X-8432

GMC

1984

LIGHT DUTY TRUCKS

SERVICE MANUAL

LIST OF AUTOMOTIVE ABBREVIATIONS WHICH MAY BE USED IN THIS MANUAL

A - Ampere(s)
A-6 - Axial 6 Cyl. A/C Compressor
A/C - Air Conditioning
ACC - Automatic Climate Control
Adj. - Adjust
A/F - Air/Fuel (As in Air/Fuel Ratio)
AIR - Air Injection Reaction System
ALC - Automatic Level Control
ALCL - Assembly Line Communications Link
Alt. - Altitude
APT - Adjustable Part Throttle
AT - Automatic Transmission
ATC - Automatic Temperature Control
ATDC - After Top Dead Center

BARO - Barometric Absolute Pressure Sensor
Bat. - Battery
Bat. + - Positive Terminal
Bbl. - Barrel
BHP - Brake Horsepower
BP - Back Pressure
BTDC - Before Top Dead Center

Cat. Conv. - Catalytic Converter
CC - Catalytic Converter
- Cubic Centimeter
- Converter Clutch
CCC - Computer Command Control
C-4 - Computer Controlled Catalytic Converter
CB - Citizens Band (Radio)
CCOT - Cycling Clutch (Orifice) Tube
CCP - Controlled Canister Purge
C.E. - Check Engine
CEAB - Cold Engine Airbleed
CEMF - Counter Electromotive Force
CID - Cubic Inch Displacement
CLOOP - Closed Loop
CLCC - Closed Loop Carburetor Control
CLTBI - Closed Loop Throttle Body Injection
Conv. - Converter
CP - Canister Purge
Cu. In. - Cubic Inch
CV - Constant Velocity
Cyl. - Cylinder(s)

DBB - Dual Bed Bead
DBM - Dual Bed Monolith
DEFI - Digital Electronic Fuel Injection
DFI - Digital Fuel Injection
Diff. - Differential
Distr. - Distributor

EAC - Electric Air Control Valve
EAS - Electric Air Switching Valve
ECC - Electronic Comfort Control
ECM - Electronic Control Module
ECS - Emission Contrpl System
ECU - Engine Calibration Unit
EEC - Evaporative Emission Control
EEVIR - Evaporator Equalized Valves in Receiver
EFE - Early Fuel Evaporation
EFI - Electronic Fuel Injection
EGR - Exhaust Gas Recirculation
ELC - Electronic Level Control
EMF - Electromotive Force
EMR - Electronic Module Retard
EOS - Exhaust Oxygen Sensor
ESC - Electronic Spark Control
EST - Electronic Spark Timing
ETC - Electronic Temperature Control
ETCC - Electronic Touch Comfort Control
ETR - Electronically Tuned Receiver
Exh. - Exhaust

FMVSS - Federal Motor Vehicle Safety Standards
Ft. Lb. - Foot Pounds (Torque)
FWD - Front Wheel Drive
- Four Wheel Drive
4 x 4 - Four Wheel Drive

HD - Heavy Duty
HEI - High Energy Ignition
Hg. - Mercury
Hi. Alt. - High Altitude
HVAC - Heater-Vent-Air Conditioning
HVACM - Heater-Vent-Air Conditioning Module
HVM - Heater-Vent-Module

IAC - Idle Air Control
IC - Integrated Circuit
ID - Identification
- Inside Diameter
ILC - Idle Load Compensator
I/P - Instrument Panel
ISC - Idle Speed Control

km - Kilometers
km/hr - Kilometers Per Hour
KV - Kilovolts (Thousands of Volts)
km/L - Kilometers/Liter (mpg)
kPa - Kilopascals

L - Liter
L-4 - Four Cylinder In-Line (Engine)
L-6 - Six Cylinder In-Line (Engine)
LF - Left Front
LR - Left Rear

Man. Vac. - Manifold Vacuum
MAP - Manifold Absolute Pressure
MAT - Manifold Air Temperature Sensor
M/C - Mixture Control
MPG - Miles Per Gallon
MPH - Miles Per Hour
MT - Manual Transmission

N·m - Newton Metres (Torque)

OD - Outside Diameter
OHC - Overhead Cam
OL - Open Loop
OXY - Oxygen

PAIR - Pulse Air Injection Reaction System
P/B - Power Brakes
PCV - Positive Crankcase Ventilation
PECV - Power Enrichment Control Valve
P/N - Park, Neutral
PROM - Programmable, Read Only Memory
P/S - Power Steering
PSI - Pounds Per Square Inch
Pt. - Pint
PTO - Power Takeoff

Qt. - Quart

R - Resistance
R-4 - Radial Four Cyl. A/C Compressor
RF - Right Front
RPM - Revolutions Per Minute
RR - Right Rear
RTV - Room Temperature Vulcanizing (Sealer)
RVR - Response Vacuum Reducer
RWD - Rear Wheel Drive

SAE - Society of Automotive Engineers
SI - System International
Sol. - Solenoid

TAC - Thermostatic Air Cleaner
TACH - Tachometer
TBI - Throttle Body Injection
TCC - Transmission Converter Clutch
TCS - Transmission Controlled Spark
TDC - Topdead Center
TPS - Throttle Position Sensor
TURB - Turbocharger
T/V - Throttle Valve
TVBV - Turbocharger Vacuum Bleed Valve
TVRS - Television & Radio Suppression
TVS - Thermal Vacuum Switch

UJT - Universal Joint

V - Volt(s)
V-6 - Six Cylinder Engine - Arranged in a "V"
V-8 - Eight Cylinder Engine - Arranged in a "V"
Vac. - Vacuum
VATS - Vehicle Anti-Theft System
VIN - Vehicle Identification Number
VIR - Valves in Receiver
VSS - Vehicle Speed Sensor
VMV - Vacuum Modulator Valve

W/ - With
W/B - Wheel Base
W/O - Without
WOT - Wide Open Throttle

X-Valve - Expansion Valve

Fig. 0A-16 -- Common Abbreviations

GM PRODUCTION OPTIONS

VE1 . . . . Japanese Modification Export
VE5 . . . . Strip — Frt. and Rr. Bumper, Impact
VE6 . . . Bumper — Frt. & Rr. Painted (w/Impact Strips)
VF1 . . . . Bumper — Chrome/Rr.
VF5 . . . Bumper — Car Color
VF6 . . . Bumper — Rr. Step
VF9 . . . . Bumper — Frt. and Rr. Rbr. Protected w/Grds.
VG3 . . . . Strip, Frt Bumped Impact
VG5 . . . Strip Rear Bumper Impact
VG7 . . . . Bumper — Reinforcement, Front
VG8 . . . . Bumper — Reinforcement Rr./Calif. & Florida
VG9 . . . . Frt. Bumper Guards
VH6 . . . Black Bumper
VH7 . . . . Bumper, Custom
V1D . . . . AM/FM Stereo & Tape Player w/o Eject
VJ5 . . . Mounting, License Plate
VJ6 . . . . Pocket — Lic. Plt. Rear
VJ7 . . . Bracket — w/Lamp Rear Lic Plt.
VJ9 . . . . California Emission Compliance Information
VK1 . . . . License Plate — Frt. Mounting Pkg.
VK3 . . . . Mounting — License Plate/ Front
VL4 . . . . Plate, Frt. Mtg. Lic.
VN1 . . . Modifications — Calif. Reqmts.
VN2 . . . Modifications — Georgia Reqmts.
VN3 . . . Modifications — Florida Reqmts.
VP1 . . . . Spoiler — Lower Front
VR2 . . . Hitch — Trailer/Dead Weight
VR4 . . . Hitch — Trailer/Weight Distributing Platform
VR5 . . . Ball — Trailer Hitch/1-7/9 Inch
VR6 . . . Ball — Trailer Hitch/2 Inch
VT3 . . . Deluxe w/Impact Strips Frt. Bmpr.
VT4 . . . . Deluxe w/Impact Strips RR Bmpr.
VT7 . . . Export — Unregulated Countries
VU9 . . . Flashlite Mtg.
V1H . . . Special Paint-Two Tone
V1L . . . Special Trim
V1T . . . Spare Whl Conventional
V01 . . . Radiator — Heavy Duty
V02 . . . Radiator — H.D. with HD .Trans. Oil Cooler
V03 . . . Radiator — Extra Capacity Cooling
V05 . . . . Radiator — Heavy Duty — Truck
V08 . . . Cooling System, Heavy Duty
V10 . . . . Cold Climate Package
V13 . . . . Cold Climate Package Delete
V22 . . . . Grille — Front Bumper/ Chrome
V28 . . . . Guards — Front Bumper/ Painted
V30 . . . . Guards — Frt. & Rr. Bumper
V31 . . . . Guard — Frt. Bpr./Chr
V32 . . . . Guard — Rr. Bumper
V35 . . . . Bumper, Rr. w/Recessed Lights
V37 . . . . Bumper — Chrome/Frt. & Rr./Truck
V38 . . . . Bumper — Rr./Painted/ Truck
V58 . . . . Carrier — Deck Lid Luggage
V4S . . . . Delegance
V4T . . . . Delegance
V4W . . . Wheel Disc
V42 . . . . Bumper — Rear Step/ Chrome/Truck
V43 . . . . Bumper Rear Step Painted Truck
V46 . . . . Bumper — Chrome/Frt./ Truck
V50 . . . . Frame — Rear Lic. Plt.
V51 . . . . Frame — Front & Rear Lic. Plt.
V54 . . . . Carrier — Luggage and Roof Panel
V55 . . . . Carrier — Roof Luggage
V56 . . . . Luggage Compt. — Lock & Trim
V62 . . . . Jack — Auto
V65 . . . . Bumper — Lt. Duty
V69 . . . . Trailer Provisions
V70 . . . . Hooks — Towing — Export
V76 . . . . Hook — Front Tow
V78 . . . . Plate — Less Certificate of Compliance
V81 . . . . Trailer Provisions
V82 . . . . Trailer Prov. — Class 2 2000-3500
V83 . . . . Trailer Provisions — Class 3 3500-5000

WA3 . . Seat Adj. — 6 Way Driver & Pass.
WA5 . . Speaker — Dual — Frt. & Rear
WB2 . . . Promotional Package
WB5 . . . Estate Wagon Group
WB7 . . . Landau Top and Formal Window Group
WB9 . . . Palm Beach Opt.
WC2 . . . Molding Package
WC3 . . . Moldings — Rkr. — Rr. Qtr. & w/Opg.
WC4 . . . Convenience Group
WD3 . . . Appearance Group
WD4 . . . Accessory Package
WF5 . . . Custom Trim Group
WF6 . . Molding Group
WF8 . . . Apollo XB-27 Package
WH2 . . . Free Spirit Skyhawk Design 11
WH3 . . Appearance Group
WH4 . . . Tachometer & Clock
WH5 . . . Handling Package
WH6 . . . Night Hawk Decor. Package
WJ4 . . . Firenza Coupe, Special Edition
WJ5 . . . Cierra Coupe, Special Edition
WJ7 . . . Trim, Interior Leather
WJ8 . . Starfire SX Package
WJ9 . . . F85 Deluxe Package
WK1 . . . Roof Panel Stowage Brackets
WK2 . . . Special Trim/Delta Royale Brougham
WK9 . . . Regency Brougham Sedan Option
WO5 . . . Regal Limited Option
WO6 . . . Century Estate Wagon (1984)
WS4 . . . Trans. Am Option
WS6 . . . Special Performance Package
WS7 . . Special Handling Pkg.
WS9 . . . Phoenix Appearance Package
WS9 . . Leader — Fuel Economy (1982-83)
WT1 . . Suspension — Bias Belted Tire
WU2 . . GT Option
WU7 . . . Custom Third Stea
WU9 . . . Window Reveal Mldgs.
WV6 . . Graphics Pkg./Gold
WV7 . . . Graphics Pkg./Charcoal
WV8 . . . Graphics Pkg./Blue
WV9 . . . Graphics Pkg./Red
WW1 . . Less Console
WW2 . . Custom Safari
WW3 . . Can Am Option
WW7 . . Aplq. — Hood/Firebird
WW8 . . Gages — Rally with I/P Tach. and Clock
WX3 . . Ram Air — Shaker Hood
WY5 . . . Suspension — Radial Tuned
W02 . . Wood Grain Applique
W03 . . . Regal Limited Sedan
W04 . . . Century Limited Coupe
W06 . . . Custom Trim Group
W07 . . Century — Sport Coupe
W08 . . . Custom Trim Group
W09 . . Century Limited Sedan
W10 . . Park Avenue Option
W11 . . Regal Sport Coupe
W12 . . . Skyhawk Package
W13 . . . Century — Turbo Coupe
W14 . . LeSabre Sport Coupe
W15 . . Custom Trim Group
W17 . . Interior Trim Deluxe
W18 . . Sport Option
W19 . . Custom Trim Group
W20 . . . Convenience Group
W21 . . Custom Trim Group
W22 . . Custom Trim Group
W24 . . . Custom Trim Group

USAGE	FLUID/LUBRICANT
Engine	"SF" or "SF/CD" or "SF/CC" Engine Oil conforming to GM spec. 6048-M
Engine Coolant	Mixture of water and a high quality Ethylene Glycol base type antifreeze conforming to GM spec. 1825-M (GM Part No. 1052753) or equivalent
Brake System	Delco Supreme 11 fluid or DOT-3
Parking Brake Cables	Chassis grease meeting requirements of GM spec. 6031-M
Power Steering System	GM power steering fluid Part No. 1050017 or equivalent
Manual Steering Gear	Lubricant GM Part No. 1051052 or equivalent
Automatic Transmission 4-Speed Manual Trans. w/O.D. S10 Truck with Manual Trans. Transfer Case	DEXRON® II Automatic Transmission Fluid
Differential—Standard Manual Transmission (Except: 4-Speed with O.D., and S10 Truck)	SAE-80W, GL-5 or SAE-80W-90 GL-5 gear lubricant (SAE-80W—GL-5 in Canada)
Differential—Locking	Lubricant GM Part No. 1052271
Manual Transmission Shift Linkage, Column Shift, Propeller Shaft Slip Joint	Chassis grease meeting requirements of GM spec. 6031-M
Key Lock Cylinders	Light Oil or General Purpose Silicone Lubricant (GM Part No. 1052276)
Clutch Linkage (Man. Trans. only) a. Pivot points b. Push rod to clutch fork joint, and cross shaft pressure fitting	a. Engine oil b. Chassis grease meeting requirements of GM spec. 6031-M
Chassis Lubrication	Chassis grease meeting requirements of GM spec. 6031-M
Windshield Washer Solvent	GM Optikleen washer solvent Part No. 1051515 or equivalent
Hood Latch Assembly a. Pivots and spring anchor b. Release pawl	a. Engine oil b. Chassis grease
Front Wheel Bearings	Lubricant GM Part No. 1051344 (one pound) or equivalent*
Constant Velocity Universal Joint	GM Lubricant Part No. 1052497 or equivalent
Automatic Transmission Shift Linkage, Floor Shift Linkage, Hood and Door hinges, body door hinge pins, tailgate hinge and linkage, folding seat, fuel door hinge	Engine Oil

* Fluids and lubricants identified with GM part numbers or GM specification numbers may be obtained from your GM dealer.

Fig. 0B-14—Recommended Fluids and Lubricants

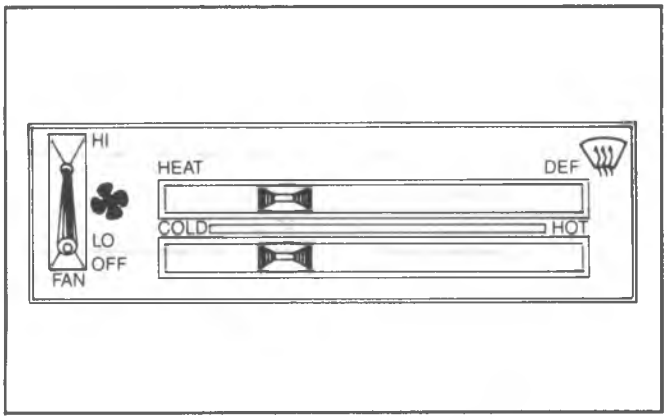

Fig. 1A-2--Heater Control-C-K Models

SPECIFICATIONS

SECTION 1A

HEATER

	Volts	Amps. (Cold)	RPM (Cold)
Blower Motor			
C-K Models	13.5	6.25 Max.	2550 Min. 2950 Max.
G Models	13.5	7.1 Max.	2850 Min. 3250 Max.

Fuses	
C-K Models	20 Amp.
G Models	20 Amp.

AUXILIARY HEATER

	Volts	Amps. (Cold)	RPM (Cold)
Blower Motor	13.5	9.6 Max.	2700 Min.

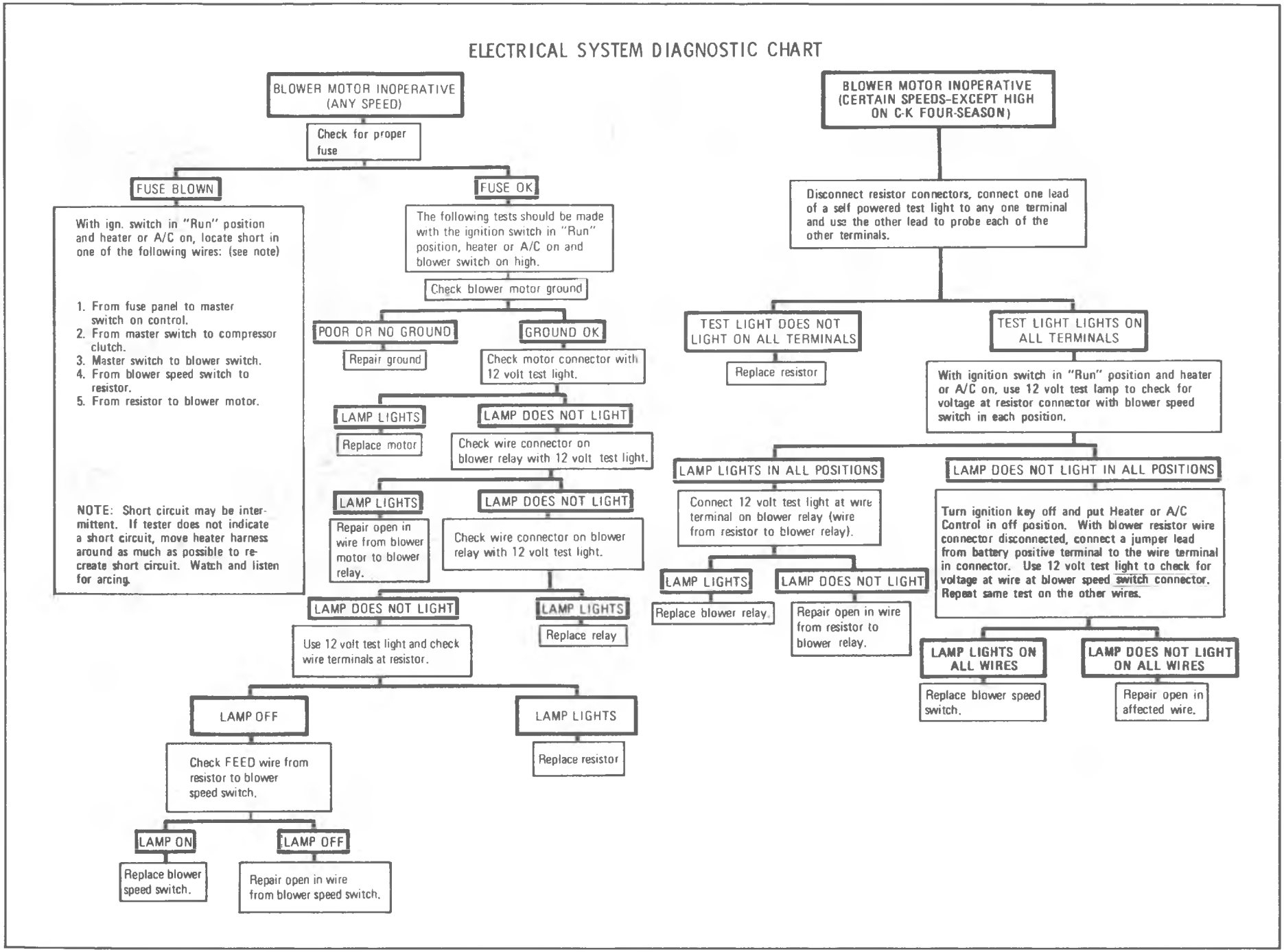

Fig. 1B-20--Electrical Diagnosis

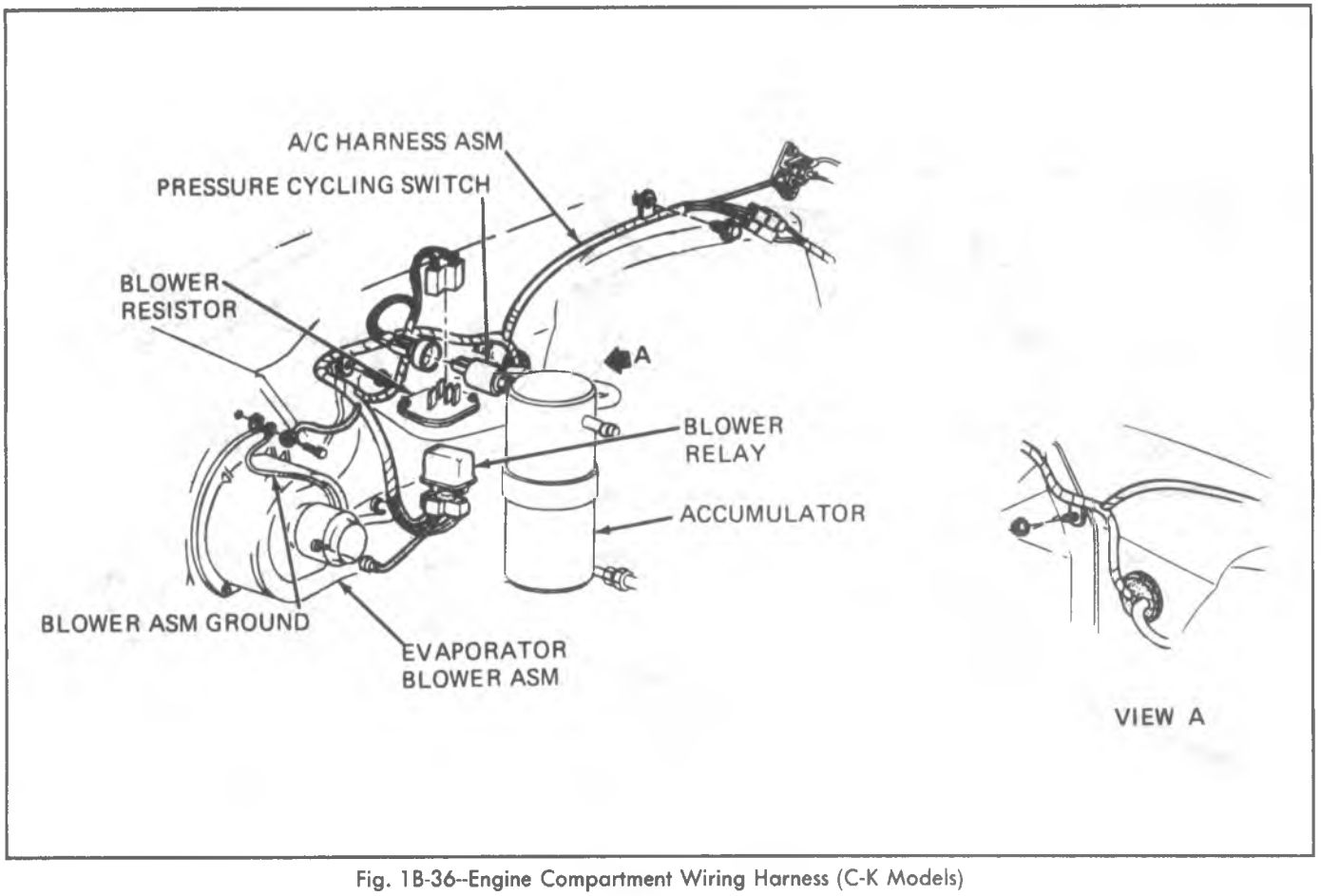

Fig. 1B-36--Engine Compartment Wiring Harness (C-K Models)

5. To install, reverse Steps 1 thru 4 above.

BLOWER MOTOR RESISTOR

The blower motor resistor is located on the cover side of the C60 System blower-evaporator as shown in Fig. 1B-38.

Replacement

1. Disconnect battery ground cable.
2. Disconnect the electrical harness at the resistor.
3. Remove the resistor attaching screws and remove the resistor.
4. To install a new resistor, reverse Steps 1 thru 3 above.

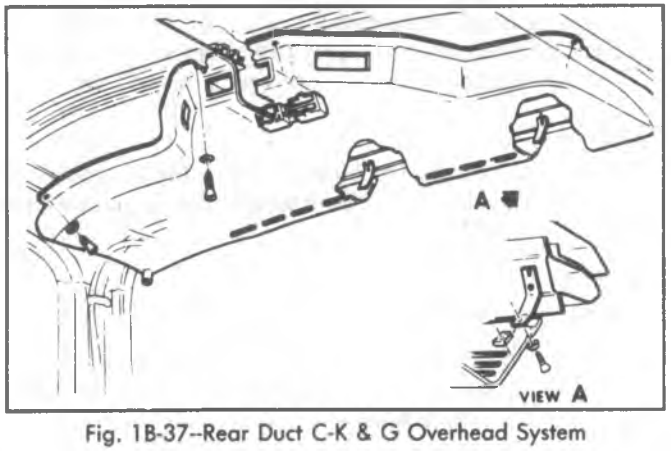

Fig. 1B-37--Rear Duct C-K & G Overhead System

BLOWER MOTOR ASSEMBLY

Removal (Fig. 1B-39)

1. Disconnect the battery ground cable.
2. Remove the rear duct as outlined previously.
3. Disconnect the blower motor ground strap.
4. Disconnect the blower motor lead wire.
5. Remove the lower to upper blower-evaporator case screws and lower the lower case and motor assembly.

   NOTICE: Before removing the case screws, support the lower case to prevent damage to the case or motor assemblies.
6. Remove the motor retaining strap and remove the motor and wheels. Remove the wheels from the motor shaft.

Installation

1. Place the blower wheels onto the motor shaft making sure the wheel tension springs are installed on hub of wheels.

   Be sure that the blower wheels are installed as shown in Fig. 1B-40.
2. Install the blower motor retaining strap and foam.
3. Place the blower motor and wheel assembly into the lower case. Align the blower wheels so that they do not contact the case.
4. Place the lower case and blower motor assembly in position in the vehicle and install the lower to upper case screws.

   NOTICE: Rotate the blower wheels to make sure that

SECTION 1D

AIR CONDITIONING COMPRESSOR OVERHAUL

For Compressor REMOVAL AND INSTALLATION, see Air Conditioning Section. For DISCHARGING, ADDING OIL, EVACUATING AND CHARGING PROCEDURES FOR C.C.O.T. A/C SYSTEMS, see Air Conditioning Section.

CONTENTS OF THIS SECTION

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A-6 Comp. Leak Testing (External and Internal) 1D-25

For all practical purposes, all vehicles make use of the same air conditioning 4 and 6-cylinder compressors. Actual differences between compressors are found in their mounting brackets, pulleys, connector assemblies and compressor capacities, none of which will affect the following Overhaul Procedures.

When servicing the compressor, it is essential that steps be taken to prevent dirt or foreign material from getting on or into the compressor parts and system during disassembly or reassembly of the compressor. Clean tools and clean work area are very important for proper service. The compressor connection areas and the exterior of the compressor should be cleaned off as much as possible prior to any "on car" repairs or removal of the compressor for workbench service. The parts must be kept clean at all times and any parts to be reassembled should be cleaned with naphtha, stoddard solvent, kerosene or equivalent solvent

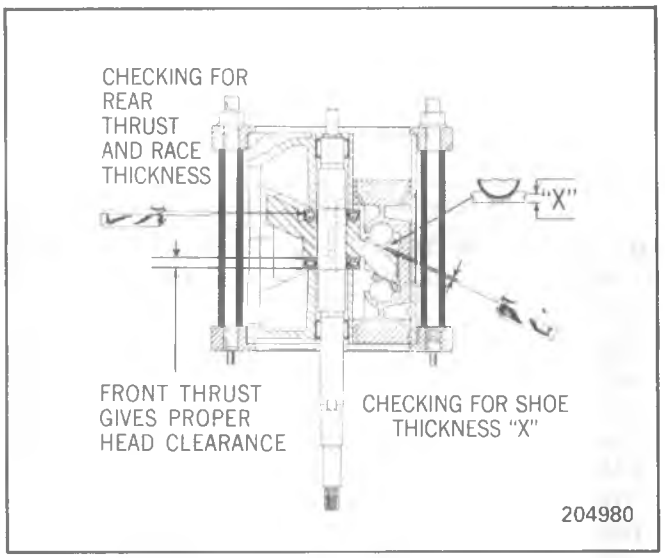


Fig. 1D-44 Checking A-6 Piston and Shaft End Play

Fifteen (15) thrust races are provided in increments of .01mm (.0005") (one-half thousandths) thickness and one ZERO gage thickness, providing a total of 16 sizes available for field service. The thrust race "number" also corresponds to the last three digits of the piece part number. See Thrust Race Size Chart in Fig. 1D-41.

22. Remove nuts from top plate of Compressing Fixture J 9397, and remove top plate.

23. Separate cylinder halves while unit is in Fixture. It may be necessary to use a wooden block and mallet.

24. Remove Rear Cylinder Half and carefully remove one piston at a time from axial plate and front cylinder half. Do not lose the relationship of the front ball and shoe disc and rear ball. Transfer each piston, ball and shoe disc to its proper place in Parts Tray J 9402.

25. Now remove rear outer zero thrust race (it will be on top) from shaft and install the thrust race just selected in Steps 20 and 21 that is presently setting in the right-hand slot at bottom center of Parts Tray J 9402.

The removed zero thrust race may be put aside for re-use in additional Gaging or rebuilding operations.

A-6 COMPRESSOR CYLINDER AND SHAFT ASSEMBLY

A-6 Teflon Piston Ring Replacement

The Teflon piston ring installing, sizing and gaging tools are shown in Fig. 1D-45.

1. Remove the old piston rings by carefully slicing through the ring with a knife or sharp instrument, holding the blade almost flat with the piston surface. Be careful not to damage the aluminum piston or piston groove in cutting to remove the ring. Exercise personal care in cutting the piston ring for removal to prevent injury.

2. Clean the piston and piston ring grooves with trichloroethane, naphtha, stoddard solvent, kerosene or equivalent solvent and blow the piston dry with DRY air.

3. Set the piston on-end on a clean, flat surface and install the Ring Installer Guide J 24608-2 on the end of the piston (Fig. 1D-46).

4. Install a Teflon ring on the Ring Installer Guide J 24605-2 as shown in Fig. 1D-47, with the dished or dull-side down and glossy-side up.

5. Push the Ring Installer J 24608-5 down over the Installer Guide J 24608-2 to install the Teflon ring in the piston ring groove (Fig. 1D-47). If the Teflon ring is slightly off position in the ring groove, it can be positioned into place by fingernail or blunt-edged tool that will not damage the piston.

The Ring Installer J 24608-5 will retain the Installer Guide J 24608-2 internally when the Teflon ring is installed on the piston. Remove the Installer Guide from the Ring Installer and do not store the installer guide in the ring installer, as the Ring Installer Segment Retainer O-Ring J 24608-3 will be stretched and possibly weakened during storage. This could result in the O-Ring J 24608-3 not holding the Ring Installer segments tight enough to the Installer Guide J 24608-2 to properly install the Teflon ring on the piston.

6. Lubricate the piston ring area with 525 viscosity refrigerant oil and rotate the Piston and Ring Assembly into the Ring Sizer J 24608-6 at a slight angle (Fig. 1D-48). Rotate the piston, while pushing inward, until the piston is inserted against the center stop of the Ring Sizer J 23608-6.

NOTICE: DO NOT push the Piston and Ring Assembly into the Ring Sizer J 24608-6 without proper positioning and rotating as described above, as the ends of the needle bearings of the Ring Sizer may damage the end of the piston.

7. Rotate the Piston and Ring Assembly in the Ring Sizer J 24608-6 several complete turns, until the Assembly rotates relatively free in the Ring Sizer (Fig. 1D-48).

8. Remove the Piston and Ring Assembly, wipe the end of the piston and ring area with a clean cloth and then push the Piston and Ring Assembly into the Ring Gage J 24608-1 (Fig. 1D-49). The piston should go through the Ring Gage with a 2 to 8 lb. force or less without lubrication. If not, repeat Steps 6 and 7.

9. Repeat the procedure for the opposite end of the piston (Fig. 1D-50).

NOTICE: DO NOT lay the piston down on a dirty surface where dirt or metal chips might come into contact and become imbedded in the Teflon ring surface.

10. Lubricate both ends of the piston with 525 viscosity refrigerant oil before inserting the piston into the cylinder bore.

NOTICE: Reasonable care should be exercised in installing the piston into the cylinder bore to prevent damage to the Teflon ring.

A-6 COMPRESSOR INTERNAL CYLINDER AND SHAFT ASM.

Assembly

After properly performing the "Gaging Procedure," choosing the correct shoe discs and thrust races, and

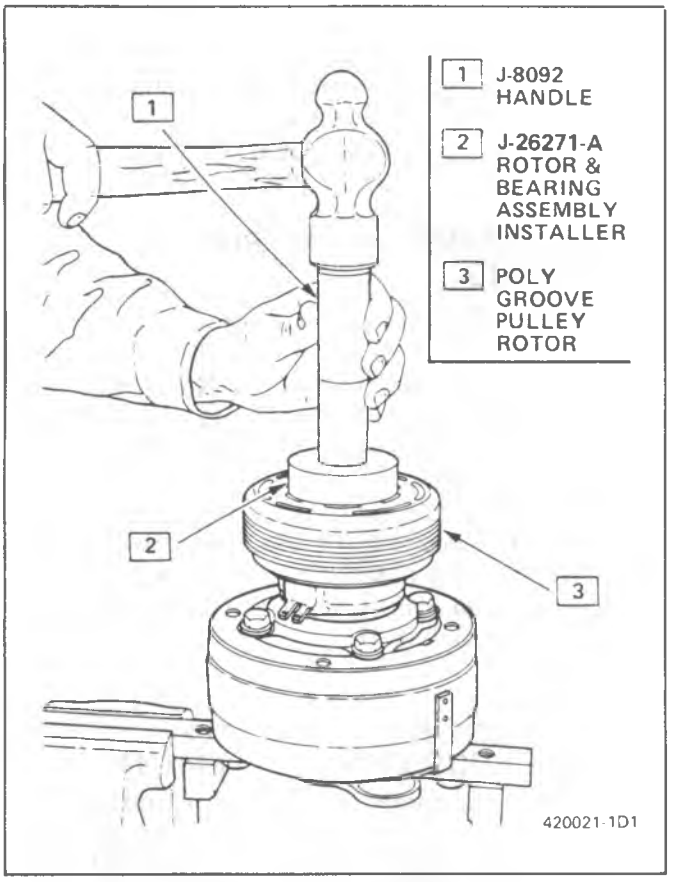


Fig. 1D1-21 Installing Rotor & Bearing Assembly, Poly-Groove Type (On

3. Slide the pulley rim off the Rotor and Hub assembly. The Pulley Rim and the Clutch Coil (Fig. 1D1-22) are replaceable at this point.

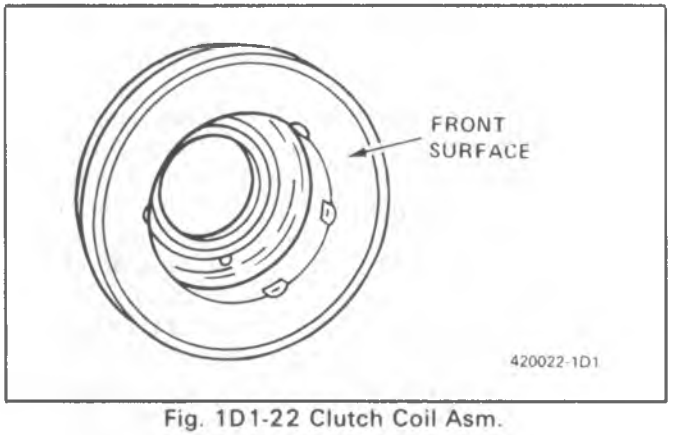


Fig. 1D1-22 Clutch Coil Asm.

Remove - Poly-Groove Drive

1. Remove the clutch plate and hub assembly as described previously.
2. Remove the pulley rotor and bearing assembly as described previously. Mark the location of the clutch coil terminals on the compressor.
3. Install Rotor and Bearing Puller Guide J-25031 (Fig. 1D1-13) to the front head and install Puller J-8433 with Poly-V-Belt Puller Leg Set J-24092 and remove the clutch coil from the front head (Fig. 1D1-23). Clutch coil may also be removed by using rotor and bearing puller guide J-25031 (Fig. 1D1-13) with puller tool J-25287 (Fig. 1D1-24).

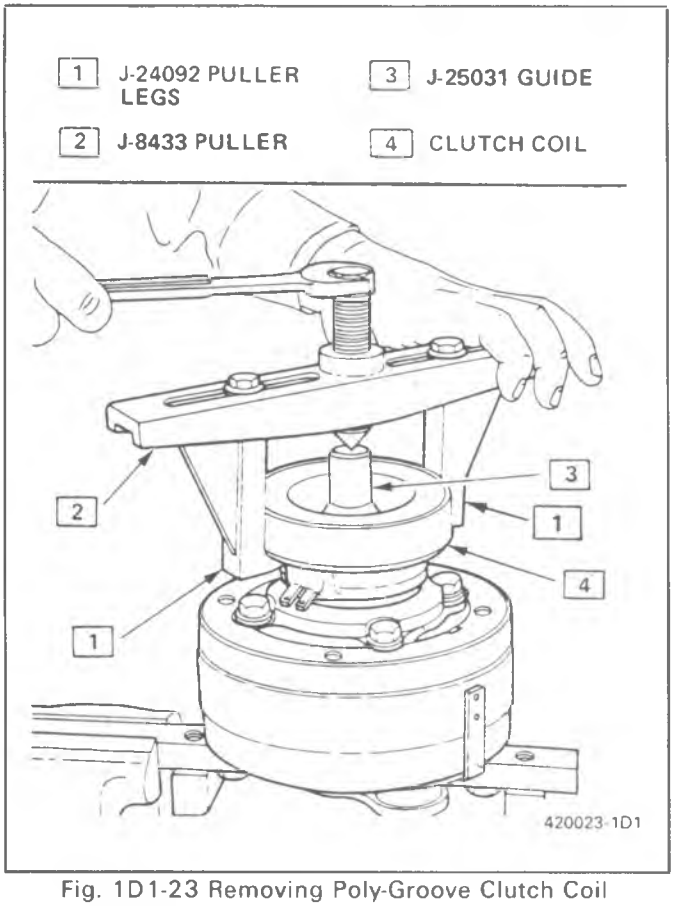


Fig. 1D1-23 Removing Poly-Groove Clutch Coil

Replace - V-Groove Drive

1. Assemble the Clutch Coil, Pulley Rim and the Clutch Rotor and Bearing assembly as shown in Fig. 1D1-25. Use new screws and special lock washers and apply sealer (Loctite RC-75, Loctite 601, or equivalent) to screw threads but do not lock the screws in place.
2. Place the assembly on the neck of the Front Head and seat into place using Rotor & Bearing Installer J-26271-A (Fig. 1D1-19).
   Before fully seating the assembly on the Front Head, be sure the clutch coil terminals are in the proper location in relation to the compressor and that the three protrusions on the rear of the clutch coil align with the locator holes in the Front Head.
3. Install the rotor and bearing assembly retaining ring and reassemble the Clutch Plate and Hub assembly as described in "R-4 Compressor Clutch Plate and Hub Asm." Replacement procedure. Check to see that the clutch plate to clutch rotor air gap is .5 to 1.0mm (.020 to .040 inches).
   Rotate the Pulley Rim and Rotor to be sure the Pulley Rim is rotating "in-line" and adjust or replace as required.
4. Tighten the pulley rim mounting screws to 11 N·m (100 inch-pounds) torque and lock the screw heads in place by bending lock washers

Error will result if a tram bar is not level and centered at the reference points.

4. Obtain vertical dimensions and compare the differences between these dimensions with the dimensions as shown in Fig. 2A-3 or 2A-4.

Horizontal Check

1. Measure frame width at front and rear. If widths correspond to specifications, draw centerline full length of vehicle halfway between lines indicating front and rear widths. If frame widths are not correct, layout centerline as shown in Step 4.
2. Measure distance from centerline to corresponding points on each side of frame layout over entire length. Opposite side measurement should correspond within 3/16 in. (4.7 mm).
3. Measure diagonals marked A, B and C. If the lengths of intersecting diagonals are equal and these diagonals intersect the centerline, frame area included between these points of measurement may be considered in alignment.
4. If front or rear end of frame is damaged and width is no longer within limits, frame centerline may be drawn through the intersection of any two previously drawn pairs of equal, intersecting diagonals.

Vertical Check

Vertical dimensions are checked with a tramming bar from indicated points on the frame (Figs. 2A-2 and 2A-4). For example, if the tram bar is set at point B with a vertical pointer length of 8-1/4 in. (206 mm), and at point E with a vertical pointer length of 5-1/4 in. (131 mm) (a height difference of 3 in. (75 mm), the tram bar should be parallel with the frame. If the area is twisted or misaligned in any way, tram bar will not be parallel. Placing the tram bar vertical pointers on opposite sides of the frame side rail is preferable in that frame twist will show up during this vertical check. Fig. 2A-2 and 2A-4 show typical checking points, with dimensions for various frames shown in Fig. 2A-3.

Frame Repair

Welding

Before welding up a crack in frame, a hole should be drilled at the starting point of the crack to prevent spreading. Widen V groove crack to allow complete weld penetration.

NOTICE: Do not weld into corners of frame or along edges of side rail flanges. Welding at these points will tend to weaken the frame and encourage new cracks.

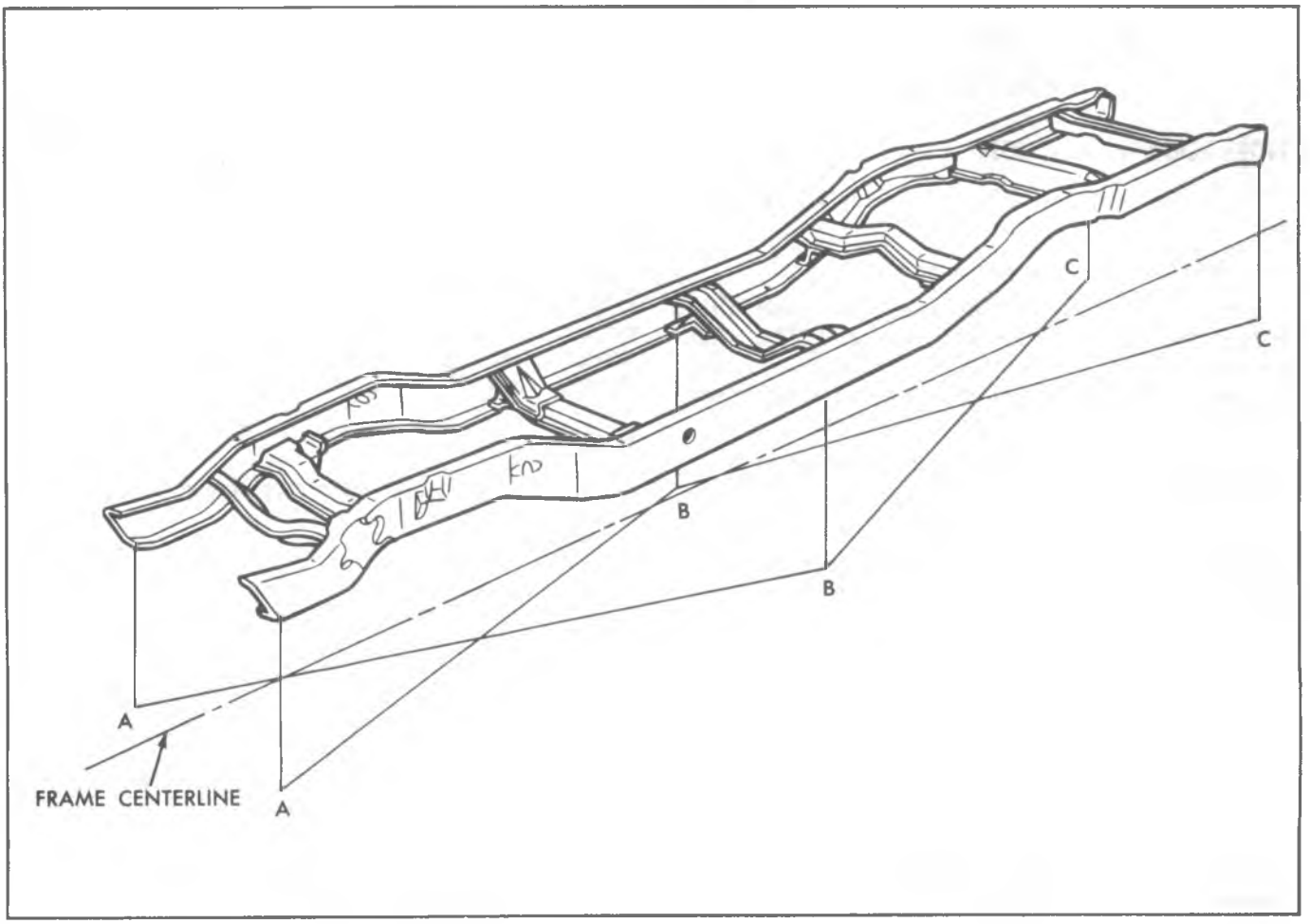


Fig. 2A-1--Frame Horizontal Checking--Typical

piercing them with an ordinary safety pin will relieve the en- trapped air so that the bubble can be smoothed out.

17. Shelf life of the vinyl tape is 90 days at a maximum temperature of 105°F (40°C).

REPAIR

Repair is required when:

1. If the tape is damaged.
2. The paint is damaged as the tape is pulled back for realignment or releasing traped air.

The following repair procedure is recommended:

1. If the tape is ruined with no paint being removed, the surface should be wiped with a prep-sol to insure a smooth and clean surface. Another section of tape would then be applied according to the application procedure.
2. If a section of paint is removed when the tape is pulled away, the area must be repainted and feathered into the adjoining surfaces. Another section of tape should be applied according to the application procedure.

REMOVAL

Removal of decal should cause it to be permanently damaged. Test to be conducted at an ambient temperature not to exceed 90°F (32°C) and after a minimum of 72 hours aging.

For Large Decals

1. Prior to application of transer, wet down the complete transfer surface with a solution of 0.25 oz. of neutral detergent cleaner (must not contain oils, perfumes, or bleaches) per gallon of clear water. It is essential that no substitute for this solution be used and that the specified proportions be maintained.
2. While entire area is still wet with solution, remove paper backing from transfer, locate and press on lightly.
3. Start at center of transfer and squeegee outboard from middle to edges, removing all air bubbles and wetting solution to assure a satisfactory bond. Use teflon-backed plastic squeegee only.

TORQUE SPECIFICATIONS

	CK	G
Lock to Bracket & Rad. Support	27 N·m (20 ft. lbs.)	
Lock Support to Hood		17 N·m (150 in. lbs.)
Lock Bolt Nut		54 N·m (40 ft. lbs.)
Bumper Bolt Nut		17 N·m (150 in. lbs.)
Hood Hinge	24 N·m (18 ft. lbs.)	24 N·m (18 ft. lbs.)
Hood Lock Catch	27 N·m (20 ft. lbs.)	24 N·m (18 ft. lbs.)
Lock Support to Rad. Support	17 N·m (150 in. lbs.)	24 N·m (18 ft. lbs.)
Rad. Support to Frame	48 N·m (35 ft. lbs.)	
Rad. Support to Fender	17 N·m (150 in. lbs.)	
Fender Skirt to Fender	17 N·m (150 in. lbs.)	
Fender to Cowl	48 N·m (35 ft. lbs.)	
Rad. Grille Panel Lower	17 N·m (150 in. lbs.)	

TILT COLUMNS

GENERAL INFORMATION

All of the preceding diagnosis will generally apply to tilt columns. The following is supplied in addition to and specifically for tilt columns.

HOUSING SCRAPING ON BOWL

Cause	Solution
A. Bowl bent or not concentric with hub.	A. Replace bowl.

STEERING WHEEL LOOSE

Cause	Solution
A. Excessive clearance between holes in support or housing and pivot pin diameters.	A. Replace either or both.
B. Defective or missing anti-lash spring in spheres.	B. Add spring or replace both.
C. Upper bearing seat not seating in bearing.	C. Replace both.
D. Upper bearing inner race seat missing.	D. Install seat.
F. Loose support screws.	F. Tighten to 60 in. lbs.
G. Bearing preload spring missing or broken.	G. Replace preload spring.

STEERING WHEEL LOOSE EVERY OTHER TILT POSITION

Cause	Solution
A. Loose fit between shoe and shoe pivot pin.	A. Replace both.

NOISE WHEN TILTING COLUMN

Cause	Solution
A. Upper tilt bumper worn.	A. Replace tilt bumper.
B. Tilt spring rubbing in housing.	B. Lubricate.

STEERING COLUMN NOT LOCKING IN ANY TILT POSITION

Cause	Solution
A. Shoe seized on its pivot pin. ivot pin.	A. Replace shoe and pivot pin.
B. Shoe grooves may have burrs or dirt.	B. Replace shoe.
C. Shoe lock spring weak or broken.	C. Replace lock spring.

STEERING WHEEL FAILS TO RETURN TO TOP TILT POSITION

Cause	Solution
A. Pivot pins are bound up.	A. Replace pivot pins.
B. Wheel tilt spring is defective.	B. Replace tilt spring.
C. Turn signal switch wires too tight.	C. Reposition wires.

Fig. 3-15--Tilt Column Diagnosis

Governmental Periodic Motor Vehicle Inspection programs usually include wheel alignment among items that are inspected. To provide useful information for such inspections, the specifications stated in column 2 of the wheel alignment chart are given and these are well within the range of safe vehicle operation.

In the event the actual settings are beyond the specifications set forth in column 1 or 2 (whichever is applicable), or whenever for other reasons the alignment is being reset, the specifications given in column 3 of the wheel alignment chart should be used.

It is good practice to set front end alignment to specifications while the vehicle is in its **normally loaded** condition. Trucks which are **consistently operated with heavy loads should have toe-in adjusted with the truck under heavy load.** This procedure should result in longer tire life.

ALIGNMENT ADJUSTMENTS

A normal shim pack will leave at least two (2) threads of the bolt exposed beyond the nut. If two (2) threads cannot be obtained, check for damaged control arms and related parts. The difference between front and rear shim packs must not exceed 7.62mm (.30 inches). Front shim pack must be at least 2.54mm (.10 inches).

Access to Shim Packs

G10-20 Models, C10 Models with 3/4" Nut:

With vehicle on front end rack, jack at frame and raise the wheel off the ground. This will allow the upper control arm to pivot down far enough to use a socket on the nuts and permit shim removal.

G30 Models, C20 and 30 Models with 7/8" Nut:

Remove the upper control arm bumper; then follow the same procedure as above. Reinstall the upper control arm bumper when alignment is completed.

Caster

All caster specifications are given assuming a frame angle of zero. Therefore, it will be necessary to know the angle of the frame (whether "up" in rear or "down" in rear) before a corrected caster reading can be determined. Camber and toe can be read "as is" from the alignment equipment.

How to Determine Caster (Fig. 3A-4)

All caster specifications are given assuming vehicle frame angle is zero. Therefore, it is necessary to adjust specifications when applying them to vehicles with any frame angle other than zero.

1. With vehicle on a level surface, determine frame angle (whether up or down in rear) with the use of a bubble protractor or inclinometer. Record this measurement (See Figure 4).
2. Measure dimension "A" (See Figure 4).
3. Check and record specifications for caster under that column related to dimension "A" as measured in step 2.
4. Using one of the following rules, add or subtract frame angle found in step 1 to or from specification found in step 3.
   a. A down-in-rear frame angle must be added to a positive caster specification.
   b. An up-in-rear frame angle must be subtracted from a positive caster specification.
   c. A down-in-rear frame angle must be subtracted from a negative caster specification.
   d. An up-in-rear frame angle must be added to a negative caster specification.

Vehicle caster specification should be adjusted to answer arrived at in step 4.

Camber

1. Determine the camber angle from the alignment equipment.
2. Add or subtract shims from both the front and rear bolts to affect a change.

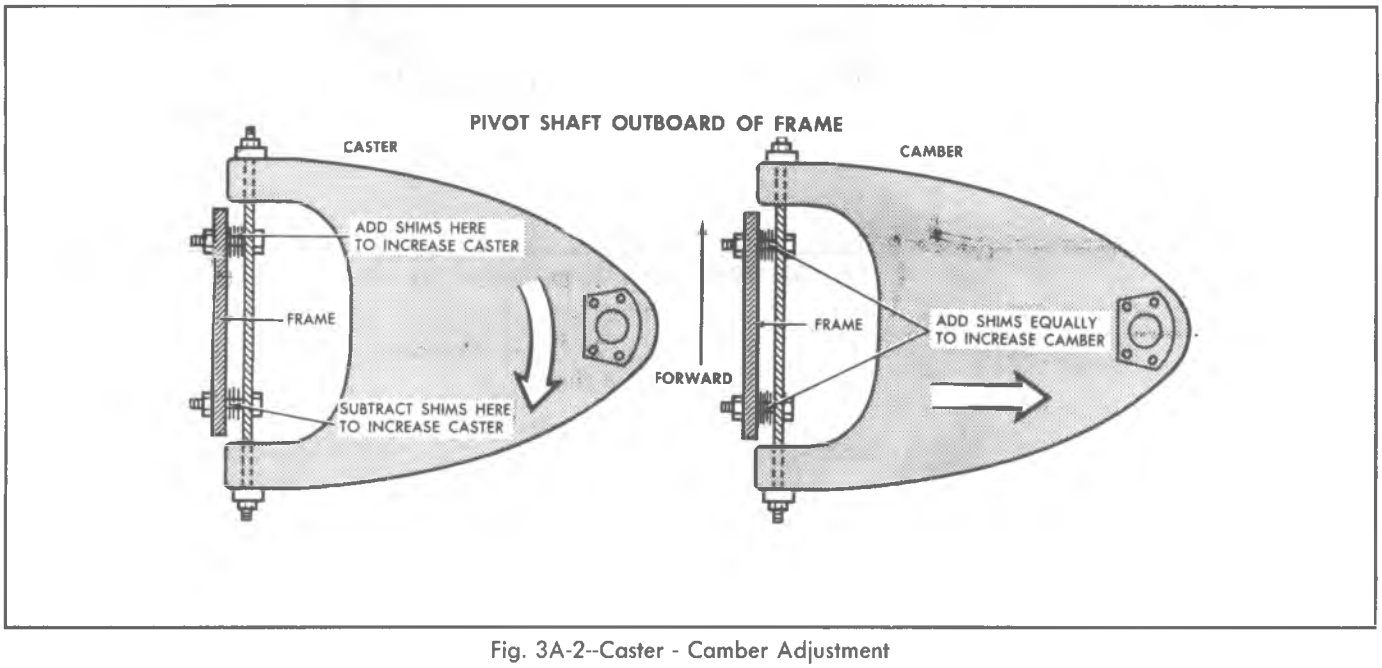
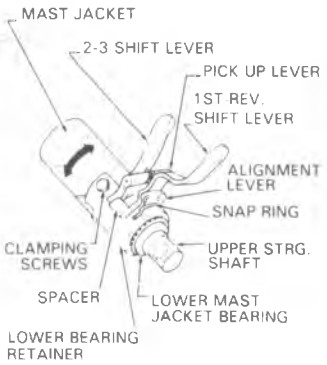


Fig. 3A-2--Caster - Camber Adjustment

A. TO REDUCE CLEARANCE
SLIDE THE CLAMPING SCREWS AROUND THE MAST JACKET IN THE DIRECTION OF ARROW A

B. TO INCREASE CLEARANCE
SLIDE THE CLAMPING SCREWS AROUND THE MAST JACKET IN THE DIRECTION OF ARROW B



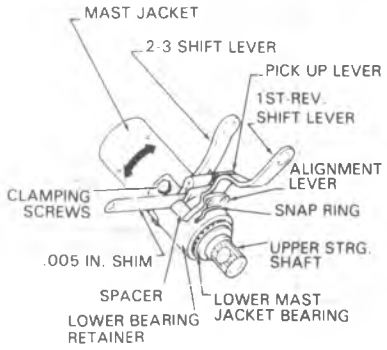
ADJUSTMENT PROCEDURE

1. WITH THE TRANSMISSION IN NEUTRAL DISCONNECT THE TRANSMISSION RODS.
2. TEST FOR ROTATIONAL DRAG BY TURNING THE SHIFT LEVER (INSIDE TRUCK) THROUGH THE 2-3 SHIFT ARC. DRAG, MEASURED AT THE SHIFT KNOB, MUST BE NO MORE THAN 2.0 LBS. IF DRAG IS MORE THAN 2.0 LBS. CORRECTIONS MUST BE MADE BEFORE PROCEEDING WITH THE ADJUSTMENT.
3. LOOSEN THE THREE CLAMPING SCREWS.
4. INCREASE CLEARANCE BY SLIDING THE CLAMPING SCREWS IN DIRECTION OF ARROW "B" ABOVE UNTIL THE 1ST-REV. SHIFT LEVER COMPLETELY FREE OF DRAG.
5. DECREASE CLEARANCE BY SLIDING THE CLAMPING SCREWS IN DIRECTION OF ARROW "A" ABOVE UNTIL A SLIGHT DRAG IS FELT AT THE 1ST REV. SHIFT LEVER.
6. TIGHTEN THE THREE CLAMPING SCREWS.
7. RECONNECT THE TRANSMISSION RODS

NOTE: IF NO PROBLEM WITH STEERING COLUMN DRAG IS INVOLVED, THIS ADJUSTMENT CAN BE MADE BY DISCONNECTING ONLY THE 1ST. REV. TRANSMISSION ROD AND OMITTING STEP 2.

A. TO REDUCE CLEARANCE
SLIDE THE CLAMPING SCREWS AROUND THE MAST JACKET IN THE DIRECTION OF ARROW A

B. TO INCREASE CLEARANCE
SLIDE THE CLAMPING SCREWS AROUND THE MAST JACKET IN THE DIRECTION OF ARROW B



ADJUSTMENT PROCEDURE

1. WITH THE TRANSMISSION IN NEUTRAL DISCONNECT THE TRANSMISSION RODS.
2. TEST FOR ROTATIONAL DRAG BY TURNING THE SHIFT LEVER (INSIDE TRUCK) THROUGH THE 2-3 SHIFT ARC. DRAG MEASURED AT THE SHIFT KNOB MUST BE NO MORE THAN 2.0 LBS. IF DRAG IS MORE THAN 2.0 LBS. CORRECTIONS MUST BE MADE BEFORE PROCEEDING WITH THIS ADMUSTMENT.
3. LOOSEN THE THREE CLAMPING SCREWS.
4. INSTALL A .005 IN. THICK SHIM BETWEEN THE SPACE AND EITHER OF THE SHIFT LEVERS. THE ABOVE ILLUSTRATION SHOWS THE SHIM BETWEEN THE SPACER AND THE 2-3 SHIFT LEVER.
5. SLIDE THE CLAMPING SCREWS IN DIRECTION OF ARROW B UNTIL THE SYSTEM IS LOOSE. THEN SLIDE THE SCREWS IN OPPOSITE DIRECTION UNTIL A DEFINITE DRAG IS FELT AT THE 1ST REV. SHIFT LEVER.
6. TIGHTEN THE CLAMPING SCREWS.
7. REMOVE THE SHIM.
8. REINSTALL THE TRANSMISSION RODS.

NOTE: IF THERE IS NO PROBLEM WITH STEERING COLUMN DRAG. THIS ADJUSTMENT CAN BE MADE BY DISCONNECTING ONLY THE 1ST. REV. TRANSMISSION ROD AND OMITTING STEP. 2.

Fig. 3B5-29--Adjusting Lower Bearing-Typical

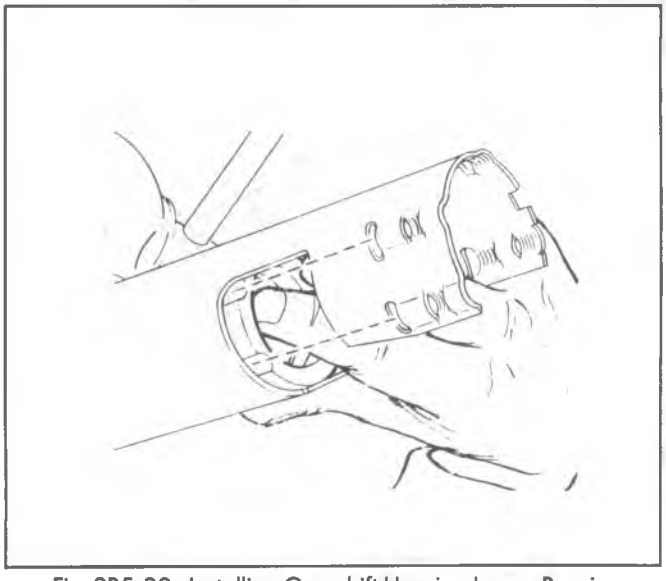


Fig. 3B5-28--Installing Gearshift Housing Lower Bearing

13. Install the neutral-safety or back-up switch as outlined in Section 8 of this manual.
14. Slide the steering shaft into the column and install the upper bearing thrust washer.
15. Install the turn signal switch, lock cylinder assembly and ignition switch as previously outlined in this section.
16. Install the shift lever and shift lever pivot pin.
17. Remove the column from the vise.
18. Install the dash bracket to the column; torque the screws to specifications.

Disassembly-Tilt Columns

Steps 3-14 may be performed with the steering column in the vehicle.

1. Remove the four screws retaining the dash mounting bracket to the column and set the bracket aside to protect the breakaway capsules.

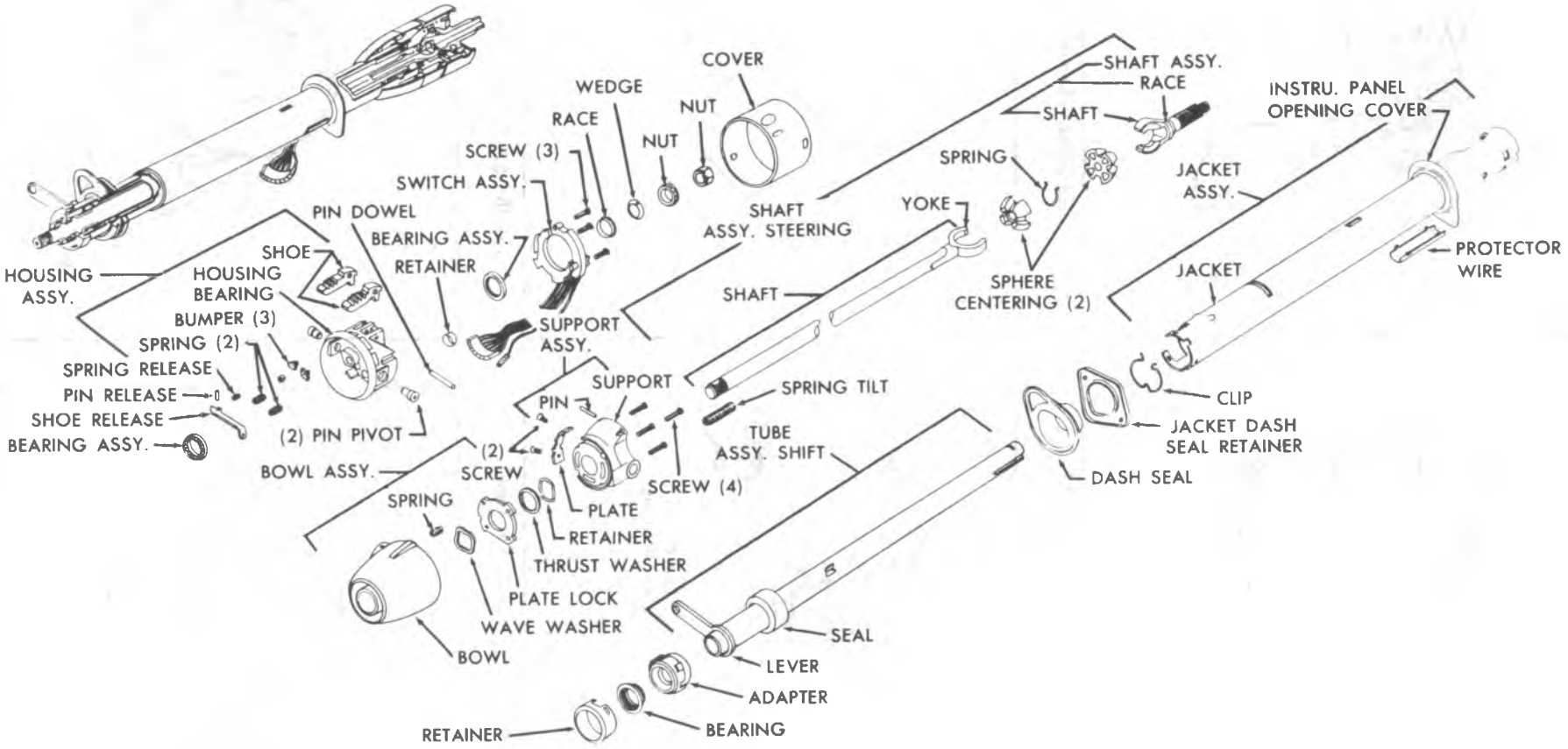


Fig. 3B5-57--Tilt Steering Column-G & P

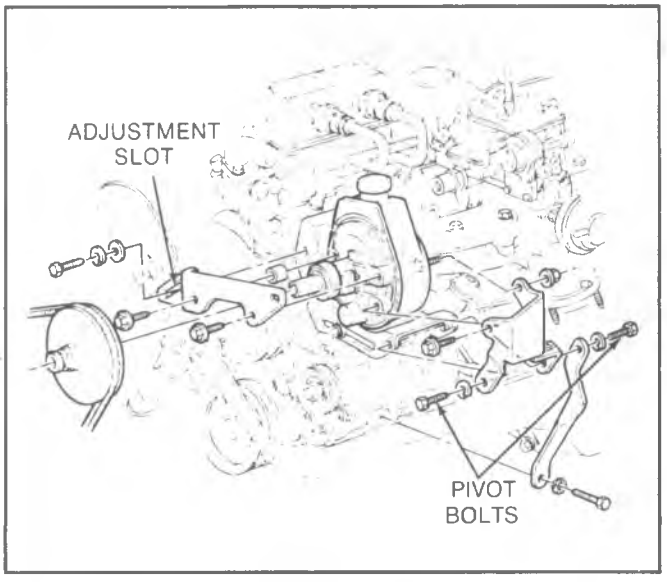


Fig. 3B7-1–Adjusting Pump Position

5. Readjust toe-in as outlined in Section 3A (if necessary).
6. Be sure to properly orient sleeves and clamps, as shown in Section 3B1, when fastening and torquing clamps to proper specifications.

PUMP BELT TENSION ADJUSTMENT

1. Loosen pivot bolt and pump brace adjusting nuts. See Fig. 3B7-1.

   NOTICE: Do not move pump by prying against reservoir or by pulling on filler neck, or damage to the pump could occur.
2. Move pump, with belt in place until belt is tensioned to specifications as indicated by Tool J-23600 (Fig. 3B7-2). See Figure 3B7-3.
3. Tighten pump brace adjusting nut. Then tighten pivot bolt nut.

FLUID LEVEL ADJUSTMENT

1. Check oil level in the reservoir by checking the dipstick when oil is at operating temperature. On models equipped with remote reservoir, the oil level should be maintained approximately 1/2 to 1 inch from top with wheels in full left turn position.
2. Fill, if necessary, to proper level with GM Power Steering Fluid or equivalent.

   NOTICE: Never use brake fluid in the power steering pump, or damage may occur.

BLEEDING HYDRAULIC SYSTEM

1. Fill oil reservoir to proper level and let oil remain undisturbed for at least two minutes.
2. Start engine and run only for about two seconds.
3. Add oil if necessary.
4. Repeat above procedure until oil level remains constant after running engine.
5. Raise front end of vehicle so that wheels are off the ground.
6. Increase engine speed to approximately 1500 rpm.
7. Turn the wheels (off ground) right and left, lightly contacting the wheel stops.
8. Add oil if necessary.
9. Lower the vehicle and turn wheels right and left on the ground.
10. Check oil level and refill as required.
11. If oil is extremely foamy, allow vehicle to stand a few minutes with engine off and repeat above procedure.
    a. Check belt tightness and check for a bent or loose pulley. (Pulley should not wobble with engine running.)
    b. Check to make sure hoses are not touching any other parts of the truck, particularly sheet metal except where design calls for a clamp.
    c. Check oil level, filling to proper level if necessary, following operations 1 through 10. This step and Step "d" are extremely important as low oil level and/or air in the oil are the most frequent causes of objectional pump noise.
    d. Check the presence of air in the oil. If air is present, attempt to bleed system as described in operations 1 through 10. If it becomes obvious that the pump will not bleed after a few trials, proceed as outlined under Hydraulic System Checks.

HYDRAULIC SYSTEM CHECKS

The following procedure outlines methods to identify and isolate power steering hydraulic circuit difficulties. The test provides means of determining whether power steering system hydraulic parts are actually faulty. This test will result in readings indicating faulty hydraulic operation, and will help to identify the faulty component.

Before performing hydraulic circuit test, carefully check belt tension, fluid level and condition of driving pulley.

Power Steering System Test

Engine must be at normal operating temperature. Inflate front tires to correct pressure. All tests are made with engine idling. Check idle adjustment and, if necessary, adjust engine idle speed to correct specifications listed in Section 6C and proceed as follows:

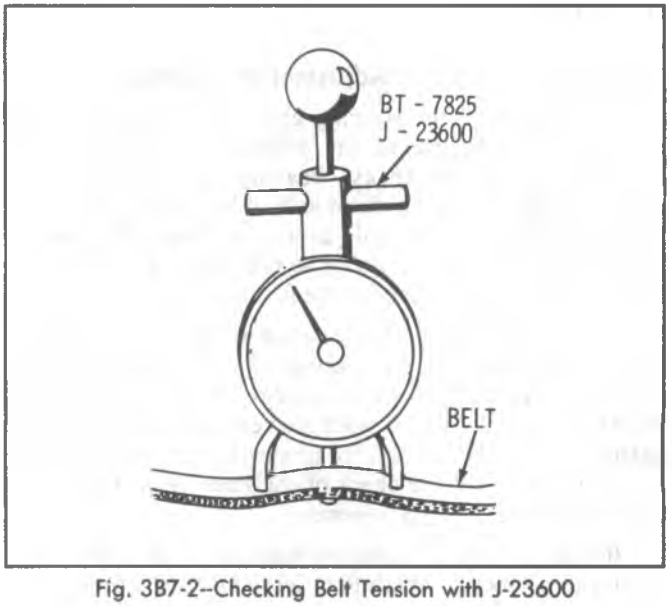


Fig. 3B7-2–Checking Belt Tension with J-23600

SECTION 3B8
MANUAL STEERING GEAR

The following notice applies to one or more steps in the assembly procedure of components in this portion of the manual as indicated at appropriate locations by the terminology "See Notice on page 1 of this Section".

NOTICE: This fastener is an important attaching part in that it could affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.

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Manual Gear 3B8-3
Pitman Shaft Seal 3B8-4
Unit Repair 3B8-6

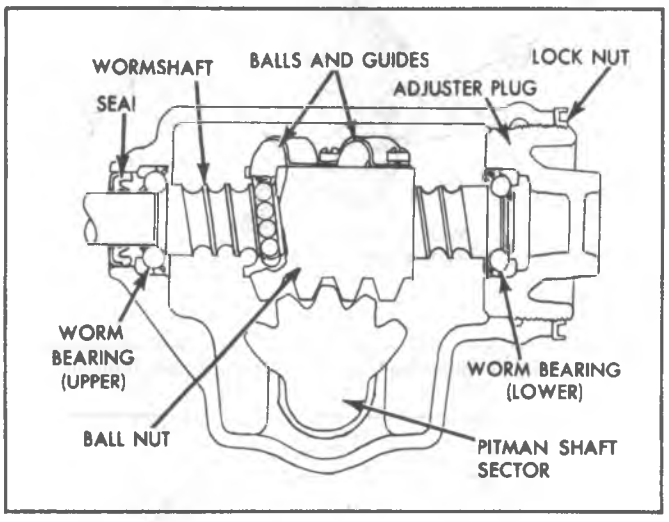


Fig. 3B8-1--Manual Steering Gear

GENERAL DESCRIPTION

The steering gear is of the recirculating ball type. This gear provides for ease of handling by transmitting forces from the wormshaft to the pitman shaft through the use of ball bearings.

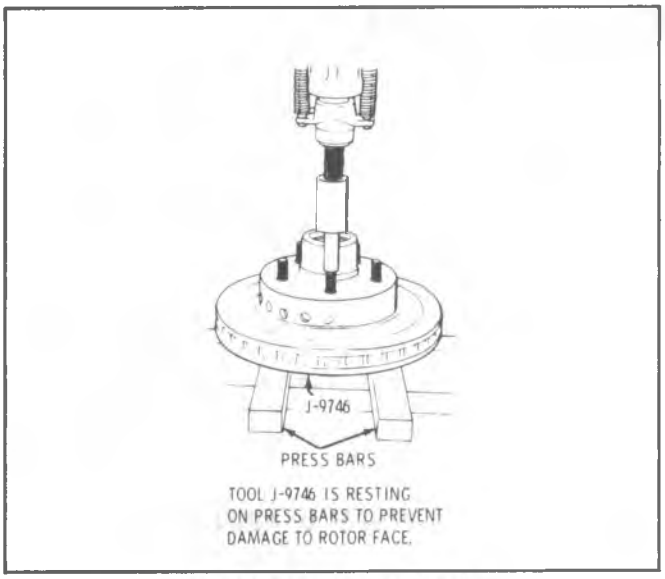


Fig. 3C-7--Pressing Hub Bolt

NOTICE: Use care when installing new race to start it squarely into the hub, to avoid distortion and possible cracking.

Wheel Stud Replacement (Fig. 3C-7)

Use a piece of water pipe or other similar tool to support the hub while pressing a wheel stud either in or out.

Installation

NOTICE: See NOTICE on page 1 of this section regarding the fasteners referred to in steps 8 and 9.

1. Clean off any grease in the hub and spindle and thoroughly clean out any grease in the bearings. Use cleaning solvent. Use a small brush with no loose bristles to clean out all old grease. Do not spin the bearing with compressed air while drying it or the bearing may become damaged.
2. Use a GM approved high temperature front wheel bearing grease or equivalent. Do not mix greases as mixing may change the grease properties and result in poor performance.
3. Apply a thin film of grease to the spindle at the outer bearing seat and at the inner bearing seat, shoulder, and seal seat.
4. Put a small quantity of grease inboard of each bearing cup in the hub. This can be applied with your finger forming a dam to provide extra grease availability to the bearing and to keep thinned grease from flowing out of the bearing.
5. Fill the bearing cone and roller assemblies 100% full of grease. A method for doing this is with a cone type grease machine that forces grease into the bearing. If a cone greaser is not available, the bearings can be packed by hand. If hand packing is used, it is extremely important to work the grease thoroughly into the bearings between the rollers, cone, and the cage. Failure to do this could result in premature bearing failure.
6. Place the inner bearing cone and roller assembly in the hub. Then using your finger, put an additional quantity of grease outboard of the bearing.
7. Install a new grease seal using a flat plate until the seal is flush with the hub. Lubricate the seal lip with a thin layer of grease.
8. Carefully install the hub and rotor assembly. Place the outer bearing cone and roller assembly in the outer bearing cup. Install the washer and nut and initially tighten the nut to 12 ft. lbs. while turning the wheel assembly forward by hand. Put an additional quantity of grease outboard the bearing. This provides extra grease availability to the bearing.
9. Final wheel bearing adjustment should be performed as previously outlined.

SHOCK ABSORBER

Removal (Fig. 3C-8)

1. Raise vehicle on hoist.
2. Remove nuts and eye bolts securing upper and lower shock absorber eyes.
3. Withdraw shock absorber and inspect rubber eye bushings. If defective, replace shock absorber assembly. See Section 3.

Installation

Place shock absorber into position over mounting bolts or into mounting brackets. Install eye bolts and nuts and torque as shown in Specifications Section. Lower vehicle to floor.

STABILIZER BAR

Removal (Fig. 3C-9)

1. Raise vehicle on hoist and remove nuts and bolts attaching stabilizer brackets and bushings at frame location.
2. Remove brackets and bushings at lower control arms and remove stabilizer from vehicle.

Inspection

Inspect rubber bushings for excessive wear or aging, replace where necessary. Use rubber lubricant when installing bushings over stabilizer bar.

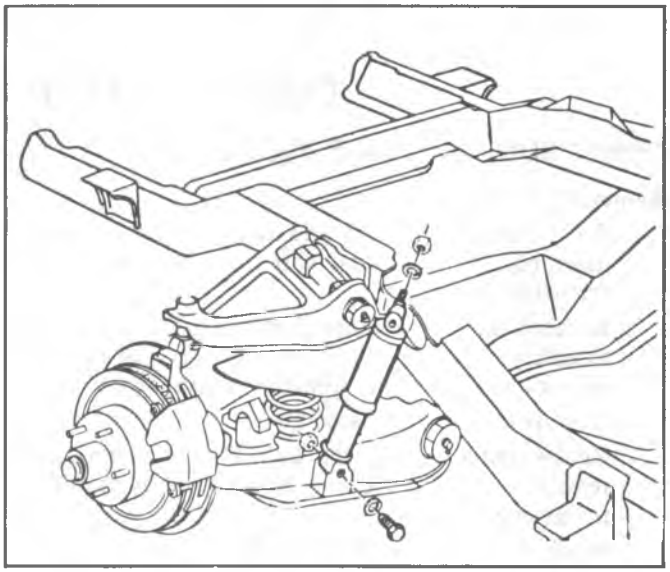
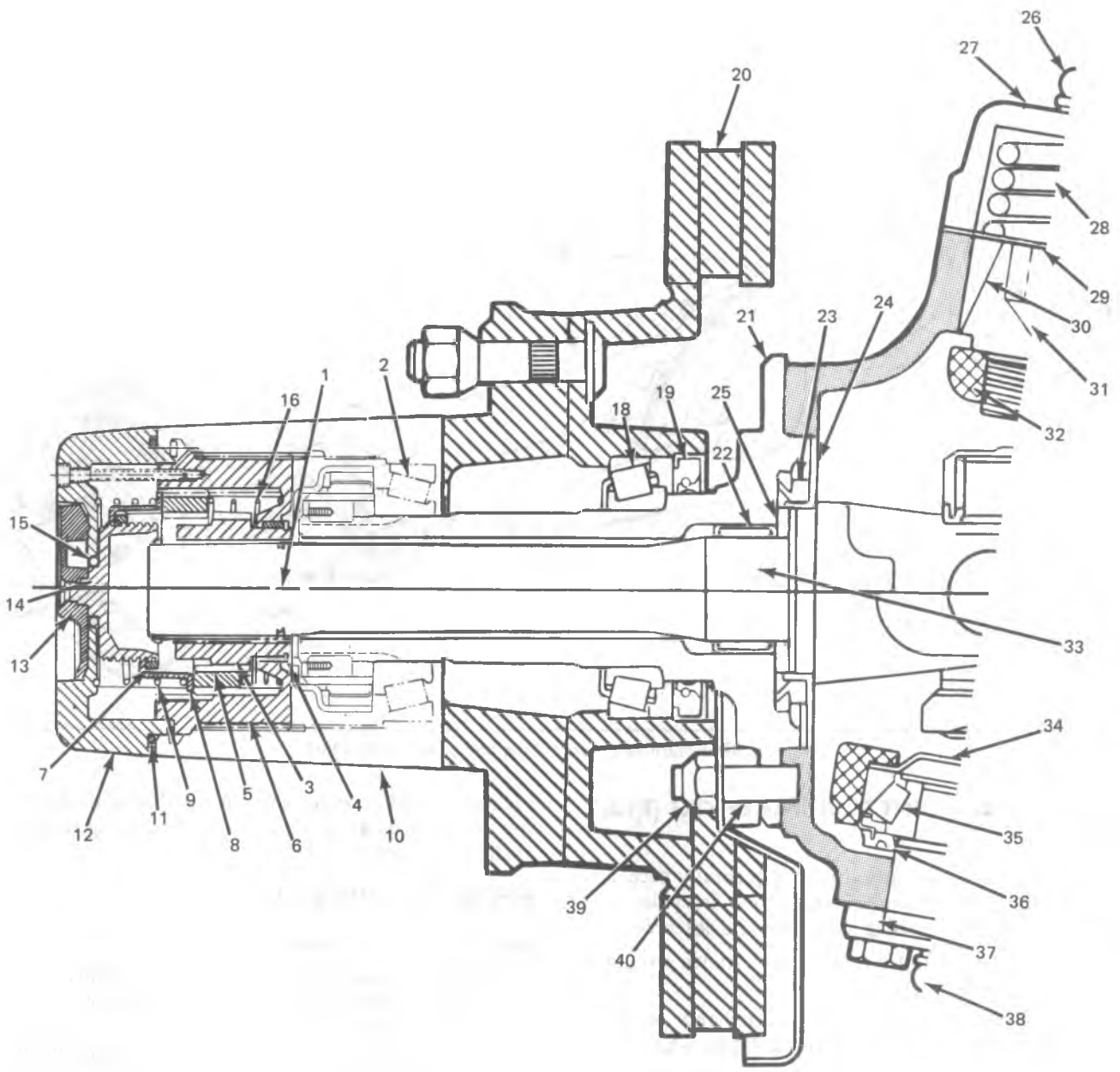


Fig. 3C-8--Shock Absorber Attachments



1 Axle Shaft
2 Outer Bearing
3 Inner Drive Gear
4 Internal Snap Ring
5 Clutch Ring
6 Hub Body
7 Clutch Nut
8 Clutch Cup
9 Compression Spring
10 Hub
11 "O" Ring
12 Hub Cap
13 Dial Control
14 Dial Screw
15 "O" Ring
16 Spring
18 Inner-Wheel Bearing
19 Seal
20 Hub-And-Disc Asm
21 Spindle
22 Spindle Bearing
23 Seal
24 Deflector
25 Spacer
26 Lube Fitting
27 Upper Bearing Cap
28 Pressure Spring
29 Gasket
30 Bushing, King Pin
31 King Pin
32 Yoke
33 Outer Axle Shaft
34 Grease Retainer
35 Lower Bearing
36 Seal
37 Bearing Cap
38 Lube Fitting
39 Spindle Attaching Nut
40 Spindle Attaching Bolt

Fig. 3C-5K--K30 w/Warn Industries Manual Hublock and King Pins

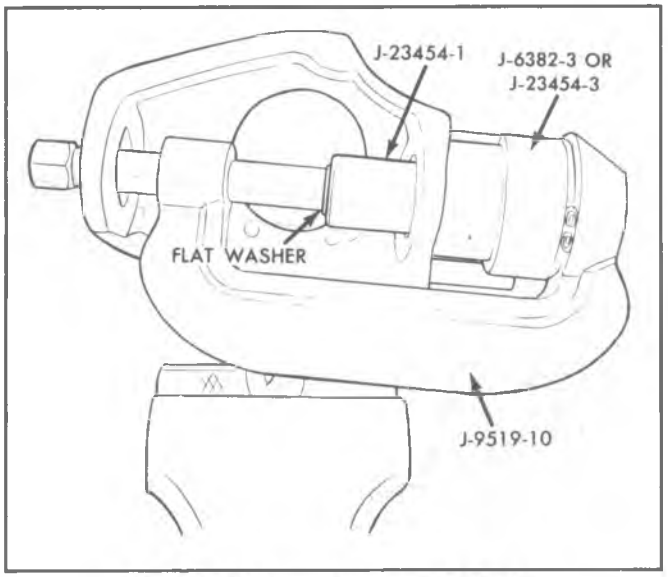


Fig. 3C-39K--Removing Upper Ball Joint

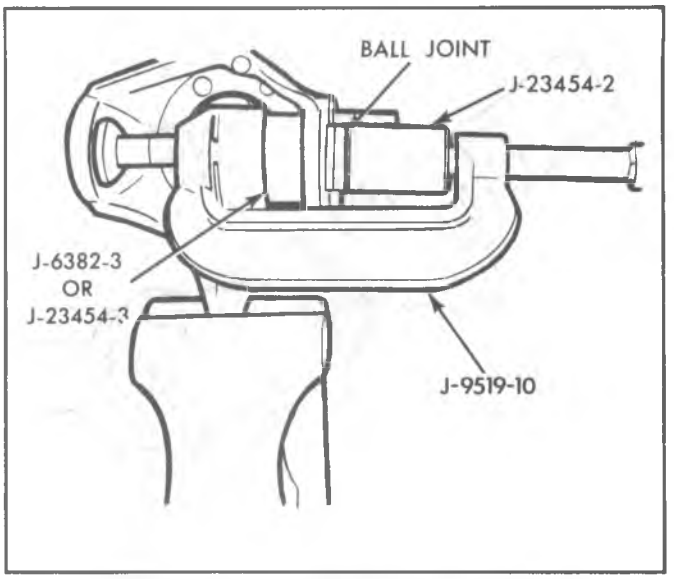


Fig. 3C-41K--Installing Upper Ball Joint

3. Install the lower ball joint into the knuckle. Make sure that the lower ball joint (the joint without cotter pin hole in the stud end) is straight. Press the stud into the knuckle until properly seated using tools J-9519-10, J-23454-2, and J-23454-4 or equivalent as shown in Figure 3C-41K and install snap ring.
4. Install the upper ball joint into the knuckle. Press the stud into the knuckle until properly seated using Tools J-9519-10, J-23454-2, and J-23454-4 or equivalent as shown in Figure 3C-41K.

Installation

NOTICE: See NOTICE on page 1 of this section regarding the fasteners in the following steps.

1. Position the knuckle and sockets to the yoke. Install new nuts finger tight to the upper (the nut with the cotter pin slot) and lower ball socket studs.
2. Push up on the knuckle (to keep the ball socket from turning in the knuckle) while tightening the lower socket retaining nut. PARTIALLY TORQUE lower nut to 40 N·m (30 ft. lbs.).
3. Torque the yoke upper ball stud adjusting sleeve to 70 N·m (50 ft. lbs.) using Spanner J-23447. See Figure 3C-42K.
4. Torque the upper ball socket nut to 100 ft. lbs. as shown in Figure 3C-43K. After torquing the nut, do not loosen to install cotter pin, apply additional torque, if necessary, to line up hole in stud with slot in nut.
5. Apply FINAL torque to lower nut, 95 N·m (70 ft. lbs.).
6. If the tie rod and steering arm were removed:
   a. Assemble the steering arm using the three stud adapters and three new self-locking nuts. Torque the nuts to 120 N·m (90 ft. lbs.).
   b. Assemble the tie rod to the knuckle arm. Torque the tie rod nuts to 60 N·m (45 ft. lbs.) and install cotter pin.

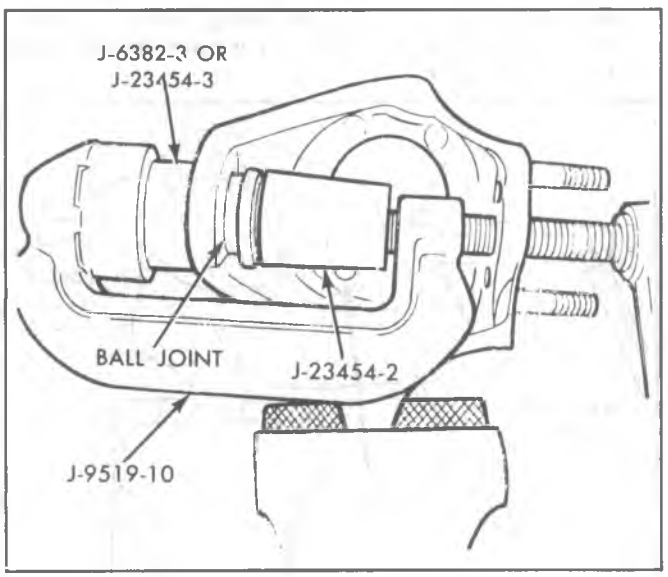


Fig. 3C-40K--Installing Lower Ball Joint

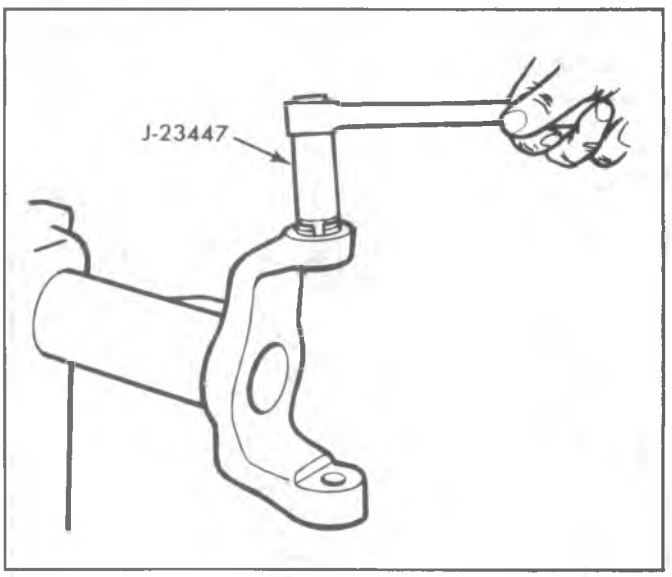
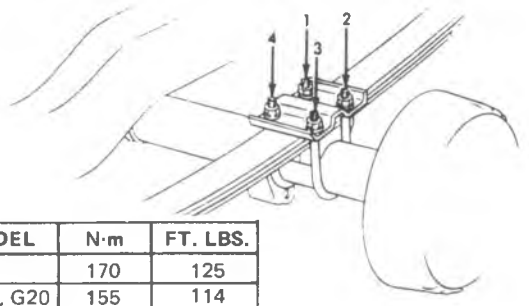
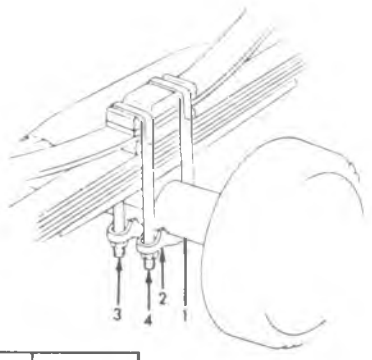


Fig. 3C-42K--Ball Stud Adjusting Sleeve

1. Install all four nuts to uniform engagement on 'U' Bolts to retain and position anchor plate in design position (perpendicular to axis of 'U' Bolts).
2. Torque all nuts in a diagonal sequence (e.g. 1-3-2-4) to 14-35 N•m.
3. Torque all nuts to full torque using a diagonal sequence.



MODEL	N·m	FT. LBS.
CK	170	125
G10, G20	155	114
G30	155	114



MODEL	N·m	FT. LBS.
CK	200	147
G	205	151

Fig. 22--U-Bolt Installation

	C-K	G	P
Spring-to-Axle "U" Bolt Nuts	Refer to Fig. 3D-22 for Torque Specifications	Refer to Fig. 3D-22 for Torque Specifications	P10 190 N·m (140 ft. lbs.) P20 190 N·m (140 ft. lbs.) P30 230 N·m &170 ft. lbs.) (Exc. W/3/4" Bolt) 272 N·m (20 ft. lbs.) (W/3/4" Bolt)
Leaf Spring			
—Front Bushing Bolt	150 N·m (110 ft. lbs.)	122/183* N·m (90/135* ft. lbs.) (G316 . . . 90)	195 N·m (144 ft. lbs.)
—Rear Shackle Bolt	150 N·m (110 ft. lbs.)	122/183* N·m (90/135* ft. lbs.) (G316 . . . 90)	195 N·m (144 ft. lbs.)
Shock Absorber			
—Upper Attachment	204 N·m (150 ft. lbs.)	100 N·m (75 ft. lbs.)	P10 34 N·m (25 ft. lbs.) P20 190 N·m (140 ft. lbs.) P30 68 N·m (50 ft. lbs.)
—Lower Attachment	156 N·m (115 ft. lbs.)	100 N·m (75 ft. lbs.)	156 N·m (115 ft. lbs.)
Propeller Shaft			
To Rear Axle (Strap)	20 N·m (15 ft. lbs.)	20 N·m (15 ft. lbs.)	20 N·m (15 ft. lbs.)
To Rear Axle ("U" Bolt)	28 N·m (20 ft. lbs.)	28 N·m (20 ft. lbs.)	28 N·m (20 ft. lbs.)
Bearing Support-to-Hanger	34 N·m (25 ft. lbs.)	34 N·m (25 ft. lbs.)	34 N·m (25 ft. lbs.)
Hanger-to-Frame	60 N·m (45 ft. lbs.)	—	—
Rear Stabilizer-to-Anchor Plate	34 N·m (25 ft. lbs.)	—	34 N·m (25 ft. lbs.)

Fig. SP-Specifications

COMPLAINT	POSSIBLE CAUSE	CORRECTION
Leak at front slip yoke. NOTE: An occasional drop of lubricant leaking from splined yoke is normal and requires no attention.	a. Rough outside surface on splined yoke. b. Defective transmission rear oil seal.	a. Replace seal if cut by burrs on yoke. Minor burrs can be smoothed by careful use of crocus cloth or honing with a fine stone. Replace yoke if outside surface is rough or burred badly. b. Replace transmission rear oil seal. c. Bring transmission oil up to proper level after correction.
Knock in drive line, clunking noise when car is operated under floating condition at 10 mph in high gear or neutral.	a. Worn or damaged universal joints. b. Side gear hub counterbore in differential worn oversize.	a. Disassemble universal joints, inspect and replace worn or damaged parts. b. Replace differential case and/or side gears as required.
Ping, Snap or Click in drive line. NOTE: Usually occurs on initial load application after transmission has been put into gear, either forward or reverse.	a. Loose upper or lower control arm bushing bolts. b. Loose companion flange.	a. Tighten bolts to specified torque. b. Remove companion flange, turn 180° from its original position, apply white lead to splines and reinstall. Tighten pinion nut to specified torque.

Fig. 6--Diagnosis Chart A

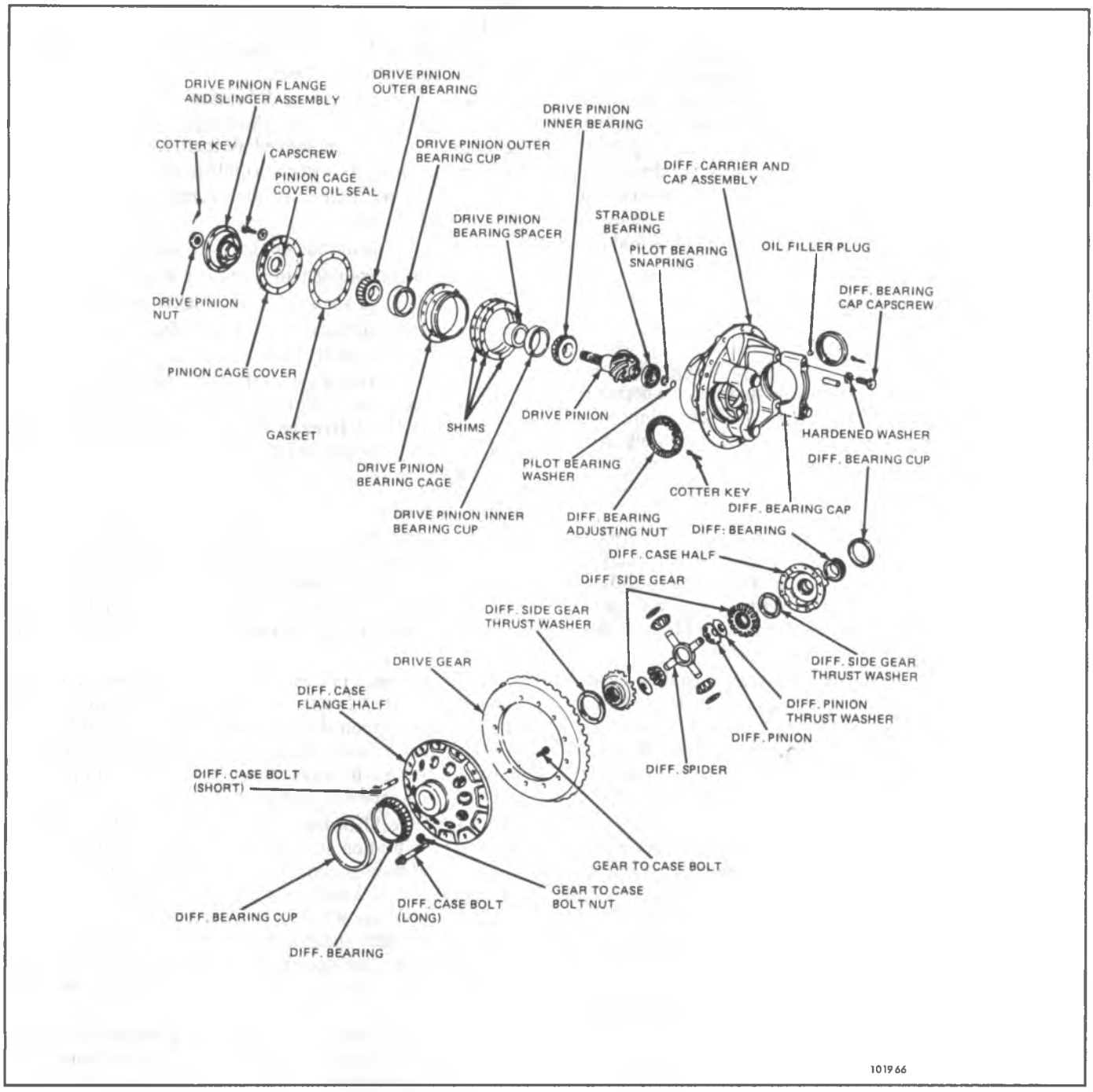


Fig. 4B-5a--Rockwell 12" Ring Gear Axle-11,000# Capacity

DIAGNOSIS

NOISE

The most essential part of rear axle service, as with any mechanical repair, is proper diagnosis of the problem, and, in axle work one of the most difficult areas to diagnosis is noise. Locating a broken axle shaft, or broken differential gear, presents little or no problem, but, locating and isolating axle noise can be an entirely different matter.

Degree of Noise

Any gear driven unit, and especially an automotive drive axle where engine torque multiplication occurs at a 90° turn in the drive line, produces a certain amount of noise. Therefore, an interpretation must be made for each vehicle to determine whether the noise is normal or if a problem actually exists. A normal amount of noise must be expected and cannot be eliminated by conventional repairs or adjustment.

Acceptable noise can be defined as a slight noise heard only at a certain speed or under unusual or remote conditions. For example, this noise tends to reach a "peak" at speeds from 40 to 60 miles per hour (60 to 100 km/h) depending on road and load conditions, or on gear ratio and tire size. This slight noise is in no way

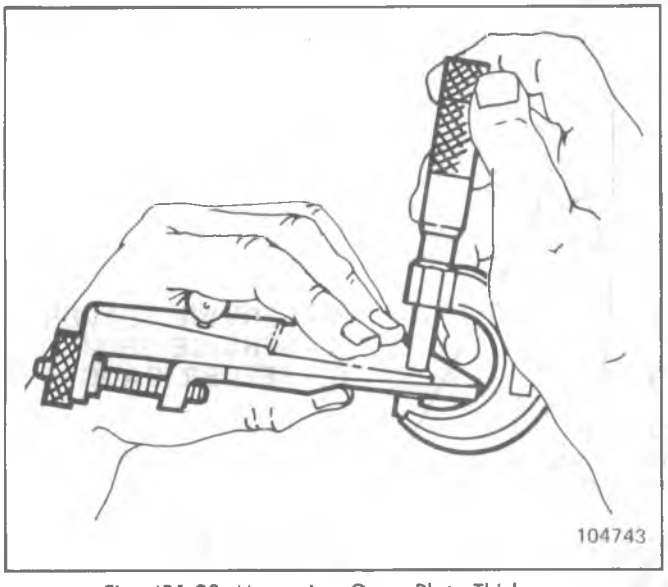


Fig. 4B1-23--Measuring Gage Plate Thickness

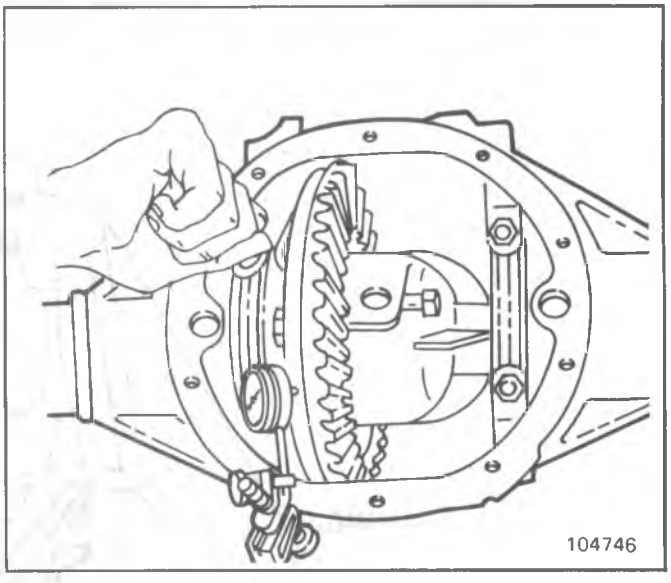


Fig. 4B1-26--Checking Ring Gear Runout

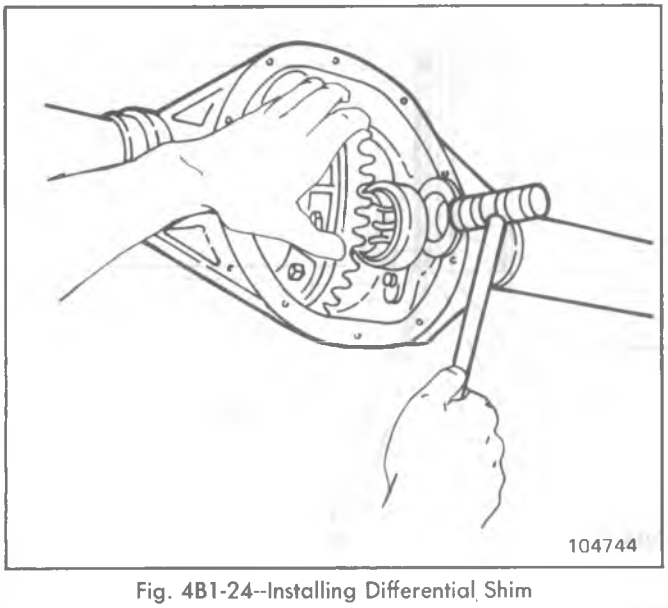


Fig. 4B1-24--Installing Differential Shim

DRIVE PINION

Removal

1. Remove differential as previously outlined.
2. Check torque required to rotate drive pinion, as described under "Drive Pinion - Installation and Adjustment". If there is no preload reading, check for looseness of pinion assembly by shaking (push-pull) the companion flange. Looseness indicates the need for bearing replacement.
3. Install Holder J-8614-11 on flange by using two bolts with flat washers, as shown in figure 4B1-28. Position J-8614-11 on flange so that the four notches are toward the flange.
4. Remove pinion nut and washer.
5. Thread end of J-8614-3 into small O.D. end of J-8614-2. Then with J-8614-11 installed as in step 3, insert J-8614-2 into J-8614-11 and turn it 1/8 of a turn to locked position. Remove flange by turning J-8614-3 while holding J-8614-11 as shown in figure 4B1-29.

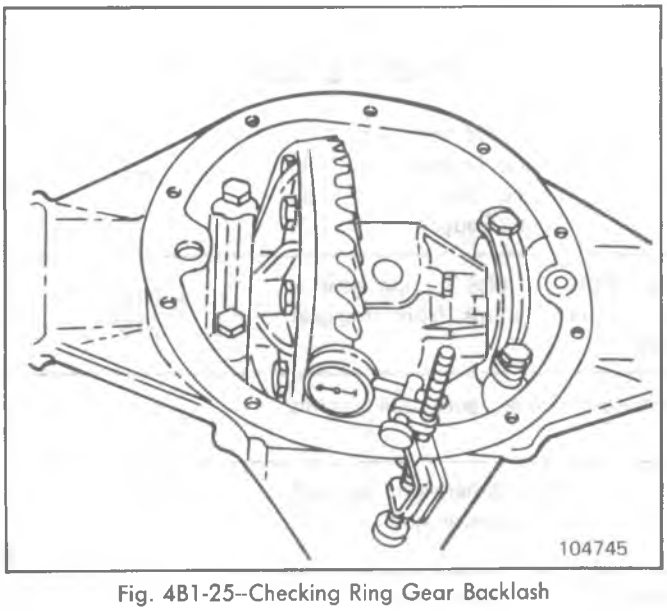


Fig. 4B1-25--Checking Ring Gear Backlash

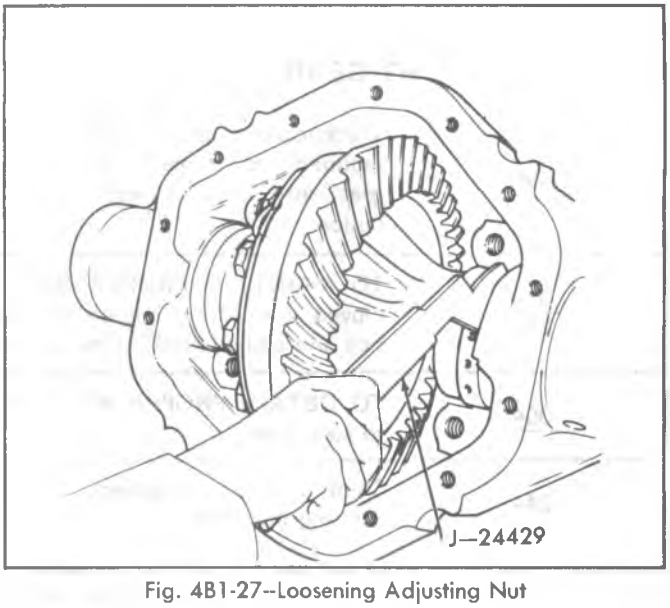


Fig. 4B1-27--Loosening Adjusting Nut

SECTION 4B3

DANA 10-1/2" RING GEAR AXLE

The following notice applies to one or more steps in the assembly procedure of components in this portion of the manual as indicated at appropriate locations by the terminology "See Notice on Page 1 of this Section".

NOTICE: This fastener is an important attaching part in that it could affect the performance of vital components and systems, and/or could result in major repair expense. It must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.

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Unit Repair 4B3-1
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Drive Pinion-Removal and Disassembly 4B3-3
Differential Case-Reassembly 4B3-4
Shim Requirements-Gaging Procedures 4B3-4
Drive Pinion-Assembly and Installation 4B3-5
Differential Case-Installation and Adjustments 4B3-6
Operational Checks and Adjustments 4B3-6

ON-VEHICLE SERVICE

Procedures for service to axle assembly, axle shafts, hub and drum components and bearing adjustments are identical to those described for "Chevrolet 10-1/2" Ring Gear Axle".

Drive pinion oil seal replacement requires different special tools for the Dana axles. Follow the same procedure listed for "Chevrolet 10-1/2" Ring Gear Axle"; use J-24384 for seal replacement on Dana 10-1/2" Ring Gear Axles.

UNIT REPAIR

This Dana Spicer axle is similar in design to other Salisbury type axles with the following exceptions:

- In order to remove the differential case, the carrier must be spread.
- The drive pinion assembly incorporates an inner and outer bearing shim. The inner shim is used to maintain proper pinion depth. The outer shim is used to maintain proper preload on the pinion bearing.

DIFFERENTIAL CASE

Removal

1. Place vehicle on hoist with rear axle hanging free.
2. Remove wheel and tire assemblies.
3. The axle shafts are full-floating type with flanged outer end of shaft attached to wheel hub by studs and nuts. Wheel is supported by tapered roller bearings at outer end of axle housing.
   a. Remove axle shaft to hub attaching nuts.
   b. Rap on axle shaft to loosen shaft from hub and remove shafts.
4. Remove plug in carrier and drain lubricant.
5. Remove cap screws and lock washers attaching cover to carrier. Remove cover and gasket.
6. Mark one side of carrier and matching cap for reassembly in the same position. Remove bearing caps.
7. Using spreader tool J-24385, and a dial indicator as shown in figure 4B3-2, spread carrier a maximum of .015 inch.

   NOTICE: Do not exceed this dimension, as carrier may be permanently damaged.

8. Remove the dial indicator and use a prybar to remove the differential case from the carrier. Record the dimensions and location of the side bearing shims. Remove the spreader tool.

Disassembly

1. Remove differential side bearings by using bearing puller J-29721.
   Use care not to damage bearings with tool J-29721.
2. Remove the ring gear bolts and the ring gear. Tap the ring gear with a soft-faced hammer to free it from the case.
3. Scribe both case halves for reassembly in same position.
4. Remove bolts holding case halves together, as shown in figure 4B3-3.
5. Tap lightly on top half of case to free it from the bottom half. Remove top half of case.
6. Lift out all internal parts.

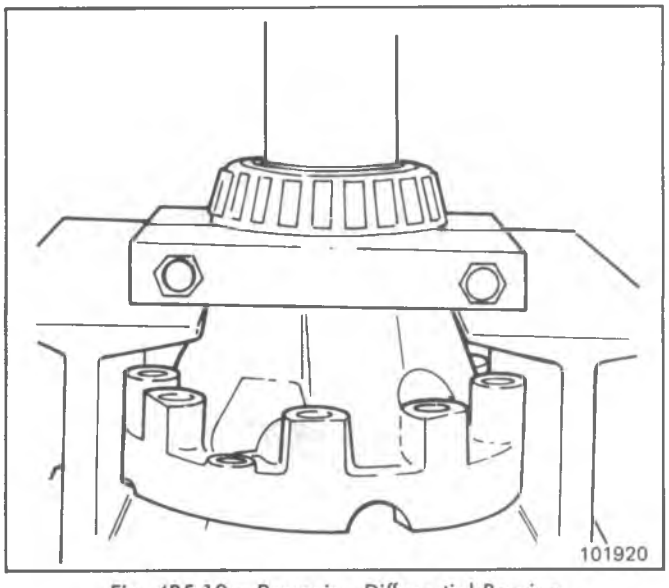


Fig. 4B5-10 -- Removing Differential Bearing

NOTICE: The use of a pinch bar will damage the shims. Driving pinion from inner end with a drift will damage the bearing lock ring groove.

6. Wire shim pack together to facilitate adjustment on reassembling.

Disassemble Pinion and Cage Assembly

1. Tap shaft out of cage with soft mallet or press shaft from cage.
2. Remove outer bearing from cage.
3. Remove spacer or spacer combination from pinion shaft.
4. Remove inner bearing using a press or puller.
5. If necessary to replace rear straddle bearing, remove with suitable puller.
6. Remove oil seal assembly from bearing cover.

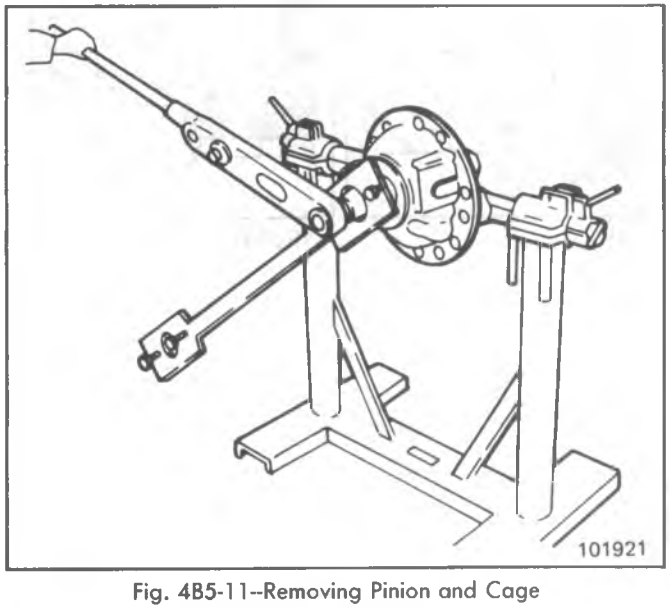


Fig. 4B5-11--Removing Pinion and Cage

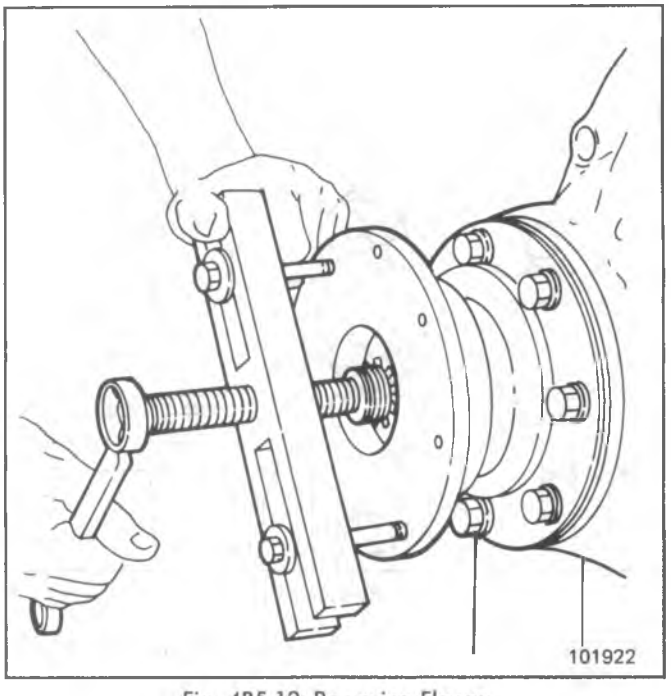


Fig. 4B5-12--Removing Flange

CLEANING AND INSPECTION

Cleaning

Steam cleaning assembled drive units after they have been removed from the housing is not recommended. When this method of cleaning is used, water is trapped in the cored passage of the castings and in the close clearances between parts as well as on the parts. This can lead to corrosion (rust) of critical parts of the assembly and the possiblility of circulating rust particles in the lubricant. Premature failure of bearings, gears and other parts can be caused by this practice. Assembled drive units cannot be properly cleaned by steam cleaning, dipping or slushing. Complete drive unit disassembly is a necessary requisite to thorough cleaning.

Completely assembled axles, torque dividers and transfer cases may be steam cleaned on the outside only, to

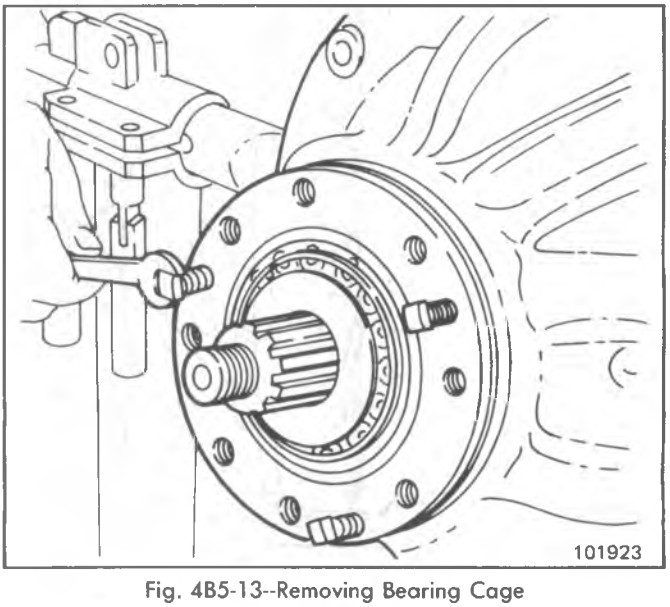


Fig. 4B5-13--Removing Bearing Cage

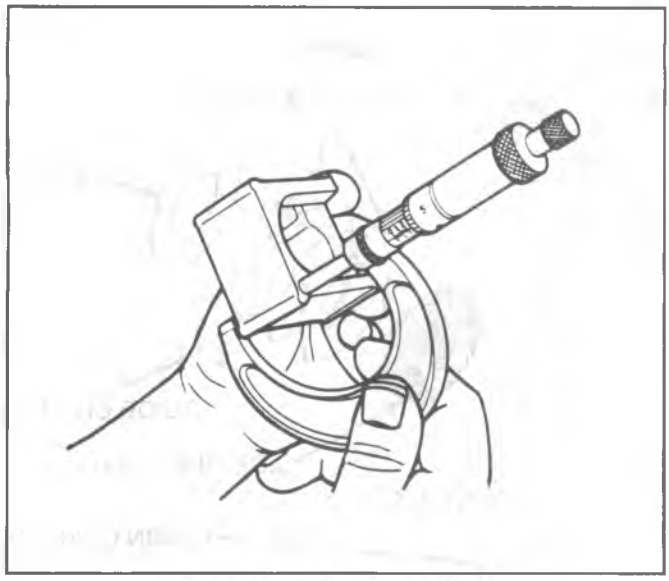


Fig. 8--Measuring Thrust Block

telescoping gage with a 1" to 2" micrometer and not reading. Next, measure the thickness of the original thrust block at outer corner (Fig. 8) and note reading.

If the thrust block thickness is not within a range of .000 to .006 less than the side gear spread, adjust clearance with one of the following procedures:

a. Reshim R.H. Clutch Disc Pack. Note: Backlash of .002 - .010 must still be maintained.

b. Select a new thrust block of the correct size to obtain .000 to .006 clearance.

Once the proper thrust block clearance has been obtained, continue reassembly of case.

CASE

Reassembly (Fig. 2)

1. Install (4) clutch pack guide clips on the ears of the cam gear clutch pack using grease for retention.
2. Install cam gear assembly and original shim in flange end of case. If new camgear is installed, see differential gear replacement.
3. Lock an axle shaft in vise, in a vertical position. Mount the differential case over the end of the axle shaft engaging the spline of the side gear with the shaft. Assemble on to bell end gear hub(3) splined discs and (4) eared discs alternately as shown. Begin and end with an eared disc. Install (4) small clutch pack guide clips on the ears of the bell end clutch pack using grease for retention. Install in case with shim. If new R.H. side gear is installed, refer to differential gear replacement.
4. Install thrust washers onto back surfaces of pinion gears. Use small amount of grease to adhere washers to gears. Insert one pinion gear through the small window opening in the case while at the same time inserting the reaction block and other pinion gear through the large window opening. Rotate the two pinion gears and thrust block 90° so as to position the reaction block with the open side towards the small window opening in the case. Be sure the two pinion gears and thrust washers are in their proper location.

   NOTICE: Thrust block thickness is critical to proper differential function. If new side gears or thrust blocks are installed, refer to instructions in differential gear thrust block replacement.
5. Install pinion shaft and lock screw. A new lock screw must used on assembly.
6. Insert governor assembly and latching bracket into case, Figure 3. Place straight end of latching bracket spring over and to the outside of the engagement shaft to preload the latching bracket against the governor assembly. Press bushing for governor assembly into case to give .004 to .020 shaft end play. A 3/8" diameter plug or socket will aid in pressing the bushing into the housing. Press latching bracket assembly bushing into case to provide .000-.003 shaft end play.
7. Install ring gear and side bearings using the procedure outlined for standards differentials.
8. Place differential unit in carrier and adjust ring gear and pinion backlash and gear tooth pattern as outlined in the standard differential section.
9. Check operation as outlined in Service Test Procedure.

   NOTICE: Use only the rear axle lubricant recommended in Maintenance and Lubrication Section. The usage of any other lubricant or any additive may result in damage to the differential.

UNIT REPAIR

8-7/8" RING GEAR

Due to critical internal clearance dimensions, the differential side gears and case cannot be serviced separately. If any side gear or case damage is found the entire differntial must be replaced.

Internal clearances are such that shims, thrust block and thrust ring should not be replaced unnecessarily even if slight wear indications are present. If shims, thrust block, or thrust ring must be replaced due to damage, correct measurement and replacement procedures must be followed. Failure to do so may disturb critical clearances and could result in differential complaints.

Internal components can be inspected through the windows of the differential housing.

If the governor assembly and latching bracket are the only items to be replaced, proceed only through Step No. 2 of the disassembly procedure. To install new governor and latching bracket, gegin at Step No. 6 of the 39 reassembly procedure.

CASE

Disassembly

1. Note position of governor and latching bracket assembly, Fig. 10. Remove ring gear and side bearings following procedures established for the standard

CAUSE \ SYMPTOM	Excessive Brake Pedal Travel	Brake Pedal Travel Gradually Increases	Excessive Brake Pedal Effort	Excessive Braking Action	Brakes Slow to Respond	Brakes Slow to Release	Brakes Drag	Uneven Braking Action (Side to Side)	Uneven Braking Action (Front to Rear)	Scraping Noise from Brakes Application	Brakes Squeak During	Brakes Squeak During Stop	Brakes Chatter (Roughness)	Brakes Groan at End of Stop	Brake Tell-Tale Glows During Stop
Leaking Brake Line or Connection	X	XX								X					XX
Leaking Wheel Cylinder or Piston Seal	X	XX		X						X					X
Leaking Master Cylinder	X	XX													X
Air In Brake System	XX									X					XX
Contaminated or Improper Brake Fluid					X	X	X								X
Leaking Vacuum System			XX		X										
Restricted Air Passage in Power Head			X		XX	X									
Damaged Power Head			X	X	X	X	X								
Improperly Assembled Power Head Valving			X	X	X	X	XX								
Worn Out Brake Lining - Replace			X	X						X	X	X	X	X	
Uneven Brake Lining Wear - Replace and Correct	X			X						X	X	X	X	XX	X
Glazed Brake Lining			XX		X					X	X		X	X	
Incorrect Lining Material - Replace			X	X						X	X			X	
Contaminated Brake Lining - Replace				XX						XX	XX	X	X	X	
Linings Damaged by Abusive Use - Replace			X	XX						X	X	X	X	X	
Excessive Brake Lining Dust			X	XX						XX	XX		X	XX	
Heat Spotted or Scored Brake Drums or Rotors				X						X	X		X	X	XX
Out-of-Round or Vibrating Brake Drums														X	XX
Out-of-Parallel Brake Rotors															XX
Excessive Rotor Run-Out															X
Faulty Automatic Adjusters	X							X		X	X				
Incorrect Wheel Cylinder Sizes			X	X						X	X				
Weak or Incorrect Brake Shoe Retention Springs				X			X	XX		X	X	XX	X	XX	
Brake Assembly Attachments - Missing or Loose	X							X		X	X	X		X	X
Insufficient Brake Shoe Guide Lubricant							X	X		X	X	XX	XX		
Restricted Brake Fluid Passage or Sticking Wheel Cylinder Piston		X	X		X	X	X			X	X				
Faulty Metering Valve	X		X	X	X	X	X				X				X
Brake Pedal Linkage Interference or Binding			X		X	XX	XX								
Improperly Adjusted Parking Brake							X								
Drums Tapered or Threaded												XX			
Incorrect Front End Alignment										XX					
Incorrect Tire Pressure										X	X				
Incorrect Wheel Bearing Adjustment	X											X		X	
Loose Front Suspension Attachments										X		XX		X	X
Out-of-Balance Wheel Assemblies														XX	
Operator Riding Brake Pedal	X	X	X					X			X				X
Improperly Adjusted Master Cylinder Push Rod	X						X	XX							X
Sticking Wheel Cylinder or Caliper Pistons			X				X	X		X	X				
Faulty Proportioning Valve			X		X	X	X								

XX - Indicates more probable cause(s) X - Indicates causes

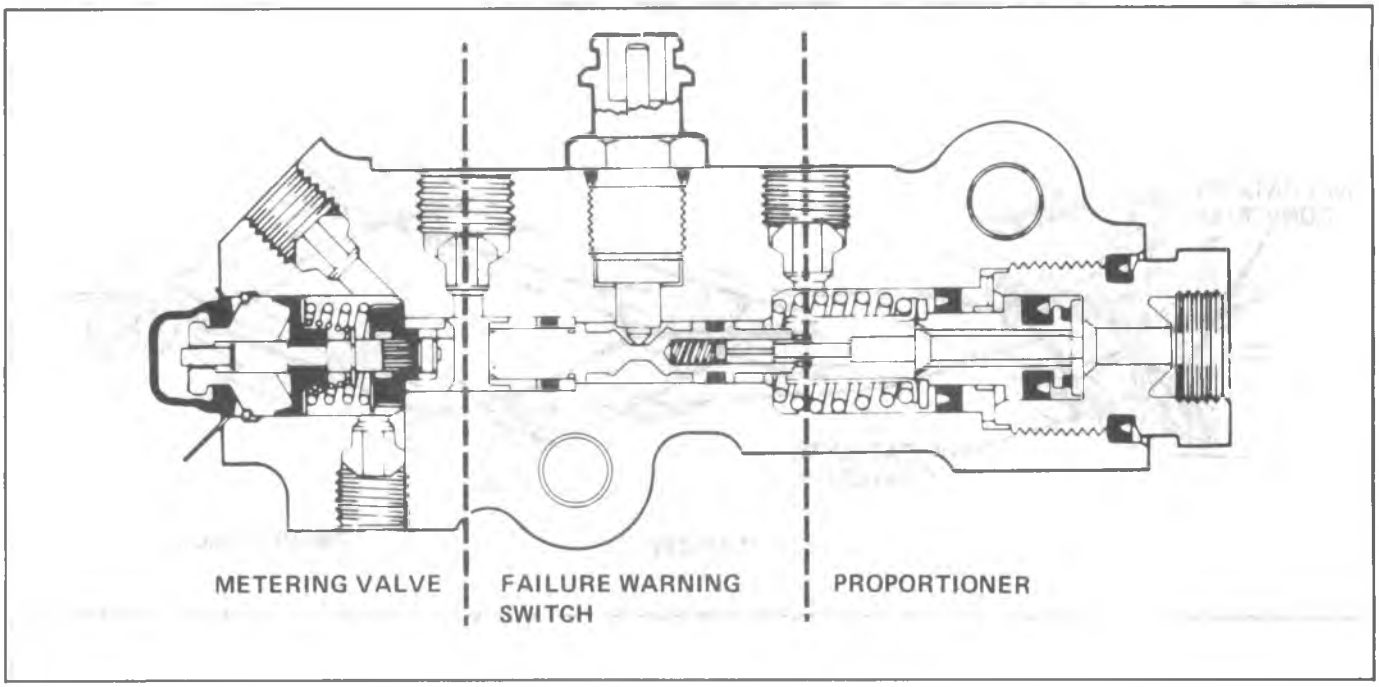


Fig. 5-17--Combination Valve

with a new combination valve.

5. Lower vehicle to floor. Check and refill master cylinder to proper level.

Replacement

The combination valve is not repairable and must be serviced as a complete assembly.

1. Disconnect hydraulic lines at combination valve. Plug lines to prevent loss of fluid and entrance of diret. Disconnect warning switch wiring harness from valve switch terminal.
2. Remove combination valve.
3. Install combination valve by reversing removal steps.
4. Bleed entire brake system. Do not move vehicle until a firm brake pedal is obtained.

HEIGHT SENSING BRAKE PROPORTIONING VALVE

The height sensing brake proportioning valve, used on 30 series models, provides optimum brake balance and efficiency. Vehicle braking force is distributed to the front and rear wheels as defined by light or heavy payload conditions.

Mounted on the frame, the valve responds to changes in vehicle trim height as related to rear axle load. Mechanical linkage connects the valve to a bracket that is attached to the rear axle.

CAUTION: Adding any suspension accessories or other equipment (such as load leveling kits, air shocks, suspension lift kits, additional spring leafs, etc.), or making modification that will change the distance between the axle and the frame without changing the load, will provide a false reading to the brake proportioning valve. This could result in unsatisfactory brake performance which in turn could result in an accident and possibly personal injury.

Adjustment Procedure

If diagnosis indicates front wheel lock-up is experienced when vehicle is operated at near GVWR with a lower than desired brake application rate, the height sensing proportioning valve may be adjusted using the following procedure:

1. Raise vehicle, axle must be allowed to hang free (no load condition), wheels on.
2. Remove nut from valve shaft and remove lever (Fig. 5-18).
3. Rotate valve shaft to permit installation of correct adjustment gage. Center hole of adjustment gage must seat on "D" shape of valve shaft and gage tang must seat in valve mounting hole as shown in Figure 5-19. Adjustment gages are available from service parts.
4. Install lever on valve shaft by pushing plastic bushing and clip assembly over serrations on valve shaft using a "C" clamp or channel lock pliers. When properly installed, serrations on valve shaft fully engage plastic bushing.

   NOTICE: Do not drive lever assembly on valve shaft by using nut, or proper valve setting may be disturbed.
5. Install nut and tighten to 8-11 N·m (70-98) in. lbs.).
6. Sever tang on adjustment gage to allow valve assembly to rotate freely (Fig. 5-19).
7. Lower vehicle and test brakes.

Removal

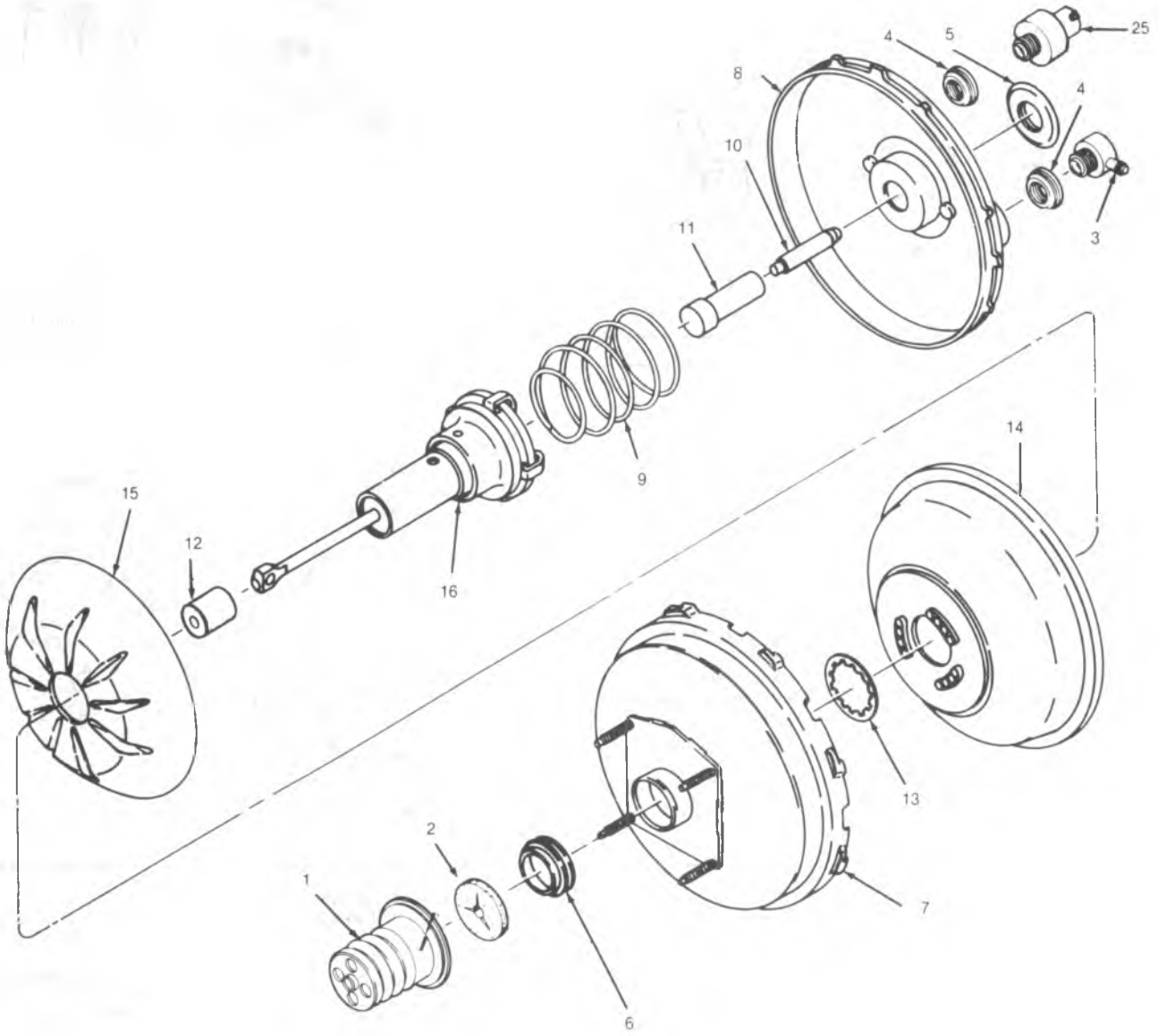
1. Raise vehicle, axle must be allowed to hang free (load condition) with wheels removed.
2. Clean exterior of valve to prevent dirt from contaminating hydraulic system when brake pipes are disconnected.
3. Disconnect brake lines from valve.
4. Remove nut from shaft and remove lever.

POWER HEAD ASSEMBLY - SINGLE DIAPHRAGM

GENERAL DESCRIPTION

This booster is a single diaphragm vacuum suspended unit. It may have a single function vacuum switch to activate the brake warning light in case of low booster vacuum or vacuum pump malfunction. In a normal operating mode, with the service brakes in the released position, a vacuum suspended booster operates with vacuum on both sides of its diaphragm. When the brakes are applied, air at atmospheric pressure is admitted to one side of the diaphragm to provide the power assist.

NOTICE: Use all components included in repair kits to service this booster. Lubricate rubber parts, where indicated, with silicone grease provided in kits. The torque values specified are for dry, unlubricated fasteners. If any hydraulic component is removed or brake line disconnected, bleed the brake system.



1. Boot
2. Silencer
3. Vacuum check valve
4. Grommet
5. Front housing seal
6. Power piston bearing
7. Rear housing
8. Front housing
9. Return spring
10. Piston rod (gaged)
11. Reaction retainer
12. Filter
13. Diaphragm retainer
14. Diaphragm
15. Diaphragm support
16. Power piston and pushrod assembly
25. Vacuum switch (some models)

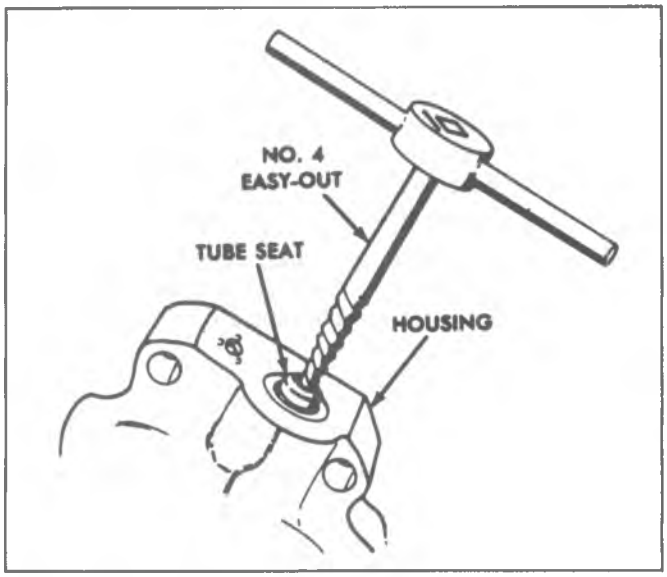


Fig. 5-B10--Removing Tube Seat

through the piston seal. Remove piston installing tool.

9. If removed, install return hose fitting with new "O" ring.
10. If accumulator valve was removed, install new seal into the valve bore. The seat can be forced to the bottom by installing the two function valve (Fig. 5-B8). Make certain the check valve seat is cup side up when in bore.
11. If removed, insert new dump valve over the two function valve making certain that the dump valve plunger is held in place until installation is complete.
12. Insert spoool valve spring and spool valve assembly into bore in housing. Extend power piston lever to accept sleeve on spool valve, then slide lever pins into slot in sleeve.

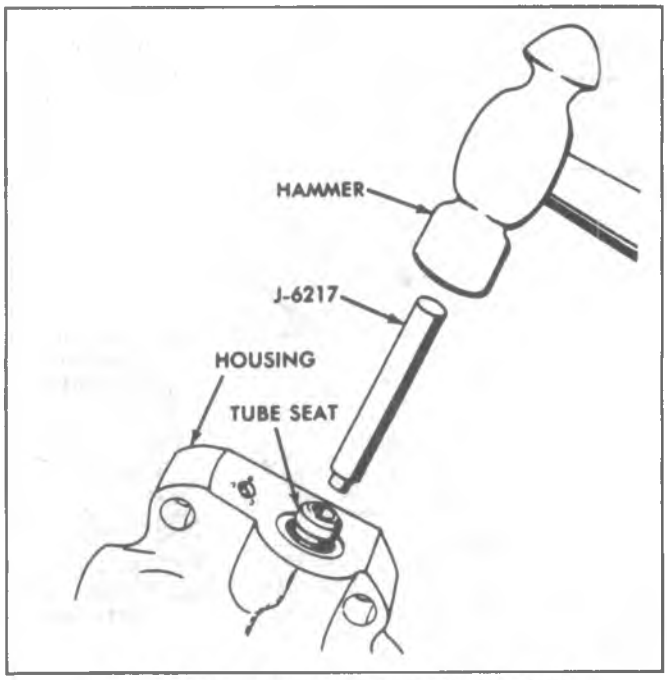


Fig. 5-B11--Installing Tube Seat Using J-6217

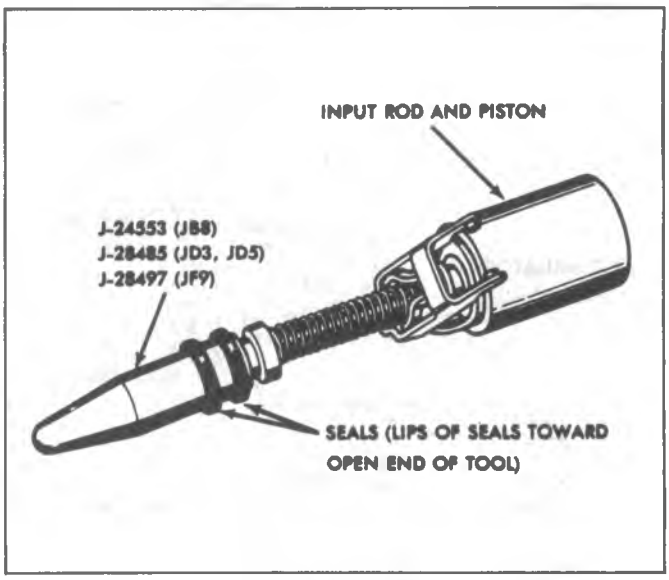


Fig. 5-B12--Installing Input Rod Seals

13. Position a NEW "figure eight" seal in the groove in the housing cover. Then join the booster housing and cover and secure with five screws. Tighten the screws to 20 ft. lbs.

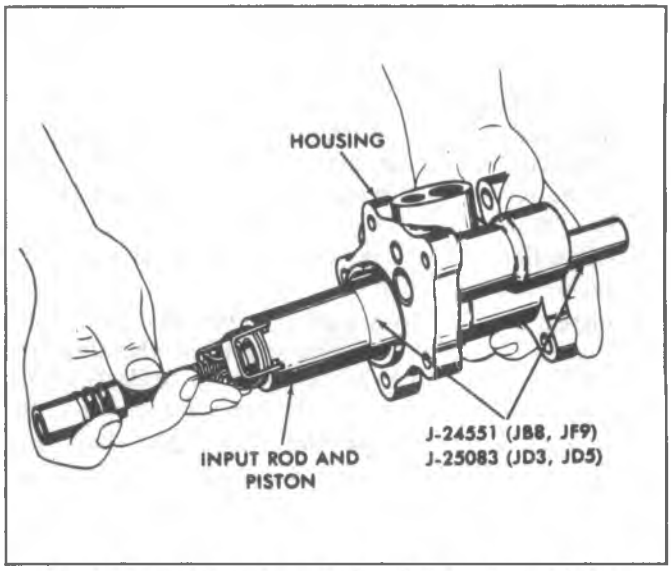


Fig. 5-B13--Installing Input Rod and Piston Assembly Into Booster (Typical)

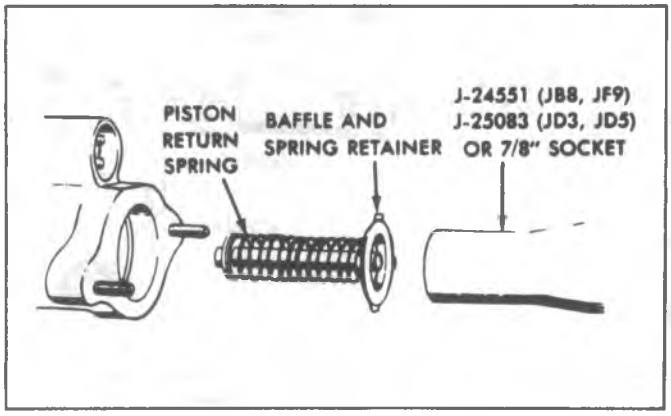


Fig. 5-B14--Installing Baffle and Spring Retainer

	malfunctioning oil pressure gage.	
	d. Improper oil viscosity or diluted oil.	1. Install oil of proper viscosity for expected temperature. 2. Install new oil if diluted with moisture or unburned fuel mixtures.
	e. Oil pump worn or dirty.	1. Clean pump and replace worn parts as necessary.
	f. Plugged oil filter.	1. Replace filter and oil.
	g. Oil pickup screen loose or plugged.	1. Clean or replace screen as necessary.
	h. Hole in oil pickup tube.	1. Replace tube.
	i. Excessive bearing clearance.	1. Replace as necessary.
	j. Cracked, porous or plugged oil galleys.	1. Repair or replace block.
	k. Galley plugs missing or mis-installed.	1. Install plugs or repair as necessary.
Valve Train Noise	a. Low oil pressure.	1. Repair as necessary. (See diagnosis for low oil pressure.)
	b. Loose rocker arm attachments.	1. Inspect and repair as necessary.
	c. Worn rocker arm and/or pushrod.	1. Replace as necessary.
	d. Broken valve spring.	1. Replace spring.
	e. Sticking valves.	1. Free valves.
	f. Lifters worn, dirty or defective.	1. Clean, inspect, test and replace as necessary.
	g. Camshaft worn or poor machining.	1. Replace camshaft.
	h. Worn valve guides.	1. Repair as necessary.

ENGINE KNOCK DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
Engine knocks cold and continues for two to three minutes. Knock increases with torque.	a. EFE equipped engines may have valve knock.	1. Replace EFE valve.
	b. Flywheel contacting splash shield.	1. Reposition splash shield.
	c. Loose or broken balancer or drive	1. Tighten or replace as necessary.

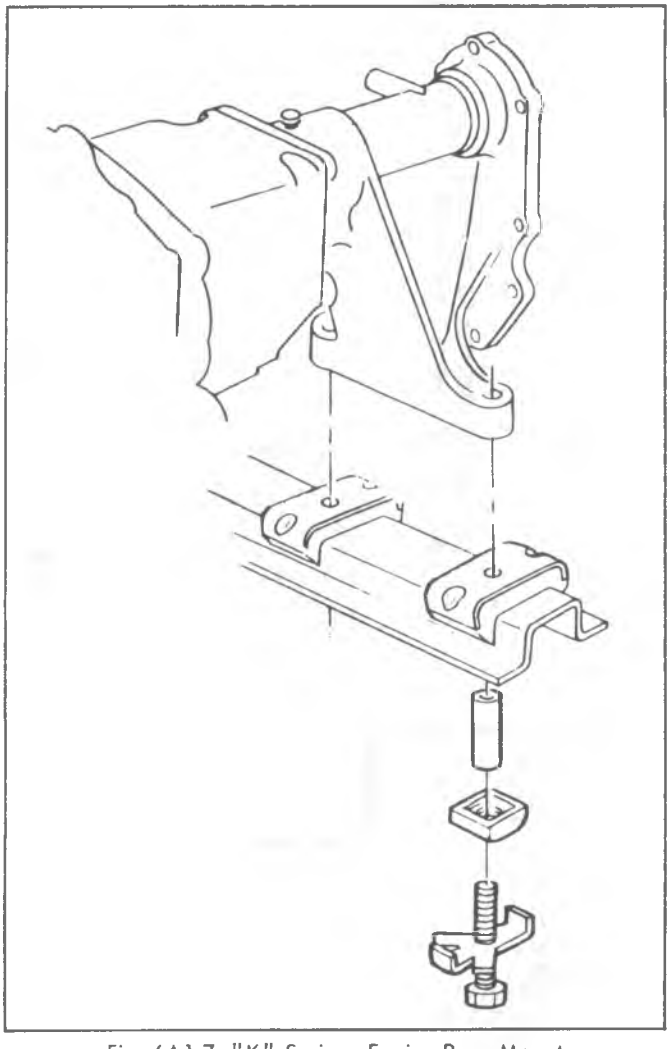


Fig. 6A1-7--"K" Series - Engine Rear Mount

10. Remove tool, being careful not to withdraw seal.
11. Install seal half in bearing cap, again using tool as a "shoe-horn", feeding seal into cap using light pressure with thumb and finger.
12. Install bearing cap to case with sealant applied to the cap-to-case interface being careful to keep sealant off the seal split line (fig. 6A1-38).
13. Install the rear main bearing cap (with new seal) and torque to 10-12 lb. ft. (14-16 N·m). Tap end of crankshaft first rearward then forward with a lead hammer. This will line up rear main bearing and crankshaft thrust surfaces. Retorque bearing cap to 65 lb. ft. (88N·m).

PISTON AND CONNECTING ROD ASSEMBLIES

Removal

1. Remove oil pan, oil pump and cylinder head as previously outlined.
2. For the cylinder being serviced, turn crankshaft until piston is at the bottom of the stroke. Place a cloth on top of the piston.
3. Use a ridge reamer to remove any ridge and/or deposits from the upper end of the cylinder bore.
4. Turn crankshaft until piston is at top of stroke and remove cloth and cuttings.
5. Remove connecting rod cap and install Tool J-6305 (11/32") on studs. Push connecting rod and piston assembly out of top of cylinder block (fig. 6A1-39). It will be necessary to turn the crankshaft slightly to disconnect some of the connecting rod and piston assemblies and push them out of the cylinder.

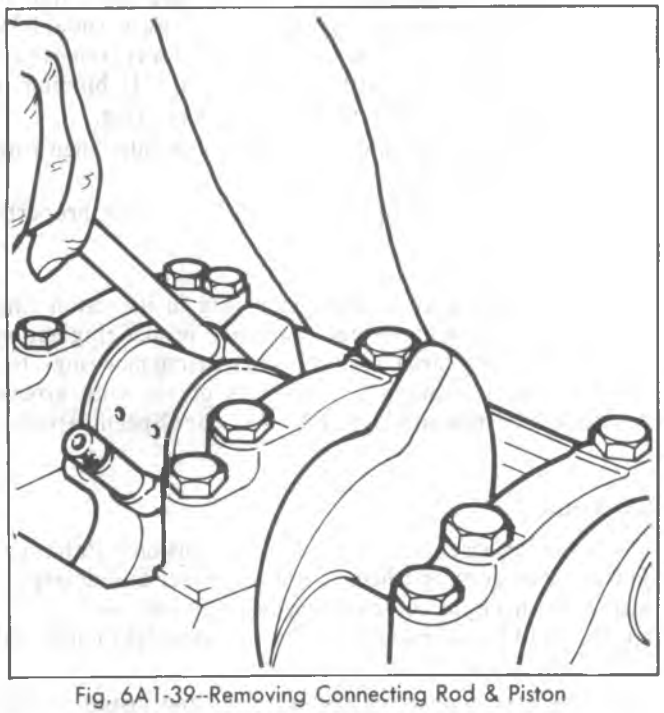


Fig. 6A1-39--Removing Connecting Rod & Piston Assembly

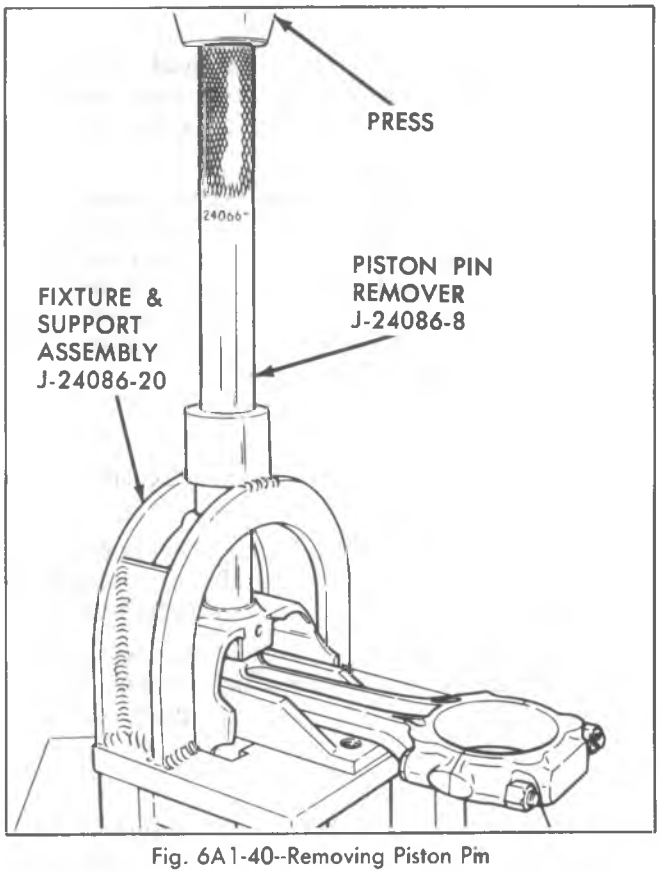


Fig. 6A1-40--Removing Piston Pin

Disassembly

1. Remove connecting rod bearings from connecting rods and caps. If bearings are being reused, place them in a rack so they may be reinstalled in their original positions.
2. Remove piston rings by expanding and sliding them off the pistons. Tools J-8021 (3-7/8") and J-22249 (3-15/16") are available for this purpose.
3. Place connecting rod and piston assembly on tool J-24086-20. Using an arbor press and piston pin remover, J-24086-8, press the piston pin out of connecting rod and piston (fig. 6A1-40).

Cleaning and Inspection

Connecting Rods

Wash connecting rods in cleaning solvent and dry with compressed air.

Check for twisted or bent rods and inspect for nicks or cracks. Replace connecting rods that are damaged.

Pistons

Clean varnish from piston skirts and pins with a cleaning solvent. DO NOT WIRE BRUSH ANY PART OF THE PISTON. Clean the ring grooves with a groove cleaner and make sure oil ring holes and slots are clean.

Inspect the piston for cracked ring lands, skirts or pin bosses, wavy or worn ring lands, scuffed or damaged skirts, eroded areas at top of the piston. Replace pistons that are damaged or show signs of excessive wear.

Inspect the grooves for nicks or burrs that might cause the rings to hang up.

Measure piston skirt (across center line of piston pin) and check clearance.

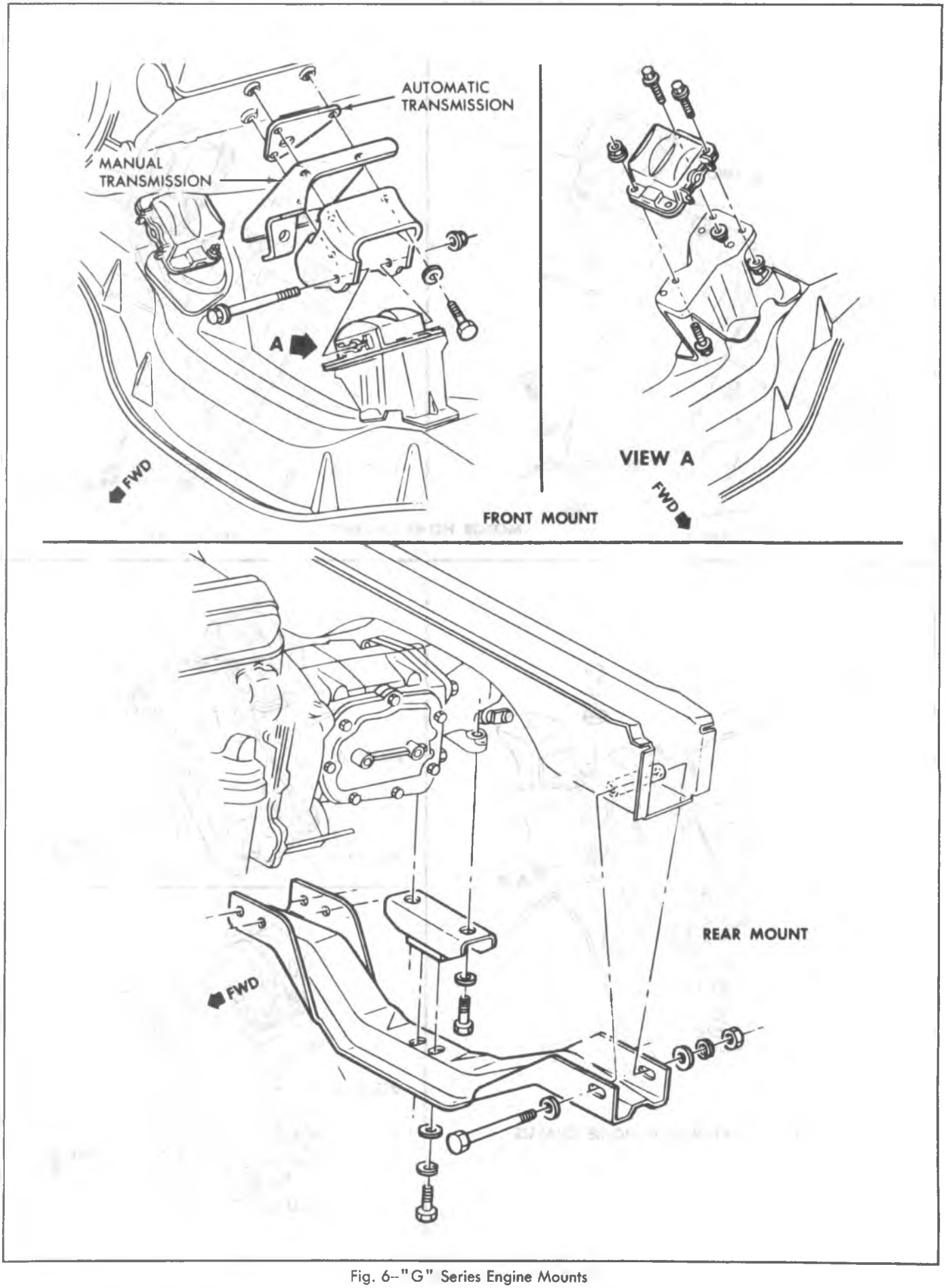


Fig. 6--"G" Series Engine Mounts

Fig. 46--Gaging Plastic on Journal

shimming may be necessary. Laminated shims for each cap are available for service. Shim requirement will be determined by bearing clearance.

Inspection

In general, the lower half of the bearing (except #1 bearing) shows a greater wear and the most distress from fatigue. If upon inspection the lower half is suitable for use, it can be assumed that the upper half is also satisfactory. If the lower half shows evidence of wear or damage, both upper and lower halves should be replaced. NEVER REPLACE ONE HALF WITHOUT REPLACING THE OTHER HALF.

Checking Clearance

To obtain the most accurate results with "Plastigage" (or its equivalent) a wax-like plastic material which will compress evenly between the bearing and journal surfaces without damaging either surface, certain precautions should be observed.

If the engine is out of the vehicle and upside down, the crankshaft will rest on the upper bearings and the total clearance can be measured between the lower bearing and journal. If the engine is to remain in the vehicle, the crankshaft must be supported upward to remove any clearance from the upper bearing. The total clearance can then be measured between the lower bearing and journal.

To assure the proper seating of the crankshaft, all bearing cap bolts should be at their specified torque. In addition, preparatory to checking fit of bearings, the surface of the crankshaft journal and bearing should be wiped clean of oil.

1. With the oil pan and oil pump removed, and starting with the rear main bearing, remove bearing cap and wipe oil from journal and bearing cap.
2. Place a piece of gaging plastic the full width of the bearing (parallel to the crankshaft) on the journal (fig. 46).

   Do not rotate the crankshaft while the gaging plastic is between the bearing and journal.
3. Install the bearing cap and evenly torque the retaining bolts to specifications. Bearing cap **MUST** be torqued to specifications in order to assure proper reading. Variations in torque affect the compression of the plastic gage.
4. Remove bearing cap. The flattened gaging plastic will be found adhering to either the bearing shell or journal.
5. On the edge of gaging plastic envelope there is a graduated scale which is correlated in thousandths of an inch. Without removing the gaging plastic, measure its compressed width (at the widest point) with the graduations on the gaging plastic envelope (fig. 47).

   Normally main bearing journals wear evenly and are not out-of-round. However, if a bearing is being fitted to an out-of-round (.001" max.), be sure to fit to the maximum diameter of the journal: If the bearing is fitted to the minimum diameter and the journal is out-of-round .001", interference between the bearing and journal will result in rapid bearing failure. If the flattened gaging plastic tapers toward the middle or ends, there is a difference in clearance indicating taper, low spot or other irregularity of the bearing or journal. Be sure to measure the journal with a micrometer if the flattened gaging plastic indicates more than .001" difference.
6. If the bearing clearance is within specifications, the bearing insert is satisfactory. If the clearance is not within specifications, replace the insert. Always replace both upper and lower inserts as a unit.

   If a new bearing cap is being installed and clearance is less than .001", inspect for burrs or nicks; if none are found then install shims as required.
7. A standard, .001" or .002" undersize bearing may produce the proper clearance. If not, it will be necessary to regrind the crankshaft journal for use with the next undersize bearing.

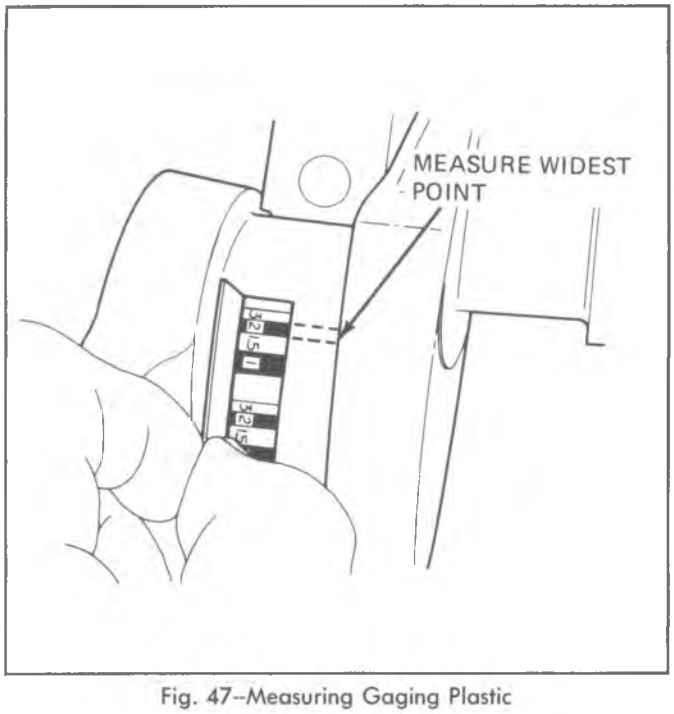
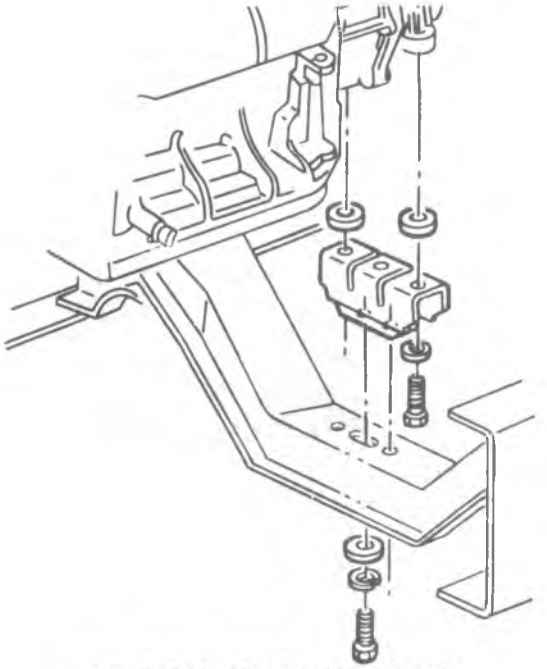
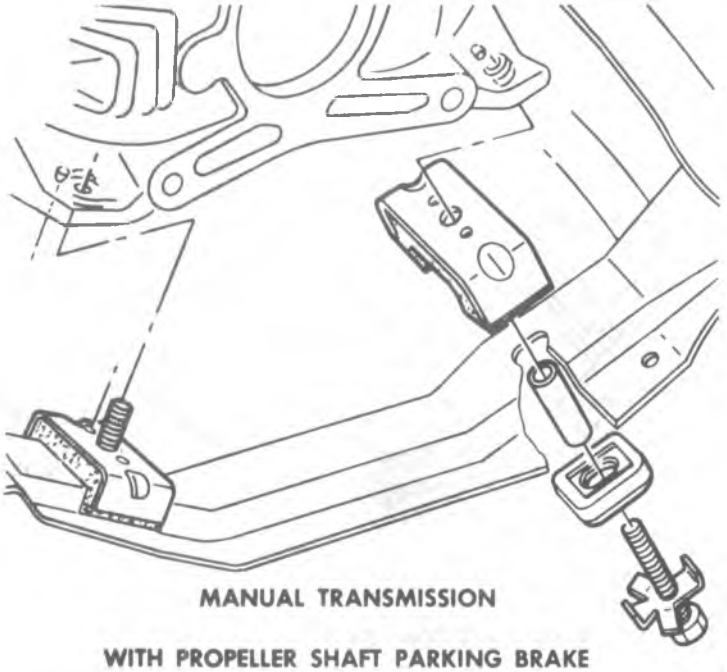


Fig. 47--Measuring Gaging Plastic



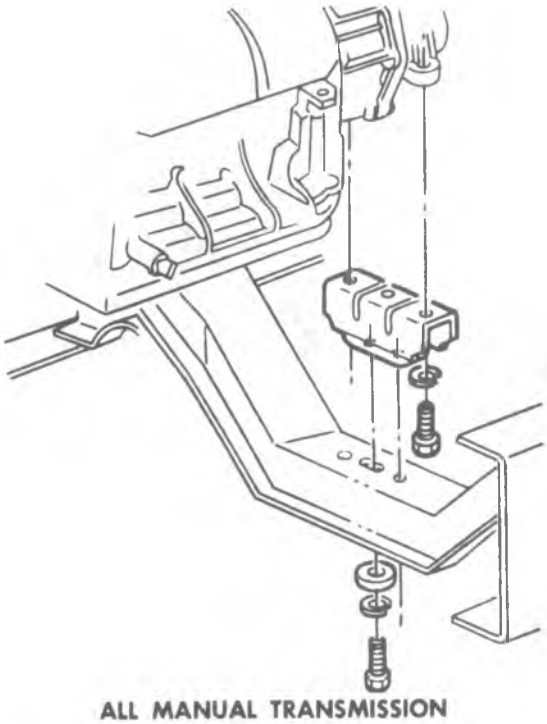
ALL TURBO HYDRA-MATIC 400
(EXCEPT MOBILE HOME CHASSIS)

WITHOUT PROPELLER SHAFT PARKING BRAKE



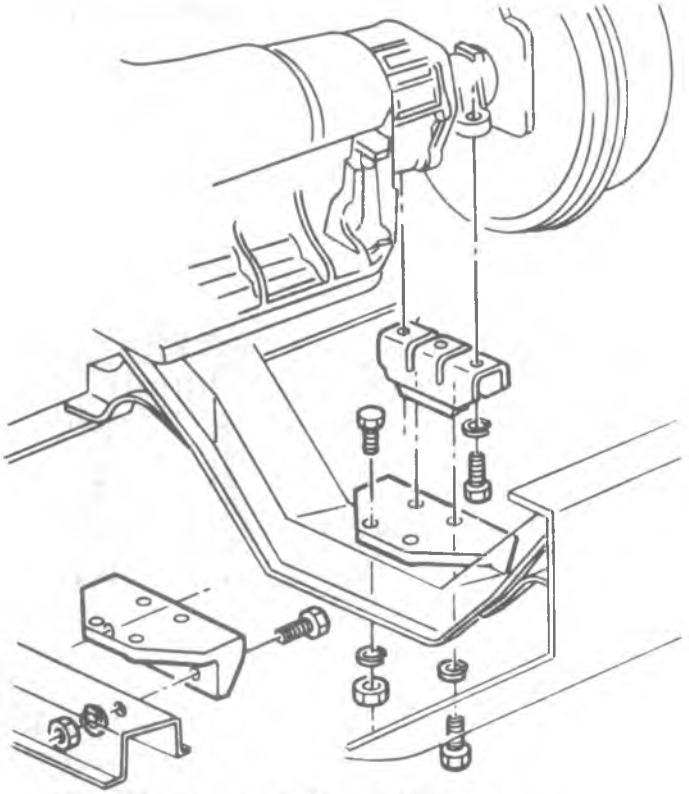
MANUAL TRANSMISSION

WITH PROPELLER SHAFT PARKING BRAKE



ALL MANUAL TRANSMISSION
ALL TURBO HYDRA-MATIC 350
ALL MOBILE HOME CHASSIS

WITHOUT PROPELLER SHAFT PARKING BRAKE



AUTOMATIC TRANSMISSION

WITH PROPELLER SHAFT PARKING BRAKE

Fig. 6A5-5--"P" Series Engine Rear Mount

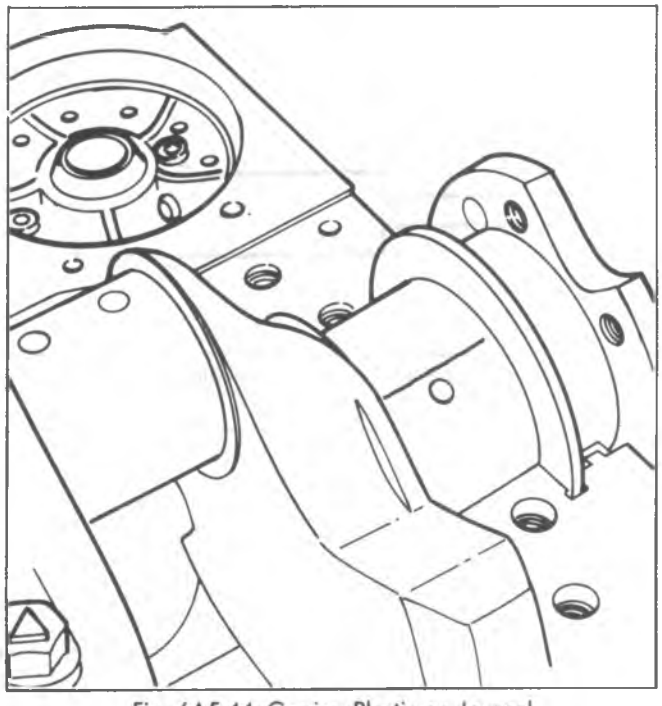


Fig. 6A5-44--Gaging Plastic on Journal

2. Place a piece of gaging plastic the full width of the bearing (parallel to the crankshaft) on the journal (fig. 6A5-44). Do not rotate the crankshaft while the gaging plastic is between the bearing and journal.

3. Install the bearing cap and evenly torque the retaining bolts to specifications. Bearing cap **MUST** be torqued to specifications in order to assure proper reading. Variations in torque affect the compression of the plastic gage.

4. Remove bearing cap. The flattened gaging plastic will be found adhering to either the bearing shell or journal.

5. On the edge of gaging plastic envelope there is a graduated scale which is correlated in thousandths of an inch. Without removing the gaging plastic, measure its compressed width (at the widest point) with the graduations on the gaging plastic envelope (fig. 6A5-45).

   Normally main bearing journals wear evenly and are not out-of-round. However, if a bearing is being fitted to an out-of-round (.001" max.), be sure to fit to the maximum diameter of the journal: If the bearing is fitted to the minimum diameter and the journal is out-of-round .001", interference between the bearing and journal will result in rapid bearing failure. If the flattened gaging plastic tapers toward the middle or ends, there is a difference in clearance indicating taper, low spot or other irregularity of the bearing or journal. Be sure to measure the journal with a micrometer if the flattened gaging plastic indicates more than .001" difference.

6. If the bearing clearance is within specifications, the bearing insert is satisfactory. If the clearance is not within specifications, replace the insert. Always replace both upper and lower inserts as a unit. If a new bearing cap is being installed and clearance is less than .001", inspect for burrs or nicks; if none are found then install shims as required.

7. A standard, .001" or .002" undersize bearing may produce the proper clearance. If not, it will be necessary to regrind the crankshaft journal for use with the next undersize bearing. After selecting new bearing, recheck clearance.

8. Proceed to the next bearing. After all bearings have been checked rotate the crankshaft to see that there is no excessive drag. When checking #1 main bearing, loosen accessory drive belts so as to prevent tapered reading with plastic gage.

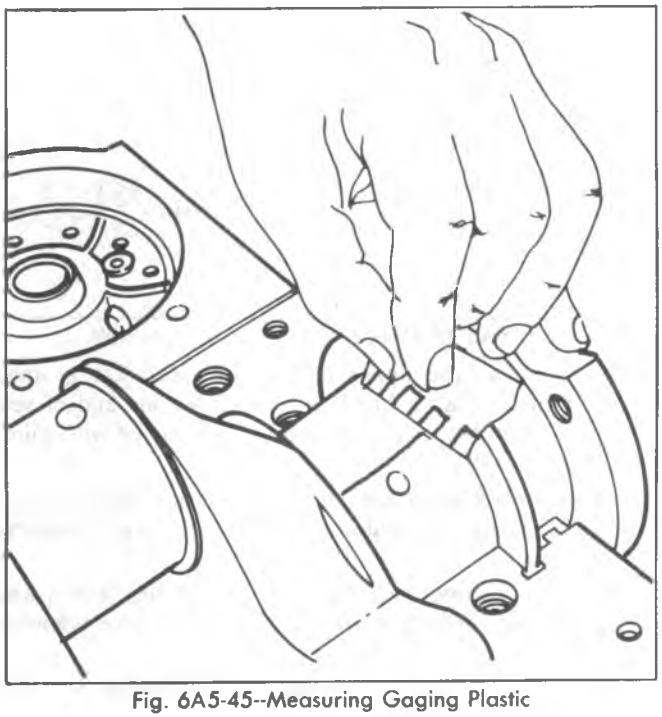


Fig. 6A5-45--Measuring Gaging Plastic

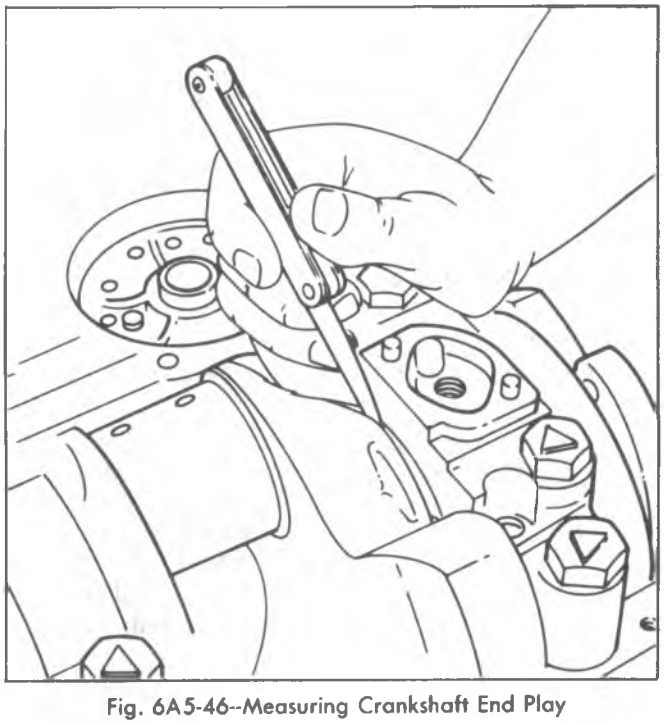


Fig. 6A5-46--Measuring Crankshaft End Play

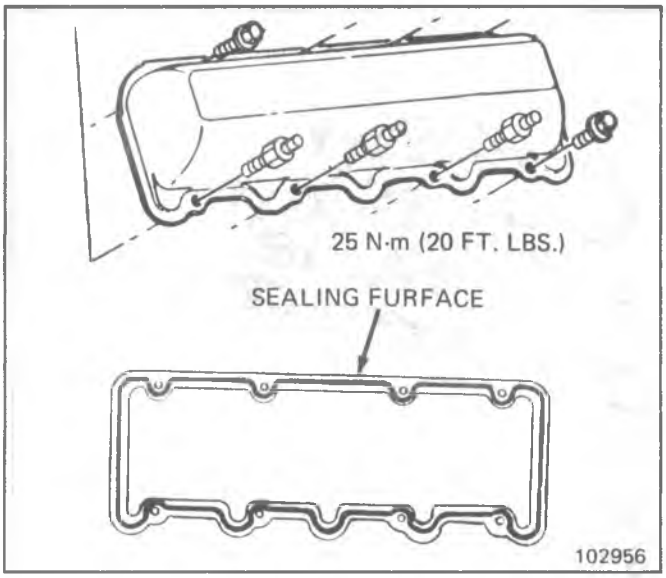


Fig. 6A7-6--Rocker Arm Cover

12. If any further operations are to be performed, install protective covers J-29664-1.

Installation

1. Remove protective covers after use.
2. Gasket surfaces must be clean prior to installation.
3. Install new gasket.
   Gasket has opening for EGR on light duty applications, and gasket has insert covering opening for heavy duty applications.
4. Install intake manifold.
5. Install intake manifold bolts in sequence shown.
6. Refer to 6.2 Diesel Fuel Injection Section for fuel line installation.
7. For remainder of the installation procedures, reverse removal.

ROCKER ARM COVER (Fig. 6A7-6)

CK Truck

Removal

1. Remove intake manifold as previously outlined.
2. Remove injection lines as outlined in 6.2 Diesel Fuel Injection Section (#5 and #7 injection lines do not have to be removed for right side only).
3. Remove wire loom from clip.
4. Remove wire loom bracket (2 nuts).
5. Remove rocker cover bolts and cover.

Installation

1. Clean sealing surface on head and intake manifold.
2. Place a 5mm diameter (3/16") bead of RTV sealant #1052915 or equivalent all around the rocker cover sealing surface. (When going around the attaching bolts holes always flow the sealant on the inboard side of the holes). Sealer must be wet to touch when bolts are torqued.

   NOTICE: When applying sealant, keep sealant out of bolt holes as this could cause a "hydraulic" condition which could damage the head casting.
3. Install the rocker cover bolts and studs.
4. Install loom wire bracket.
5. Install injection lines as outlined in 6.2 Diesel Fuel Injection Section.
6. With protective covers J-29664-1 installed start engine and check for leaks at line fittings.
7. Stop engine.
8. Install intake manifold as previously outlined.

G Van

Removal (Right Side)

1. Remove intake manifold as previously outlined.
2. Remove injection lines as outlined in 6.2 Diesel Fuel Injection Section.
3. Disconnect glow plug wires.
4. Remove loom bracket nuts and remove bracket.
5. Remove rocker cover bolts.
6. Remove rocker cover.

Installation (Right Side)

1. Clean sealing surface on head and intake manifold.
2. Place a 5mm diameter (3/16") bead of RTV sealant #1052915 or equivalent all around rocker cover sealing surface. (When going around the attaching bolt holes, always flow the sealant on the inboard side of holes.) Sealer must be wet to touch when bolts are torqued.

   NOTICE: When aplying sealant, keep sealant out of bolt holes as this could cause a "hydraulic" condition which could damage the head casting.
3. Install rocker cover bolts and studs.
4. Reverse removal procedures for the remainder of installation procedures.

Removal (Left Side)

1. Remove intake manifold as previously outlined.
2. Remove injection lines as outlined in 6.2 Diesel Fuel Injection Section. Before lowering vehicle, it may be necessary to remove other components mentioned below after injection line removal.
3. If equipped with A/C:
   - Remove upper fan shroud.
   - Remove A/C belt.
   - Raise vehicle.
   - Disconnect exhaust at manifold flange.
   - Remove rear A/C brace from exhaust manifold and remove manifold.
   - Lower vehicle.
   - Discharge A/C system.
   - Disconnect A/C lines at compressor.
   - Remove A/C compressor from brackets and remove compressor.
4. Loosen dipstick tube front bracket and remove from stud.
5. Remove loom bracket nuts and remove brackets.
6. Remove rocker cover bolts and disconnect fuel return bracket.
7. Remove rocker cover.

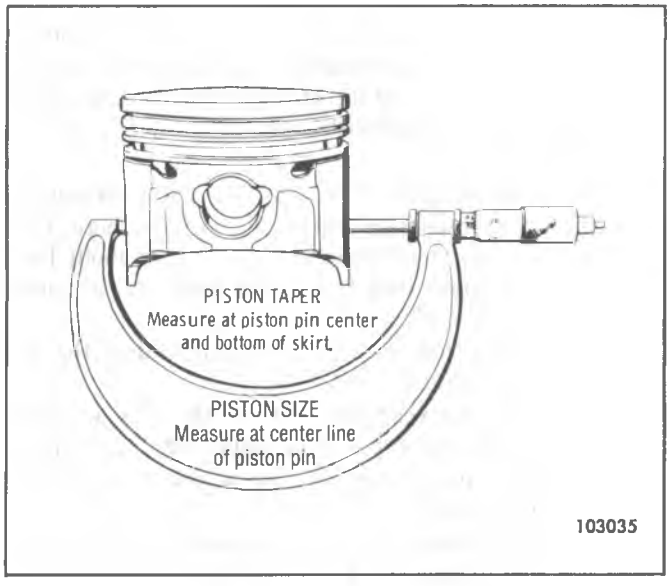


Fig. 6A7-39--Measuring Piston

desired to entirely clean up the bore in these cases, it will be necessary to rebore for an oversize piston. If more than .005" taper or wear, they should be bored and honed to the smallest oversize that will permit complete resurfacing of all cylinders.

When pistons are being fitted and honing is not necessary, cylinder bores may be cleaned with a hot water and detergent wash. After cleaning, the cylinder bores should be swabbed several times with light engine oil and a clean cloth and then wiped with a clean dry cloth.

Boring

1. Before using any type boring bar, the top of the cylinder block should be filed off to remove any dirt or burrs. This is very important. If not checked, the boring bar may be tilted which would result in the rebored cylinder wall not being at right angles to the crankshaft.
2. The piston to be fitted should be measured with a micrometer, measuring at the center of the piston skirt and at right angles to the piston pin. The cylinder should be bored to the same diamter as the piston and honed to give the specified clearance.
3. The instructions furnished by the manufacturer of the equipment being used should be carefully followed.

Honing

1. When cylinders are to be honed, follow the hone manufacturer's recommendations for the use of the hone and cleaning and lubrication during honing.
2. Occasionally during the honing operation, the cylinder bore should be thoroughly cleaned and the piston selected for the individual cylinder checked for correct fit.
3. When finished honing a cylinder bore to fit a piston, the hone should be moved up and down at a sufficient speed to obtain very fine uniform surface finish marks, in a cross-hatch pattern of approximately 45° to 65° included angle. The finish marks should be clean but not sharp, free from imbedded particles and torn or folded metal.
4. Permanently mark the piston for the cylinder to which it has been fitted and proceed to hone cylinders and fit the remaining pistons.

   NOTICE: Handle the pistons with care and do not attempt to force them through the cylinder until the cylinder has been honed to correct size as this type piston can be distorted through careless handling.
5. Thoroughly clean the bores with hot water and detergent. Scrub well with a stiff bristle brush and rinse thoroughly with hot water. It is extremely essential that a good cleaning operation be performed. If any of the abrasive material is allowed to remain in the cylinder bores, it will rapidly wear the new rings and cylinder bores in addition to the bearings lubricated by the contaminated oil, the bores should be swabbed and then wiped with a clean dry cloth. Cylinder should not be cleaned with a kerosene or gasoline. Clean the remainder of the cylinder block to remove the excess material spread during the honing operation.

Piston Selection

1. Check USED piston to cylinder bore clearance as follows:
   a. Measure the "Cylinder Bore Diamter" with a telescope gage 2-1/2" (64mm) from the top of cylinder bore.
   b. Measure the "Piston Diameter" (at skirt across center line of piston pin).
   c. Subtract piston diameter from cylinder bore diamter to determine "Piston to Bore Clearance".
2. If used piston is not acceptable, determine if a new piston can fit cylinder bore.
3. If cylinder bore must be reconditioned, measure new piston diameter (across center line of piston pin) then hone cylinder bore to correct clearance.
4. Mark the piston to identify the cylinder for which it was fitted.

ROD ASSEMBLY

If a rod is twisted or bent, a new rod must be installed. NO ATTEMPT SHOULD BE MADE TO STRAIGHTEN CONNECTING RODS.

PISTONS

Clean varnish from piston skirts and pins with a cleaning solvent. DO NOT WIRE BURSH ANY PART OF THE PISTON. Clean the ring grooves with a groove cleaner and make sure oil ring holes and slots are clean.

Inspect the piston for cracked ring lands, skirts or pin bosses, wavy or worn ring lands, scuffed or damaged skirts, eroded areas at top of the piston. Replace pistons that are damaged or show signs of excessive wear.

Inspect the grooves for nicks or burrs that might cause the rings to hang up.

Measure piston skirt (across center line of piston pin) and check clearance.

PISTON PINS

The piston pin is a free floating piston pin. It is important that the piston and rod pin hole be clean and free

ENGINE COOLING SYSTEM COMPLAINT

TO AVOID NEEDLESS TIME AND COST IN DIAGNOSING COOLING SYSTEM COMPLAINTS, THE CUSTOMER SHOULD BE QUESTIONED ABOUT DRIVING CONDITIONS THAT PLACE ABNORMAL LOADS ON THE COOLING SYSTEM.

1. DOES OVERHEATING OCCUR WHILE PULLING A TRAILER?

   IF ANSWER IS "YES" – HOW HEAVY IS TRAILER? IF TRAILER WEIGHT IS GREATER THAN 2,000 LBS. & VEHICLE IS EQUIPPED WITH NORMAL DUTY COOLING SYSTEM, A HEAVY DUTY COOLING PACKAGE IS REQUIRED [PER MFR'S TRAILER HAULING SPECS.]. FURTHER DIAGNOSTIC CHECKS SHOULD NOT BE REQUIRED.

2. IS VEHICLE EQUIPPED WITH ADD–ON OR AFTER MARKET AIR CONDITIONING SYSTEM?

   IF ANSWER IS "YES" – WAS HEAVY DUTY RADIATOR INSTALLED WITH THE SYSTEM? IF NOT, INSTALL HEAVY DUTY AIR CONDITIONING RADIATOR FOR THE CAR MODEL INVOLVED [PER MANUFACTURER'S SPECS.]. FURTHER DIAGNOSTIC CHECKS SHOULD NOT BE REQUIRED.

3. IS OVERHEATING OCCURRING AFTER PROLONGED IDLE, IN GEAR, A/C SYSTEM OPERATING?

   IF ANSWER IS "YES" – INSTRUCT OWNER ON DRIVING TECHNIQUES THAT WOULD AVOID OVERHEATING SUCH AS:
   a. IDLE IN NEUTRAL AS MUCH AS POSSIBLE – INCREASE ENGINE R.P.M. TO GET HIGHER AIR FLOW & WATER FLOW THROUGH RADIATOR.
   b. TURN A/C SYSTEM OFF DURING EXTENDED IDLES IF OVERHEATING IS INDICATED BY HOT LIGHT OR TEMP. GAGE.
   FURTHER DIAGNOSTIC CHECKS SHOULD NOT BE REQUIRED.

4. IS OVERHEATING OCCURRING AFTER PROLONGED DRIVING IN SLOW CITY TRAFFIC, TRAFFIC JAMS, PARADES, ETC.?

   IF ANSWER IS "YES" – INSTRUCT OWNER ON DRIVING TECHNIQUES THAT WOULD AVOID OVERHEATING – SAME AS FOR PROLONGED IDLES – NO. 3. FURTHER DIAGNOSTIC CHECKS SHOULD NOT BE REQUIRED.

IF NONE OF THE ABOVE APPLY, GO TO DIAGNOSTIC CHART

TO EFFECTIVELY USE THIS CHART, QUESTION THE OWNER TO DETERMINE WHICH OF THE FOLLOWING [3] CATEGORIES APPLIES TO THE COMPLAINT:

1. HOT LIGHT OR HOT INDICATION ON TEMPERATURE GAGE
2. BOILING
3. COOLANT LOSS

1. IF COMPLAINT IS HOT LIGHT OR HOT INDICATION ON TEMPERATURE GAGE –

   WAS HOT LIGHT ACCOMPANIED BY BOILING? IF ANSWER IS "YES", GO TO BOILING ON CHART
   IF ANSWER IS "NO", GO TO HOT LIGHT ON CHART

2. IF COMPLAINT IS BOILING – GO TO BOILING ON CHART

3. IF COMPLAINT IS COOLANT LOSS –

   DETERMINE IF CUSTOMER IS OVERFILLING THE SYSTEM, THIS WOULD NORMALLY RESULT IN SMALL AMOUNTS OF COOLANT LOSS THROUGH THE OVERFLOW TUBE. IF THIS IS THE CASE, INSTRUCT THE CUSTOMER ON PROPER FILL LEVEL & NO FURTHER DIAGNOSTIC CHECKS SHOULD BE REQUIRED.

   IF OVERFILLING IS NOT THE PROBLEM, GO TO COOLANT LOSS ON CHART.

NOTICE: ANYTIME COOLING SYSTEM IS OBVIOUSLY CONTAMINATED, THE SYSTEM SHOULD BE DRAINED AND FLUSHED.

CAUTION – THE COOLING SYSTEM IS DESIGNED TO OPERATE AT 15 P.S.I. PRESSURE & TEMPERATURES EXCEEDING 200° F. CAUTION SHOULD BE EXERCISED WHEN REMOVING PRESSURE CAP OR SERVICING THE SYSTEM.

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FUEL SYSTEM DIAGNOSIS CONT'D.

CONDITION	POSSIBLE CAUSE	CORRECTION
Engine Idles Abnormally (Too fast or too slow) (Continued)		Check float for free movement. Check for bent float hanger or binds in the float arm.
		If foreign material is found in the carburetor, clean the fuel system and carburetor. Replace fuel filter as necessary.
	Restricted air cleaner element.	Replace as necessary.
	Idle system plugged or restricted.	Clean carburetor, see Unit Repair.
	Incorrect idle mixture adjustment.	Readjust per specified procedure.
	Throttle blades or linkage sticking and/or binding.	Check throttle linkage and throttle blades (primary and secondary) for smooth and free operation. Correct problem areas.
Engine Diesels (After Run) upon Shut Off	Loose, broken or improperly routed vacuum hoses.	Check condition and routing of all vacuum hoses. Correct as necessary. (Refer to Emission Label)
	Idle speed.	Check per instructions on Emission Label.
	Fast idle cam not fully off.	Check fast idle cam for freedom of operation. Clean, repair, or adjust as required.
		Check choke linkage for binding. Clean and correct as necessary.
	Excessively lean carburetor.	Refer to Mixture Control Adjustments.
	Ignition Timing retarded.	Set to specifications.
Engine Hesitates On Acceleration	Loose, broken or incorrect vacuum hose routing.	Check condition and routing of all vacuum hoses — correct or replace.
	Accelerator pump not adjusted to specification or inoperative.	Adjust accelerator pump, replace.
	Inoperative accelerator pump system.	Remove air horn and check pump cup. If cracked, scored or distorted, replace the pump plunger.

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Fig. 6C-4--Fuel System Diagnosis - 4 of 8

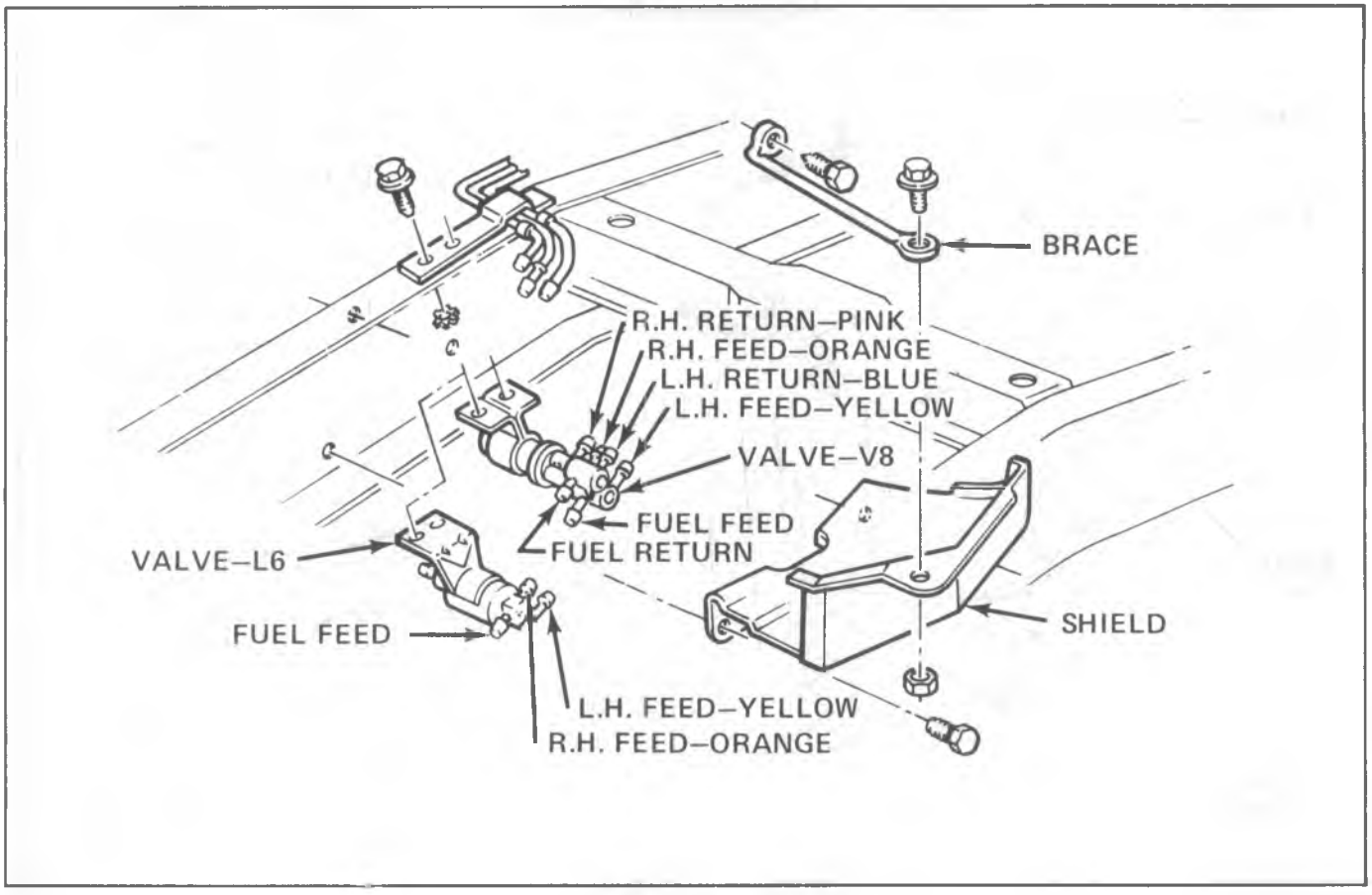


Fig. 6C-27--Selector Valve

FUEL FEED AND VAPOR PIPES

GENERAL DESCRIPTION

Fuel feed pipes are secured to the underbody with clamp and screw assemblies. Flexible hoses are located at fuel tank fuel, vapor and return lines and fuel pump. The pipes should be inspected occasionally for leaks, kinks or dents. If evidence of dirt or foreign material is found in carburetor, fuel pump or pipes, pipe should be disconnected and blown out. Dirt or foreign material may be caused by a damaged or omitted fuel strainer in fuel tank.

ON-VEHICLE SERVICE

Fuel Line Repair

Replacement

1. If replacement of a fuel feed, fuel return or emission pipe is required use welded steel tubing meeting GM Specification 124-M or its equivalent.
2. Do not use copper or aluminum tubing to replace steel tubing. Those materials do not have satisfactory durability to withstand normal vehicle vibrations.
3. When rubber hose is used to replace pipe, use only reinforced fuel resistant hose which meets GM Specification 6165-M. Hose inside diameter must match pipe outside diameter.
4. Do not use rubber hose within 4" (100 mm) of any part of the exhaust system or within 10" (254 mm) of the catalytic converter.
5. In repairable areas, cut a piece of fuel hose 4" (100 mm) longer than portion of the line removed.

   If more than a 6 inch (152 mm) length of pipe is removed, use a combination of steel pipe and hose so that hose lengths will not be more than 10 inches (254 mm).

   Follow the same routing as the original pipe.
6. Cut ends of pipe remaining on car square with a tube cutter. Using the first step of a double flaring tool, form a bead on the end of both pipe sections. If pipe is too corroded to withstand bead operation without damage, the pipe should be replaced. If a new section of pipe is used, form a bead on both ends of it also.
7. Use screw type hose clamp, Part Number 2494772, or equivalent. Slide clamps onto pipe and push hose 2" (51 mm) onto each portion of fuel pipe. Tighten clamps on each side of repair.
8. Pipes must be properly secured to the frame to prevent chafing.

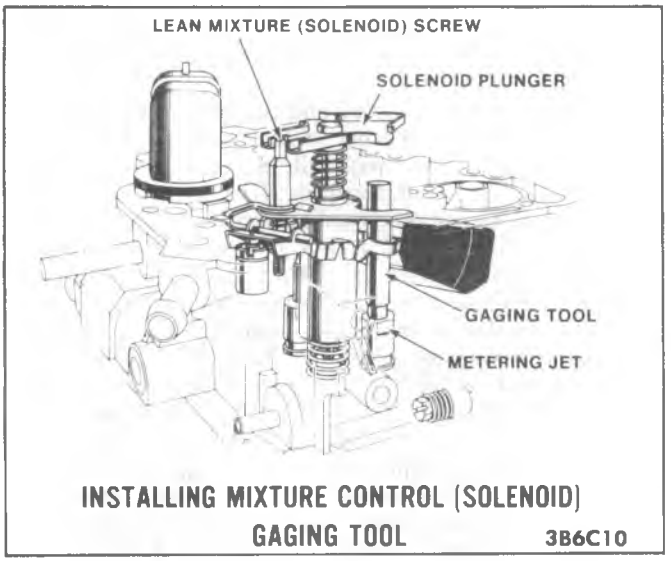


Fig. 6C1-10 Installing Mixture Control Solenoid Gaging Tool

adjustment is correct when the solenoid plunger is contacting BOTH the SOLENOID STOP and the GAGING TOOL.

See Figure 6C1-11

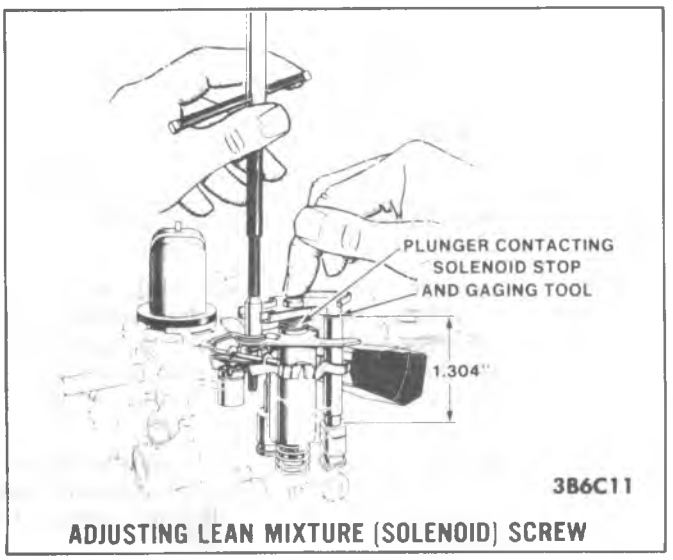


Figure 6C1-11 Adjusting Lean Mixture (Solenoid) Screw

If the total difference in adjustment required less than 3/4 turn of the lean mixture (solenoid) screw, the original setting was within the manufacturer's specifications.

4. Remove solenoid plunger and gaging tool, and reinstall metering rod and plastic filler block.
5. Invert air horn and remove rich mixture stop screw and rich authority adjusting spring from bottom side of air horn, using Tool J-28696-4, BT-7967A or equivalent.

See Figure 6C1-12

6. Remove lean mixture screw plug and the rich mixture stop screw plug from air horn, using a suitably sized punch.

See Figure 6C1-13

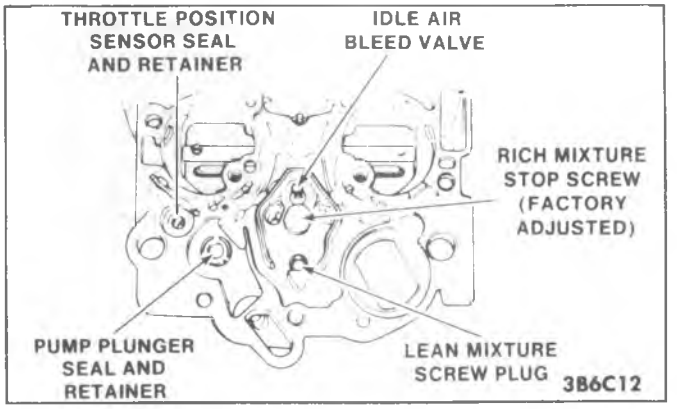


Figure 6C1-12 Removing Rich Mixture Stop Screw

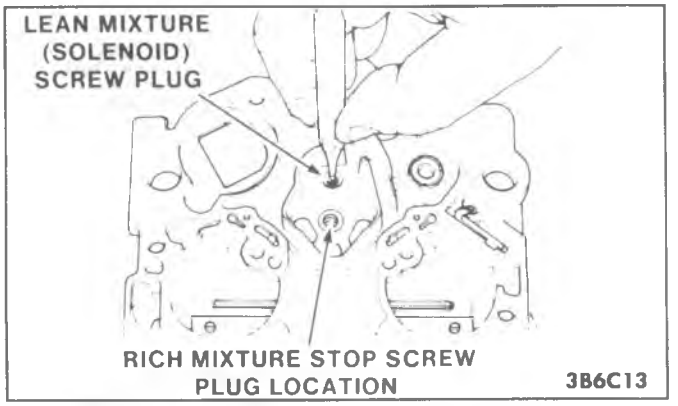


Figure 6C1-13 Removing Lean Mix. Screw & Rich Mix. Stop Screw Plugs

7. Reinstall rich mixture stop screw and rich authority adjusting spring in air horn and bottom lightly, then back screw out 1/4 turn.
8. Reinstall air horn gasket, mixture control solenoid plunger and air horn to carburetor.
9. Insert external float gage in vent hole and, with Tool J-9789-130, BT-7220, or equivalent, adjust rich mixture stop screw to obtain 4/32" total plunger travel.

See Figure 6C1-14

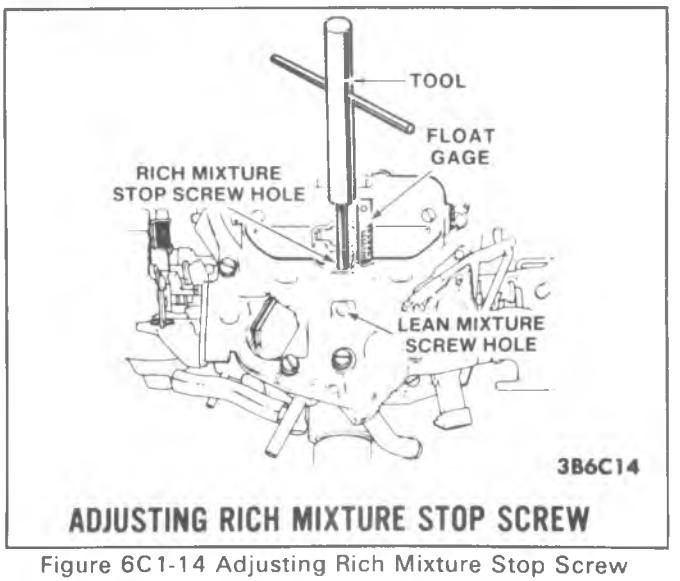
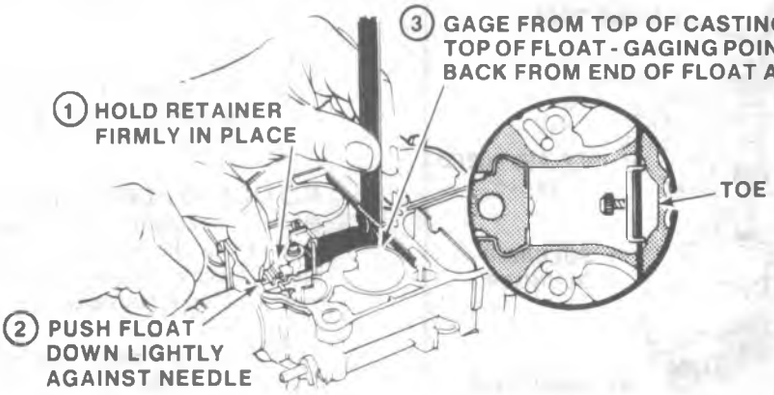


Figure 6C1-14 Adjusting Rich Mixture Stop Screw



4 IF FLOAT LEVEL VARIES OVER ±1/16" FROM SPECIFICATIONS,
FOR LEVEL TOO HIGH, HOLD RETAINER IN PLACE AND PUSH DOWN ON CENTER OF FLOAT PONTOON TO OBTAIN CORRECT SETTING.
FOR LEVEL TOO LOW,

A IF M4M OR M2M CARBURETOR, REMOVE POWER PISTON, METERING RODS, PLASTIC FILLER BLOCK. REMOVE FLOAT, BEND FLOAT ARM UPWARD TO ADJUST. REINSTALL PARTS. VISUALLY CHECK FLOAT ALIGNMENT.

B IF E4M OR E2M REMOVE METERING RODS, SOLENOID CONNECTOR SCREW. COUNT. AND RECORD FOR REASSEMBLY, THE NUMBER OF TURNS NEEDED TO LIGHTLY BOTTOM LEAN MIXTURE SCREW. BACK OUT AND REMOVE SCREW, SOLENOID, CONNECTOR. REMOVE FLOAT AND FLOAT ARM UPWARD TO ADJUST. REINSTALL PARTS, RESET LEAN MIXTURE SCREW. VISUALLY CHECK FLOAT ALIGNMENT.

FLOAT ADJUSTMENT 3B6C45

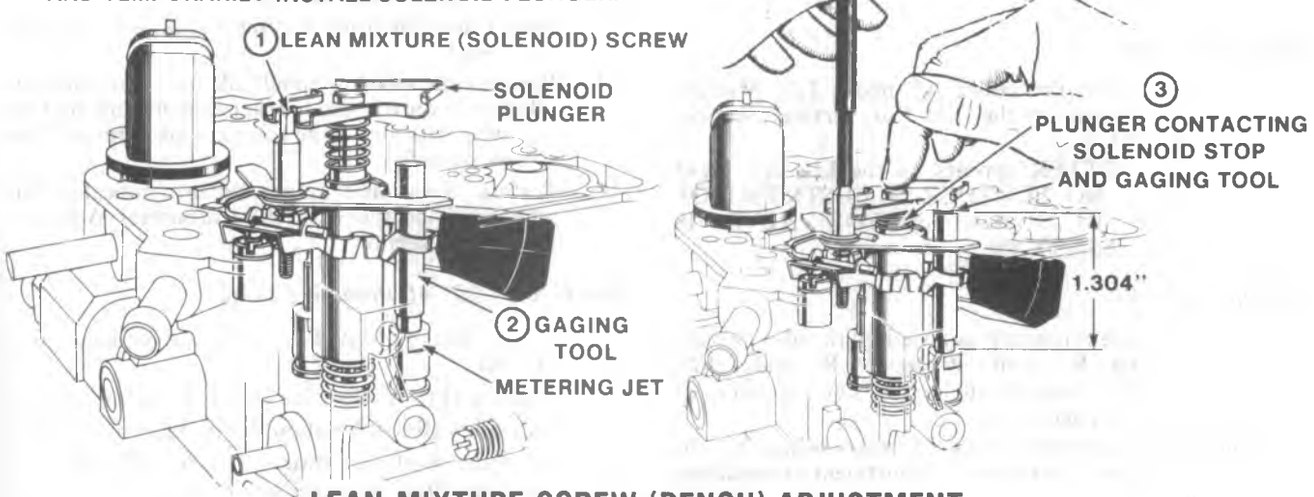
Figure 6C1-45 Float Adjustment

SEE VEHICLE MANUFACTURER'S SERVICE MANUAL, SECTION 6C, FOR "ON-VEHICLE" MIXTURE CONTROL ADJUSTMENT PROCEDURES.

1 LEAN MIXTURE (SOLENOID) SCREW SHOULD HAVE FIRST SIX THREADS ENGAGED IN FLOAT BOWL TO ASSURE PROPER INSTALLATION.

2 INSTALL MIXTURE CONTROL SOLENOID GAGING TOOL, J-33815-1, BT-8253-A, OR EQUIVALENT, OVER THE THROTTLE SIDE METERING JET ROD GUIDE, AND TEMPORARILY INSTALL SOLENOID PLUNGER.

3 HOLDING THE SOLENOID PLUNGER AGAINST THE SOLENOID STOP, USE TOOL J-28696-10, BT-7928, OR EQUIVALENT, TO TURN THE LEAN MIXTURE (SOLENOID) SCREW SLOWLY CLOCKWISE, UNTIL THE SOLENOID PLUNGER JUST CONTACTS THE GAGING TOOL.



LEAN MIXTURE SCREW (BENCH) ADJUSTMENT
E2M & E4M MODELS ONLY 3B6C46

Figure 6C1-46 Lean Mixture (Solenoid) Screw Bench Adjustment

6. Install new gasket on inlet fitting nut and install nut in carburetor and tighten to 24 N·m (18 ft. lbs.).
7. Install fuel line and tighten connector to 24 N·m (18 ft.lbs.) while holding fuel inlet fitting with wrench.
8. Run engine and observe for leaks.

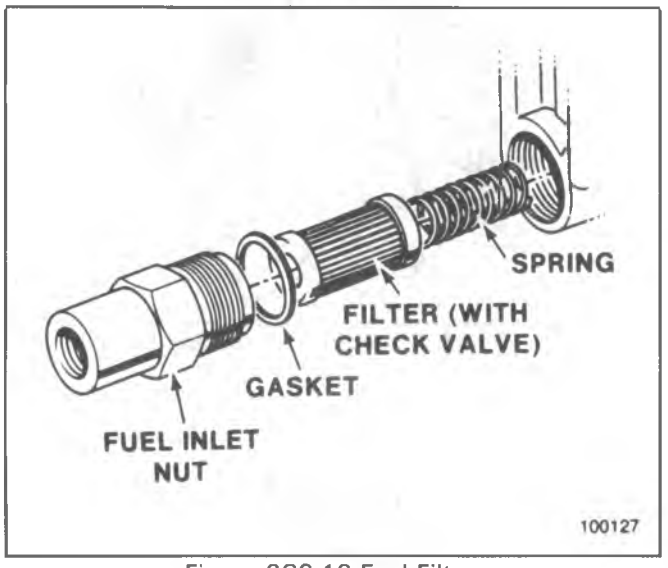


Figure 6C3-10 Fuel Filter

CHOKE AND HOSES

Check choke mechanism and vacuum break for proper operation at the recommended maintenance intervals. Any binding condition which may have developed due to petroleum gum formation on the choke shaft or from damage should be corrected. Check carburetor hoses for proper connection, cracking, abrasion or deterioration and correct or replace as necessary.

Choke Check Procedure

1. Remove air cleaner. With engine off, hold throttle half open. Open and close choke several times. Watch linkage to be certain all links ar connected and there are no signs of damage.
2. If choke or linkage binds, sticks or works sluggishly, clean with Delco Choke Cleaner X-20-A or equivalent. Use cleaner as directed on can. If cleaning does not correct, replace binding parts.
3. Visually inspect carburetor to be certain all vacuum hoses are connected. Inspect hoses for cracks, abrasion, hardness or signs of deterioration. Replace or correct as necessary.
4. Make sure vacuum break diaphragm plunger are fully extended when engine is off. If shafts are not fully extended, replace vacuum break assembly. Start engine, primary vacuum break diaphragm shaft should fully retract. If unit fails to retract, replace vacuum break assembly.

Checking Electric Choke

If the electric choke fails, the following checks should be made:

1. Check voltage at the choke heater connection with the engine running. If voltage is between 12 and 15 volts, replace the electric choke unit.
2. If the voltage is low or zero, check all wires and connections.
3. If steps 1 and 2 are OK, check the following:
   - Gage equipped vehicles - See Section 8 for Choke Heater Circuit Diagnosis.
   - Non-gage equipped vehicles - if the connection at the oil pressure switch is faulty, the temperature/pressure warning light will be off with the ignition key "on" and the engine not running. Repair wires as required. If choke is still inoperative, replace oil pressure switch.

Choke Coil Replacement

1. Remove air cleaner and disconnect choke electrical connector.
2. Align a 4mm (5/32") drill on rivet head and drill only enough to remove rivet head (Figure 6C3-11). After removing rivet heads and retainers, use a drift and small hammer to drive the remainder of the rivet from the choke housing. Use care in drilling to prevent damage to the choke cover or housing. Remove the three retainers and choke cover assembly from choke housing.
3. Remove choke coil from housing.
4. Install the choke cover and coil assembly in choke housing as follows:

   Install the choke cover and coil assembly in the choke housing, aligning notch in cover with raised casting projection on housing cover flange. Make sure coil pickup tank engages the inside choke coil lever.

   A choke cover retainer kit is required to attach the choke cover to the choke housing. Install proper retainers and rivets contained in kit using a suitable blind rivet installing tool.
5. Connect choke electrical connector.
6. Start engine, check operation of choke and then install air cleaner.

SECONDARY VACUUM BREAK THERMAL VACUUM SWITCH (TVS)

The secondary vacuum break TVS, located in the air cleaner, improves cold starting and cold driveability by sensing carburetor air inlet temperature to control the carburetor secondary vacuum break.

Replacement

1. Remove air cleaner cover and element.
2. Disconnect vacuum hoses.
3. Remove clip from TVS and remove TVS.
4. Install new TVS and replace clip.
5. Reconnect vacuum hoses (refer to Vehicle Emission Control Information Label).
6. Install air cleaner cover and element.

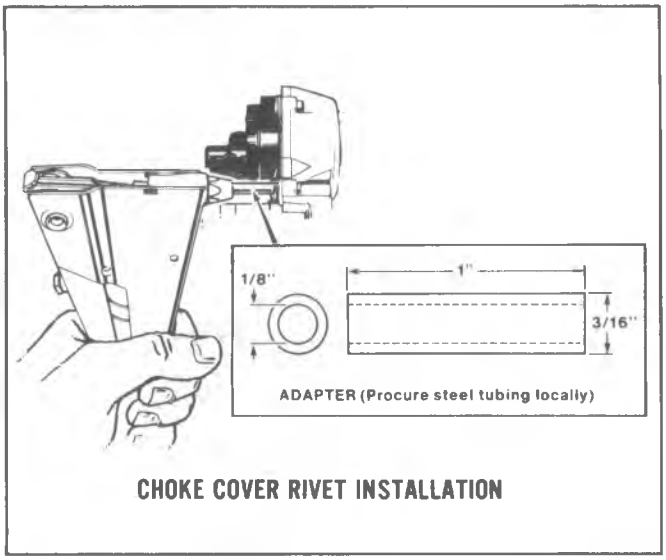


Figure 6C3-46 Choke Cover Installation

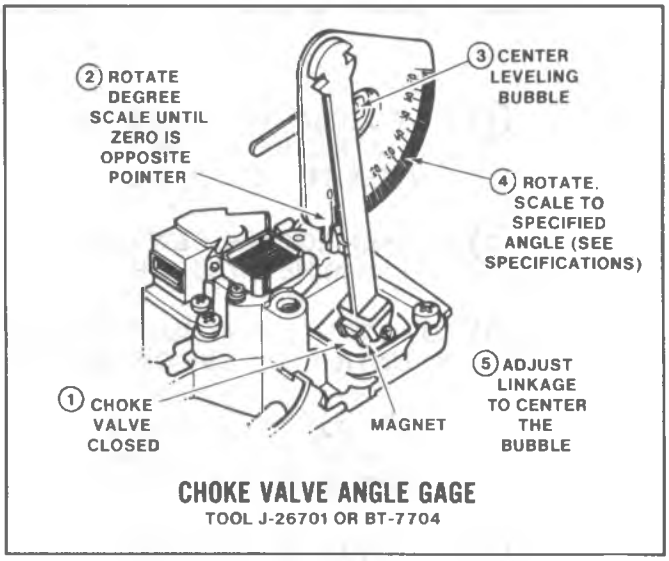
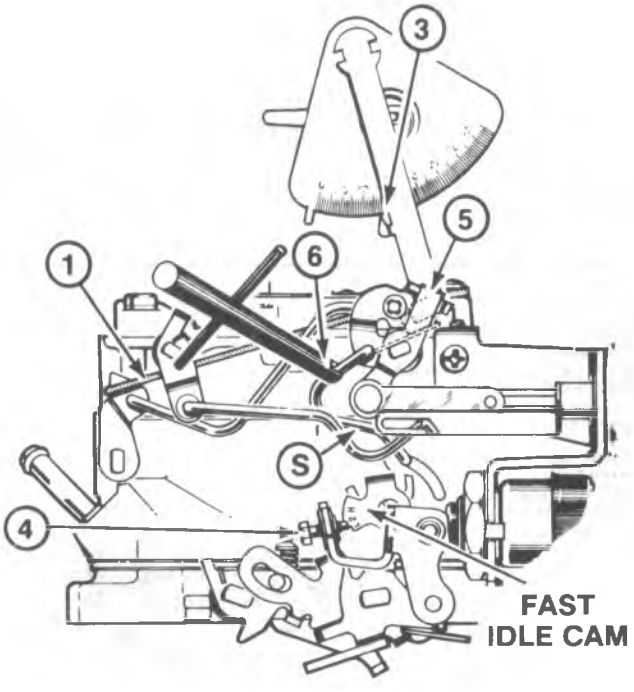


Figure 6C3-47 Choke Valve Angle Gage

1. ATTACH RUBBER BAND TO INTERMEDIATE CHOKE LEVER.
2. OPEN THROTTLE TO ALLOW CHOKE VALVE TO CLOSE.
3. SET UP ANGLE GAGE AND SET ANGLE TO SPECIFICATIONS.
4. PLACE FAST IDLE SCREW ON SECOND STEP OF CAM AGAINST RISE OF HIGH STEP.
5. PUSH ON CHOKE SHAFT LEVER TO OPEN CHOKE VALVE AND TO MAKE CONTACT WITH BLACK CLOSING TANG.
6. SUPPORT AT "S" AND ADJUST BY BENDING FAST IDLE CAM LINK UNTIL BUBBLE IS CENTERED.



CHOKE LINK - FAST IDLE CAM ADJUSTMENT

Figure 6C3-48 Choke Link-Fast Idle Cam Adjustment

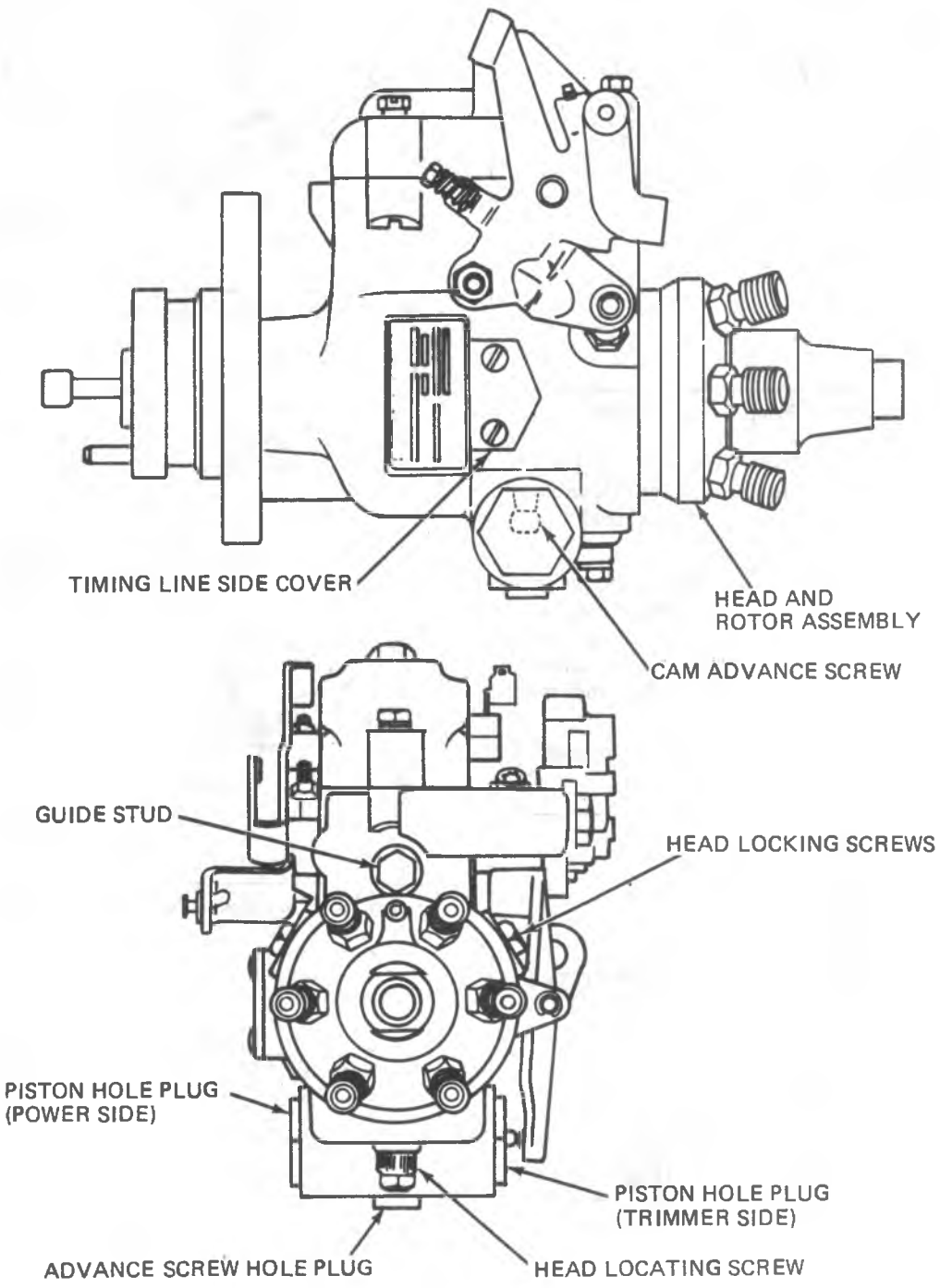
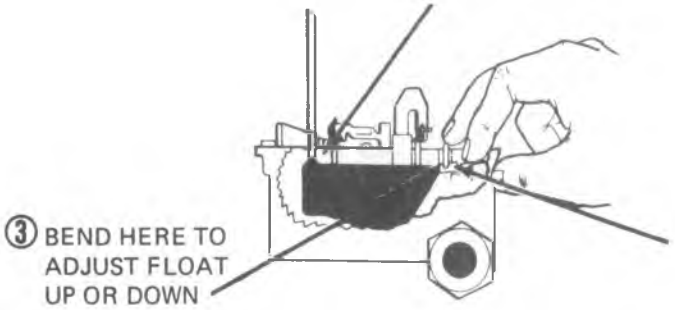
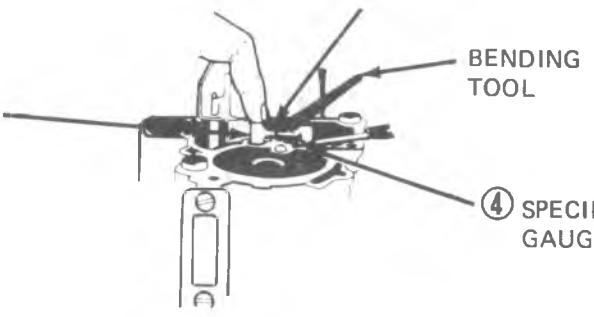


Fig. 6C6-19--Injection Pump Components Location

FLOAT LEVEL ADJUSTMENT



METERING ROD ADJUSTMENT



CHOKE COIL LEVER ADJUSTMENT – 1ME

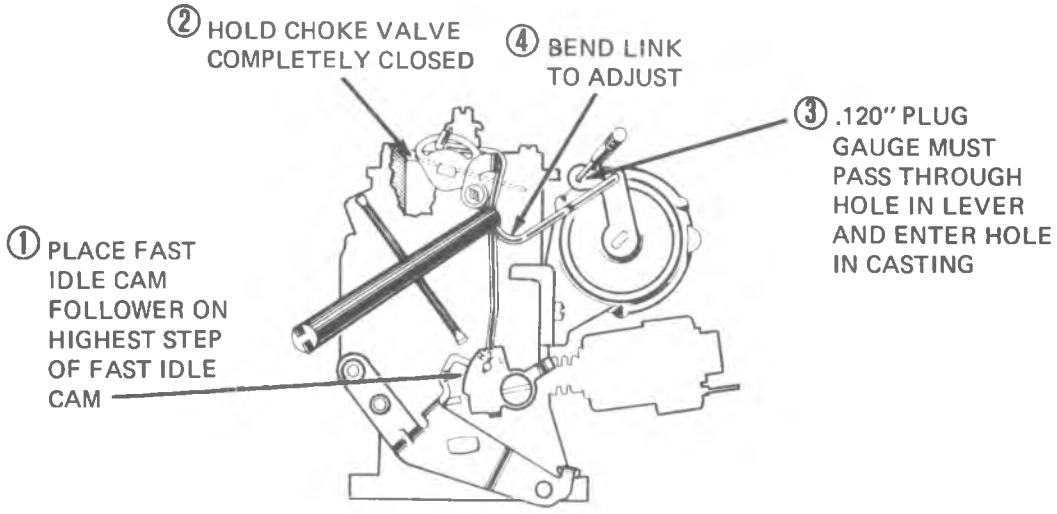


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Fig. 6C7-29--1ME Adjustments (1 of 2)

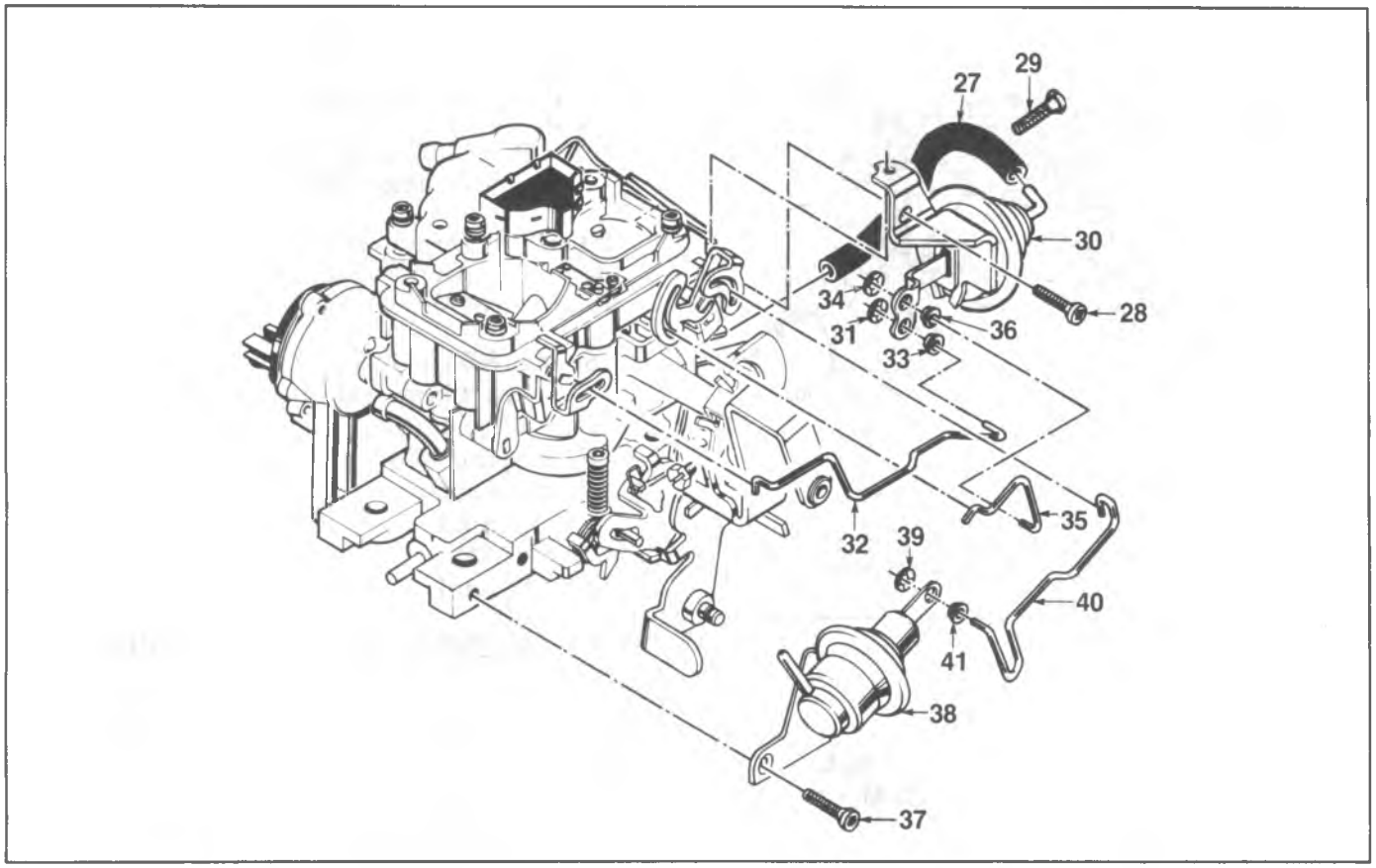


Figure 6C9-18 Vacuum Breaks and Links

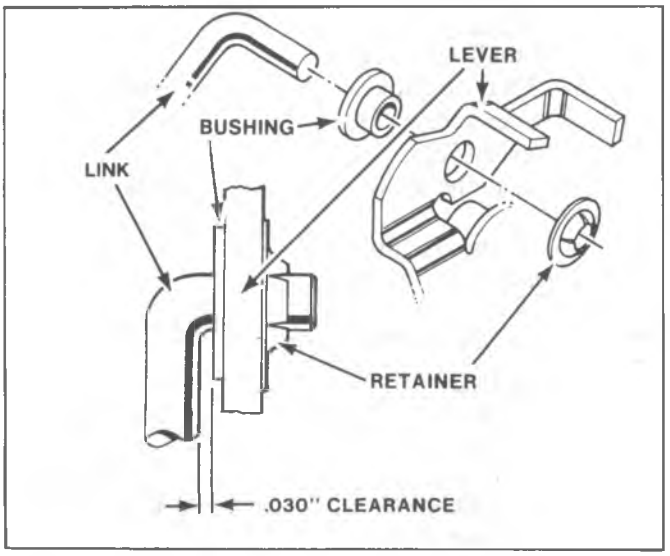


Figure 6C9-19 Choke Linkage

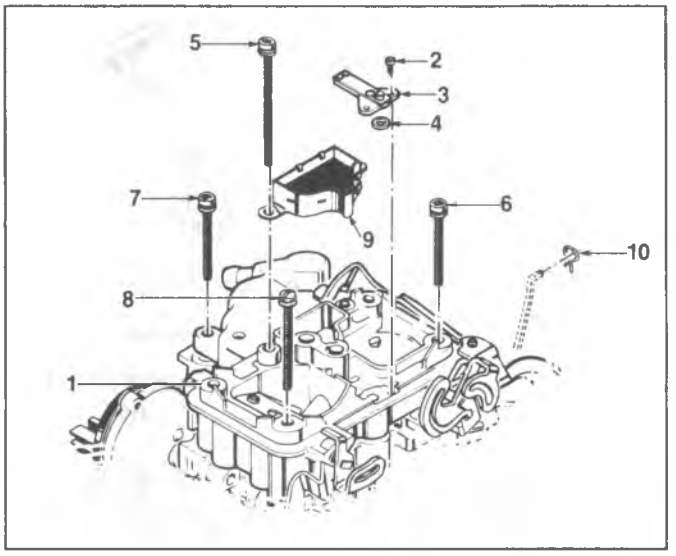


Figure 6C9-20 Air Horn

5 Lower insert (74), if used.

6. Needle seat (72C), and gasket (72D).

- Power piston (75A or 75B) and metering rod assembly (76).
  - Do not use pliers.
  - Repeatedly press piston down and allow it to snap free.

Disassemble (Figure 6C9-27)

If necessary to remove metering rod (76) from power piston hanger (75A or 75B), compress spring on top of metering rod, and line up groove of rod with slot in hanger. Avoid damage to tip.

Important

Power piston (75B) includes an adjustable metering rod hanger to calibrate part throttle (APT) metering. Do not remove nor change position of the hanger. Fuel metering may be seriously affected.

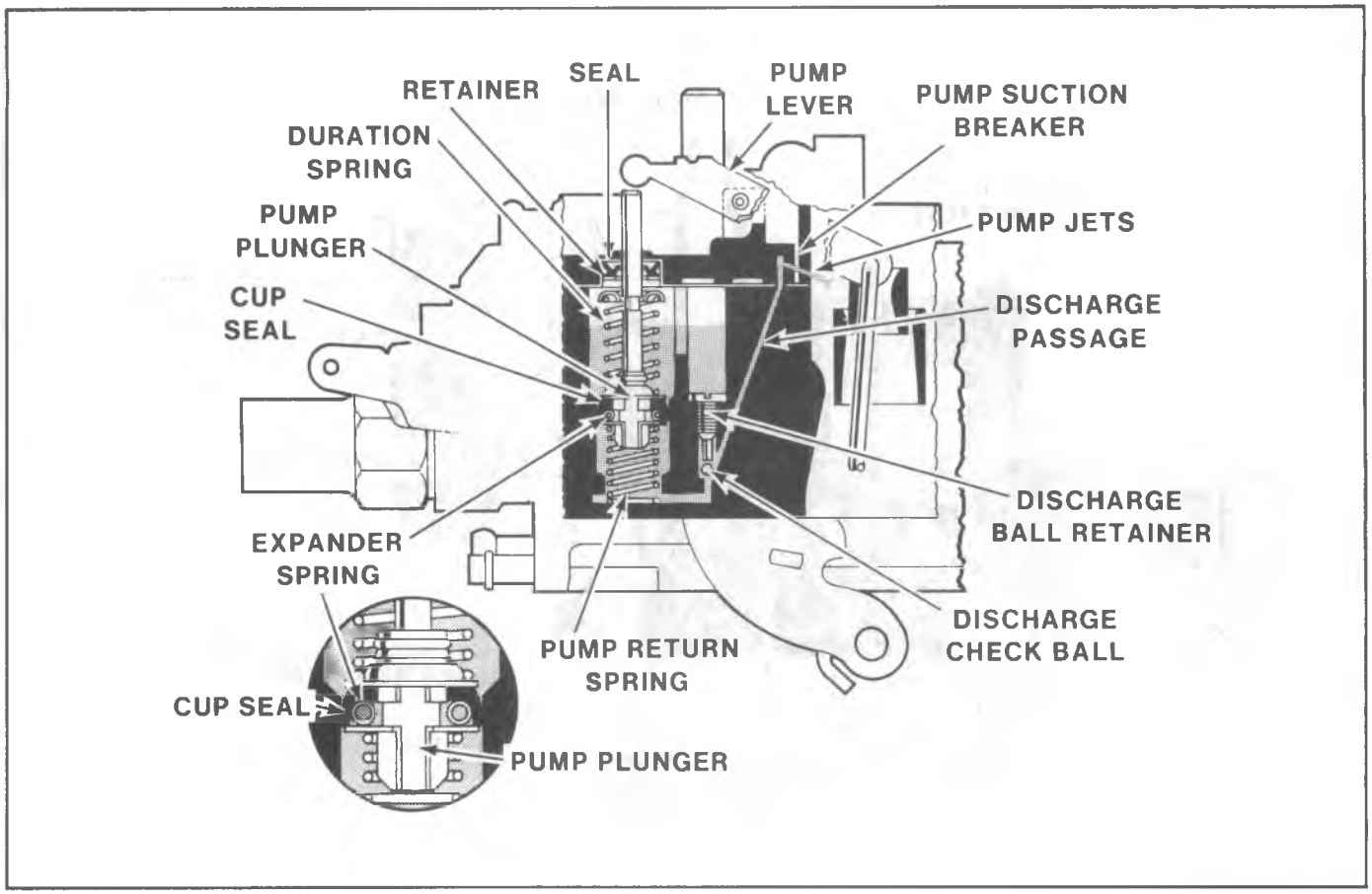


Fig. 6C10-5--Pump System

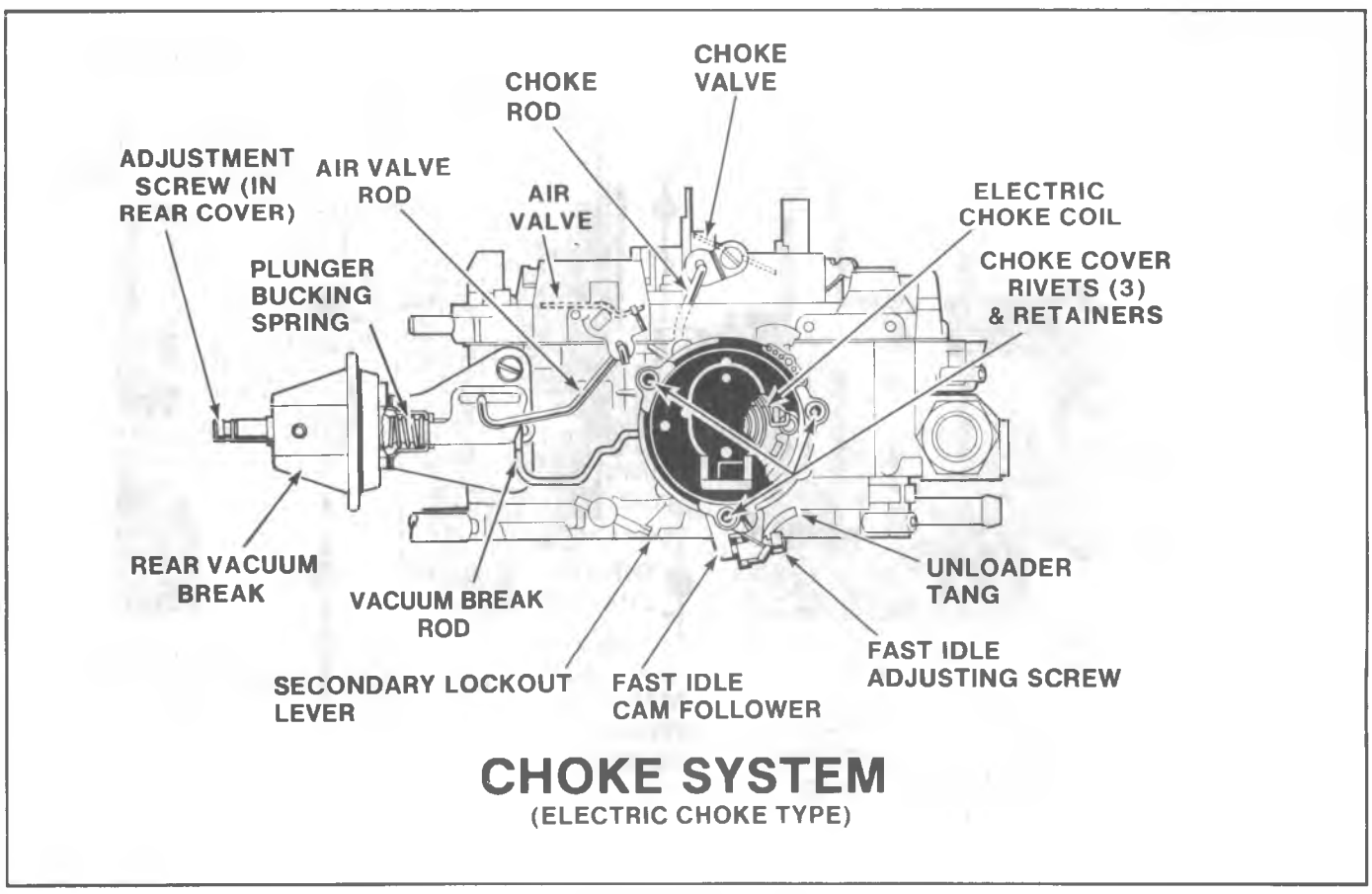


Fig. 6C10-6--Choke System - M4ME (with Rear Vacuum Break)

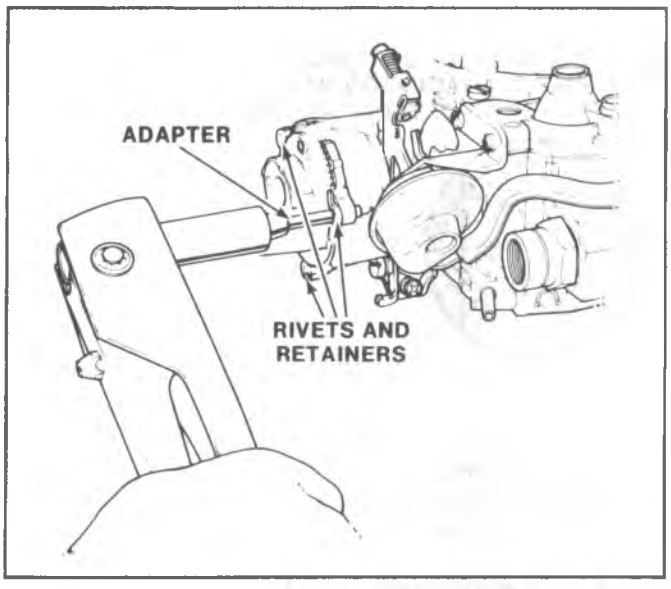


Fig. 6C10-30--Installing Choke Cover Rivets

Do not force the air horn assembly onto the bowl but rather lightly lower in place.

2. Install eleven (or seven) air horn attaching screws and lockwashers; and two countersunk screws (Nos. 1 2) located next to the carburetor venturi area. If used, install secondary air baffle deflector under air horn screws **3 and 4. Tighten all screws evenly and securely following air horn screw tightening sequence (Fig. 6C10-22).**
3. On models using a single rear vacuum break, install air valve rod in air valve lever. Install end of air valve rod and vacuum break link in slots in vacuum break plunger. Install vacuum break and bracket assembly on float bowl using too large countersunk attaching screws. Tighten screws securely. If vacuum break adjustment is necessary, see adjustment.procedure (Fig. 6C10-39).
4. On models using a front vacuum break, install air valve rod into slot in air valve lever. Install the other end of rod in hole in front vacuum break diaphragm plunger. Install vacuum break on air horn using two attaching screws. Tighten screws securely. If vacuum break adjustment is necessary, see adjustment. procedure (Fig. 6C10-38).
5. Connect upper end of pump rod to pump lever by placing rod in specified hole in lever, noted at disassembly. Align hole in pump lever with hole in air horn casting using J-25322 or equivalent. Using screwdriver, push pump lever roll pin back through casting until end of pin is flush with casting bosses in air horn.

   Use care installing the roll pin to prevent damage to pump lever bearing surface and casting bosses.
6. Install two secondary metering rods into the secondary metering rod hanger (upper end of rods point toward each other). Install secondary metering rod hanger, with rods, onto air valve cam follower. Install retaining screw and tighten securely. Work air valves up and down several times to make sure they move free in all positions.
7. Connect choke rod into lower choke lever inside bowl cavity. Install choke rod into slot in upper choke lever and position lever on end of choke shaft. Install retaining screw and tighten securely. When properly installed, the lever will point to the rear of the carburetor and the number on the lever will face outward.
8. Perform adjustments indicated below, which will be found in the carburetor adjustment section:

   Air Valve Spring Adjustment, Figure 6C10-33.

   Choke Coil Lever Adjustment, Figure 6C10-34.
9. Install the cover and coil assembly in the choke housing:

   a. Place cam follower on hightest step of fast idle cam.

   b. Install the thermostatic cover and coil assembly, and gasket (if used), in the choke housing, making sure coil tang engages the inside coil pick-up lever.

   NOTICE: On M4ME models, ground contact for the electric choke is provided by a metal plate located at the rear of the choke cover assembly. Do not install a choke cover gasket between the electric choke assembly and the choke housing.

   c. A choke cover retainer kit is required to attach the choke cover to the choke housing. Follow instructions contained in kit and install proper retainers and rivets using suitable blind rivet installing tool (Fig. 6C10-30).

   d. It may be necessary to use an adapter (tube) if the installing tool interferes with the electrical connector tower on the choke cover, (Figure 6C10-30).

   e. On hot air choke models, torque the choke heat pipe nut to 10 N·m (95 in. lbs.).
10. Install hose on front vacuum break and on tube on float bowl.
11. If used, position ISS or similar throttle actuating device and/or bracket assembly on float bowl, retaining with two large countersunk screws. Tighten screws securely.
12. Perform the remaining unit repair adjustments (Figs. 6C10-31 through 6C10-42).
13. Reinstall carburetor on vehicle with new insulator referring to On-Vehicle Service for installation and idle speed adjustment.

UNIT REPAIR ADJUSTMENTS

The carburetor adjustments that are part of Unit Repair, in most cases, may be performed on the vehicle.

- Float Adjustment (Fig. 6C10-31)
- Pump Adjustment (Fig. 6C10-32)
- Air Valve Spring Adjustment (Fig. 6C10-33)
- Choke Coil Lever Adjustment (Fig. 6C10-34)
- Choke Valve Angle Gage (Fig. 6C10-35)
- Choke Rod-Fast Idle Cam Adjustment (Fig. 6C10-36)
- Vacuum Break Adjustment Information (Fig. 6C10-37)
- Front (Primary) Vacuum Break Adjustment (Fig. 6C10-38)
- Rear (Auxiliary) Vacuum Break Adjustment (Fig. 6C10-39)
- Air Valve Rod Adjustment - Front (Fig. 6C10-40)

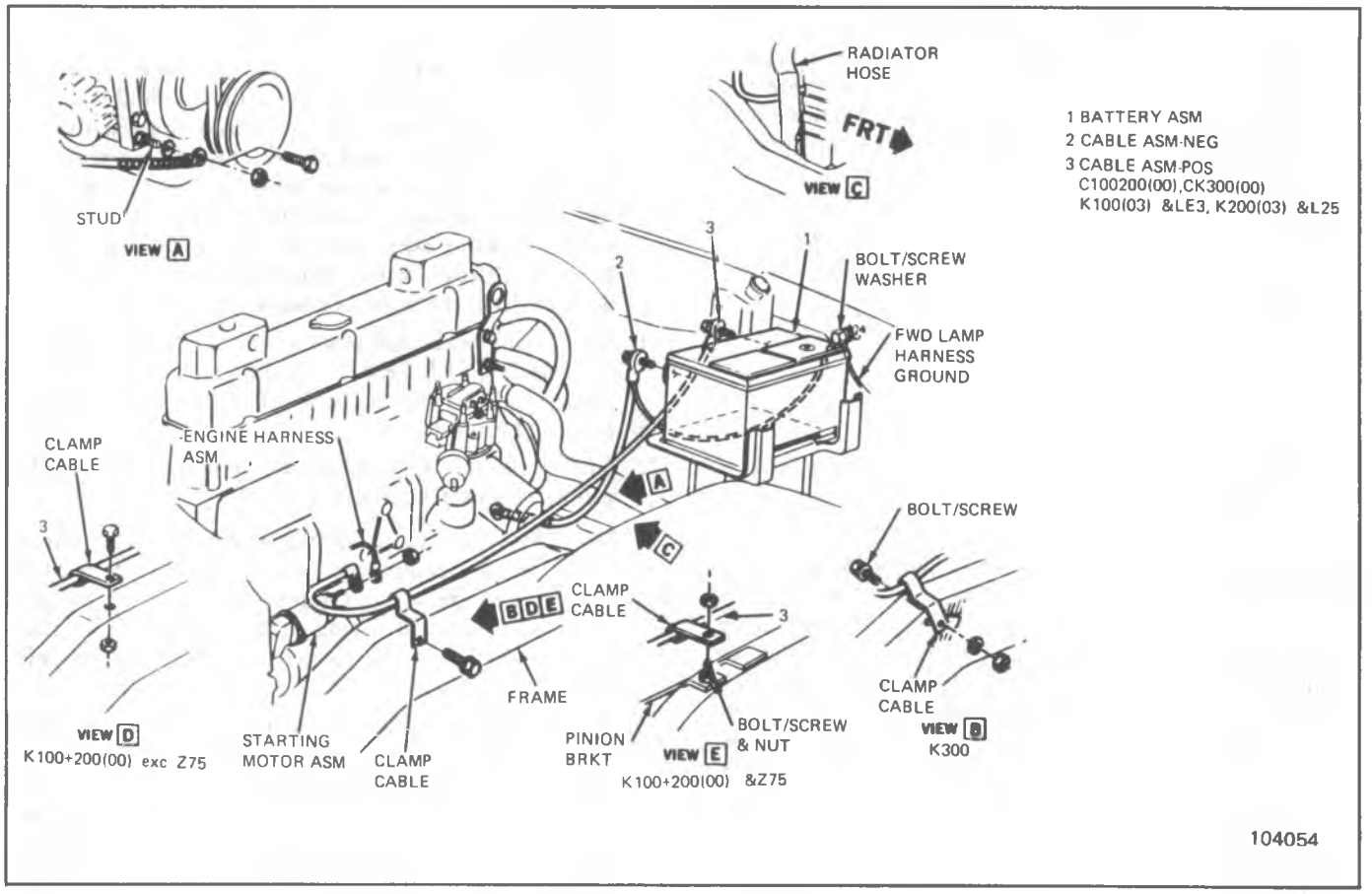


Fig. 6D-8--Battery Cables CK LE2/125

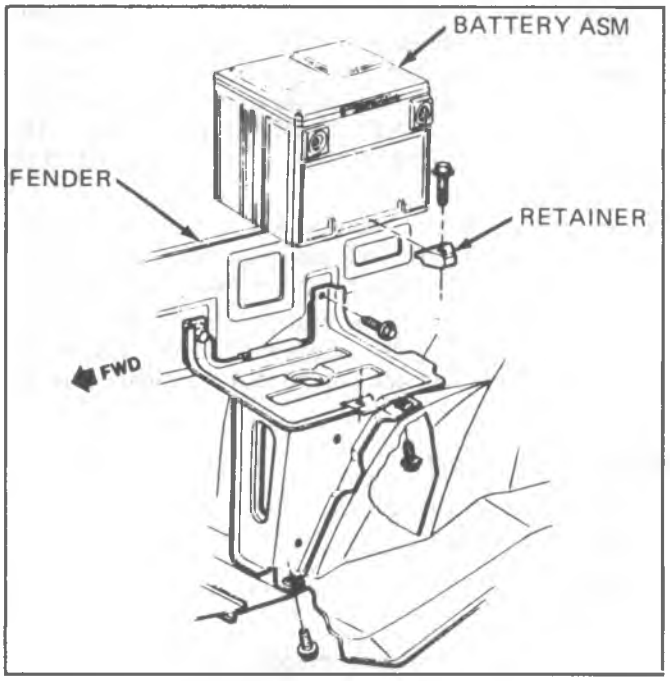


Fig. 6D-7--Battery Mounting-CK Truck

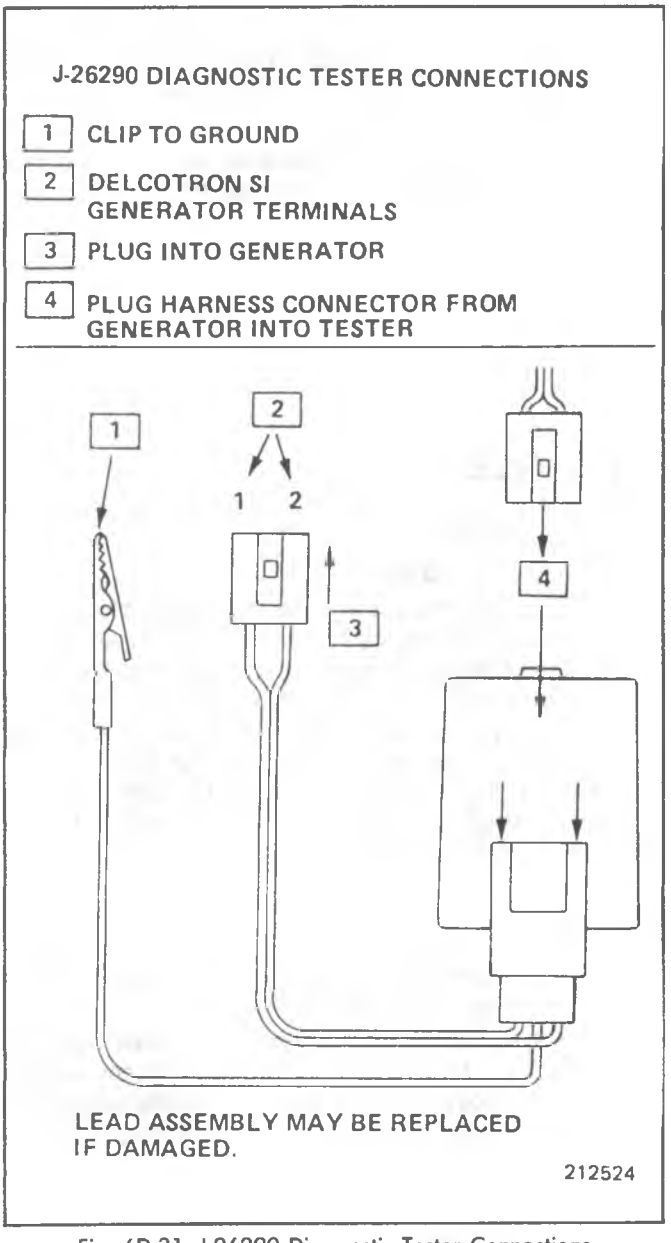


Fig. 6D-31--J-26290 Diagnostic Tester Connections

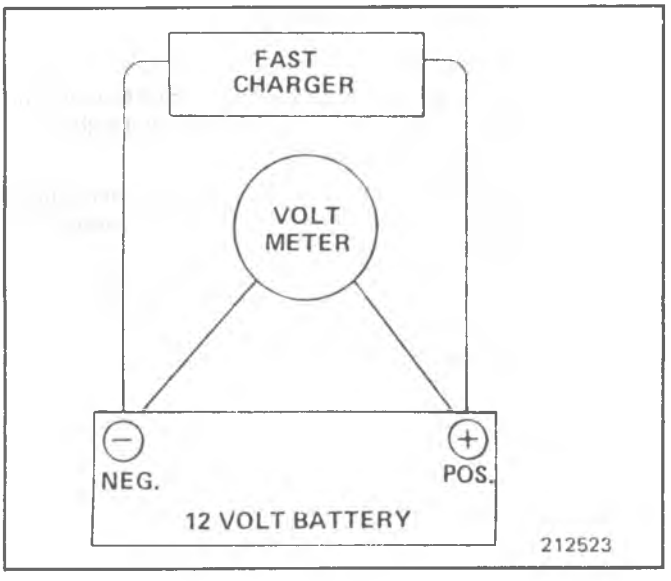


Fig. 6D-32--On Car Voltage Regulator Test

defective, replace rotor, and test regulator with an approved regulator tester.

Generator Tester - many testers are available to check the generator. They provide a quick on-car test, and can save time over conventional diagnostic methods. Consult manufacturer's instructions for usage.

GENERATOR DIAGNOSTIC TESTER INDICATIONS (TOOL J-26290)

This tester is designed as a quick check to determine if the generator should be removed from the vehicle. It will indicate about 98% of charging system faults.

Be certain engine is at fast idle when using tester in Part 2.

Connect tester as shown in Fig. 6D-31.

1. Engine Off: (Lights and Accessories Off)
   a. Light flashes--Skip Steps b and c and go to Part 2.
   b. Light on--Indicates fault in tester which should be replaced.
   c. Light off-Pull plug from generator:
      (1) Flashing light--indicates that the generator should be removed and the rectifier bridge replaced.
      (2) Light off-indicates faulty tester or no voltage to tester. Check for 12-volts at #2 terminal of harness connector. Repair wiring or terminals if 12-volts is not available. Replace tester if 12-volts is available.
2. Engine at Fast Idle: (Lights and Accessories Off)

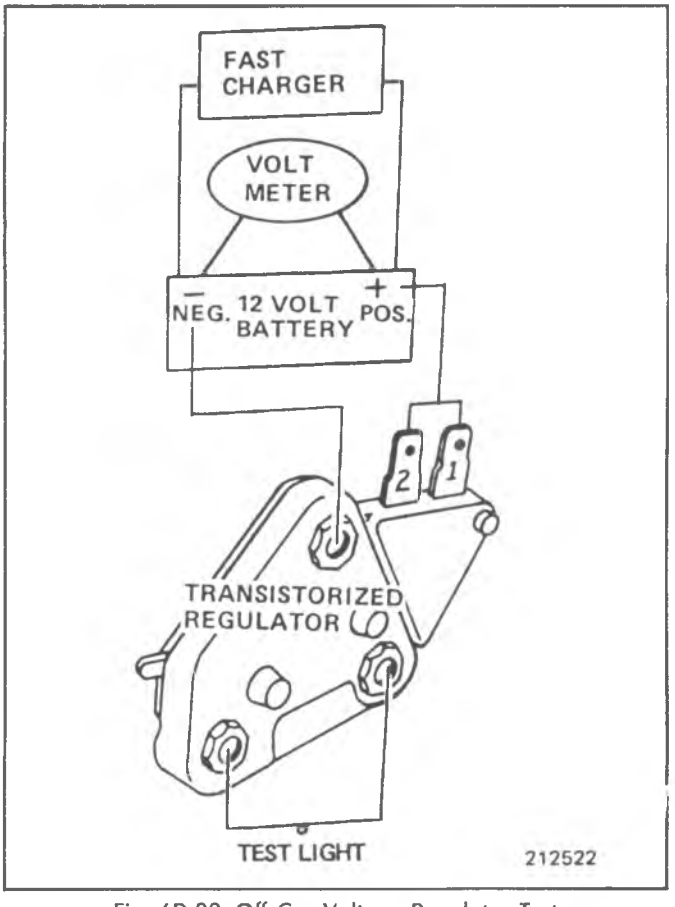


Fig. 6D-33--Off Car Voltage Regulator Test

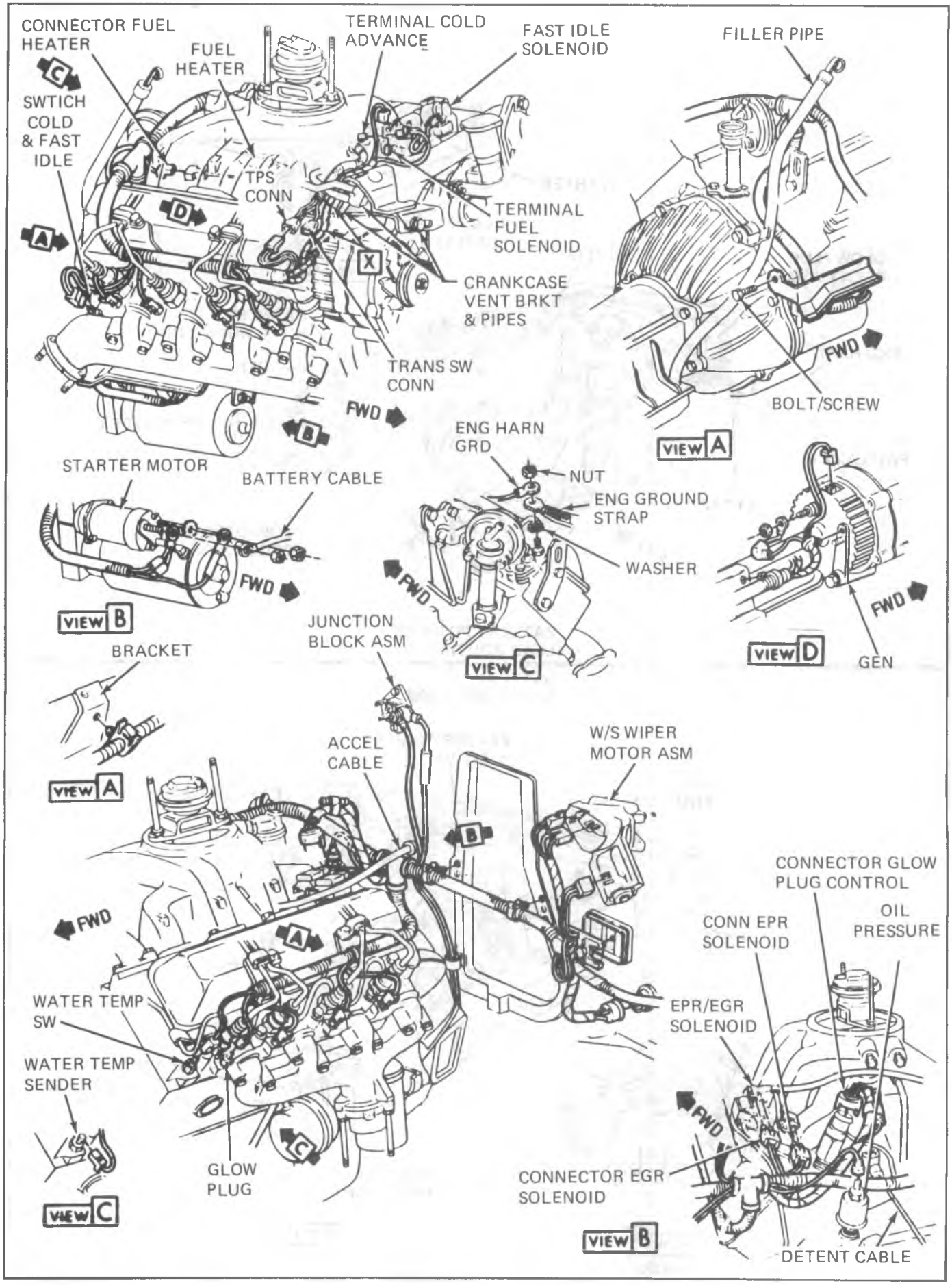
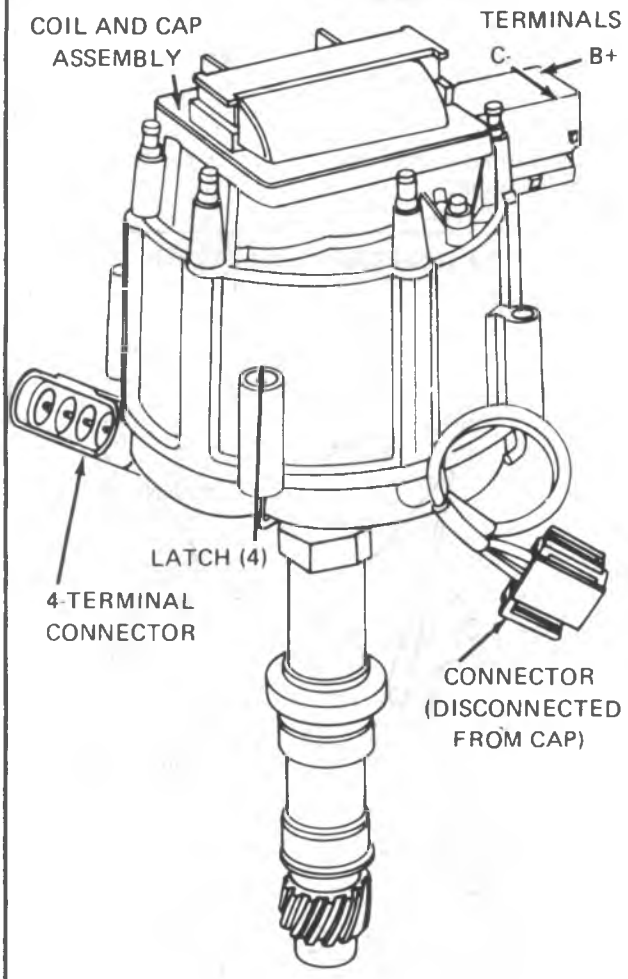


Fig. 6D-47--Engine Compartment Wiring-LH6

Unit Repair

DISTRIBUTOR DISASSEMBLY TEST AND REASSEMBLY (COIL IN CAP)

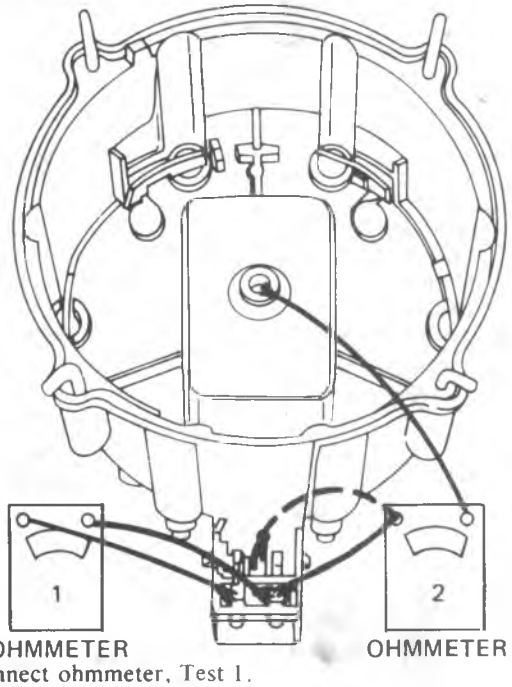
"COIL IN CAP" DISTRIBUTOR



1. A 6-cyl. EST distributor with coil-in-cap is illustrated.
2. Detach wiring connector from cap, as shown.
3. Turn four latches and remove cap and coil assembly from lower housing.

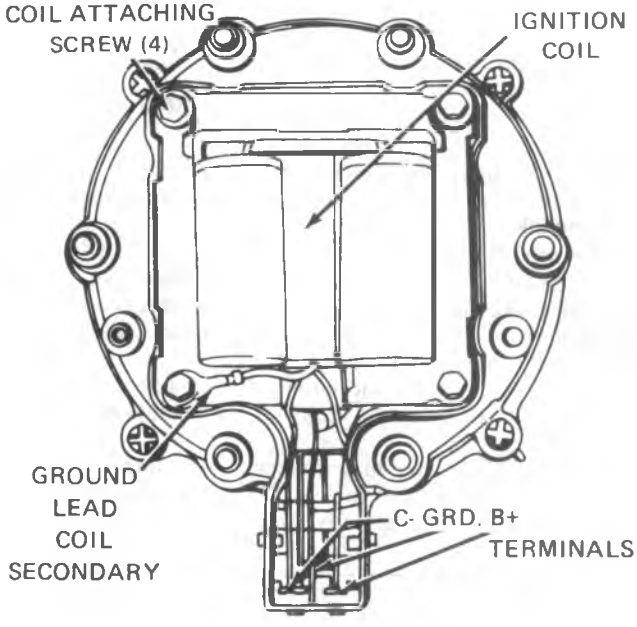
210847

TESTING IGNITION COIL



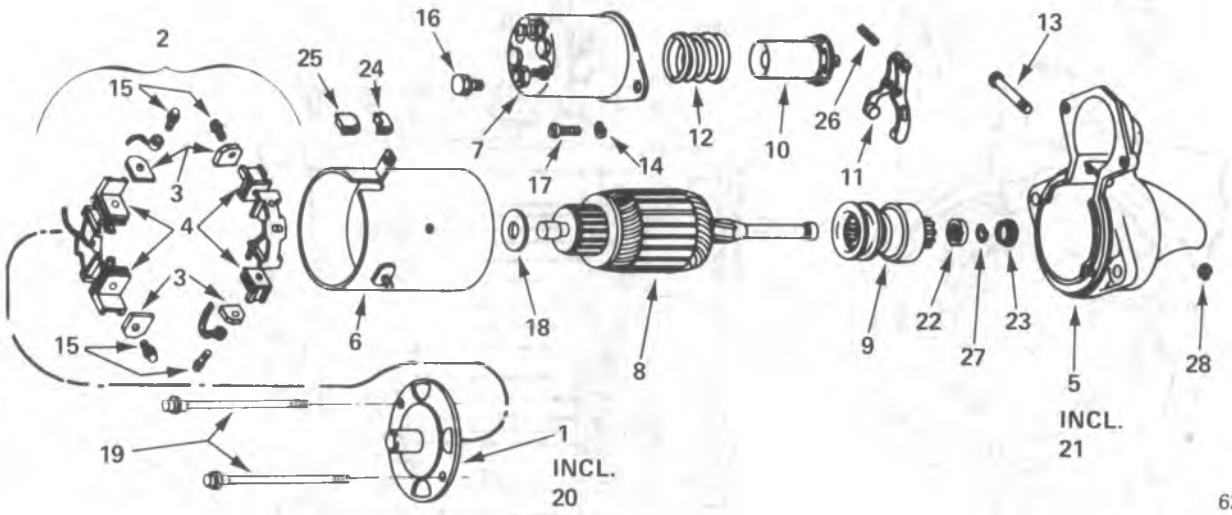
4. Connect ohmmeter, Test 1.
5. Reading should be zero, or nearly zero. If not, replace coil, Step 8.
6. Connect ohmmeter both ways, Test 2. Use high scale. Replace coil only if both readings are infinite, Step 8.
7. If coil is good, go to Step 13.

IGNITION COIL ATTACHING SCREWS



8. Remove coil-cover attaching screws and lift off cover.

Fig. 6D-61--Distributor Unit Repair

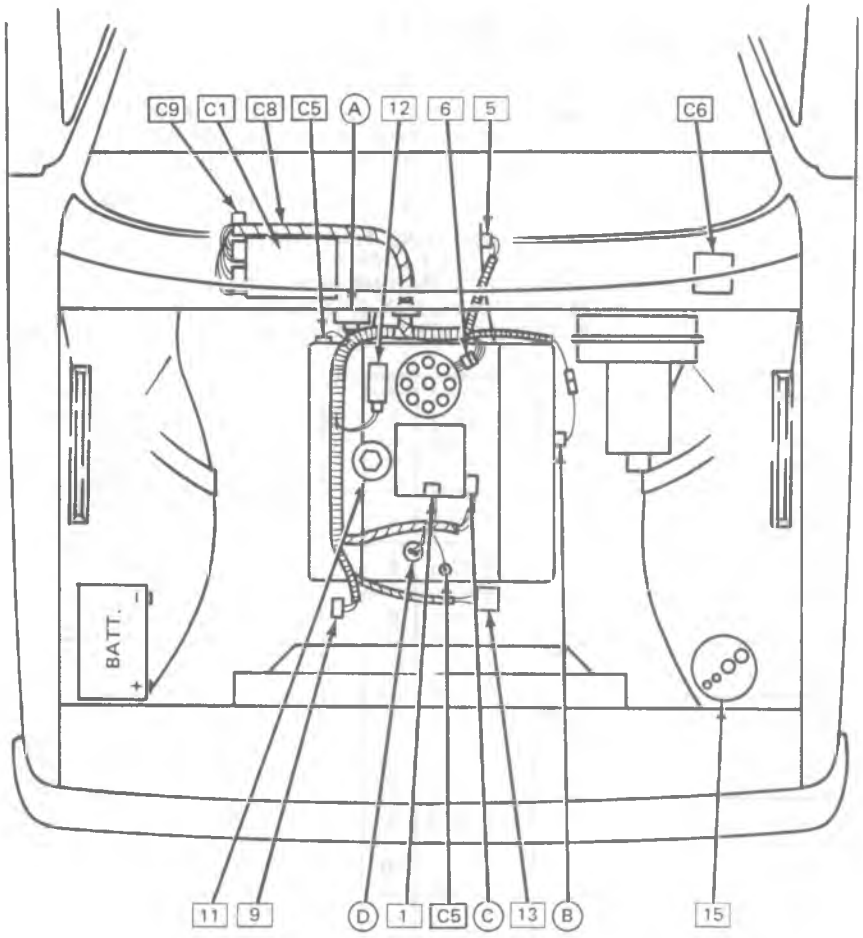


1. FRAME–COMMUTATOR END	10. PLUNGER	19. THRU BOLT
2. BRUSH AND HOLDER PKG.	11. SHIFT LEVER	20. BUSHING–COMMUTATOR END
3. BRUSH	12. PLUNGER RETURN SPRINGER	21. BUSHING–DRIVE END
4. BRUSH HOLDER	13. SHIFT LEVER SHAFT	22. PINION STOP COLLAR
5. HOUSING–DRIVE END	14. LOCK WASHER	23. THRUST COLLAR
6. FRAME AND FIELD ASM.	15. SCREW–BRUSH ATTACHING	24. GROMMET
7. SOLENOID SWITCH	16. SCREW–FIELD LEAD TO SWITCH	25. GROMMET
8. ARMATURE	17. SCREW–SWITCH ATTACHING	26. PLUNGER PIN
9. DRIVE ASM.	18. LEATHER WASHER—BRAKE	27. PINION STOP RETAINER RING
		28. LEVER SHAFT RETAINING RING

Fig. 6D-78--Exploded View, 5MT Motor

Specifications 6E8-163
Special Tools 6E8-164

ALL NEW GENERAL MOTORS VEHICLES ARE CERTIFIED BY THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY AS CONFORMING TO THE REQUIREMENTS OF THE REGULATIONS FOR THE CONTROL OF AIR POLLUTION FROM NEW MOTOR VEHICLES. THIS CERTIFICATION IS CONTINGENT ON CERTAIN ADJUSTMENTS BEING SET TO FACTORY STANDARDS. IN MOST CASES, THESE ADJUSTMENT POINTS EITHER HAVE BEEN PERMANENTLY SEALED AND/OR MADE INACCESSIBLE TO PREVENT INDISCRIMINATE OR ROUTINE ADJUSTMENT IN THE FIELD. FOR THIS REASON, THE FACTORY PROCEDURE FOR TEMPORARILY REMOVING PLUGS, CAPS, ETC., FOR PURPOSES OF SERVICING THE PRODUCT, MUST BE STRICTLY FOLLOWED AND, WHEREVER PRACTICABLE, RETURNED TO THE ORIGINAL INTENT OF THE DESIGN.



"C/K" SERIES
5.0/5.7 (305/350 CID) V8 RPO: LF3/LS9 V.I.N. CODE: F/L
CALIFORNIA ONLY

COMPUTER SYSTEM

- C1 Electronic Control Module (ECM)
- C5 System Ground
- C6 Fuse Panel
- C8 Computer Control Harness
- C9 Remote Lamp Driver
- C10 Dwell Connector

AIR/FUEL SYSTEM

- 1 Mixture Control

TRANSMISSION CONVERTER CLUTCH CONTROL SYSTEM

- 5 Trans. Conv. Clutch Connector

IGNITION SYSTEM

- 6 Electronic Spark Timing Connector

AIR INJECTION SYSTEM

- 9 Air Divert Solenoid Valve

EXHAUST GAS RECIRCULATION CONTROL SYSTEM

- 11 Exhaust Gas Recirculation Valve
- 12 Exhaust Gas Recirculation Solenoid Valve

FUEL VAPOR CONTROL SYSTEM

- 13 Canister Purge Solenoid Valve
- 15 Vapor Canister

SENSORS/SWITCHES

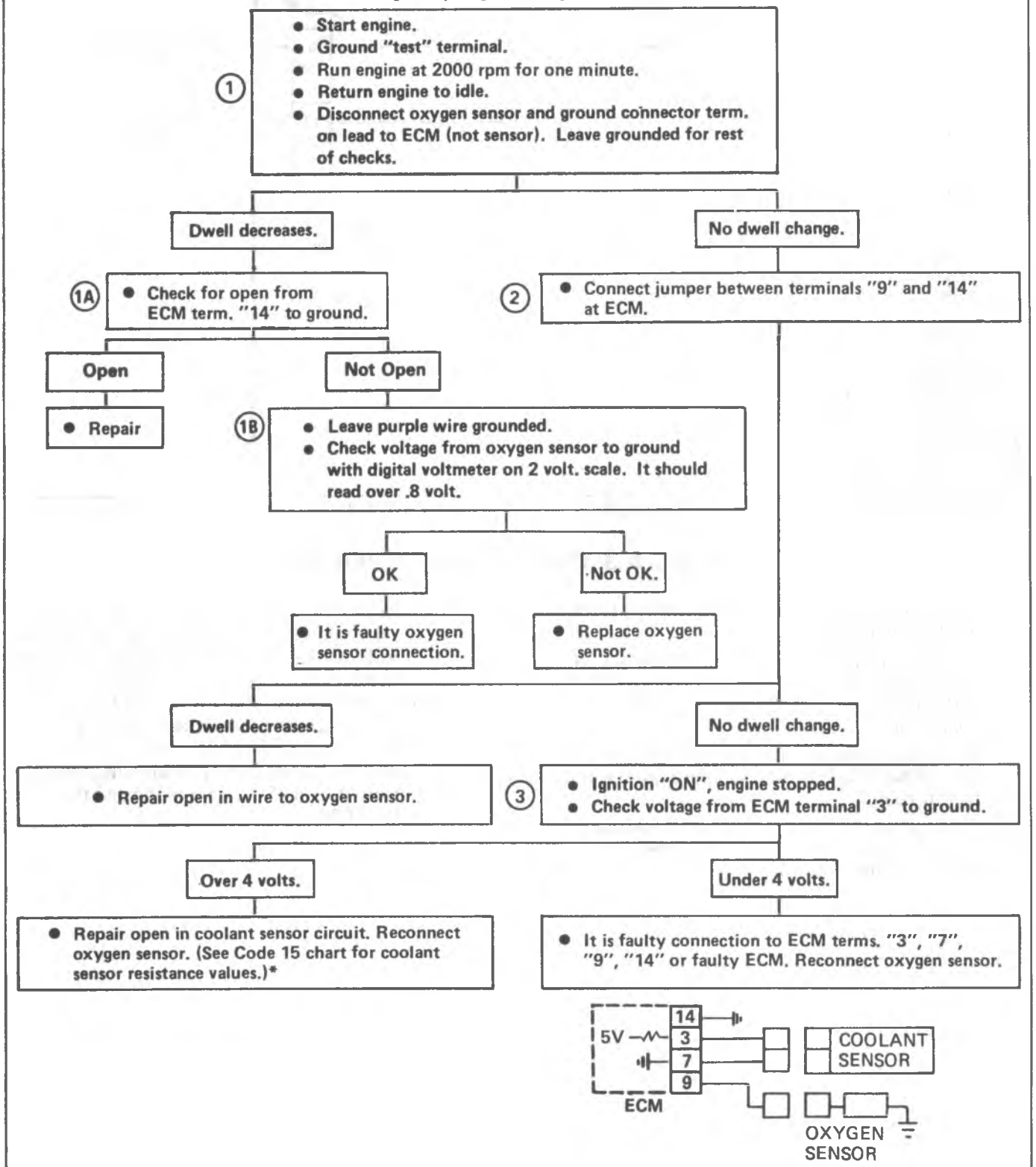
- A Vacuum Sensor
- B Exhaust Oxygen Sensor
- C Throttle Position Sensor
- D Coolant Sensor

Figure 13 Component Locations - 5.0L/5.7L (CK Series)

1984 CC

CHART NO. A-2
DWELL FIXED BETWEEN 10°-50°
OPEN COOLANT OR OXYGEN SENSOR CIRCUIT

Certain engines have a very stable dwell at idle. Choke engine to verify fixed or varying dwell. Check for sticking TPS plunger and adjustment and low coolant.



***Checking coolant sensor resistance may require use of connector and wire assembly No. 12026621 for accessibility.**

Figure 28 Dwell Fixed Between 10° and 50° - CHART A-2

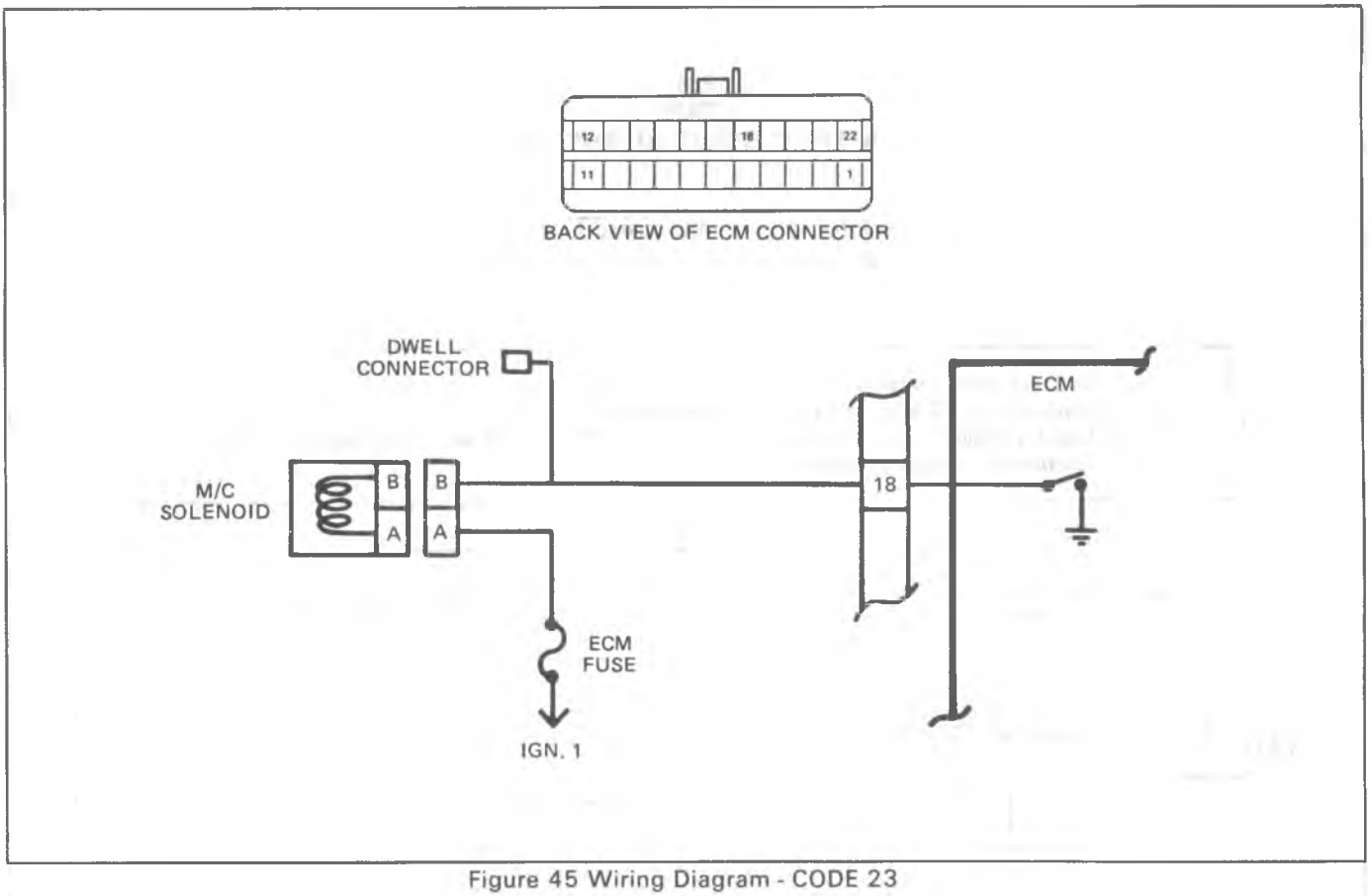


Figure 45 Wiring Diagram - CODE 23

CODE 23, M/C SOLENOID CIRCUIT LOW

Code 23 says the ECM has seen the voltage at ECM Term. "18" stay low instead of rising and falling as the M/C solenoid is turned "ON" and "OFF". This could be caused by an open in the M/C solenoid circuit or a ground on the ECM side of the M/C solenoid.

An open would cause a full rich condition and cause poor economy, odor, smoky exhaust or poor driveability. A ground would cause a full lean condition and cause poor driveability.

1. Checks for a complete circuit from the battery to the M/C solenoid dwell lead. It should be battery voltage. Battery voltage means there might be an open circuit between the dwell connector and ground. No voltage could be either an open between the connector and battery or a ground on the ECM side of the M/C solenoid.

2. Checks for B+ on the pink ignition source wire. Test light should light between the ignition source and ground.

2A. Checks for an open in the solenoid to ECM circuit. A normal circuit would read about battery voltage at the ECM Terminal "18".

3. This step determines whether the fault is in the M/C solenoid, a ground in the circuit to the ECM, or the ECM. A light would indicate a ground in circuit to Terminal "18" or a faulty ECM. A voltmeter can't be used because it is normal to have enough current flow through the ECM even with the circuit open to make a voltmeter read, but not enough to light a test light.

4. This checks for ground in the wire to ECM Term. "18". If it is grounded, the light will stay "ON".

1984 CCC

TROUBLE CODE 55

High voltage on oxygen sensor circuit or wrong voltage on ECM terminal 21.

Check for corrosion at ECM edgeboard connectors and terms. If present, check for coolant sensor, windshield or heater core leaks. Repair leak, clean connector terms. and replace ECM. Also, check for 4 term. EST harness being too close to electrical signals, such as spark plug wires, distributor housing, generator, etc.

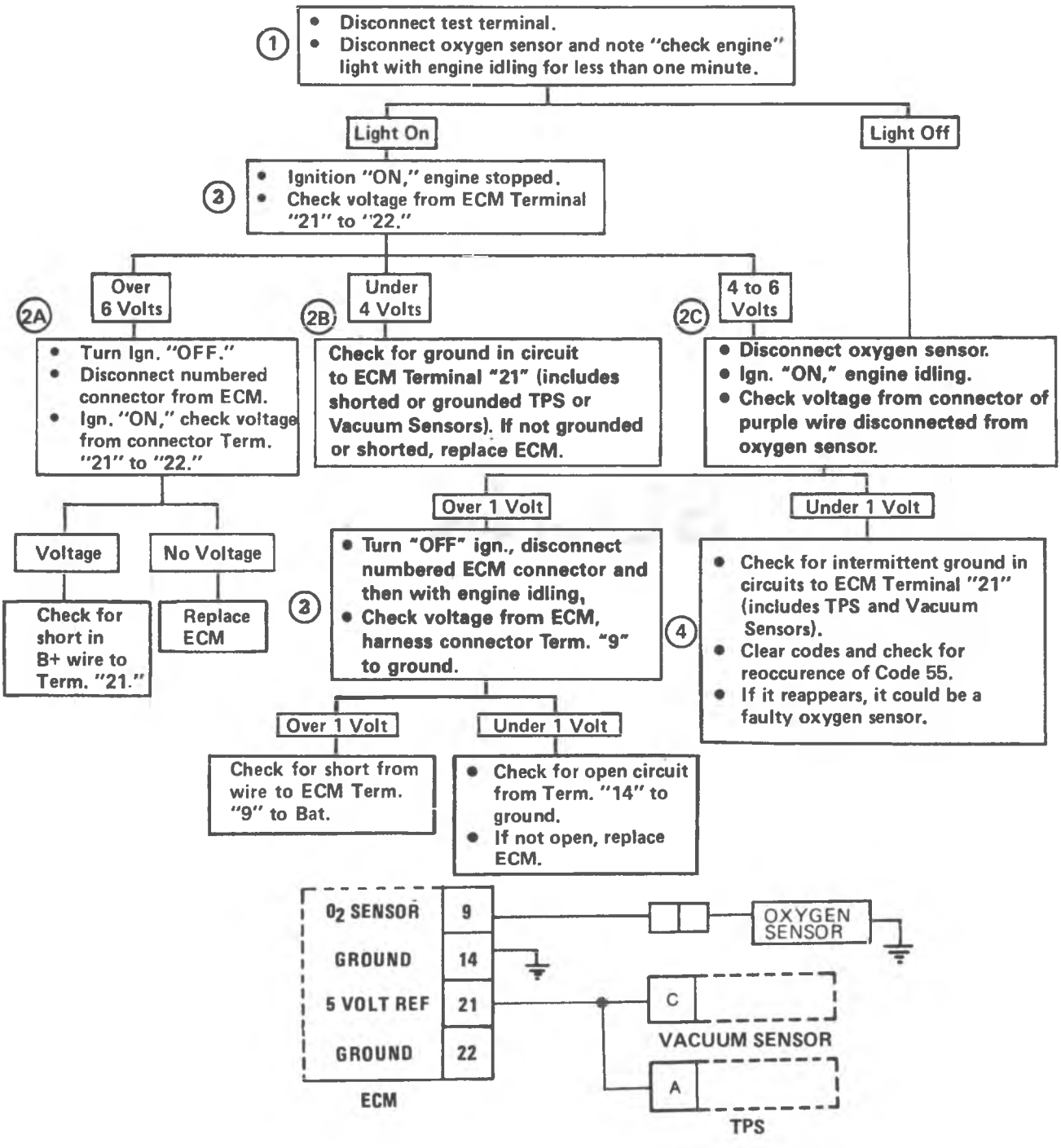


Figure 62 CODE 55 (4.1L Only)

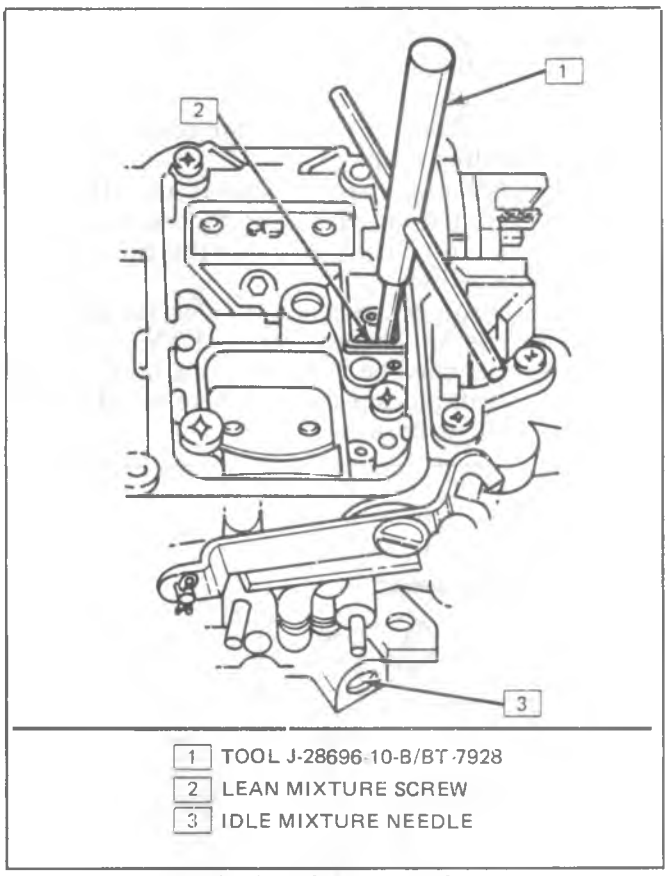
CHART C-1, ECM REPLACEMENT CHECK

Prior to replacing an ECM, the circuit involved must be tested for: 1) poor connector terminal to ECM contact; 2) direct battery voltage on an ECM ground circuit from a short to B+; or 3) shorted solenoid or relay. If a short is found, the circuit must be repaired prior to replacing the ECM to prevent repeat ECM failures.

1. Checks for good terminal contact due to weak or dirty terminals. Remove terminal to inspect. Replace if broken or dirty. If coolant is present, replace coolant sensor and connector. Also, replace ECM connector terminal and blow coolant out of harness. Clean connector with alcohol or spray contact cleaner and replace ECM.
2. Checks for a short to ignition or shorted solenoid or relay. All terminals must be tested since several are connected internally in the ECM. A short in one circuit may cause another circuit in the ECM to be inoperative that does not have an external fault, but was the cause of "driver's complaint." Any circuit testing below 20 ohms is shorted to ignition, or shorted across the relay or solenoid.
3. Checks for shorted TCC solenoid. Some transmissions have a normally open 3rd gear switch in series with the solenoid. The ohmmeter will read infinite resistance (open circuit) in these cases. If the reading is less than 20 ohms, a short to ignition or faulty solenoid exists. A normal solenoid will read between 20 - 50 ohms.
4. Checks for shorted TCC circuit in units with a 3rd gear switch. The vehicle must be in 3rd gear to close the switch to obtain a resistance reading. A normal solenoid will read between 20 - 50 ohms.

If unable to adjust, inspect idle system for leak or restrictions (See E2SE Carburetor Unit Repair).

7. Return to idle and observe dwell reading. Dwell should be varing within 25° to 35° and calibration is completed.
   Reinstall vent stack.

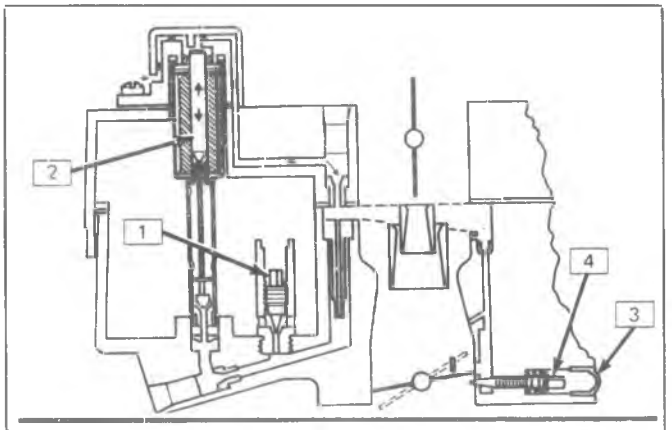


1 TOOL J-28696-10-B/BT-7928
2 LEAN MIXTURE SCREW
3 IDLE MIXTURE NEEDLE

Figure 106 E2SE Carburetor Calibration

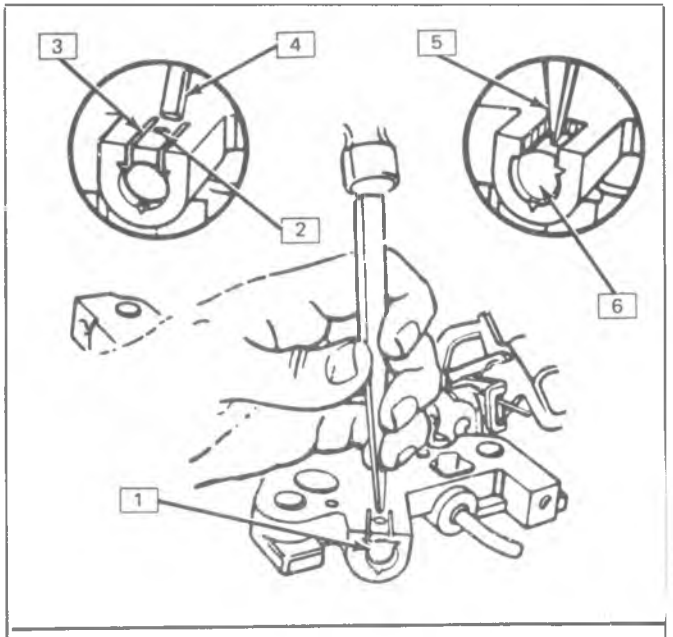
If calibration is not correct at idle, turn off engine and remove carburetor from engine to remove idle mixture needle plug.

8. Remove carburetor from engine:
   a. Remove air cleaner and gasket.
   b. Disconnect electrical connectors.
   c. Disconnect accelerator linkage.
   d. Disconnect automatic transmission downshift cable, if equipped.
   e. Disconnect cruise control linkage if equipped.
   f. Disconnect fuel and vacuum lines from carburetor.
   g. Remove carburetor attaching bolts and carburetor.
9. Remove idle mixture needle plug. (Figure 107)
   a. Invert carburetor and place on suitable holding fixture, (manifold side up).
   b. Make two parallel cuts in the throttle body, one on each side of the locator point, with a hacksaw. Cuts should reach down to the steel plug, but should not extend more than 1/8" (3.2mm) beyond the locator point. Distance between saw cuts depends on size of the punch to be used. (Figure 108)



1 LEAN MIXTURE SCREW
2 MIXTURE CONTROL SOLENOID
3 PLUG
4 IDLE MIXTURE NEEDLE

Figure 107 Idle Mixture Needle



1 RECESSED IDLE MIXTURE NEEDLE AND PLUG LOCATION
2 LOCATOR POINT
3 HACKSAW SLOTS
4 FLAT PUNCH
5 CENTER PUNCH
6 PLUG

Figure 108 Removing Plug

   c. Place a flat punch at a point near the ends of the saw marks in the throttle body. Hold the punch at a 45° angle, and drive it into the throttle body until the casting breaks away, exposing the steel plug. (Figure 108)
   d. Hold center punch in vertical position, and drive it into the plug. Now hold punch at a 45° angle, and drive plug out of the casting.

NOTICE: Hardened plug will break, rather than remaining intact. It is not necessary to remove the plug completely, but remove loose pieces to allow

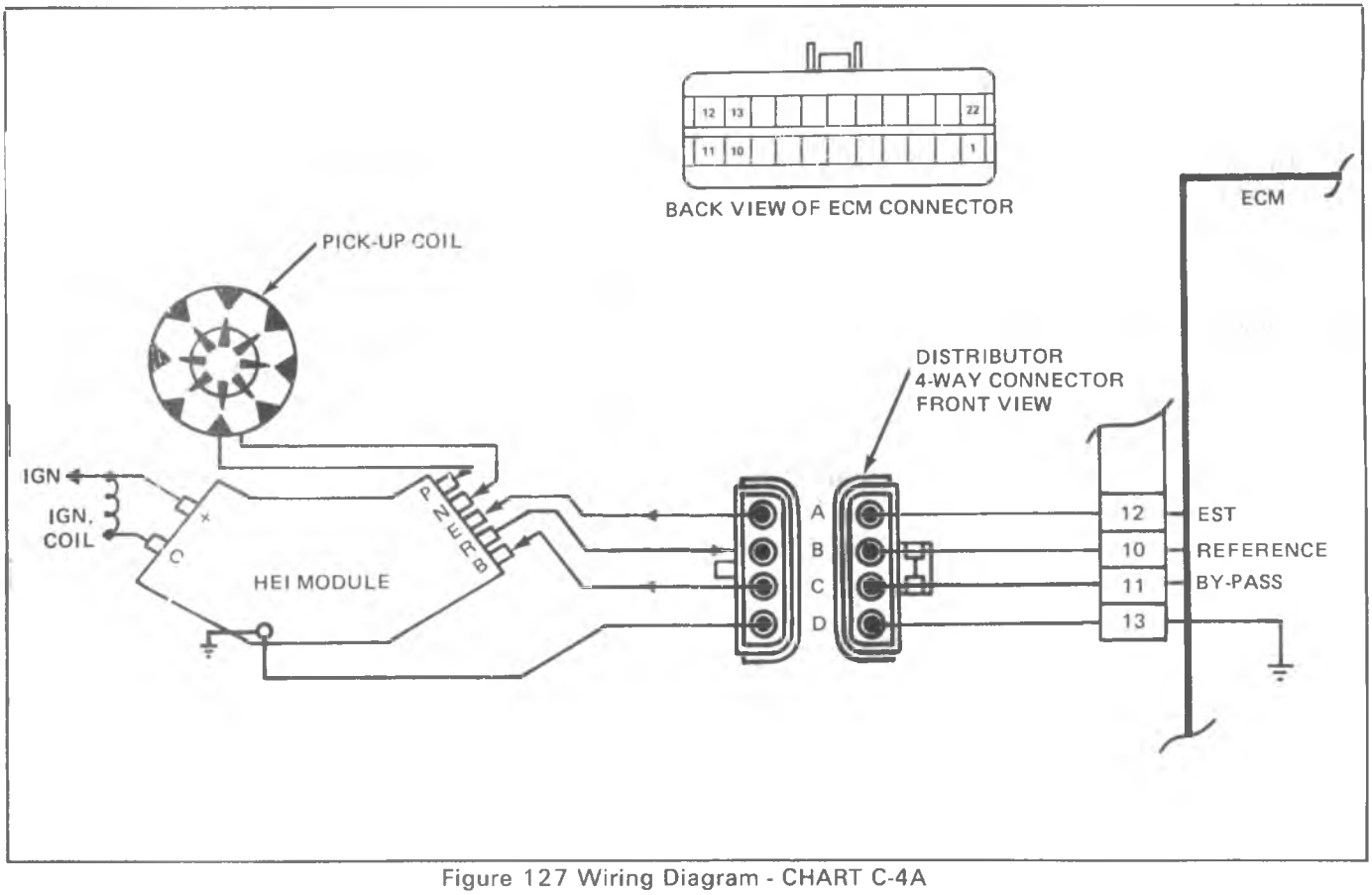


Figure 127 Wiring Diagram - CHART C-4A

CHART C-4A, IGNITION SYSTEM CHECK (INTEGRAL COIL)

1. Checks for proper output from the ignition system. The ST-125 requires a minimum of 25, 000 volts to fire. This check can be used in case of an ignition miss because the system may provide enough voltage to run the engine but not enough to fire a spark plug under heavy load.

1A. If the engine will start with the connector disconnected, it indicates the problem is related to the EST circuit. The problem would usually be a grounded EST line or no ground to the ECM.

2. Normal reading during cranking is about 9-10 volts.

3. Checks for a shorted module or grounded circuit from the ignition coil to the module. The distributor module should be turned off so normal voltage should be about 12 volts. If the module is turned "ON", the voltage would be low but above 1 volt. This could cause the ignition coil to fail from excessive heat.
   With an open ignition coil primary winding, a small amount of voltage will leak through the module from the "Bat." to the tach terminal.

4. Checks the voltage output with the pick-up coil triggering the module. A spark says the ignition system has enough output, but intermittent no-starts or poor performance can result if the polarity of the ignition coil and pick-up coil is not correct.
   The color of the pick-up coil connector has to be yellow if one of the ignition coil leads is yellow. If the ignition coil has a white lead, any pick-up coil connector color **except** yellow is OK.

5. Checks for an open module or circuit to it. 12 volts applied to the module "P" terminal should turn the module "ON" and the voltage should drop to about 7-9 volts.

6. This should turn off the module and cause a spark. If no spark occurs, the fault is most likely in the ignition coil because most module problems would have been found before this point in the procedure. A module tester could determine which is at fault.

If the EGR valve should stay open all of the time, the engine may not idle.

Too little or no EGR flow allows combustion temperatures to get too high during acceleration and load conditions. This could causes:

- Spark knock (detonation).
- Engine overheating.
- Emission test failure.

DIAGNOSIS

Diagnosis of the EGR system is covered in charts at the end of this section.

- CHART C-7A for Pulse Width Modulated EGR.
- CHART C-7C for EGR Valve Check - Non-ECM Controlled

ON-VEHICLE SERVICE

EGR VALVE

Remove or Disconnect

1. Air cleaner.
2. EGR valve vacuum hose at valve. (Figure 151)
3. Bolts.
4. EGR valve from manifold.

Install or Connect

1. EGR valve to manifold (use new gasket.)
2. Bolts.
3. Vacuum hose to EGR valve.
4. Air cleaner.

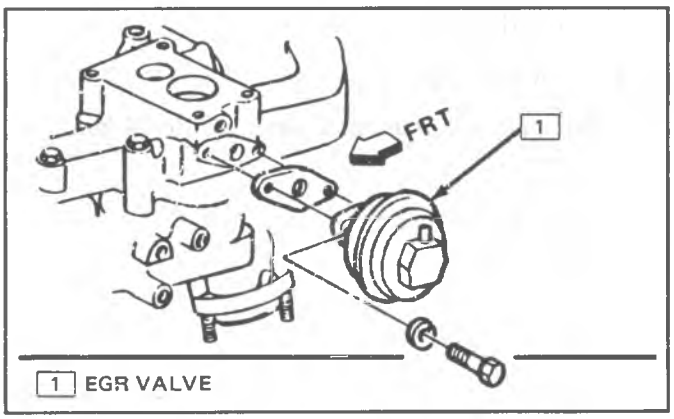


Figure 151 EGR Valve

CLEANING EGR VALVES

Non-Serviceable (Non-Take-Apart) EGR Valves

NOTICE: Do not wash valve assembly in solvents or degreaser - permanent damaged to valve diaphragm may result. Also, sand blasting of the valve is not recommended since this can affect the operation of the valve.

Clean

1. Hold the valve assembly in hand (Figure 152). Then, using a light snapping action with a plastic hammer, tap on the end of the round pintle to remove the exhaust deposits from the valve seat. Empty loose particles.
2. Clean the mounting surface of the EGR valve with a wire wheel or wire brush, and the pintle with a wire brush.
3. Depress the valve diaphragm and check the seating area for cleanliness by looking thru the valve outlet. If pintle or seat are not completely clean, repeat step 1.
4. Inspect the valve outlet for deposits. Remove any deposit build-up with a screw driver or other suitable sharp tool.
5. Clean mounting surface with a wire wheel or wire brush, then using a new gasket install the valve assembly to the intake manifold or adapter. Torque the bolts to 34 N·m (15 ft. lbs.).
6. Connect vacuum hoses.

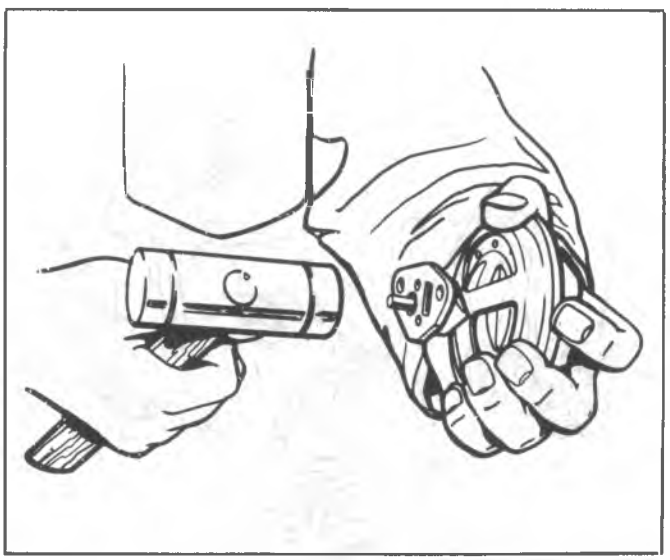


Figure 152 EGR Valve Cleaning

EGR Manifold Passage

Inspect

If EGR passages in the inlet manifold indicate excessive build-up of deposits, the passages should be cleaned. Care should be taken to ensure that all loose particles are completely removed to prevent them from clogging the EGR valve or from being ingested into the engine.

POSITIVE CRANKCASE VENTILATION (PCV)

GENERAL DESCRIPTION

A Positive Crankcase Ventilation (PCV) system is used to provide more complete scavenging of crankcase vapors. Fresh air from the air cleaner is supplied to the crankcase, mixed with blow-by gases and then passed through a positive crankcase ventilation (PCV) valve into the intake manifold Figure 176).

The primary control is through the PCV valve (Figure 175) which meters the flow at a rate depending on manifold vacuum.

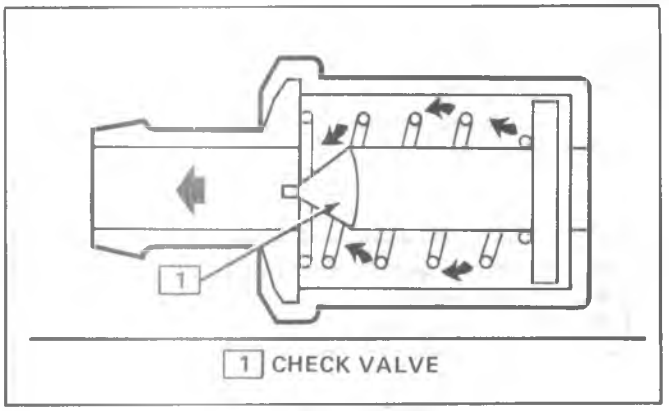


Figure 175 PCV Valve Cross Section

To maintain idle quality, the PCV valve restricts the flow when intake manifold vacuum is high. If abnormal operating conditions arise, the system is designed to allow excessive amounts of blow-by gases to back flow through the crankcase vent tube into the air cleaner to be consumed by normal combustion.

Results of Incorrect PCV Operation

- A plugged valve or hose may cause:
  - Rough idle.
  - Stalling or slow idle speed.
  - Oil leaks.
  - Oil in air cleaner.
  - Sludge in engine.
- A leaking valve or hose would cause:
  - Rough idle.
  - Stalling.
  - High idle speed.

DIAGNOSIS

If an engine is idling rough, check for a clogged PCV valve or plugged hose. Replace as required. Use the following procedure:

1. Remove PCV valve from rocker arm cover.
2. Run the engine at idle.
3. Place your thumb over end of valve to check for vacuum. If there is no vacuum at valve, check for plugged hoses or manifold port, or PCV valve. Replace plugged or deteriorated hoses.
4. Turn off the engine and remove PCV valve. Shake valve and listen for the rattle of check needle inside the valve. If valve does not rattle, replace valve.

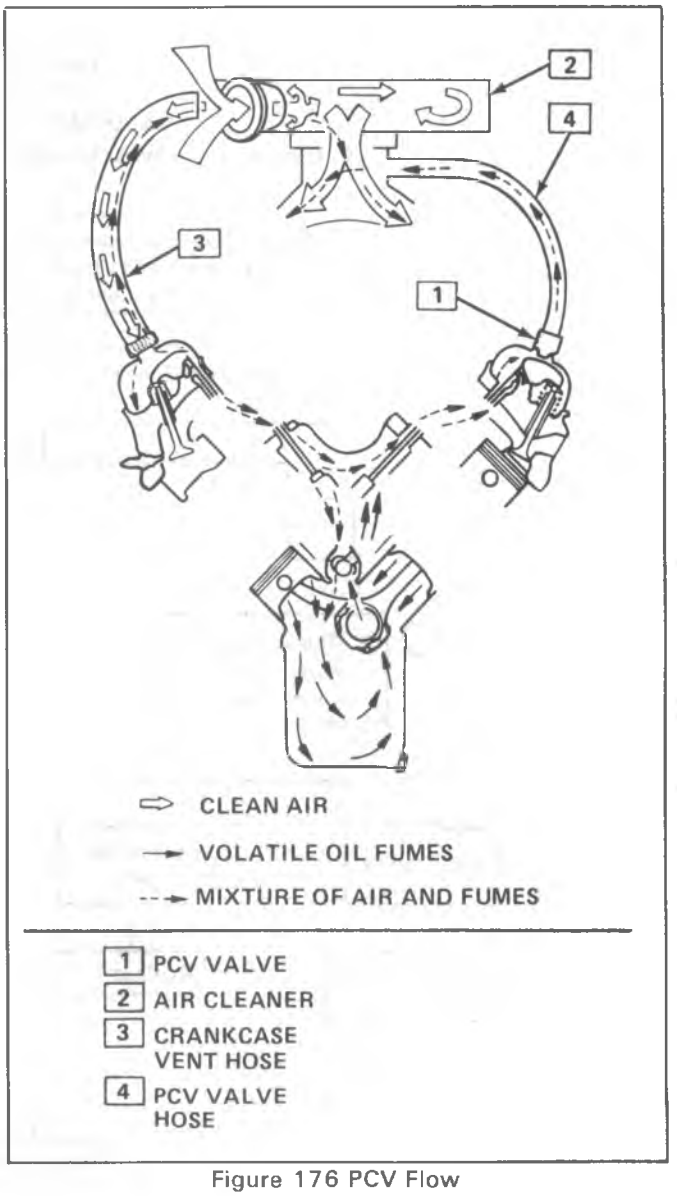


Figure 176 PCV Flow

With this system, any blow-by in excess of the system capacity (from a badly-worn engine, sustained heavy load, etc.) is exhausted into the air cleaner and is drawn into the engine.

Proper operation of the PCV System (Figure 177) is dependent upon a sealed engine. If oil sludging or dilution is noted, and the PCV System is functioning properly, check engine for possible cause and correct to ensure that system will function as intended.

ON-VEHICLE SERVICE

See Figure 177 for replacement of PCV system components.

An engine which is operated without any crankcase ventilation can be damaged. Therefore, it is important to replace the PCV valve and air cleaner breather at intervals shown in Section 0B.

Periodically, inspect the hoses and clamps and replace any showing signs of deterioration.

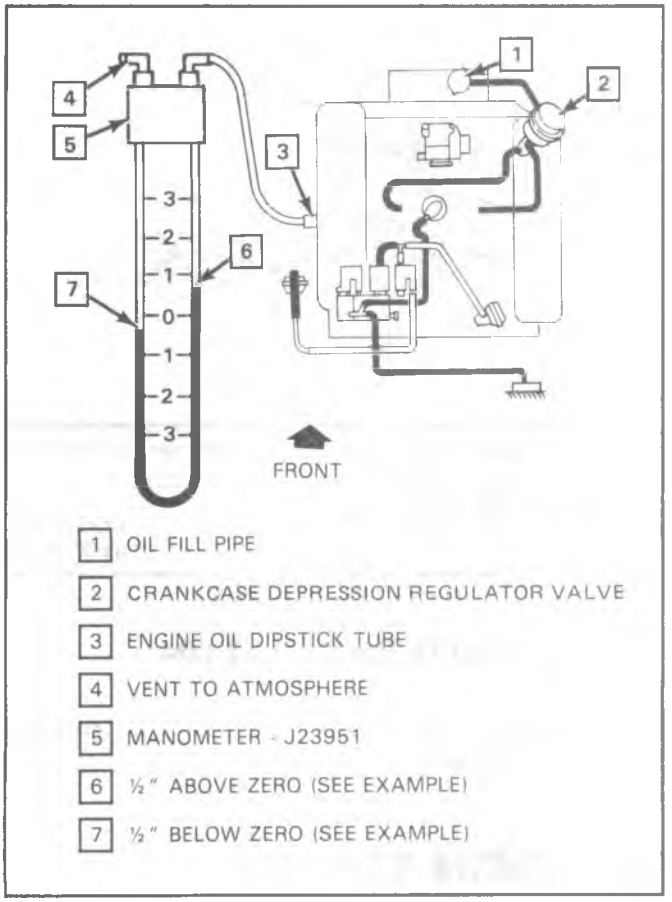


Fig. 6E9-12--CDR Valve Test

Connect one end of the manometer to the engine oil dip stick hole. The other end of the manometer is vented to atmosphere.

Install air cleaner and run engine at idle.

CDR Valve Specification

One inch (1") water pressure @ idle to approximately 3-4 inches water vacuum at full load. Add the amount that the manometer column travels up, to amount column travels down to obtain total PSI/Vacuum. An example (Fig. 6E9-12) of a manometer reading is as follows: One-half inch above zero plus one-half inch below zero equals one inch vacuum reading (1/2" + 1/2" = 1").

ON-VEHICLE SERVICE

Fig. 6E9-9

The crankcase depression regulator valve is replaced as an assembly. Replace hoses as required if inspection indicates cracks or decay.

PART INFORMATION

PART NAME	GROUP
Bracket, C/Case Depr Reg Vlv	1.745
Hose, C/Case Depr Reg Vlv	1.762
Tube, C/Case Depr Reg Vlv	1.745
Valve, C/Case Depr Reg Vlv	1.745

VACUUM REGULATOR VALVE

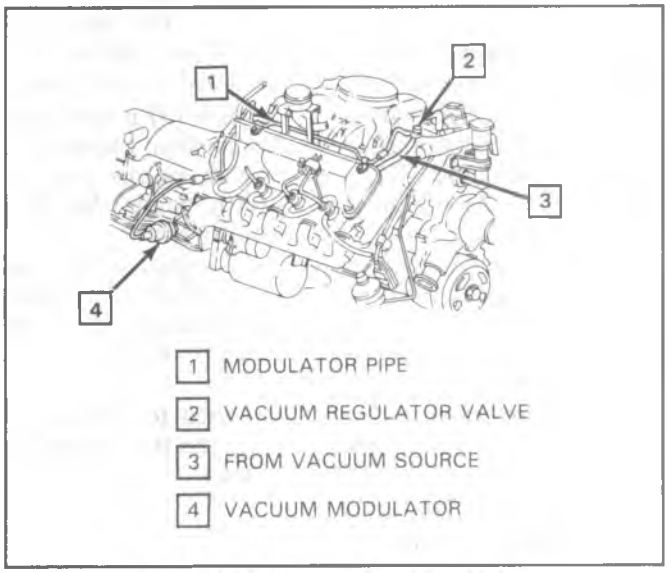


Fig. 6E9-13--Vacuum Regulator Valve

A vacuum regulator valve (Fig. 6E9-13) used on engines with heavy duty emission regulations (LL4 engine) regulates the vacuum signal to the vacuum modulator of a 400 automatic transmission. It is mounted to the injection pump and vacuum is supplied from the vacuum pump.

DIAGNOSIS

Refer to the 400 Automatic Transmission for the diagnosis of the vacuum modulator and the vacuum signal to the modulator.

ON-VEHICLE SERVICE

Adjustment (Figs. 6E9-14 and 15)

1. Attach the vacuum regulator valve snugly to the fuel injection pump. The switch body must be free to rotate on the pump.
2. Attach vacuum source of 67 ±5 kPa (20" Hg. ±1.5" Hg.) to the bottom vacuum nipple. Attach vacuum gage to the top vacuum nipple.
3. Insert vacuum regulator valve gage block between the gage boss on the injection pump and the wide open stop screw on the throttle lever (Switch on position).
4. Rotate and hold the throttle shaft against the gage block.
5. Slowly rotate the vacuum regulator valve body clockwise (facing valve) until vacuum gage reads 27 ±2 kPa (8 ±.6" Hg.). Hold valve body at this position and tighten mounting screws to 5-7 N·m (4-5 ft. lbs.).

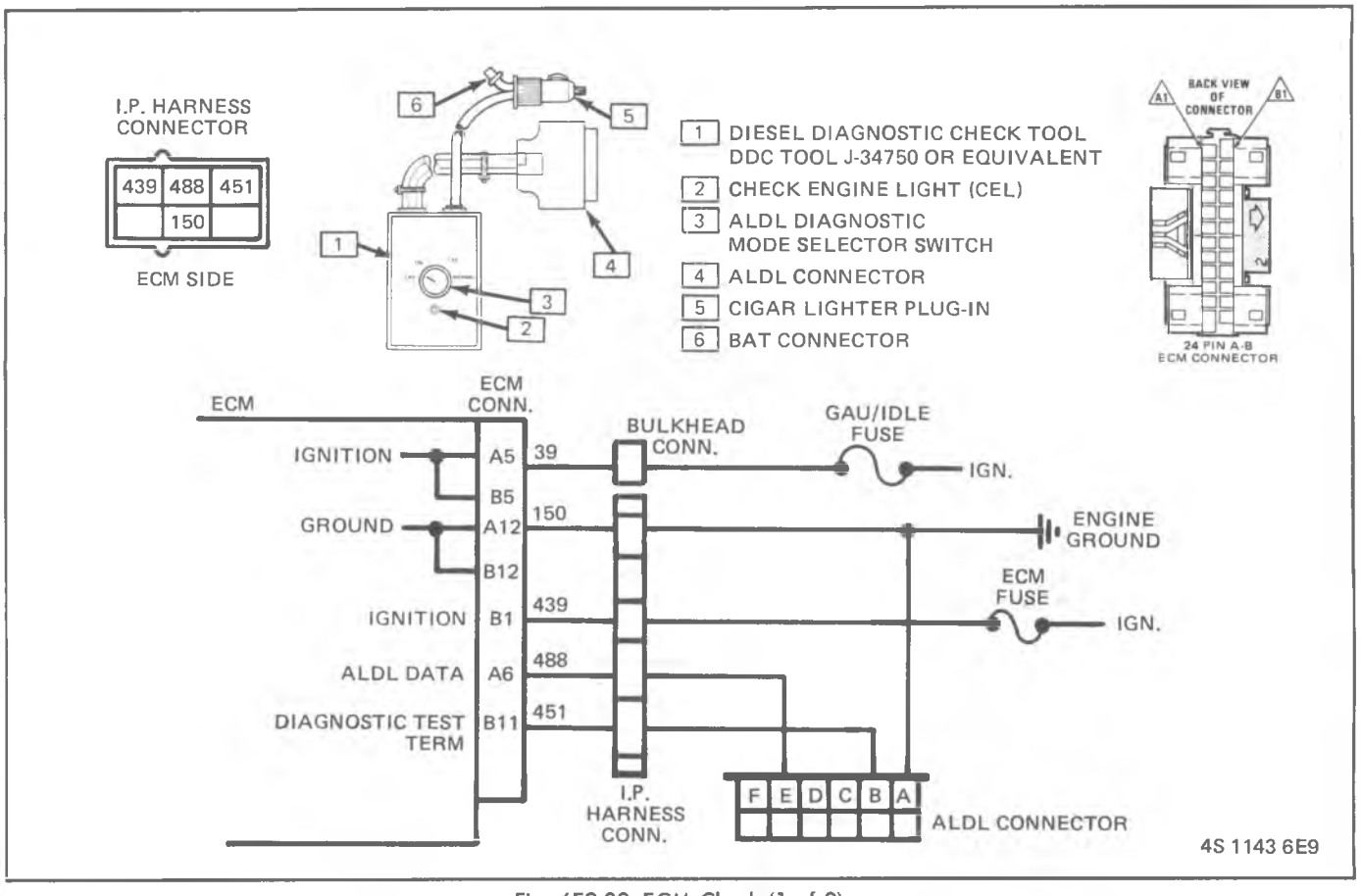


Fig. 6E9-38--ECM Check (1 of 2)

ECM CHECK (6.2L LH6)

The ECM check is made to determine why the "Check Engine" Light remains "ON" after the engine is started. Normally, the ECM will not recognize a fault for at least 10 seconds after start-up. If the CEL remains "ON", the ECM has lost power, ground or the signal that turns the CEL "OFF" has been lost. Since the the CEL is remote from the ECM, it can recognize faulty ECM power or ECM.

1. Checks for proper CEL signal at ALDL. It should normally be about battery voltage until the vehicle is started.
2. Checks for 12 volts at ECM ignition feed terminals. Battery voltage should normally be present at both terminals.
3. Checks for good ECM ground. Light should normally be "ON". If ECM power and ground terminals are OK, check for good ECM to connector terminal contact.
4. When the vehicle is started, the ECM turns the CEL "OFF" and voltage at ALDL should normally drop under 6 volts.

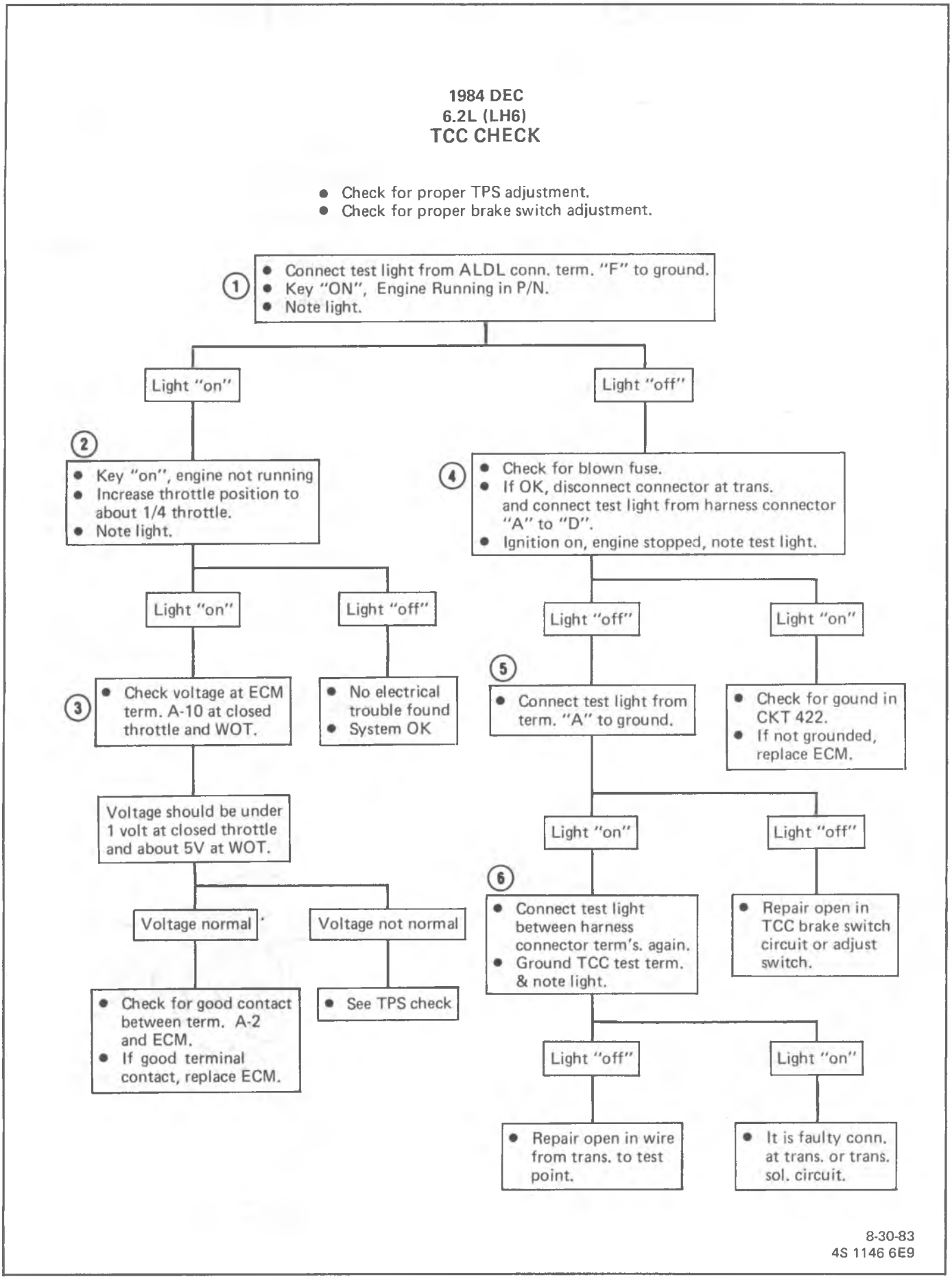


Fig. 6E9-57–TCC Check (2 of 2)

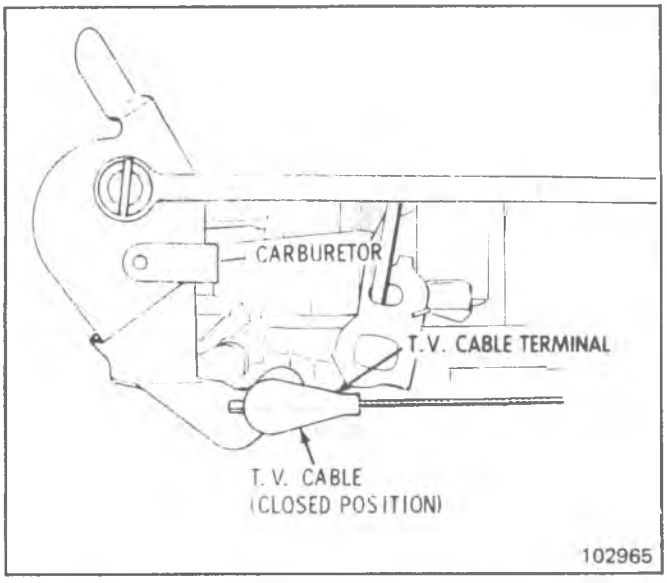


Fig. 7A-10--T.V. Cable at Carburetor Lever (Typical)

described as no upshifts, delayed or sharp upshifts.

Downshift (Detent) Cable System for 350C Transmissions

The detent valve is activated by the downshift (detent) cable which is connected to the carburetor linkage. When the throttle is half open, the detent valve is actuated, causing a part throttle downshift at speeds below 50 mph (80 km/h). When the throttle is fully opened, the detent valve is actuated causing the transmission to downshift. The 3-1 detent downshift may be obtained when vehicle speed is approximately 6 to 12 mph (9 to 19 km/h) below the maximum throttle 1-2 upshift point. The 3-2 detent downshift may be obtained when vehicle speed is approximately 4 to 8 mph (6 to 13 km/h) below the maximum throttle 2-3 upshift point.

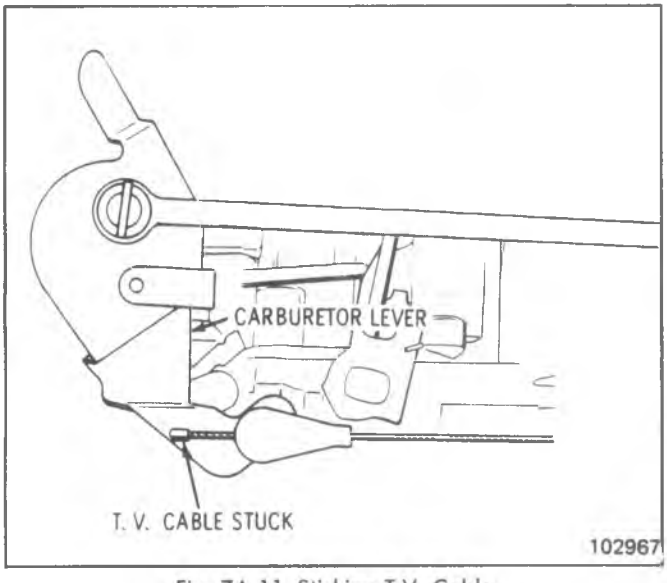


Fig. 7A-11--Sticking T.V. Cable

Adjustment Procedure fot T.V. and Detent Cable

Preliminary Checks

1. Check transmission oil level and correct as required.
2. Be sure engine is operating properly and brakes are not dragging.
3. Check for correct cable, according to the parts catalog.
4. Check tghat the cable is connected at both ends.
5. Adjust the cable as follows:

Adjusting Cable (Diesel Engine Only)

1. Stop Engine.
2. Remove cruise control rod (if so equipped).
3. Disconnect transmission T.V. or detent cable terminal from throttle assembly.
4. Loosen lock nut on pump rod and shorten several turns.
5. Rotate the lever assembly to the full throttle position and hold.
6. Lengthen pump rod until the injection pump lever contacts the full throttle stop.
7. Release tghe lever assembly and tighten pump rod lock nut.
8. Remove the pump rod from the lever assembly.
9. Reconnect the transmission T.V. or detent cable terminal to throttle assembly.
10. Depress and hold the metal re-adjust tab on the cable upper end. Move the slider through the fitting in the direction away from the lever assembly until the slider stops against the fitting.
11. Release the tab, rotate ghe lever assembly to the full throttle stop and release the lever assembly.
12. Reconnect the pump rod (and cruise control throttle rod if so equipped).
13. If equipped with cruise control, adjust the servo throttle rod to minimum slack (engine off) then put clip in first free hole closet to the bellcrank, but

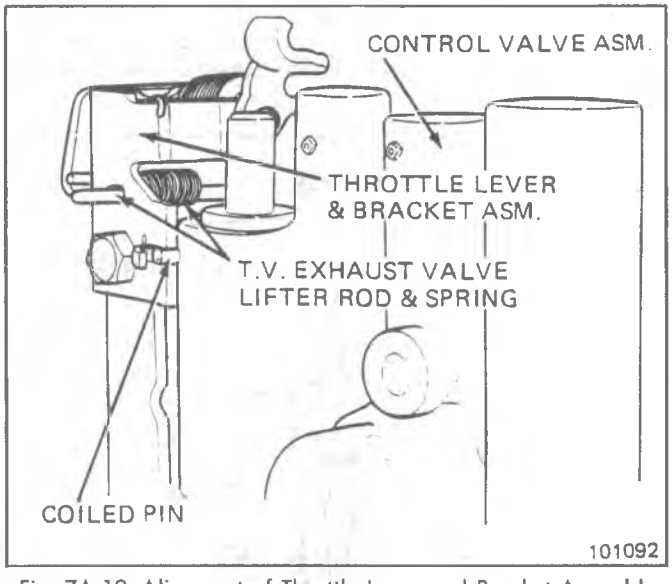


Fig. 7A-12--Alignment of Throttle Lever and Bracket Assembly

SECTION 350C
AUTOMATIC 350C TRANSMISSION
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Internal Parts - Removal and Inspection 350C-17
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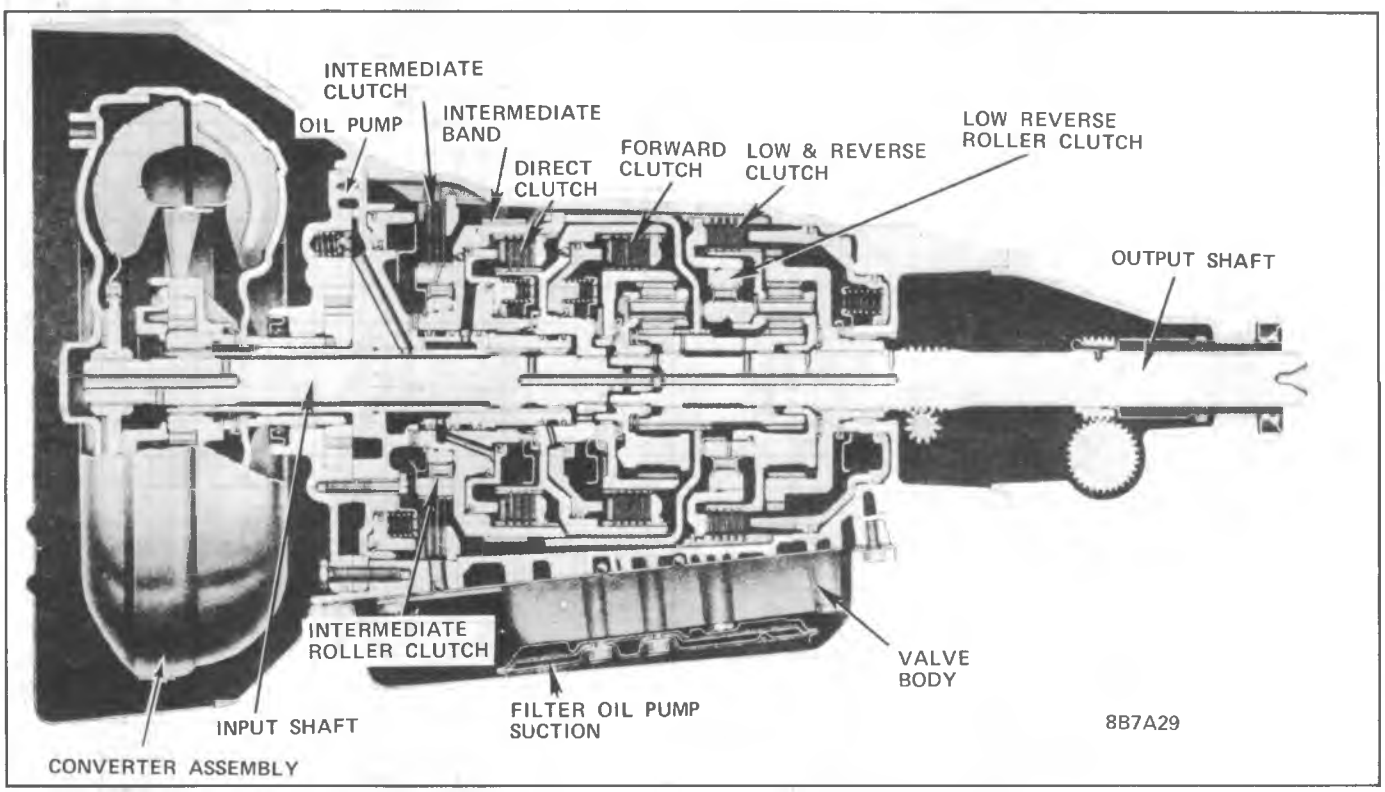


Figure 350C-1 Typical 350 Automatic Transmission

GENERAL DESCRIPTION

The 350C automatic transmission, is a fully automatic unit consisting primarily of a 4-element hydraulic torque converter and two planetary gear sets. Four multiple-disc clutches, two roller clutches, and an intermediate overrun band provide the friction elements required to obtain the desired function of the two planetary gear sets.

A hydraulic system pressurized by a gear type pump provides the working pressure required to operate the friction elements and automatic controls.

External control connections to the transmission are:

1. Manual Linkage - To select the desired operating range.
2. Engine Vacuum - To operate the vacuum modulator.
3. Detent Cable - To operate the detent valve.

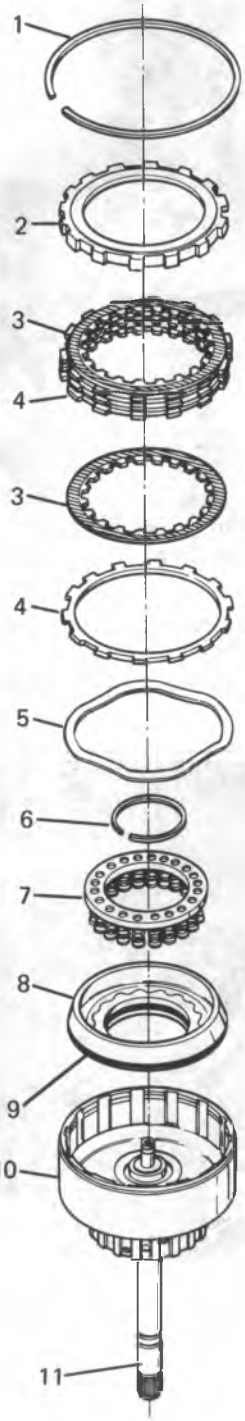
TROUBLE DIAGNOSIS

The key to correcting any complaint is to make use of all the available symptoms and logically letting them direct you to the cause. Symptoms or conditions that will help are determined by subjective road test, oil pressure checks or noise evaluation.

When dealing with automatic transmission complaints, it is best to gather as many symptoms as possible before making the decision to remove the transmission from the vehicle. Remember, **THE VEHICLE IS THE BEST TEST STAND AND DIAGNOSTIC TOOL AVAILABLE TO YOU,** if the transmission is operable. Once the transmission is on the bench, it cannot tell you "what hurts" and quite frequently the correction of the cause of the complaint does not require removal of the transmission from the vehicle.

ILL. NO.	DESCRIPTION
1	CONVERTER ASSEMBLY, TRANSMISSION
2	CASE ASSEMBLY, TRANSMISSION
3	RETAINER, INTERMEDIATE CLUTCH ACCUMULATOR PISTON COVER
4	COVER, INTERMEDIATE CLUTCH ACCUMULATOR PISTON
5	SEAL, INTERMEDIATE CLUTCH ACCUMULATOR PISTON COVER
6	SPRING, INTERMEDIATE CLUTCH ACCUMULATOR PISTON
7	RING, INTERMEDIATE CLUTCH ACCUMULATOR PISTON SEAL
8	PISTON, INTERMEDIATE CLUTCH ACCUMULATOR
9	RING, INTERMEDIATE CLUTCH ACCUMULATOR PISTON SEAL
10	PLUG, LINE PRESSURE CHECK
12	VALVE, VACUUM MODULATOR
13	SEAL, VACUUM MODULATOR TO CASE
14	RETAINER, VACUUM MODULATOR
15	BOLT, VACUUM MODULATOR RETAINER TO CASE
16	MODULATOR, VACUUM
17	SEAL, CASE EXTENSION TO CASE
18	EXTENSION, TRANSMISSION CASE
19	BUSHING, EXTENSION
20	SEAL, TRANSMISSION OUTPUT YOKE SLEEVE
21	SEAL, CASE EXTENSION OIL
22	BOLT, SLEEVE RETAINER
23	RETAINER, SPEEDOMETER DRIVEN GEAR SLEEVE
24	SEAL, SPEEDO DRIVEN GEAR SLEEVE TO EXTENSION
25	SLEEVE, SPEEDO DRIVEN GEAR
26	GEAR, SPEEDO DRIVEN
27	COVER, GOVERNOR
28	SEAL, GOVERNOR COVER TO CASE
29	GOVERNOR ASSEMBLY, TRANSMISSION
30	PIN, DOWEL
31	CONNECTOR, CASE ELECTRICAL
32	SEAL, CASE ELECTRICAL CONNECTOR
33	SCREEN, GOVERNOR PRESSURE HOLE
34	BALL, CHECK VALVE
35	PIPE, TRANSMISSION VENT
36	SCREEN, OIL PUMP PRESSURE HOLE
37	GASKET, VALVE BODY – UPPER
38	PLATE, VALVE BODY – SPACER
39	SUPPORT, VALVE BODY – SPACER PLATE
40	BOLT, SUPPORT TO CASE
41	GASKET, VALVE BODY – LOWER
42	BODY, VALVE
43	VALVE ASSEMBLY, MANUAL
44	SWITCH, OIL PRESSURE
45	GASKET, OIL PUMP FILTER
46	SCREEN, OIL FILTER
47	BODY, AUXILIARY VALVE
48	BOLT, AUXILIARY VALVE BODY TO VALVE BODY
49	BOLT, VALVE BODY TO CASE
50	SOLENOID, TORQUE CONVERTER CLUTCH
51	GASKET, OIL PAN
52	PAN, OIL
53	BOLT, OIL PAN TO CASE
54	BOLT, OIL SCREEN TO VALVE BODY

Figure 350C-15A External Parts



1 RETAINING RING
2 FORWARD CLUTCH PRESSURE PLATE
3 FACED PLATE
4 STEEL SEPARATOR PLATE
5 CUSHION SPRING
6 RETAINING RING
7 PISTON SPRING ASSEMBLY
8 FORWARD CLUTCH PISTON ASSEMBLY
9 SEAL
10 FORWARD CLUTCH DRUM
11 INPUT SHAFT

9B7A26-1

Figure 350C-65 Forward Clutch Assembly

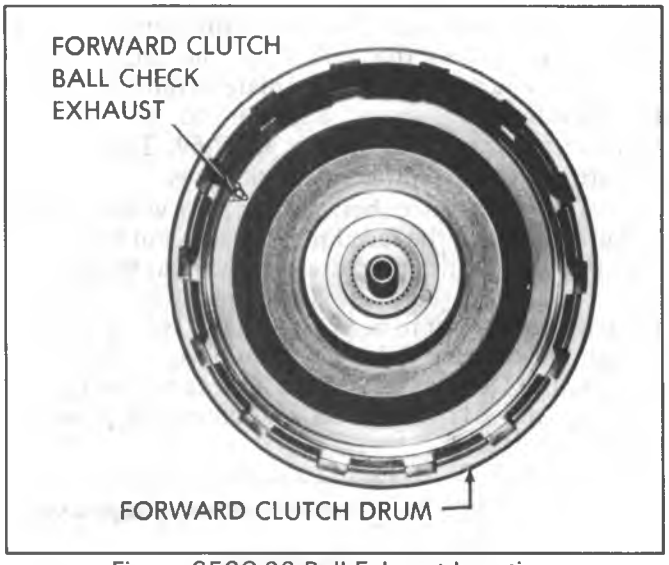


Figure 350C-66 Ball Exhaust Location

When pressing the input shaft into the forward clutch housing, care must be taken not to place excessive force on the pilot end of the input shaft as damage may result.

Reassembly

1. Install the forward clutch inner piston seal and outer piston seal, if previously removed.
2. Install the forward clutch piston assembly using a thin feeler gage. See Figure 350C-67.

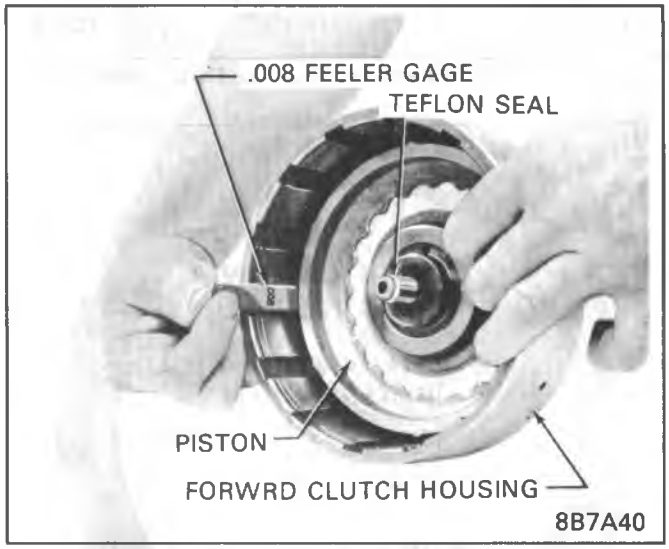


Figure 350C-67 Installing Forward Clutch Piston

3. Install spring retainer and springs. Compress spring retainer with an arbor press or ram press. See Figure 350C-64.
4. Lubricate with transmission fluid and install cushion spring, faced plates and steel separator plates, starting with the cushion spring and alternating steel and faced. See Figure 350C-65.
5. Install forward clutch pressure plate and retaining ring. Using a feeler gage check clearance between forward clutch pressure plate and faced plate. See Figure 350C-68.

J-2619. Clamp slide hammer into vise. Grasp stator shaft and remove bushing. See Figure 350C-130.

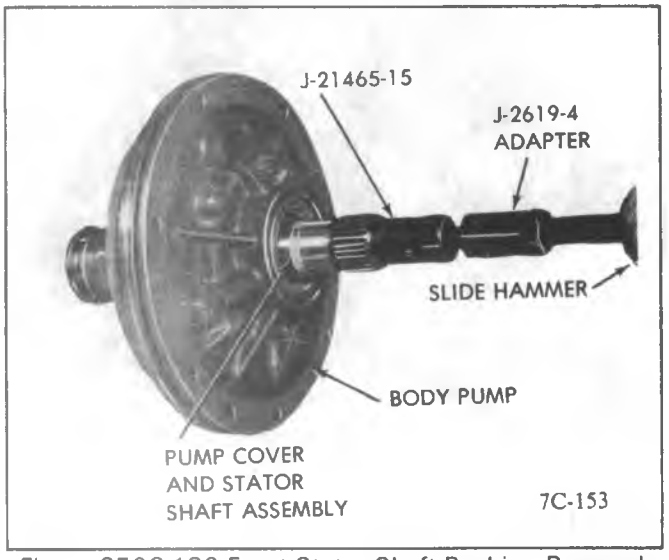


Figure 350C-130 Front Stator Shaft Bushing Removal

Installation

1. Install front stator shaft bushing as follows: Support pump assembly on J-21424-17 before installing bushing. Install bushing into the front end of stator shaft. Using installer J-21424-17 and Drive Handle J-8092, tap bushing into shaft 1/4 inch below top of stator shaft. See Figure 350C-131. Extreme care must be taken so bushing is not driven past shoulder.

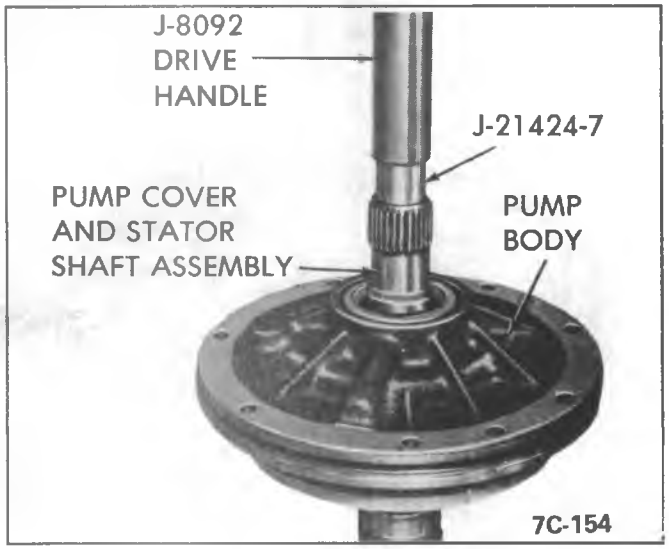


Figure 350C-131 Front Stator Shaft Bushing Installation

Rear Stator Shaft Bushings

Removal

1. If replacement at lower rear stator shaft bushing is required, proceed as follows: Thread Tool J-21465-115 into stator shaft lower rear bushing. Thread slide hammer J-2619 into remover. Clamp slide hammer into vise. Grasp stator shaft and remove bushing. See Figure 350C-132. If upper rear stator shaft bushing is required, repeat above procedure.

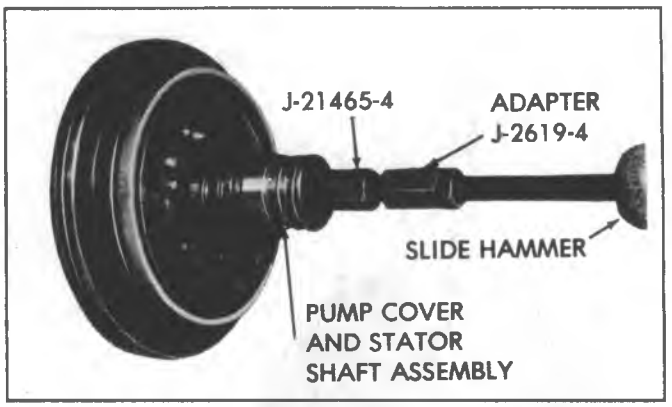


Figure 350C-132 Rear Stator Shaft Bushing Removal

Installation

1. Using Tool J-23062-12, press upper rear stator shaft bushing to 1-11/32 inch below top surface of oil pump delivery sleeve. See Figure 350C-133.

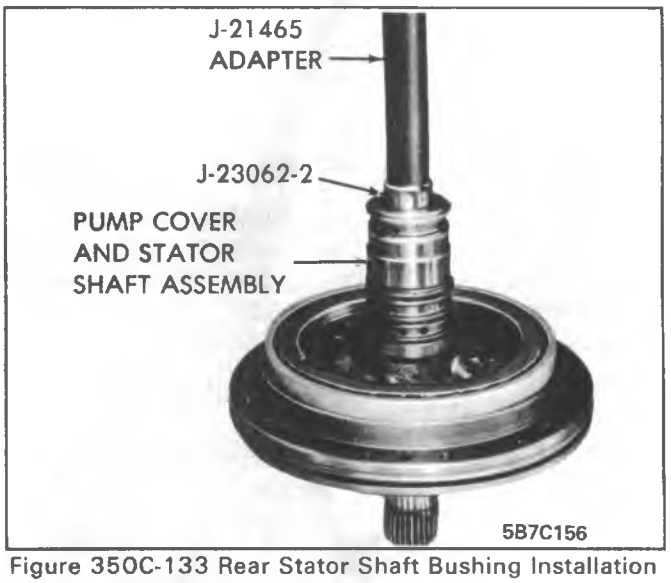


Figure 350C-133 Rear Stator Shaft Bushing Installation

2. Using Tool J-23062-12, press lower rear stator shaft bushing flush to .010" below chamfer on oil pump delivery sleeve.

Direct Clutch Bushing

Removal

1. If bushing replacement is necessary, use Tool J-23062-110 and Drive Handle J-8092 and remove the bushing. See Figure 350C-134.

Installation

1. Install direct clutch bushing using Tool J-23062-14, Drive Handle J-8092, and install .010" below slot in retainer hub. See Figure 350C-135.

L. Drive in Neutral

CHECK OUTSIDE MANUAL LINKAGE & CORRECT

↓

- INTERNAL LINKAGE -
MANUAL VALVE DISCONNECTED OR END BROKEN,
INSIDE DETENT LEVER PIN BROKEN

↓

- PUMP ASSEMBLY -
TRANSMISSION FLUID PRESSURE LEAKING INTO
FORWARD CLUTCH APPLY PASSAGE

↓

- FORWARD CLUTCH -
BURNED PLATES - CHECK CAUSE - PART u
INCORRECT CLUTCH PLATE USAGE - PART x

M. Will not Hold in Park or Will Not Release from Park

CHECK OUTSIDE MANUAL LINKAGE & CORRECT, PAGE 400-24

↓

- INTERNAL LINKAGE -

1. Parking brake rod assembly (Check actuator for chamfer)
2. Parking pawl broken, chamfer omitted.
3. Parking brake bracket loose, burr or rough edges or incorrectly installed.
4. Parking pawl return spring missing, broken, incorrectly hooked.
5. Broken lugs on output carrier.

Figure 400-12 Diagnosis

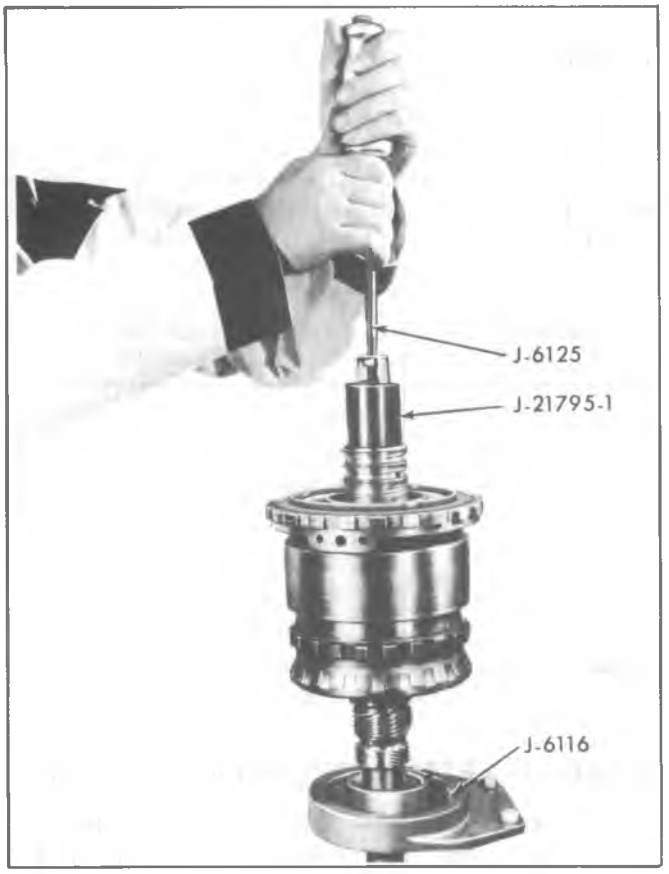


Figure 400-46 Gear Unit Holding Fixture

9. Using Adapter, J-21364, in Rear Unit Holding Fixture, J-6116-01, place gear unit assembly in holding fixture with mainshaft pointing upward, **Figure** 400-46. Remove Tool J-21795.

10. Remove rear unit selective washer from transmission case.

11. Remove the center support to case spacer, refer to **Figure** 400-76.

12. Remove rear band assembly. To facilitate removal, rotate band lugs away from pins and pull band assembly out of transmission case.

13. Remove center support assembly from reaction carrier by lifting straight upward.

14. Remove center support to reaction carrier thrust washer, **Figure** 400-47.

Thrust washer may have stuck to back of center support. If so, remove from center support.

15. Remove reaction carrier and roller clutch assembly from output carrier, **Figure** 400-48, and remove roller clutch assembly from reaction carrier.

TRANSMISSION DISASSEMBLY, CLEANING, INSPECTION AND ASSEMBLY OF INDIVIDUAL UNITS

Inspect each part thoroughly after the transmission and individual units have been disassembled and cleaned, to determine which parts should be replaced. It is very important to distinguish between parts that are simply "worn-in", and those parts worn to the extent that they affect operation of the unit. Only "worn-out", broken or damaged parts should be replaced.

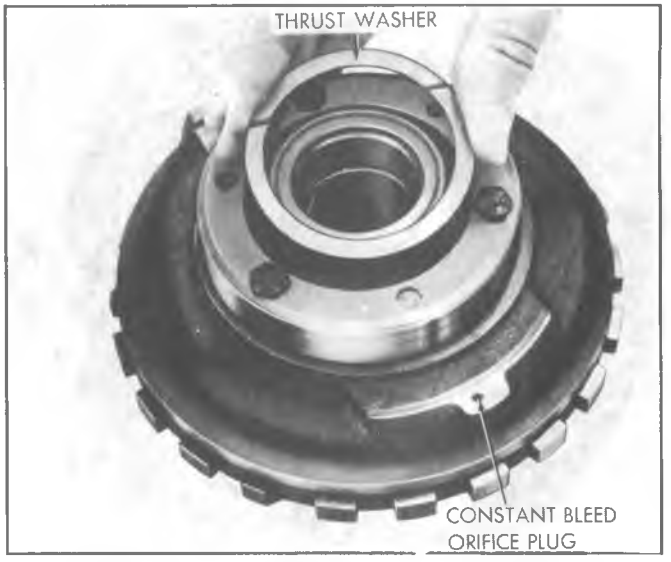


Figure 400-47 Removing Center Support to Reaction Carrier Thrust Washer

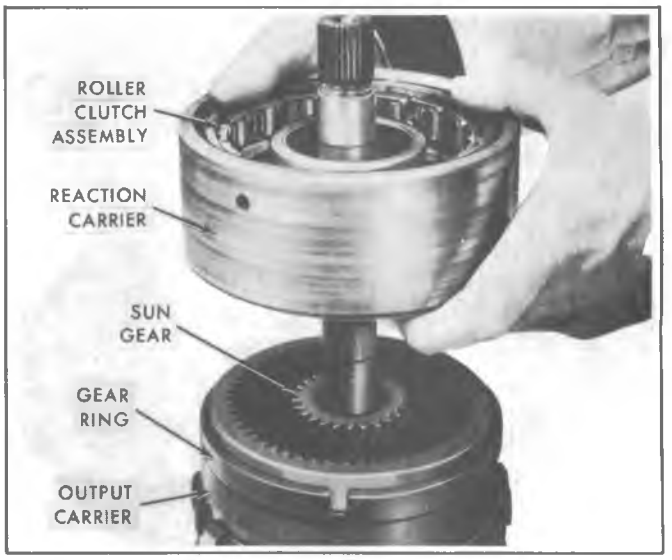


Figure 400-48 Roller Clutch Assembly

Inspection of Torque Converter

1. Check converter for leaks.

2. Check converter hub surfaces for signs of scoring or wear.

Inspection of Vacuum Modulator and Valve

1. Inspect vacuum modulator for any signs of bending or distortion.

2. Inspect O-ring seat for damage.

3. Inspect modulator valve for nicks or damage.

4. Check freeness of valve operation in case bore.

5. Check modulator for damaged bellows.

Modulator plunger is under approximately 16 pounds pressure. If bellows is damaged, plunger will have very little pressure. Use procedure outlined in Diagnosis Part V.

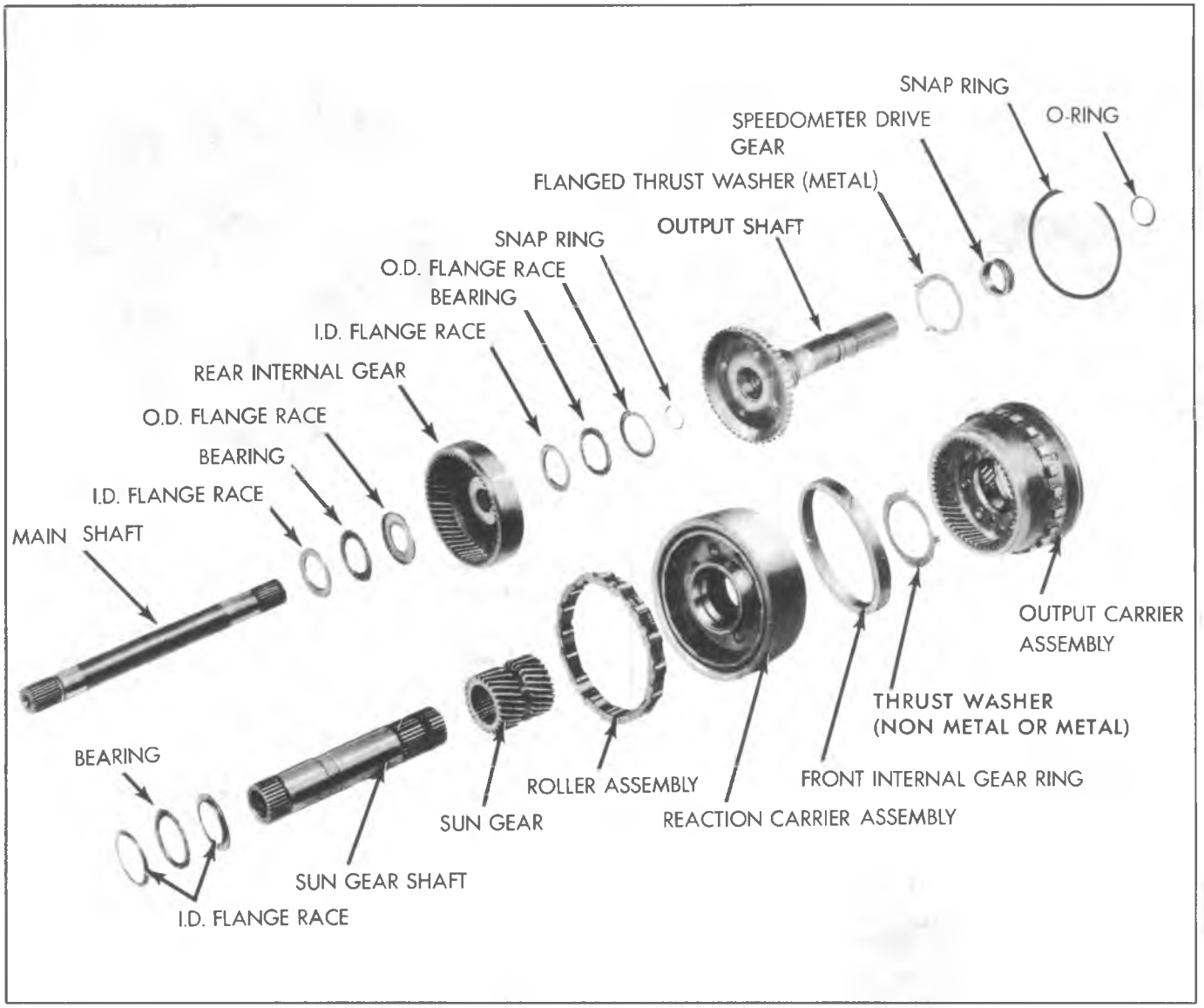


Figure400-84 Gear Unit - Disassembled View

4. Drive gear onto shaft until distance from rear face of gear to end of output shaft is 5-21/32", **Figure** 400-86.

Inspection of Main Shaft

1. Inspect shaft for cracks or distortion.
2. Inspect splines for damage.
3. Inspect ground bushing journals for damage.
4. Inspect snap ring groove for damage.
5. Make sure lubrication holes are open.

Inspection of Rear Internal Gear

1. Inspect gear teeth and bearing surfaces for damage or wear.
2. Inspect splines for damage.
3. Inspect gear for cracks.

Inspection of Output Carrier Assembly

1. Inspect front internal gear for damaged teeth.
2. Inspect pinion gears for damage, rough bearings or tilt.
3. Check pinion end play. Pinion end play should be .009 inch-.024 inch, **Figure** 400-87.
4. Inspect parking gear lugs for cracks or damage.
5. Inspect output shaft locating splines for damage.
6. Inspect front internal gear ring for flaking or cracks.

Inspection of Reaction Carrier Assembly

1. Inspect band surface on reaction carrier for signs of burning or scoring.
2. Inspect roller clutch outer cam for scoring or wear.
3. Inspect thrust washer surfaces for signs of scoring or wear.
4. Inspect bushing for damage. If bushing is damaged, carrier must be replaced.
5. Inspect pinion gears for damage, rough bearings or excessive tilt.
6. Check pinion end play. Pinion end play should be .009 inch-.024 inch.

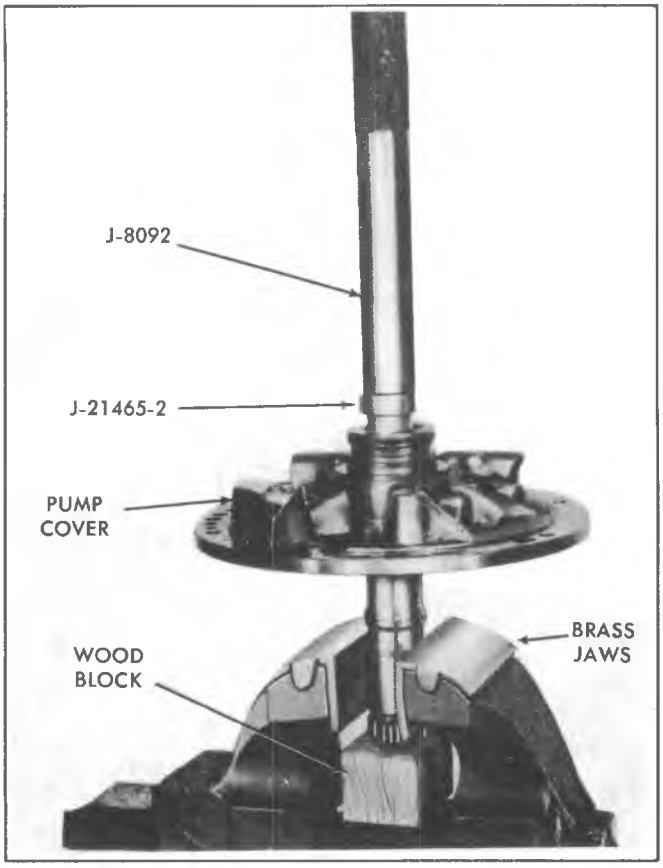


Figure 400-130 Installing Stator Shaft Rear Bushing.

STATOR SHAFT - FRONT BUSHING

1. Mount pump cover and stator shaft in vise as shown. Use brass jaws to protect shaft. Assemble Slide Hammer J-2619 and Adapter J-2619-4 on Remover J-21465-15. Thread remover into front bushing and remove bushing with slide hammer, **Figure** 7A-131.

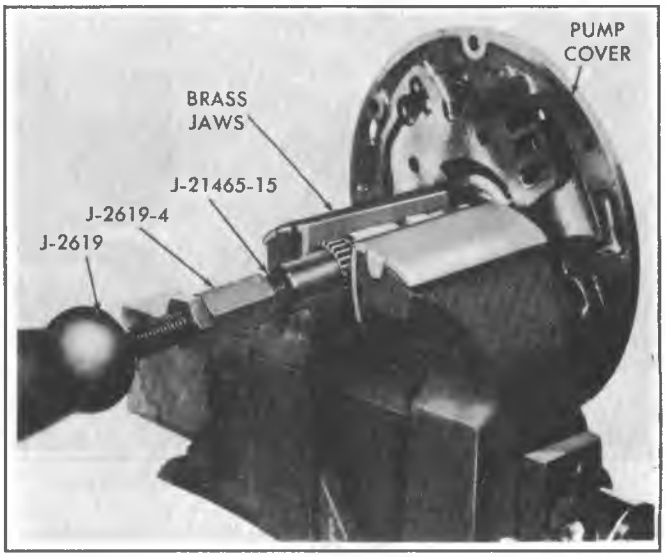


Figure 400-131 Removing Stator Shaft Front Bushing

2. Clean all shavings from stator shaft. Assemble installer J-21465-3 to Drive Handle J-8092. Locate new bushing on shoulder of installer and drive bushing squarely into bore with a lead or brass hammer, as shown in, **Figure** 400-132. Remove tool and inspect bushing.

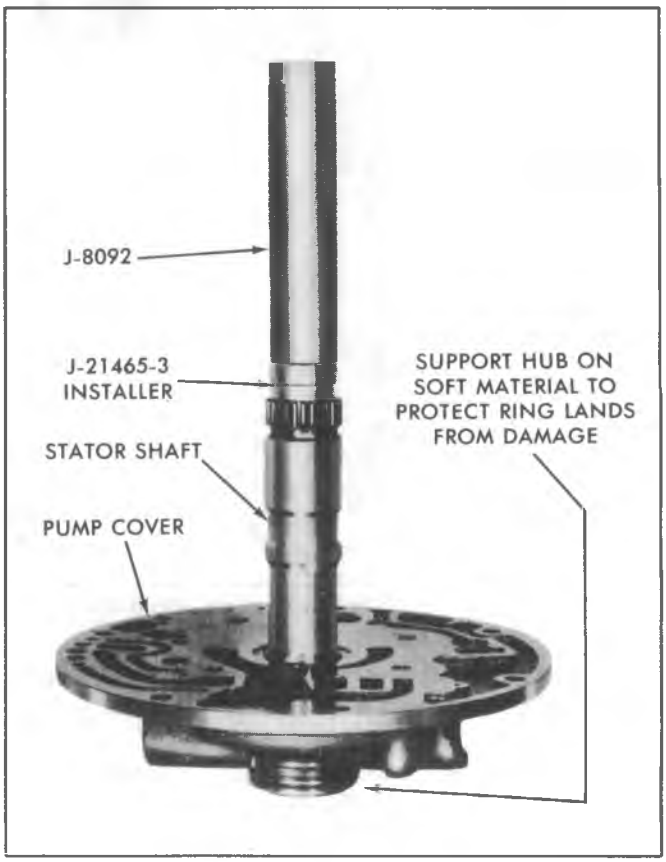


Figure 400-132 Installing Stator Shaft Front Bushing

CONDITION	INSPECT COMPONENT	FOR CAUSE
NO PARK	• Parking Linkage	– Actuator rod assembly bent or damaged. – Actuator rod spring binding or improperly crimped. – Actuator rod not attached to inside detent lever. – Parking bracket damaged or not torqued properly. – Inside detent lever not torqued properly. – Detent roller mispositioned or not torqued properly. – Parking pawl binding or damaged.
RACHETING NOISE	• Parking Pawl	– Parking pawl return spring weak, damaged or misassembled.
OIL OUT THE VENT	• Oil Pump	– Chamfer in pump body rotor pocket too large.
	• Valve Body	– T.V. limit valve stuck.
VIBRATION IN REVERSE AND WHINING NOISE IN PARK	• Oil Pump	– Broken vane rings.

490277-700-R4

Figure 17 Diagnosis Chart J

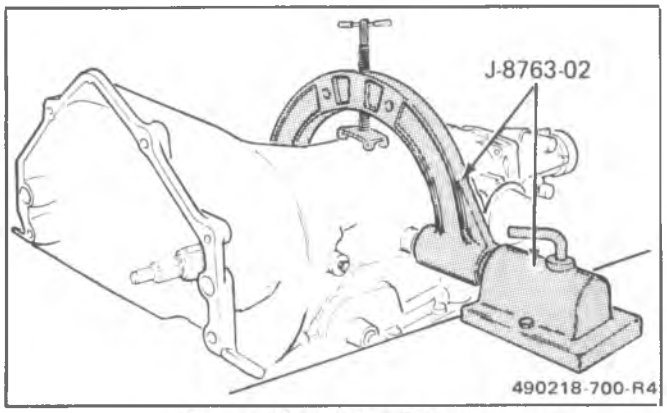


Figure 42 Holding Fixture

2. Servo cover retaining ring (13)
3. Servo cover and "O" ring seal (14 and 15)
4. 2-4 servo assembly (16-31)

Servo Pin Length

As a diagnostic aid, the servo pin length should now be checked. If the pin length is too short or too long be certain to inspect the 2-4 band and reverse input drum for damage or wear when disassembled.

Remove or Disconnect (Figures 43, 44, 45, 46)

TOOLS REQUIRED:
J-22269-01 Piston Compressor

1. 4th apply piston (16)
2. Servo return spring (31)
3. Servo pin retainer ring (18), washer (19), and apply pin spring (20)
4. 2nd apply piston pin (29).
5. Install J-22269-01.
6. Retainer ring (28)
7. Cushion spring retainer (27) and cushion spring (26)

Measure (Figure 47)

TOOLS REQUIRED:
J-33037 Band Apply Pin Tool

1. Install J-33037 as shown with apply pin (29).
2. Apply 11 N·m (100 in. lbs.) torque.
3. If white line "A" appears in gage slot "B" pin length is correct.
4. Use pin selection chart to determine correct pin length.

Governor and Extension

Remove or Disconnect (Figure 48)

1. Extension bolts (37) and case extension (36)
2. Extension seal ring (35)
3. Output shaft sleeve (690) and output shaft "O" ring seal (691)
   - Not all models use an output shaft sleeve and seal.
4. Speedometer drive gear (689) and clip (688)

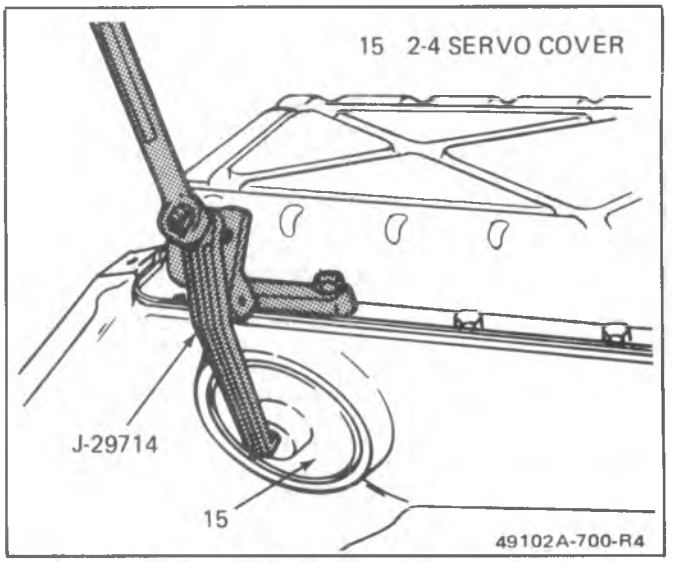


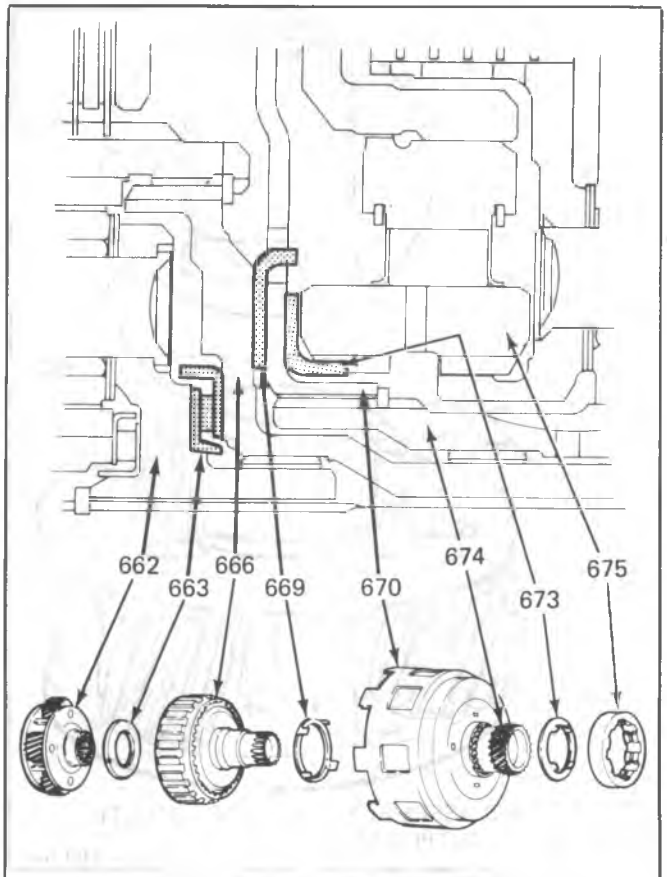
Figure 43 Servo Cover Removal

   - push tab of retaining clip down and tap speedometer gear off the output shaft. Use care not to damage the speedo gear.
5. Governor Cover (46)
   - tap around the cover flange with a punch to remove.
   - **DO NOT DAMAGE THE GOVERNOR COVER**
6. Governor assembly (45)

Valve Body and Wiring Harness

Remove or Disconnect (Figures 41, 49, 50, 51, 52, 53)

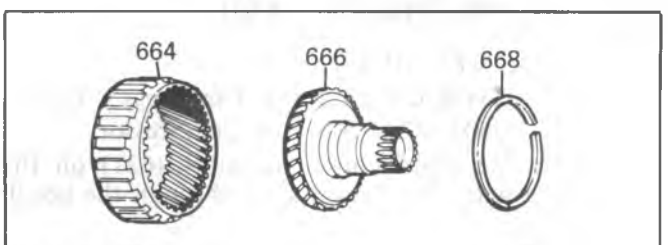
1. Bolts (74), oil pan (73), and gasket (72)
2. Oil filter (71) and "O" ring seal (70)
   - "O" ring seal may stick in the case.
3. Solenoid bolts (51), solenoid assembly (50), and "O" seal (49)
4. Outside electrical connector (33) and "O" ring seal (34)
5. Accumulator cover bolts (63) and 1-2 accumulator cover and pin assembly (62)
6. The 1-2 accumulator piston (61), seal (60), and spring (59)
7. Bolts (78) and oil passage cover (79)
8. Manual detent spring assembly (709)
9. Valve body bolts (69)
10. Electrical wire clips (66)
11. Wire harness retaining washer and the filter retainer clip (87)
12. Throttle bracket and lever assembly (65)
13. T.V. link (64)
14. Rod end clip (704)
15. Manual valve link (705)
16. Control body valve assembly (67)
17. Spacer plate (56) and spacer plate gaskets (88 and 89)
18. Nine checkballs (55 and 91)
   - four were located under the valve body and five are in the case. The large copper colored ball is the #10 checkball (91).



662 CARRIER ASSEMBLY, INPUT – COMPLETE
663 BEARING ASSEMBLY, THRUST (INPUT CARRIER TO REACTION SHAFT)
666 SHAFT, REACTION CARRIER
669 WASHER, THRUST (REACTION SHAFT/SHELL)
670 SHELL, REACTION SUN
673 GEAR, REACTION SUN
674 WASHER, THRUST (RACE/REACTION SHELL)
675 RACE, LO & REVERSE ROLLER CLUTCH

49008A-700-R4

Figure 83 Input Carrier and Reaction Shell Bearing and Thrust Washer Locations

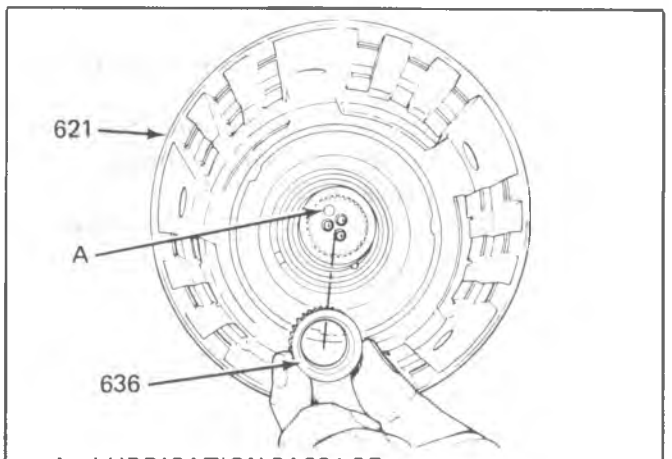


664 GEAR, INPUT INTERNAL
666 SHAFT, REACTION CARRIER
668 RING, REACTION SHAFT/INTERNAL GEAR RETAINER

490225-700-R4

Figure 84 Input Internal Gear and Reaction Shaft

- plugged or restrictred lube passages
- damaged splines or ring groove
- damaged governor drive gear teeth
- burrs or damage to the front of the shaft at seal area. (Polish with crocus cloth if necessary)
- burrs or damage to bearing journals



A LUBRICATION PASSAGE
621 HOUSING & SHAFT ASSEMBLY, INPUT
636 SEAL, INPUT HOUSING TO OUTPUT SHAFT

490260-700-R4

Figure 85 Input Hsg. to Output Shaft Lip Seal

Install or Connect (Figures 84, 86 and 87)

1. Reaction shaft (666) into the input internal gear (664)
2. Retainer ring (668) into the input internal gear (664)
3. Input internal gear and shaft assembly into the sun gear shell
   - index the shaft spline into the reaction carrier.
4. Thrust Bearing (663) onto the reaction carrier shaft.
   - outer race goes toward the reaction carrier shaft.
5. Output shaft (687) into the transmission
   - index the splines with the mating parts.
6. J-29837 onto the case (10)
   - position upwards as far as possible to support the output shaft (687).

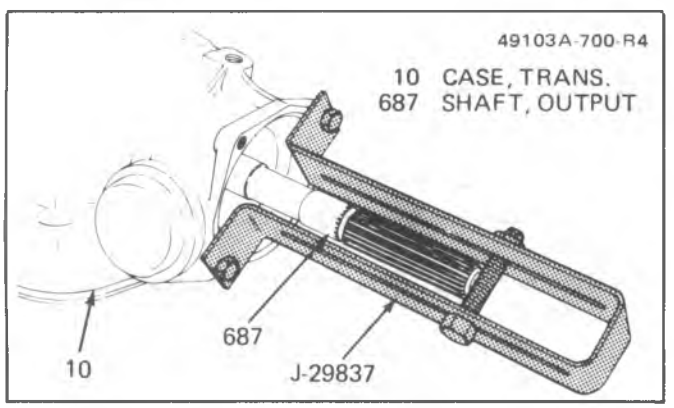


Figure 86 Output Shaft - Installation

Input Carrier and Sun Gear

Inspect (Figures 87 and 88)

- Input carrier assembly (662) for
  - pinion gear damage
  - excessive pinion washer wear (end play .20-.61 mm/.008-.024 in.)

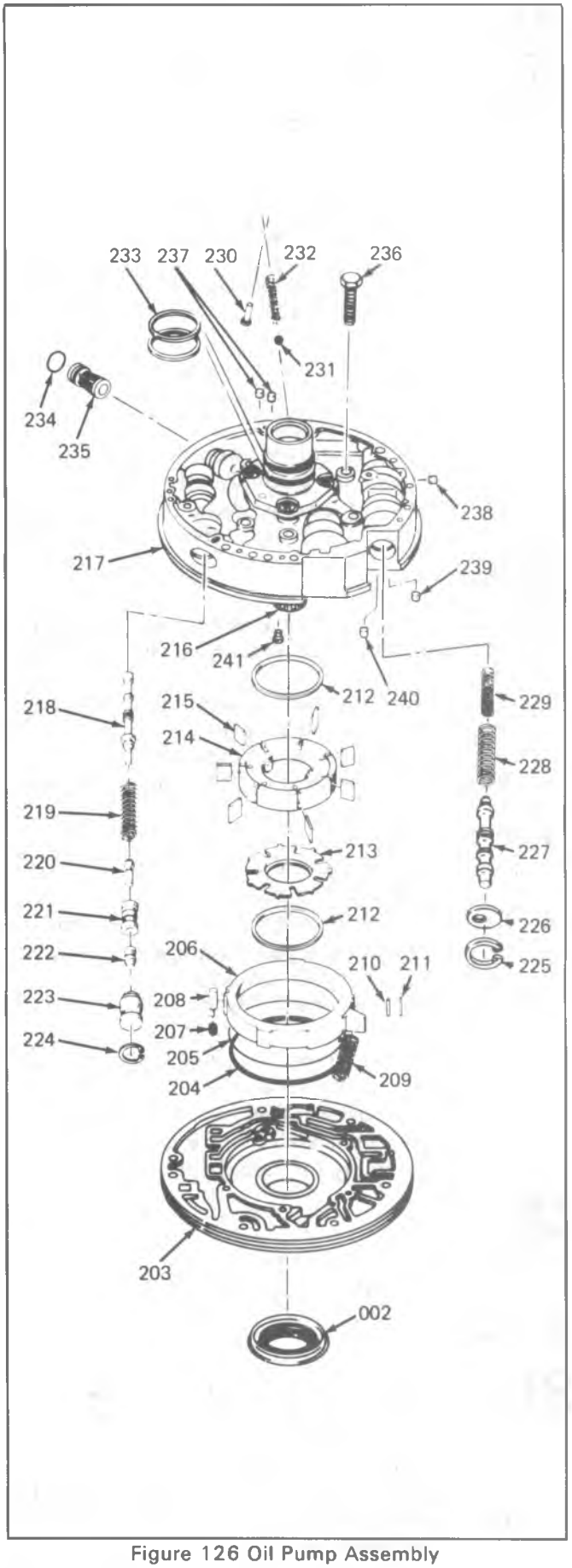


Figure 126 Oil Pump Assembly

490235-700-R4

ILL. NO.	DESCRIPTION
002	SEAL ASSEMBLY, OIL
203	BODY, PUMP
204	RING, OIL SEAL - SLIDE TO WEAR PLATE
205	SEAL "O" RING (SLIDE SEAL BACK-UP)
206	SLIDE, PUMP
207	SPRING, PIVOT PIN
208	PIN, PIVOT SLIDE
209	SPRING, PUMP SLIDE
210	SUPPORT, PUMP SLIDE SEAL
211	SEAL, PUMP SLIDE
212	RING, PUMP VANE
213	GUIDE, ROTOR
214	ROTOR, OIL PUMP
215	VANE, PUMP
216	SHAFT, STATOR
217	COVER, PUMP
218	VALVE, PRESSURE REGULATOR
219	SPRING, PRESSURE REGULATOR VALVE
220	VALVE, REVERSE BOOST
221	SLEEVE, REVERSE BOOST VALVE
222	VALVE, T.V. BOOST
223	BUSHING, T.V. BOOST
224	RING, OIL PUMP REV. BOOST VALVE RET.
225	RING, OIL PUMP CONV. CL. VALVE RET.
226	STOP VALVE
227	VALVE, CONVERTER CLUTCH
228	SPRING, CONV. CL. VALVE (OUTER)
229	SPRING, CONV. CL. VALVE (INNER)
230	RIVET, PRESSURE RELIEF BOLT
231	BALL, PRESSURE RELIEF
232	SPRING, PRESSURE RELIEF
233	RING, OIL SEAL (STATOR SHAFT)
234	SEAL, OIL PUMP COVER SCREEN
235	SCREEN, OIL PUMP COVER
236	BOLT, M8 X 1.25 X 40 (COVER TO BODY)
237	PLUG, OIL PUMP AIR BLEED
238	PLUG, OIL PUMP COVER
239	PLUG, OIL PUMP COOLER FEED
240	PLUG, OIL PUMP CONVERTER CL. SIGNAL
241	RETAINER & BALL ASM., PUMP COVER

Figure 126L

- index the notch in the slide with the pivot pin.
- the oil seal ring must face downward into the pump pocket.

4. Slide seal (211) and support (210)
5. Pump vane ring (212)
6. Rotor guide (213) onto the rotor
   - retain with petrolatum.
7. Rotor (214)
   - with guide toward the pump pocket.
8. Vanes (215)
9. Pump vane ring (212)
10. Pump slide spring (209)
11. Oil seal assembly (2), if removed.
    - use J-25016

Oil Pump Cover

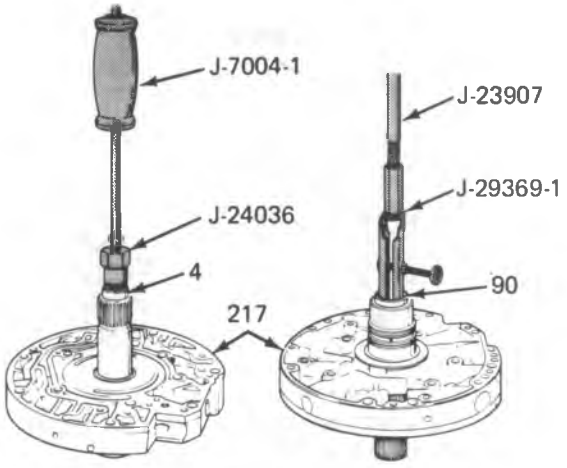
Assemble (Figures 126, 126L and 129)

1. "O" ring (234) onto the oil pump screen (235)
2. Oil pump screen (235) into the pump cover (217)

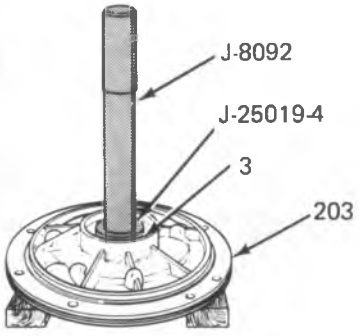
BUSHING REPLACEMENT PROCEDURE

PROTECT PARTS WITH WOOD BLOCKS OR CLOTH AS NECESSARY

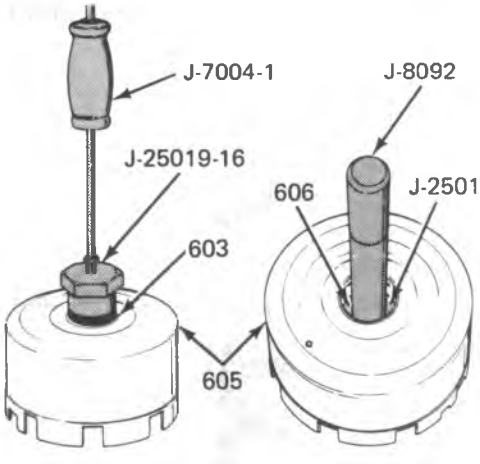
REMOVE AS SHOWN



4 BUSHING, STATOR SHAFT – FRONT
90 BUSHING, STATOR SHAFT – REAR
217 COVER, PUMP

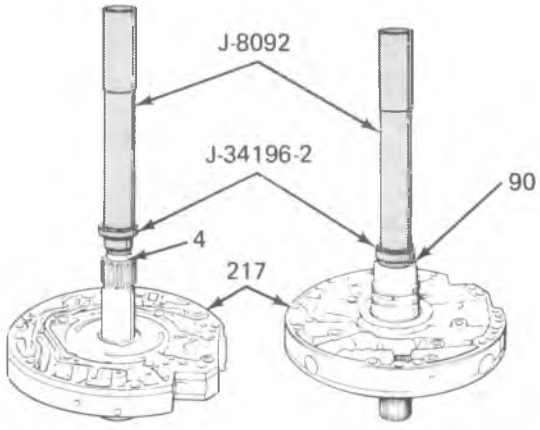


3 BUSHING, OIL PUMP BODY
203 BODY, PUMP

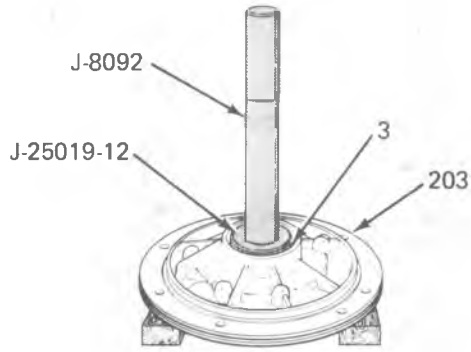


603 BUSHING, REVERSE INPUT CLUTCH – FRONT
605 HOUSING & DRUM ASSEMBLY, REVERSE INPUT CLUTCH
606 BUSHING, REVERSE INPUT CLUTCH – REAR

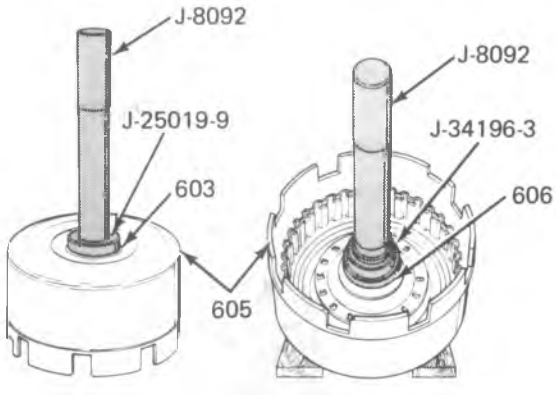
INSTALL AS SHOWN



4 BUSHING, STATOR SHAFT – FRONT
90 BUSHING, STATOR SHAFT – REAR
217 COVER, PUMP



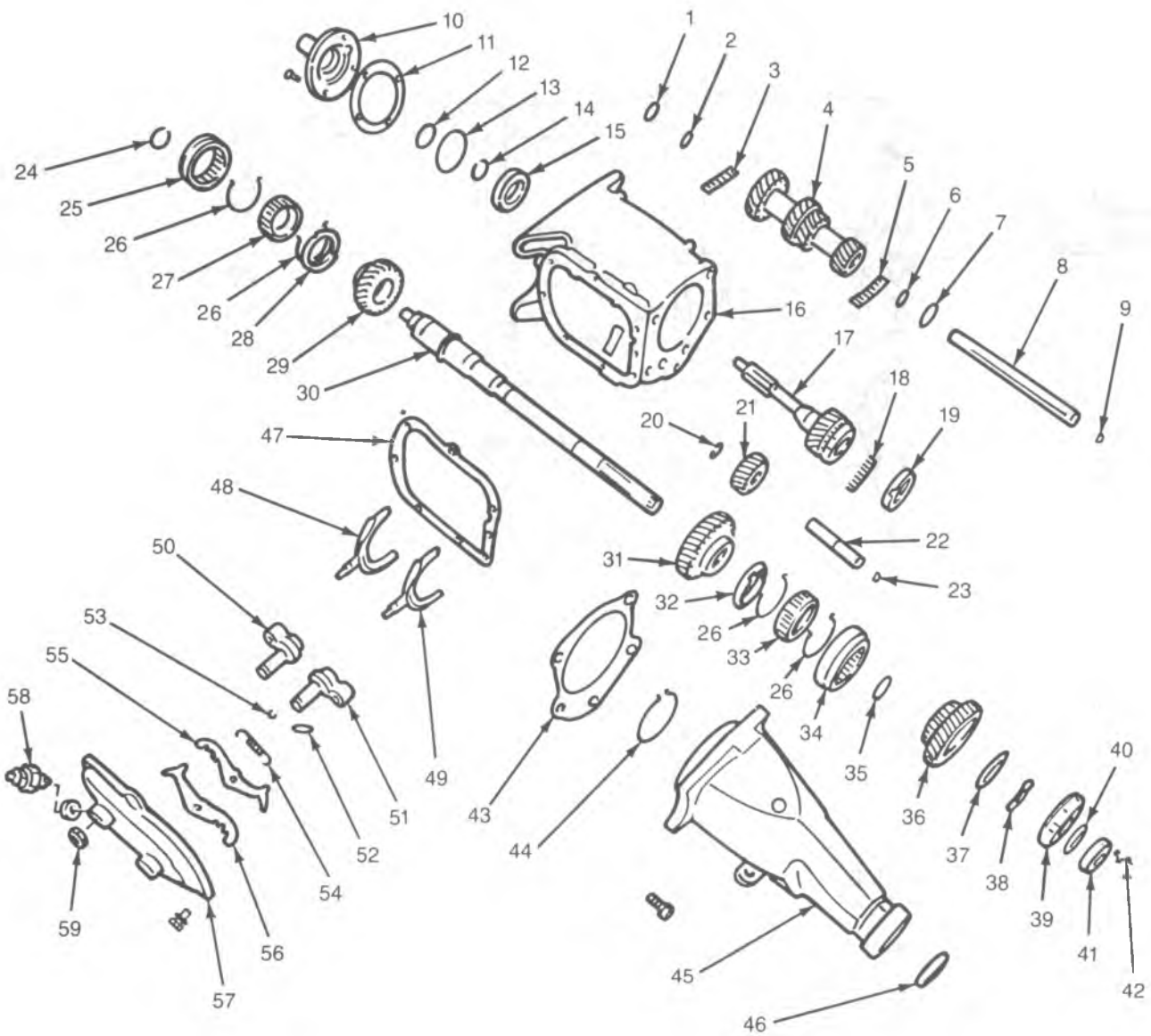
3 BUSHING, OIL PUMP BODY
203 BODY, PUMP



603 BUSHING, REVERSE INPUT CLUTCH – FRONT
605 HOUSING & DRUM ASSEMBLY, REVERSE INPUT CLUTCH
606 BUSHING, REVERSE INPUT CLUTCH – REAR

490232-700-R4

Figure 168 Bushing Replacement Procedure



1. THRUST WASHER — FRONT
2. BEARING WASHER
3. NEEDLE BEARINGS
4. COUNTERGEAR
5. NEEDLE BEARINGS
6. BEARING WASHER
7. THRUST WASHER — REAR
8. COUNTER SHAFT
9. WOODRUFF KEY
10. BEARING RETAINER
11. GASKET
12. OIL SEAL
13. SNAP RING — BEARING TO CASE
14. SNAP RING — BEARING TO GEAR
15. DRIVE GEAR BEARING
16. CASE
17. DRIVE GEAR
18. PILOT BEARINGS
19. 3RD SPEED BLOCKER RING
20. "E" RING
21. REVERSE IDLER GEAR
22. REVERSE IDLER SHAFT
23. WOODRUFF KEY
24. SNAP RING — HUB TO SHAFT
25. 2-3 SYNCHRONIZER SLEEVE
26. SYNCHRONIZER KEY SPRING
27. 2-3 SYNCHRONIZER HUB ASSEMBLY
28. 2ND SPEED BLOCKER RING
29. 2ND SPEED GEAR
30. MAINSHAFT
31. 1ST SPEED GEAR
32. 1ST SPEED BLOCKER RING
33. 1-2 SYNCHRONIZER HUB ASSEMBLY
34. 1-2 SYNCHRONIZER SLEEVE
35. SNAP RING — HUB TO SHAFT
36. REVERSE GEAR
37. THRUST WASHER
38. SPRING WASHER
39. REAR BEARING
40. SNAP RING — BEARING TO SHAFT
41. SPEEDOMETER DRIVE GEAR
42. RETAINING CLIP
43. GASKET
44. SNAP RING — REAR BEARING TO EXTENSION
45. EXTENSION
46. OIL SEAL
47. GASKET
48. 2-3 SHIFT FORK
49. 1ST AND REVERSE SHIFT FORK
50. 2-3 SHIFTER SHAFT ASSEMBLY
51. 1ST AND REVERSE SHIFTER SHAFT ASSEMBLY
52. "O" RING SEAL
53. "E" RING
54. SPRING
55. 2ND AND 3RD DETENT CAM
56. 1ST AND REVERSE DETENT CAM
57. SIDE COVER
58. TCS SWITCH AND GASKET
59. LIP SEAL

104633

Fig. 7B1-4--3-Speed 76mm Exploded View

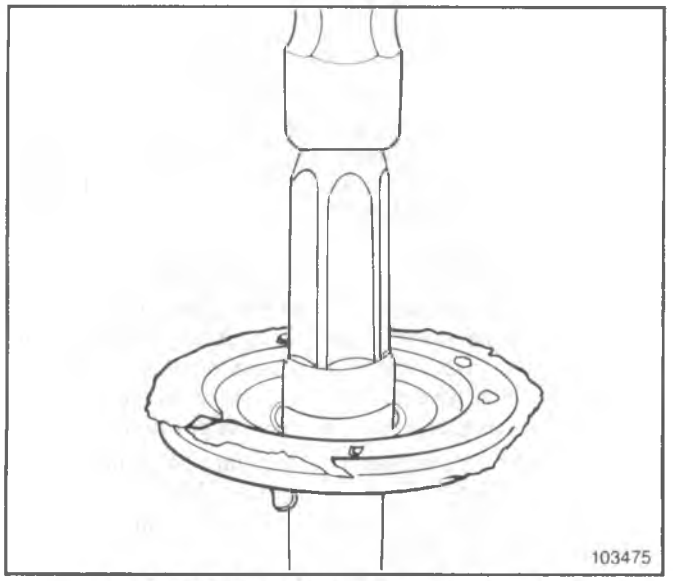


Fig. 7B3-20--Drive Gear Bearing Retainer Seal

3. Slide a new brushing on tool J-23596 and drive bushing into place. Refer to Fig. 7B3-18.
4. Position a new seal in opening of extension housing and drive it into the housing with tool J-21426. Refer to Fig. 7B3-19.

Drive Gear Bearing Retainer Oil Seal

Replacement

1. Pry out old seal.
2. Using a new seal, install new seal into retainer using Tool J-23096 until it bottoms in bore. Refer to Fig. 7B3-20. Lubricate I.D. of seal with transmission lubricant.

Transmission Side Cover (Fig. 7B3-21)

The following three steps need only be done if oil leakage is visible around gearshift lever shifts, or the interlock levers are cracked.

1. Remove nuts that attach shift operating levers to the shafts. Disengage levers from flats on shafts and remove. Makes ure shafts are free of burrs before removal, otherwise the bores may be scored resulting in leakage after reassembly.
2. Pull gearshift lever shafts out of cover.
3. Remove "O" ring retainers and "O" rings from housing.
4. Remove "E" ring from interlock lever pivot pin and remove interlock levers and spring from cover.
5. To assemble side cover, install interlock levers on pivot pin and fasten with "E" ring. Use pliers to install spring on interlock lever hangers.
6. Grease housing bores and push each shaft into its proper bore followed by greased "O" ring and retainer.
7. Install operating levers and torque retaining nuts to specifications. Be sure 3rd-O/D operating levers point downward.

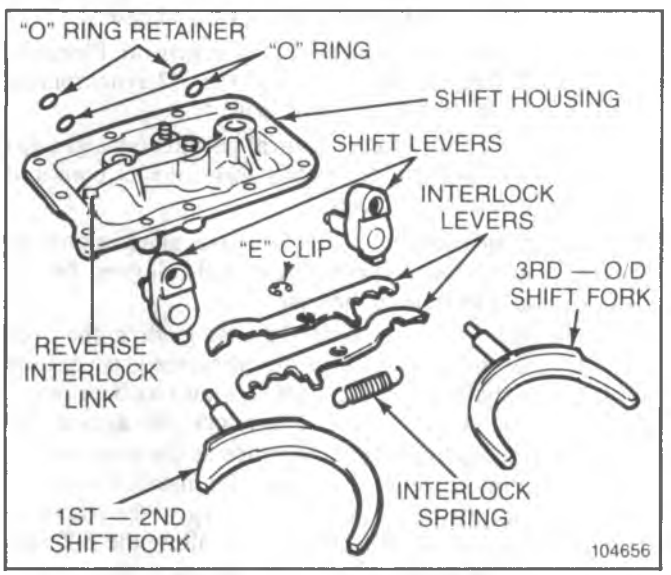


Fig. 7B3-21--Side Cover Exploded View

COUNTERGEAR

Assembly

1. Coat inside bore of countergear at each end with a thin film of grease and install spacer with Tool J-29793 into gear. Center spacer and arbor.
2. Install 19 roller bearings, followed by a spacer ring and 19 more bearings and a spacer ring into each end of gear.
3. If countershaft thrust washers are worn or scored, install new thrust washers. Coat washers with grease and install one at the front of the countergear on the arbor with the tang side facing the case bore. Install the other washer after the countergear assemble is positioned in the bottom of the case.

DRIVE GEAR

Assembly

1. Press drive gear bearing on drive gear seating bearing fully against shoulder on gear. Be sure outer snap ring groove is toward the front. Refer to Fig. 7B3-22.
2. Install a new snap ring on shaft to retain bearing. Be sure snap ring is seated. This snap ring is a select fit for minimum end play.
3. Place drive gear in a vise (with soft jaws), then install 16 bearing rollers in cavity of shaft. Coat bearing rollers with grease, then install retaining snap ring in its groove.

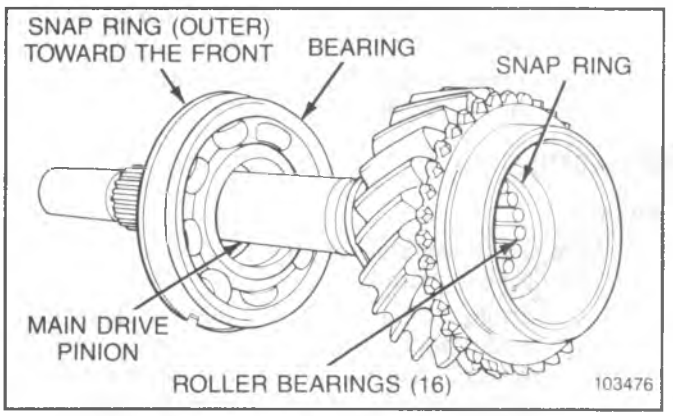


Fig. 7B3-22--Drive Pinion and Bearing Assembly

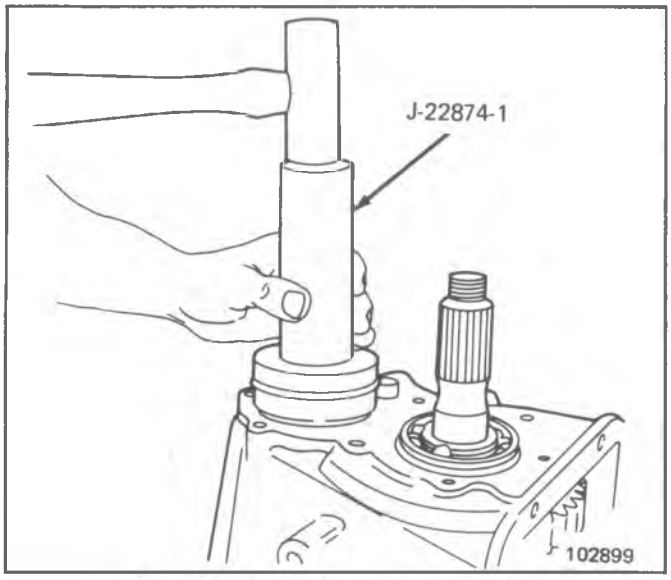


Fig. 7B4-29--Countergear Rear Bearing

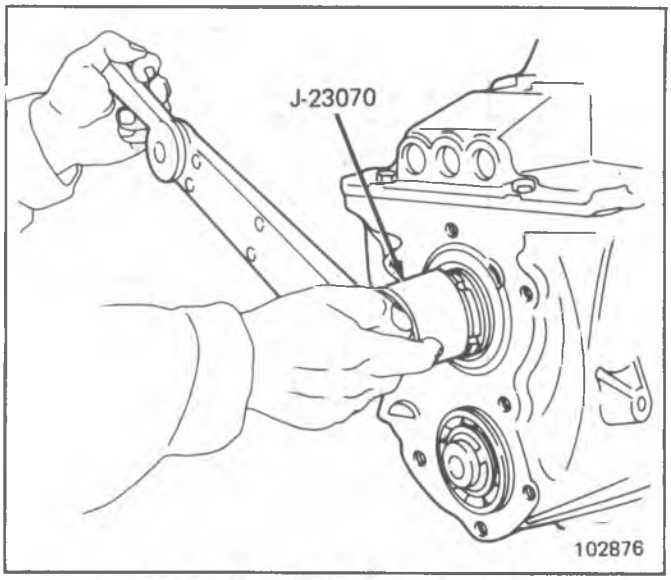


Fig. 7B4-30--Mainshaft Rear Bearing Lock Nut

gear teeth toward the front. Install idler gear shaft from rear to front, being carefuly to have slot in end of shaft in facing down. Shaft slot face must be at least flush with case.

3. Install mainshaft assembly into case with rear of shaft protruding out rear bearing hole in case. Position Tool J-22874 in clutch gear case opening and engaging front mainshaft (Fig. 7B4-27). Rotate case onto front end.

   Install 1st speed gear thrust washer on shaft, if not previously installed.

4. Install snap ring on bearing O.D. and position rear mainshaft bearing on shaft. Using Tool J-22874-1 drive bearing onto shaft and into case (Fig. 7B4-27). Rotate case and remove Tool J-22874-5.

5. Install synchronizer cone on pilot end of mainshaft and slide rearward to clutch hub. Make sure three cut out sections of 4th speed synchronizer cone align with three clutch keys in clutch assembly.

6. Install snap ring on drive gear bearing O.D. Index cut out portion of drive gear teeth to obtain clearance over countershaft drive gear teeth, and install clutch gear assembly onto case. Raise mainshaft to get clutch gear started and tap bearing outer race with plastic tip hammer.

7. Install drive gear bearing retainer using a new gasket, install bolts and torque to specifications.

8. Install appropriate tool in countergear front bearing opening in case to support countergear and rotate case onto front end. (Fig. 7B4-28).

9. Install snap ring on countergear rear bearing O.D. position, bearing on countergear and using Tool J-22874-1, drive bearing into place (Fig. 7B4-29). Rotate case, install snap ring on countershaft at rear bearing and then remove Tool J-22874-1.

10. Tap countergear front bearing assembly into case.

11. Install countergear front bearing cap and new gasket. Torque screws to specifications.

12. Slide speedometer drive gear over mainshaft to bearing.

13. Install rear bearing retainer with new gasket. Be sure snap ring ends are in lube slot and cut out in bearing retainer. Install bolts and torque to specifications. Install brake backing plate assembly on models equipped with propeller shaft brake.

    On models equipped with 4-wheel drive, install rear lock nut and washer using Tool J-23070 (Fig. 7B4-30). Torque lock nut to specifications and bend washer tangs to fit slots in nut.

14. Install parking brake drum and/or universal joint flange. Apply light coat of oil to seal surface.

15. Lock transmission in two gears at once. Install universal joint flange locknut and torque to specifications.

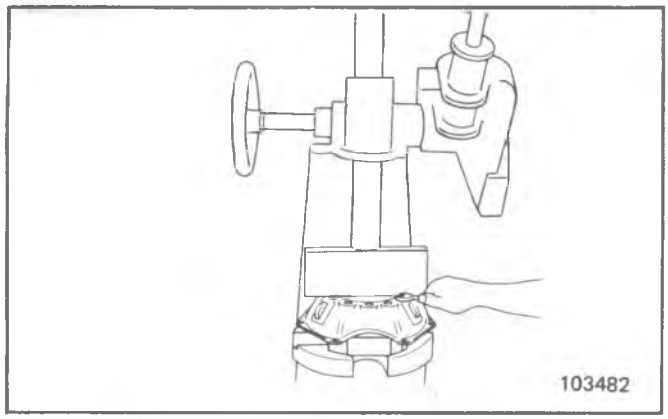


Fig. 7C-17--Compressing Clutch

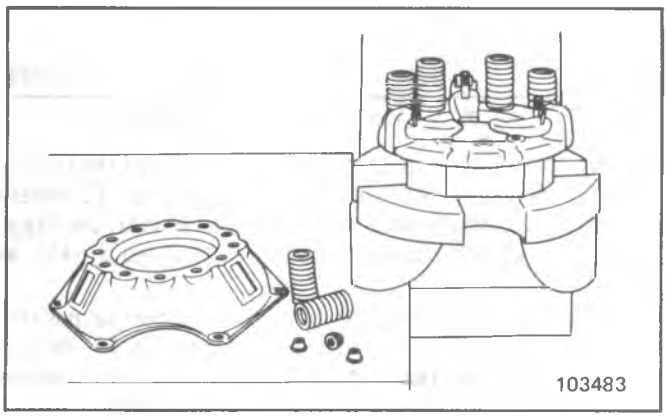


Fig. 7C-18--Disassembly of Clutch

SINGLE PLATE COIL SPRING CLUTCH

Disassembly

1. Place the cover assembly on the bed of an arbor or drill press with a block under the pressure plate so arranged that the cover is left free to move down.
2. Place a block or bar across the top of the cover with the spindle. Hold compressed while the adjusting nuts are removed, as shown in Fig. 7C-17. Then slowly release pressure to prevent springs flying out.
3. Lift off cover and all parts will be available for inspection. Note carefully the location of all parts including arrangement of springs. See Fig. 7C-18.
4. To remove levers grasp lever and eyebolt between thumb and fingers as shown in Figure 7C-19, so that

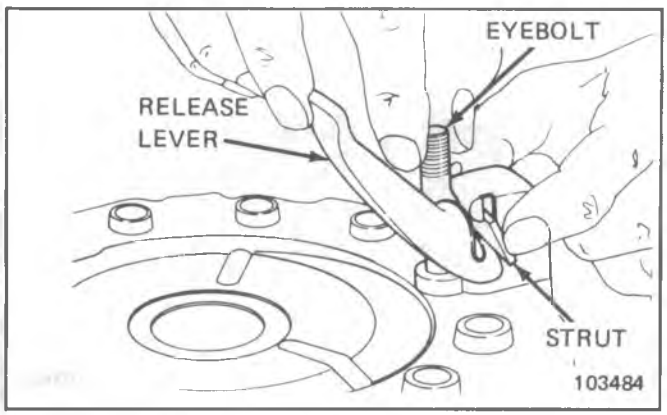


Fig. 7C-19--Grasping Lever and Strut

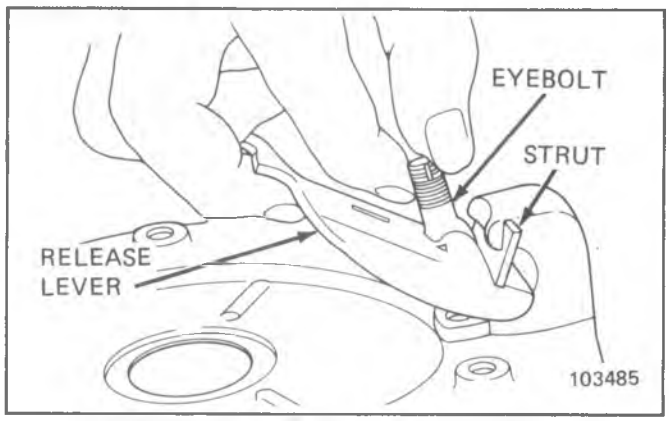


Fig. 7C-20--Removing or Installing Lever

inner end of lever and upper end of eyebolt are close together, keeping eyebolt pin seated in its socket in lever.

5. Lift strut over ridge on end of lever, as in Fig. 7C-20.
6. Lift lever and eyebolt off pressure plate.

NOTICE: It is important to replace all parts which show wear, to avoid damaging other components.

Inspection

In addition to applicable items listed under Diaphragm Clutch Inspection, check the following items.

1. Check driving lugs for wear.
2. Check clutch cover for distortion or cracks.
3. Check release levers for wear or cracks.

Assembly

1. Lay the pressure plate on the block in the press and coat the lugs with a thin film of approved lubricant such as lubriplate. See Fig. 7C-21.
2. Assemble lever, eyebolt and pin, holding eyebolt and lever as close together as possible and with the other hand grasp strut as shown in Fig. 7C-22.
3. Insert strut in the slots in the pressure plate lug, drop slightly and tilt the lower edge until it touches vertical milled surface of lug.
4. Insert lower end of eyebolt in hole in pressure plate. The short end of the lever will then be under the hook of the pressure plate and near the strut, as in Fig. 7C-20.

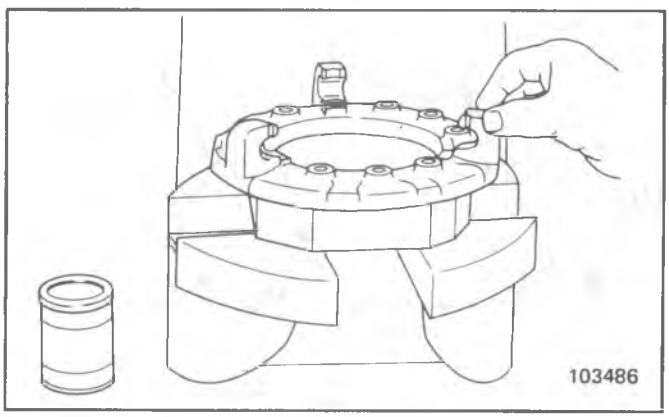


Fig. 7C-21--Greasing Lug

surface of front case and install rear case on front case. Be sure front output shaft rear thrust bearing assembly is seated in the rear case.

28. Align case bolt holes and alignment dowels and install bolts. Tighten bolts alternately and evenly to 31 N·m (23 ft. lb.). Besure to install flat washers on the two bolts installed at the opposite ends of the case.
29. Install seal in pump housing. Apply petroleum jelly to pump housing tabs and install housing in rear retainer.
30. Apply Loctite 515 sealant, or equivalent, to mating surface of rear retainer.
31. Align rear retainer and case index marks and install retainer. Install and tighten retainer bolts to 31 N·m (23 ft. lb.).
32. Install oil seal in rear retainer bore. Coat seal lip with petroleum jelly before installation.
33. Install washer and indicator switch. Tighten switch to 24 N·m (18 ft. lb.).
34. Apply small quantity of Loctite 515 sealant, or equivalent, to detent retainer bolt and install detent ball, spring and bolt (Fig. 7E-9). Tighten bolt to 31 N·m (23 ft. lb.).
35. Install drain plug and gasket. Tighten plug to 24 N·m (18 ft. lb.).
36. Install oil seal in front case output shaft bore.
37. Install front yoke.
38. Install yoke seal washer and yoke nut. Tighten nuts to 163 N·m (120 ft. lb.).
39. Pour 10 pints of Dexron® II into transfer case through fill plug hole and install and tighten fill plug to 24 N·m (18 ft. lb.).

	N·m MODEL 208
NUT, SHIFT LEVER-TO-SHIFTER ASSEMBLY	19-27
NUT, KNOB ASSEMBLY-TO-SHIFT LEVER	26-40
BOLT, SHIFTER ASSEMBLY-TO-TRANSFER CASE	120-140
NUT, SHIFT ARMS-TO-CASE	14-20
SCREW, SHIFT LEVER BOOT RETAINER	2.2-3.2
BOLT, DETENT RETAINER	27-34
SWITCH, INDICATOR	122-176
BOLT, ADAPTER-TO-TRANSMISSION	26-40
BOLT, ADAPTER-TO-TRANSFER CASE	26-40
FILLER PLUG	40-54
NUT, SKID PLATE-TO-CROSSMEMBER	55-70
BOLT, SUPPORT STRUT ROD	
— TRANSMISSION END	40-54
— TRANSFER CASE END	150-200

MODEL NO.	205 (PART TIME)	208 (PART TIME)
RATIOS: HI RANGE LO RANGE	1.00 TO 1 1.96 TO 1	2.61 TO 1
LEVER POSITIONS	4-LO (ALL WHEEL UNDERDRIVE) N (NEUTRAL) 2-HI (REAR WHEEL DRIVE) 4-HI (ALL WHEEL DIRECT DRIVE)	4-LO (ALL WHEEL UNDERDRIVE) N (NEUTRAL) 2-HI (REAR WHEEL DRIVE) 4-HI (ALL WHEEL DIRECT DRIVE)
LEVER LOCATION	REAR OF TRANS. SHIFT LEVER	REAR OF TRANS. SHIFT LEVER
LUBRICANTS: OIL CAPACITY	5.2 PINTS*	10 PINTS*
TYPE, GRADE	SEE OWNER'S MANUAL	SEE OWNER'S MANUAL

* TO BE FILLED TO EDGE OF FILL PLUG HOLE.

Fig. 7E-SP Specifications

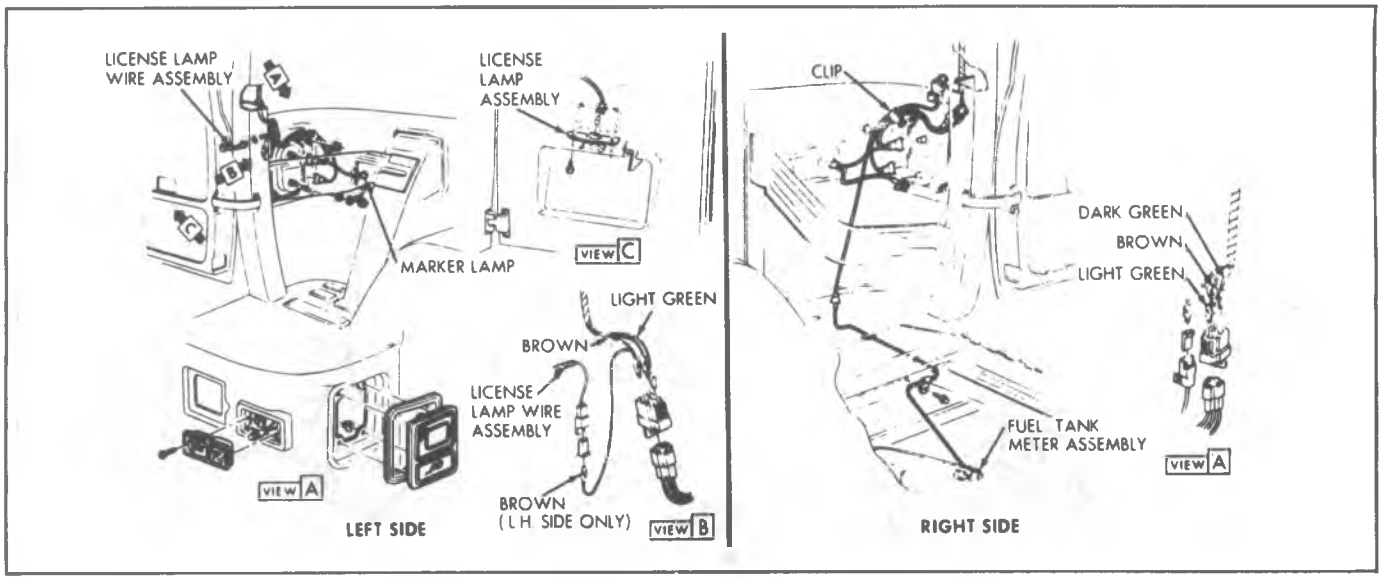


Fig. 8B-11--Rear Lighting (G Models)

TAIL, STOP AND BACKUP LAMP HOUSING

C-K 16, 03 and 63 w/E63 and 06 Models

All G Models

Replacement

1. Remove lens to housing attaching screws.
2. Remove bulbs from sockets.
3. Remove housing attaching screws (nuts on G Models).
4. Rotate wiring harness sockets counterclockwise and remove housing.
5. To install, reverse Steps 1-4 above.

DIRECTIONAL SIGNAL LAMPS

Directional signal lamps are an integral part of parking and tail lamp assemblies. Refer to the applicable lamp or bulb replacement procedures covered previously.

CLEARANCE, LICENSE PLATE AND IDENTIFICATION LAMPS

Refer to Figures 8B-16 and 8B-17 for clearance, license plate and identification lamp installations.

LIGHT SWITCH

C-K Series (Fig. 8B-18)

Replacement

1. Disconnect battery ground cable.
2. Reaching up behind instrument cluster, depress shaft retaining button and remove switch knob and rod.
3. Remove instrument cluster bezel screws on left end. Pull out on bezel and hold switch nut with a wrench.
4. Disconnect multiple wiring connectors at switch terminals.
5. Remove switch by rotating while holding switch nut.
6. To install, reverse Steps 1-5 above.

G Series (Fig. 8B-18)

Replacement

1. Disconnect battery ground cable.
2. Reaching up behind instrument panel, depress shaft retaining button and remove switch knob-shaft.
3. From front of instrument panel remove switch retaining nut.
4. Push switch from panel opening and remove multiple electrical connector at switch terminals.
5. To install, reverse Steps 1-4, making sure grounding ring is installed on switch.

NEUTRAL START SWITCH

C-K Models (Fig. 8C-23)

Replacement and Adjustment

1. Disconnect battery ground cable.
2. Disconnect electrical harness at switch.
3. Remove switch mounting screws and remove switch.
4. Position shift lever in neutral gate notch.
5. Insert .096" (2.4mm) gage pin to depth of 3/8 inch (9.5mm) into switch gage hole. switch assembly is fixed in neutral position with internal plastic shear pin.
6. Assemble the switch to column by inserting the switch carrier tang in the shift tube slot and fasten in position by assembling mounting screws to retainers. If retainer strips out it must be replaced.
7. Remove .096" gage pin.
8. Move shift lever out of neutral gate notch to park gate position to shear switch internal plastic pin.
9. Return shift lever to neutral gate notch.
10. Switch (2.0mm) gage hole will freely admit .080" gage pin to a depth of 3/8 inch (9.5mm).
11. If pin will not freely enter gage hole, switch must be reset as below.
12. Connect battery ground cable and electrical harness.

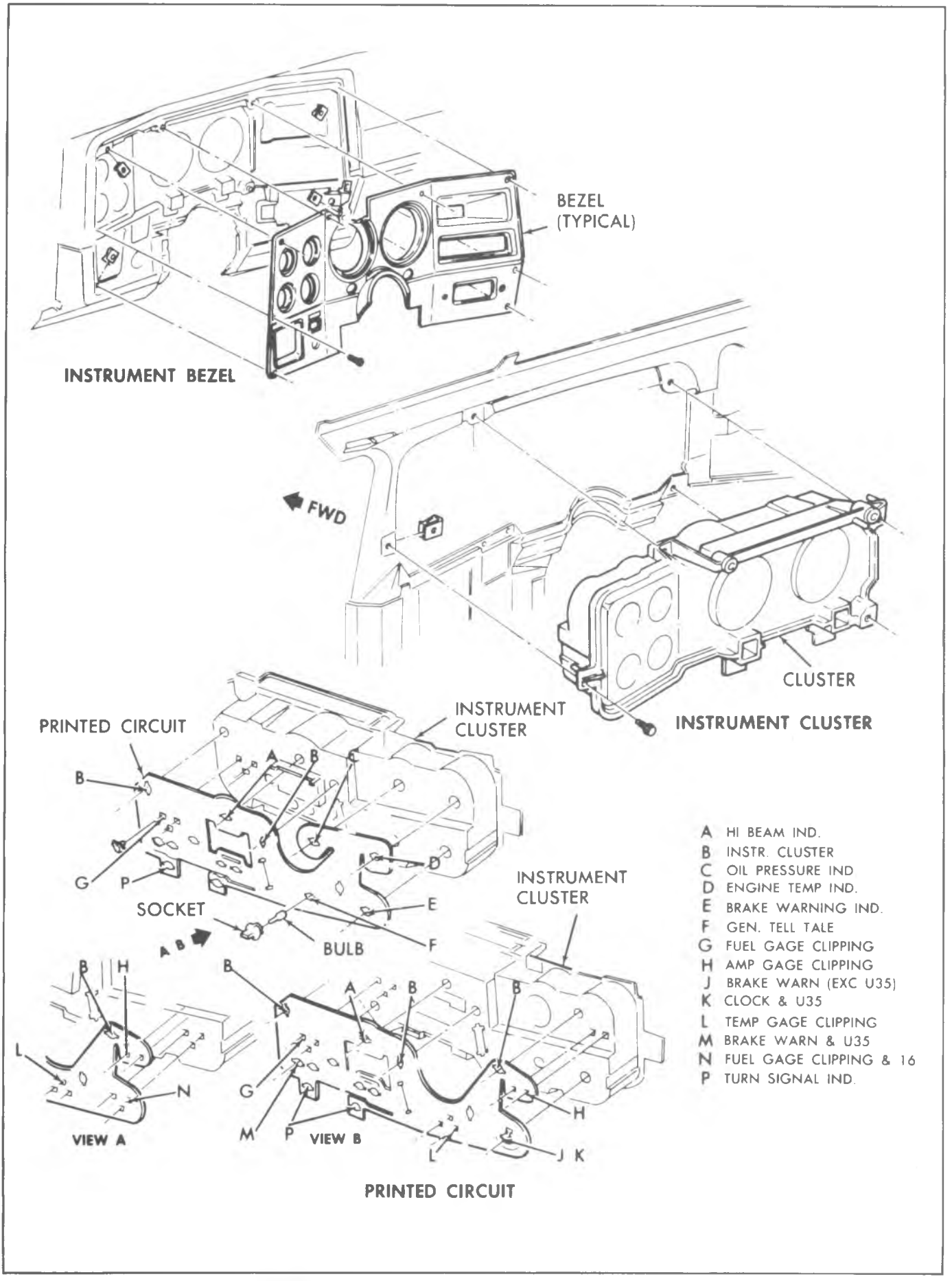
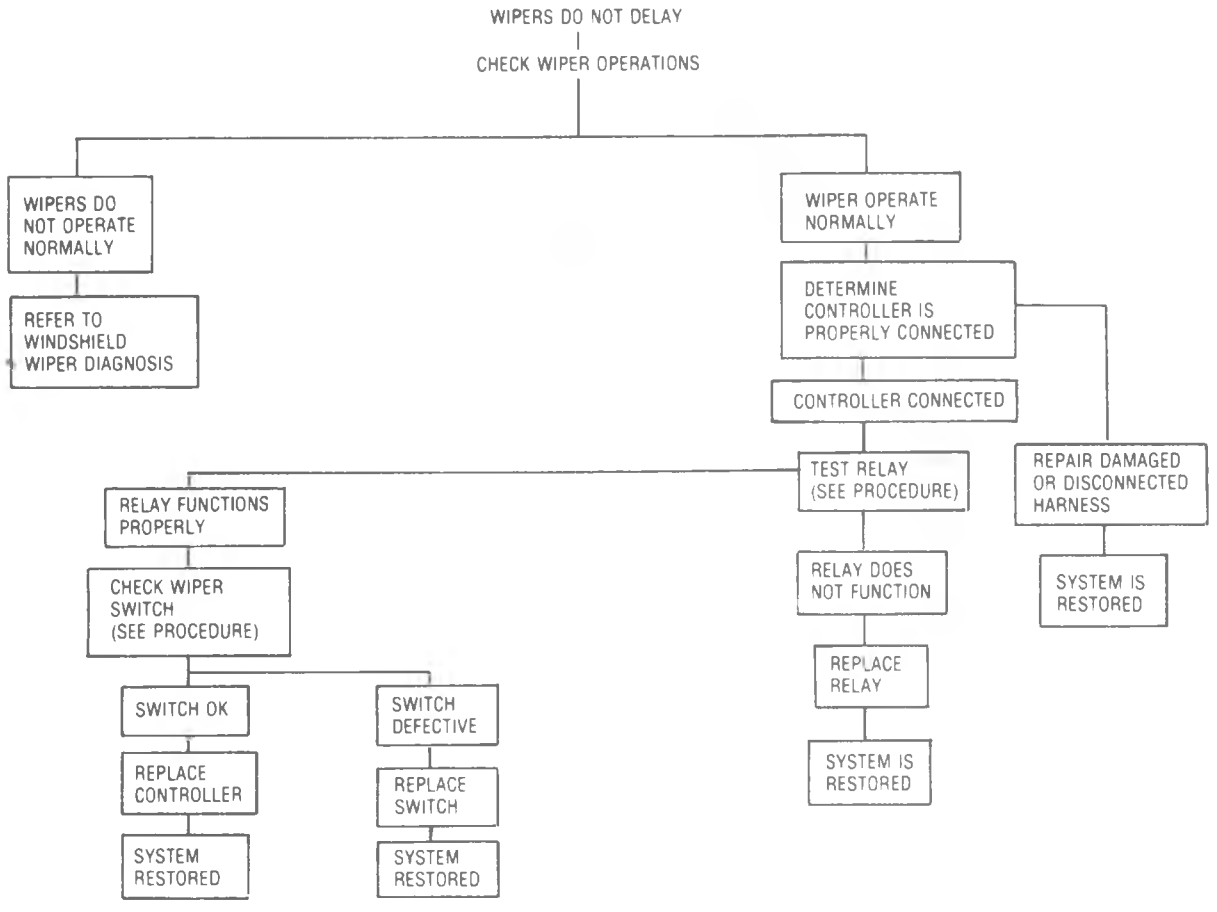


Fig. 8C-1--Instrument Cluster Assembly (C-K Series)

Diagnosis



Selector Switch Checking Procedure

If the wiper/washer selector switch is suspected of being faulty, it can be checked with an ohm meter as indicated in table below. Before performing any continuity check on selector switch, disconnect both harness connectors from switch to controller. Next, place selector switch in mode desired and perform a continuity check between the individual leads as indicated in table below, Figure 15. If there is a meter reading at each check but no indication of shorts, switch can be assumed to be good.

	Mist	Off	Delay	Delay (Rotate Control full clockwise)	LO	HI	Wash (Off Mode — press in on control)
Dark Blue							X
Light Blue	X				X	X	X
Green	X	X			X	X	X
Black	X	X	X		X	X	X
Black Wht Str	X	X	X		X		X
Orange				X			
White				X			

CONDITION	APPARENT CAUSE	CORRECTION
1. Wiper Inoperative or Intermittent	A. Broken or damaged gear train (only if inoperative)	A. Replace gears as required
	B. Poor solder connections at terminal board	B. Resolder wires at terminals
	C. Loose splice joints at brush plate	C. Recrimp or solder splice joints
	D. Brushes binding in brush holder	D. Clean holder or replace brush, spring or brush plate assembly.
	E. Open circuit in armature	E. Replace armature
2. Wiper will not shut-off: A. Wiper has normal "Hi" and "Lo" speed	A. Defective park switch	A. Replace terminal board assembly
	B. Grounded red lead wire	B. Repair short circuit in red wire
B. Wiper has "Lo" speed only	A. Grounded shunt field coil	A. Replace frame and field assembly
	B. Grounded black wire	B. Repair short circuit in black wire
C. Wiper has "Hi" speed only	A. Open circuit in shunt field coil	A. Replace frame and field assembly
	B. Open circuit in black wire	B. Repair broken wire or poor solder connection
3. Wiper shuts off - but not in park position	A. Park switch defective or contacts dirty	A. Replace terminal board assembly or clean contacts
4. "Hi" speed too fast	A. Resistor defective	A. Replace terminal board assembly

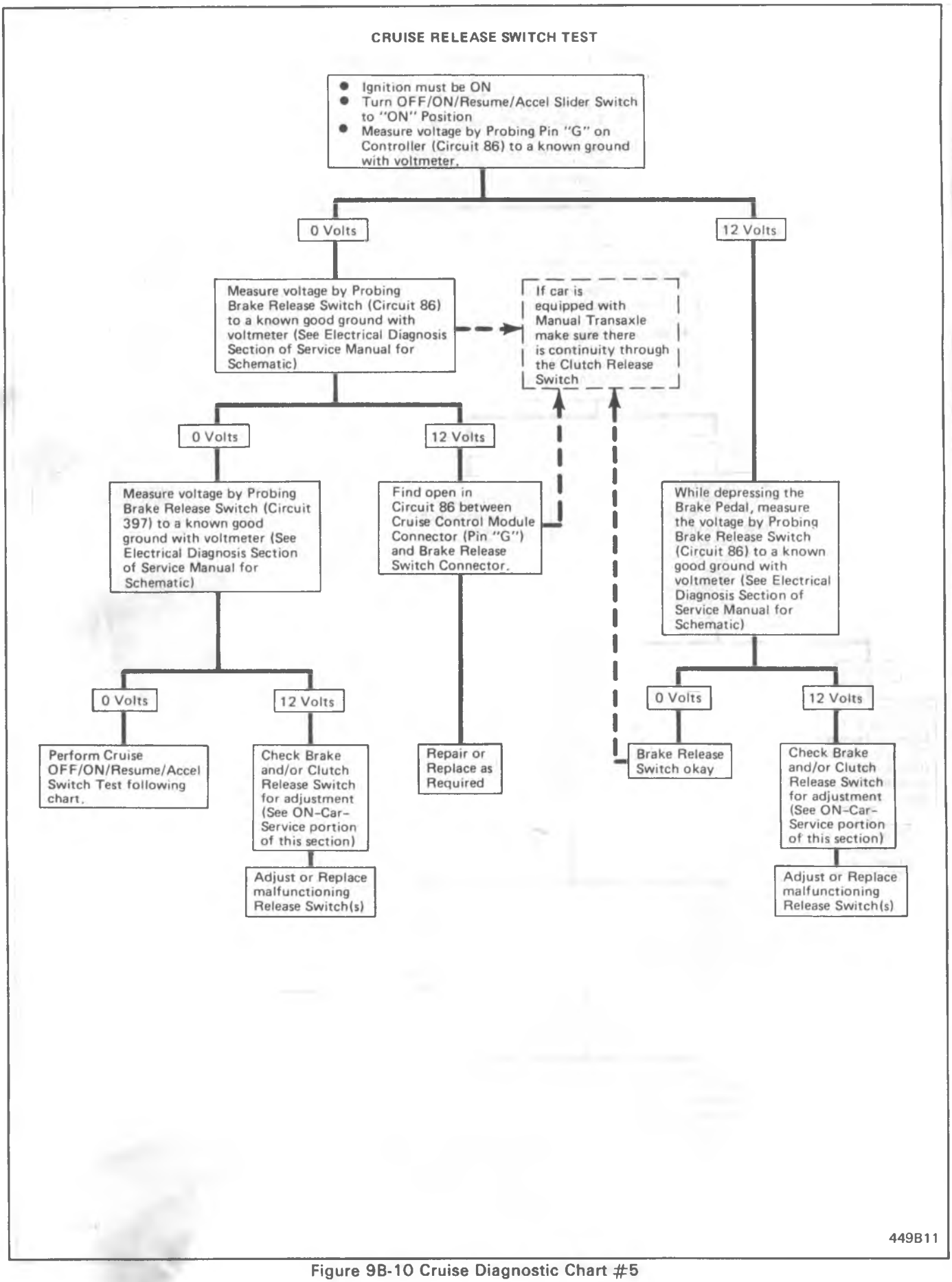


Figure 9B-10 Cruise Diagnostic Chart #5

SWR (STANDING WAVE RATIO) CHECK

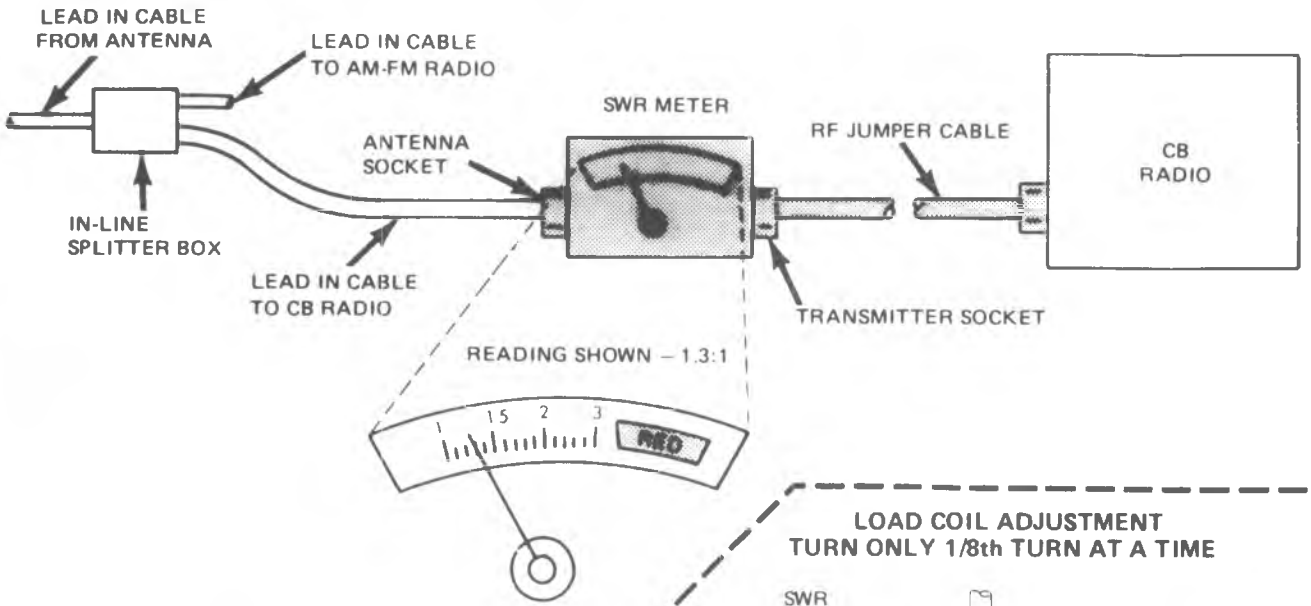
1. With Ignition and Radio off install an SWR meter as shown following meter manufacturers instructions.

NOTICE: Operation of transmitter requires FCC CB Operators License.
When making this check, car should be at least 20 feet away from any building, hood closed and no one should be standing close to the antenna.

2. Turn on Ignition and Radio.

3. Check Antenna height – Must be fully extended.
   914 mm (36") from fender to tip
   286 mm (11-1/4") top of load coil to tip.

4. After adjustment is complete apply a small amount of thread cement to adjusting band.



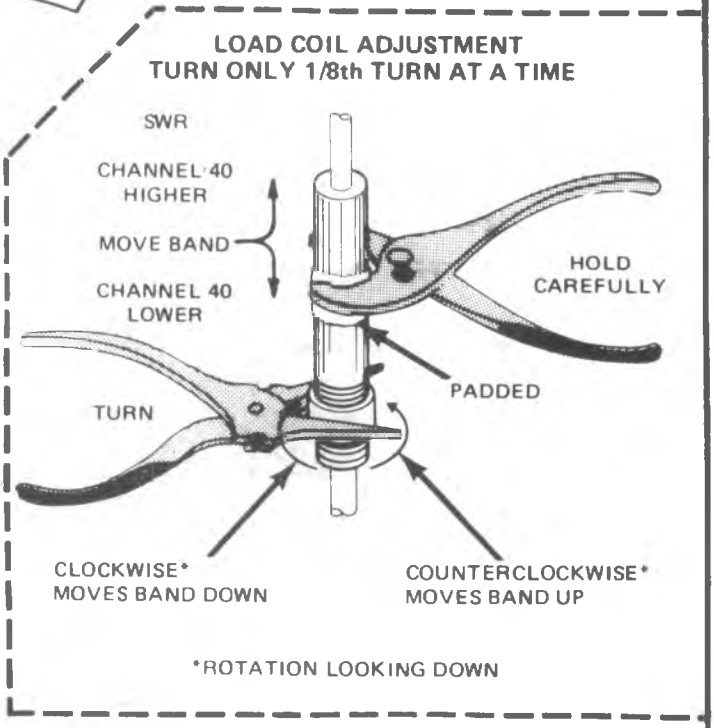
POSSIBLE SWR READINGS

1. Initial readings taken on Channel 1, 20, 40

   a. SWR of 2:1 or lower on Channel 20 and nearly equal on Channels 1 and 40 is considered good. No adjustment required.

   b. SWR higher than 2 1 on Channel 20. Adjustment required.

   c. Unequal SWR on Channels 1 and 40 (one channel in red) indicates adjustment required.



ANY READING IN THE RED BAND (ABOVE 3:1 SWR) CHECK FOR:

– Antenna mounting screws tight making a good ground connection between antenna mounting surface and car sheet metal.

– Lead in cable connections to radio, splitter and antenna are tight.

– Lead in cables not pinched and cutting the insulation.

Fig. 9-13R--Slimline SWR Check

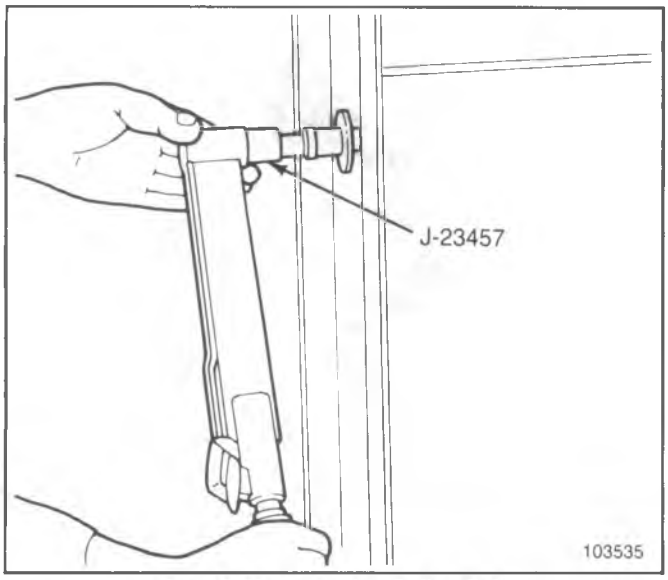


Fig. 10-23--Loosening Striker Bolt

Striker Bolt Adjustment

With the use of J-23457, shown in figure 10-23, the striker bolt can be adjusted in any of three ways. See figure 10-24.

1. **Up and down** - To adjust striker up or down, loosen bolt, adjust to desired height, and tighten bolt securely.

   This adjustment is important to assure that the right proportion of door's weight will rest on striker bolt when door is closed. If bolt is positioned too high on pillar, rapid wear will occur to the lock cam; if too low, an extra load will be placed on door hinges as well as pull door downward and out of alignment.
2. **In and Out** - To adjust striker in and out, loosen bolt, adjust horizontally to desired position and tighten bolt securely.
3. **Forward and Rearward**--To make this adjustment, loosen striker bolt, shim to desired position, and tighten bolt securely.

FRONT SIDE DOOR

Replacement

Remove the door assembly from the body by removing the hinge-to-door attaching bolts.

DOOR HINGE

The door check is part of the front door upper hinge. The front door torque rod check holds the door in either of two positions between full open and closed. The front door check-hinge assembly is replaced as a complete unit as follows. See figure 10-22.

Removal

1. Loosen front fender rear bolts.
2. With special Tool J-22585 remove 3 bolts securing front door upper hinge to cowl pillar.

   a. Remove the door to upper hinge retaining bolts.

   b. With aid of an assistant to support weight of door, remove the door to lower hinge retaining bolts and remove door.

Installation

1. Install hinge snugly on pillar in same location as hinge removed.
2. With the aid of an assistant fasten the door to the hinge.
3. Adjustment of the door lock and striker plate should be made after the door is positioned in the opening.

DOOR TRIM PANELS - CK MODELS

Removal

1. Using tool J-9886-01, remove clip retaining window crank (fig. 10-26).
2. Remove door lock knob.
3. Remove (4) screws securing lower edge of trim panel.
4. Remove (2) arm rest attaching screws and remove arm rest pad.
5. Remove (1) screw at door handle cover plate and (1) screw located under arm rest pad.
6. If equipped assist strap, remove (2) screws retaining assist strap.
7. Remove trim panel by carefully prying out at trim retainers located around perimeter of panel.

Installation

Before installing door trim assembly, check that all trim retainers are securely installed to the assembly and are not damaged.

1. To install door trim assembly, pull door inside handle inward; then position trim assembly to inner panel, inserting door handle through handle hole in panel.
2. Position trim assembly to door inner panel so trim retainers are aligned with attaching holes in panel and tap retainers into holes with a clean rubber mallet.
3. Install previously removed items.

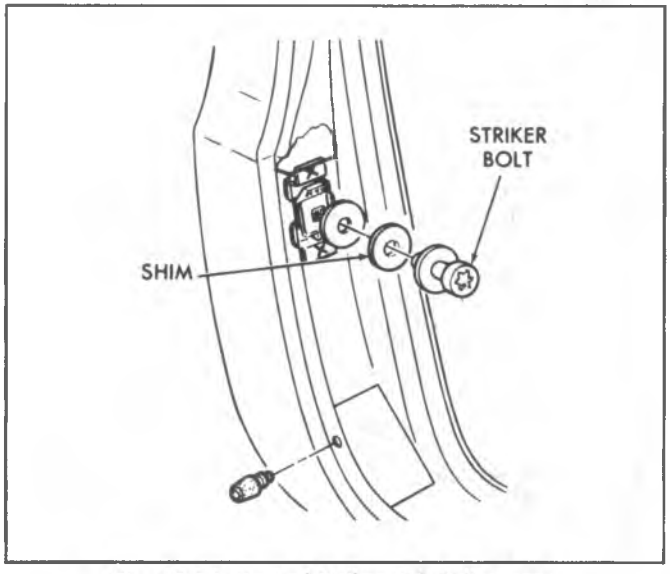


Fig. 10-24--Typical Striker Bolt Adjustment