then stop engine.

(7) Road test car to verify proper operation of power steering system.

(8) Recheck fluid level. After system has stabilized at operating temperature, fluid level should be at HOT mark on dipstick. Add fluid to reservoir as necessary.

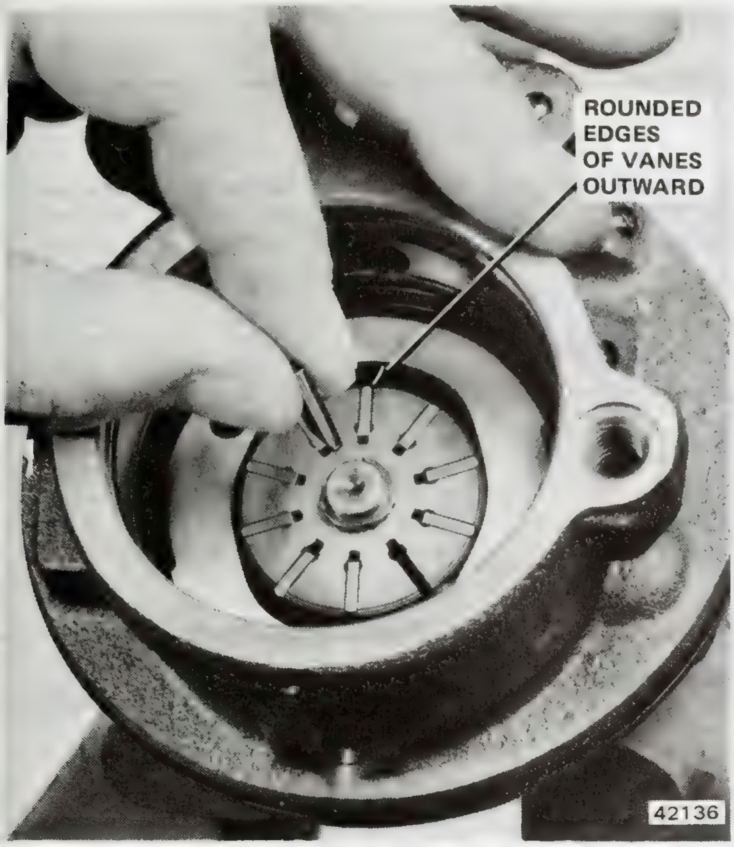

Fig. 2K-124 Rotor Vane Installation

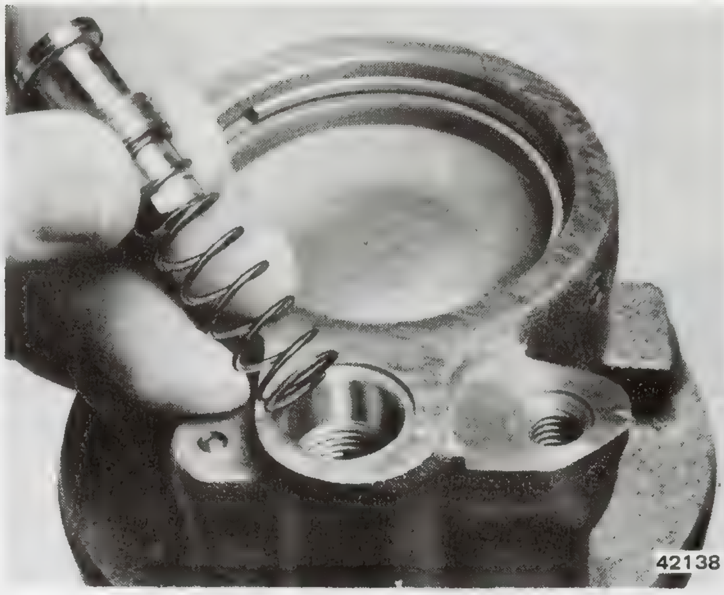

Fig. 2K-126 Flow Control Valve and Spring Installation

Fig. 2K-125 End Plate and Retaining Ring Installation

SPECIFICATIONS

Pump Operating Specifications

Pump Operating Pressure — PSI

Idle	80-125
Turning	400
Full Stop	
Four and Six-Cylinder	1000-1100
Eight-Cylinder	1100-1200

Lubricants and Fluids . . . . Use AMC power steering Fluid, Dexron, or equivalent

	Initial Pounds New Belt	Reset Pounds Used Belt
Drive Belt Tension Specifications:		
Air Conditioner	125-155	90-115
Air Pump		
(All except Six-Cylinder w/AC)	125-155	90-115
Six-Cylinder w/AC (3/8-inch belt)	65-75	60-70
Fan	125-155	90-115
Idler Pulley	125-155	90-115
Power Steering Pump	125-155	90-115

Torque Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft.lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Air Pump To Bracket Mounting Stud Nut	27	20-30	20	15-22
Air Pump Strap Bolt	41	34-47	30	25-35
Air Pump Adjusting Strap To Pump	27	20-30	20	15-22
Power Steering Hose Fittings At Gear	34	27-41	25	20-30
Power Steering Pump Adapter Bolt	31	24-38	23	18-28
Power Steering Pump Adjuster Locknuts	38	32-44	28	24-32
Power Steering Pump Adjusting Bolt	48	41-54	35	30-40
Power Steering Pump Front and Rear Bracket To Block Bolt	45	38-52	33	28-38
Power Steering Pump Front Bracket To Rear Bracket Bolt	34	29-39	25	21-29
Power Steering Pump Mounting Bolt	38	34-48	28	25-35
Power Steering Pump Pivot Stud	38	32-44	28	24-32
Power Steering Pump Rear Bracket To Block Bolt (Front)	45	38-52	33	28-38
Power Steering Pump Rear Bracket To Block Bolt (Side)	22	19-25	16	14-18
Power Steering Pump Union	52	41-61	38	30-45

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

70353

Special Tools

70356A

STEERING LINKAGE 2L

SECTION INDEX

GENERAL

Two steering linkage designs are used in AMC cars. Gremlin, Concord, AMX and Matador models use the Ackerman system of articulated-type linkage to interconnect the steering gear and front wheels. Pacer models use a rack and pinion steering gear with integral linkage that connects steering gear and front wheels directly.

The steering linkage provides a method for connecting the front wheels to the steering gear. Turning effort applied at the steering wheel is transmitted to the steering gear where it is multiplied and transferred to the front wheels through the interconnecting linkage.

STEERING LINKAGE—GREMLIN-CONCORD-AMX-MATADOR

The Ackerman system of articulated linkage is used on these models. This is a parallogram design linkage having five main components: two adjustable tie rod assemblies, one center link, one pitman arm, and one idler arm (fig. 2L-1).

All linkage components are connected by spring-loaded nonadjustable ball studs. Only the idler arm-to-bracket bushing and tie rod ball studs, which connect to the center link, have removable plugs for lubrication purposes. All other ball studs are permanently lubricated and sealed during manufacture. Refer to Chapter B for lubrication intervals.

Each tie rod assembly consists of a tie rod, tie rod end, and adjusting tube and clamps. The threaded tube connects the tie rod and tie rod end which have left- and right-hand threads to allow toe-in adjustment. The tie rod end is connected to the steering arm and the tie rod is connected to the center link. Only the tie rod ball studs require lubrication.

The pitman arm connects the steering gear to the linkage and also supports the left side of the linkage. It is splined to the steering gear pitman shaft and is connected to the center link by a ball stud.

The idler arm supports the right side of the linkage. It is bolted to the frame side sill and is connected to the center link by a ball stud. On Matadors, the idler arm has a replaceable bushing. On all other models, the idler arm-to-bracket bushing has a removable plug for periodic lubrication.

The center link connects the tie rod assemblies, pitman arm, and idler arm together to form the steering linkage.

Operation

The steering linkage in the straight-ahead position is shown in Figure 2L-2. When the steering wheel is turned, the steering gear rotates the pitman arm which moves the center link to one side or the other. The center link then moves both tie rod assemblies which turn the front wheels on the pivoting knuckles (fig. 2L-3).

Steering Linkage Service

Tie Rod Ends

(1) Raise and support front of car.

(2) Remove cotter pin and retaining nut from tie rod end.

(3) Loosen adjuster tube clamp bolts

(4) Disconnect tie rod end using Remover Tool J-21628 on Gremlin, Concord, and AMX or Tool J-3295 on Matadors.

(5) Remove tie rod end from adjuster tube.

(6) Install replacement tie rod end in adjuster tube.

(7) Insert tie rod end ball stud in steering gear arm and install retaining nut. Tighten nut to 35 foot-pounds (47.5 Nm) torque and install replacement cotter pin. Do not loosen nut to align nut slots with cotter pin in ball stud.

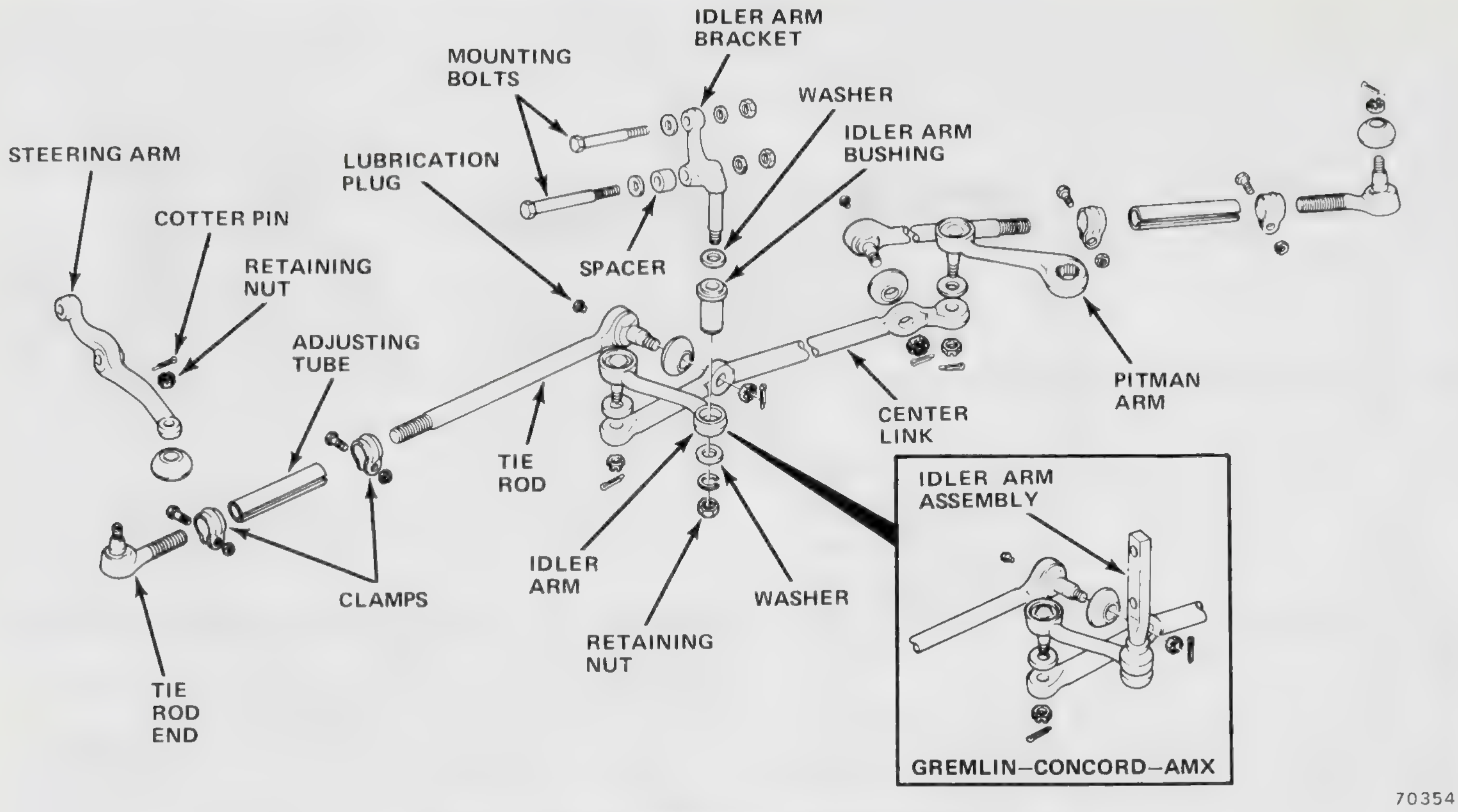

Fig. 2L-1 Steering Linkage—Gremlin-Concord-AMX-Matador

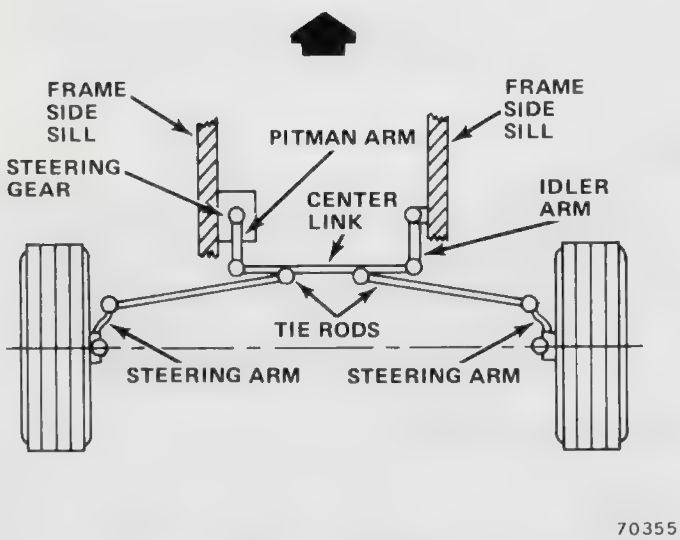

Fig. 2L-2 Steering Linkage—Straight-Ahead Position

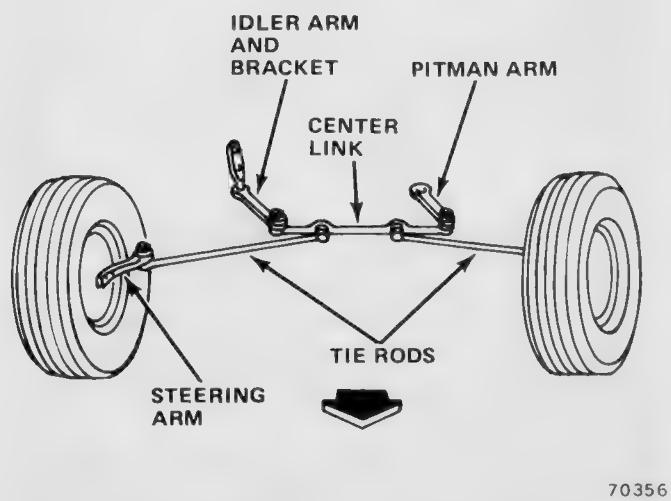

Fig. 2L-3 Steering Linkage—Turn Position

(8) Adjust toe-in as outlined under Toe-In Adjustment and tighten adjusting tube clamp bolts to 14 foot-pounds (18.4 Nm) torque.

(9) Remove supports and lower car.

Idler Arm and Bracket—Gremlin-Concord-AMX

NOTE: *The idler arm and bracket used on these models is serviced as an assembly only. Do not attempt to disassemble these parts.*

(1) Raise and support front of car.

(2) Remove idler arm ball stud retaining nut and cotter pin and disconnect arm at center link using Remover Tool J-21628.

(3) Remove bolts attaching idler arm bracket to frame side sill and remove idler arm.

(4) Install replacement idler arm and bracket. Install and tighten bracket-to-frame side sill bolts to 50 foot-pounds (67.8 Nm) torque.

(5) Insert idler arm ball stud in center link and nstall retaining nut. Tighten nut to 40 foot-pounds (54.3 Im) torque. Do not loosen nut to align nut slots and otter pin hole in ball stud.

(6) Remove supports and lower car.

ler Arm Bushing—Matador

(1) Raise and support front of car.

(2) Remove idler arm-to-bracket retaining nut and otter pin.

(3) Remove bolts attaching idler arm bracket to ame side sill and remove bracket, bushing washers, nd spacer.

(4) Remove idler arm ball stud retaining nut and otter pin and remove idler arm.

(5) Press bushing out of idler arm using socket and rbor press.

(6) Install replacement bushing using 1-1/8 socket nd arbor press. Place socket on bushing flange and ress bushing into arm until clearance between bushing ange and surface of arm is 0.070 inch (1.7780 mm) (fig. L-4).

(7) Assemble idler arm and bracket. Hand-tighten ler arm-to-bracket retaining nut only.

(8) Insert idler arm ball stud in center link. Hand-ghten ball stud retaining nut only.

(9) Align bracket with mounting bolt holes in frame de sill and install mounting bolts. Tighten bolts to 50 ot-pounds (67.8 Nm) torque.

(10) Tighten idler arm-to-bracket retaining nut to 55 ot-pounds (74.6 Nm) torque.

(11) Tighten idler arm ball stud retaining nut to 40 ot-pounds (54.3 Nm) torque and install replacement otter pin. Do not loosen nut to align nut slots with otter pin hole in ball stud.

(12) Remove supports and lower car.

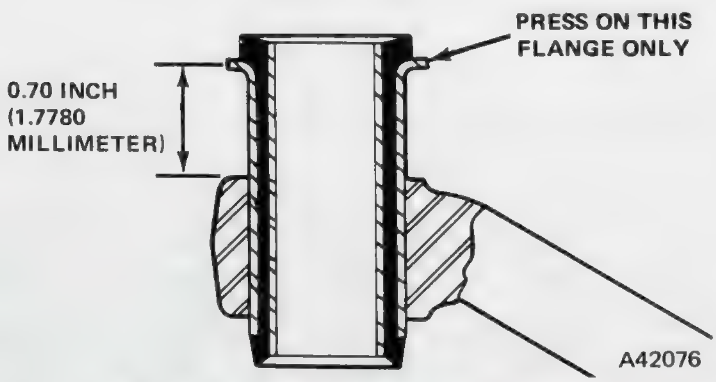

Fig. 2L-4 Idler Arm and Bushing—Matador

tman Arm

(1) Raise and support front of car.

(2) Remove pitman arm nut and remove pitman rm from steering gear pitman shaft using Remover ool J-5566-04. Mark position of arm for assembly align-ent reference.

(3) Remove pitman arm ball stud retaining nut and cotter pin and remove pitman arm.

(4) Install replacement pitman arm on steering gear pitman shaft and insert pitman arm ball stud in center link.

(5) Install pitman arm nut. Tighten nut to 115 foot-pounds (155.9 Nm) torque and stake nut to pitman shaft threads in one place to properly retain nut.

(6) Tighten pitman arm ball stud nut to 40 foot-pounds (54.3 Nm) torque and install replacement cotter pin. Do not loosen nut to align nut slots with cotter pin hole in ball stud.

(7) Remove supports and lower car.

STEERING LINKAGE—PACER

Pacer models have an integral-type steering linkage that provides a direct connection between steering gear and front wheels.

The manual or power steering gear used on Pacer models is a rack and pinion design which combines the steering gear and linkage into one compact assembly (fig. 2L-5).

The steering linkage consists of two inner tie rod assemblies, two adjuster tube assemblies and two tie rod ends. The inner tie rods are attached to each end of the steering rack by tie rod housings. The adjuster tube assemblies attach the inner tie rods to the tie rod ends which are connected to the steering arms on the front suspension.

A protective rubber boot, attached to the tube and inner tie rod with steel clamps, is used to cover and protect the inner tie rod assemblies from road splash and debris. The function of the breather tube, which is connected to each of the rubber boots, is to equalize the pressure within the boots during steering manuevers.

The steering gear assembly is transverse mounted on the front crossmember. A flexible coupling, mounted on the pinion shaft, is used to connect the pinion shaft to the intermediate steering shaft, which is attached to the steering shaft in the column.

When the steering wheel is turned, the rotary motion of the pinion shaft is converted to linear travel of the steering rack by meshing of the helical pinion shaft teeth with the rack teeth. Since the steering arms are connected to the steering rack through the tie rod ends, rack movement is transferred directly to the steering arms and front wheels.

Refer to the appropriate On-Car Service subsections in Chapter 2J—Manual Steering Gear, or Chapter 2K—Power Steering Gear and Pump for service procedures.

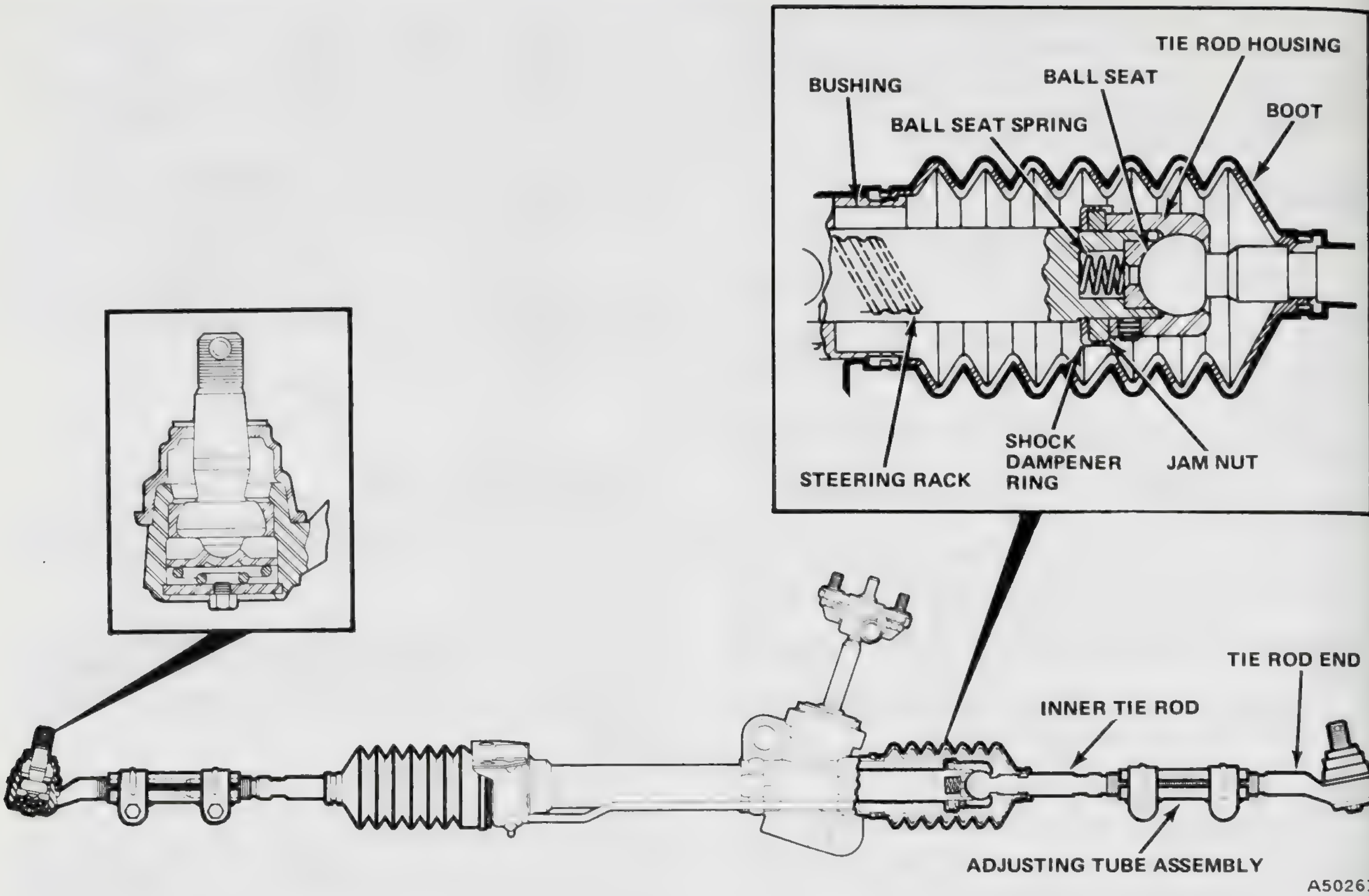

Fig. 2L-5 Steering Linkage—Pacer

SPECIFICATIONS

Steering Linkage Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Idler Arm Ball Stud-to-Center Link Retaining Nut — Gremlin-Concord-AMX-Matador	54	48-61	40	35-45
Idler Arm and Bracket Ball Stud Retaining Nut — Gremlin-Concord-AMX	54	48-61	40	35-45
Idler Arm Bracket-to-Idler Arm Retaining Nut — Matador	75	48-95	55	35-70
Idler Arm Bracket Mounting Bolts — Gremlin-Concord-AMX-Matador	68	48-81	50	35-60
Tie Rod Adjusting Tube Clamp Bolt — Pacer	27	20-34	20	15-25
*Pitman Arm Nut — Gremlin-Concord-AMX-Matador	156	136-169	115	100-125
Tie Rod Adjusting Tube Clamp Bolt — Gremlin-Concord-AMX-Matador	19	16-22	14	12-16
Tie Rod-to-Center Link Retaining Nut — Gremlin-Concord-AMX-Matador	54	48-61	40	35-45
Tie Rod End Ball Stud Retaining Nut — Pacer	68	61-81	50	45-60
Tie Rod End Ball Stud Retaining Nut — Gremlin-Concord-AMX-Matador	48	38-52	35	28-38

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

* The pitman arm nut must be staked to the pitman shaft threads in one place to properly retain the nut.

70353B

Special Tools

NOTES

FRONT SUSPENSION 2M

SECTION INDEX

FRONT SUSPENSION– GREMLIN, CONCORD, AMX, MATADOR

ENERAL

Gremlin, Concord, AMX, and Matador models have an ndependent coil spring-type front wheel suspension sys-em. The suspension components at each front wheel onsist of an upper and lower control arm, a steel coil pring, a shock absorber, a strut rod, a stabilizer bar ptional on six-cylinder models), a steering knuckle, a teering arm, and a steering spindle (fig. 2M-1).

The upper control arms pivot on rubber bushings in-talled at each inner end of the arm. Pivot bolts installed hrough the bushings are used to mount the arms on the heelhouse panel.

he lower control arms pivot on a single rubber bushing nstalled at the inboard end of the arm. Pivot bolts nstalled through the bushings attach the arms to the ront crossmember. The pivot bolts have integral eccen-ric washers which control camber adjustment.

he upper and lower control arms are connected to the teering knuckles by spherical-type ball joints riveted to he outer end of each arm.

Diagonally mounted strut rods connect each lower ontrol arm to the frame side sill. The rods control fore

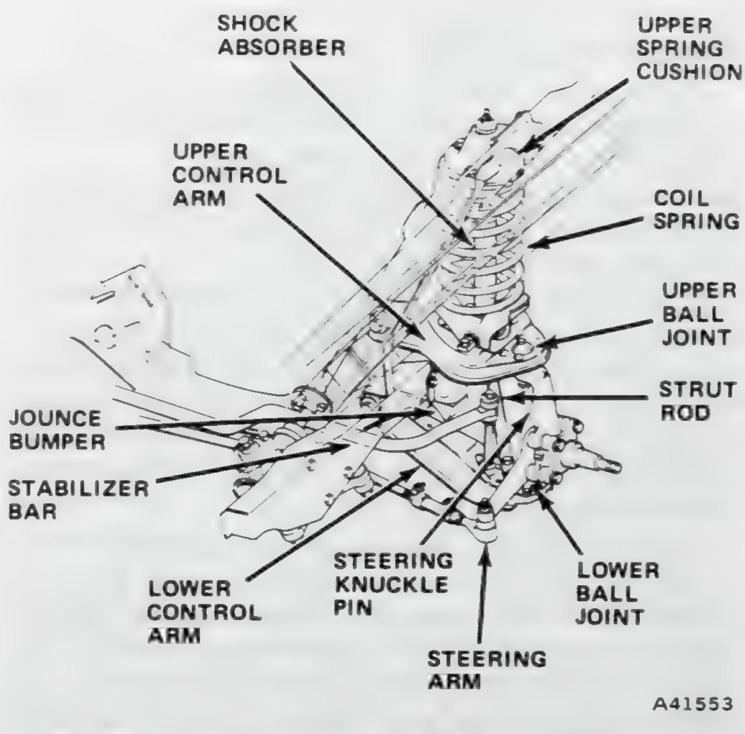

Fig. 2M-1 Front Suspension—Gremlin-Concord-AMX-Matador and aft movement of the wheels. The forward end of the rod is attached to the outer end of the lower control arm and the threaded rear end of the rod is attached to a bracket on the frame side sill. Caster angle adjustments are performed by adjusting the locknuts attaching the threaded end of the rod to the side sill bracket.

The front coil springs are mounted on top of the upper control arms. The spring upper end is positioned in a rubber cushioned seat in the wheelhouse panel. The spring lower end is positioned on a seat attached to the upper control arm. The coil springs control ride quality and maintain proper ride height. A plastic tag with the spring part number on it is attached to every coil spring.

The shock absorbers are mounted inside the coil springs.The shock lower end is attached to the upper control arm spring seat and the upper end to a mounting bracket at the top of the wheelhouse panel. The shock absorbers provide constant damping control of wheel and spring movement to maintain ride quality and handling.

The stabilizer bar is transverse-mounted on the frame side sills forward of the lower control arms. The bar is attached to the side sills with rubber bushings and clamps and is connected to the lower arms by steel links cushioned in rubber bushings at both ends. The stabilizer bar reduces body sway by resisting independent motion of either side of the front suspension. The stabilizer bar is optional on Gremlin models but is standard on all other models.

Rubber jounce bumpers, attached to brackets on each side of the front crossmember, limit front suspension upward (jounce) travel.

Front suspension components should be lubricated and inspected for wear at regular intervals. Refer to the Maintenance Schedule in Chapter B.

FRONT WHEEL ALIGNMENT

Front wheel alignment, or steering geometry, refers to the various angles assumed by the components which form the front wheel turning mechanism.

There are three adjustable alignment angles on Gremlin, Concord, AMX, and Matador models. These angles are caster, camber, and toe-in.

Caster describes the forward or rearward tilt (from vertical) of the steering knuckle (fig. 2M-2). Tilting the top of the knuckle rearward provides positive caster. Tilting the top of the knuckle forward provides negative caster. Caster is a directional stability angle which enables the front wheels to return to a straight-ahead position after turns.

Camber describes the inward or outward tilt of the wheel relative to the center of the car (fig. 2M-3). An inward tilt of the top of the wheel produces negative camber. An outward tilt produces positive camber. Camber greatly affects tire wear. Incorrect camber will cause abnormal wear on the tire outside or inside edge. Refer to Chapter 2G.

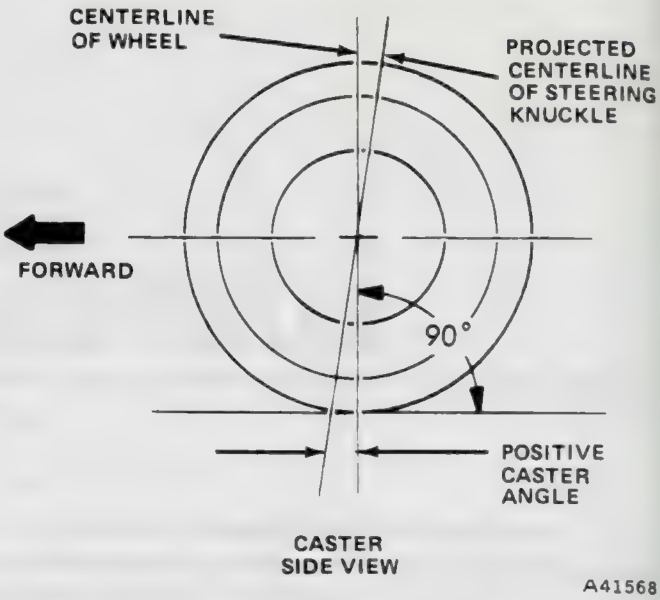

Fig. 2M-2 Caster

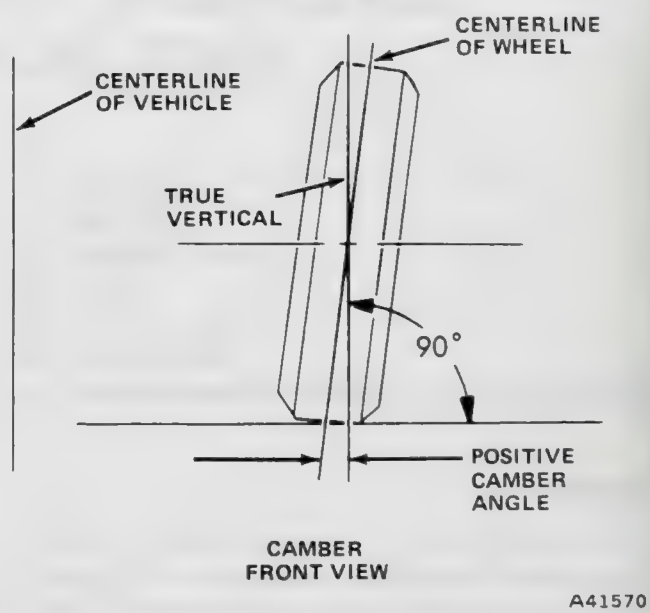

Fig. 2M-3 Camber

Toe-in is a condition that exists when the measured distance at the front of each tire is less than the distance at the rear of the tires. When the distance at front is less than the rear, the tires are toed-in (fig. 2M-4).

Toe-in compensates for normal steering play and causes the tires to roll in a straight-ahead manner. Incorrect toe-in will wear the tires to a feathered edge. Refer to Chapter 2G.

Turning radius is controlled by a steering stop, built into the steering arm. On turns, the stop contacts the strut rod to prevent wheel overtravel and (fig. 2M-5).

NOTE: *A small amount of grease should be applied to the stops periodically to prevent noise when the stops contact the strut rods during turn-and-stop maneuvers.*

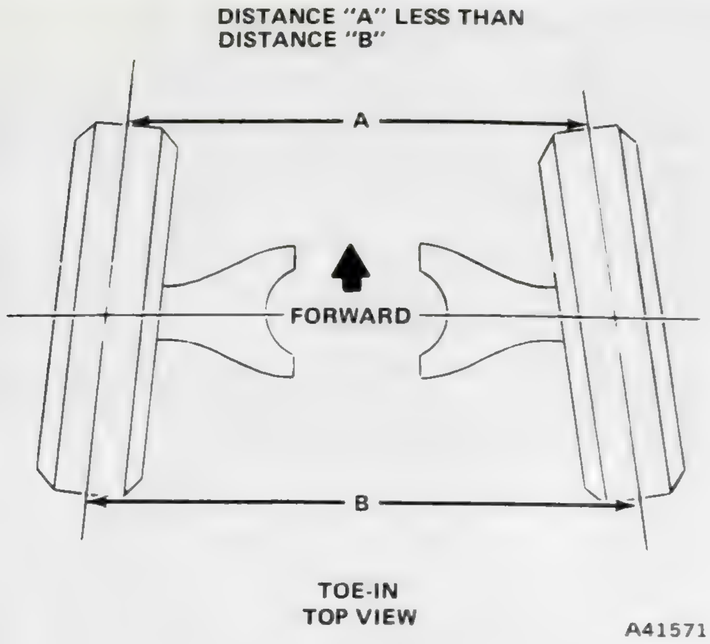

Fig. 2M-4 Toe-In

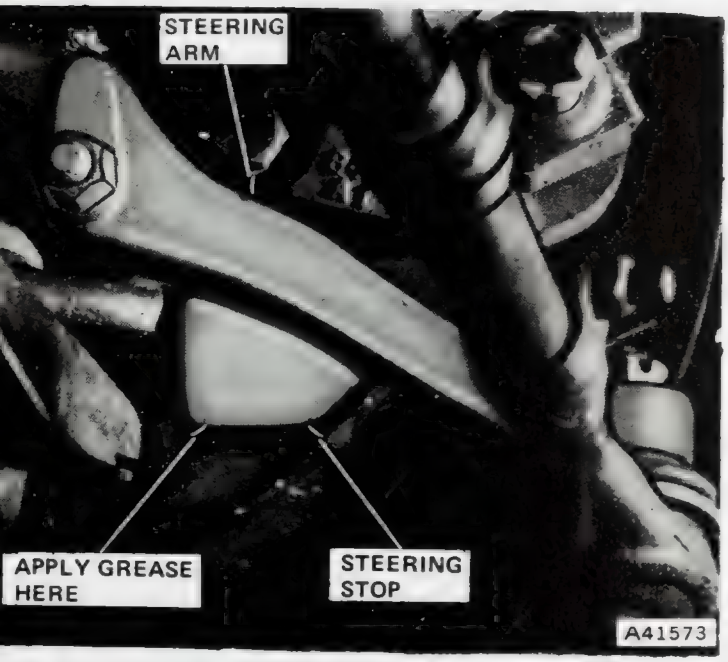

Fig. 2M-5 Steering Stop

uspension Inspection

Before performing a front wheel alignment, first de-ermine if an alignment is in fact necessary, and that uspension components are not worn to the point where djustment could not be maintained. A driver may think n alignment is required, however, diagnosis may reveal hat handling is normal or the problem is in another rea. To determine if an alignment is necessary, exam-ie the tires for abnormal wear patterns. If the tires do ot exhibit abnormal wear road test the car and check or proper handling. If the tires are worn or the car andles incorrectly, the front end should be inspected nd then checked for correct alignment.

When diagnosing alignment problems and before checking alignment angles, check for the following:

(1) All tires are inflated to recommended levels.

(2) All tires are of the same construction and tread style.

(3) Front tires have approximately the same tread wear.

(4) Front wheel bearings are adjusted correctly.

(5) Ball joints, tie rod ends, and steering rods are serviceable.

(6) Control arm and strut rod bushings are serviceable.

(7) Stabilizer bar is properly attached.

(8) Shock absorbers operate properly.

(9) Brakes are properly adjusted and not dragging.

Alignment Check

If some type of load is normally carried in the car, that load should remain in the car during alignment checks.

After verifying the need for an alignment and all front suspension components are determined to be serviceable, check the alignment angles and adjust them as necessary with the tires at reduced load inflation pressures and with a full fuel tank. Refer to Adjusting Front Wheel Alignment.

If the steering arms are bent, or it is suspected they were bent due to a collision, they should be replaced.

Adjusting Front Wheel Alignment

NOTE: *Always follow the alignment equipment manufacturers instructions explicity when performing an alignment check.*

(1) Refer to Front Wheel Alignment Specifications at end of this chapter before proceeding with adjustment.

(2) Perform alignment adjustments in following order: camber, caster, toe-in.

(3) Adjust **camber** by turning lower control arm inner pivot bolt eccentric. Tighten pivot bolt locknuts to 110 foot-pounds (149.1 Nm) torque after completing camber adjustment (fig. 2M-6).

(4) Adjust **caster** by loosening strut rod jamnut and turning rod adjusting nuts in or out to move lower control arm forward or rearward to obtain desired caster angle (fig. 2M-7). Tighten adjusting nuts to 65 foot-pounds (88.1 Nm) torque and jamnut to 75 foot-pounds (101.6 Nm) torque when adjustment is completed.

NOTE: *The strut rods have right-hand threads as viewed from the rear of the car. Turning the adjusting nut one complete turn clockwise or counterclockwise will usually change the caster angle by approximately one half degree.*

(3) Place pry bar under tire to load ball joint and raise tire several times to seat gauge tool pin.

(4) Pry tire upward to load ball joint and record gauge reading; then release tire to unload ball joint and record gauge reading. Perform this operation several times to ensure accuracy.

(5) Difference between load/no-load readings represents ball joint clearance. If clearance is more than 0.080-inch (2.03 mm), ball joint should be replaced.

Upper Ball Joint—Using Dial Indicator or Wheel Runout Gauge

NOTE: *The front wheel bearing must be adjusted to specifications before performing this check.*

(1) Raise and support front of car.

(2) Position dial indicator or wheel runout gauge at tire scrub bead so that tire in-and-out movement can be measured (fig. 2M-12).

(3) Move upper portion of wheel and tire toward center of car and record gauge reading; Then move upper portion of wheel and tire outward and again record gauge reading. Perform this operation several times to ensure accuracy.

(4) Total travel (in both directions) must not exceed 0.160 inch (4.06 mm). Ball joint should be replaced if travel exceeds specified limit.

Fig. 2M-12 Checking Upper Ball Joint Using Runout Gauge

Lower Ball Joint Inspection

(1) Raise and support front of car.

(2) Move lower portion of wheel and tire alternately toward and away from center of car. Perform this operation several times.

(3) Lower ball joint is spring-equipped and preloaded in its socket at all times to minimize looseness and compensate for wear. If lower joint exhibits noticeable lateral movement (shake), ball joint should be replaced.

Ball Joint Replacement

Upper Ball Joint

(1) Install 2 x 4 x 5 inch (5.1 x 10.1 x 12.7 cm) wood block on frame side sill and under upper control arm (fig. 2M-13).

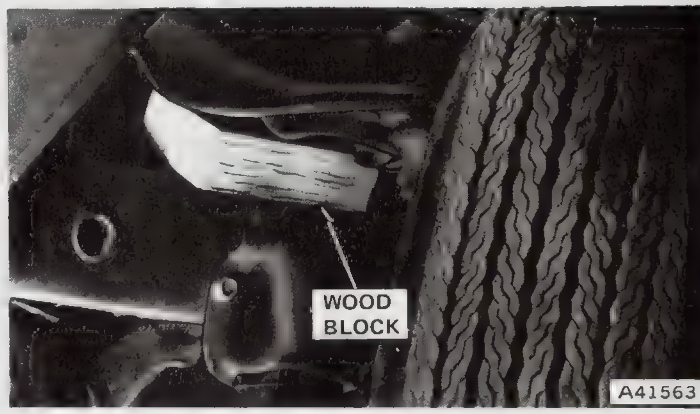

Fig. 2M-13 Installing Wood Block

(2) Raise and support front of car.

(3) Remove wheel, caliper, and rotor. Refer to Chapter 2F.

(4) Remove ball stud cotter pin and retaining nut.

(5) Install Ball Joint Remover Tool J-9656 and loosen ball stud in steering knuckle. Do not remove tool at this time (fig. 2M-14).

(6) Place support stand under lower control arm.

(7) Remove heads from ball joint attaching rivets using chisel or grinding tool.

(8) Drive rivets out of ball joint and control arm using punch.

(9) Disengage ball joint from control arm.

(10) Remove tool J-9656 from ball joint stud and remove ball joint from steering knuckle.

(11) Position replacement ball joint in control arm and align bolt holes.

(12) Install ball joint attaching bolts (supplied in ball joint replacement kits) and tighten nuts to 25 foot-pounds (33.9 Nm) torque.

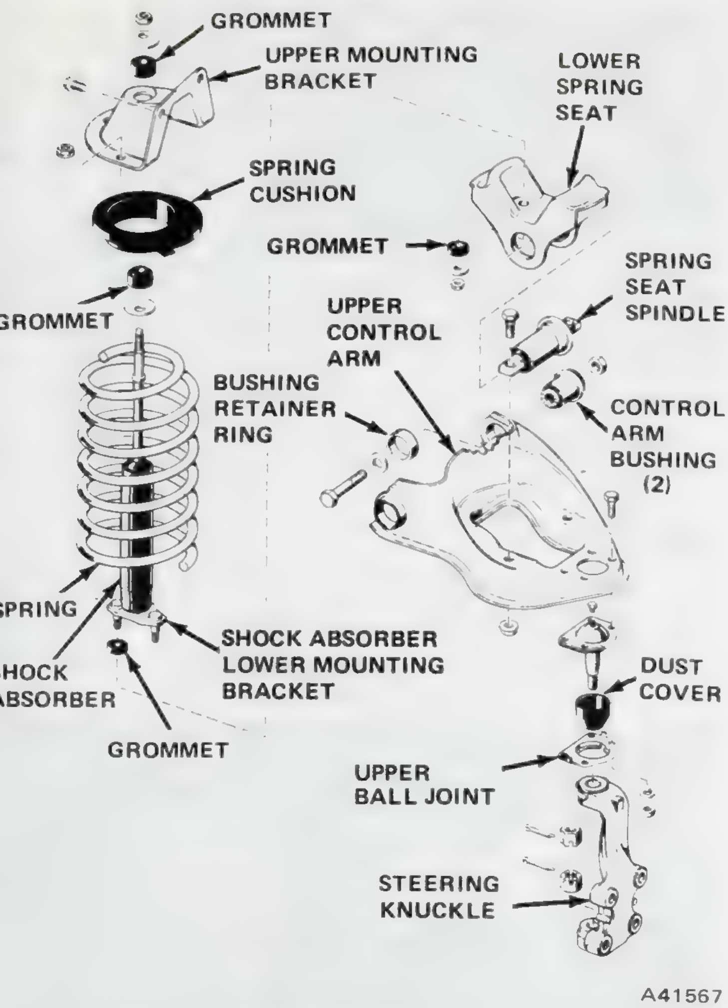

Fig. 2M-9 Front Suspension Upper Control Arm Components—Gremlin-Concord-AMX-Matador

(3) Position lower attaching studs through lower pring seat, and install lower grommets, flat washers, nd nuts. Tighten nuts to 15 foot-pounds (20.3 Nm) orque.

(4) Install and tighten upper mounting bracket at-aching bolts to 20 foot-pounds (27.1 Nm) torque.

ALL JOINTS

Ball joints must be inspected and lubricated period-cally. Refer to the Maintenance Schedule in Chapter B or recommended frequencies.

Lubricate the ball joints with a lithium-base chassis rease using Lubricant Gun J-9670, or equivalent hand-perated equipment only. This type of lube gun is de-gned to deliver 6 to 8 psi only to avoid excessive pres-ure on the ball joint seals. Lubrication Gun J-9670 is lentified with blue tape.

To lubricate the ball joints, first load the lube gun ith an AMC, or equivalent, lithium-base chassis lubri-ant cartridge (AMC cartridge is identified with blue ape). Next, remove the ball joint lube plugs (fig. 2M-10). Vhen the plugs are removed, insert the lube gun nozzle in the ball joint and apply lubricant as necessary. Be sure to reinstall the lube plugs when service operations are completed.

Ball Joint Inspection

Upper Ball Joint—Using Gauge J-21240

(1) Raise and support front of car.

(2) Remove upper ball joint lubrication plug and install Gauge J-21240. Thread knurled nut of gauge into lubrication plug hole (fig. 2M-11).

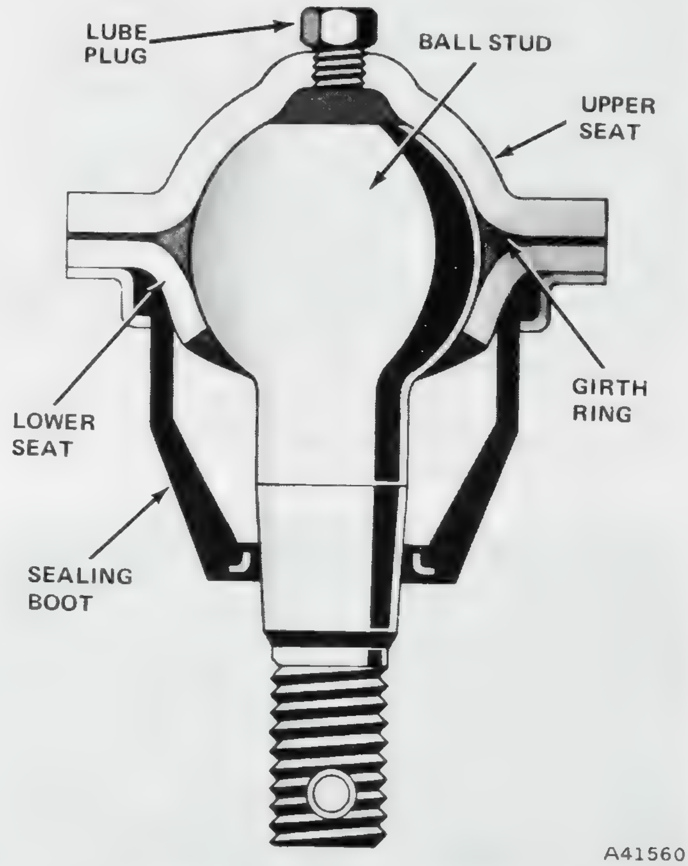

Fig. 2M-10 Upper Ball Joint (Typical)

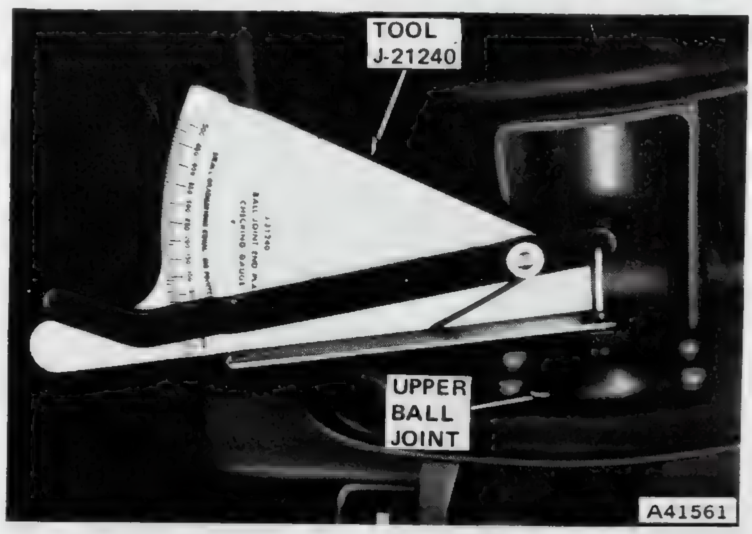

Fig. 2M-11 Checking Upper Ball Joint Using Clearance Gauge

(3) Install Spring Compressor Tool J-23474 through upper spring seat opening and seat compressor tool ball socket and support (fig. 2M-16).

(4) Insert spring compressor tool lower attaching bolts through shock absorber mounting holes in lower spring seat.

(5) Install spring compressor tool lower retainer and tighten retaining nuts to approximately 5 foot-pounds (6.7 Nm) torque (fig. 2M-17).

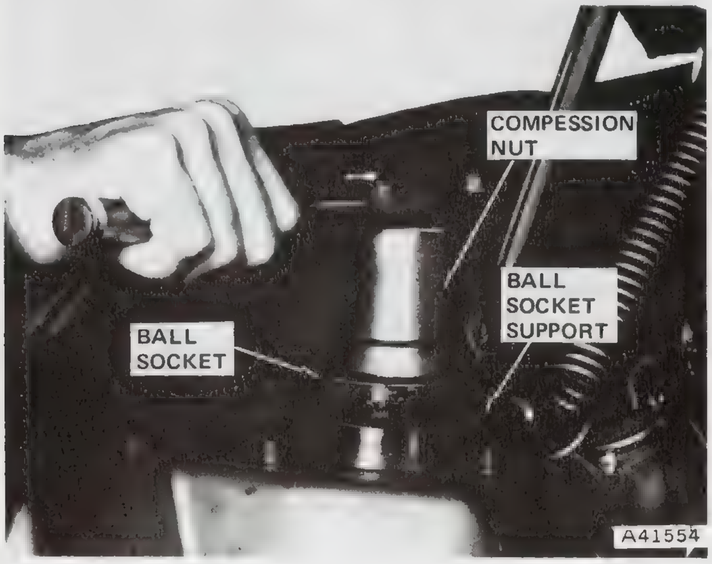

Fig. 2M-16 Installing Spring Compressor Tools

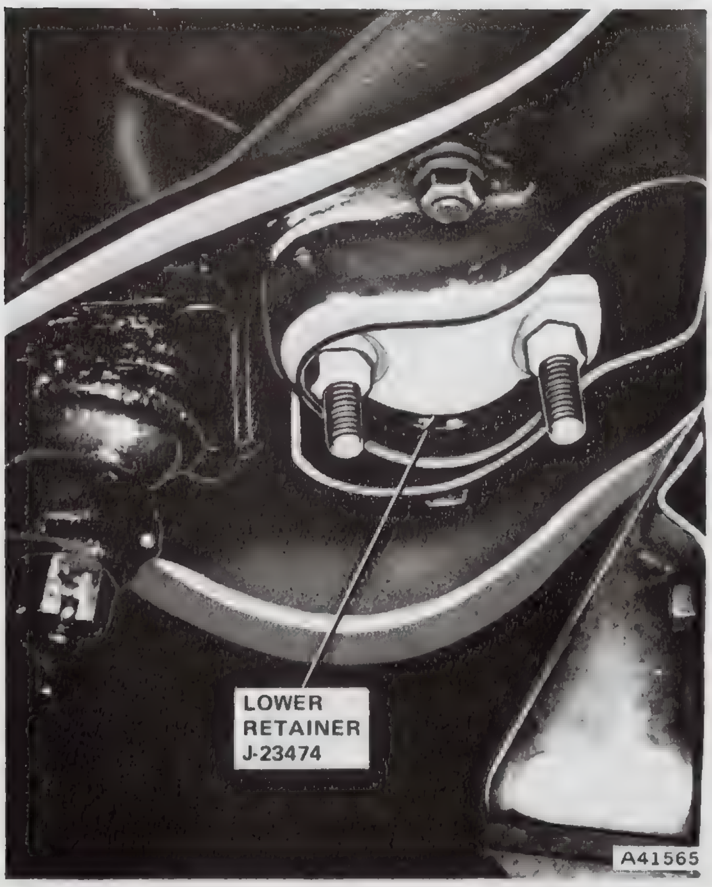

Fig. 2M-17 Lower Retainer Installation

(6) Remove lower spring seat pivot bolt retaining nuts.

(7) Using ratchet handle, turn compressor tool compression nut clockwise until spring is compressed approximately 1.00 inch (2.5 cm).

CAUTION: *Do not use an impact wrench to turn the compression nut. An impact wrench will place unnecessary stress on the compressor tool bolt threads which could result in thread damage or bolt breakage.*

(8) Raise front of car until control arms are free of lower spring seat.

(9) Support front of car using support stands.

(10) Remove wheel.

(11) Pull lower spring seat away from car.

(12) Turn compression nut counterclockwise and guide lower spring seat out and over upper control arm.

(13) Remove spring compressor tool and remove lower retainer, spring seat, and spring.

Installation

(1) Install spring compressor tool through upper spring seat opening and seat compressor tool ball socket and support (fig. 2M-16).

(2) Install spring upper cushion on top coil of spring. Tape cushion in place to retain it.

(3) Install spring in lower spring seat.

NOTE: *One side of the lower spring seat has a formed shoulder to help locate the spring properly. Position the spring on the seat so the cut-off end of the spring bottom coil seats against this shoulder (fig. 2M-18). If the spring seat was removed for service, be sure the shouldered end of the spring seat and cut-off end of the spring bottom coil are installed so they face the engine compartment.*

(4) Position spring in upper seat.

(5) Align and install compressor tool lower attaching bolts through shock absorber mounting holes in lower spring seat.

(6) Install spring compressor tool lower retainer and retaining nuts (fig. 2M-17).

Fig. 2M-18 Lower Spring Seat Position

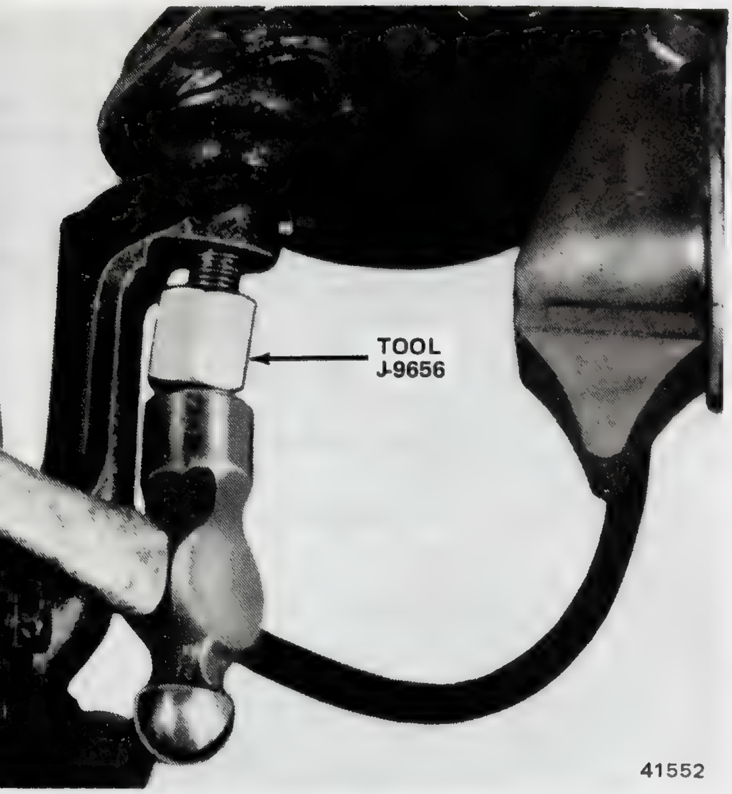

Fig. 2M-14 Upper Ball Joint Removal

(13) Install steering knuckle and retaining nut on all joint stud. Tighten nut to 75 foot-pounds (101.6 Nm) orque and install replacement cotter pin.

(14) Install rotor, caliper and wheel. Refer to Chap- er 2F.

(15) Remove support stands and lower car.

(16) Remove wood block.

(17) Check and adjust front wheel alignment as ecessary.

ower Ball Joint

(1) Install 2 x 4 x 5 inch (5.1 x 10.1 x 12.7 cm) wood lock on frame side sill and under upper control arm ig. 2M-13).

(2) Raise and support front of car.

(3) Remove wheel, caliper, and rotor. Refer to Chap- er 2F.

(4) Disconnect strut rod at lower control arm.

(5) Disconnect steering arm from steering knuckle.

(6) Remove ball stud cotter pin and retaining nut.

(7) Install Ball Joint Remover Tool J-9656 and oosen ball stud in steering knuckle (fig. 2M-15). Do not emove tool at this time.

(8) Place support stand under lower control arm.

(9) Remove heads from ball joint attaching rivets sing chisel or grinding tool.

(10) Drive rivets out of ball joint and control arm sing punch.

(11) Disengage ball joint from control arm.

(12) Remove tool J-9656 from ball stud.

(13) Remove ball joint from steering knuckle.

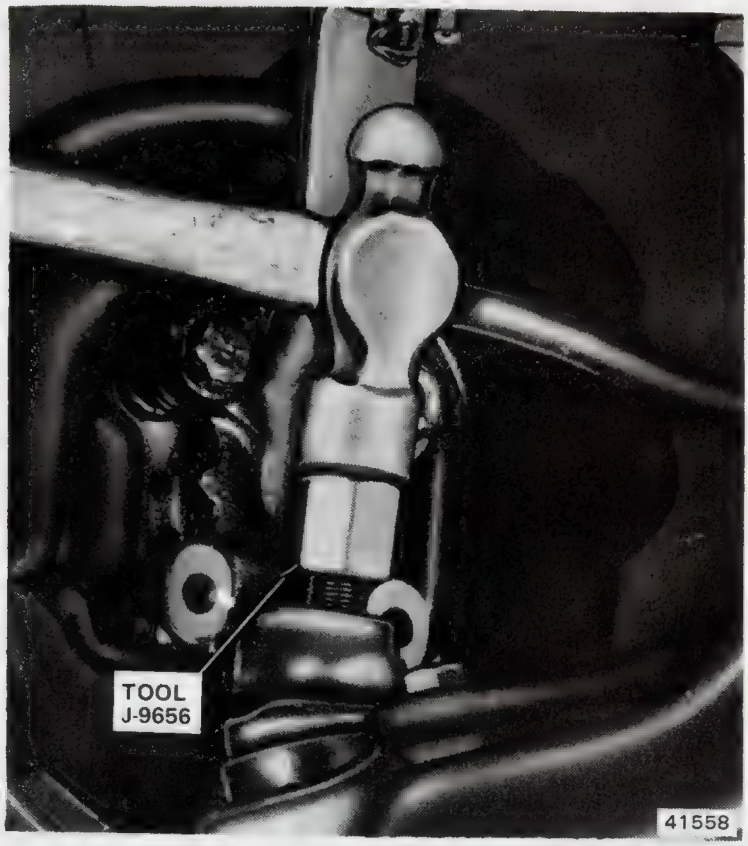

Fig. 2M-15 Lower Ball Joint Removal

(14) Position replacement ball joint on control arm and align bolt holes.

(15) Install but do not tighten attaching bolts supplied in replacement ball joint kit.

(16) Attach strut rod to lower control arm. Tighten rod attaching bolts to 75 foot-pounds (101.6 Nm) torque.

(17) Tighten ball joint attaching bolts to 25 foot-pounds (33.9 Nm) torque.

(18) Apply chassis grease to steering stops.

(19) Install ball joint stud in steering knuckle.

(20) Install retaining nut on ball stud. Tighten nut to 75 foot-pounds (101.6 Nm) torque and install replacement cotter pin.

(21) Install steering arm on steering knuckle.

(22) Install rotor, caliper, and wheel. Refer to Chapter 2F.

(23) Remove support stands and lower car.

(24) Remove wood block.

(25) Check and adjust front wheel alignment if necessary.

COIL SPRINGS

Removal

(1) Remove shock absorbers and mounting brackets.

(2) Lubricate bolt threads of Spring Compressor Tool J-23474 with chassis grease.

(9) Remove control arm pivot bolts and remove arm from wheelhouse by tilting steering knuckle outward and backward. Take care not to damage brake hose.

(10) Rotate control arm over disc brake rotor to expose bushings.

(11) Remove bushings using Bushing Remover and Installer Tool J-23474 (fig. 2M-20).

(12) Install replacement bushings and retainer ring using Bushing Remover and Installer Tool J-23473. Install retainer ring on rear bushing only (fig. 2M-21).

(13) Position control arm in wheelhouse panel and install inner pivot bolts.

CAUTION: *Do not tighten the pivot bolt nuts until the car weight is supported by the wheels.*

(14) Turn spring compressor tool compression nut counterclockwise and guide spring seat pivot retaining studs into control arm (fig. 2M-19).

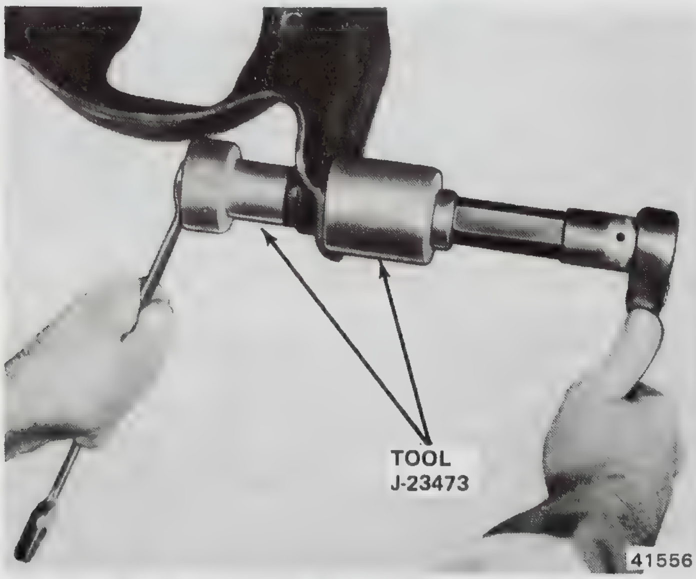

Fig. 2M-20 Upper Control Arm Bushing Removal

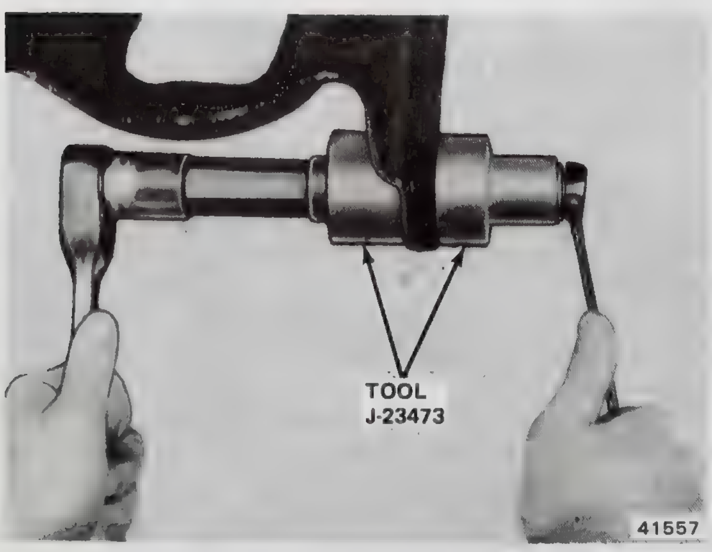

Fig. 2M-21 Upper Control Arm Bushing Installation

(15) Install wheel.

(16) Remove support stands and lower car.

(17) Install and tighten lower spring seat pivot retaining nuts to 35 foot-pounds (47.4 Nm) torque.

(18) Tighten control arm inner pivot bolts to 80 foot-pounds (108.4 Nm) torque.

(19) Remove spring compressor tool.

(20) Install shock absorber and mounting bracket.

(21) Check and adjust front wheel alignment if necessary.

LOWER CONTROL ARM

Removal

(1) Raise and support front of car.

(2) Remove wheel, caliper, and rotor. Refer to Chapter 2F.

(3) Disconnect steering arm from steering knuckle.

(4) Remove lower ball joint stud cotter pin and retaining nut.

(5) Remove ball stud from steering knuckle using tool J-9656 (fig. 2M-15).

(6) Disconnect stabilizer bar from control arm, if equipped.

(7) Disconnect strut rod from control arm.

(8) Remove inner pivot bolt and remove control arm from crossmember.

Installation

(1) Position control arm in crossmember and install inner pivot bolt (fig. 2M-22).

CAUTION: *Do not tighten the inner pivot bolt until the car weight is supported by the wheels as ride height may be affected.*

(2) Install steering knuckle and retaining nut on ball joint stud. Tighten nut to 75 foot-pounds (101.6 Nm) torque and install replacement cotter pin.

(3) Connect strut rod to control arm. Tighten bolts to 75 foot-pounds (101.6 Nm) torque.

(4) Connect stabilizer bar to control arm, if equipped. Tighten bolts to 7 foot-pounds (9.4 Nm) torque.

(5) Connect steering arm to steering knuckle. Tighten bolts to 55 foot-pounds (74.5 Nm) torque.

(6) Install rotor, caliper and wheel. Refer to Chapter 2F.

(7) Place hydraulic jack under control arm. Raise jack to compress spring slightly and tighten control arm inner pivot bolt to 110 foot-pounds (149.1 Nm) torque.

(8) Remove supports and lower car.

(9) Check and adjust front wheel alignment if necessary.

(7) Align lower spring seat pivot so that retaining studs will enter upper control arm when spring is in position. Be sure spring lower coil end is properly positioned on seat.

(8) Compress spring until lower spring seat pivot studs can be aligned with holes in upper control arm.

(9) Turn compression nut counterclockwise and carefully guide spring seat pivot bolts into control arm (fig. 2M-19).

(10) Install wheel.

(11) Remove supports and lower car.

(12) Install and tighten lower spring seat pivot retaining nuts to 35 foot-pounds (47.4 Nm) torque.

(13) Remove spring compressor tool.

(14) Install shock absorber and mounting brackets.

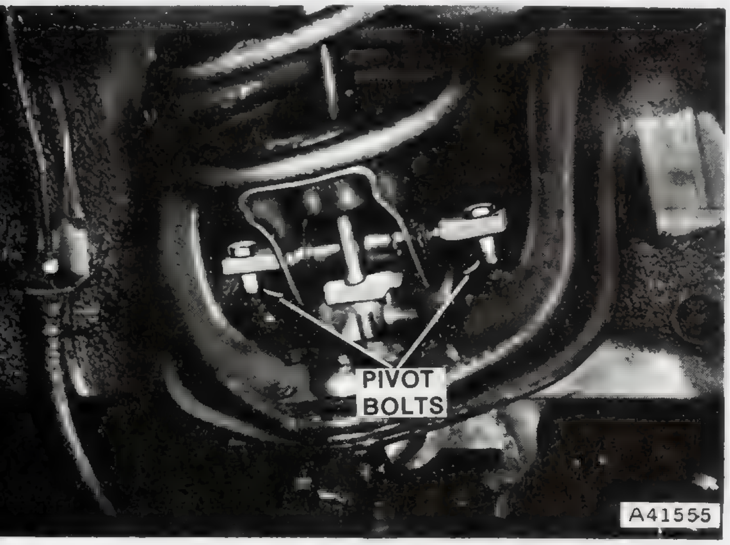

Fig. 2M-19 Aligning Spring Seat Pivot Bolts

Coil Spring Identification

The front coil springs used on AMC cars are individually selected to be compatible with the weight and load requirements of each car.

A plastic identification tag which has the spring part number printed on it is attached to each coil spring. Whenever a spring must be replaced, refer to this part number when ordering a replacement spring.

UPPER CONTROL ARM

Removal

(1) Remove shock absorber and mounting bracket.

(2) Insert Spring Compressor Tool J-23474 through upper spring seat opening and seat compressor tool ball socket and support (fig. 2M-16).

(3) Insert compressor tool lower retainer attaching bolts through shock absorber mounting holes in lower spring seat.

(4) Install compressor tool lower retainer and tighten retaining nuts to approximately 5 foot-pounds (6.7 Nm) torque.

(5) Remove lower spring seat pivot retaining nuts, and turn compressor tool compression nut clockwise until spring is compressed approximately 2 inches (5.08 cm).

(6) Raise and support front of car.

(7) Remove wheel.

(8) Remove upper ball joint stud cotter pin and retaining nut.

(9) Remove upper ball joint stud from steering knuckle using tool J-9656 (fig. 2M-14).

(10) Remove control arm inner pivot bolts and control arm from wheelhouse panel.

Installation

(1) Position control arm in wheelhouse panel and install inner pivot bolts.

CAUTION: *Do not tighten the pivot bolts until the car is resting on the wheels as ride height may be affected.*

(2) Install steering knuckle and retaining nut on ball joint stud. Tighten nut to 75 foot-pounds (101.6 Nm) torque and install replacement cotter pin.

(3) Turn spring compressor tool compression nut counterclockwise and guide spring seat pivot studs into control arm (fig. 2M-19).

(4) Install wheel.

(5) Remove supports and lower car.

(6) Install lower spring seat pivot retaining nuts and tighten to 35 foot-pounds (47.4 Nm) torque.

(7) Tighten control arm inner pivot bolts to 80 foot-pounds (108.4 Nm) torque.

(8) Remove spring compressor tool.

(9) Install shock absorber and mounting bracket.

(10) Check and adjust front wheel alignment and if necessary.

Upper Control Arm Bushing Replacement

(1) Remove shock absorber and mounting bracket.

(2) Install Spring Compressor Tool J-23474 through upper spring seat opening (fig. 2M-16).

(3) Install spring compressor tool lower attachment studs through shock absorber mounting holes in lower spring seat.

(4) Install compressor tool lower retainer and tighten nuts to approximately 5 foot-pounds (6.7 Nm) torque.

(5) Remove lower spring seat pivot retaining nuts.

(6) Turn spring compressor tool compression nut clockwise until spring is compressed approximately 2 inches (5.08 cm).

(7) Raise and support front of car.

(8) Remove wheel.

(6) Remove stabilizer bar from right side of car. Move steering linkage and left side wheel as necessary to provide removal clearance.

Installation

(1) Install stabilizer bar. Manuever bar and steering linkage as necesssary to position bar.

(2) Install stabilizer bar mounting clamps and clamp bolts. Do not tighten clamp bolts completely.

(3) Install link bolts, grommets, spacer, retainers and link bolt nuts.

(4) Tighten clamp bolts to 35 foot pounds (47.4 Nm) torque and tighten link bolt nuts to 7 foot-pounds (9.4 Nm) torque.

(5) Connect idler arm bracket to frame side sill and tighten bolts to 50 foot-pounds (67.7 Nm) torque.

(6) Install wheel and tire.

(7) Remove supports and lower car

SPECIFICATIONS

Front Alignment Specifications

	Series	Set-To	OK Range
Caster	AMX Gremlin—Concord Matador Pacer	$+1^\circ$ $+1^\circ$ $+1^\circ$ 2°	0° to $+2^\circ$ 0° to $+2^\circ$ 0° to $+2^\circ$ $+1^\circ$ to $+3^\circ$
Camber	All – Left All – Right	$+3/8^\circ$ $+1/8^\circ$	$+1/8^\circ$ to $+5/8^\circ$ 0° to $+1/2^\circ$
Toe-In	All	1/8"	1/16" to 3/16"
Turning Angle At Full Turn (Inside Wheel) Gremlin-AMX-Concord-Matador: $38^\circ \pm 2^\circ$ Pacer: $35^\circ \pm 2^\circ$			

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Suspension Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m) Service Set-To Torque	Metric (N·m) In-Use Recheck Torque	USA (ft. lbs.) Service Set-To Torque	USA (ft. lbs.) In-Use Recheck Torque
Ball Joint Stud Nut	102	81-122	75	60-90
Caliper Anchor Plate Adapter Bolt (01-40)	75	68-88	55	50-65
Front Crossmember to Sill Bolt/Nut	88 min.	75 min.	65	55 min.
Jounce Bumper to Sill Bolt	34	20-41	25	15-30
Lower Control Arm Pivot Bolt	149	129-163	110	95-120
Shock Absorber Nut	11	7-19	8	5-14
Shock Absorber Mounting Bracket Bolt	27	14-34	20	10-25
Spindle to Anchor Plate Bolt	75	68-88	55	50-65
Steering Arm Bolt	75	68-88	55	50-65
Strut Rod to Bracket Jamnut	102	68-88	75	50-65
Strut Rod to Bracket Nut	88	75-109	65	55-80
Strut Rod Bracket to Sill Bolt	102	81-122	75	60-90
Strut Rod Nut Bolt to Lower Control Arm	102	81-122	75	60-90
Sway Bar Clamp to Sill Bolt	34	20-41	25	15-30
Sway Bar Link to Lower Control Arm Nut	10	7-14	7	5-10
Tie Rod Adjusting Sleeve Clamp Bolt Nut	16	14-20	12	10-15
Upper Control Arm Inner Pivot Bolt	108	95-122	80	70-90

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

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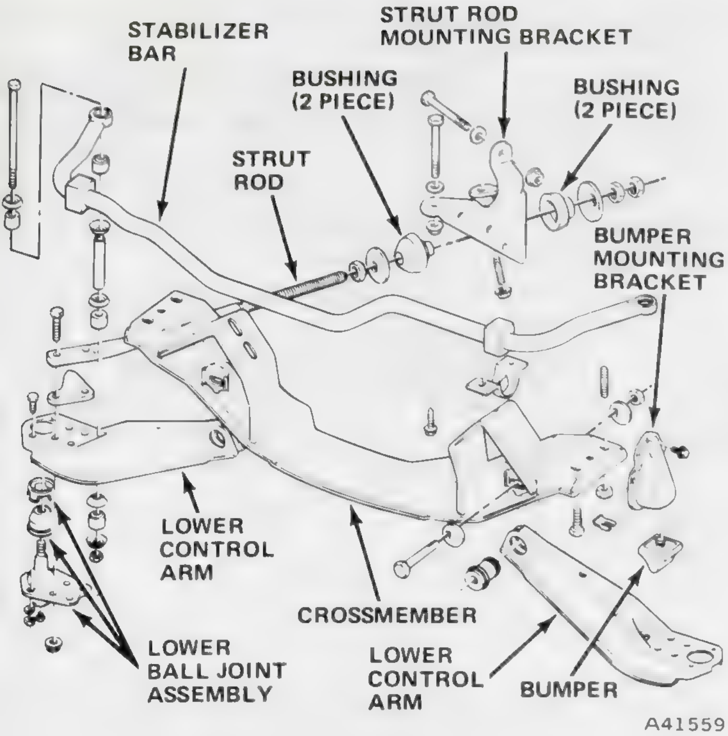


Fig. 2M-22 Lower Control Arm Assembly Gremlin-Concord-AMX-Matador

STEERING KNUCKLE AND SPINDLE

Removal

(1) Raise and support front of car.

(2) Remove wheel, caliper, and rotor. Refer to Chapter 2F.

(3) Remove caliper anchor plate, adapter, steering spindle, and steering arm from knuckle.

(4) Remove upper and lower ball joint stud cotter pins and retaining nuts.

(5) Remove ball joint studs from steering knuckle pin using tool J-9656 (fig. 2M-14).

Installation

(1) Install steering knuckle and retaining nuts on ball joint studs. Tighten nuts to 75 foot-pounds (101.6 Nm) torque and install replacement cotter pins.

(2) Install steering arm, spindle, caliper anchor plate, and adapter. Tighten bolts to 55 foot-pounds (74.5 Nm) torque.

(3) Install rotor, caliper, and wheel. Refer to Chapter 2F.

(4) Remove supports and lower car.

(5) Check and adjust front wheel alignment if necessary.

STRUT ROD AND BUSHING

Replacement

(1) Raise and support front of car.

(2) Remove jamnut and caster adjustment nut from strut rod.

(3) Disconnect strut rod from lower control arm and remove rod, bushings, and washers.

(4) On cars with one-piece bushing, lubricate replacement bushing with soapy water and install using Bushing Remover and Installer Tool J-23473. Assemble strut rod, washers, bushings, and nuts and install assembly in bracket (fig. 2M-23).

(5) On cars with two-piece bushing, assemble strut rod, washers, bushings and nuts and install assembly in bracket (fig. 2M-23).

(6) Attach strut rod to control arm and tighten bolts to 75 foot-pounds (101.6 Nm) torque.

(7) Tighten strut rod caster adjustment nuts to 65 foot-pounds (88.1 Nm) torque and jamnuts to 75 foot-pounds (101.6 Nm) torque.

(8) Remove supports and lower car.

(9) Check front wheel alignment and correct as necessary.

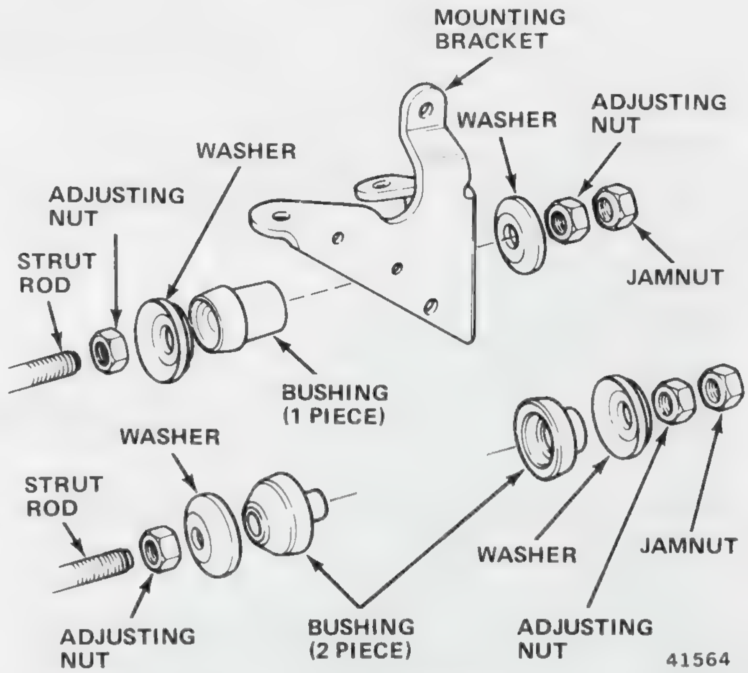


Fig. 2M-23 Strut Rod Bushings

STABILIZER BAR

Removal

(1) Raise and support front of car.

(2) Remove right side wheel and tire.

(3) Disconnect idler arm at frame side sill. Do not lose spacer used on one of the attaching bolts.

(4) Remove bolts attaching stabilizer bar mounting clamps to frame side sills and remove mounting clamps.

(5) Remove nuts attaching stabilizer bar link bolts to lower control arms and remove link bolts, rubber grommets, spacers, and retainers.

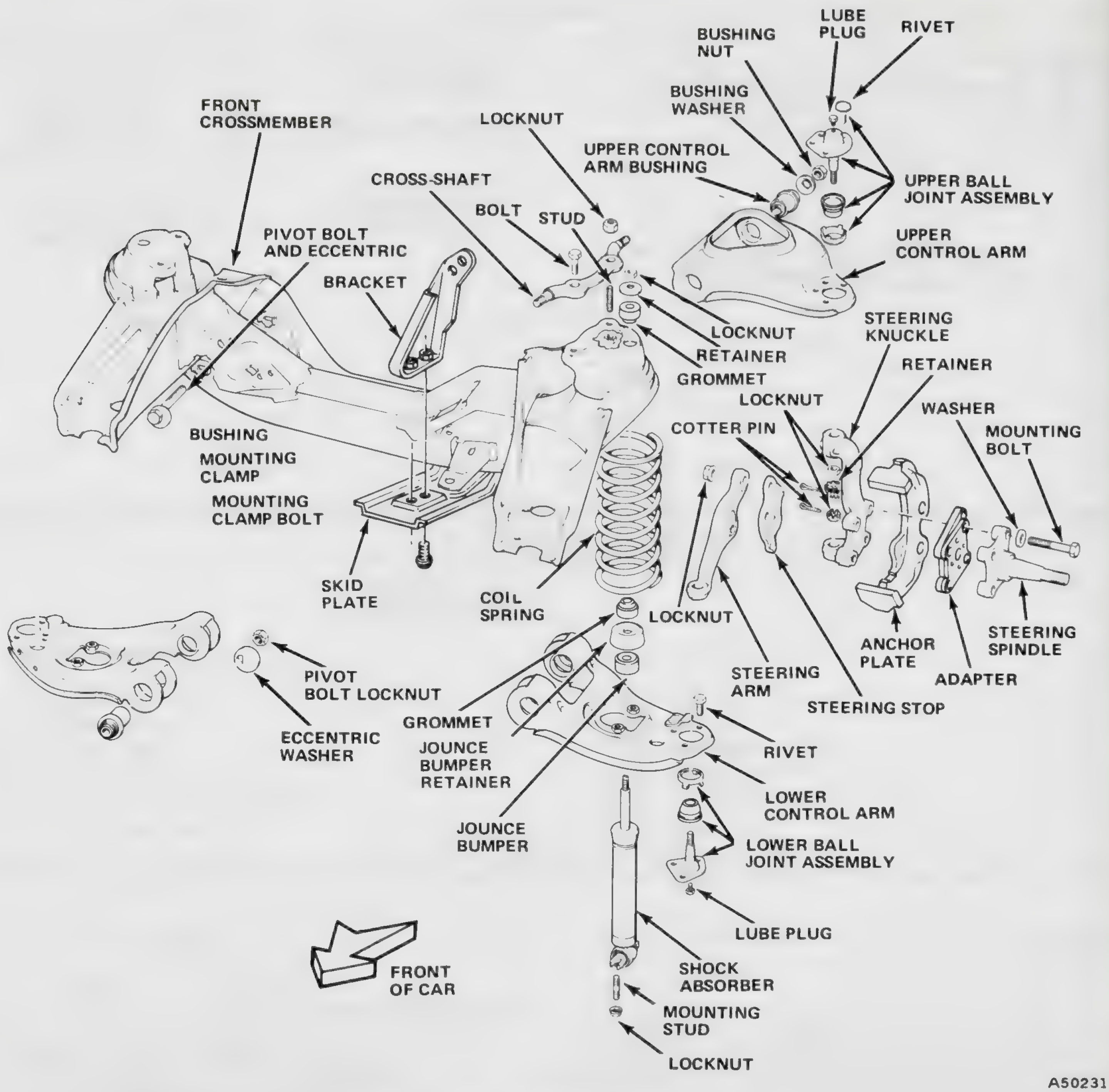


Fig. 2M-25 Pacer Front Suspension (Exploded View)

The lower end of the coil spring is positioned in a spring seat formed in the lower control arm. The upper end of the spring is positioned in a spring pocket formed in the front crossmember.

The upper control arm pivots on a cross-shaft, attached to the front crossmember. Rubber bushings are used to mount the arm on the shaft.

The lower control arm pivots, at two points, on pivot bolts installed in the front crossmember. Eccentric washers installed on the pivot bolts control caster /camber adjustment. Rubber bushings are used at each of the lower control arm pivot points.

A spherical-type ball joint is riveted to the outboard end of each upper and lower control arm. The upper ball joint is spring loaded to compensate for wear and maintain preload. The lower ball joint is not spring loaded. A polyurethane ring is installed within the lower ball joint to eliminate lash. The lower ball joint is preloaded and firmly seated by car weight.

The ball joints connect the control arms to the steering knuckle. The steering arm and steering spindle are attached to the steering knuckle.

The telescopic, double-action shock absorbers are mounted vertically inside the coil springs. The lower end

Special Tools

FRONT SUSPENSION–PACER

GENERAL

All Pacer models have an independent coil spring-type front suspension system with unequal length upper and lower control arms. The coil spring is mounted between the lower control arm and front crossmember with the lower control arm functioning as the loaded member (fig. 2M-24).

The suspension components for each front wheel consist of a short upper and a long lower control arm, a steel coil spring, a shock absorber, upper and lower ball joints, a steering knuckle and steering spindle (fig. 2M-25). Models equipped with the optional handling package or with radial-ply tires use a front stabilizer bar.

All of the front suspension components are attached to or contained within the front crossmember. The crossmember is removable and is attached through rubber bushings to the frame side sills at four points.

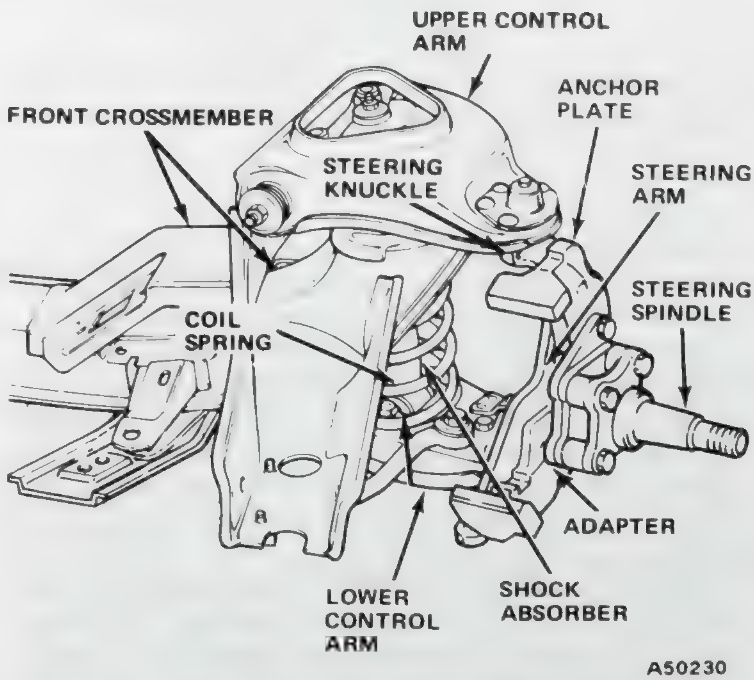


Fig. 2M-24 Front Suspension Assembly—Pacer

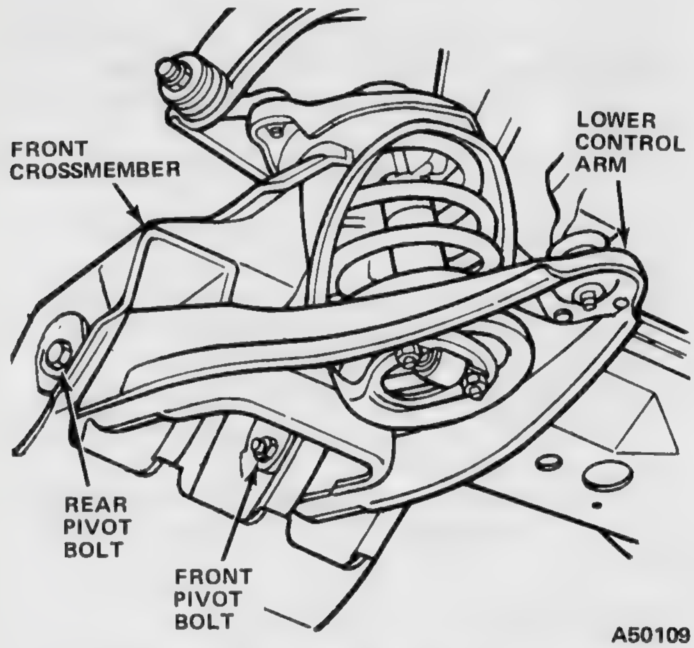


Fig. 2M-26 Camber/Caster Adjustment—Pacer

(4) Adjust **caster** by turning rear pivot bolt eccentric **only**. Tighten pivot bolt locknut to 110 foot-pounds (149.1 Nm) torque after adjustment.

CAUTION: *When loosening/tightening the pivot bolts, take care to avoid damaging the steering gear protective boots. If the boots are cut or torn, the inner tie rod assemblies will be exposed to dirt, road splash, and other debris resulting in premature wear.*

(5) Adjust **toe-in** by turning outer tie rod adjusting tubes to shorten or lengthen outer tie rods (fig. 2M-27). Proceed to following steps for adjustment procedure.

(6) Loosen adjuster tube clamp nuts.

(7) Use anti-rust solvent to free rusted tube threads. If tube is seized on outer tie rod threads, hold

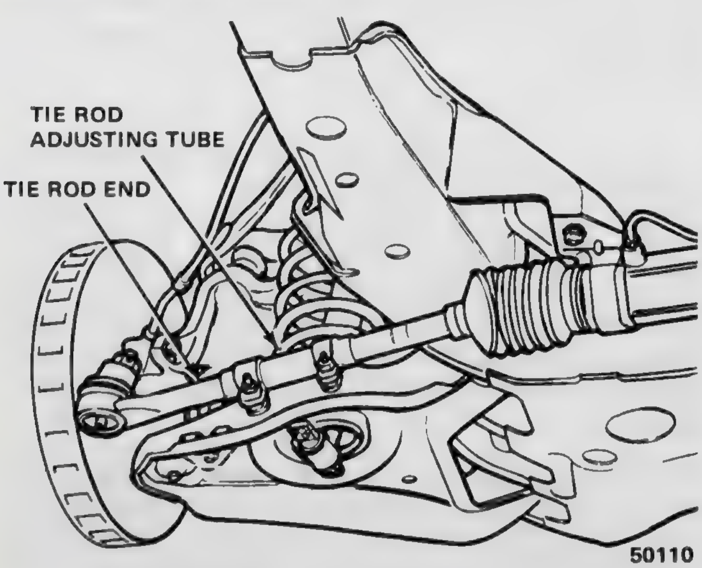


Fig. 2M-27 Toe-In Adjustment—Pacer

inner tie rod and tie rod end with pipe wrench or vise-grip pliers and loosen tube. This avoids damaging tie rod ball studs and inner tie rod components.

(8) Place front wheels in straight-ahead position and center steering wheel and gear.

(9) Turn adjuster tubes to obtain desired toe-in.

(10) If steering wheel spoke position was disturbed during alignment adjustment, correct position by turning adjuster tubes equally in same direction.

(11) Center outer tie rod ball studs in steering arms. Position open ends of tube clamps so they face downward and tighten clamp nuts to 14 foot-pounds (18.9 Nm) torque.

SHOCK ABSORBER

Removal

(1) Remove shock absorber upper locknut, retainer, and grommet .

(2) Raise and support front of car.

(3) Remove locknuts from shock absorber lower mounting studs and remove shock absorber.

(4) Remove lower grommet and jounce bumper retainer from shock absorber piston rod.

Installation

(1) Install jounce bumper retainer, and lower grommet on shock absorber piston rod (fig. 2M-28).

(2) Extend piston rod to full length.

(3) Insert shock absorber through lower control arm and position shock absorber lower mounting bracket on mounting studs. Be sure piston rod is positioned in mounting hole in front crossmember.

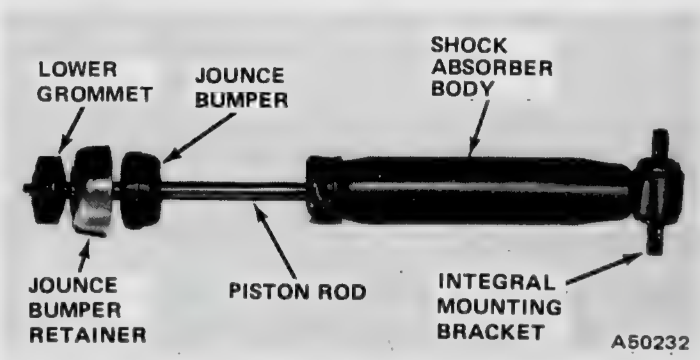


Fig. 2M-28 Front Shock Absorber—Pacer

(4) Install locknuts on lower mounting studs. Tighten nuts to 20 foot-pounds (27.1 Nm) torque.

(5) Remove supports and lower car.

(6) Install upper grommet, retainer, and locknut on shock absorber piston rod. Be sure locating shoulder on grommet seats in hole in crossmember. Tighten upper locknut to 8 foot-pounds (10.8 Nm) torque.

of the shock absorber is attached to the lower control arm. The upper end is attached to the top of the front crossmember coil spring pocket.

A rubber jounce bumper is installed on each shock absorber piston rod to absorb road shock and help control suspension movement.

A front stabilizer bar is used only on Pacer models equipped with the optional handling package or with radial-ply tires. The stabilizer bar is mounted in rubber cushions and is attached to the crossmember. It is connected to the lower control arms by steel link bolts mounted in rubber bushings.

The stabilizer bar reduces body sway by resisting independent motion of either side of the front suspension.

FRONT WHEEL ALIGNMENT

There are three adjustable alignment angles on Pacer models. These angles are caster, camber, and toe-in.

Caster describes the forward or rearward tilt from vertical of the steering knuckle (fig. 2M-2). Tilting the top of the knuckle rearward provides positive caster. Tilting the top of the knuckle forward provides negative caster. Caster is a directional stability angle helps return the front wheels to a straight-ahead position after turns.

Camber describes the inward or outward tilt of the top of the wheel relative to the center of the car (fig. 2M-3). An inward tilt at the top of the wheel produces negative camber. An outward tilt produces positive camber. Camber greatly affects tire wear. In correct camber causes abnormal wear on the outside or inside edge of the tire. Refer to Chapter 2G.

Toe-In describes a condition that exists when the distance measured between the front of each tire is less than the distance between the rear of the tires. When the distance at the front is less than the rear, the tires toed-in (fig. 2M-4). Incorrect toe-in will cause the front tires to wear to a feathered edge. Refer to Chapter 2F.

Suspension Inspection

Before performing a front wheel alignment, determine if an alignment is actually necessary and that suspension components are not worn to the point where adjustment could not be maintained. A driver may think an alignment is required, however, diagnosis may reveal that handling is normal or the problem is in another area. To determine if an alignment is necessary, examine the tires for unusual wear patterns. If the tires do not exhibit unusual wear, road test the car for proper handling. If the tires are worn or the car handles incorrectly, the front end should be inspected and checked for correct alignment.

When diagnosing alignment problems and before checking alignment angles, check the following:

(1) All tires are inflated to recommended inflation pressures.

(2) All tires are of the same tread-type and ply construction.

(3) Front tires have approximately the same tread wear.

(4) Front wheel bearings are adjusted correctly.

(5) Ball joints and tie rod ends are serviceable.

(6) Control arm bushings are serviceable.

(7) Stabilizer bar is properly attached, if equipped.

(8) Shock absorbers operate properly (no dents in tube or leaks from seal).

(9) Brakes are properly adjusted and not dragging.

(10) All suspension component attaching parts are tight.

Alignment Check

After verifying the need for an alignment and that all front suspension components are serviceable, check and adjust the alignment angles if they are not within specifications.

The fuel tank should be full when checking alignment and the tires should be inflated to reduced load pressures.

Only caster, camber, and toe-in need to be checked since these are the only adjustable angles. Refer to the Front Wheel Alignment Specifications at the end of this section.

If the steering or control arms are bent or it is suspected they were bent due to a collision, these components should be replaced before attempting an alignment.

Adjusting Front Wheel Alignment

NOTE: *Always follow the alignment equipment manufacturers instructions explicitly when performing an alignment.*

(1) Refer to Front Wheel Alignment Specifications at end of this section before proceeding.

(2) Adjust alignment angles in following order only: camber, caster, toe-in.

(3) Adjust **camber** by turning both front—or both front and rear lower control arm pivot bolt eccentrics to obtain desired camber (fig. 2M-26). Tighten pivot bolt locknuts to 110 foot-pounds (149.1 Nm) torque after adjustment.

CAUTION: *When loosening/tightening the pivot bolts, take care to avoid damaging the steering gear protective boots. If the boots are cut or torn, the inner tie rod assemblies will be exposed to dirt, road splash, and other debris resulting in premature wear.*

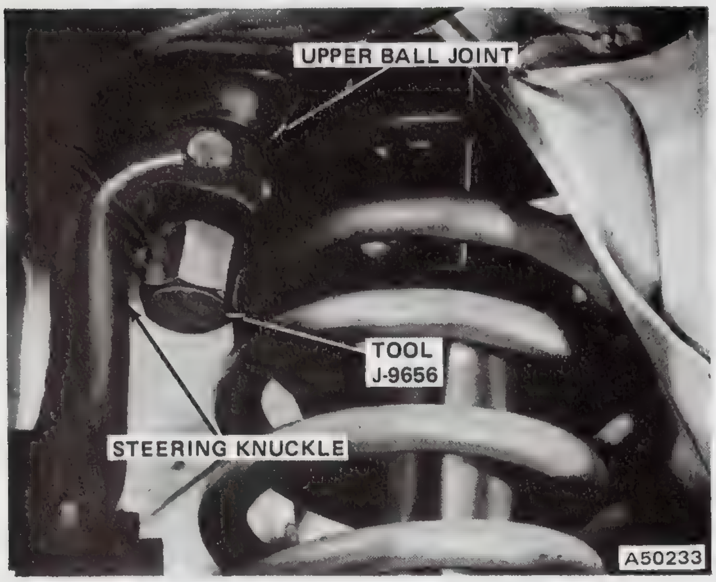


Fig. 2M-30 Upper Ball Joint Removal

Upper Ball Joint Installation

(1) Position replacement ball joint in upper control arm.

(2) Install ball joint-to-control arm attaching bolts and nuts supplied in replacement ball joint kit and tighten nuts to 25 foot-pounds (33.9 Nm) torque.

NOTE: *Install the replacement ball joint attaching bolts from the underside of the control arm. The nuts should be on top.*

(3) Raise and support lower control arm with hydraulic jack.

(4) Engage upper ball joint stud in steering knuckle and install retaining nut. Tighten nut to 75 foot-pounds (101.6 Nm) torque and install retainer and replacement cotter pin.

(5) Install wheel and tire assembly.

(6) Remove support stands and hydraulic jack.

(7) Lower car.

(8) Check and adjust front wheel alignment if necessary.

Lower Ball Joint Removal

(1) Raise and support front of car.

(2) Remove wheel, tire, caliper, and rotor. Refer to Chapter 2F.

(3) Remove bolts attaching steering arm to steering knuckle and move steering arm aside.

(4) Disconnect stabilizer bar link bolt at lower control arm, if equipped.

(5) Support lower control arm with hydraulic jack.

(6) Remove cotter pin and retaining nut from lower ball joint stud.

(7) Thread ball joint remover tool J-9656 on ball stud and lower hydraulic jack.

(8) Strike remover tool with hammer to loosen ball stud in knuckle (fig. 2M-31).

(9) Raise lower control arm with hydraulic jack. Unthread remover tool from ball joint stud and remove ball joint from steering knuckle.

(10) Move steering knuckle, steering spindle, adapter, and anchor plate aside to provide working clearance.

(11) Remove heads from ball joint attaching rivets using grinder or chisel.

(12) Drive rivets out of ball joint and arm using punch.

(13) Remove ball joint.

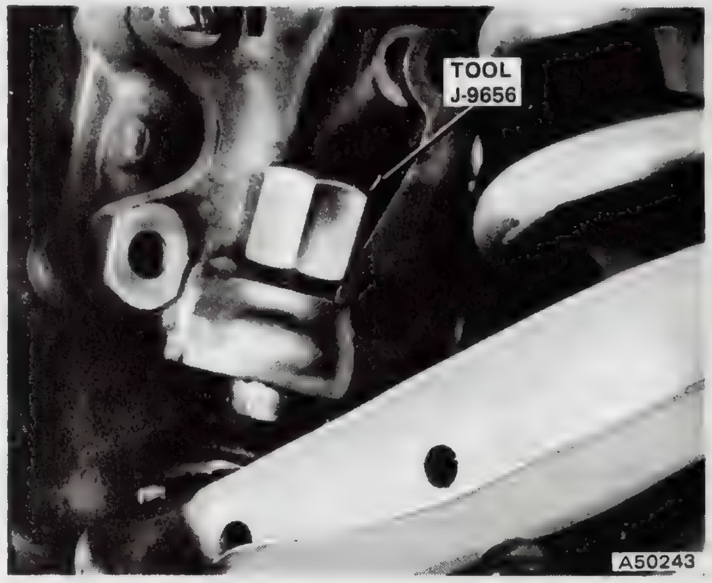


Fig. 2M-31 Lower Ball Joint Removal

Lower Ball Joint Installation

(1) Position replacement ball joint in lower control arm.

(2) Install ball joint attaching bolts and nuts supplied in replacement ball joint kit and tighten bolts to 25 foot-pounds (33.9 Nm) torque.

NOTE: *Install the replacement ball joint attaching bolts from the underside of the control arm. The nuts should be on top.*

(3) Remove wire supporting steering knuckle, steering spindle, adapter, and anchor plate.

(4) Engage ball joint stud in steering knuckle and install retaining nut on ball stud. Tighten nut to 75 foot-pounds (101.6 Nm) torque and install replacement cotter pin.

(5) Install steering arm on steering knuckle and install retaining bolts. Tighten bolts to 55 foot-pounds (74.5 Nm) torque.

(6) Connect stabilizer bar link bolt to lower control arm, if equipped. Tighten nut to 7 foot-pounds (9.4 Nm) torque.

(7) Install caliper, rotor, and wheel and tire assembly. Refer to Chapter 2F.

BALL JOINTS

Ball joints should be inspected and lubricated periodically in accordance with the Maintenance Schedule in Chapter B.

Ball Joint Lubrication

Lubricate the ball joints with a lithium-base chassis grease using Lubrication Gun J-9670, or equivalent hand-operated lubrication equipment only. This gun is designed to deliver 6 to 8 psi only to avoid excessive pressure on the ball joint seals.

To lubricate the ball joints, first load the lube gun with an AMC, or equivalent chassis lubricant cartridge (AMC cartridge has identifying strip of blue tape on it). Next, remove the ball joint lube plugs (fig. 2M-29) and install a lubrication fitting in the plug hole. Connect the lube gun to the fitting, and apply lubricant as needed. Be sure to remove the lubrication fittings and reinstall the lube plugs after service operations are completed.

Checking Ball Joint Clearance

Lower Ball Joint

(1) Position car on level surface.

(2) Remove lube plug from lower ball joint.

(3) Check ball joint clearance as follows:

(a) Fabricate checking tool from 2 to 3 inch (5.08 to 7.62 cm) length of stiff wire or thin rod.

(b) Insert tool into lubrication plug hole until it contacts ball stud. Accurately mark tool with knife or scriber where it is aligned with outer edge of lube plug hole. Distance from ball stud to outer edge of lubrication plug hole is ball joint clearance.

(c) Carefully measure distance from end of tool to mark made in step (b). If distance measured is less than 7/16 inch (11.1 mm), ball joint is serviceable. However, if distance is 7/16 inch (11.1 mm) or more, ball joint should be replaced.

(4) Install lube plug.

Upper Ball Joint

(1) Position hydraulic jack under lower control arm and raise car until wheel is off floor.

(2) Move top of tire toward and away from center of car. If ball joint exhibits any looseness or play, replace ball joint.

(3) Move upper control arm up and down using pry bar. If ball joint exhibits any looseness or play, replace ball joint.

(4) Lower car and remove jack.

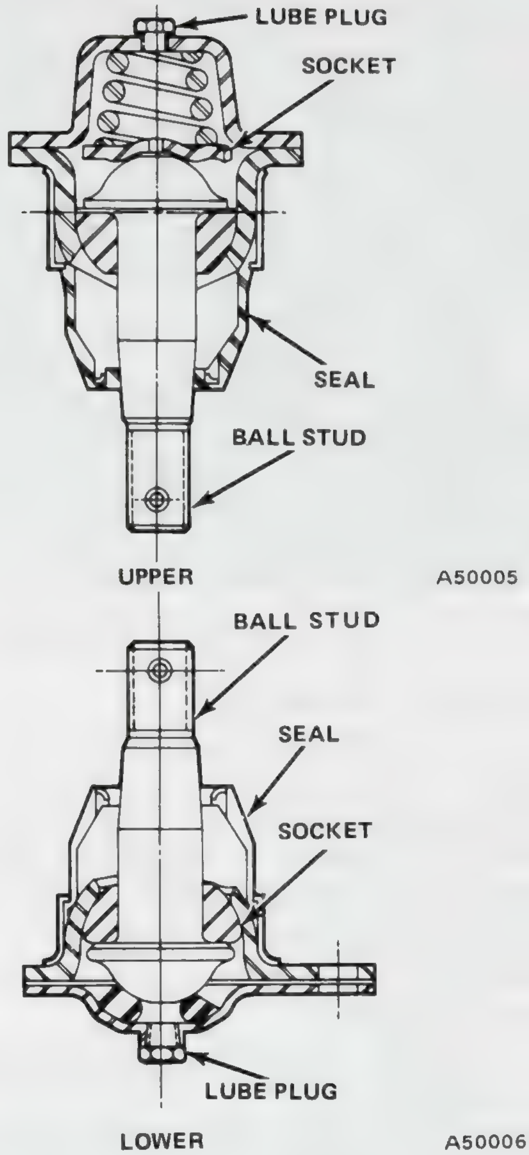


Fig. 2M-29 Upper and Lower Ball Joints

Ball Joint Replacement

Upper Ball Joint Removal

(1) Raise and support front of car.

(2) Remove wheel and tire assembly.

(3) Remove cotter pin and retaining nut from upper ball joint stud.

(4) Position hydraulic jack under lower control arm and raise arm approximately 1.00 inch (2.54 cm).

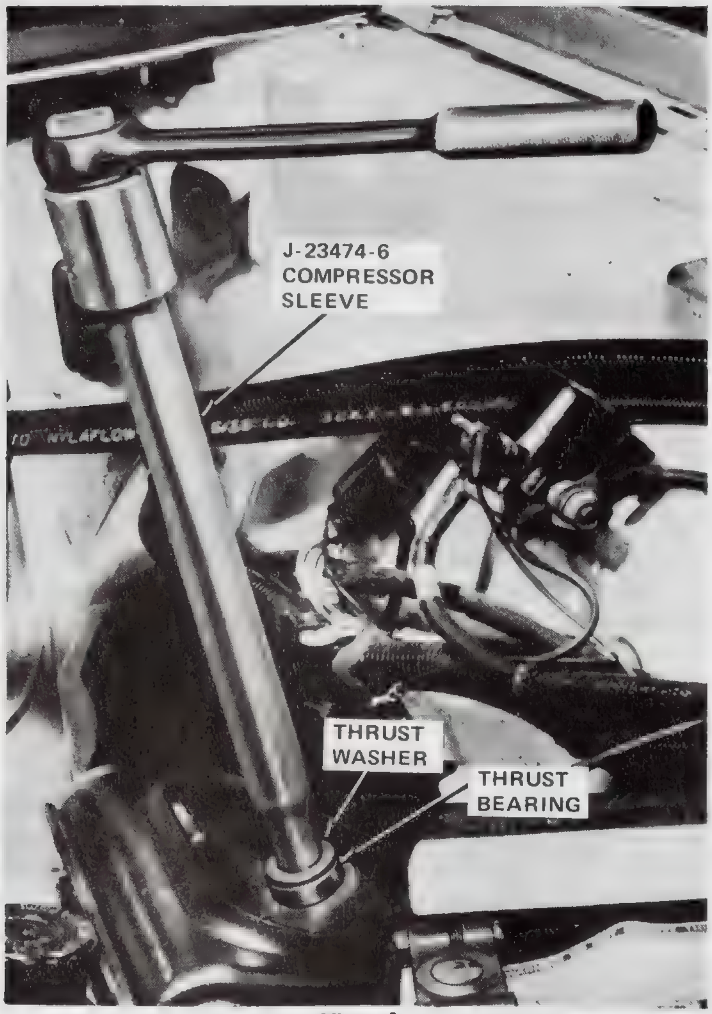
(5) Thread Ball Joint Remover Tool J-9656 on ball stud (fig. 2M-30).

(6) Remove heads from rivets attaching ball joint to control arm using grinder or chisel.

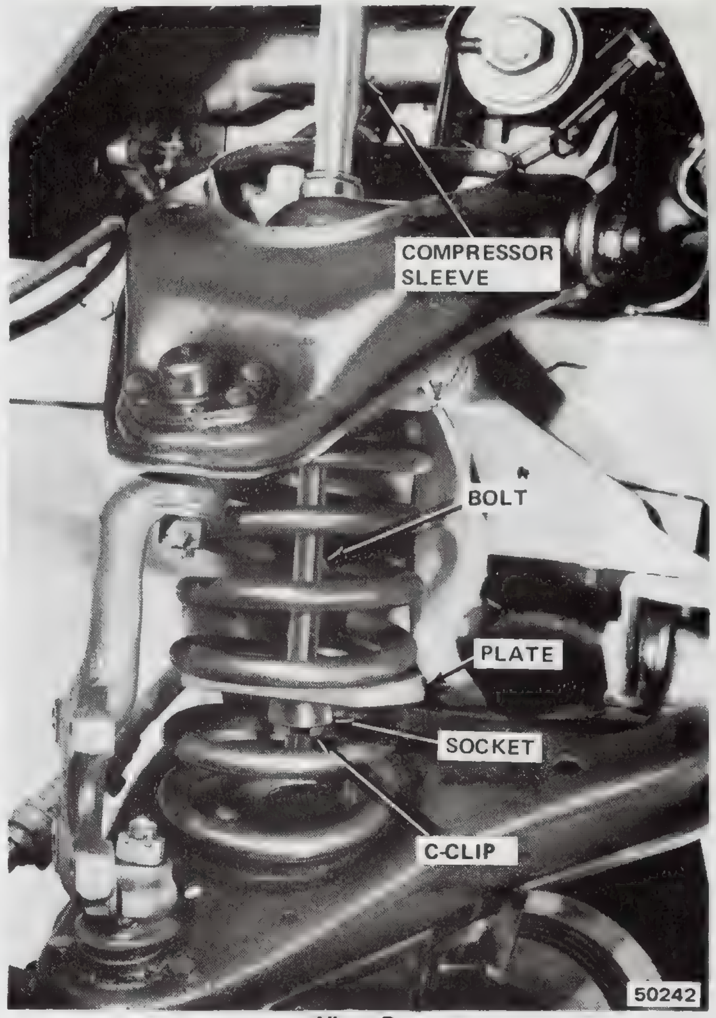
(7) Drive rivets out of ball joint and arm using punch.

(8) Lower jack slightly and strike ball joint remover tool with hammer to loosen stud in steering knuckle.

(9) Remove tool from ball stud and remove ball joint from knuckle.



View A



View B

Fig. 2M-33 Installing Assembled Spring Compressor Tool

(8) Install shock absorber. Tighten lower mounting stud locknuts to 20 foot-pounds (27.1 Nm) torque.

(9) Connect stabilizer bar link bolt to lower control arm. Tighten locknut to 7 foot-pounds (9.4 Nm) torque.

(10) Install rotor, wheel, and tire. Refer to Chapter 2F.

(11) Remove supports and lower car.

(12) Install shock absorber upper grommet, retainer, and locknut. Be sure locating shoulder on grommet seats in hole in front crossmember. Tighten upper locknut on shock absorber to 8 foot-pounds (10.8 Nm) torque.

Coil Spring Identification

The front coil springs used on AMC cars are individually selected to be compatible with the weight and load requirements of each car.

A plastic identification tag which has the spring part number printed on it is attached to each coil spring. Whenever a spring must be replaced, refer to this part number when ordering a replacement spring.

UPPER CONTROL ARM

Upper Control Arm Removal

(1) Raise and support front of car.

(2) Remove wheel and tire assembly.

(3) Remove cotter pin, retaining nut, and locknut from upper ball joint stud.

(4) Thread tool J-9656 on stud and strike tool with hammer to loosen stud in steering knuckle (fig. 2M-30).

(5) Support lower control arm and rotor using hydraulic jack.

(6) Remove tool from ball joint stud and disengage stud from steering knuckle.

(7) Remove retaining stud-locknuts attaching cross-shaft to front crossmember and remove upper control arm assembly (fig. 2M-34).

Upper Control Arm Bushing

Removal

(1) Remove bushing nuts and bushing washers from upper control arm cross-shaft (fig. 2M-35).

(8) Remove supports and hydraulic jack.
(9) Lower car.
(10) Check and adjust front wheel alignment if necessary.

COIL SPRING

Removal

(1) Remove upper locknut, retainer, and grommet from shock absorber.
(2) Raise and support front of car.
(3) Remove locknuts from shock absorber lower mounting studs and remove shock absorber.
(4) Disconnect stabilizer bar link bolt at lower control arm, if equipped.
(5) Remove wheel, tire, caliper and rotor. Refer to Chapter 2F.
(6) Remove bolts attaching steering arm to steering knuckle and move steering arm aside.
(7) Assemble and install Spring Compressor Tool Sleeve J-23474 and Adapter Tools J-25581 as follows:
(a) Lubricate threads, socket, C-clip, and thrust washer of Adapter Tool J-25581 with chassis lubricant (fig. 2M-32).
(b) Thread adapter tool bolt into compressor tool sleeve J-23474 and install thrust washer followed by thrust bearing on bolt.
(c) Insert assembled tool (bolt end first) through shock absorber upper mounting hole in front crossmember (fig. 2M-33, View A).
(d) Install compressor plate under third coil up from bottom of spring with flat side of plate facing downward and insert bolt through compressor plate (fig. 2M-33, View B).
(e) Install socket on bolt, with rounded end of socket facing up, followed by C-clip to retain compressor plate on bolt (fig. 2M-33, View B). Be sure plate is properly positioned under each side of coil.

CAUTION: *The C-clip is installed in the undercut at the bottom of the bolt. Be sure the clip is fully seated in the undercut and socket before attempting to compress the spring.*

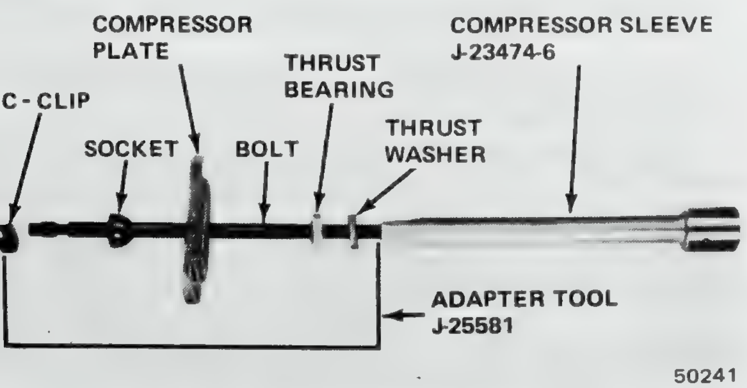


Fig. 2M-32 Spring Compressor Adapter Tools

(8) Using 1/2 drive (12.7 mm) ratchet handle, inserted in upper end of compressor sleeve, turn sleeve clockwise to compress coil spring (fig. 2M-33, View A).

CAUTION: *Do not use an impact wrench to turn the compressor sleeve. Use a ratchet handle only. An impact wrench can place unnecessary stress on the compressor tool bolt resulting in bolt thread damage or a broken bolt.*

(9) Remove cotter pin and nut from lower ball joint stud.
(10) Thread tool J-9656 onto stud and strike tool with hammer to loosen stud in steering knuckle (fig. 2M-31).
(11) Remove tool from ball joint stud and disengage stud from steering knuckle.
(12) Move steering knuckle, steering spindle, and anchor plate, aside to provide working clearance.
(13) Move lower control arm aside, release spring compressor tool, and remove tool and coil spring.

Installation

(1) Position upper end of spring in front crossmember spring seat and align cut-off end of bottom coil with formed shoulder in spring seat.
(2) Use hydraulic jack or support stand to support spring and control arm until spring compressor tool is installed.

NOTE: *The top coil of the spring is flat. This end is installed in the spring pocket of the front crossmember. Also, Pacer model front springs do not use an insulator between the top coil of the spring and the spring pocket.*

(3) Install spring compressor tool as outlined in removal procedure and compress spring.
(4) Insert ball joint stud in steering knuckle and install retaining nut on ball stud. Tighten nut to 75 foot-pounds (101.6 Nm) torque and install replacement cotter pin.
(5) Install steering arm on steering knuckle and install retaining bolts and nuts. Tighten bolts to 55 foot-pounds (74.5 Nm) torque.
(6) Loosen spring compressor tool until bottom coil of spring is approximately 1/2-inch (12.7 mm) from spring seat in lower control arm.
(7) Assemble 9/16 (14 mm) deep socket and 8 or 12-inch (20.3 or 30.4 cm) extension. Place socket over end of compressor tool bolt and pry inward on bolt to align bottom coil of spring and spring seat in control arm. When spring and seat are aligned, release compressor tool, seat spring in control arm, and remove compressor tool.

NOTE: *Be sure that the cut-off end of the bottom coil seats against the formed shoulder in the control arm spring seat.*

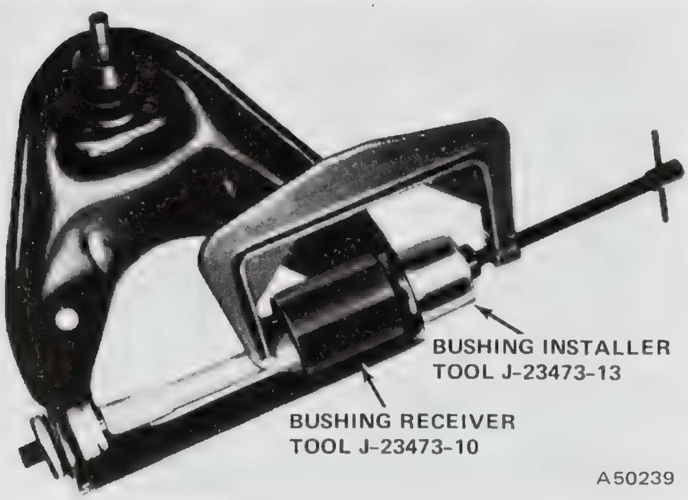


Fig. 2M-39 Upper Control Arm Bushing Installation

(6) Repeat steps (2) through (5) to install second bushing on cross-shaft and into upper control arm.

(7) Install bushing washers on cross-shaft with dished side of washer facing bushing.

(8) Install bushing nuts on cross-shaft and partially tighten nuts.

Upper Control Arm Installation

(1) Position upper control arm assembly on cross-member and install locknuts (fig. 2M-34). Tighten lock-nuts to 80 foot-pounds (108.4 Nm) torque.

(2) Insert upper ball joint stud in steering knuckle. Raise lower control using hydraulic jack to ease installation and relieve spring tension on upper ball joint.

(3) Install locknut on upper ball joint stud. Tighten nut to 75 foot-pounds (101.6 Nm) torque and install nut retainer and replacement cotter pin. Do not loosen nut to align slots in nut with hole in ball stud.

(4) Install wheel and tire assembly.

(5) Remove hydraulic jack and support stands and lower car.

(6) Tighten cross-shaft bushing nuts to 60 foot-pounds (81.3 Nm) torque.

LOWER CONTROL ARM

Lower Control Arm Removal

(1) Remove upper locknut, retainer and grommet from shock absorber.

(2) Raise and support front of car.

(3) Remove locknuts from shock absorber lower mounting studs and remove shock absorber.

(4) Disconnect stabilizer bar link bolt at lower control arm, if equipped.

(5) Remove wheel tire, caliper, and rotor. Refer to Chapter 2F.

(6) Remove bolts attaching steering arm to steering knuckle and move steering arm aside.

(7) Install Spring Compressor Tool Sleeve J-23474 and Adapter Tools J-25581. Refer to Coil Spring—Removal/Installation (fig. 2M-32 and fig. 2M-33).

(8) Using 1/2 drive (12 mm) ratchet handle, inserted in upper end of compressor tool sleeve, turn sleeve clockwise to compress spring (fig. 2M-33).

CAUTION: *Do not use an impact wrench to turn the compessor sleeve. Use a ratchet handle only. An impact wrench can place unnecessary stress on the compessor tool bolt resulting in bolt thread damage or a broken bolt.*

(9) Remove cotter pin and nut from lower ball joint stud.

(10) Thread tool J-9656 on stud and strike tool with hammer to loosen stud in steering knuckle (fig. 2M-31).

(11) Remove tool from ball joint stud and disengage stud from steering knuckle.

(12) Move steering knuckle, steering spindle, adapter, and anchor plate aside to provide working clearance.

(13) Remove two pivot bolts attaching lower control arm to front crossmember (fig. 2M-40) and remove lower control arm.

CAUTION: *When loosening/tightening the pivot bolts, take care to avoid damaging the steering protective boots. If the boots are cut or torn, the inner tie rod assemblies will be exposed to dirt, road splash, and other debris resulting in premature wear.*

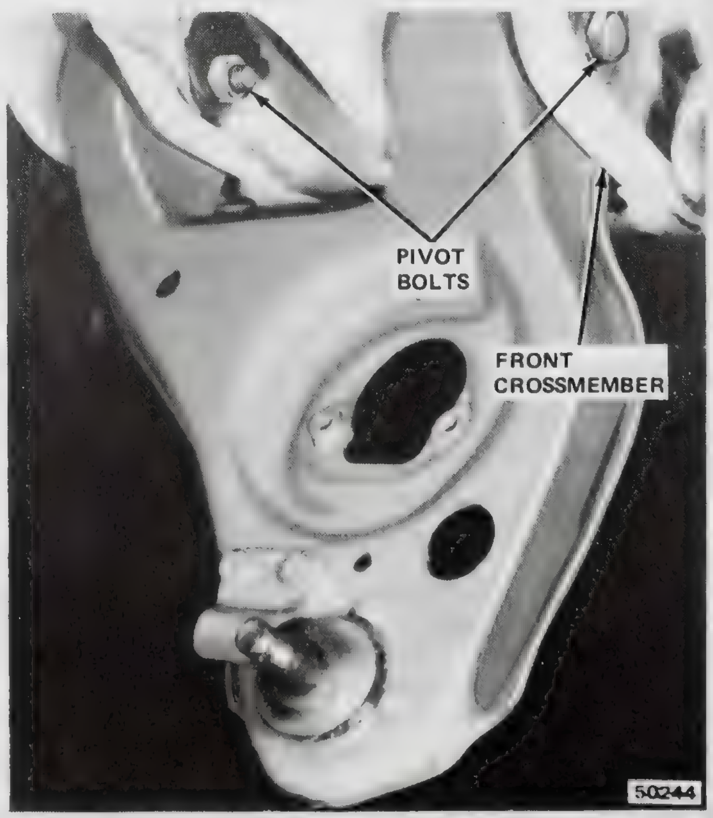


Fig. 2M-40 Lower Control Arm Pivot Bolt Location

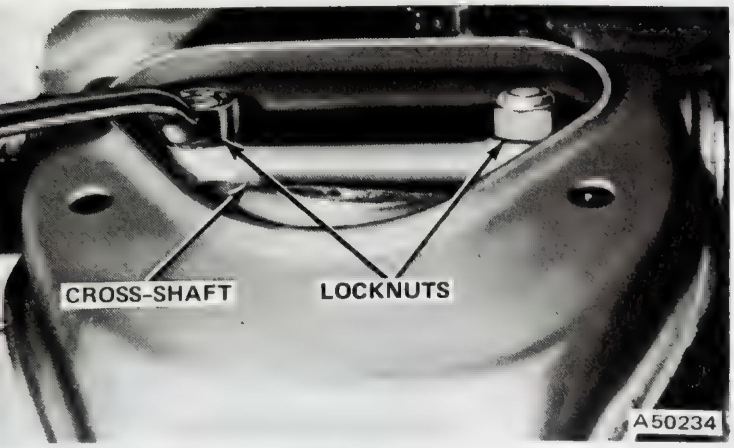


Fig. 2M-34 Upper Control Arm Removal/Installation

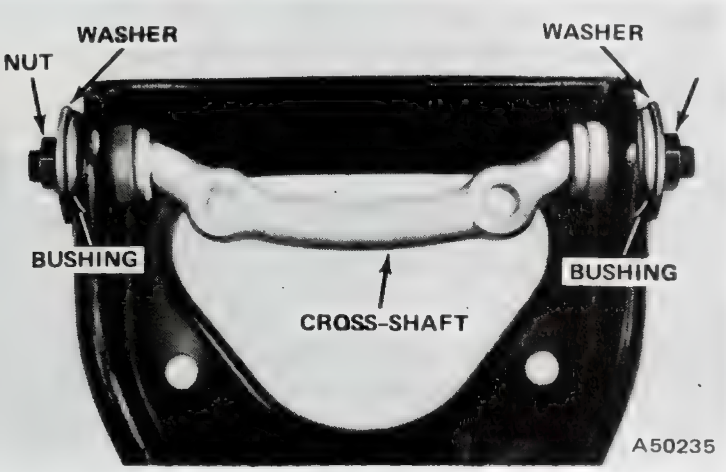


Fig. 2M-35 Bushing Nut and Washer Location

(2) Place U-Washer Tool J-23473-11 on upper control arm cross-shaft (fig. 2M-36).

(3) Position Bushing Receiver Tool J-23473-10 over large end of bushing and install C-Clamp Tool J-22269-01 over U-washer and bushing receiver (fig. 2M-37).

(4) Tighten C-clamp Tool J-22269-01 to remove bushing from upper control arm and cross-shaft.

(5) Repeat steps (2) through (4) to remove opposite bushing and cross-shaft.

Installation

(1) Position cross-shaft in upper control arm.

(2) Install first bushing on cross-shaft and in upper control arm.

(3) Install Bushing Receiver Tool J-23473-10 on cross-shaft (fig. 2M-38).

(4) Position Bushing Installer Tool J-23473-13 on large end of bushing and install C-clamp Tool J-22269-01 over bushing receiver and installer tools (fig. 2M-39).

(5) Tighten C-clamp tool to install bushing. Be sure bushing is seated fully in upper control arm. Remove bushing installation tools.

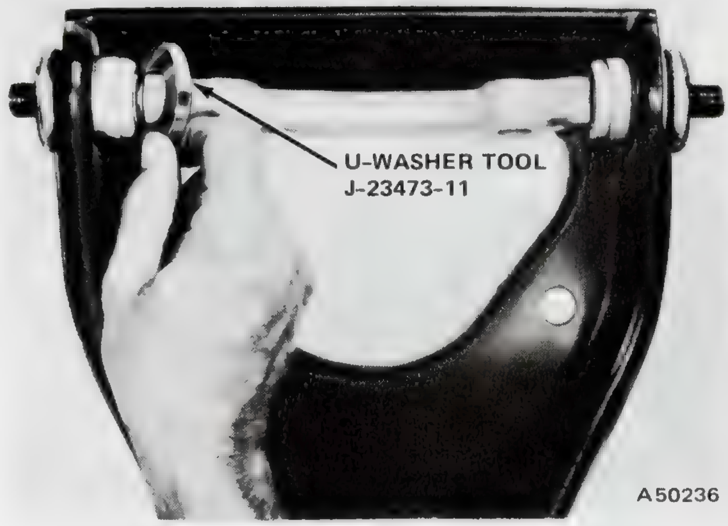


Fig. 2M-36 U-Washer Tool Installation

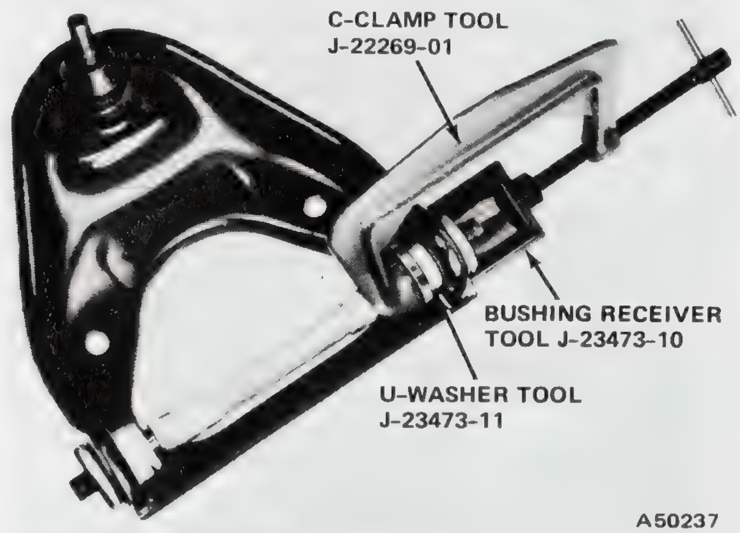


Fig. 2M-37 Upper Control Arm Bushing Removal

Fig. 2M-38 Bushing Receiver Installation

NOTE: *The thrust washer and nut are part of Bolt Assembly J-23473-6.*

(4) Tighten nut to press rear bushing out of lower control arm (fig. 2M-44).

NOTE: *Do not remove the spacer tools from the control arm after removing the bushing.*

Rear Bushing (Large Diameter) Installation

(1) Install rear bushing in lower control arm with flanged end of bushing facing away from control arm.

(2) Install Bushing Installer Tool J-23473-13 on Bolt J-23473-6 and insert bolt through bushing sleeve.

NOTE: *Insert the threaded end of the bolt through the bushing sleeve from the outer end of the lower control arm only.*

(3) Install Bushing Receiver Tool J-23473-7 on threaded end of bolt followed by thrust washer and nut (fig. 2M-45).

(4) Tighten nut to press rear bushing into lower control arm (fig. 2M-45).

(5) Remove bushing installation tools and remove Spacer Tool J-23473-12 from lower control arm.

Front Bushing (Small Diameter) Installation

(1) Install front bushing in lower control arm with flanged end of bushing facing away from control arm.

(2) Install Bushing Installer Tool J-23473-3 on bolt and insert bolt through bushing sleeve.

(3) Install Bushing Receiver Tool J-23473-7 on threaded end of bolt followed by thrust washer and nut (fig. 2M-46).

NOTE: *Insert the threaded end of the bolt through the bushing from the outer end of the lower control arm only.*

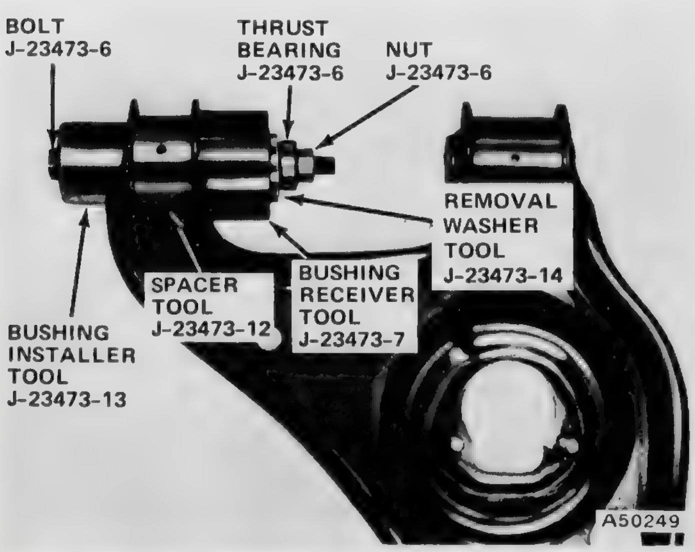


Fig. 2M-45 Lower Control Arm Rear Bushing Installation

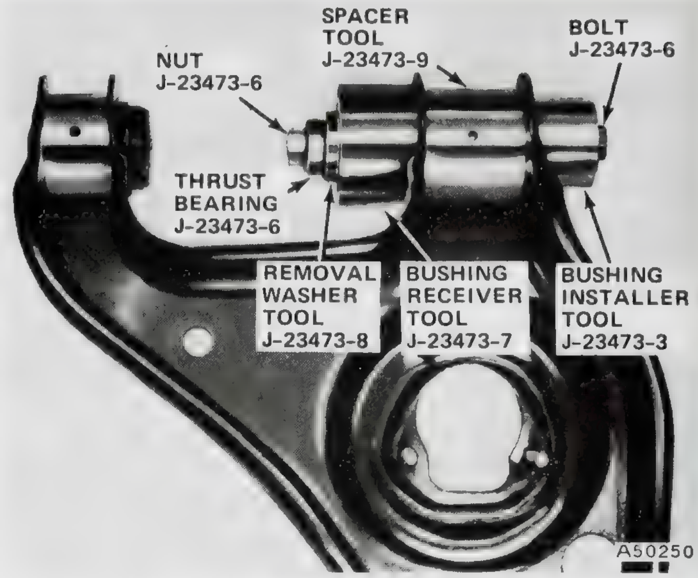


Fig. 2M-46 Lower Control Arm Front Bushing Installation

(4) Tighten nut to press front bushing into lower control arm (fig. 2M-46).

(5) Remove bushing installation tools and remove Spacer Tool J-23473-9 from lower control arm.

Lower Control Arm Installation

(1) Position lower control arm in front crossmember and install pivot bolts and locknuts. Tighten locknuts securely but not completely.

(2) Insert lower control arm ball joint stud in steering knuckle and install retaining nut on ball stud. Tighten nut to 75 foot-pounds (101.6 Nm) torque and install replacement cotter pin. Do not loosen nut to align slots in nut with hole in ball stud.

(3) Install steering arm on steering knuckle and install retaining bolts and nuts. Tighten bolts to 55 foot-pounds (74.5 Nm) torque.

(4) Loosen spring compressor tool until bottom coil of spring is approximately 1/2-inch (12.7 mm) from spring seat in lower control arm.

(5) Assemble 1/2 drive (12 mm), deep socket and 8 or 12 inch (20.3 or 30.4 cm) extension. Place socket over bottom end of compressor tool bolt and pry inward on bolt to align bottom coil of spring and spring seat in control arm.

NOTE: *The cut-off end of the bottom coil must seat against the formed shoulder in the spring seat.*

(6) Release spring compressor tool, seat spring in control arm, and remove compressor tool.

(7) Install shock absorber. Tighten lower mounting stud locknuts to 20 foot-pounds (27.1 Nm) torque.

(8) Connect stabilizer bar link bolt to lower control arm if equipped. Tighten locknut to 7 foot-pounds (9.4 Nm) torque.

Lower Control Arm Bushing Replacement

Front Bushing (Small Diameter) Removal

(1) Install Spacer Tools J-23473-9 and J-23473-12 in lower control arm (fig. 2M-41).

CAUTION: *Do not attempt to remove the bushings without using the spacer tools to avoid damaging the control arm.*

(2) Install Bushing Receiver Tool J-23473-7 on Bolt J-23473-6 and insert bolt through bushing sleeve (fig. 2M-42).

NOTE: *Insert the threaded end of the bolt through the front bushing sleeve from the outer end of the lower control arm only (fig. 2M-42).*

(3) Install Remover Washer Tool J-23473-8 on threaded end of bolt followed by thrust bearing J-23473-6 and nut J-23473-6 (fig. 2M-43).

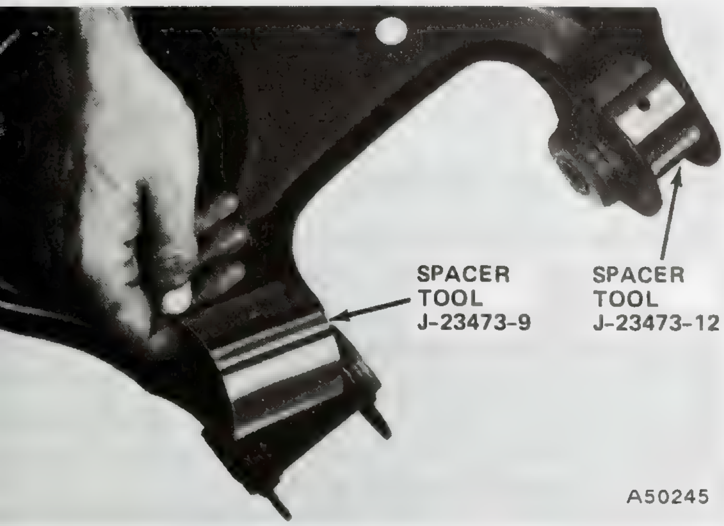


Fig. 2M-41 Spacer Tool Installation

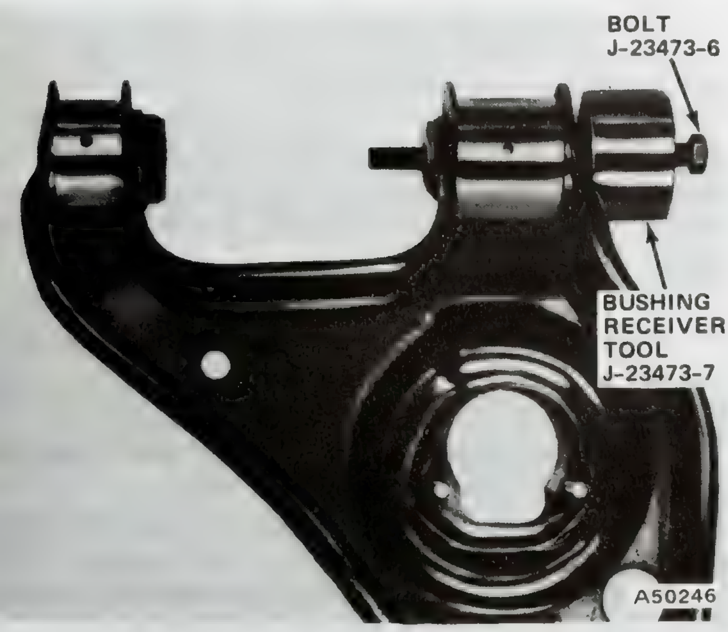


Fig. 2M-42 Bushing Receiver and Bolt Installation

NOTE: *The thrust washer and nut are part of Bolt Assembly J-23473-6.*

(4) Tighten nut to press front bushing out of lower control arm (fig. 2M-43).

NOTE: *Do not remove the spacer tool from the control arm after removing the bushing.*

Rear Bushing (Large Diameter) Removal

(1) Install Bushing Receiver Tool J-23473-7 on Bolt J-23473-6 and insert bolt through bushing sleeve (fig. 2M-44).

(2) Insert threaded end of bolt through bushing sleeve from outer end of lower control arm only.

(3) Install Remover Washer Tool J-24373-14 on threaded end of bolt followed by Thrust Bearing J-23473-6 and Nut J-23473-6 (fig. 2M-44).

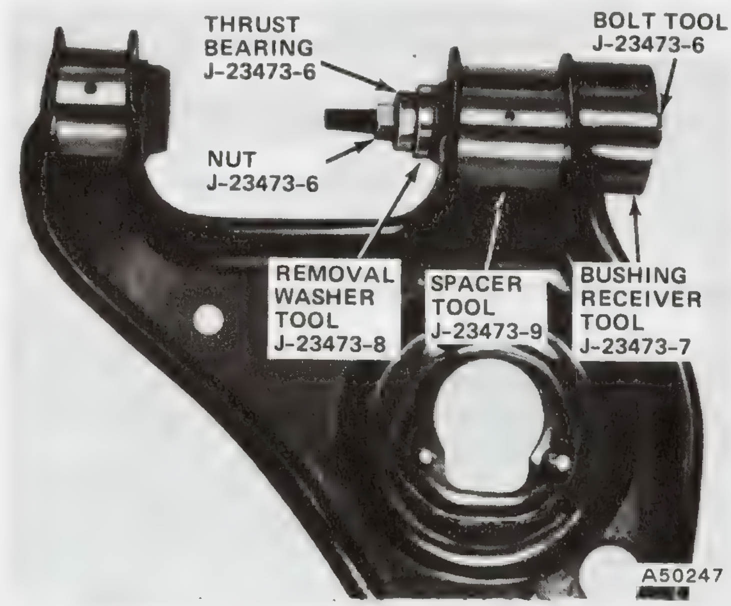


Fig. 2M-43 Lower Control Arm Front Bushing Removal

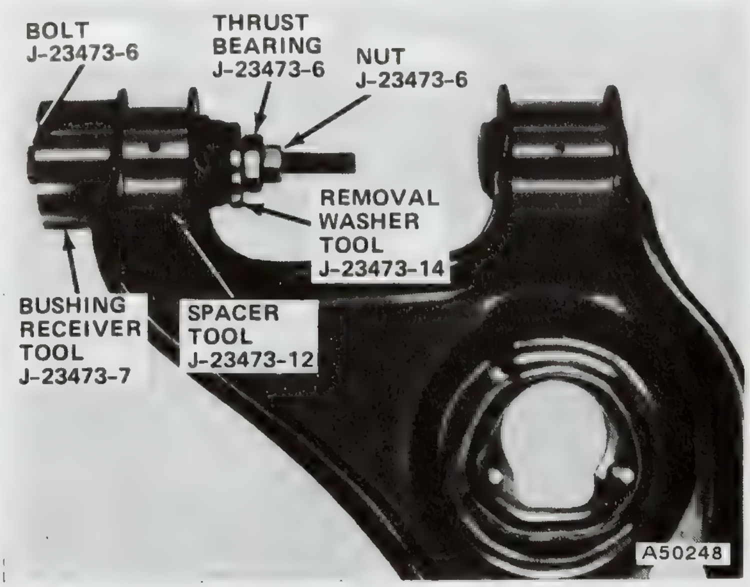


Fig. 2M-44 Lower Control Arm Rear Bushing Removal

(2) Insert tie rod end ball stud in steering arm (from bottom) and install retaining nut. Tighten nut to 50 foot-pounds (67.7 Nm) torque and install replacement cotter pin.

(3) Install rotor, caliper, and wheel and tire. Refer to Chapter 2F.

(4) Remove supports and hydraulic jack and lower car.

(5) Check front wheel alignment and correct if necessary.

FRONT CROSSMEMBER

Removal

(1) Raise and support front of car.

(2) Remove front wheel and tire assemblies.

(3) Remove upper and lower control arms and coil springs as outlined in this section.

(4) Remove steering gear. Refer to Chapter 2K.

(5) Raise and support engine using chain hoist or portable crane.

(6) Remove bolts that connect engine front mounting brackets to engine front support cushions, which are attached to crossmember.

(7) Using hydraulic jack, support front crossmember and remove mounting bolts at front of crossmember and mounting stud locknuts at rear of crossmember.

(8) Lower hydraulic jack and remove jack and front crossmember from under car.

(9) Remove engine front support cushions from crossmember.

(10) Remove crossmember front mounting bushings and clamps from frame side sills.

Installation

(1) Install crossmember front mounting bushings and clamps on frame side sills. Tighten bolts to 50 foot-pounds (67.7 Nm) torque.

(2) Install engine front support cushions on crossmember. Tighten bolts to 30 foot-pounds (40.6 Nm) torque.

(3) Place front crossmember on hydraulic jack and position jack and crossmember under car.

(4) Raise crossmember using hydraulic jack and position crossmember on frame side sills. Be careful not to damage threads of crossmember rear mounting studs.

(5) Install crossmember front mounting bolts and rear mounting stud locknuts. Tighten bolts and locknuts to 50 foot-pounds (67.7 Nm) torque.

(6) Install bolts connecting engine front support cushions to engine front mounting brackets. Tighten bolts to 55 foot-pounds (74.5 Nm) torque.

(7) Remove tools or device used to lift and support engine.

(8) Install steering gear as outlined in Chapter 2K.

(9) Install upper and lower control arms and coil springs as outlined in this section.

(10) Install front wheel and tire assemblies.

(11) Remove supports and hydraulic jack and lower car.

(12) Check and adjust front wheel alignment as necessary.

SPECIFICATIONS

Suspension Specifications

Service Set-To Torques should be used when assembling components. Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Metric (N·m)		USA (ft. lbs.)	
	Service Set-To Torque	In-Use Recheck Torque	Service Set-To Torque	In-Use Recheck Torque
Adaptor-to-Steering Knuckle Bolt	108	102-122	80	75-90
Brake Caliper Anchor-Plate Mounting Bolt	115	108-129	85	80-95
Brake Caliper Support Key Retaining Screw	20	16-24	15	12-18
Brake Line to Wheel Cylinder or Caliper Fitting Bolt	11	10-13	100 in-lb	90-115 in-lb
Front Crossmember-to-Frame Side Sill Bracket Mounting Bolts	68	61-81	50	45-60
Front Shock Absorber Locknut Upper	11	7-19	8	5-14
Front Shock Absorber Locknut Lower	27	20-34	20	15-25
Lower Control Arm Pivot Bolt Nut	149	129-169	110	95-125
Rear Shock Absorber Locknut Upper And Lower	11	7-19	8	5-14
Stabilizer Bar Clamp Bolt	24	19-30	18	14-22
Stabilizer Bar Link Bolt Nut	10	7-14	7	5-10
Stabilizer Bat Mounting Bracket Bolt	24	19-30	18	14-22
Tie Rod Adjusting Clamp Bolt	19	16-22	14	12-16
Tie Rod Ball Stud Nut	68	61-81	50	45-60
Upper and Lower Ball Joint Nut	102	81-122	75	60-90
Upper Control Arm — Cross-Shaft Bushing Nut	81	68-95	60	50-70
Upper Control Arm — Cross-Shaft Retaining	108	95-122	80	70-90

All Torque values given in newton-meters and foot-pounds with dry fits unless otherwise specified.

Refer to the Standard Torque Specifications and Capscrew Markings Chart in Chapter A of this volume for any torque specifications not listed above.

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(9) Install rotor, caliper, and wheel and tire assembly. Refer to Chapter 2F.

(10) Remove supports and lower car.

(11) Install shock absorber upper grommet, retainer, and locknut. Be sure locating shoulder on grommet seats in hole in front crossmember. Tighten upper locknut to 8 foot-pounds (10.8 Nm) torque.

(12) Tighten lower control arm pivot bolts to 110 foot-pounds (149.1 Nm) torque.

(13) Check and adjust front wheel alignment if necessary.

STEERING KNUCKLE AND SPINDLE

Removal

(1) Raise and support front of car.

(2) Remove wheel, tire, caliper and rotor. Refer to Chapter 2F.

(3) Remove bolts attaching steering arm, steering stop, steering spindle, anchor plate, and adapter to steering knuckle and remove these components (fig. 2M-47).

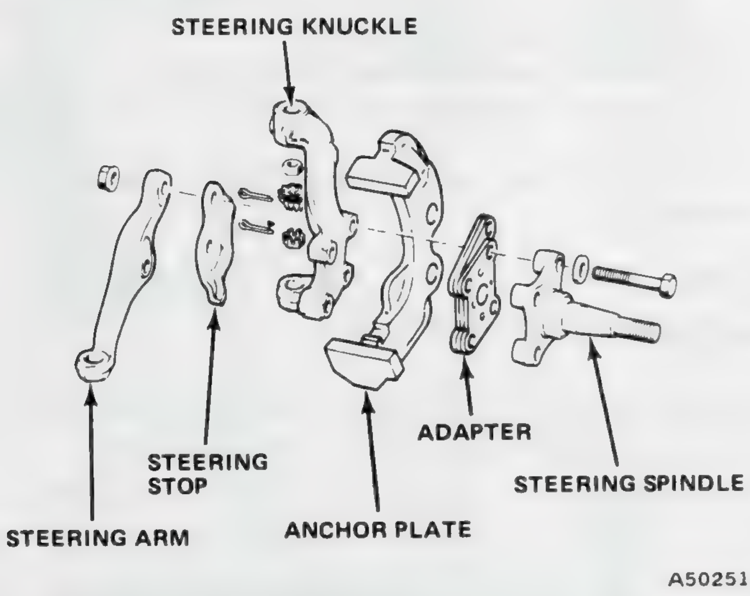

Fig. 2M-47 Steering Knuckle and Related Components

(4) Disconnect stabilizer bar link bolt at lower control arm, if equipped.

(5) Support lower control arm using hydraulic jack.

(6) Remove cotter pins and retaining nuts from upper and lower ball joint studs. Use tool J-9656 to loosen ball joint studs in steering knuckle (fig. 2M-30 and 2M-31).

(7) Remove tools and disengage ball joint studs from steering knuckle.

(8) Remove steering knuckle.

Installation

(1) Install steering knuckle on upper and lower ball joint studs and install stud retaining nuts. Tighten nuts to 75 foot-pounds (101.6 Nm) torque and install replacement cotter pins. Do not loosen nuts to align nut slots with hole in ball studs.

(2) Position steering stop, steering arm, steering spindle, anchor plate, and adapter on steering knuckle and install retaining bolts. Tighten bolts to 85 foot-pounds (115.2 Nm) torque.

(3) Connect stabilizer bar link bolt to lower control arm if equipped. Tighten nut to 7 foot-pounds (9.4 Nm) torque.

(4) Install wheel, tire, rotor and caliper. Refer to Chapter 2F.

(5) Remove supports and hydraulic jack and lower car.

(6) Check and adjust front wheel alignment if necessary.

STEERING ARM

Removal

(1) Raise and support front of car.

(2) Remove wheel and tire, caliper and rotor. Refer to Chapter 2F.

(3) Raise and support lower control arm using hydraulic jack.

(4) Remove cotter pin and retaining nut from tie rod end ball stud.

(5) Disconnect tie rod end from steering arm using Remover Tool J-26951 (fig. 2M-48).

(6) Remove bolts attaching steering arm to steering knuckle and remove steering arm.

Installation

(1) Position steering arm on steering knuckle and install retaining bolts. Tighten bolts to 85 foot-pounds (115.2 Nm) torque.

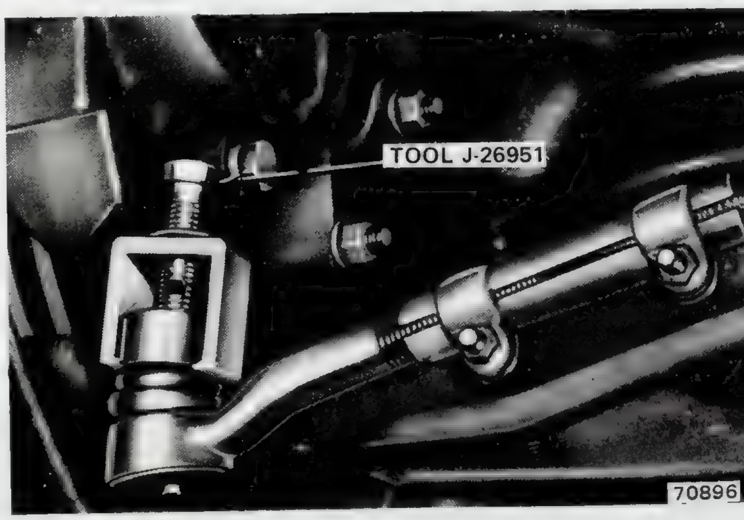

Fig. 2M-48 Disconnecting Tie Rod End

NOTES

Front Alignment Specifications

	Series	Set-To	OK Range
Caster	AMX Gremlin—Concord Matador Pacer	+ 1° + 1° + 1° 2°	0° to + 2° 0° to + 2° 0° to + 2° + 1° to + 3°
Camber	All — Left All — Right	+ 3/8° + 1/8°	+ 1/8° to + 5/8° 0° to + 1/2°
Toe-In	All	1/8°	1/16" to 3/16"
Turning Angle At Full Turn (Inside Wheel) Gremlin-AMX-Concord-Matador: 38° ± 2° Pacer: 35° ± 2°			

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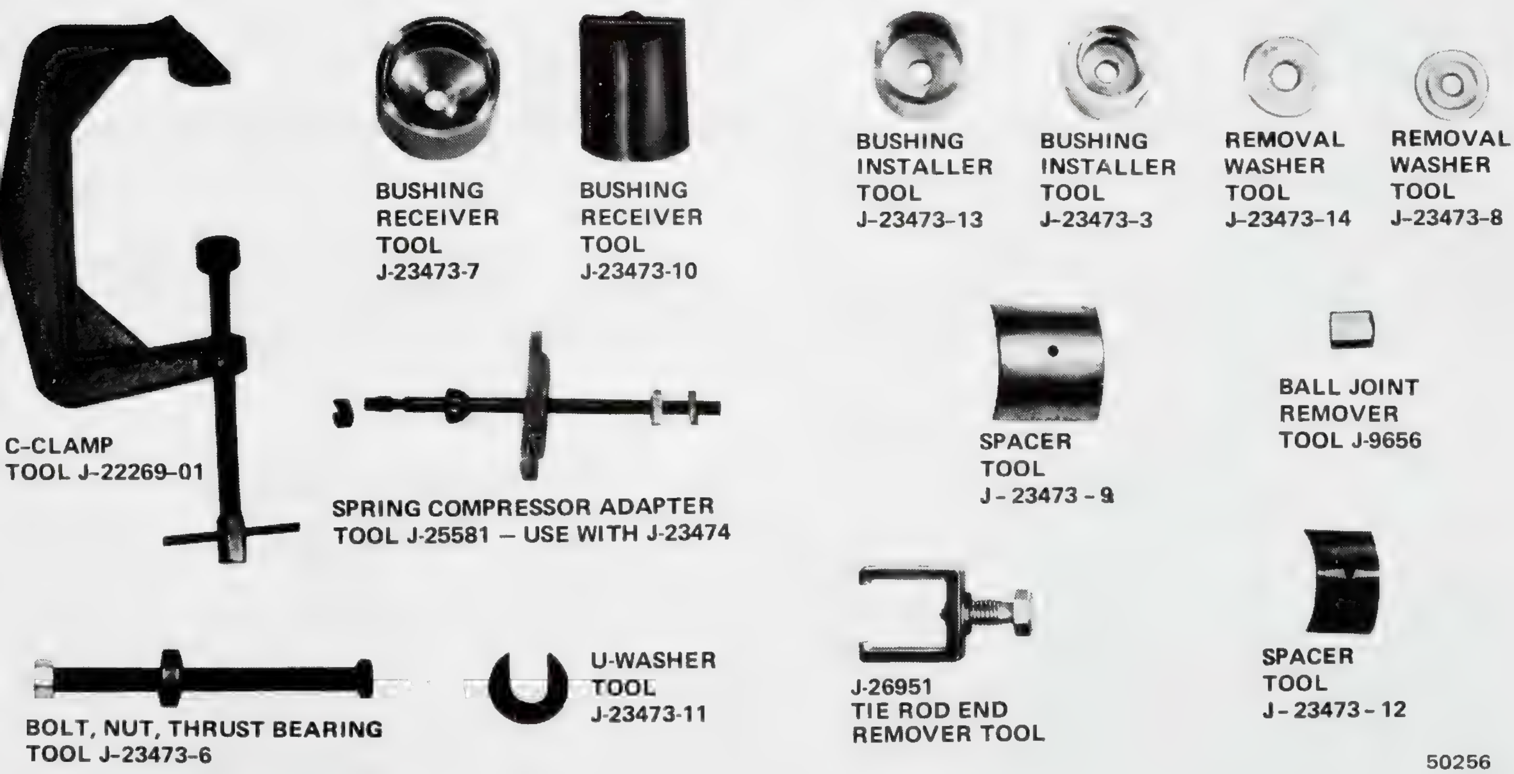
Special Tools



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inserts are installed between the tips of the spring leaves to reduce friction and noise during spring movement.

The rear axle assembly is attached to the springs with U-bolts and spring plates.

Spring action is controlled by the shock absorbers which are attached to the spring plate and rear underbody panel of the car.

The shock absorbers have a stud-type mounting and use rubber grommets at each end to prevent the transfer of noise into the body. The upper end of the shock absorber is mounted in a bracket which is attached to the rear underbody panel. The lower end is attached directly to the spring plate.

SHOCK ABSORBER

Removal

(1) Raise and support rear of car and support axle assembly with hydraulic jack.

(2) Remove locknut, retainer, and grommet which attach shock absorber lower mounting stud to spring plate.

(3) Compress shock absorber by hand and disengage lower mounting stud from spring plate.

(4) Remove bolts and lockwashers which attach shock absorber upper mounting bracket to underbody panel and remove shock absorber.

(5) Remove locknut, retainer, and grommet which attach mounting bracket to shock absorber upper mounting stud and remove bracket.

(6) Remove remaining grommets and retainers from shock absorber upper and lower mounting studs.

Installation

(1) Install a retainer and grommet on shock absorber mounting stud with locating shoulder of grommet facing end of mounting stud.

(2) Install mounting bracket on shock absorber upper mounting stud with flat side of bracket facing underbody panel. Install second grommet on stud with locating shoulder of grommet seated in bracket. Install retainer and locknut. Tighten locknut to 8 foot-pounds (10.8 Nm) torque.

NOTE: *The locating shoulders of the grommets must seat in the hole in the bracket.*

(3) Position assembled mounting bracket and shock absorber on mounting studs in underbody panel and install lockwashers and bolts. Tighten bolts to 28 foot-pounds (37.9 Nm) torque on Pacers and 15 foot-pounds (20.34 Nm) torque on all other models.

(4) Engage shock absorber lower mounting stud in spring plate.

(5) Install second grommet with shoulder of grommet facing spring plate. Install retainer and locknut.

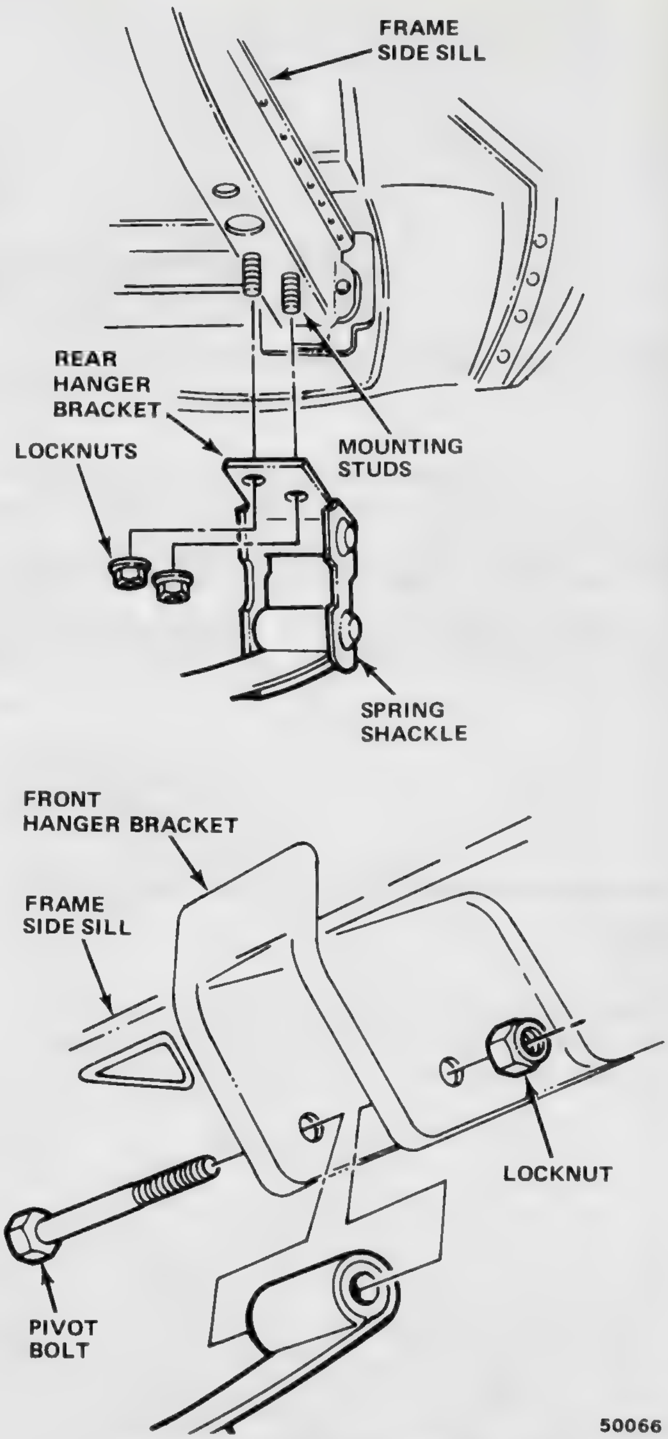

Fig. 2N-2 Spring to Frame Mounting—Pacer

Tighten locknut to 8 foot-pounds (10.9 Nm) torque.

(6) Remove supports and hydraulic jack and lower car.

SPRING IDENTIFICATION

The last three digits of the American Motors part number are stamped into the lower surface of the fourth (main) leaf, forward of the center bolt.

SPRING REMOVAL

(1) Raise and support rear of car and support axle

REAR SUSPENSION 2N

SECTION INDEX

REAR SUSPENSION—PACER, GREMLIN, CONCORD, AMX

GENERAL

Semi-elliptic multi-leaf springs and telescopic, double-action shock absorbers comprise the rear suspension on Pacer, Gremlin, Concord and AMX models (fig. 2N-1).

The leaf springs are installed parallel to the frame side sills with the spring eyes attached to hanger brackets located on the frame side sills. Pivot bolts, inserted through rubber bushings in the spring eyes, attach the eyes to the hanger brackets. Polyurethane

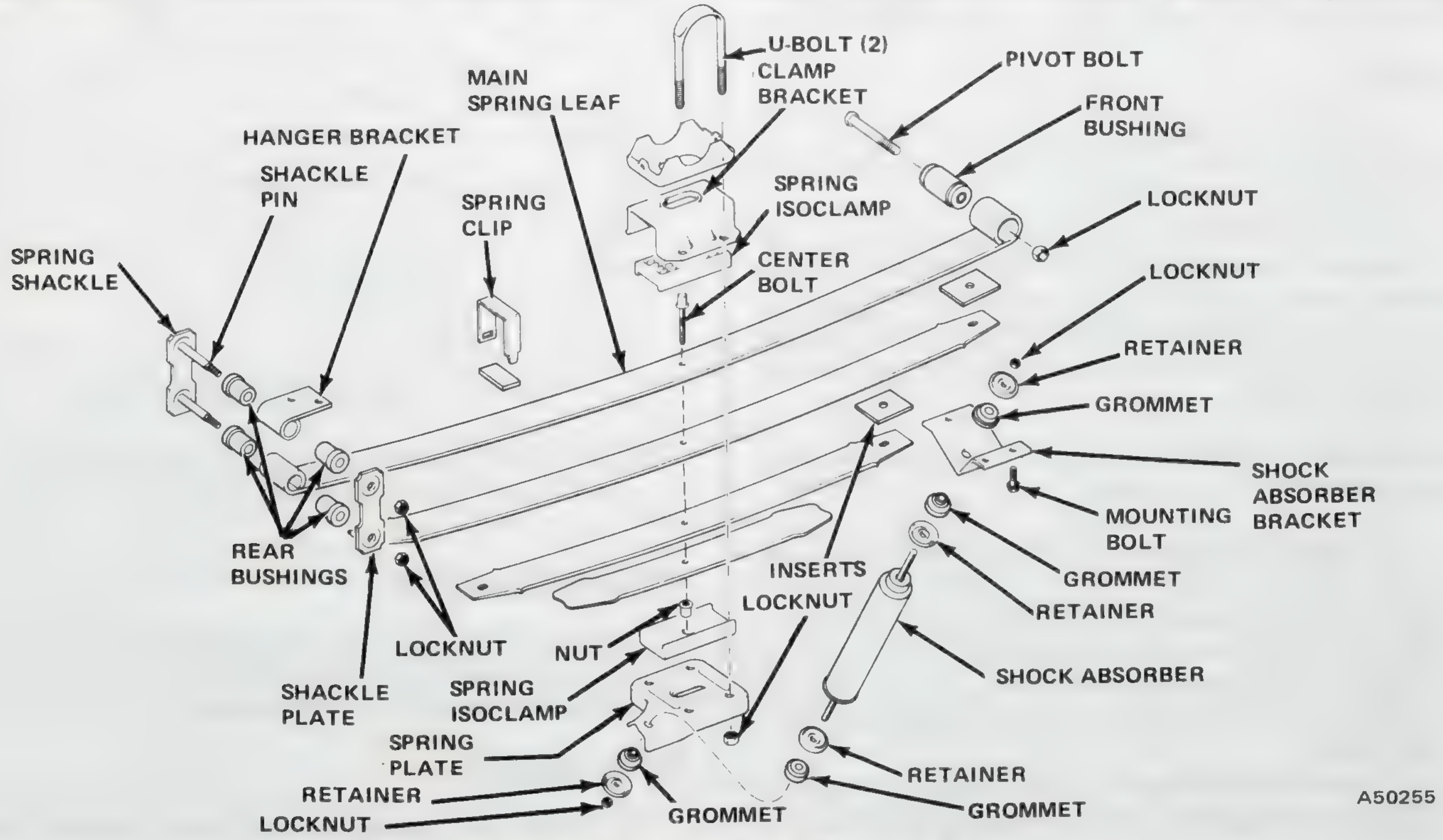

Fig. 2N-1 Rear Suspension—Pacer-Gremlin-Concord-AMX (Typical)

REAR SUSPENSION—MATADOR

GENERAL

A four-link, trailing arm-type rear suspension utilizing coil springs is used on all Matador models (fig. 2N-3). Four controls arms are used to maintain rear axle position and to attach the axle to the car. Two coil springs mounted on brackets attached to the axle tubes maintain ride height and quality. Telescopic double-acting shock absorbers are used to control spring action and provide the desired ride control.

The lower control arms have a rubber bushing at each end to isolate road noise from the passenger compartment. The arms are attached to the outer ends of the axle tubes and to mounting brackets on the frame side sills. The lower arms control fore and aft movement of the axle.

The upper control arms are attached to the rear axle housing and to the rear crossmember. The upper arms control lateral movement of the axle. A rubber bushing is installed only at the end of the control arm that is attached to the rear crossmember. Rubber bushings are pressed into integrally-cast mounting flanges on the rear axle housing to insulate the axle mounted end of the arm.

The position of the upper and lower control arms is such that they control the roll attitude of the rear axle

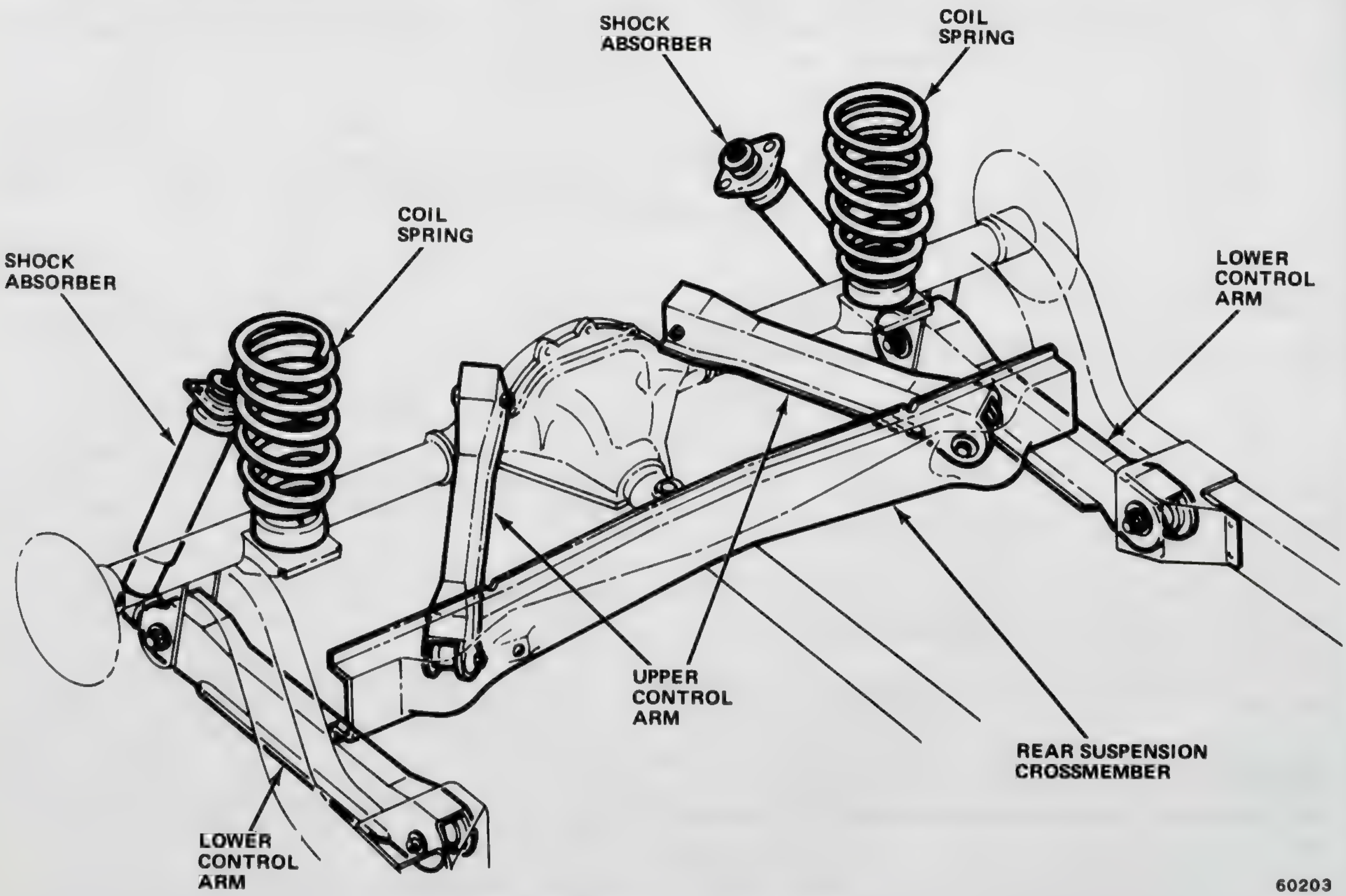

Fig. 2N-3 Rear Suspension—Matador

ssembly with hydraulic jack.

(2) Remove shock absorber lower mounting stud, ocknut, retainer, and grommet.

(3) Compress shock absorber by hand and disngage lower mounting stud from spring plate.

(4) Remove U-bolts spring isoclamps, and clamp racket (fig. 2N-1).

(5) Remove pivot bolt and nut from spring front ye.

(6) Remove shackle nuts, shackle plate, and shackle t rear spring eye and remove spring.

(7) On Pacers, remove nuts attaching rear hanger racket to mounting studs on frame side sill and remove pring (fig. 2N-2). Remove shackle nuts and shackle fter spring is removed.

PRING OVERHAUL

(1) Remove spring clips.

(2) Mount spring in vise or use two C-clamps to ompress and retain spring leaves and remove spring enter bolt.

(3) Slowly release vise or C-clamps and separate pring leaves and inserts.

(4) Remove bushings from spring eyes using arbor ress and suitable size socket or section of pipe.

(5) Install replacement bushings in spring eyes usg arbor press and suitable size socket or section of ipe. Be sure bushings are centered in spring eyes.

SPRING INSTALLATION

(1) On Gremlin, Concord and AMX insert shackle pins into spring rear eye and rear hanger.

(2) On Pacers, assemble rear hanger bracket and shackle and install in spring rear eye.

(3) On Pacers, position rear hanger bracket on frame side sill and install mounting stud nuts. Tighten nuts to 45 foot-pounds (61.0 Nm) torque.

(4) Position front spring eye in front hanger and install pivot bolt and pivot bolt locknut. Tighten locknut to 110 foot-pounds (149.1 Nm) torque.

(5) Install shackle plate and locknuts on shackle pins. Tighten locknuts to 30 foot-pounds (40.7 Nm) torque.

(6) Install clamp bracket, spring isoclamps, spring plate, and U-bolts.

(7) Install U-bolt locknuts and tighten locknuts to 50 foot-pounds (67.8 Nm) torque.

NOTE: *When installing the springs on the axle, be sure the spring center bolt is properly positioned in the clamp bracket and spring plate before tightening the U-bolt locknuts.*

(8) Insert shock absorber lower mounting stud in spring plate and install grommet, retainer, and locknut. Tighten locknut to 8 foot-pounds (10.9 Nm) torque.

(9) Remove supports and hydraulic jack and lower car.

SPECIFICATONS

Rear Suspension Specifications

Service Set-To Torques should be used when assembling components.

Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Service Set-To Torque (USA) Ft-Lbs	Service Set-To Torque (Metric) N-m	Service In-Use Recheck Torque (USA) Ft-Lbs	Service In-Use Recheck Torque (Metric) N-m
Rear Shock Absorber Locknut Upper and Lower	8	10.8	5-14	6.8-18.0
Rear Shock Absorber Mounting Bracket Nuts				
Pacer	28	37.0	20-35	27.1-47.5
Gremlin - Concord - AMX	15	20.3	10-18	13.6-24.4
Rear Spring Front Eye Pivot Bolt and Nut	110	149.1	95-120	128.8-162.7
Note: Tighten and Check Torque Through Bolt Head.				
Rear Spring Shackle Pin Nuts	30	40.7	20-35	27.1-47.5
Rear Spring Hanger Mounting Stud Nuts	45	61.0	35-55	27.1-74.6
Rear Spring U-Bolt Nuts	50	67.8	35-70	27.1-94.9

All Torque values given in foot-pounds with dry fits unless otherwise specified.

Refer to the Standard Torque Specifications and Capscrew Markings Chart in Chapter A of this manual for any torque specifications not listed above.

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(2) Assemble Remover J-22668-1 and Screw J-21474-3 from Bushing Service Set J-22668 and insert screw through bushing.

(3) Install Receiver J-21474-16 on screw (fig. 2N-5).

(4) Install thrust bearing and nut on screw J-21474-3.

(5) Turn screw clockwise and press bushing out of axle housing mounting flange.

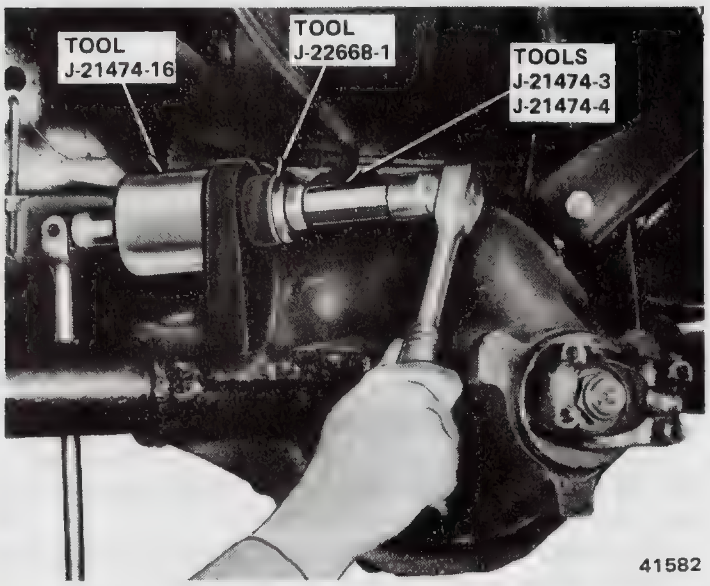

Fig. 2N-5 Axle Housing Upper Control Arm Bushing Removal

(6) Install replacement bushing using Installer J-22668-2 and Receiver J-21474-15 assembled on Screw J-21474-3 (fig. 2N-6).

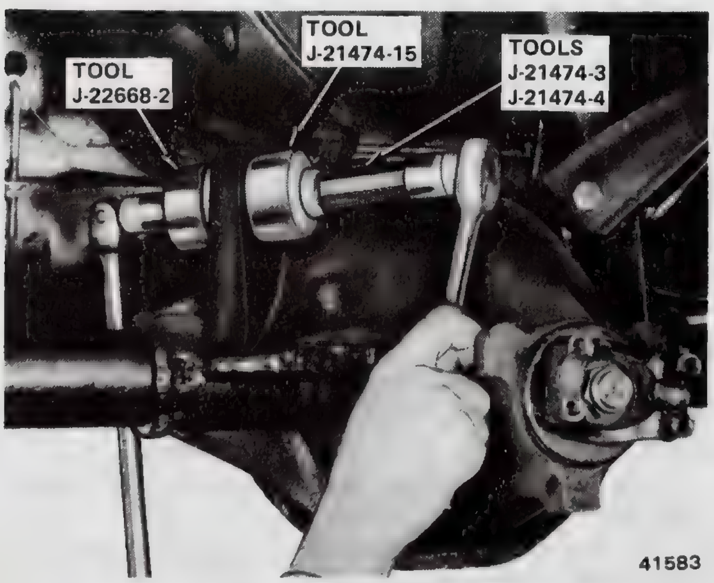

Fig. 2N-6 Axle Housing Upper Control Arm Bushing Installation

CAUTION: *The bushing must be installed dry only. Do not lubricate the bushing.*

(7) Install upper control arm as outlined in this section.

LOWER CONTROL ARM

Removal

NOTE: *The lower control arm is serviced as an assembly only. If the bushings or arm are damaged or worn, replace the entire control arm.*

(1) Raise car on hoist.

(2) Place support stand under rear axle housing.

(3) Remove stabilizer bar, if equipped.

(4) Remove pivot bolts attaching lower control arm to brackets on frame side sill and rear axle tube and remove arm.

Installation

(1) Position lower control arm in axle tube bracket and install rear pivot bolt. Hand-tighten bolt only.

(2) Position control arm in frame side sill bracket and install pivot bolt.

(3) Tighten control arm-to-frame side sill bracket pivot bolt to 65 foot-pounds (88.1 Nm) torque. Tighten control arm-to-axle tube bracket pivot bolt to 65 foot-pounds (88.1 Nm) torque.

(4) Install stabilizer bar, if equipped.

(5) Remove support stand and lower car.

SPRING IDENTIFICATION

A plastic identification tag which has the spring part number printed on it is attached to each coil spring. Whenever a spring must be replaced, refer to this part number when ordering a replacement spring.

SPRING REMOVAL

(1) Raise car on axle contact hoist and place support stands under rear frame side sills.

(2) Disconnect shock absorbers at axle tubes.

(3) Disconnect upper control arms at axle housing.

(4) Lower car on hoist until axle assembly drops down far enough to permit coil spring removal and remove coil spring(s).

SPRING INSTALLATION

(1) Install spring(s). Be sure spring(s) is properly positioned in upper and lower spring seat(s). Large end of spring goes in upper seat in body. Small end goes in seat on axle tube.

(2) Raise hoist and axle assembly and connect upper control arms to axle housing. Hand-tighten control arm pivot bolts only.

(3) Connect shock absorbers to axle tubes. Tighten nuts to 8 foot-pounds (10.9 Nm) torque.

(4) Remove support stands.

(5) Tighten both upper control arm pivot bolts to 65 foot-pounds (88.1 Nm) torque.

(6) Lower car.

during turning, braking, and acceleration torque loads.

The rear universal joint angle is adjusted by shims nstalled between the rear crossmember and car body. Refer to Chapter 2D for details and adjustment procedures.

A rear stabilizer bar is available as an option on Matador models (fig. 2N-4). It operates in the same manner as a front stabilizer bar. When installed, the bar interconnects the two rear lower control arms and torsionally esists independent motion of the two sides of the rear uspension members.

Spacing sleeves are installed in the lower control arms o prevent distortion of the arm when the stabilizer bar nounting bolts are tightened. Spacing shims are intalled between the control arm and stabilizer bar to rovide a proper fit on some cars (fig. 2N-4).

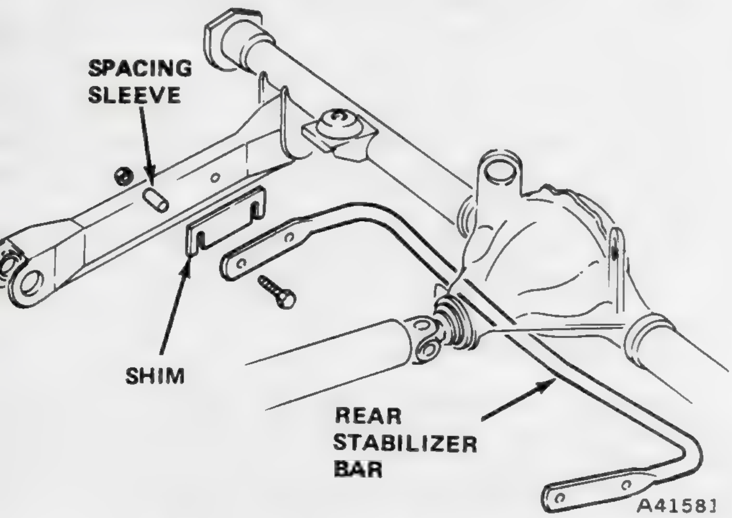

Fig. 2N-4 Rear Stabilizer Bar—Matador

HOCK ABSORBER

emoval

(1) Raise and support car.

(2) Remove bolts attaching shock absorber upper nounting plate to underbody.

(3) Remove nut, retainer, and grommet from shock bsorber lower mounting stud and remove shock bsorber.

(4) Remove nut, retainer, and grommet from shock bsorber upper mounting stud and remove mounting late, grommet, and retainer.

stallation

(1) Install retainer, grommet, and mounting plate n shock absorber upper mounting stud. Be sure gromet seats in mounting plate.

(2) Install remaining grommet, retainer, and nut on pper mounting stud. Tighten locknut to 8 foot-pounds 0.9 Nm) torque. Be sure both grommets seat in mountg plate before tightening nut.

(3) Position shock absorber upper mounting plate on underbody and install attaching bolts. Tighten bolts to 15 foot-pounds (20.3 Nm) torque.

(4) Install retainer and grommet on shock absorber lower mounting stud and insert mounting stud in axle tube bracket. Be sure grommet seats in axle tube bracket.

(5) Install remaining grommet, retainer, and nut on lower mounting stud. Tighten nut to 8 foot-pounds (10.9 Nm) torque. Be sure grommets seat in axle tube bracket before tightening nut.

REAR STABILIZER BAR

Removal

(1) Raise car on hoist.

(2) Remove bolts attaching stabilizer bar to lower control arms and remove bar, shims (if any), and spacing sleeves.

Installation

(1) Install spacing sleeves in lower control arms.

(2) Position stabilizer bar on lower control arms and install attaching bolts and nuts. Hand-tighten bolts and nuts only.

(3) Install shims (if any) and tighten stabilizer bar attaching bolts to 75 foot-pounds (101.7 Nm) torque.

(4) Lower car.

UPPER CONTROL ARM

Removal

NOTE: *The upper control arm is serviced as an assembly only. If the arm or bushing is damaged or worn, replace the entire control arm.*

(1) Raise car on hoist.

(2) Remove pivot bolt attaching upper control arm to rear axle housing mounting flange.

(3) Remove pivot bolt attaching upper control arm to rear crossmember and remove control arm.

Installation

(1) Position upper control arm on rear axle housing mounting flange and install pivot bolt. Hand-tighten bolt only.

(2) Position arm on rear crossmember and install pivot bolt.

(3) Tighten both control arm pivot bolts to 65 foot-pounds (88.1 Nm) torque.

(4) Remove support stand and lower car.

AXLE HOUSING UPPER CONTROL ARM BUSHING

Bushing Replacement

(1) Remove upper control arm as outlined in this section.

to be towed, increase air pressure only enough to raise the car to the desired ride height. **Do not exceed the maximum inflation pressure of 90 psi and do not increase air pressure within the shock absorbers until after the car is loaded.**

NOTE: *Changing car ride height affects headlamp aiming.*

Adjustable Air Shock Test

Inflate the shock absorbers to 90 psi and apply a solution of soapy water around the valve, fittings, lines, and shock absorbers and check for leaks. Leaks will cause the soapy water solution to form bubbles in or near the area of leakage. If a leak is detected, repair or replace the defective part(s) as necessary.

SPECIFICATIONS

Rear Suspension Specifications

Service Set-To Torques should be used when assembling components.

Service In-Use Recheck Torques should be used for checking a pre-torqued item.

	Service Set-To Torque		Service In-Use Recheck Torque	
	(USA) Ft-Lbs	(Metric) N-m	(USA) Ft-Lbs	(Metric) N-m
Rear Cross Member to Body Mounting Bracket Bolt	75	101.7	65-90	88.1-122
Seat Belt Anchor Bolt	30	40.7	25-45	33.9-61.0
Shock Absorber Mounting Stud Nut —				
Lower	55	74.6	45-70	61.0-94.9
Upper	8	10.8	5-14	6.8-18.0
Shock Absorber Upper Mounting Plate Bolts	20	27.1	10-25	13.6-33.9
Stabilizer Bar-to-Lower Control Arm Bolts	75	101.7	60-85	81.3-115.2
Upper and Lower Control Arm Pivot Bolt	65	88.1	50-70	67.8-94.9

All Torque values given in foot-pounds with dry fits unless otherwise specified.

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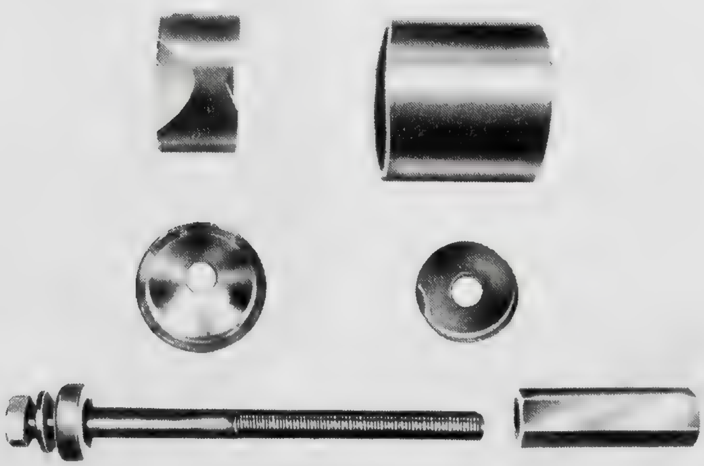
Special Tools



J-22668
BUSHING SERVICE SET

70361

REAR CROSSMEMBER

Removal

(1) Remove rear seat cushion.
(2) Remove inner seat belt anchor bolts.
(3) Raise car on hoist.
(4) Disconnect rear brake line at crossmember and plug line.
(5) Remove rear brake hose attaching clip. Move hose aside and plug hose.
(6) Remove parking brake cable holddown clips from rear crossmembmer.
(7) Remove muffler rear bracket bolts from crossmember and tailpipe hanger clamp.
(8) Remove pivot bolt nuts from all upper control arm pivot bolts. Do not remove pivot bolts.
(9) Support axle housing with adjustable support stand.
(10) Remove pivot bolts from upper control arms and remove arms.
(11) Remove rubber stop from crossmember.
(12) Remove crossmember attaching bolts.

NOTE: *Mark crossmember-to-body universal joint angle adjusting shims to avoid mixing right and left shims during assembly.*

(13) Lower axle housing support stand enough to remove crossmember.
(14) Remove crossmember. Insert left side of crossmember (forward face up) in opening between coils of left side spring; then angle right side of crossmember forward to clear lower control arm, slide crossmember underneath parking brake cable, and remove crossmember.

Installation

(1) Install crossmember and attaching bolts. Hand-tighten bolts only.

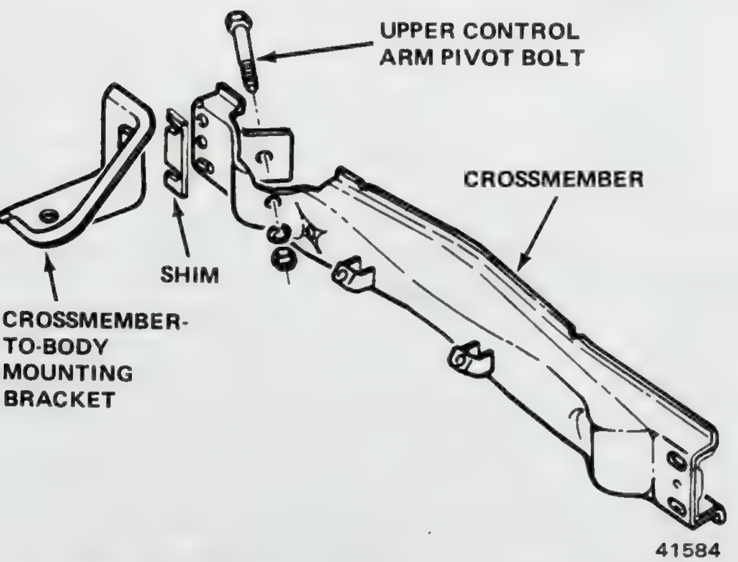


Fig. 2N-7 Rear Suspension Crossmember—Matador

(2) Install crossmember-to-body rear universal joint angle adjusting shims and tighten crossmember attaching bolts to 75 foot-pounds (101.7 Nm) torque (fig. 2P-8).
(3) Install rear axle housing jounce bumper in crossmember.
(4) Raise axle housing, install upper control arms, and insert pivot bolts in control arms.
(5) Lower axle housing and remove support stand.
(6) Install upper control arm pivot bolt nuts. Tighten nuts to 65 foot-pounds (88.1 Nm) torque.
(7) Install tailpipe hanger clamp and muffler rear bracket attaching bolts in crossmember.
(8) Install parking brake cable crossmember-to-holddown clips.
(9) Connect rear brake hose, and install hose clip.
(10) Check rear universal joint angle. Refer to Chapter 2D.
(11) Lower vehicle.
(12) Bleed brake hydraulic system. Refer to Chapter 2F.
(13) Install rear inner seat belt anchor bolts. Tighten bolts to 30 foot-pounds (40.7 Nm) torque.
(14) Install rear seat cushion.

AIR ADJUSTABLE SHOCK ABSORBER

Air adjustable shock absorbers are available on Matador models. These shock absorbers reduce rear end sag and maintain ride height.

When hauling heavy loads or towing trailers. The shock absorbers are adjusted by increasing or decreasing internal air pressure via air lines installed between the shock absorbers and bumper mounted air valve (fig. 2N-8).

When the car is unloaded, air pressure should be maintained at 0 psi. When the car is loaded or a trailer is

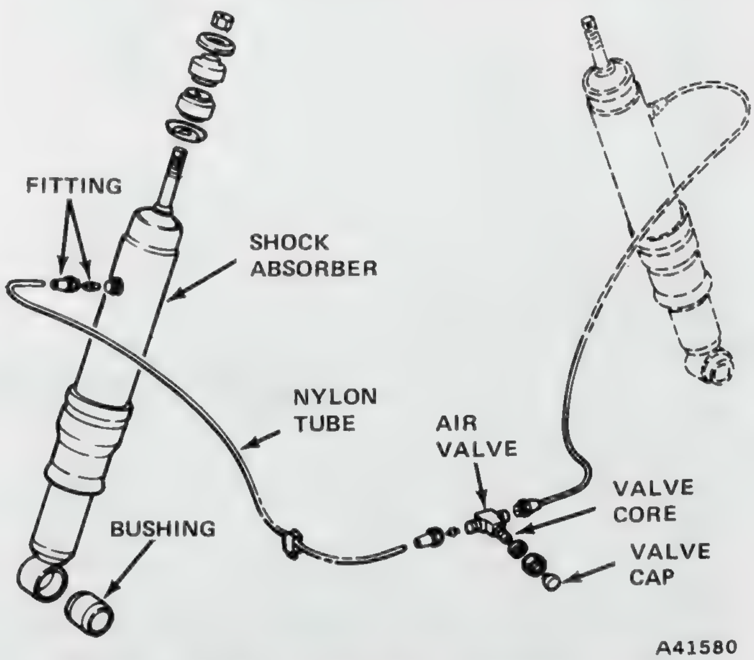


Fig. 2N-8 Rear Air-Adjustable Shock Absorbers—Matador

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Component Grid Locator
Pacer

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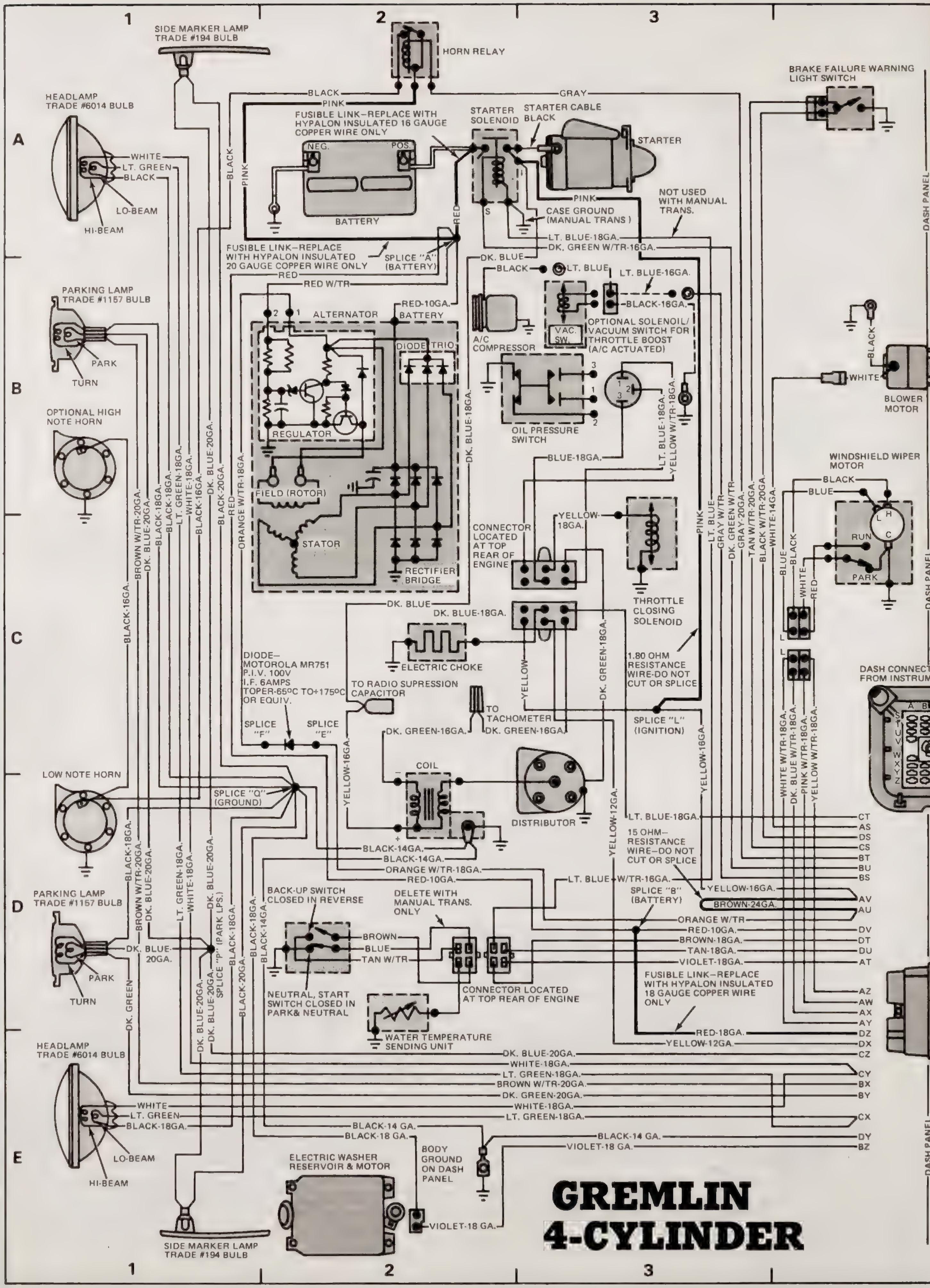
Splice "A"	D-5
Splice "B"	D-7
Splice "C"	D-3
Splice "E"	A-7
Splice "J"	B-5
Splice "H"	A-8
Splice "L"	D-3
Splice "P"	E-1
Splice "U"	C-11
Splice "V"	D-10
Splice "W"	D-10
Splice "X"	B-1
Splice "Z"	D-1
Starter	D-2
Starter Solenoid	D-2
Steering Column Connector	D-7 & D-8
Stoplight Switch	D-8
Tail Lamp Assembly, Left Rear	E-11
Tail Lamp Assembly, Right Rear	A-11
Tail — Stop — Turn Lamp, Left Rear	E-11
Tail — Stop — Turn Lamp, Right Rear	A-11
Thermo Timer	D-8 & D-9
Third Gear Switch (On Trans.)	B-2
Throttle Closing Solenoid	B-3
Transmission Control Spark (TCS) Solenoid	B-2
Windshield Washer Reservoir & Motor, Electric	A-2
Windshield Circuit Breaker	C-6
Windshield Wiper Motor	C-3
Windshield Wiper Switch	C-5

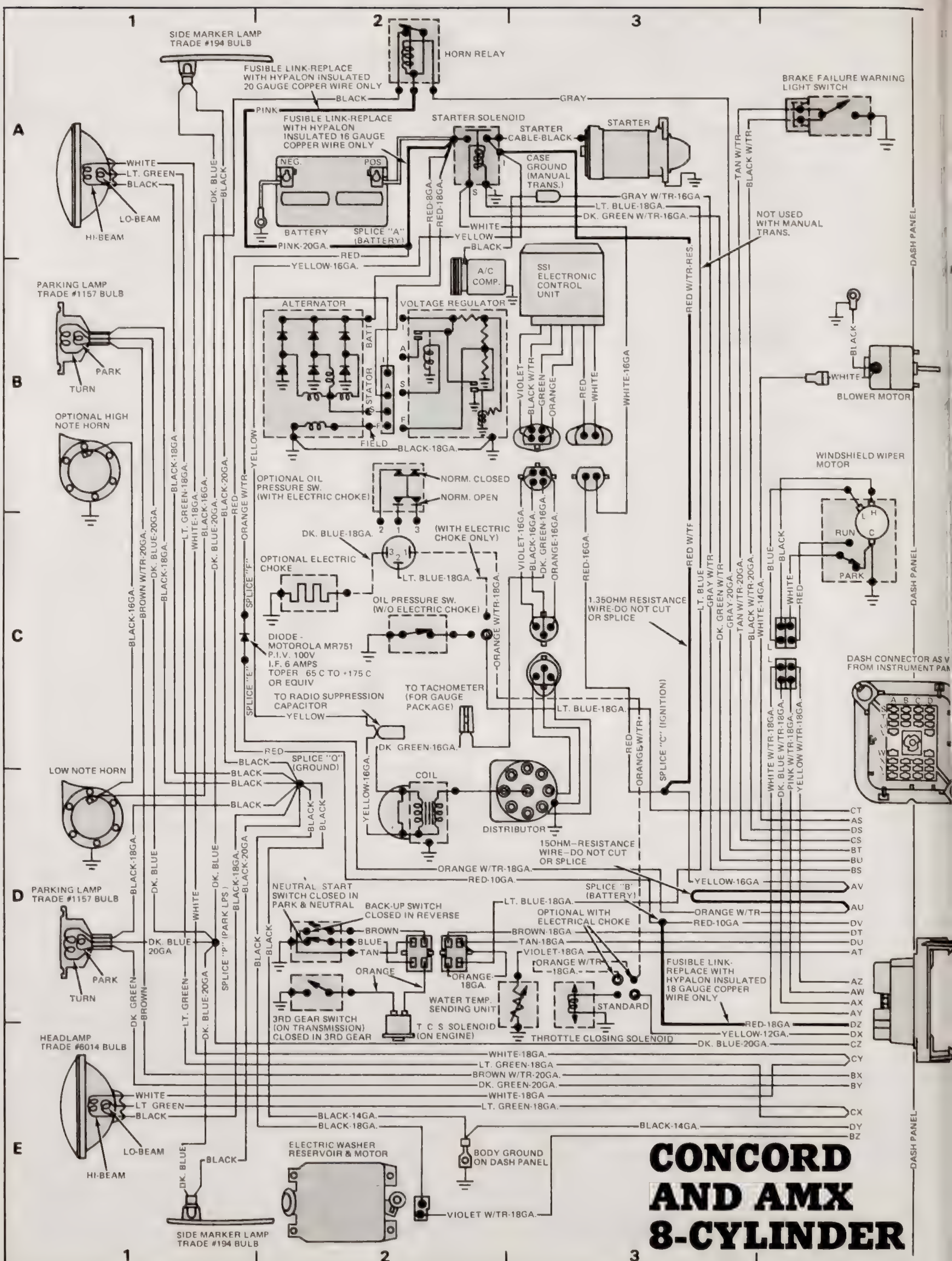
WIRING DIAGRAMS

SECTION INDEX



GREMLIN 4-CYLINDER

Wiring Diagram
Pacer
60 Series


CONCORD AND AMX 8-CYLINDER
SIDE MARKER LAMP TRADE #194 BULB
HORN RELAY
FUSIBLE LINK-REPLACE WITH HYPALON INSULATED 20 GAUGE COPPER WIRE ONLY
BRAKE FAILURE WARNING LIGHT SWITCH
STARTER SOLENOID
STARTER
STARTER CABLE-BLACK
FUSIBLE LINK-REPLACE WITH HYPALON INSULATED 16 GAUGE COPPER WIRE ONLY
CASE GROUND (MANUAL TRANS.)
BATTERY
SPLICE "A" (BATTERY)
LO-BEAM
HI-BEAM
NOT USED WITH MANUAL TRANS.
A/C COMP.
SSI ELECTRONIC CONTROL UNIT
ALTERNATOR
VOLTAGE REGULATOR
PARKING LAMP TRADE #1157 BULB
PARK
TURN
BLOWER MOTOR
OPTIONAL HIGH NOTE HORN
FIELD
WINDSHIELD WIPER MOTOR
OPTIONAL OIL PRESSURE SW. (WITH ELECTRIC CHOKE)
NORM. CLOSED
NORM. OPEN
(WITH ELECTRIC CHOKE ONLY)
OPTIONAL ELECTRIC CHOKE
OIL PRESSURE SW. (W/O ELECTRIC CHOKE)
1.35OHM RESISTANCE WIRE-DO NOT CUT OR SPLICE
DIODE - MOTOROLA MR751 P.I.V. 100V I.F. 6 AMPS TOPER 65 C TO +175 C OR EQUIV
DASH CONNECTOR AS VIEWED FROM INSTRUMENT PANEL
TO RADIO SUPPRESSION CAPACITOR
TO TACHOMETER (FOR GAUGE PACKAGE)
SPLICE "C" (IGNITION)
LOW NOTE HORN
SPLICE "O" (GROUND)
COIL
DISTRIBUTOR
15OHM-RESISTANCE WIRE-DO NOT CUT OR SPLICE
NEUTRAL START SWITCH CLOSED IN PARK & NEUTRAL
BACK-UP SWITCH CLOSED IN REVERSE
SPLICE "B" (BATTERY)
OPTIONAL WITH ELECTRICAL CHOKE
SPLICE "P" (PARK LPS.)
FUSIBLE LINK-REPLACE WITH HYPALON INSULATED 18 GAUGE COPPER WIRE ONLY
WATER TEMP. SENDING UNIT
STANDARD
3RD GEAR SWITCH (ON TRANSMISSION) CLOSED IN 3RD GEAR
T C S SOLENOID (ON ENGINE)
THROTTLE CLOSING SOLENOID
HEADLAMP TRADE #6014 BULB
ELECTRIC WASHER RESERVOIR & MOTOR
BODY GROUND ON DASH PANEL
DASH PANEL

Wiring Diagram
Gremlin
40 Series

Component Grid Locator
Matador 10 Series

NOMENCLATURE	LOCATION
Accessory Connector	E-6
A/C Compressor	C-2
A/C Temperature Sensor	C-1
A/C Thermostat	B-5
A/C Micro Switch Connector	B-5
Alternator, Six-Cyl. (Delco)	C-2
Alternator, Eight-Cyl. (Motorcraft)	B-2
Ash Receiver Lamp	A-7
Auto. Trans. Neutral & Back-up Lamp Switch	D-2
Back-up Lamp, Left	C-11
Back-up Lamp, Right	C-11
Battery	A-2
Blower Motor	B-4
Blower Motor Resistor	B-4
Body Ground	C-10
Body Ground on Dash Panel	D-2
Body Harness Connector	E-8
Brake Failure Warning Light Switch	A-4
Cigar Lighter	A-7
Clock	A-6
Coil	C-2
Courtesy Lamp, Left Side	D-9
Courtesy Lamp, Right Side	B-9
Dash Connector	D-4
Dimmer Switch	E-5
Directional Signal Flasher	D-7
Directional Signal Switch	C-8
Distributor	C-2
Dome Lamp	C-10
Door Switch, Left	E-9
Door Switch, Right	B-9
Fuse Panel	A-10 & E-6
Fusible Link, Horn Relay	A-2
Fusible Link, Ignition Switch Solenoid Circuit	A-7
Fusible Link, Starter Solenoid	A-2
Glove Box Lamp	A-9
Hazard Flasher	D-6
Headlamp, Left Side	E-1
Headlamp, Right Side	A-1
Headlamp Switch	D-6
Headlamp & Wiper Switch Lamp	C-6
Heater Rear Window Connector	D-8
Heater Blower Switch	A-5
Heater Control Lamp	A-5
Horn Switch	C-7
Horn, Left Side	D-1
Horn Relay	A-2
Horn, Right Side	B-1
Ignition Switch	B-8
Instrument Cluster Circuit Panel	B-6
Instrument Panel Ground	A-7
Key Alarm Switch	C-7
Key & Headlamp Warning Buzzer	C-6
License Lamp Assembly	C-11
Lamp Ground Screw In Trunk	C-10
Oil Pressure Sending Unit	B-3 & C-3
Parking Brake Lamp Switch	B-7
Parking Lamp, Left Side	D-1
Parking Lamp, Right Side	B-1
Radio Connector	B-5
Resistance Wire, Splice "L"	D-3
Seat Belt Buzzer/Timer	C-8

NOMENCLATURE	LOCATIO
Sending Unit, Gas Tank	D-10
Sending Unit, Water Temperature	D-2
Side Marker Lamp, Left Front	E-1
Side Marker Lamp, Left Rear	E-10
Side Marker Lamp, Right Front	A-1
Side Marker Lamp, Right Rear	A-10
Splice "A"	A-2
Splice "D"	D-6
Splice "E"	A-7
Splice "F"	A-6
Splice "H"	C-7
Splice "J"	A-7
Splice "L"	D-3
Splice "N"	E-1
Splice "P"	B-1
Splice "Q"	D-2
Splice "R"	B-1
Splice "S"	E-10
Splice "T"	A-10
Splice "U"	C-11
Splice "V"	C-10
Splice "W"	D-10
SSI Electronic Control Unit	A-3
Starter	B-3
Starter Solenoid	A-3
Steering Column Connector	C-7
Stop Lamp Switch	D-8
Tail & Stop Lamp, Left Inner	D-11
Tail & Stop Lamp, Left Outer	E-11
Tail & Stop Lamp, Right Inner	B-11
Tail & Stop Lamp, Right Outer	A-11
Third Gear Switch (On Trans.)	C-2
Throttle Closing Solenoid	D-2
Transmission Control Spark (TCS) Solenoid	D-2
Voltage Regulator, Eight-Cyl.	B-2
Windshield Washer Reservoir & Motor, Electric	E-2
Windshield Wiper Motor	C-4
Windshield Wiper Switch	C-6

Wiring Diagram
Concord and AMX
01 Series

Component Grid Locator
Matador 80 Series

NOMENCLATURE	LOCATION
A/C Compressor	C-1
A/C Micro Switch Connector	B-5
A/C Temperature Sensor	C-1
A/C Thermostat	B-5
Alternator, Six-Cyl. (Delco)	B-2 & C-2
Alternator, Eight-Cyl. (Motorcraft)	B-2
Ash Receiver Lamp	A-7
Auto. Trans. Neutral & Back-up Lamp Switch	D-2
Back-up Lamp, Left	D-11
Back-up Lamp, Right	B-11
Battery	A-2
Blower Motor	B-4
Blower Motor Resistor	B-4
Body Ground	C-11
Body Ground on Dash Panel	A-7
Body Harness Connector	E-8
Brake Failure Warning Light Switch	A-4
SSI Module	A-3
Cargo Lamp (Wagon Only)	C-10
Cargo Lamp Switch (Wagon Only)	C-10
Cigar Lighter	A-7
Clock	A-5
Coil	C-2
Courtesy Lamp, Left Side	D-9
Courtesy Lamp, Right Side	B-9
Dash Connector	C-4
Dimmer Switch	E-5
Directional Signal Flasher	E-7
Directional Signal Switch	C-7 & C-8
Distributor	C-2
Dome Lamp	C-10
Door Switch, Left Front	D-8
Door Switch, Left Rear	E-8
Door Switch, Right Front	B-9
Door Switch, Right Rear	A-9
Fuse Panel	A-9 & E-6
Fusible Link, Horn Relay	A-2
Fusible Link, Ignition Switch Solenoid Circuit	A-7 & B-7
Fusible Link, Starter Solenoid	A-2
Glove Box Lamp	A-8
Hazard Flasher	D-6
Headlamp, Left Side	E-1
Headlamp, Right Side	A-1
Headlamp Switch	D-6
Headlamp & Wiper Switch Light	C-6
Heater Blower Switch	A-5
Heater Control Lamp	A-5
Horn Contact	C-7
Horn, Left Side (Low)	D-1
Horn Relay	A-2
Horn, Right Side (High)	B-1
Ignition Switch	B-8
Instrument Cluster Circuit Panel	A-6 & B-6
Instrument Panel Ground	A-7
Key Alarm Contacts	C-7
Key & Headlamp Warning Buzzer	C-6
License Lamp Assembly	C-11
Light Ground Screw in Trunk	C-11
Oil Pressure Sending Unit	C-3
Parking Brake Light Switch	B-7
Parking Lamp, Left Side	D-1
Parking Lamp, Right Side	B-1
Radio Connector	B-5

NOMENCLATURE	LOCATI
Resistance Wire, Splice "L"	D-3
Seat Belt Buzzer	C-8
Sending Unit, Gas Tank	D-10
Sending Unit, Water Temperature	D-2
Side Marker Lamp, Left Front	E-1
Side Marker Lamp, Left Rear	E-11
Side Marker Lamp, Right Front	A-1
Side Marker Lamp, Right Rear	A-11
Splice "A"	A-2
Splice "B"	B-2
Splice "C"	D-7
Splice "D"	D-6
Splice "E"	A-7
Splice "F"	A-6
Splice "H"	B-7
Splice "J"	A-6
Splice "L"	D-3
Splice "N"	E-1
Splice "P"	B-1
Splice "Q"	D-1
Splice "R"	B-1
Splice "S"	E-11
Splice "T"	B-10
Splice "U"	C-11
Splice "V"	D-10
Splice "W"	D-10
Starter	B-3
Starter Solenoid	A-2
Steering Column Connector	C-7
Stoplight Switch	D-7
Tail & Stop Lamp, Left Inner	D-11
Tail & Stop Lamp, Left Outer	E-11
Tail & Stop Lamp, Right Inner	B-11
Tail & Stop Lamp, Right Outer	A-11
Thermo Timer	C-9
Third Gear Switch (On Trans.)	C-2
Throttle Closing Solenoid	D-2
Transmission Control Spark (TCS) Solenoid	D-2
Trunk Lamp	D-10
Voltage Regulator, Eight-Cyl.	B-2
Windshield Washer Reservoir & Motor, Electric	E-2
Windshield Wiper Motor	C-4
Windshield Wiper Switch	C-6

Wiring Diagram
Matador
10 Series

Wiring Diagram
Matador
80 Series

Accessory Diagrams
Pacer

Accessory Diagrams
Gremlin, Concord and AMX

Accessory Diagrams
Matador 10-80

AMC