

1990 Mitsubishi Mirage

AUTO TRANS OVERHAUL - F3A21 & F3A22 AUTOMATIC TRANSMISSIONS Mitsubishi F3A20 Series

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AUTOMATIC TRANSMISSIONS Mitsubishi F3A20 Series

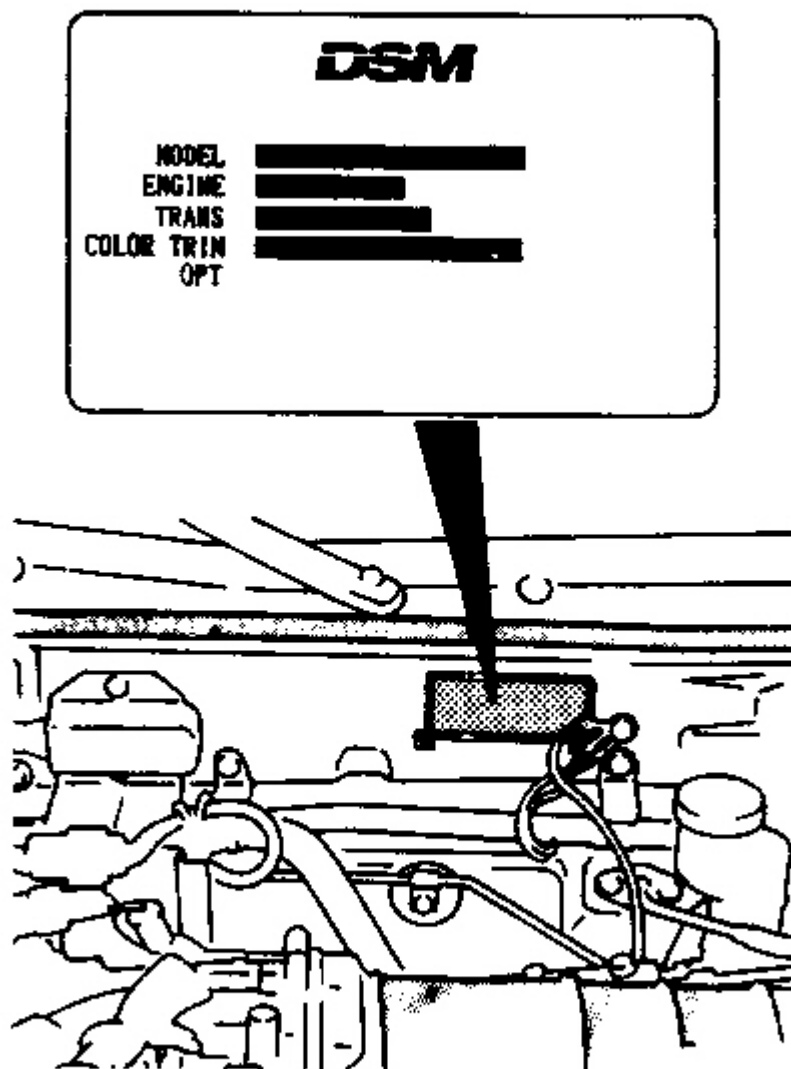
APPLICATION

TRANSMISSION APPLICATION

Vehicle Application	Transmission Model
Colt 3-Speed (1990-94)	F3A21
Colt Vista 2WD (1990-92)	F3A22
Colt Wagon (1990-92)	F3A21
Mirage 1.5L (1990-94)	F3A21
Summit 3-Speed (1990-94)	F3A21

IDENTIFICATION

Vehicle information code plate is riveted to firewall in engine compartment area. See **Fig. 1** .



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Fig. 1: Locating Vehicle Information Code Plate
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

DESCRIPTION

These Mitsubishi transaxles consist of transmission, torque converter, transfer assembly and differential. The F3A20 series is an electronically controlled, fully automatic 3-speed unit. This transaxle consists of a 3-element

torque converter with damper clutch, one planetary gear set, one brake band, 3 multiple-disc clutch assemblies for the F3A21 and F3A22 series. Transaxle shifting points are controlled by the Transmission Control Unit (TCU). The TCU calculates proper shift points using input from various sensors.

LUBRICATION & ADJUSTMENTS

See the TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICING section.

ON-VEHICLE SERVICE

INHIBITOR SWITCH & CONTROL CABLE ADJUSTMENTS

See the TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICE section.

THROTTLE CONTROL CABLE ADJUSTMENT

See the TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICE section.

THROTTLE POSITION SENSOR ADJUSTMENT

See the TRANSMISSION SERVICING - A/T article in the AUTOMATIC TRANS SERVICE section.

TROUBLE SHOOTING

F3A20 SERIES

NOTE: Always verify proper electrical systems operation, fluid level and linkage adjustments before diagnosing shifting problems.

No Forward Or Reverse Drive

Manual linkage misadjusted, improper fluid level or line pressure, torque converter failure or faulty valve body.

No Forward Drive

Manual linkage or throttle control cable misadjusted, improper fluid level or line pressure, one-way clutch or oil pump failure, faulty valve body, rear clutch or torque converter failure.

No Reverse Drive

Manual linkage or throttle control cable misadjusted, improper fluid level or line pressure, torque converter failure, faulty valve body, worn first clutch, low and reverse brake or missing "O" ring in low and reverse circuit.

Engine Stalls When Shifted To "D" Or "R"

Insufficient engine performance, faulty valve body or damper clutch or torque converter failure.

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Slips In Drive

Manual linkage or throttle control cable misadjusted, low fluid level or line pressure, one-way clutch failure, faulty valve body or worn rear clutch.

Slips In Reverse

Manual linkage or throttle control cable misadjusted, low fluid level or line pressure, faulty low and reverse brake circuit or front clutch or faulty valve body.

Stall Rpm Too Low

Insufficient engine performance, throttle control cable misadjusted or torque converter failure.

Vehicle Creeps In "N"

Manual linkage misadjusted, parking mechanism failure or faulty valve body.

Park Will Not Engage

Manual linkage misadjusted or parking mechanism failure.

Incorrect Shift Points

Throttle control cable misadjusted, low fluid level, low line pressure, faulty valve body, faulty front clutch or kickdown band, misadjusted kickdown servo or governor failure.

Excessive Shock When Shifting To "R" Or "D"

Improper engine idle speed or manual linkage adjustment, faulty valve body, front clutch, rear clutch or low and reverse brake, misadjusted inhibitor switch or throttle position sensor or TCU failure.

No 2-3 Upshift

Faulty valve body, worn front clutch, pressure control valve sticking or faulty control unit.

Excessive Shift Shock On 1-2 Or 2-3 Upshift

Throttle cable misadjusted, faulty valve body, faulty front clutch, faulty kickdown band or kickdown servo misadjusted.

Excessive Shift Shock On 2-1 Or 3-2 Downshift

Faulty valve body, faulty low and reverse brake or piston.

Engine Flares On 1-2 Or 2-3 Upshift

Low line pressure, low fluid level, faulty valve body, faulty front clutch, faulty kickdown band or kickdown servo misadjusted.

Damper Clutch Inoperative

Torque converter failure, faulty valve body, faulty throttle position sensor, faulty pulse generator, faulty ignition signal system, damper clutch control solenoid open, faulty coolant temperature sensor or faulty TCU.

Whining Noise From Converter Housing

Oil pump failure.

Rattling Noise From Converter Housing

Cracked flexplate or loose torque converter-to-flexplate bolt.

SHIFT-LOCK SYSTEM

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Symptom	Probable Cause	Remedy
The selector lever can be operated from "P" to "R" without depressing the brake pedal when the ignition key is in the ACC position.	- Damaged shift lock lever, foreign matter caught in the mechanism - Poorly adjusted shift lock cable, broken or disconnected cable - Broken or fatigued return spring of shift lock cable (shift lock lever side)	- Check selector lever bracket assembly and replace if necessary. - Check, adjust or replace shift lock cable.
The selector lever cannot be moved from "P" to "R" when the brake pedal is depressed with the ignition key in the ACC position.	- Faulty selector lever assembly - Shift lock cable, key interlock cable, automatic transaxle control cable binding - Poor routing of shift lock cable, key interlock cable - Broken or fatigued return spring of shift lock cable (brake pedal side)	- Check selector lever bracket assembly and replace if necessary. - Check, adjust or replace shift lock cable and key interlock cable. - Check routing of cables. - Replace shift lock cable.
The selector lever can be moved from "P" to "R" when the brake pedal is depressed even though the ignition key is in the LOCK position	- Deformed, damaged or worn interlock cam or interlock lever - Poorly adjusted, broken, stretched or disconnected key interlock cable	- Check interlock cam and interlock lever or replace selector lever bracket assembly. - Check, adjust or replace key interlock cable.
The selector lever cannot be moved smoothly from "P" to "R"	- Shift lock lever cannot be moved smoothly due to a large amount of play or friction of the fulcrum pin of the shift lock lever. - Poorly adjusted shift lock cable, considerable elongation of inner cable - Poorly adjusted key interlock cable - Broken or fatigued return spring of shift lock cable (brake pedal side) - Interlock cam and interlock lever not sliding smoothly	- Check and adjust shift lock lever, check and replace selector lever bracket assembly. - Check and adjust or replace shift lock cable and key interlock cable.
The selector lever cannot be moved from "R" to "P"	Shift lock lever or interlock cam binding	Check selector lever bracket assembly, apply grease or replace assembly.
The ignition key cannot be turned to LOCK when the selector lever is in the "P" position.	- Damaged interlock cam or interlock lever or foreign matter caught in the mechanism - Poorly adjusted key interlock cable, binding inner cable - Slide lever in key cylinder not sliding smoothly	- Check selector lever bracket assembly and replace if necessary. - Adjust or replace key interlock cable. - Check slide lever and replace if necessary.
The ignition key can be turned to LOCK even when the selector lever is at any position other than "P"	- Broken spring pin - Damaged interlock cam - Damaged interlock cover - Poorly adjusted or broken key interlock cable, stretched inner cable - Damaged slide lever	- Replace spring pin. - Check selector lever bracket assembly and replace if necessary. - Check and adjust or replace key interlock cable. - Replace slide lever.
The stop light stays ON	- Poorly adjusted shift lock cable - Broken shift lock cable spring	Check and adjust or replace shift lock cable.

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Fig. 2: Shift Lock System Troubleshooting Chart

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F3A20 TRANSAXLE

Selector lever position	Gear position	Front clutch	Rear clutch	One-way clutch	Kickdown band	Low-reverse brake
P	Parking					
R	Reverse	○				○
N	Neutral					
D	1st		○	○		
	2nd		○		○	
	3rd	○	○			
2	1st		○	○		
	2nd		○		○	
L	1st		○			○
	* 2nd		○		○	

* : Downshift In "L" Range Only

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Fig. 3: Clutch, Band & Brake Application Chart

Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

TESTING

NOTE: See Fig. 3 for clutch, band and brake application chart.

ELECTRONIC COMPONENT TEST (F3A20 SERIES)

ELECTRONIC COMPONENT TESTING FLOWCHART INDEX (F3A20 SERIES)

Component	Illustration
Damper Clutch	See <u>Fig. 4</u> .
System Wiring	See <u>Fig. 5</u> .
Coolant Temperature Sensor	See <u>Fig. 5</u> .
Throttle Position Sensor	See <u>Fig. 5</u> .
Pulse Generator "A" Or "B"	See <u>Fig. 6</u> .
Damper Clutch Control Solenoid Valve (DCCSV)	See <u>Fig. 7</u> .
Transaxle Control Unit	See <u>Fig. 7</u> .

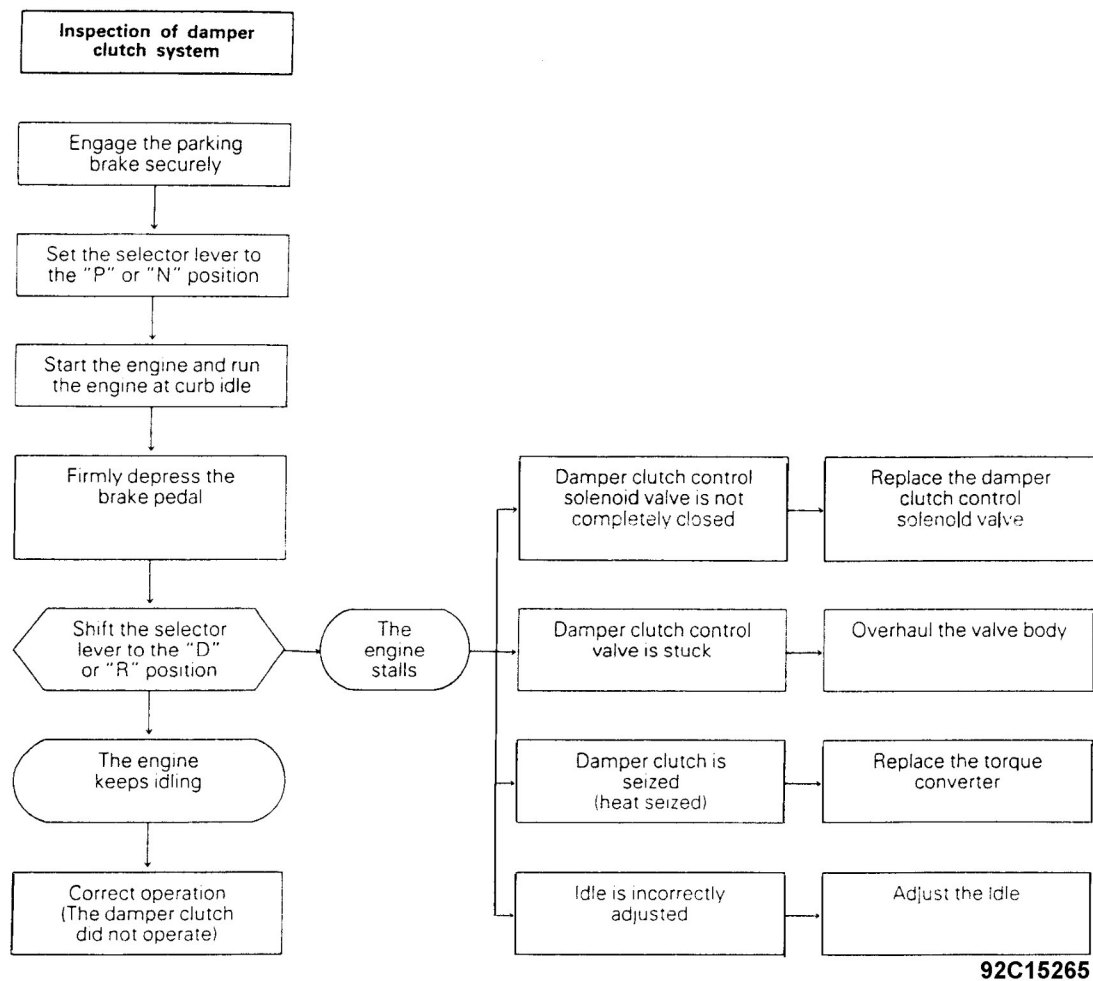
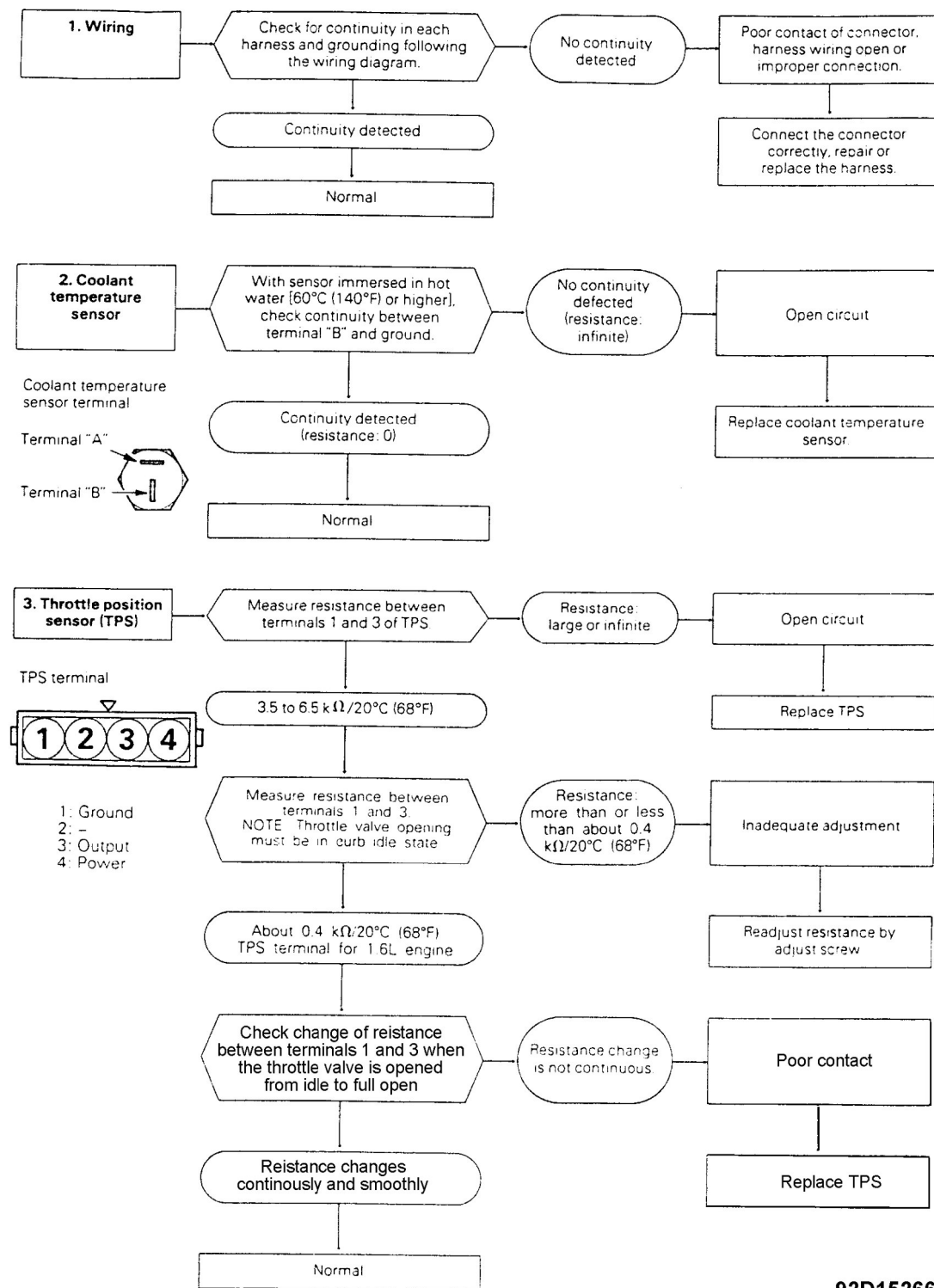


Fig. 4: Electronic Component Testing (F3A20 Series - 1 of 4)
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Fig. 5: Electronic Component Testing (F3A20 Series - 2 of 4)
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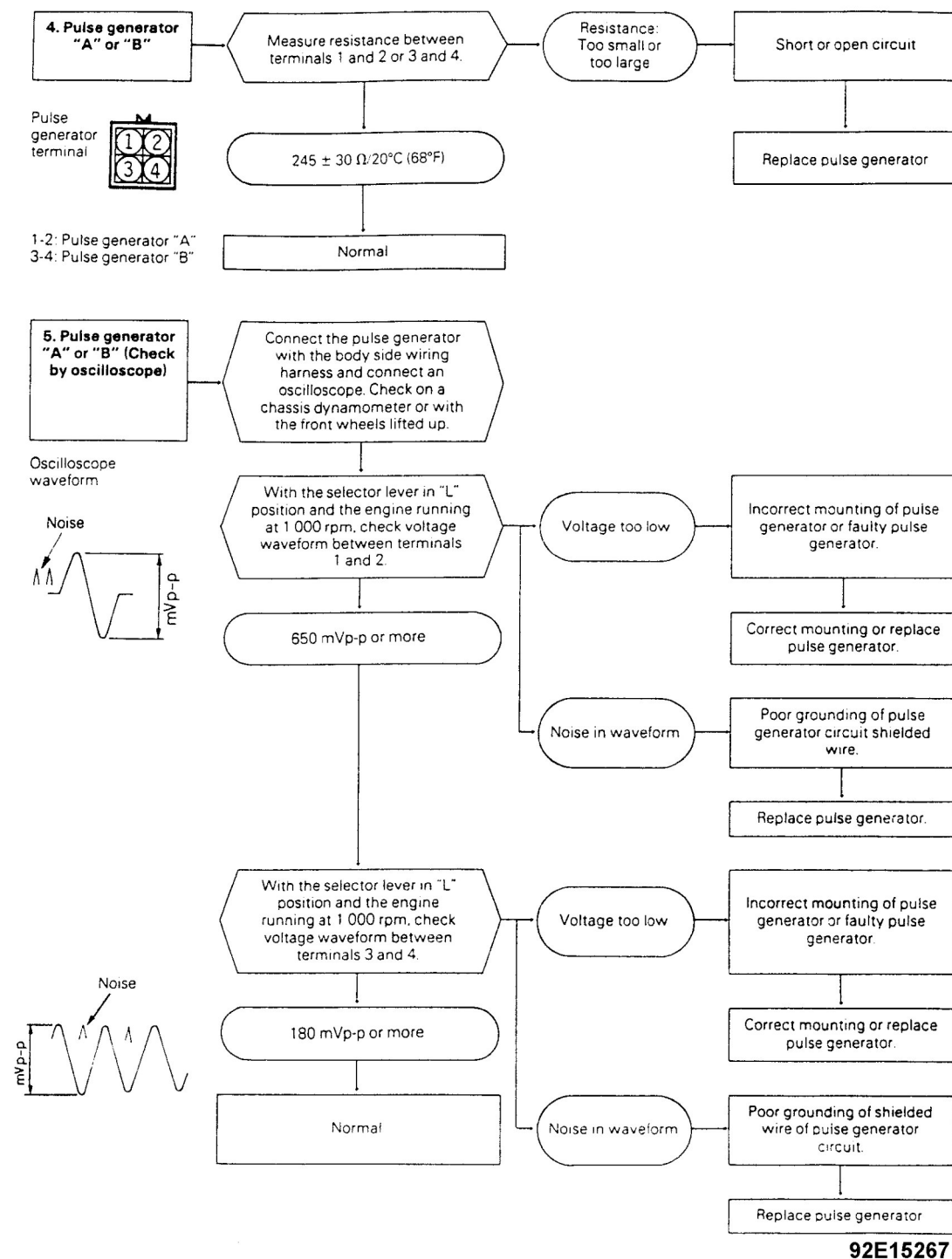
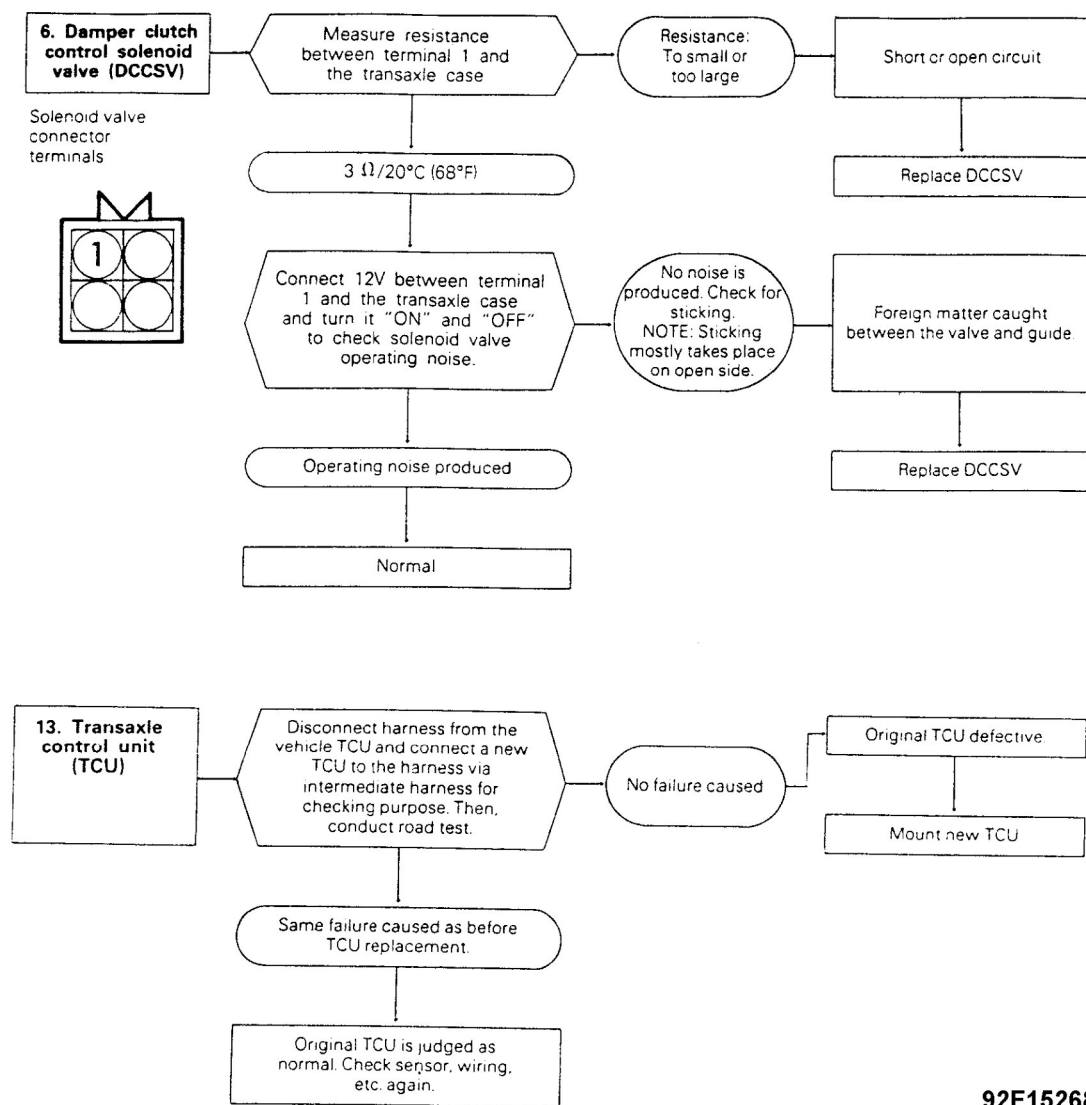


Fig. 6: Electronic Component Testing (F3A20 Series - 3 of 4)
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Fig. 7: Electronic Component Testing (F3A20 Series - 4 of 4)
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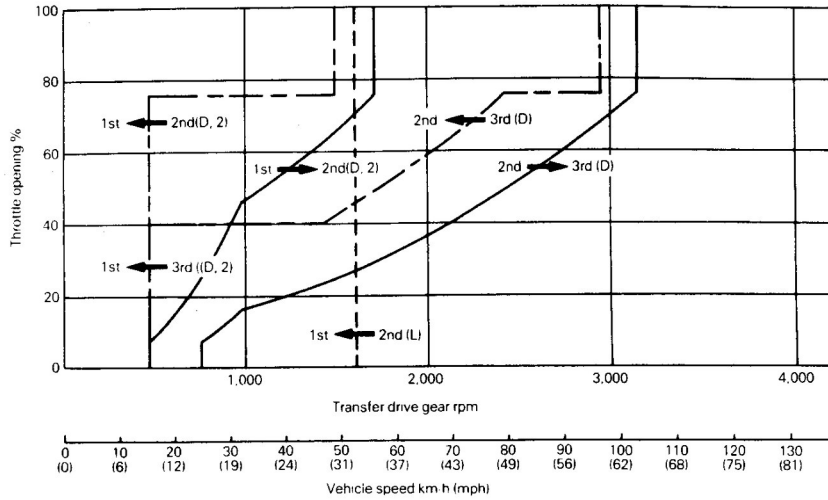
ROAD TEST

Before performing road test, ensure fluid level is okay and control cables are adjusted properly. During road test, transaxle must be checked for slipping of each friction element, a shock felt at engagement or proper upshift or downshift points. See **Fig. 3** . Also, see **Fig. 8** to **Fig. 10** .

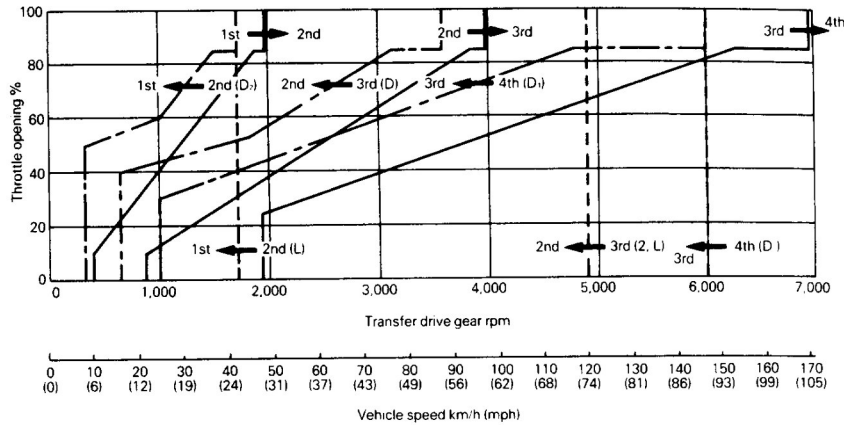
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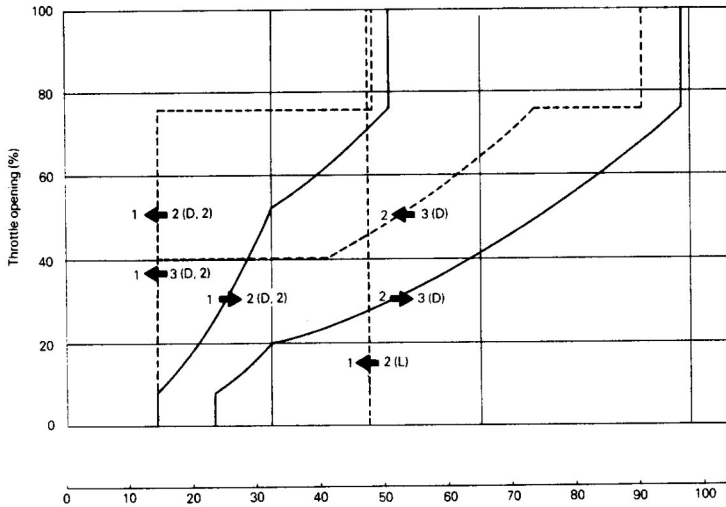
91 & 92 Colt, Colt 200 & Summit (F3A21)



91 & 92 Colt, Colt 200 & Summit (F4A21)



91 Colt Vista (F3A22)



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Fig. 8: Shift Pattern Chart (1 of 3)

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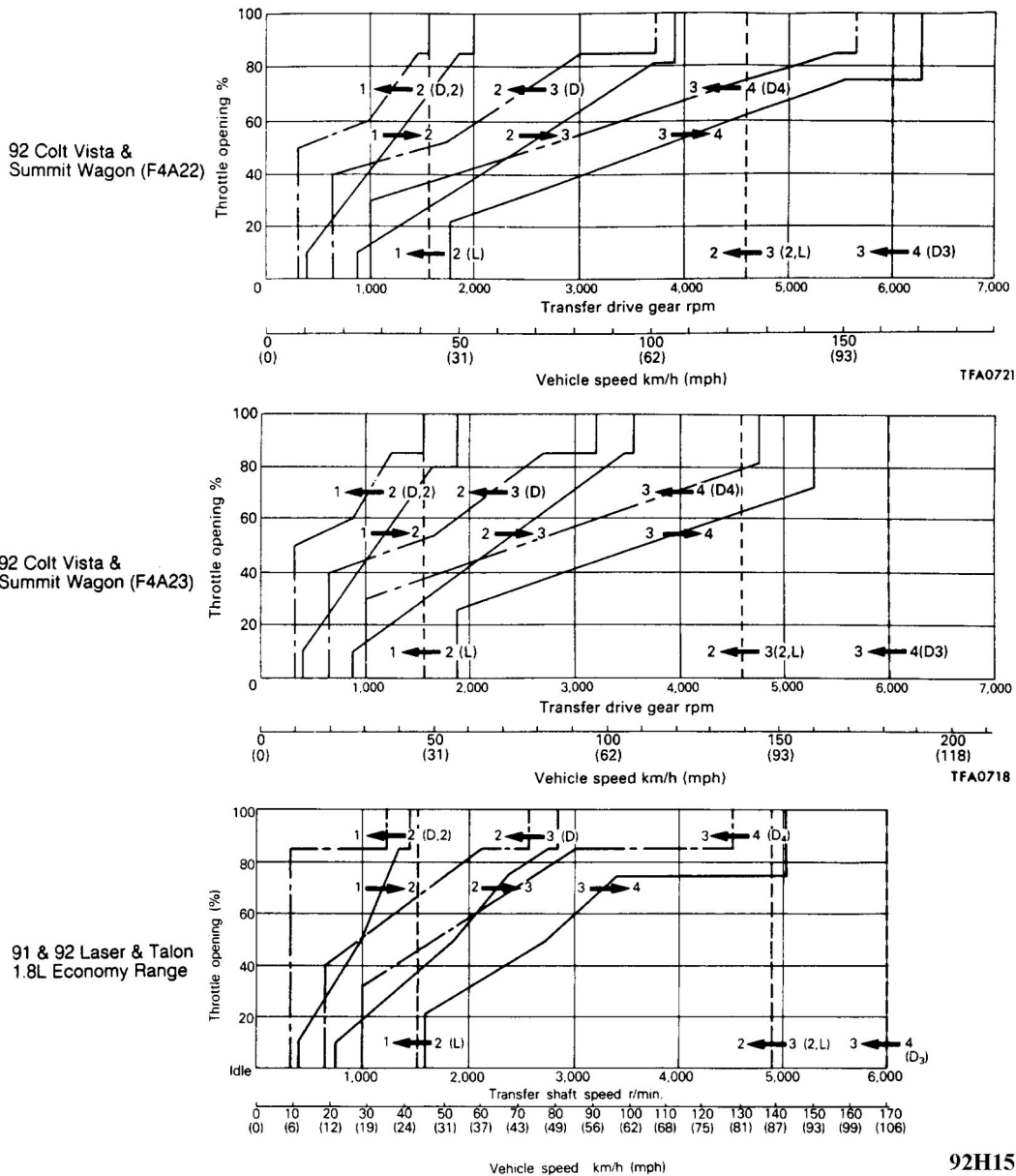


Fig. 9: Shift Pattern Chart (2 of 3)

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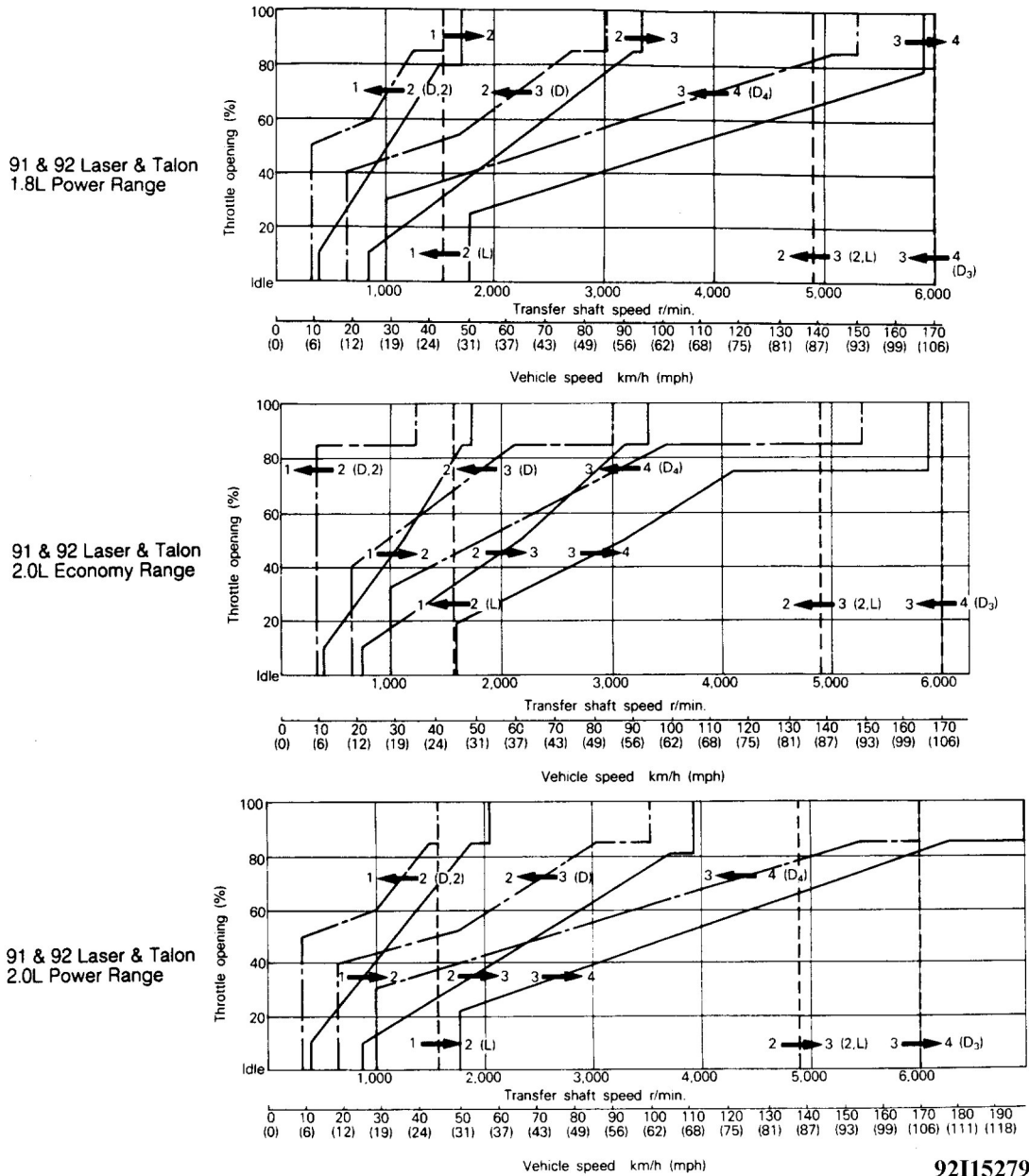


Fig. 10: Shift Pattern Chart (3 of 3)

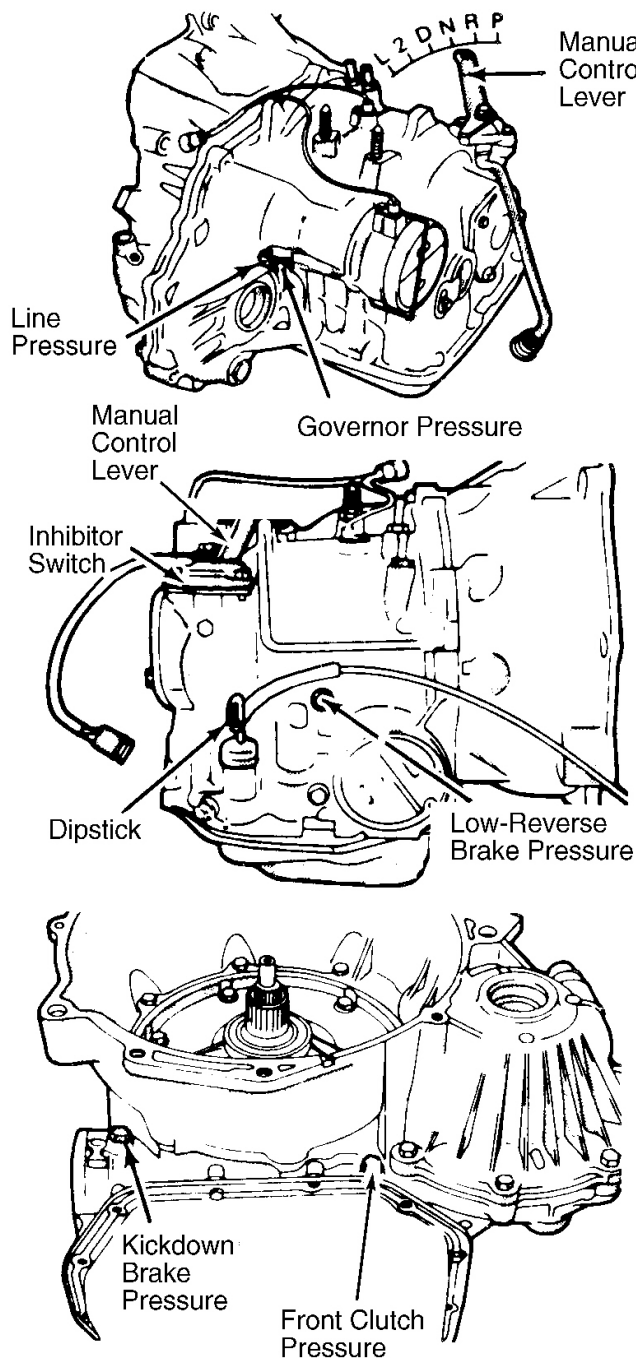
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HYDRAULIC PRESSURE TESTS

NOTE: In these testing procedures, an additional person may be necessary to activate the transmission throttle control cable. Before performing pressure tests ensure fluid level and condition are acceptable.

F3A20 Series

1. Pressure testing is an important step in the diagnostic procedure. These tests generally reveal causes of most automatic transaxle problems.
2. Before performing pressure tests ensure fluid level and condition and control cable adjustments are acceptable. Ensure fluid is at operating temperature of 160 to 180°F (70 to 80°C).
3. Raise vehicle on hoist which allows front wheels to turn. Install engine tachometer to be seen from drivers seat.
4. Disconnect transmission throttle control cable from throttle body. Attach oil pressure gauge to port required for test being performed. See **Fig. 11** .



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Fig. 11: Locating Pressure Test Ports (F3A20 Series)
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Line Pressure Test (F3A20 Series)

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1. Attach oil pressure gauge to line pressure and low-reverse brake pressure ports. Operate engine at 2,500 RPM for test.
2. Move gear selector lever to "L" range. Read pressure on gauges as transmission throttle control cable is pulled from idle to wide open positions. This tests pump output, pressure regulation, condition of rear clutch and low-reverse brake circuit. Refer to **LINE PRESSURE SPECIFICATIONS TABLE (F3A20)** .

Lubrication Pressure Test (F3A20 Series)

1. Attach oil pressure gauge to line pressure port and tee into cooler line. Operate engine at 2500 RPM for test. Move gear selector lever to "2" range.
2. Read the pressure on the gauge as the transmission throttle control cable is pulled from the idle to the wide open positions. This tests the lubrication hydraulic circuit. Refer to **LINE PRESSURE SPECIFICATIONS TABLE (F3A20)** .

LINE PRESSURE SPECIFICATIONS

Line Pressure psi (kPa) @ Idle	Line Pressure psi (kPa) @ WOT	Low & Reverse Brake Pressure	Lubrication Pressure
64 (450)	100 (700)	24 (170)	7 - 21 (49 - 147)

Front Clutch Pressure Test (F3A20 Series)

1. Attach oil pressure gauge to line pressure and front clutch pressure ports. Operate engine at 2500 RPM for test. Move gear selector lever to "D" Range. Read pressure on gauge as throttle control cable is pulled from idle to wide open positions.
2. Difference between front clutch pressure reading and line pressure reading must be less than 11 psi (78 kPa). This tests pump output pressure regulation, condition of front and rear clutches and hydraulic circuit.

Low & Reverse Brake Pressure Test (F3A20 Series)

1. Attach 400-psi oil pressure gauge to low-reverse brake pressure port. Operate engine at 2500 RPM.
2. Move gear selector lever to "R" range. Low-reverse brake pressure should be within 195-279 psi (1373-1961 kPa) regardless of transmission throttle control cable opening.
3. This tests pump output, pressure regulation, condition of front clutch and low-reverse brake hydraulic circuit.

Line Pressure Test Results (F3A20 Series)

1. If correct line pressure, minimum to maximum, is found in any one test, pump and pressure regulator are working properly.
2. Low pressure in "D", "L" and "2" ranges but correct pressure in "R" range indicates rear clutch circuit leakage.
3. Low pressure in "D" and "R" ranges but correct pressure in "L" range indicates front clutch circuit leakage.

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4. Low pressure in "R" and "L" ranges but correct pressure in "2" range indicates low-reverse circuit leakage.
5. Low line pressure in all ranges indicates faulty pump, clogged filter or stuck pressure regulator valve.

Governor Pressure Test (F3A20 Series)

1. Perform this test only if transaxle shifts at incorrect vehicle speeds when throttle control cable is properly adjusted. Connect oil pressure gauge to governor pressure test port. See **Fig. 11**.
2. Operate the transaxle in the "D" range to read pressures. Compare measured pressures with vehicle speeds, referring to the specifications in **GOVERNOR PRESSURE SPECIFICATIONS**.
3. If governor pressures are incorrect at given vehicle speeds, governor valve is probably sticking or filter in governor body is clogged. Governor pressure should respond smoothly to changes in vehicle speed and should return to 0-2.8 psi (0-20 kPa) when vehicle is stopped.

GOVERNOR PRESSURE SPECIFICATIONS

Governor Pressure: psi (kPa)	Vehicle Speed: MPH
17 (118)	16
46 (321)	40
84 (593)	62

STALL TEST

CAUTION: DO NOT allow anyone to stand in front of or behind vehicle while performing stall test. Always block both rear wheels and apply parking and service brakes fully.

Stall Test Procedure

1. Check transaxle fluid level. Fluid should be at normal operating temperature of 160-180°F (70-80°C). Engine coolant should also be at normal operating temperature of 180-190°F (60-90°C).
2. Block both rear wheels. Install engine tachometer to be seen from driver's seat. Apply parking and service brakes fully. Start engine and move gear selector to "D" range.
3. With brakes fully applied, depress accelerator pedal fully to read maximum engine RPM. See **STALL SPEED SPECIFICATIONS**.

NOTE: DO NOT hold wide open throttle for longer than 5 seconds at a time. If more than one stall test is required, operate engine at approximately 1000 RPM in neutral for 2 minutes to cool transaxle fluid.

4. Move gear selector to "R" range and repeat stall test procedure. See **STALL SPEED SPECIFICATIONS**.

Stall Test Results

1. If stall speed is above specification in "D" range, rear clutch or overrunning clutch is slipping.

HYDRAULIC PRESSURE TESTS can be performed to isolate problem.

2. If stall speed is above specification in "R" range, front clutch or low-reverse brake is slipping.

HYDRAULIC PRESSURE TESTS can be performed to isolate problem.

3. If stall speed is below specification in "R" and "D" ranges, insufficient engine performance or faulty torque converter are probable causes.

STALL SPEED SPECIFICATIONS

Transaxle Model	Stall Speed RPM
F3A20 Series	1800-2800

REMOVAL & INSTALLATION

See the TRANSMISSION REMOVAL & INSTALLATION - A/T article in the AUTOMATIC TRANS SERVICE section.

TORQUE CONVERTER

Torque converter is a sealed unit and cannot be disassembled for service. Replace unit if damaged or contaminated.

TRANSAXLE DISASSEMBLY

F3A20 SERIES

1. Prior to disassembling unit, plug all openings and thoroughly clean exterior. Remove torque converter and position transaxle with oil pan down.
2. Measure input shaft end play before disassembling transaxle. This will indicate when a thrust washer change is required (except when major parts are replaced). Record dial indicator reading for later use.
3. Remove transfer shaft cover and measure transfer shaft end play. Record dial indicator reading for use when reassembling transaxle.
4. Remove pulse generators "A" and "B" and inhibitor switch. Remove oil pan, gasket and filter. Remove solenoid valve connector and valve body assembly after throttle cable has been disconnected. Remove both accumulator pistons and springs.
5. Remove converter housing, oil pump assembly and thrust washer. Remove differential assembly with spacer. Remove input shaft with front and rear clutch assemblies as a unit.
6. Remove thrust bearing then clutch hub. Remove thrust washer and bearing. Remove kickdown drum and band. Remove kickdown servo piston, spring and anchor rod. Remove snap ring and center support. Remove reverse and forward sun gears, then planetary gear set.
7. Remove wave spring, return spring, reaction plate, brake disc and brake plate. Remove transfer idler shaft using Wrench Adapter (MD-998344-01). Remove transfer idler gear bearing inner races (2) and spacer.
8. Remove output flange bearing retainer and "O" ring. Remove snap ring from outer race of bearing. Remove internal gear, output flange, transfer drive gear and bearing as an assembly.
9. Remove snap ring at rear end of transfer shaft. Using brass drift on rear end of transfer shaft, drive shaft toward engine mounting surface. Transfer driven gear will come off. Remove sprag rod support then

manual control shaft, steel ball and spring.

COMPONENT DISASSEMBLY & REASSEMBLY

OIL PUMP

Disassembly

1. Remove "O" ring from oil pump housing. Remove 5 bolts and reaction shaft support from housing. Remove oil pump drive and driven gears from housing. Make reassembly reference marks on drive and driven gears.
2. Remove steel ball from housing. Remove snap ring and oil seal from oil pump drive gear. Remove 2 seal rings from reaction shaft support.

Inspection

1. Using a straight edge check oil pump gear side clearance. Clearance should be .0012-0.0020" (.030-.050 mm). If not within specification, replace oil pump as an assembly.
2. Check reaction shaft support surface in contact with oil pump gear for evidence of interference and replace oil pump assembly if necessary.

Reassembly

1. Fit oil seal and snap ring to oil pump drive gear. After immersing drive and driven gears in ATF, install gears in pump housing. Align reference marks made during disassembly.
2. Install steel ball in pump housing and 2 seal rings to reaction shaft support. Ensure oil pump gears turn freely. Install new "O" ring to pump housing, and lubricate.
3. Install reaction shaft support to oil pump housing and tighten 5 bolts finger tight. Align reaction shaft support with oil pump housing and torque bolts to 89-106 INCH lbs. (10-12 N.m).

FRONT CLUTCH

Disassembly

1. Remove snap ring from clutch retainer. Remove 4 clutch reaction plates and 3 clutch discs.

NOTE: If clutch reaction plates and clutch discs are to be reused, DO NOT change the installation order or direction.

2. Compress return spring and remove snap ring, retainer and return spring. Remove piston from retainer and "D" rings from piston and retainer.

Reassembly

1. Install "D" rings in piston and retainer with round side out. Apply ATF to outside surface of "D" rings and install piston in front clutch retainer by pushing with hand.

2. Install return spring and spring retainer. See **Fig. 12** . Compress return spring and install snap ring.
3. Apply ATF and install clutch reaction plates and clutch discs. See **Fig. 12** . After installing snap ring check clearance between snap ring and clutch reaction plate. Clearance should be .016-.024" (.40-.60 mm). Selective snap rings are available to adjust clearance.

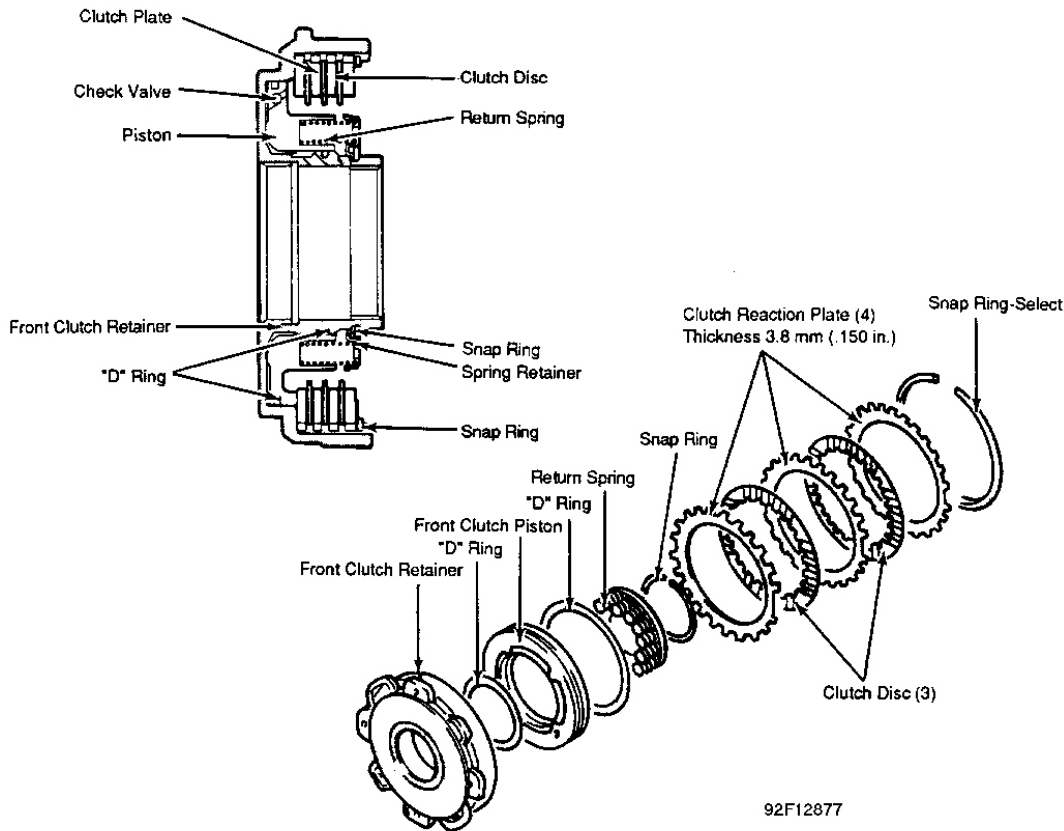


Fig. 12: Exploded View of Front Clutch Assembly
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

REAR CLUTCH

Disassembly

1. Remove snap ring and thrust race. Remove input shaft from rear clutch retainer. Remove snap ring from rear clutch retainer.
2. Remove clutch reaction plate, 2 clutch plates, 3 clutch discs and clutch pressure plate from retainer. See **Fig. 13** . Compress return spring and remove wave spring. Remove spring and piston. Remove "D" rings from piston.

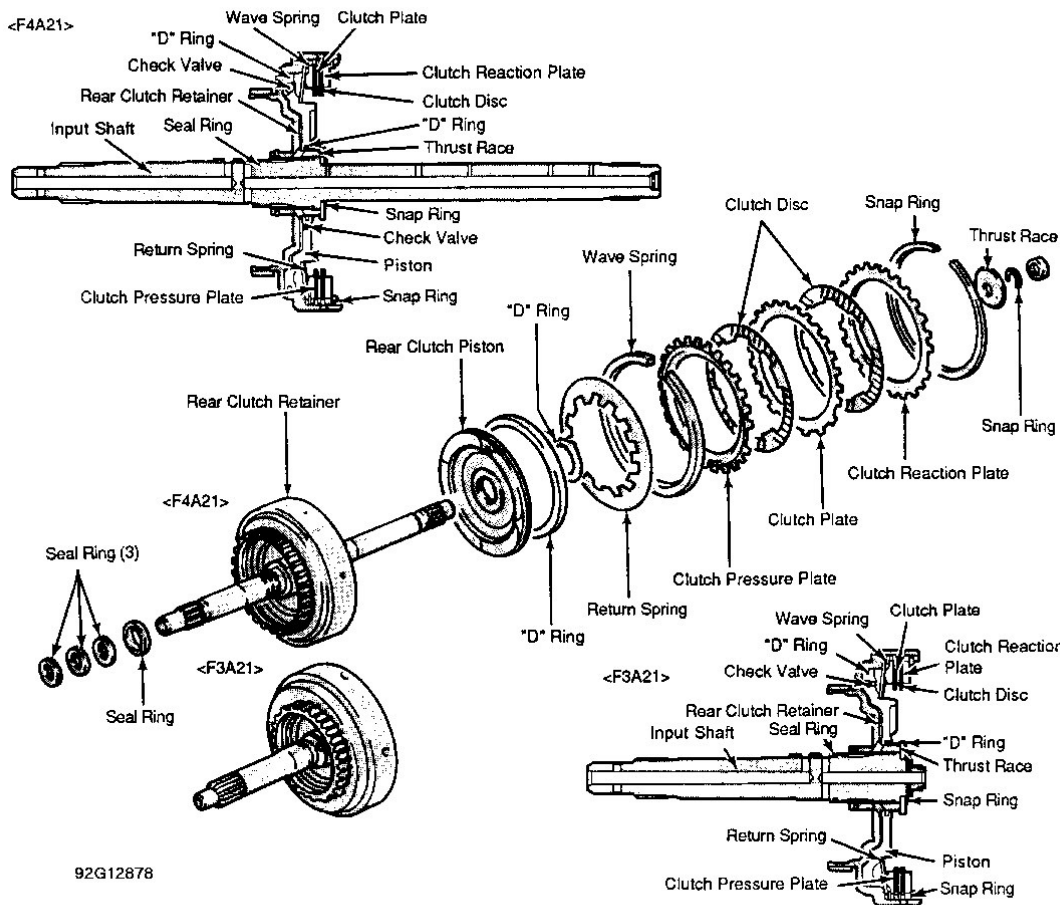


Fig. 13: Exploded View of Rear Clutch Assembly
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

Reassembly

1. Install "D" rings in clutch piston. Apply ATF to outside surfaces of "D" rings and install piston in clutch retainer by pushing with hand.
2. Install return spring on piston. Compress return spring and install wave spring. Install clutch pressure plate, 3 clutch discs, 2 clutch plates and clutch reaction plate in rear clutch retainer. See **Fig. 13** . Apply ATF to plates and discs and install snap ring.
3. Check clearance between snap ring and clutch reaction plate with spring compressed. Clearance should be .016-.024" (.40-.60 mm). Snap rings are common to those used for front clutch. Insert input shaft into clutch retainer. Install thrust race, snap ring and 3 seal rings on input shaft.

LOW & REVERSE BRAKE

Disassembly & Reassembly

Remove piston using compressed air. Remove "D" ring from piston. Fit new "D" ring in piston and apply ATF. Press piston in center support by hand.

PLANETARY GEAR SET

Disassembly

1. Remove 3 bolts retaining overrunning clutch outer race assembly. Remove overrunning clutch outer race assembly and overrunning clutch end plate. Remove short pinion shaft, spacer bushing and 2 front thrust washers.
2. Remove only one short pinion using care not to lose 17 needle rollers in short pinion. Remove thrust bearing from pinion carrier. Remove overrunning clutch by pushing outer race out using fingers.

Reassembly

1. Install thrust bearing in pinion carrier and ensure correct fit. Apply generous amount of petroleum jelly to inside diameter of short pinion and install 17 rollers.
2. Align holes in front and rear thrusts with shaft hole of carrier. Install short pinion, spacer bushing and 2 front thrust washers and align holes. Insert pinion shaft. Install end plate in overrunning clutch outer race. Push overrunning clutch in outer race. Ensure proper installation direction. See **Fig. 14**.
3. Apply petroleum jelly and install overrunning clutch end plate. Install overrunning clutch assembly to carrier and align bolt holes. Torque bolts to 25-32 ft. lbs. (35-45 N.m).

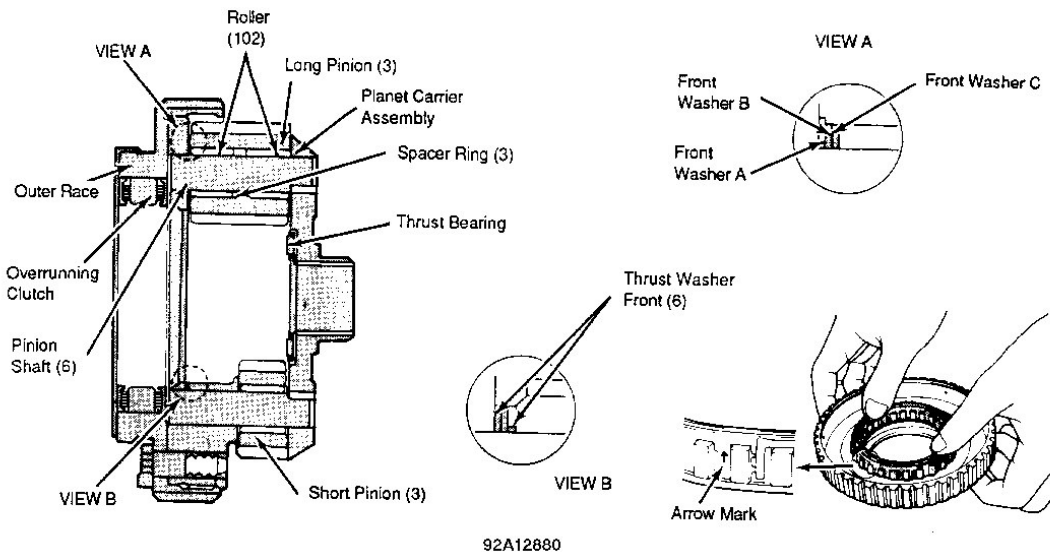


Fig. 14: Cross-Sectional View of Planetary Gear Set
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

INTERNAL GEAR & TRANSFER DRIVE GEAR SET

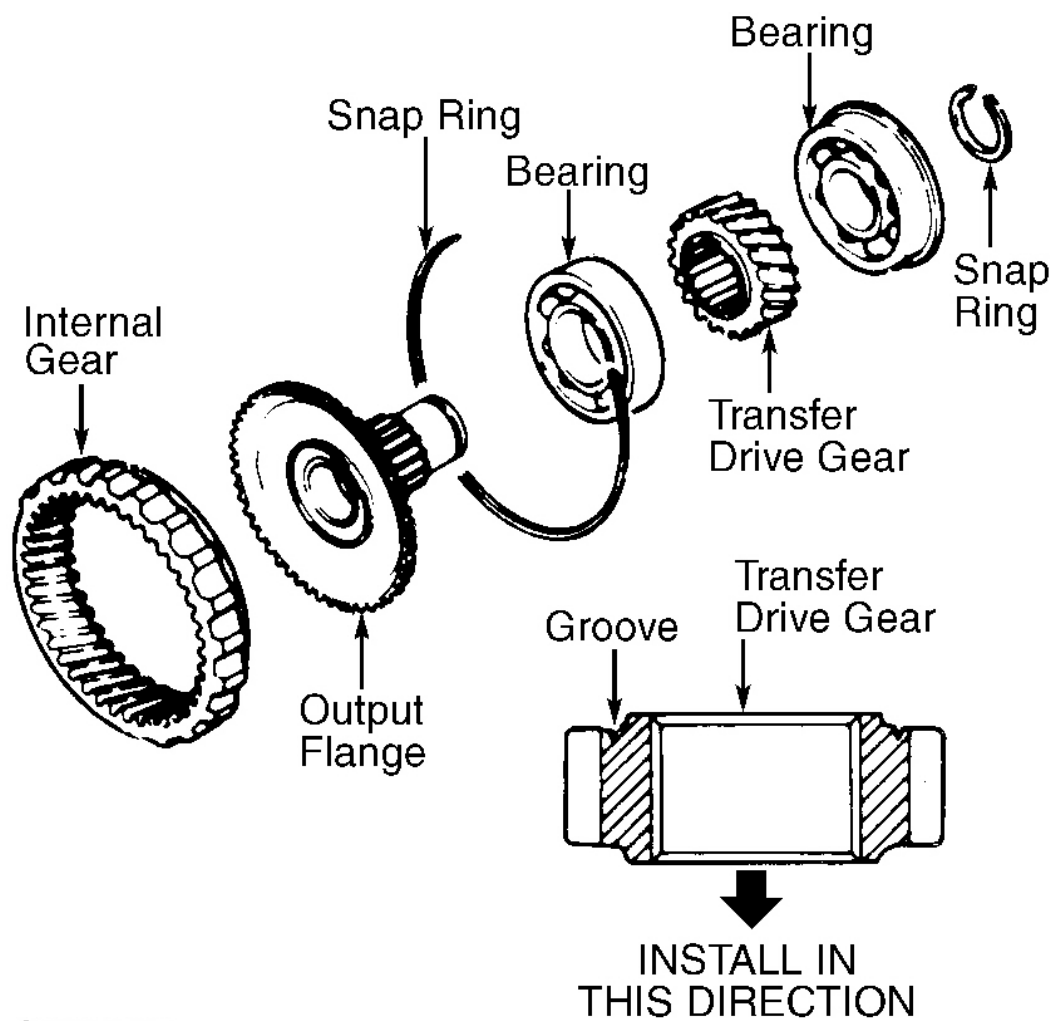
Disassembly

Remove snap ring from rear end of output flange. Using a puller, remove bearings (2) and transfer drive gear from output flange. Remove large snap ring, and separate internal gear from output flange.

NOTE: **If replacing output flange or transfer drive gear, service as a set only.**

Reassembly

1. Press transfer drive gear and bearings on output flange. Make sure the transfer drive gear is installed in the proper direction. See **Fig. 15** .
2. Install output flange snap ring. This snap ring is selective; use thickest one that can be installed in groove. Standard value for snap ring is 0-.0236" (0-.060 mm).



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Fig. 15: Exploded View of Internal & Transfer Gear
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA.

TRANSFER SHAFT & GOVERNOR ASSEMBLY (F3A20 SERIES)

Disassembly

1. Remove seal rings from transfer shaft. Loosen governor set screw and remove governor assembly. Remove snap ring and disassemble governor. See **Fig. 16**.
2. Remove governor filter. Clean or replace as necessary. Press bearing off transfer shaft.

Reassembly

1. Install taper roller bearing on transfer shaft. Install governor valve, spring, spring retainer and governor weight in governor body, then install snap ring.
2. Install governor filter. Assemble governor assembly with transfer shaft. Torque set screw to 71-89 INCH lbs. (8-10 N.m). Torque jam nut to 35-53 INCH lbs. (4-6 N.m).

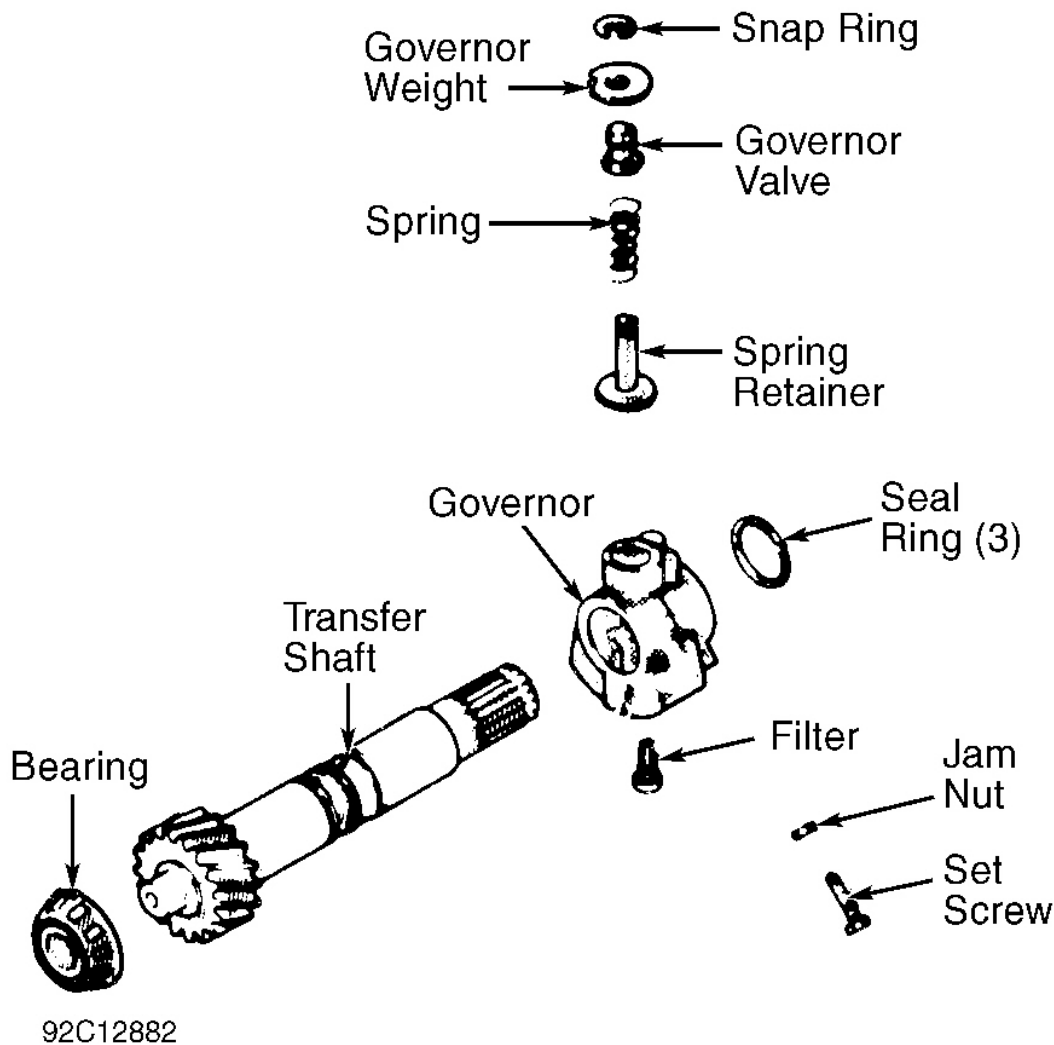


Fig. 16: Exploded View of Transfer Shaft & Governor (F3A20 Series)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

DIFFERENTIAL

Disassembly

1. Remove drive gear and bolts from differential case. Using puller, remove taper roller bearing. Inspect

bearing.

NOTE: When removing parts that are to be reused, mark position and direction for reference during reassembly.

2. Drive out lock pin with punch. Remove pinion shaft, pinion gears and washers. Make reference marks for reassembly.
3. Remove side gears and spacers. Mark right and left sides of gears for reference during reassembly.

Reassembly

1. Install side gears and spacers in differential case in noted positions. If new side gears are being used install spacers of medium thickness, .0366-.0394" (.930-1.000 mm). Install pinion gears and washers in case and insert pinion shaft.
2. Measure backlash between pinion gear and side gear. Backlash should be .001-.006" (.025-.150 mm) and right and left hand gear pairs should have equal backlash. If not within specification select a spacer for correct backlash.
3. Install pinion shaft lock pin in direction as shown in the graphic. See **Fig. 17** . After installation, ensure correct installation depth of lock pin. Projection should be less than .118" (3.00 mm).

NOTE: DO NOT reuse lock pin. Lock pin NOT requiring more than 440 lbs. (2000 N) installation load must NOT be used.

4. Install bearings and drive gear on differential case. Apply ATF to bolts, and tighten bolts to 96-103 ft. lbs. (130-140 N.m) in a crisscross pattern.

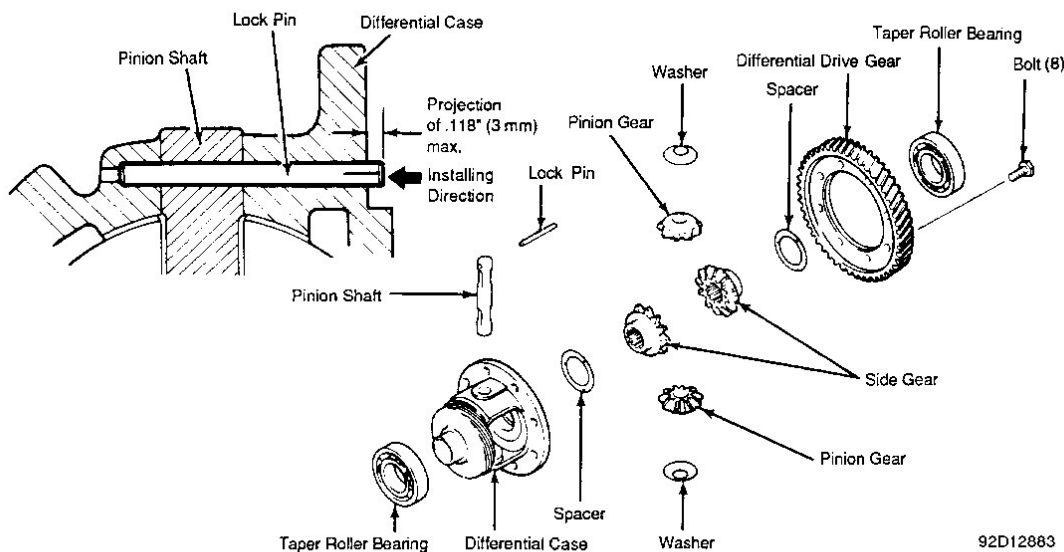


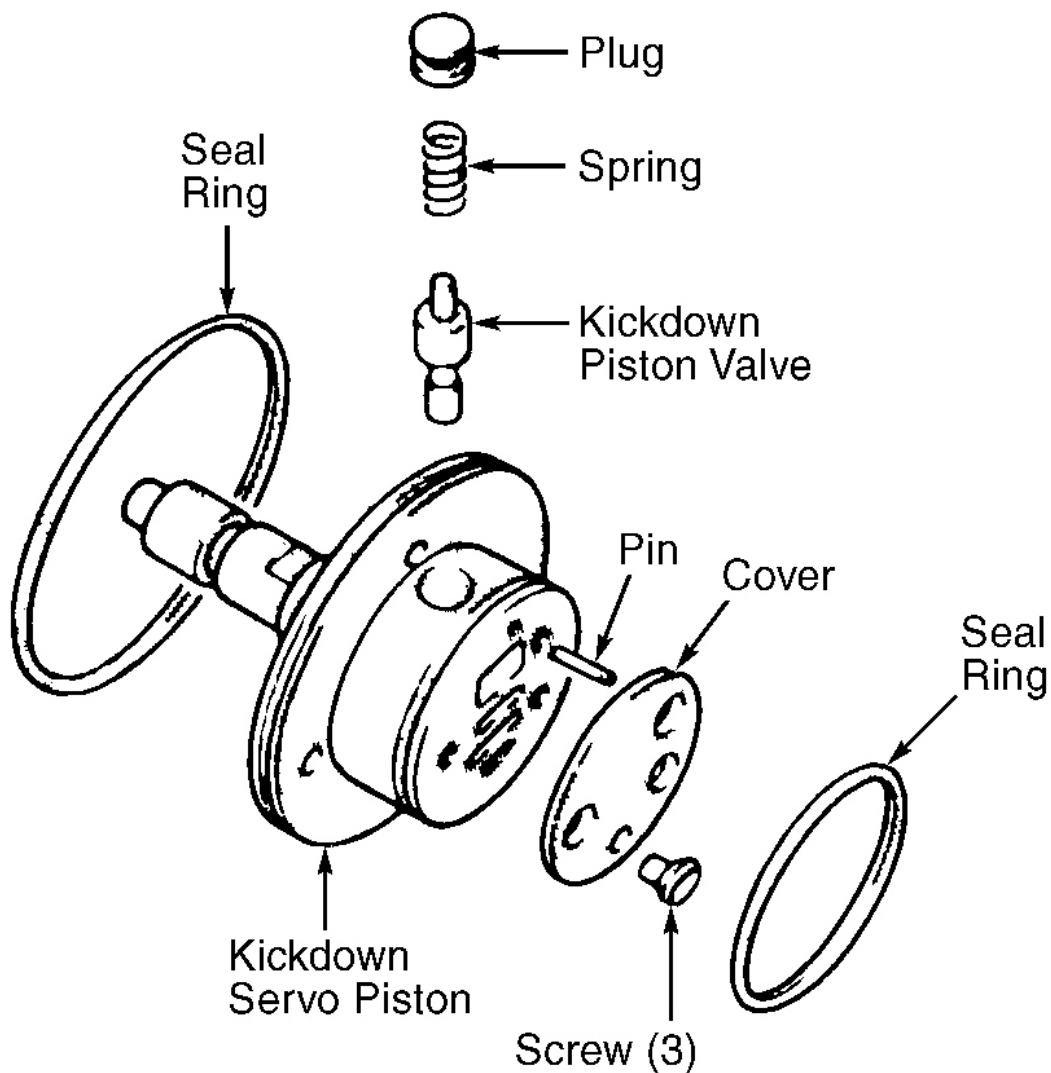
Fig. 17: Exploded View of Differential Assembly

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KICKDOWN SERVO PISTON

Disassembly & Reassembly

Disassemble servo piston, check for damage and wear, apply ATF and reassemble. See **Fig. 18**.



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Fig. 18: Exploded View of Kickdown Servo Piston Assembly
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

SPEEDOMETER DRIVEN GEAR

Disassembly & Reassembly

Drive out spring pin and disassemble gear and sleeve. **DO NOT** reuse "O" ring, oil seal and spring pin. Apply a light coat of gear oil to speedometer driven gear shaft. Assemble and drive in spring pin. See **Fig. 19**.

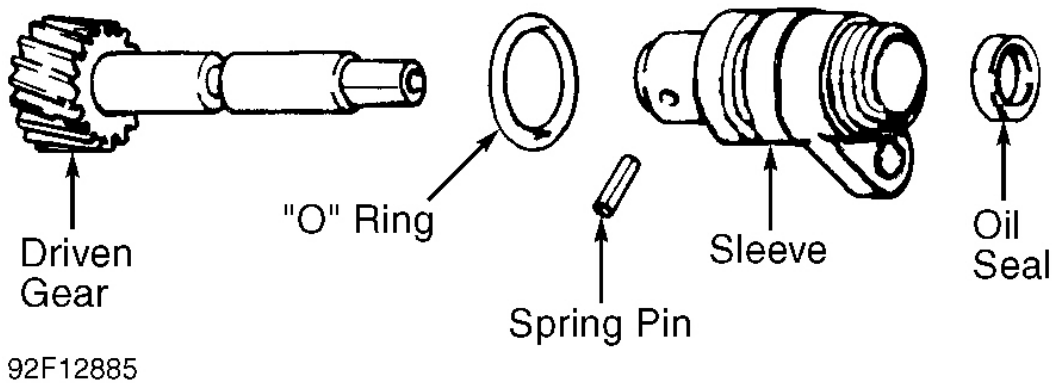


Fig. 19: Exploded View of Speedometer Gear Assembly
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

VALVE BODY

NOTE: **DO NOT** clamp any portion of valve body or transfer plate in a vise. Any slight distortion of valve body or transfer plate will result in sticking valves, excessive leakage or both. Clean all parts with ATF. **DO NOT** use shop towels during reassembly operation.

Disassembly (F3A20 Series)

1. Remove throttle cam assembly from valve body. Remove 13 valve body bolts. Remove lower valve body and lower separator plate.
2. Remove line relief spring and 3 steel balls. Separate lower valve body and intermediate plate. Remove 4 steel balls from upper valve body.
3. Remove solenoid valve, stiffener plate and upper separating plate. Remove steel ball and spring from intermediate plate.
4. Remove manual valve from upper valve body. Remove front, rear and end covers from valve body, and remove all valves, plugs, springs and filters. See **Fig. 20**.

Reassembly (F3A20 Series)

1. Clean all parts with ATF. **DO NOT** use shop towels during reassembly operation. Check sliding surfaces of valves and body for scratches or damage.
2. Check springs for deformation or damage. Lubricate with ATF and install valves, springs and plugs as

shown in **Fig. 20** .

3. Torque all valve body screws to 35-53 INCH lbs. (4-6 N.m). When assembling upper and lower bodies use guide pins at locations shown in **Fig. 21** . Make sure the steel balls are properly positioned. See **Fig. 21** .

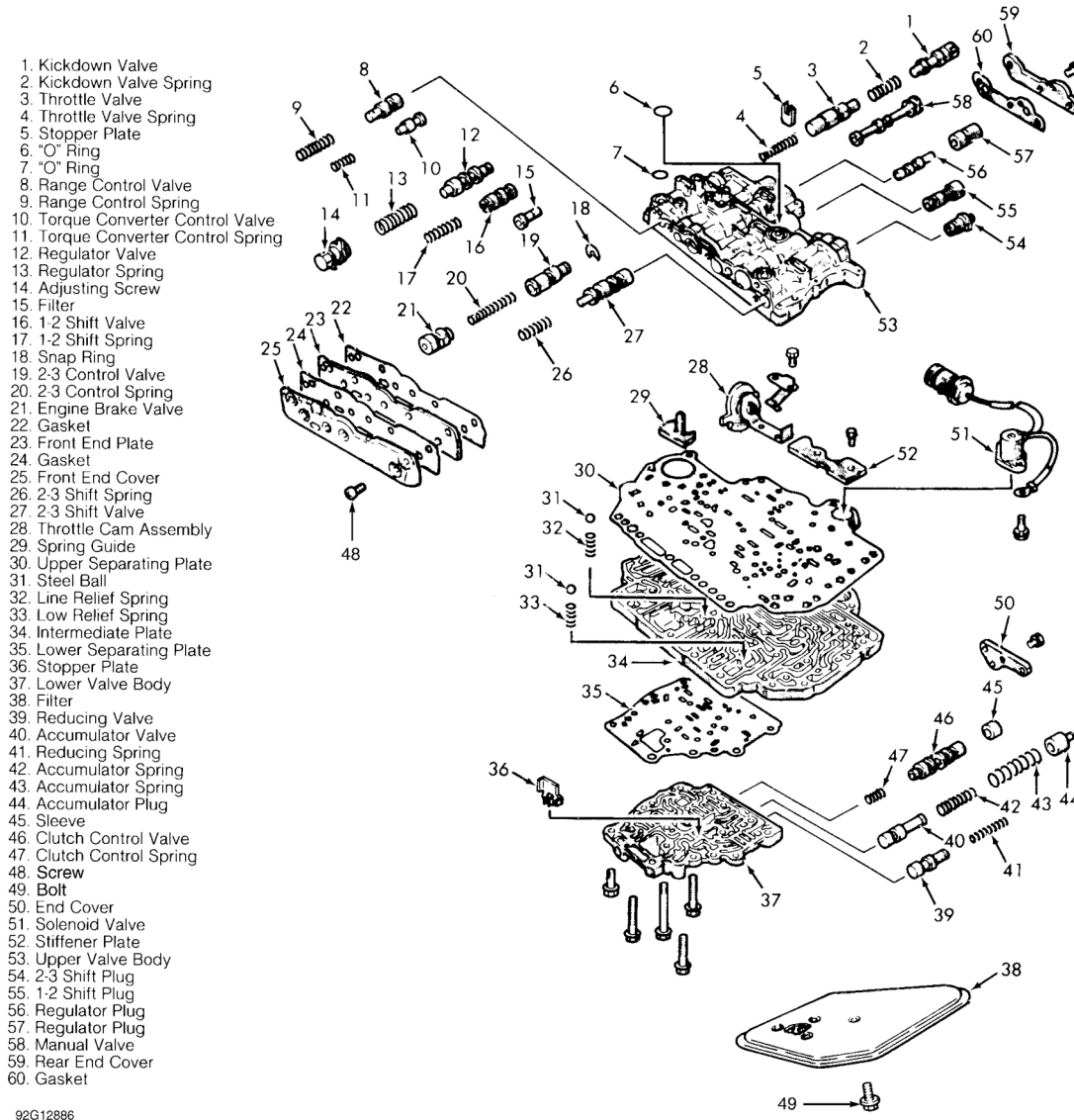


Fig. 20: Valve Body Assembly (F3A20 Series)(1991 Shown; 1992 Similar)
 Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

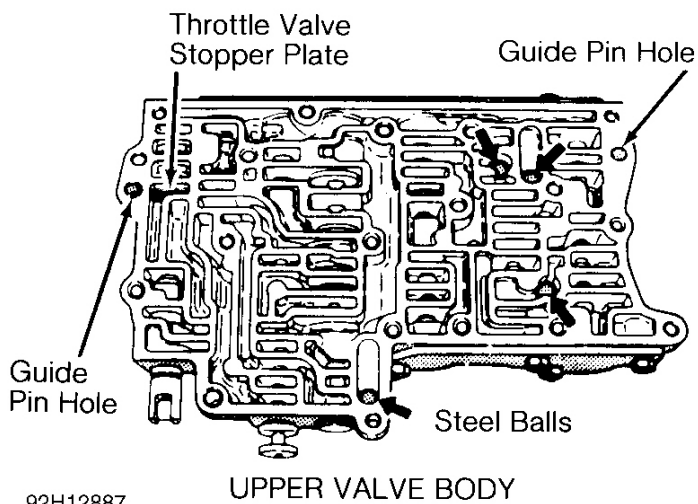
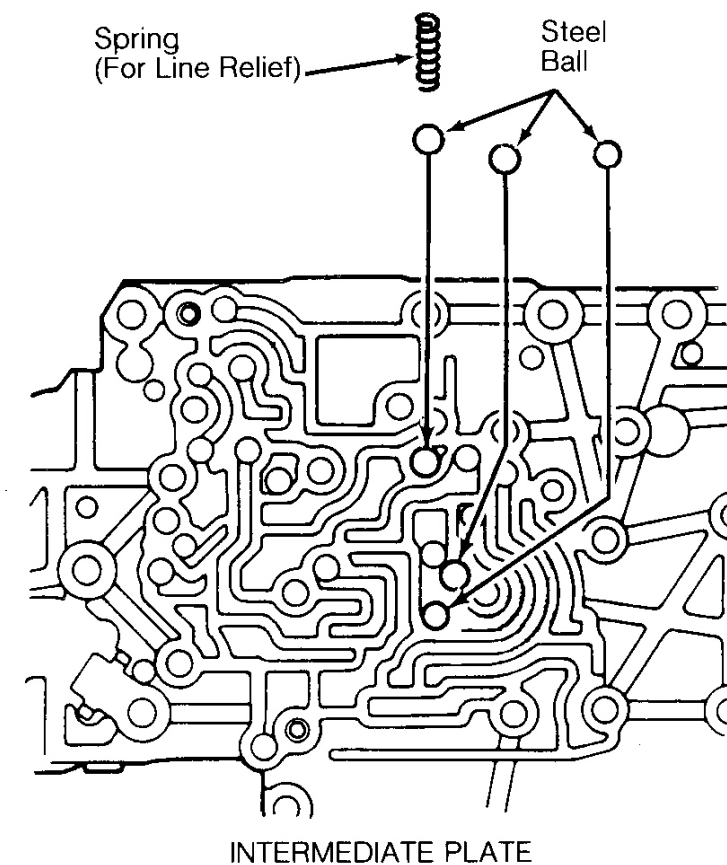


Fig. 21: Locating Steel Balls (F3A20 Series)

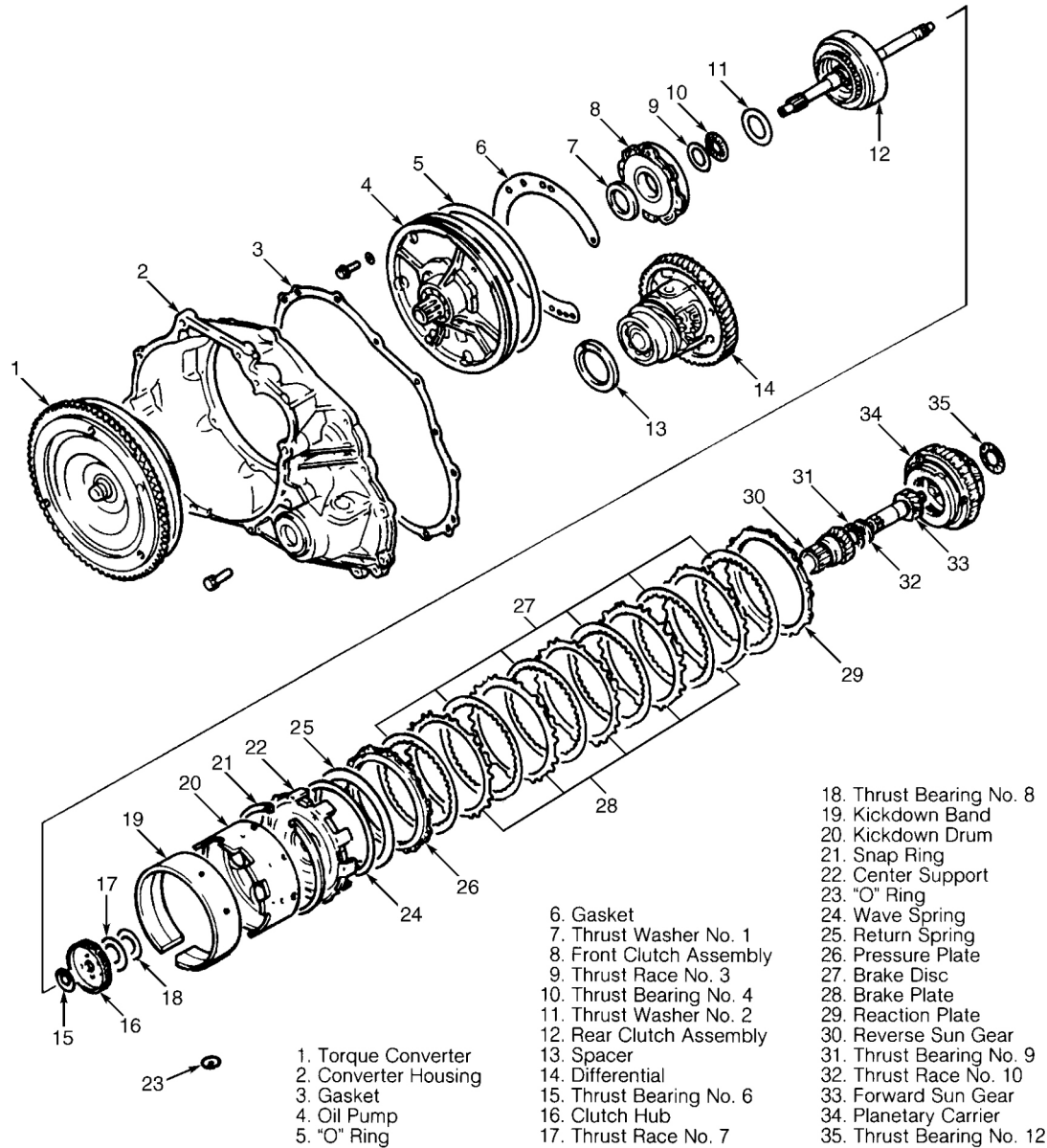
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

TRANSAXLE REASSEMBLY

1. Install brake reaction plate, brake plate and brake disc in transaxle case. Install a pressure plate with adequate size and fit the return spring. Ensure return spring is installed in proper direction.
2. Apply petroleum jelly to wave spring and stick it to the center support. Install center support and snap ring in case. Check low and reverse brake end play by mounting a dial indicator on rear of transaxle case. Install dial indicator through transfer idler shaft hole so its feeler is held perpendicular to brake reaction plate.
3. Using a hand pump feed air into low and reverse brake and read dial indicator deflection. Select a pressure plate to obtain specified end play of .0315-.0394" (.800-1.000 mm). Install transfer shaft bearing outer race in case. Install parking sprag rod on detent plate, then push manual control shaft in transaxle case. Torque manual control shaft set screw to 71-89 INCH lbs. (8-10 N.m).
4. Install sprag rod support and torque bolts to 15-20 ft. lbs. (20-27 N.m). Install bearings on transfer shaft and install shaft in transaxle case. Using a press, install transfer driven gear. Torque transfer shaft lock nut to 148-170 ft. lbs. (200-230 N.m) and stake lock nut to prevent loosening.
5. Measure transfer shaft end play and select a spacer which provides 0-.0010" (0-.025 mm) end play. Install transfer shaft cover. Assemble the planetary carrier, output flange, transfer drive gear and bearing and install in transaxle case. See **Fig. 22** and **Fig. 23** . Install snap ring on output flange rear bearing.

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Fig. 22: Transaxle Assembly (F3A20 & F4A20 Series - 1 of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

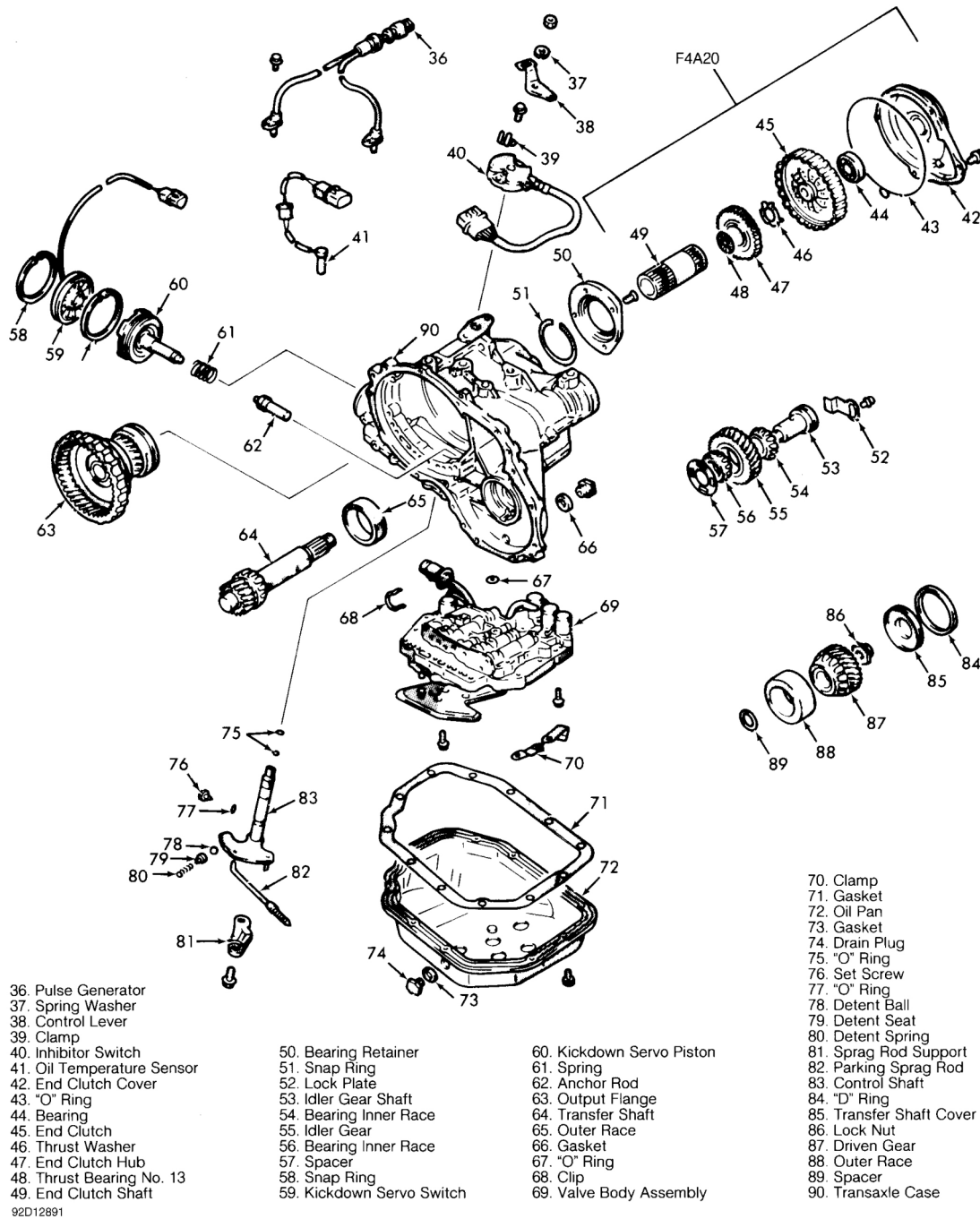


Fig. 23: Transaxle Assembly (F3A20 & F4A20 Series - 2 of 2)
Courtesy of MITSUBISHI MOTOR SALES OF AMERICA

6. Coat transfer idler spacer and attach it to case. Install 2 taper roller bearings and spacer in transfer idler gear. Place transfer idler gear in transaxle case and insert idler shaft from outer side of case.
7. Using Special Tool (MD998344) tighten idler shaft and measure preload at output flange. Adjust preload by tightening or loosening idler shaft. Preload should be 7.1 INCH lbs. (0.8 N.m).

8. After preload adjustment is complete, eliminate backlash between the idler shaft and lock plate by moving the idler shaft in the loosening direction. Install lock plate and torque to 15-20 ft. lbs. (20-27 N.m).
9. Install output flange bearing retainer and torque screws to 13-16 ft. lbs. (17-22 N.m). Apply a 5 mm bead of sealant (3M Stud Locking No. 4176) to the top. Sealant should not stick out of screw head. Stake screws to prevent loosening.
10. Install planetary carrier with thrust bearing No. 12 in place, in transaxle case. Assemble reverse sun gear and forward sun gear and install in planetary carrier. See **Fig. 24** . Install low and reverse brake assembly ensuring 2 new "O" rings are properly positioned on center support. See **Fig. 25** .

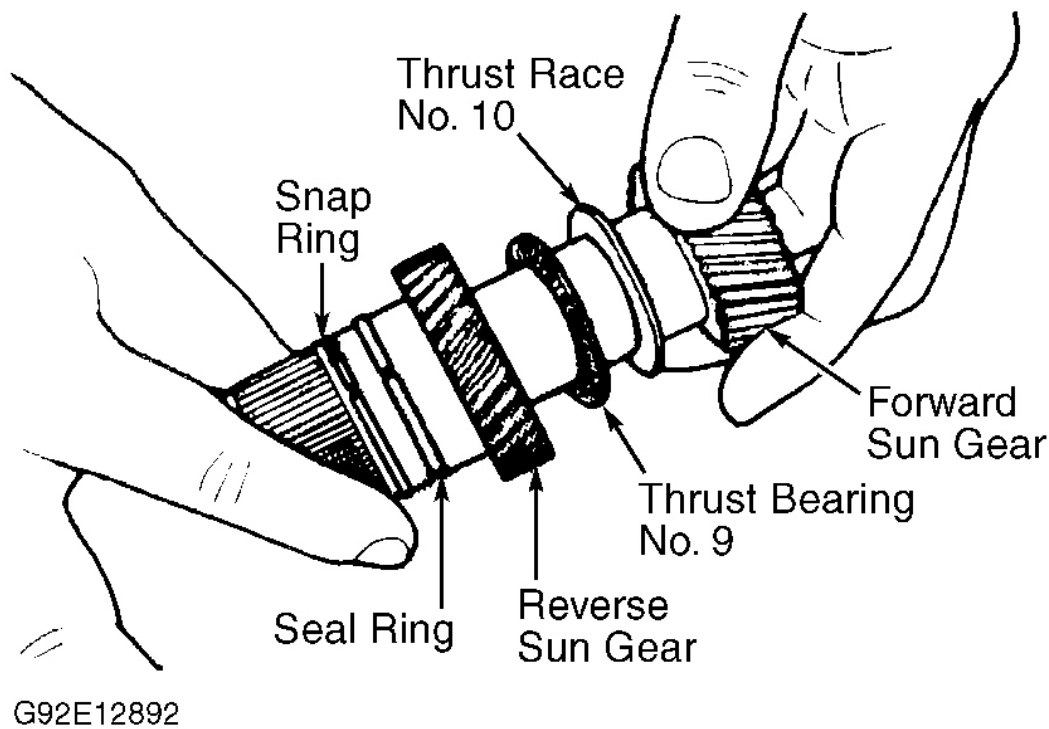


Fig. 24: Assembling Sun Gears

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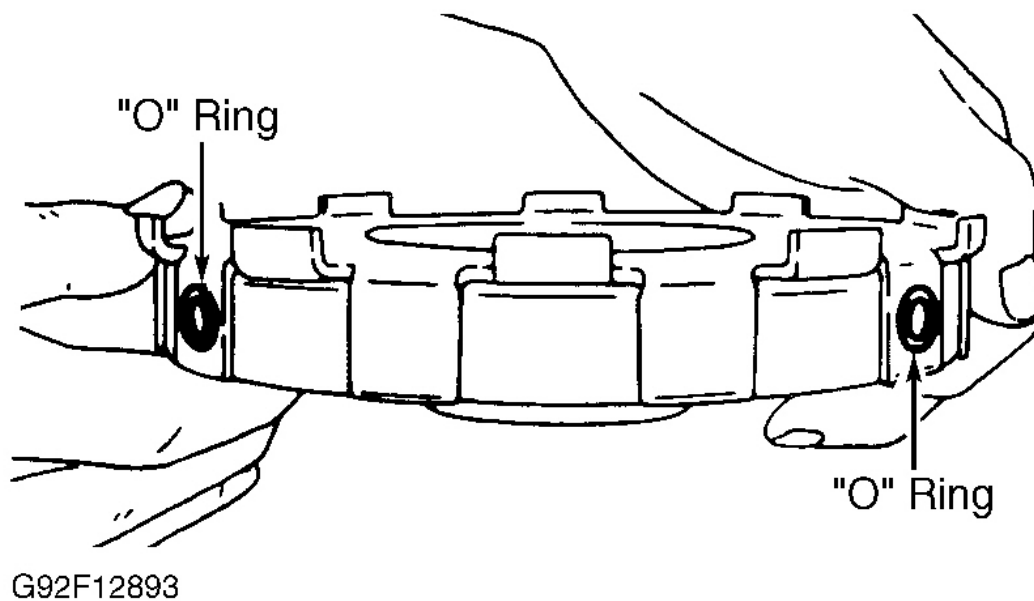
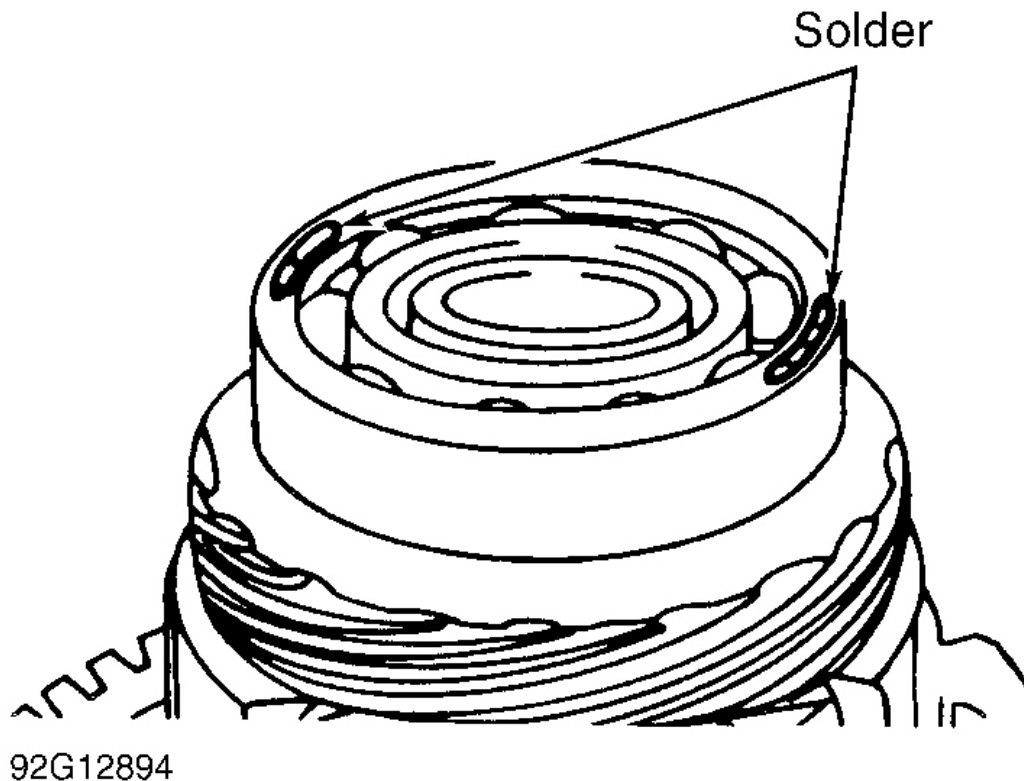


Fig. 25: Positioning "O" Rings On Center Support

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11. Apply ATF to "O" rings. Install center support, ensuring wave spring does not shift out of position. Install center support snap ring, ensuring snap ring ends are aligned with mounting hole for pulse generator "A".
- 12) Install kickdown band anchor rod. Install kickdown servo assembly and snap ring. Install kickdown band and attach ends to anchor rod and servo piston rod.
12. Install kickdown drum and position band on drum. Apply petroleum jelly to thrust bearing No. 8 and stick it to kickdown drum. Apply petroleum jelly to thrust race No. 7 and stick it to rear clutch hub.
13. Install clutch hub to sun gear splines and attach thrust bearing No. 6 to outer side of clutch hub. Install thrust washer No. 2 and thrust bearing No. 4 on rear clutch assembly. Assemble front and rear clutch assemblies and install in transaxle case. Install differential assembly.
14. If end play that was measured and recorded at disassembly is not within specification, adjust end play to specification by selecting thrust race No. 3 and thrust washer No. 1. End play should be .012-.040"(.30-1.00 mm). Install oil pump assembly, torque bolts to 11-16 ft. lbs. (15-22 N.m), and recheck end play. Readjust as necessary.
15. Measure differential end play by placing a .4" (10 mm) long, .12" (3.0 mm) diameter piece of solder at 2 locations on the differential bearing outer race. See **Fig. 26** . Install converter housing, without gasket, and tighten bolts to 14-17 ft. lbs. (19-23 N.m).

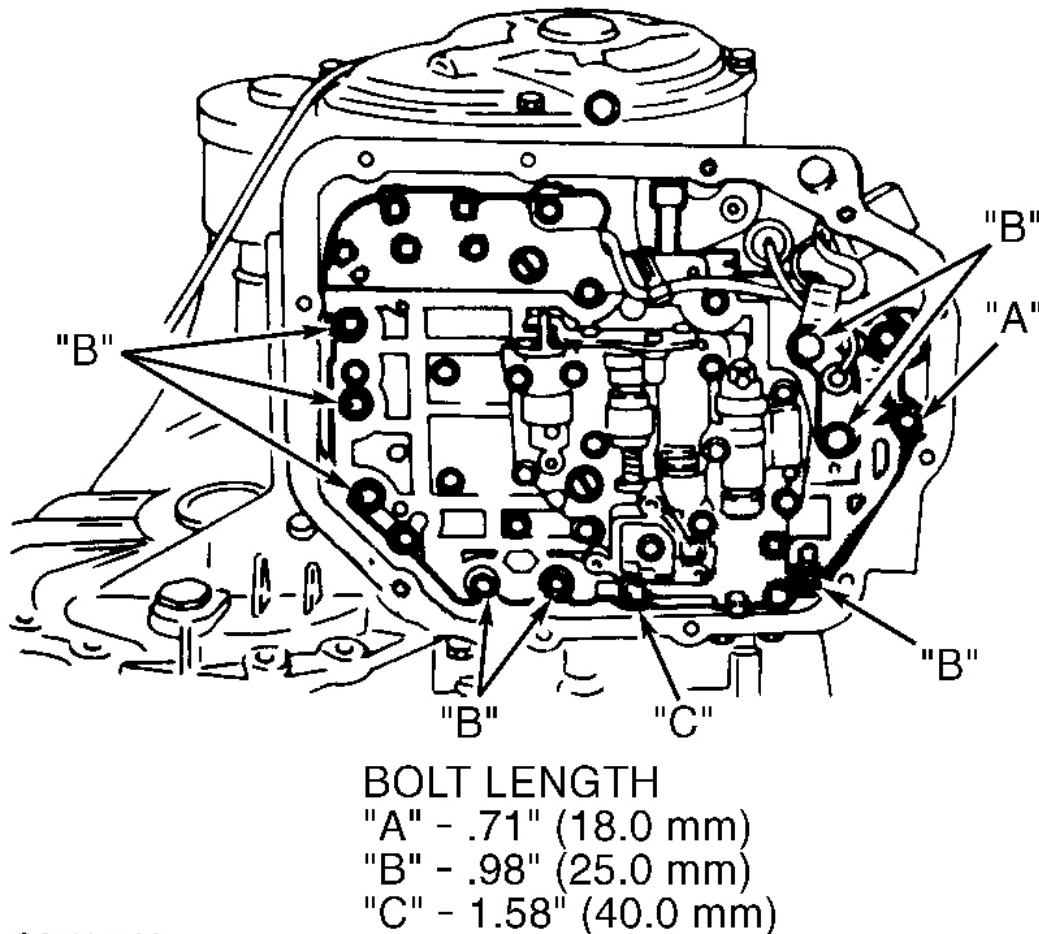
**Fig. 26: Measuring Differential End Play**

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16. Remove converter housing and measure thickness of the crushed solder with a micrometer. Determine thickness of spacer to be installed using the following formula: Thickness of solder = thickness of spacer at differential + gasket thickness .0149" (.380 mm) - end play at differential. End play should be 0-.004" (0-.10 mm).
17. Apply silicone grease to hatched area of transaxle case and install new case gasket. Install converter housing and torque bolts to 14-17 ft. lbs. (19-23 N.m). Install end clutch shaft with the longest spline end towards torque converter end of transaxle. Fit thrust washer to end clutch return spring.
18. Install end clutch hub to end clutch. Using petroleum jelly, stick thrust bearing No. 13 to end clutch hub and install end clutch assembly. Attach new "O" ring to end clutch cover and install on transaxle case. When installing end cover, ensure the screw holes are correctly aligned. If aligned after installing, "O" ring may be twisted. Torque end cover bolts to 53-71 INCH lbs. (6-8 N.m).
19. Install brake oil passage "O" ring at top center of valve body, and install valve body assembly to transaxle case. Ensure manual control shaft pin is in slot of manual valve. Install solenoid valve connector in transaxle case using new "O" ring. Tighten valve body mounting bolts to 89-106 INCH lbs. (10-12 N.m). See **Fig. 27**.
20. Install oil filter, and tighten bolts to 44-62 INCH lbs. (5-7 N.m). With magnets in place, install oil pan.

Tighten bolts to 89-106 INCH lbs. (10-12 N.m). Install kickdown servo switch using new "D" ring, and secure using snap ring. Install inhibitor switch and manual control lever.

21. Adjust inhibitor switch. Install pulse generators "A" and "B". Apply ATF to torque converter sealing area, and install torque converter. Measure distance between ring gear end and converter housing end. Installed depth should be about .47" (12.0 mm).



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Fig. 27: Locating Valve Body Bolts

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TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Bearing Retainer Bolts	13-16 (17-22)

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Converter Housing Bolts	14-17 (19-23)
Differential Drive Gear Bolts	96-103 (130-140)
Drive Plate-To-Converter Bolts	34-39 (46-53)
Idler Shaft Lock Plate Bolt	15-20 (20-27)
Manual Control Lever Nut	13-16 (17-22)
Oil Pump Bolts	11-15 (15-20)
Planetary Carrier-To-Overrunning Clutch	26-33 (35-45)
Sprag Rod Support Bolts	15-20 (20-27)
Transfer Shaft Lock Nut	148-170 (200-230)
INCH Lbs. (N.m)	
End Clutch Cover Bolts	53-71 (6-8)
Governor Set Screw	71-89 (8-10)
Inhibitor Switch Bolts	89-106 (10-12)
Manual Control Lever Set Screw	71-89 (8-10)
Oil Filter Bolts	44-62 (5-7)
Oil Pan Bolts	89-106 (10-12)
Oil Pump Housing Bolts	89-106 (10-12)
Pulse Generator Bolt	89-106 (10-12)
Valve Body Bolts	35-53 (4-6)
Valve Body-To-Case Bolts	89-106 (10-12)

WIRING DIAGRAMS

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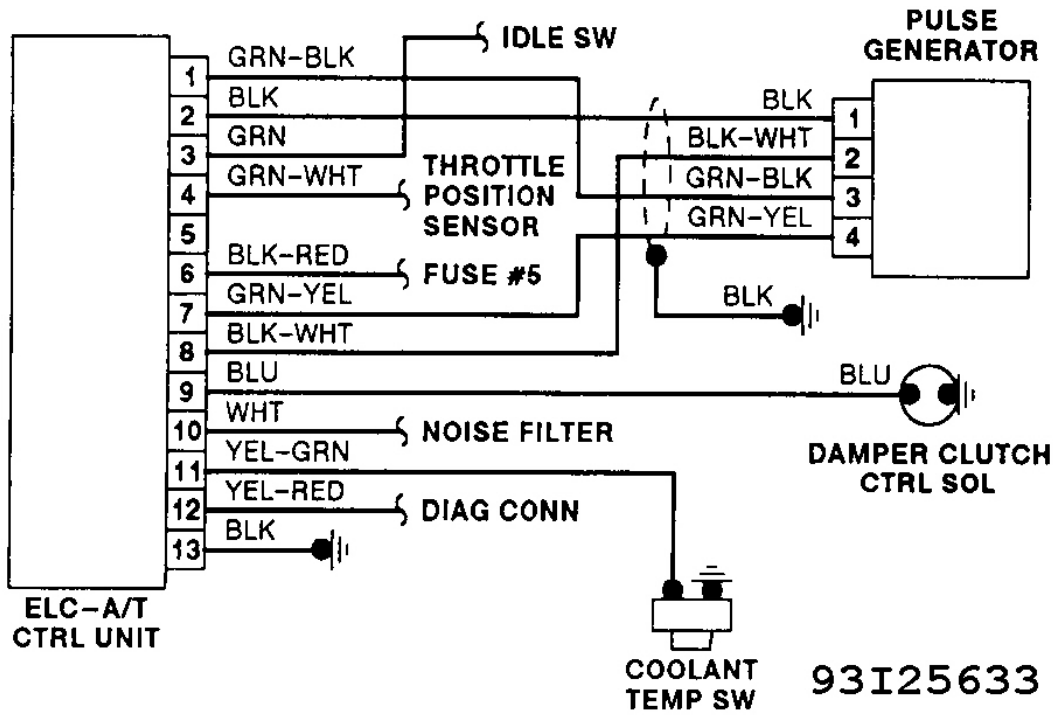


Fig. 28: F3A21 Schematic (Typical)

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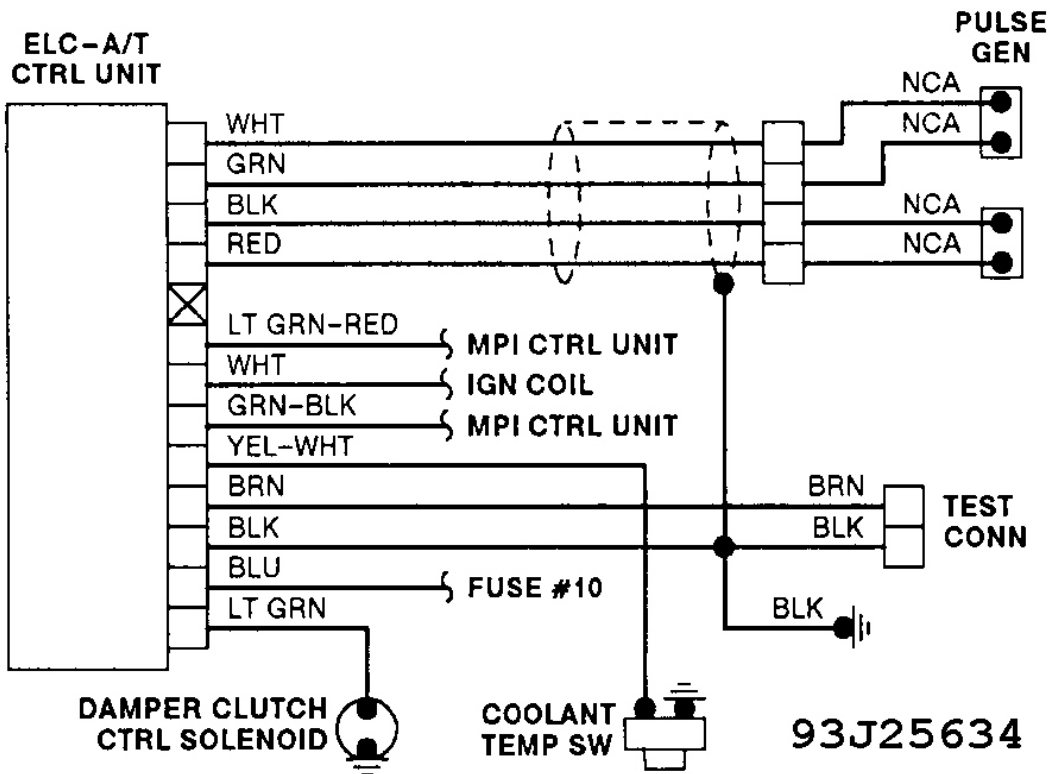


Fig. 29: F3A22 Schematic (1991 Colt Vista Only)

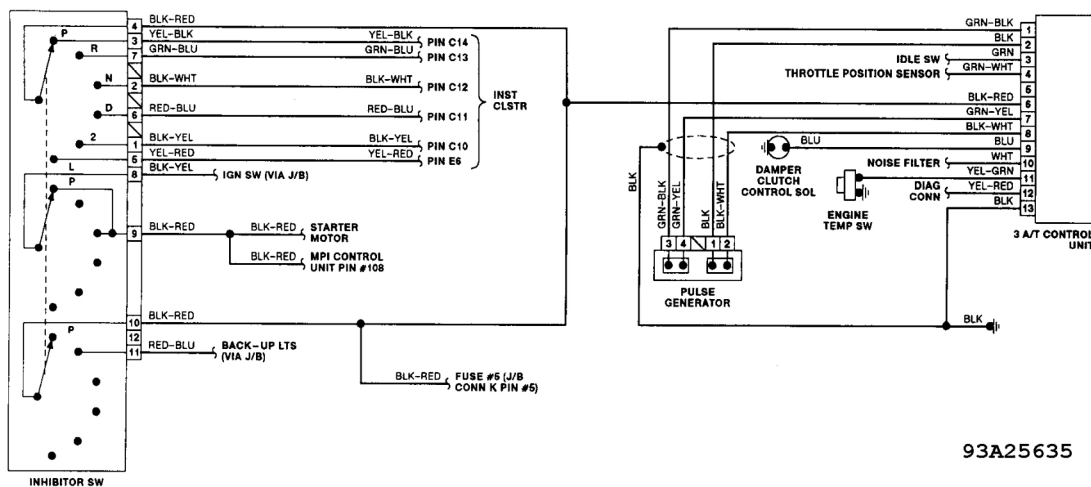


Fig. 30: F3A21 Schematic (1991-92 Mirage Shown; Others Similar)