1995 SEMINAR INFORMATION
"HOW TO SURVIVE IN 95"

INDEX

IMPORTS

GENERAL MOTORS

"HOW TO SURVIVE IN '95"

INTRODUCTION

In this years "HOW TO SURVIVE IN 95 SEMINAR" ATSG will once again present solutions for the common problems the technician is facing in the shops today. This years seminar will also give the technicians THREE manuals that can be brought back to the shop for future reference. Each manual is packed with up to date fixes and information on both domestic and import vehicles alike. These manuals are also keyed to the video and live presentation of the seminar, so the technician can place his entire attention on the seminar, without having to try to write it all down. The seminar starts by covering a wide variety of imports, followed by G.M., Ford and Chrysler vehicles. The entire day will be filled with tips on code retrieval, scanners, fixes, part changes and interchangeabilty. ATSG has been and always will be dedicated in helping the shops to survive not only in 95, but in the years to come as well.

The information and part numbers contained in this booklet have been carefully compiled from industry sources known for their reliability, but ATSG does not guarantee its accuracy.

ROBERT D. CHERRNAY
TECHNICAL DIRECTOR

DALE ENGLAND
FIELD SERVICE CONSULTANT

WAYNE COLONNA
TECHNICAL SUPERVISOR

ED KRUSE
TECHNICAL CONSULTANT

PETE LUBAN
TECHNICAL CONSULTANT

JIM DIAL
TECHNICAL CONSULTANT

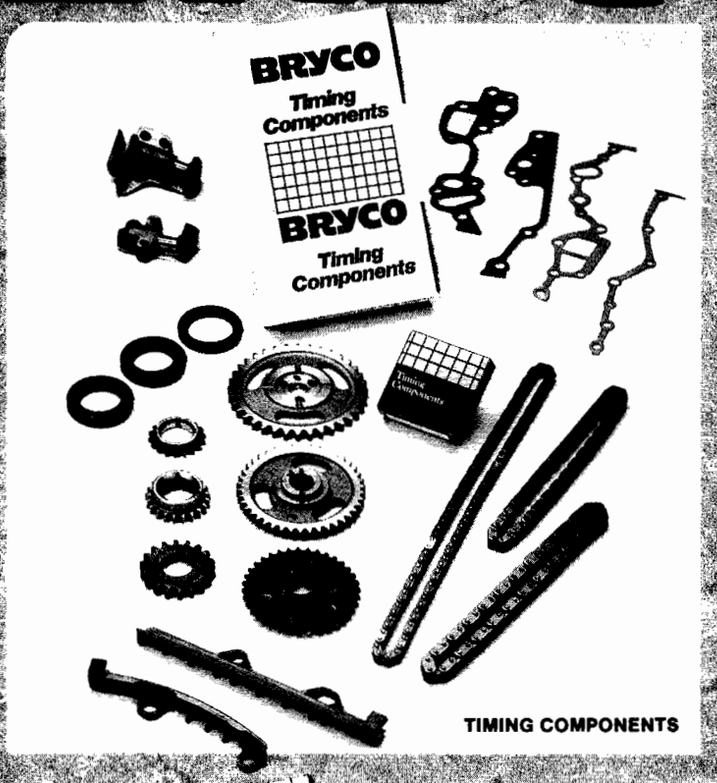
GREGORY LIPNICK
TECHNICAL CONSULTANT

JERRY GOTT
TECHNICAL CONSULTANT

DAVID CHALKER
TECHNICAL CONSULTANT

AUTOMATIC TRANSMISSION SERVICE GROUP
9200 S. DADELAND BLVD.
SUITE 720
MIAMI, FL 33156
(305) 670-4161

BRYCO ... YOUR No. 1 SUPPLIER



TIMING COMPONENTS

AUTOMATIC
TRANSMISSION REPAIR KITS

STANDARD CLUTCH PRODUCTS

AUTOMATIC TRANSMISSION COMPONENTS

BRYCO

...PROVEN THE BEST!

BRYCO has a complete line of foreign and domestic timing components, standard clutches with bearings and covers, automatic transmission parts and repair kits. All of our products are made with the highest quality materials and under the strictest supervision—providing an excellent product at a great price!

INSIST ON "BRYCO" – IT DOESN'T COST MORE TO GET THE BEST!

CARFEL INC.
7495 N.W. 46th St.
Miami, FL 33166 USA
TEL: 305-592-2760
FAX: 305-592-7543

EXPORT CUSTOMERS – PLEASE USE TEL: 305-591-2506

1985-1988 MITSUBISHI CODE RETRIEVAL IDENTIFICATION

COMPLAINT: Fault code identification on early Mitsubishi vehicles equipped with KM transaxles.

CAUSE: Failure to properly identify code charts, or a "no code stored" after a malfunction, or failure to understand voltmeter code signals, or failure to identify correct year of vehicle manufacture.

CORRECTION: **ALWAYS** identify the year of manufacture by the 10th vin digit as follows:
F=1985; G=1986: H=1987; J=1988
1985-1988 transaxle computers have no "keep alive" memory! Therefore, if the ignition is shut off, ALL fault codes will be ERASED. Drive the vehicle and leave it running while you check for codes.
Shown below in figure 1 is an example of a 1986 Galant code chart. The numbers in the far left column have NOTHING to do with codes. They are simply listed in numeric order. Any reference to these numbers will relate to that particular needle sweep that is seen on your voltmeter. For example, Code #3 seen below will be displayed on the voltmeter as 1 short sweep, 1 long and 3 short sweeps.

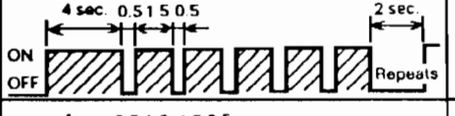
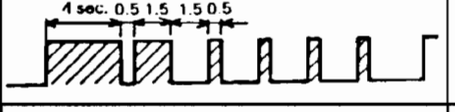
	Malfunction indication code	Diagnosis	Assumed location
1		Microprocessor (computer) malfunction; not remedied by resetting.	• Low power-supply voltage (recharging system) • TCU
2		First gear signal is detected at high vehicle speed.	• Pulse generator B • Vehicle speed sensor • TCU
3		Vehicle speed detected by pulse generator B is much lower than actual vehicle speed.	• Pulse generator B • Vehicle speed sensor • TCU

Figure 1

Illustrated on the following page in figure 2 is the numerically listed #3 malfunction code shown in the chart above, which has been singled out for clarity The first multimeter 12 volt sweep is the "BEGIN CODE" indicator. This sweep will be 4 seconds long and must be 12 volts. If this sweep is not 12 volts, this may be an indication of a poor ground or a faulty computer.
The second, third, fourth, fifth and sixth sweeps are the actual code. The long and short sweeps MUST match to the code illustration in the chart. This means you will see 1 short sweep, 1 long sweep and 3 short sweeps indicating a possible problem with Pulse Generator B. After each code is output, or a repeat of a code, there will be a 2 second pause signifying "End of Code". After all codes are output, the 4 second "begin code" sweep will repeat itself before code output starts again.
NOTE: Code charts can be found in the ATSG Import Pass Book, Volume 1.

We would like to thank John Strenfel of Balco, INC. for the information included here.

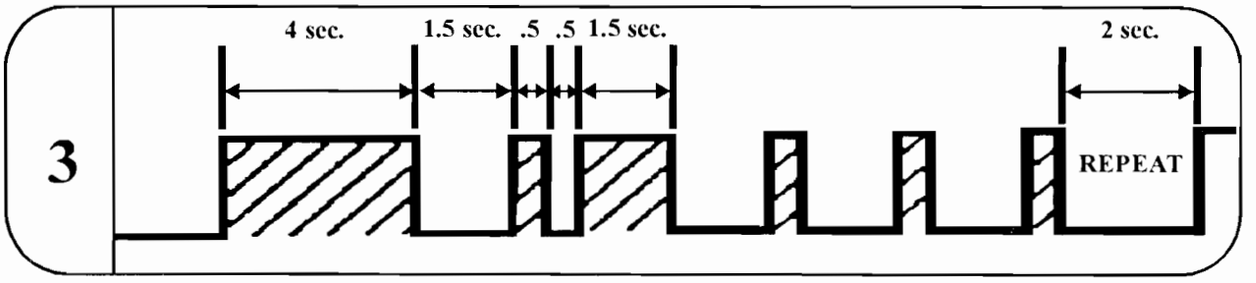


Figure 2

NOTE #1:

1) ALWAYS check the battery feed circuit going into the transaxle computer and,
2) ALWAYS check the voltage supply from the transaxle computer to the inhibitor switch.

Failure to have battery voltage (approximately 12 volts D.C.) at either of these points will result in THIRD GEAR ONLY as soon as the vehicle is in drive. This is NOT "Failsafe Mode"! This is a DEAD system!

A true "Failsafe Mode" is when the transaxle will attempt an upshift, and due to slippage in the transaxle or switched pulse generators or an extremely harsh shift into third or another failsafe related problem, the transaxle computer will then be informed there is a problem and prevent the flow of electrical signal to the shift solenoids, putting the transaxle into third gear.

The difference between these two situations is, a GENUINE "Failsafe Mode" will not interrupt electrical supply TO THE COMPUTER. A DEAD SYSTEM will!

See figures 17-22 on pages 15-17 for transaxle computer locations and refer to the charts on pages 18-30 to locate and check power supplies to the computer and inhibitor switches. A lack of power to either of these items will cause a DEAD SYSTEM. The power supply terminals in the charts are identified by ***bold italics***.

NOTE #2:

When the transaxle computer is not in "Failsafe" and the system is not dead, the computer should be sending on/off 12 volt commands to the shift solenoids in order for the transaxle to shift through the gears. This on/off signal can be checked and should be checked with a multimeter to ensure that there is in fact 12 volts being sent to the shift solenoids. If there is anything less than 12 volts but more than 0 volts, this would indicate poor grounds or a faulty computer.

NOTE #3:

When checking the system for codes as explained on the previous page, remember to ALWAYS verify vehicle year of manufacture. The numerically listed code configurations will vary from year to year. For example, illustrated on the following page in figure 3 is an example of 3 different numerically listed #9 malfunctions. One is for a 1985 vehicle, another is for a 1986 vehicle, and the remaining sequence is for a 1987 vehicle. This is why it is imperative that you verify the year of the vehicle that you are working on, and that you choose the appropriate malfunction chart and compare it to your analog meter needle sweeps. The diagnostic connector locations for the various models can be found on pages 7-14, figures 5-16.

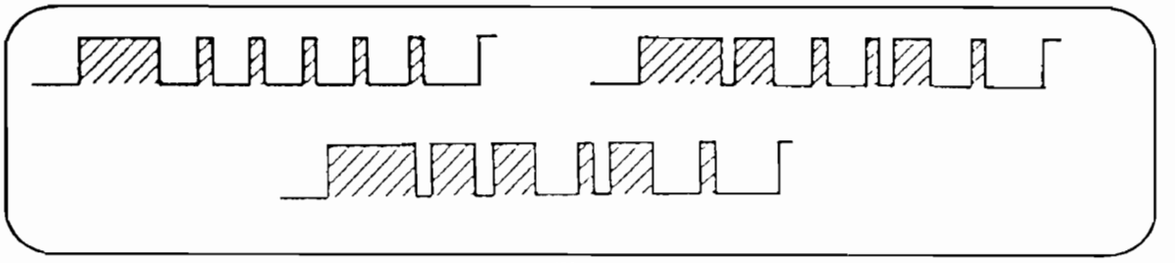


Figure 3

Illustrated below in figure 4 is a wiring schematic found in a typical KM equipped vehicle. A further explanation of what is meant by a "DEAD SYSTEM" and what to check for can be seen below by finding terminal #1 in the 13 pin connector, we see that it is the computers power supply. This terminal must be checked for battery voltage. Next, terminal #19 in the 20 pin connector would be checked for battery voltage. This is the circuit that the inhibitor switch inputs to the computer. If either of these circuits do not have battery voltage, a "DEAD SYSTEM" would exist, resulting in third gear only as soon as the vehicle is put in drive.

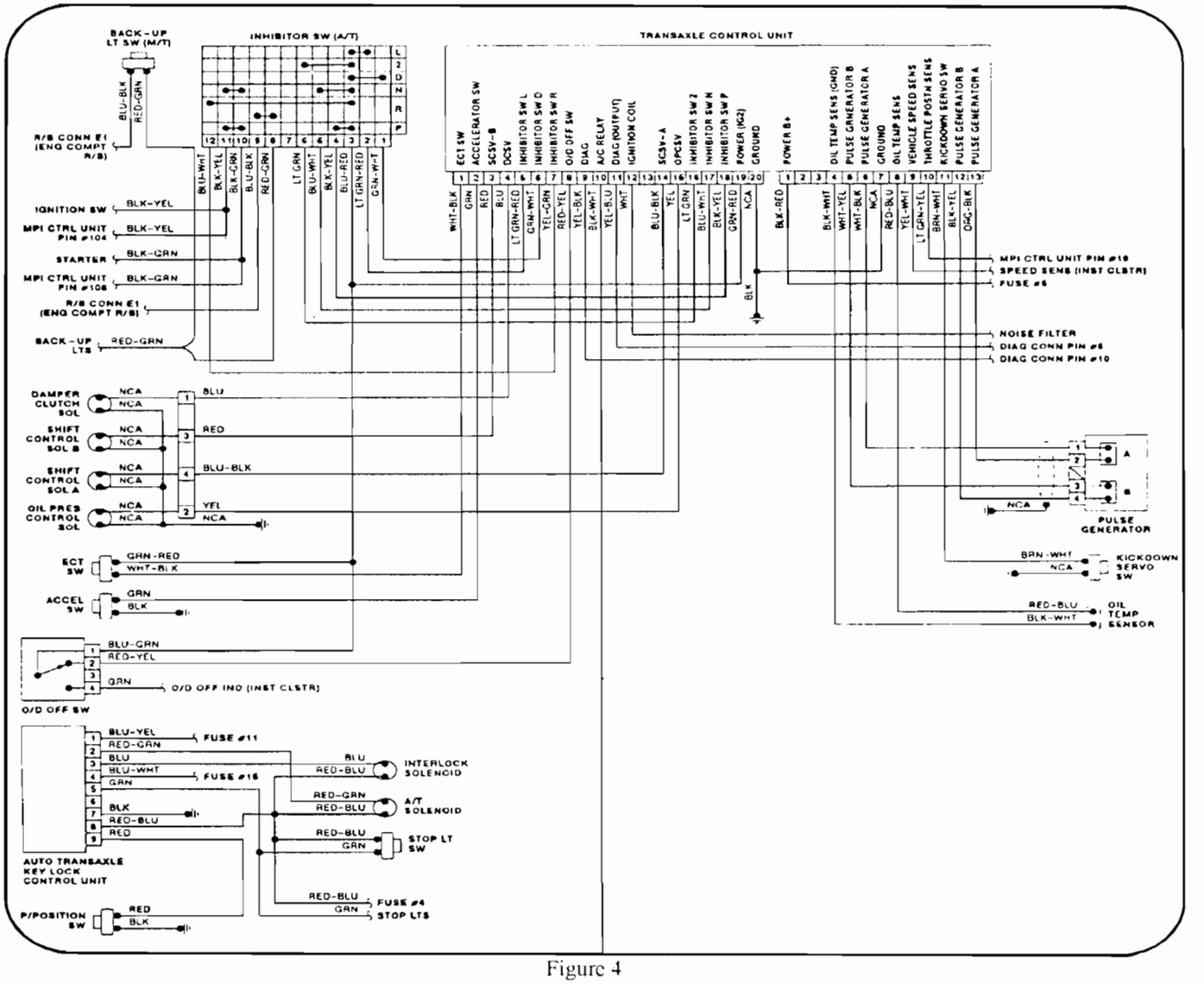
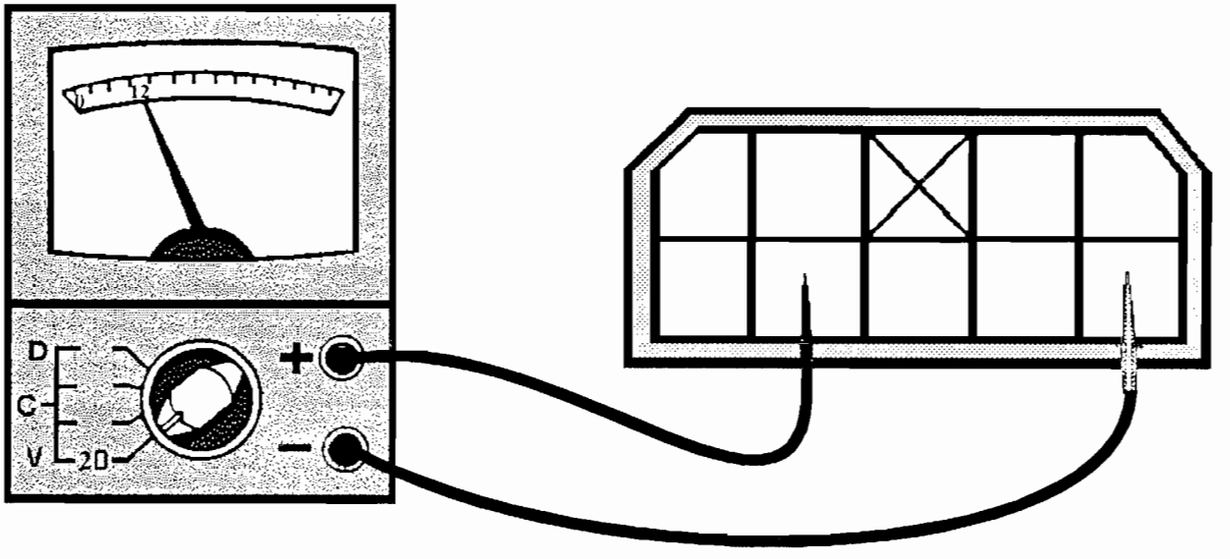


Figure 4

KM VOLTMETER DIAGNOSTIC CONNECTOR LOCATOR

1985-1986 GALANT SYSTEMS



POSITIVE=TRANSAXLE COMPUTER
NEGATIVE=GROUND

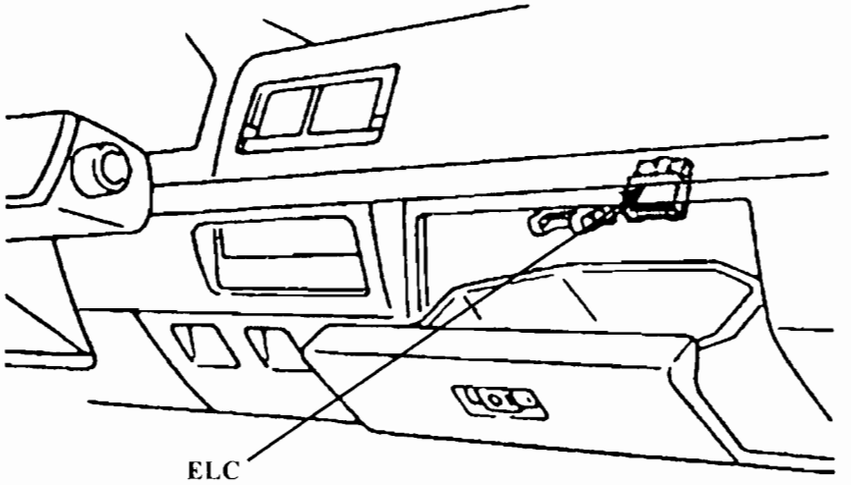


Figure 5

KM VOLTMETER DIAGNOSTIC CONNECTOR LOCATOR

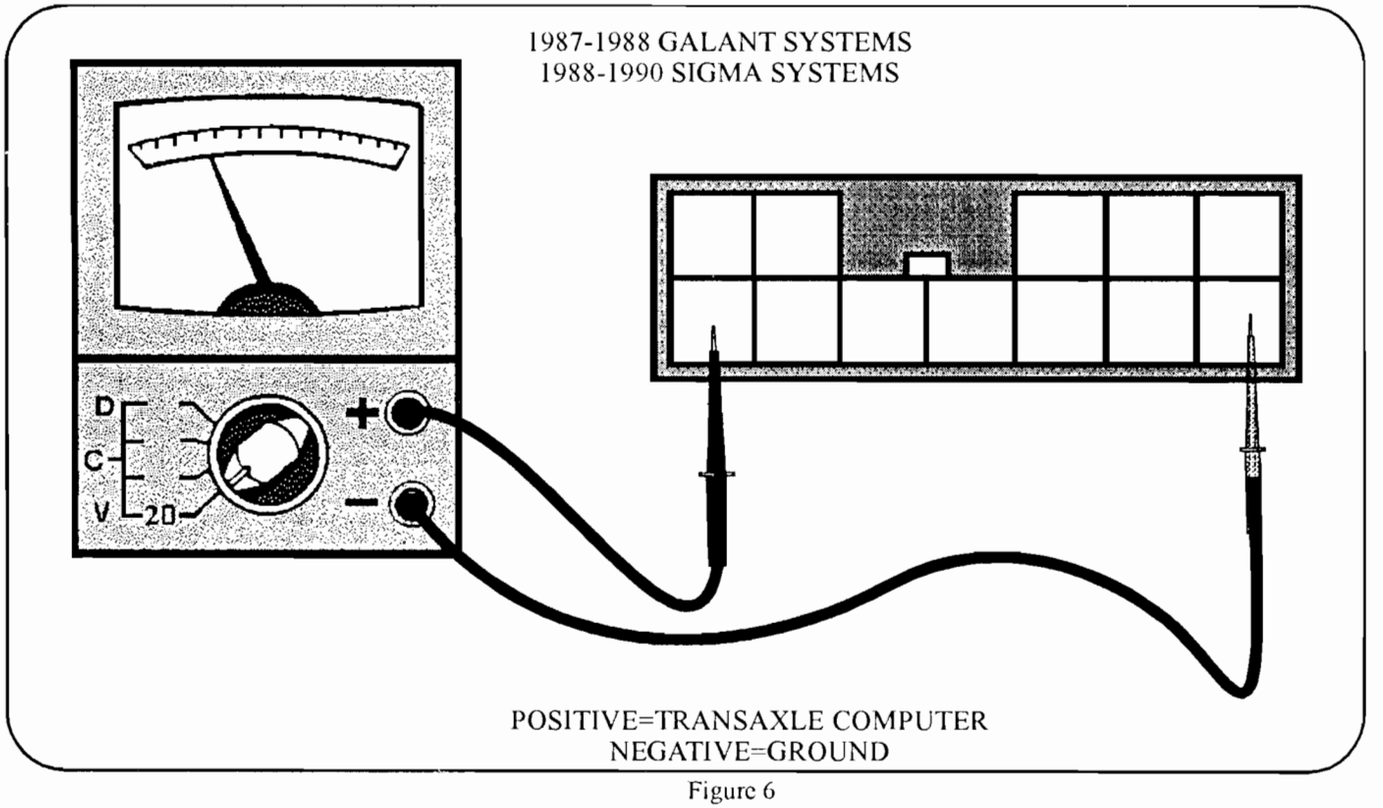


Figure 6

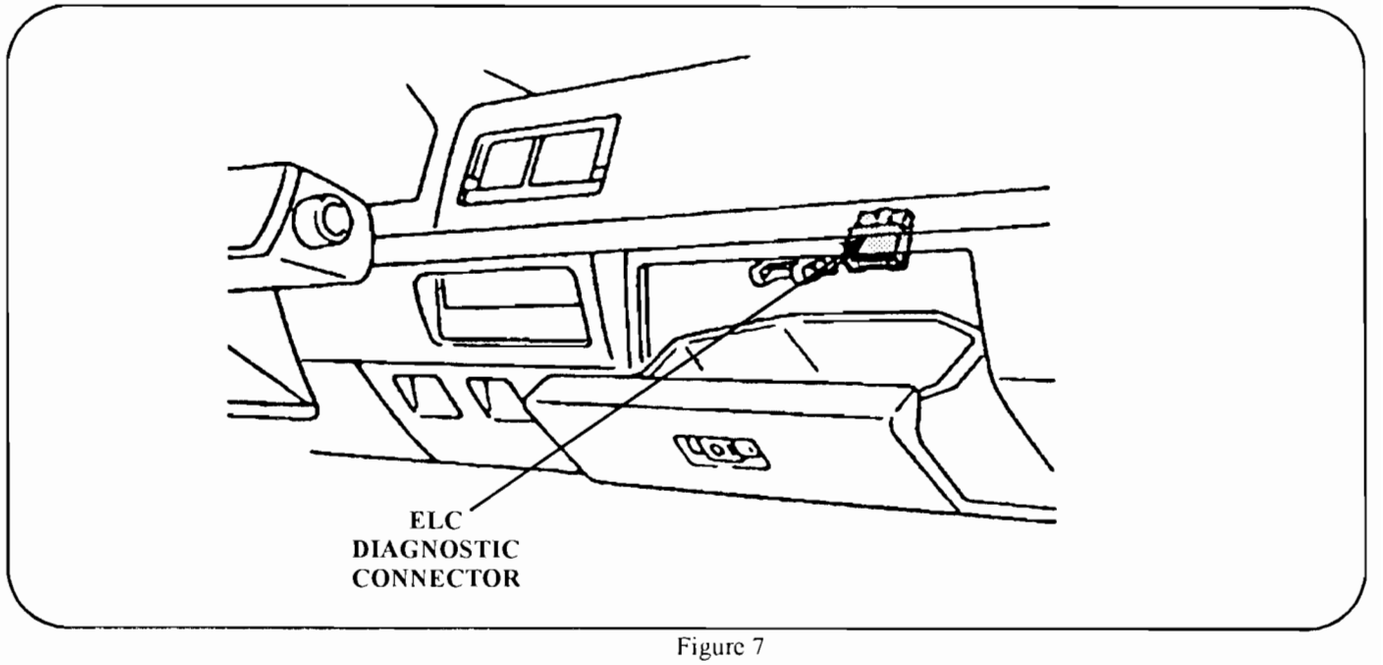


Figure 7

KM SCANNER DIAGNOSTIC CONNECTOR LOCATOR

1989-1993 GALANT SYSTEMS
1990-1994 ECLIPSE SYSTEMS
1991-1993 STEALTH & 3000GT SYSTEMS
1991-1994 LASER & TALON SYSTEMS
1992-1993 EXPO SYSTEMS
1992-1993 SUMMIT & VISTA WAGON SYSTEMS
1992-1993 DIAMANTE & DIAMANTE WAGON SYSTEMS

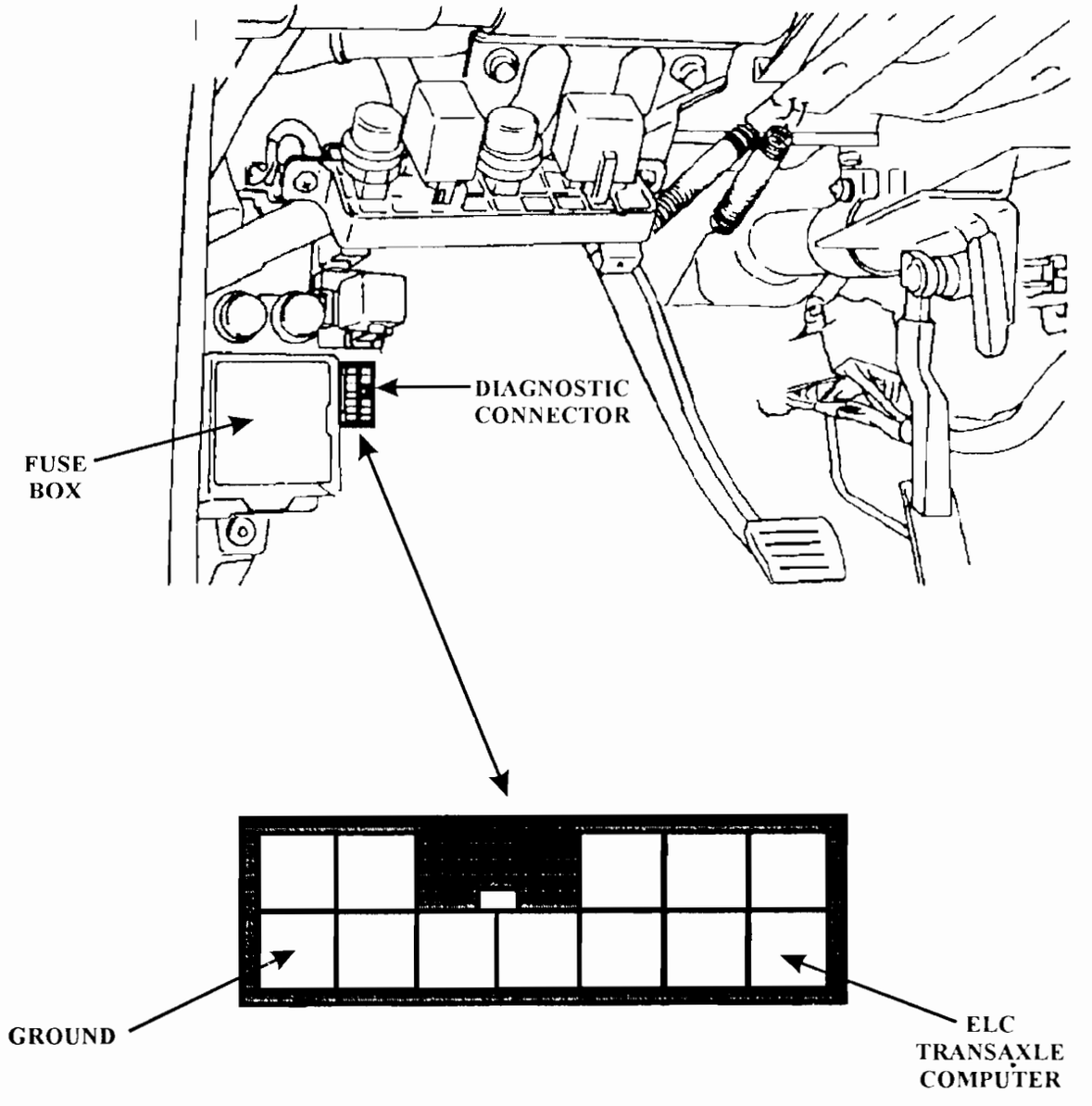
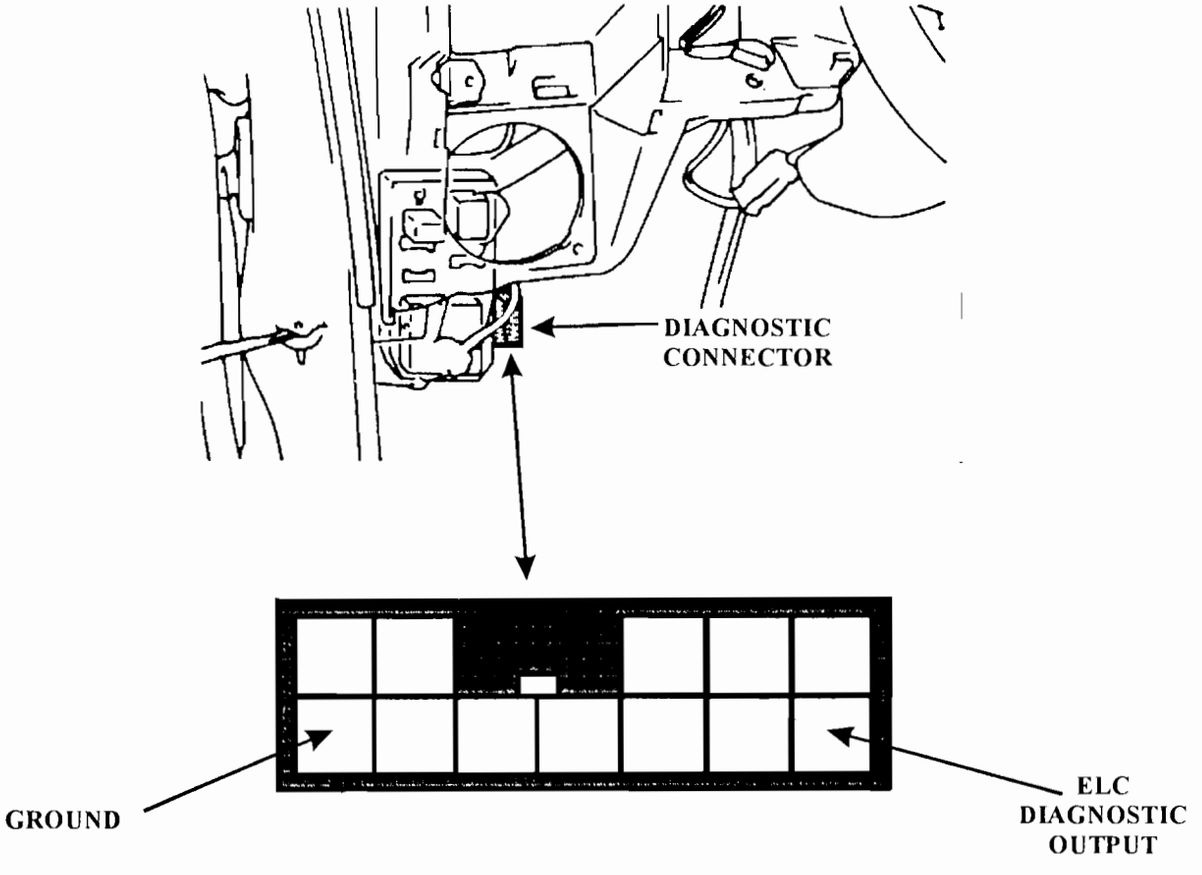


Figure 8

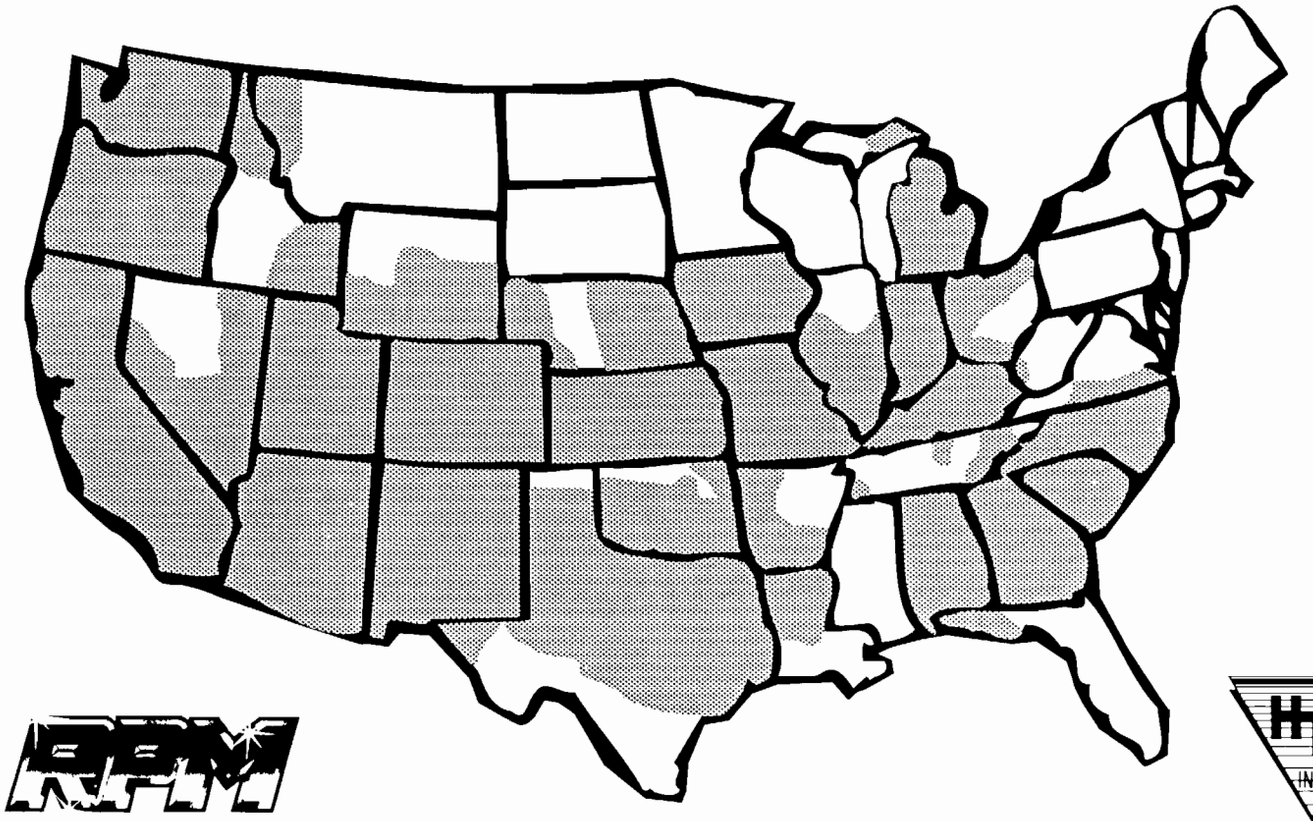
KM SCANNER DIAGNOSTIC CONNECTOR LOCATOR



1989-1993 MIRAGE, COLT & SUMMIT SYSTEMS

Figure 9

If you're lucky enough to have a shop in one of the shaded areas below,



RPM

HTP INC.

CONGRATULATIONS!

THERE ARE MANY CHOICES, BUT ONLY TWO SOLUTIONS FOR ALL YOUR TRANSMISSION NEEDS. HTP AND RPM HAVE JOINED FORCES TO BRING YOUR SHOP ALL THE BEST IN HARD PARTS, SOFT PARTS, TORQUE CONVERTERS, CLUTCH KITS, AND MORE AT COMPETITIVE PRICES.

WE ALSO OFFER YOUR SHOP THE BEST MIX OF PRICE, QUALITY, AND SERVICE ON OUR FULL LINE OF HARD AND SOFT PARTS! TAKE ADVANTAGE OF OUR NUMEROUS TRUCK RUNS.

FOR MORE INFORMATION CONTACT THE LOCATION NEAREST YOU.

ARIZONA
PHOENIX 800-275-9709
TUCSON 602-622-1971

CALIFORNIA
AZUSA 800-275-9736
FRESNO 800-275-3961
LOS ANGELES 213-730-9131
OAKLAND 800-275-2588
SACRAMENTO 800-275-7606
SAN DIEGO 800-275-6223
SANTA CLARA 800-275-2113

COLORADO
COLORADO SPRINGS 800-748-2568
DENVER 800-275-1014

GEORGIA
ATLANTA 800-938-4776

KENTUCKY
LOUISVILLE 800-289-1487

MICHIGAN
JACKSON 800-477-2487

MISSOURI
KANSAS CITY 800-221-6176
ST. LOUIS 800-928-3370
SPRINGFIELD 800-749-3939

NEW MEXICO
ALBUQUERQUE 800-275-1229

NEVADA
LAS VEGAS 702-253-9814

NORTH CAROLINA
CHARLOTTE 800-374-3487

OREGON
PORTLAND 800-275-0984

TEXAS
DALLAS 800-275-8569

UTAH
SALT LAKE CITY 800-275-0651

WASHINGTON
SEATTLE 800-275-0951
SPOKANE 800-275-0355

BRITISH COLUMBIA
VANCOUVER 800-667-6388

AND GROWING!

KM SCANNER DIAGNOSTIC CONNECTOR LOCATOR

1994 GALANT SYSTEMS
1994 STEALTH & 3000GT SYSTEMS

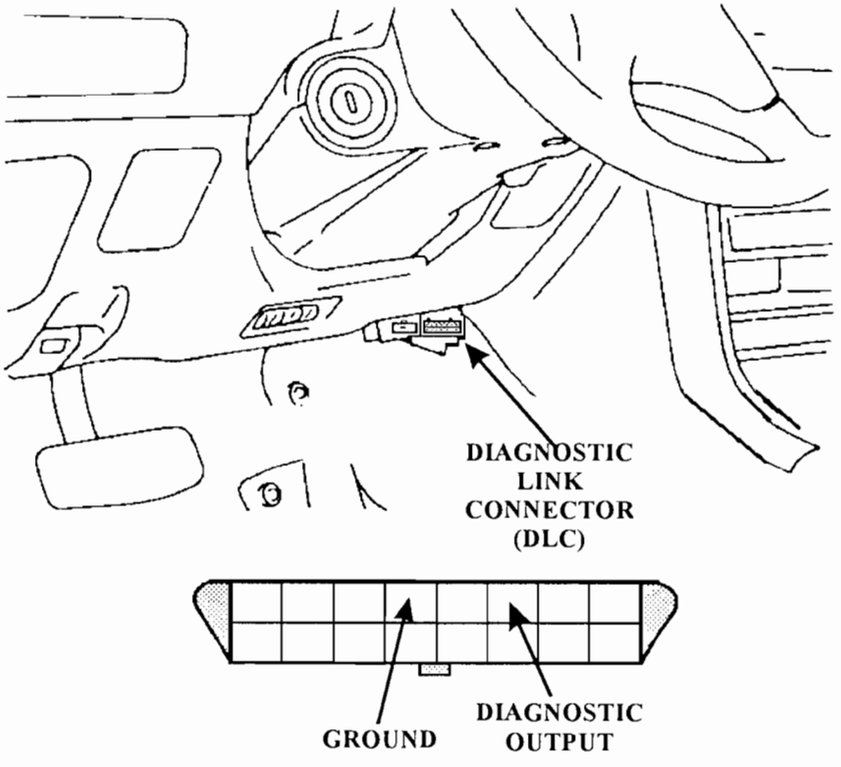
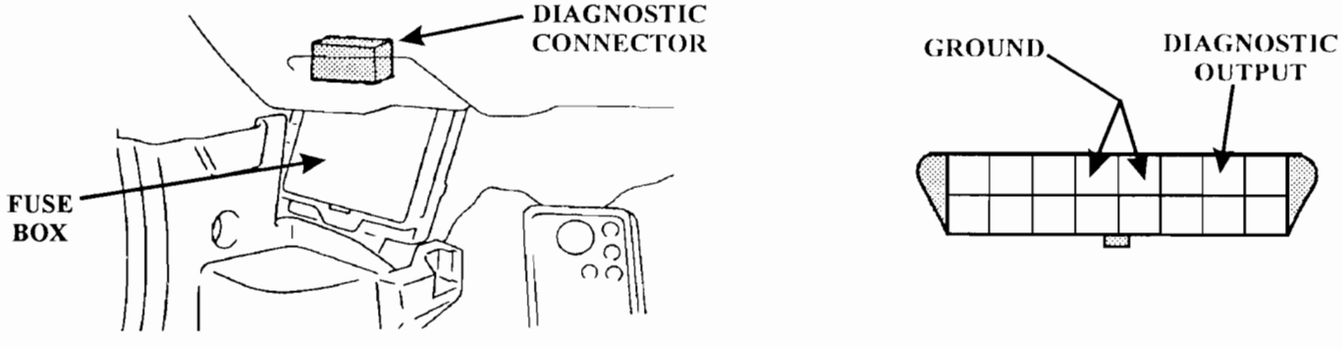


Figure 10



1994 MIRAGE SYSTEMS
1994 DIAMANTE SYSYTEMS
1994 COLT & SUMMIT SYSTEMS

Figure 11

KM SCANNER DIAGNOSTIC CONNECTOR LOCATOR

1990-1993 EXCEL SYSTEMS
1991-1993 SCOUPE SYSTEMS
1990-1993 PRECIS SYSTEMS

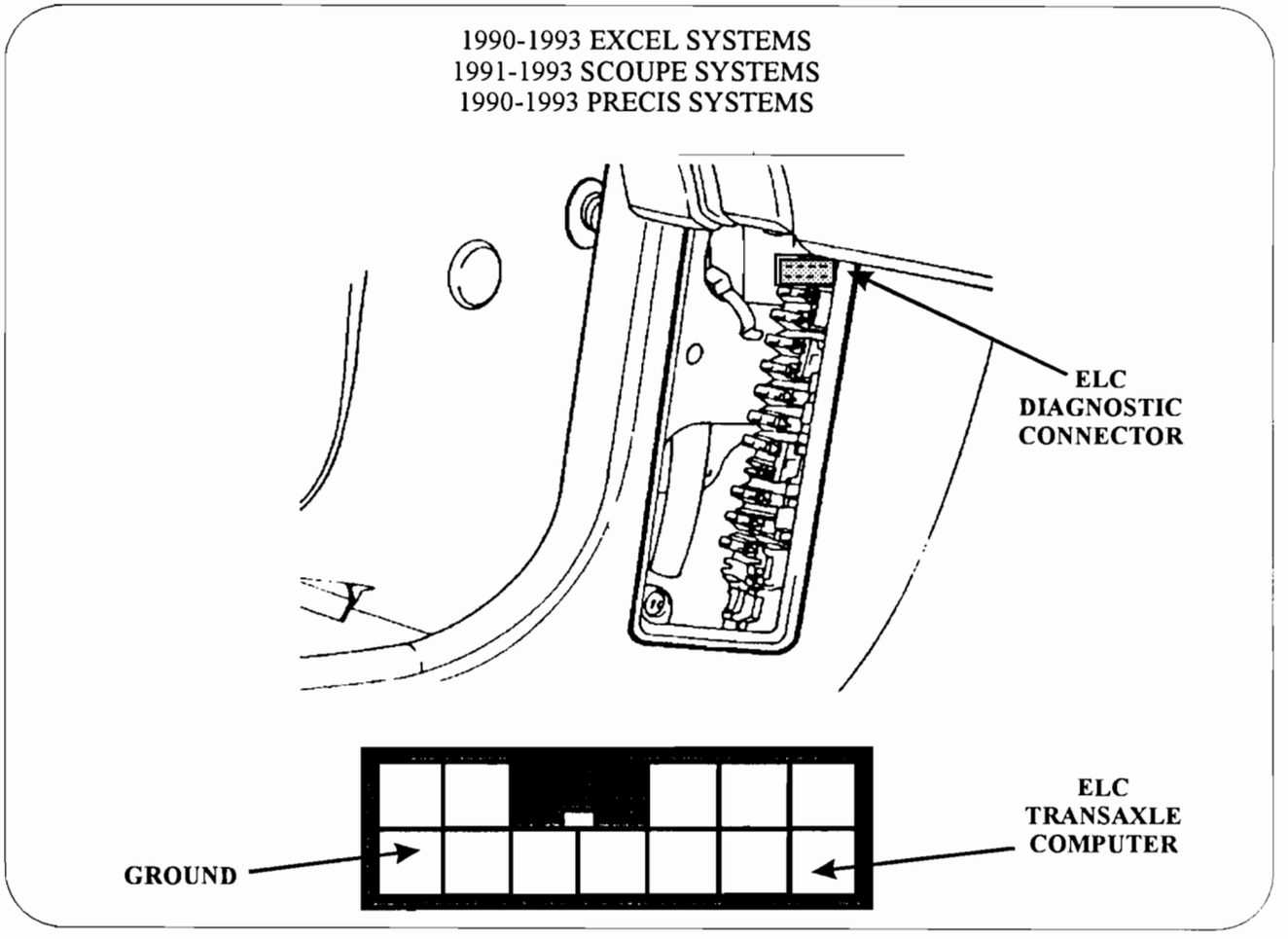
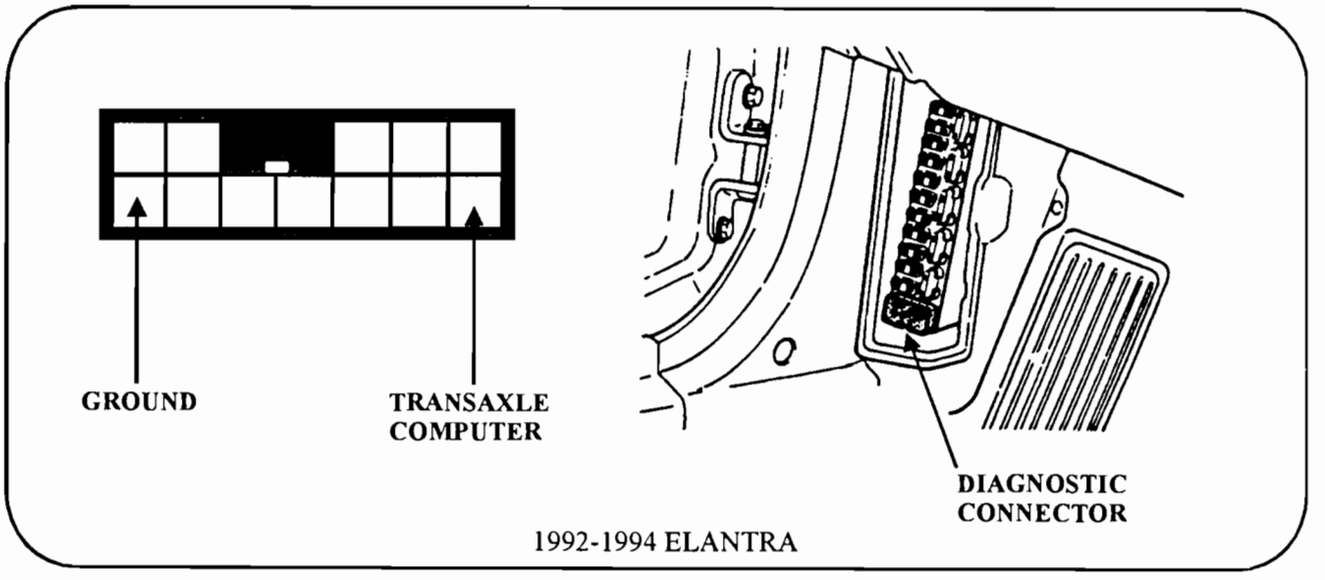


Figure 12



1992-1994 ELANTRA

Figure 13

KM SCANNER DIAGNOSTIC CONNECTOR LOCATOR

1990-1994 SONATA WITH PASSIVE SEAT BELT SYSTEMS

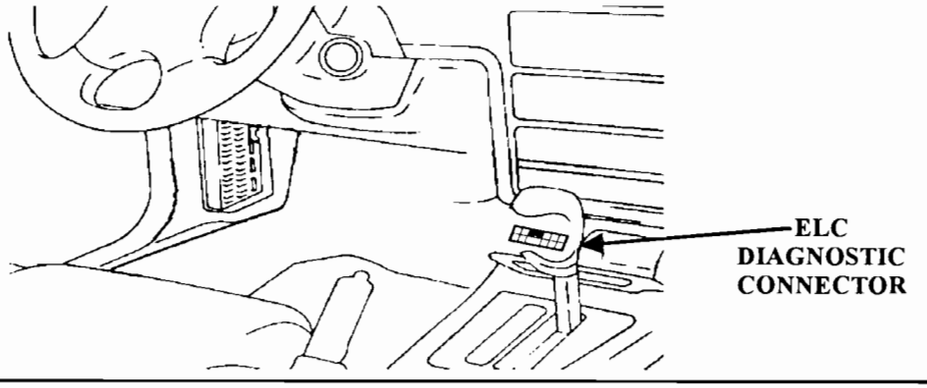
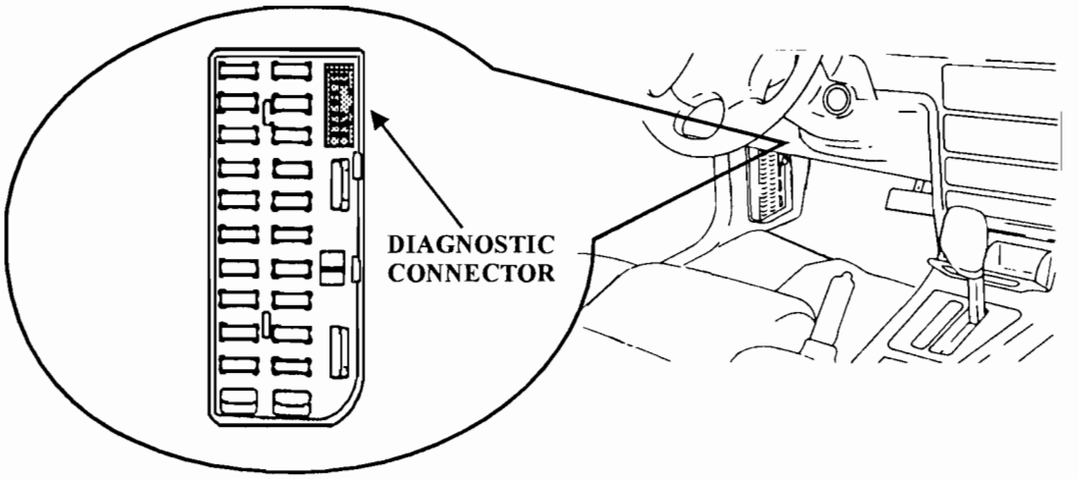
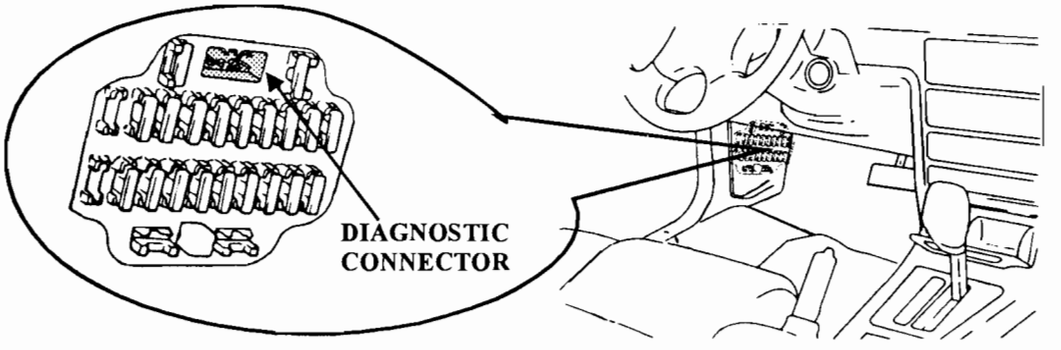


Figure 14



1989-1994 SONATA *(USA)* WITH NON-PASSIVE SEAT BELT SYSTEM

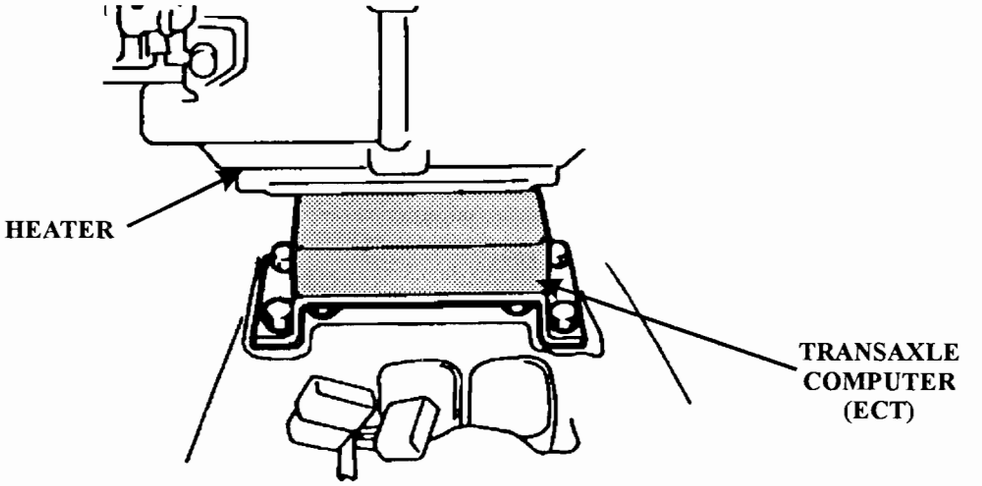
Figure 15



1989-1994 SONATA *(NON-USA)* WITH PASSIVE SEAT BELT SYSTEMS

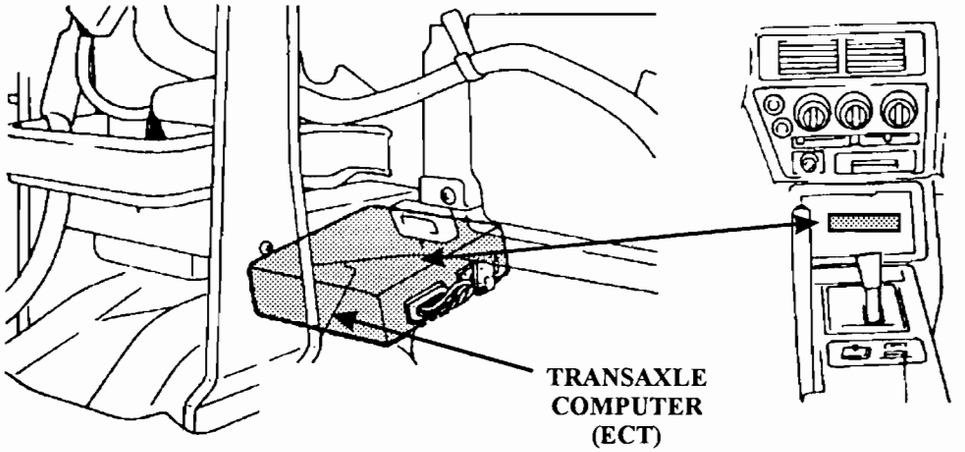
Figure 16

TRANSAXLE COMPUTER LOCATOR



1985-88 GALANT
1988-90 SIGMA
1989-92 SONATA

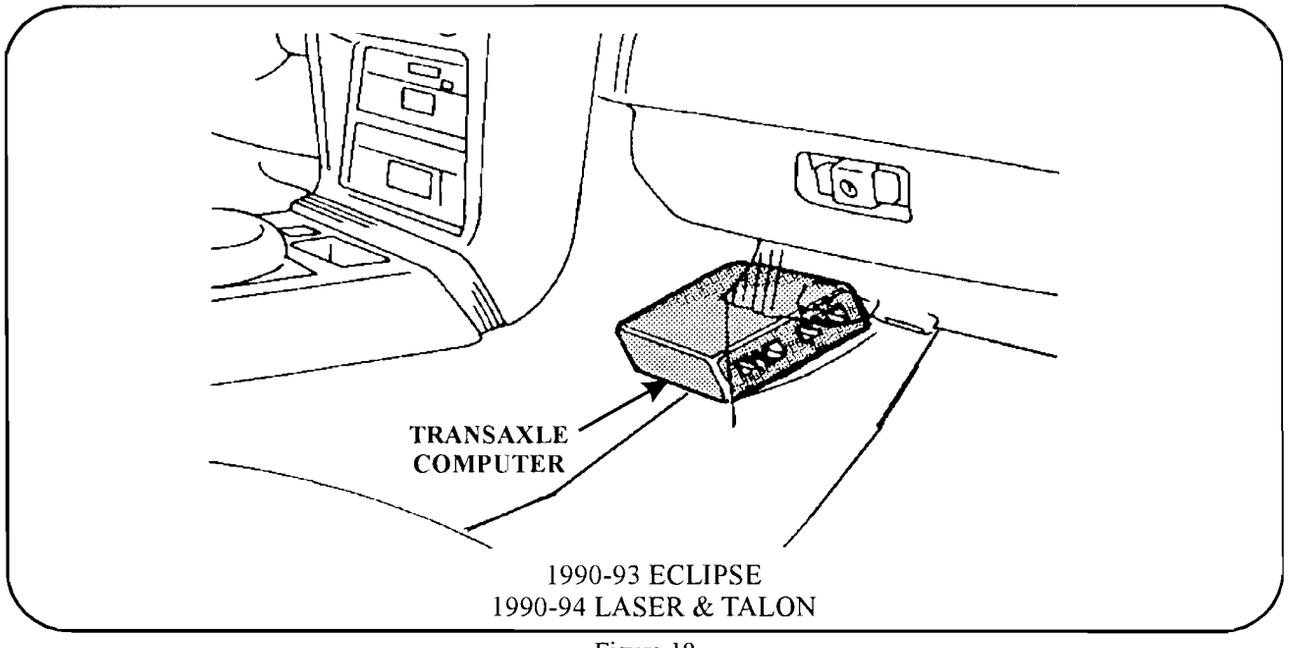
Figure 17



1989-94 GALANT
1989-93 SUMMIT, COLT & MIRAGE
1992-94 VISTA & SUMMIT WAGON
1992-93 EXPO
1992-94 DIAMANTE

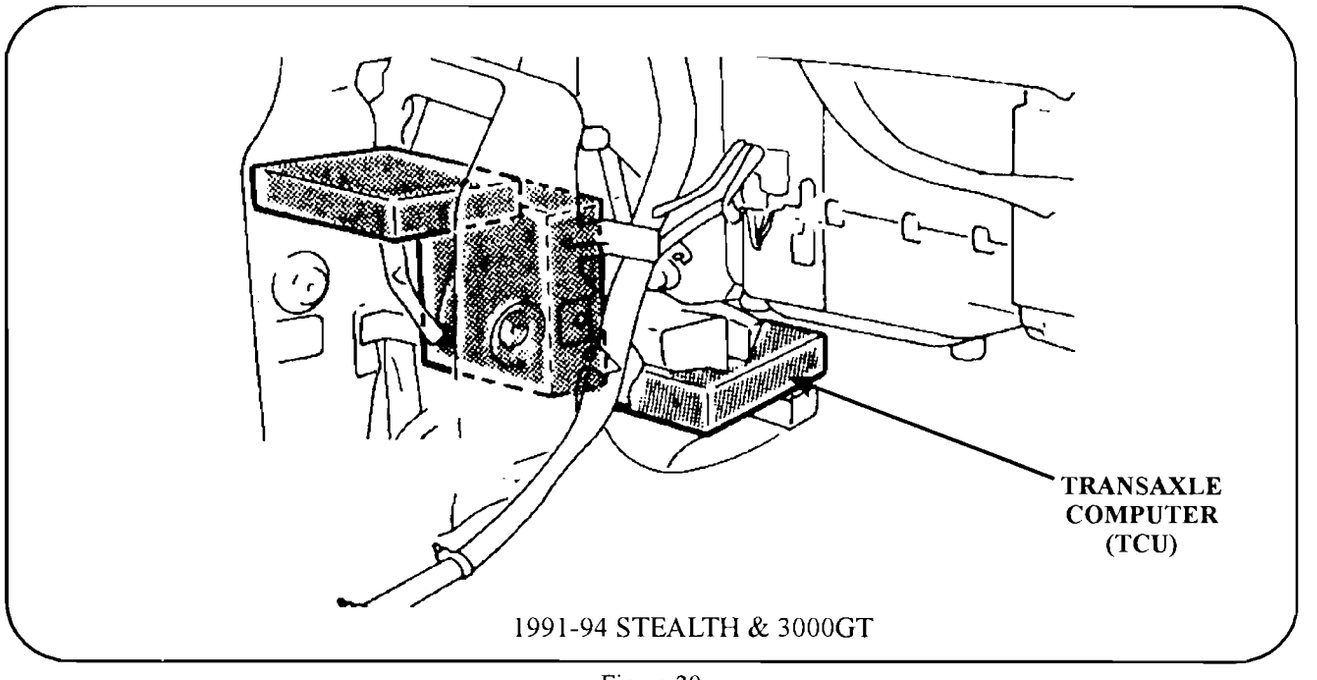
Figure 18

TRANSAXLE COMPUTER LOCATOR



1990-93 ECLIPSE
1990-94 LASER & TALON

Figure 19



1991-94 STEALTH & 3000GT

Figure 20

TRANSAXLE COMPUTER LOCATOR

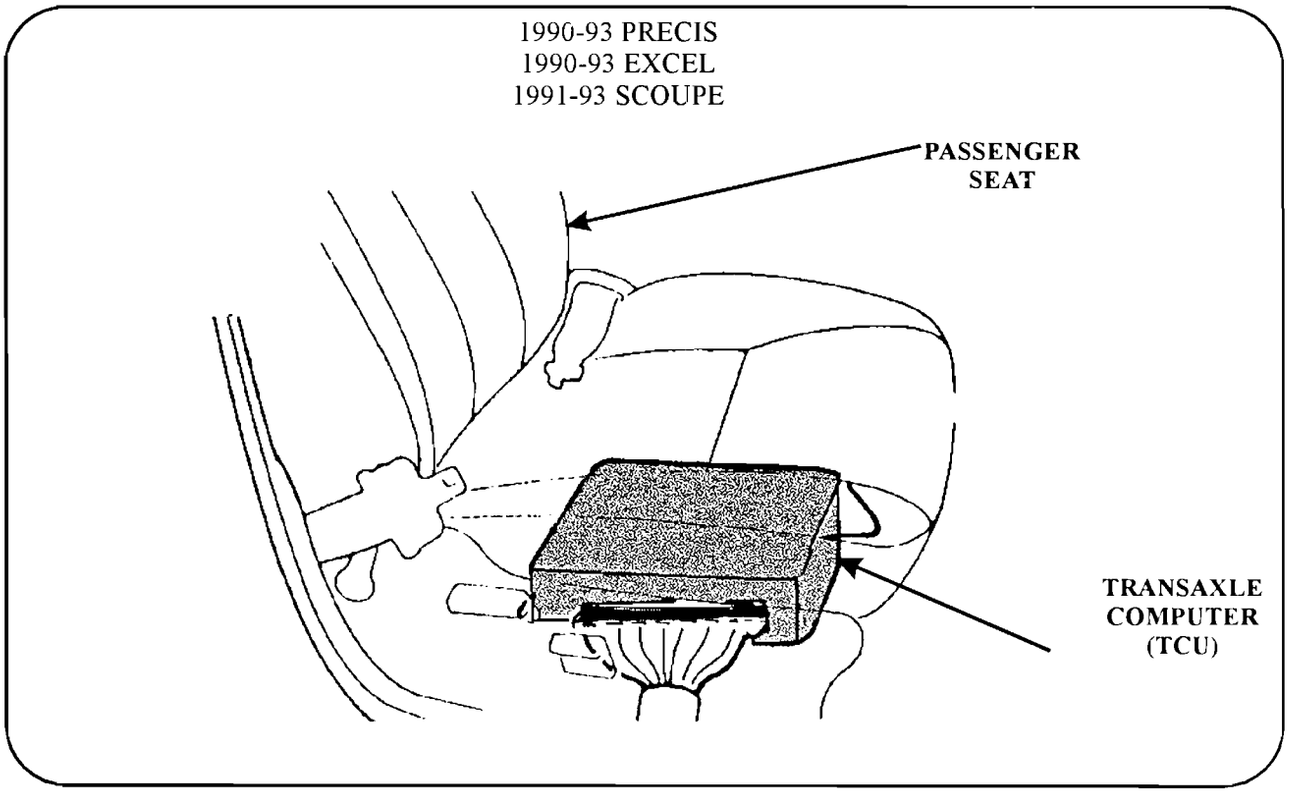


Figure 21

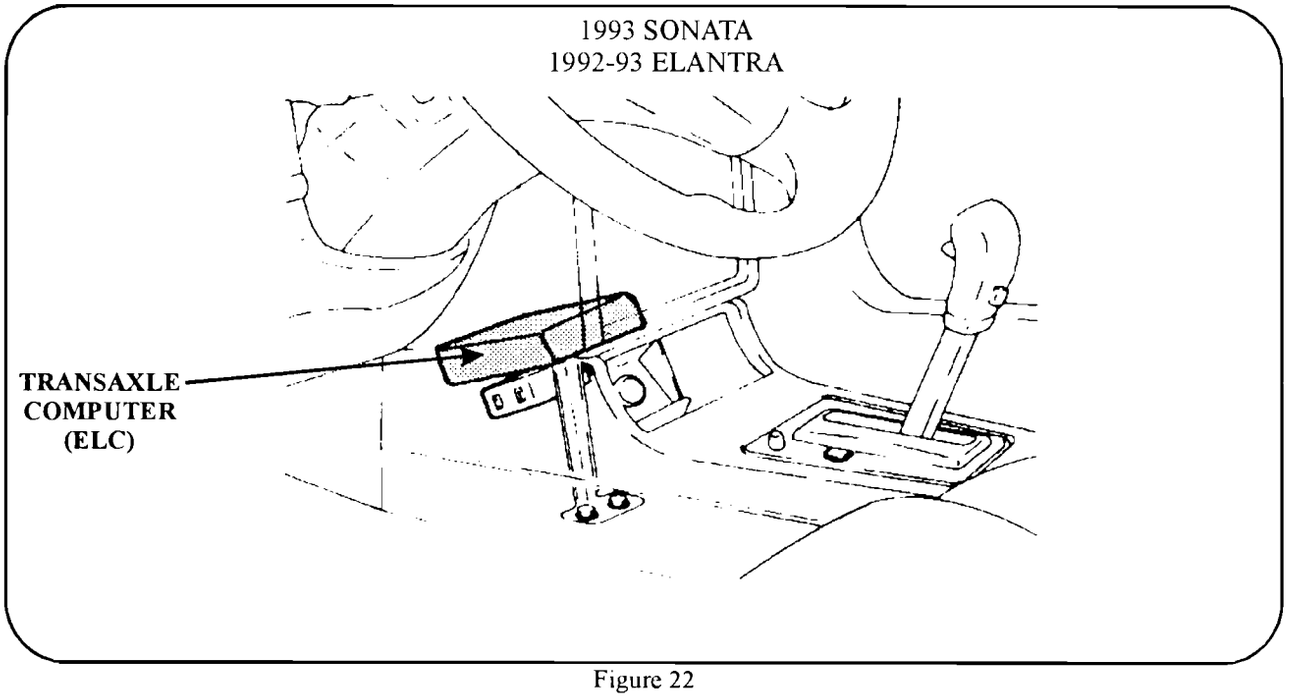
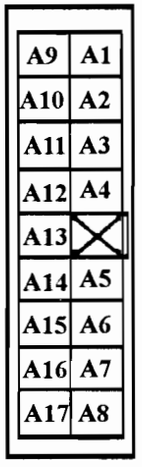


Figure 22

1985-86 GALANT

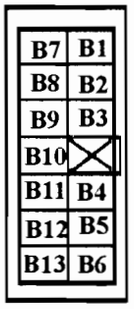
Transaxle Computer Pin ID

17 PIN CONNECTOR



A-1 ENGINE COOLANT TEMPERATURE
A-2 OVERDRIVE SWITCH
A-3 INHIBITOR SWITCH (R)
A-4 INHIBITOR SWITCH (D)
A-5 INHIBITOR SWITCH (L)
A-6 DCCSV (DAMPER CLUTCH CONTROL SOLENOID)
A-7 SHIFT CONTROL SOLENOID B
A-8 ACCELERATOR SWITCH
A-9 COMPUTER GROUND (17 PIN CONNECTOR)
A-10 12V POWER SOURCE (FUSE #10) (1986 GALANT FUSE #11)
A-11 INHIBITOR SWITCH (P)
A-12 INHIBITOR SWITCH (N)
A-13 INHIBITOR SWITCH (2)
A-14 PCSV (OIL PRESSURE CONTROL SOLENOID)
A-15 SHIFT CONTROL SOLENOID A
A-16 BLANK
A-17 IGNITION COIL

13 PIN CONNECTOR



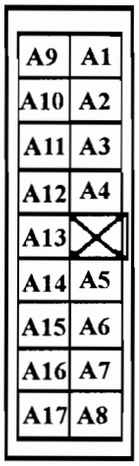
B-1 PULSE GENERATOR A
B-2 PULSE GENERATOR B
B-3 BLANK
B-4 BLANK
B-5 BLANK
B-6 BLANK
B-7 PULSE GENERATOR A
B-8 PULSE GENERATOR B
B-9 KICKDOWN SERVO SWITCH
B-10 THROTTLE POSITION SENSOR
B-11 VEHICLE SPEED SENSOR
B-12 DIAGNOSTIC OUTPUT
B-13 COMPUTER GROUND (13 PIN CONNECTOR)

***NOTE:** ALL CONNECTORS ARE VIEWED FROM THE PIN SIDE

1987-88 GALANT

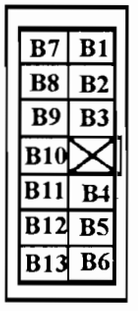
Transaxle Computer Pin ID

17 PIN CONNECTOR



A-1 INHIBITOR SWITCH (R)
A-2 INHIBITOR SWITCH (D)
A-3 INHIBITOR SWITCH (L)
A-4 INHIBITOR SWITCH (P)
A-5 INHIBITOR SWITCH (N)
A-6 INHIBITOR SWITCH (2)
A-7 BLANK
A-8 12V POWER SOURCE (FUSE #11)
A-9 IGNITION COIL
A-10 CRUISE CONTROL
A-11 ACCELERATOR SWITCH
A-12 OIL PRESSURE CONTROL SOLENOID (PCSV)
A-13 DAMPER CLUTCH CONTROL SOLENOID (DCCSV)
A-14 SHIFT SOLENOID B
A-15 SHIFT SOLENOID A
A-16 THERMO SWITCH
A-17 COMPUTER GROUND (17 PIN CONNECTOR)

13 PIN CONNECTOR

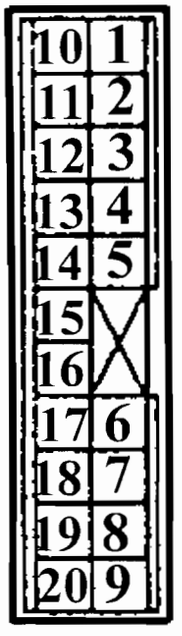


B-1 THROTTLE POSITION SENSOR
B-2 BLANK
B-3 VEHICLE SPEED SENSOR
B-4 BLANK
B-5 BLANK
B-6 DIAGNOSTIC CONNECTOR
B-7 KICKDOWN SERVO SWITCH
B-8 COMPUTER GROUND (13 PIN CONNECTOR)
B-9 PULSE GENERATOR B
B-10 PULSE GENERATOR B
B-11 PULSE GENERATOR A
B-12 PULSE GENERATOR A
B-13 BLANK

1989-90 SIGMA

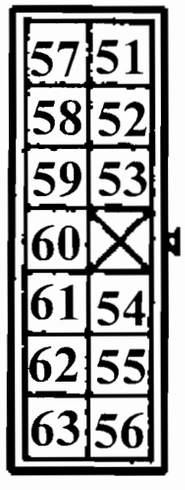
TRANSAXLE COMPUTER PIN ID

20 PIN CONNECTOR



1 BLANK
2 CRUISE CONTROL
3 INHIBITOR SWITCH (R)
4 INHIBITOR SWITCH (D)
5 INHIBITOR SWITCH (L)
6 BLANK
7 SHIFT CONTROL SOLENOID A*
8 ACCELERATOR PEDAL SWITCH
9 POWER/ECONOMY MODE SWITCH
10 COMPUTER GROUND (20 PIN CONNECTOR)*
11 INHIBITOR SWITCH 12V POWER SUPPLY (FUSE #10)
12 INHIBITOR SWITCH (P)
13 INHIBITOR SWITCH (N)
14 INHIBITOR SWITCH (2)
15 OIL PRESSURE CONTROL SOLENOID (PCSV)
16 SHIFT CONTROL SOLENOID B*
17 BLANK*
18 ENGINE RPM SIGNAL*
19 DIAGNOSTIC CONNECTOR*
20 A/C CONTROL UNIT*

13 PIN CONNECTOR



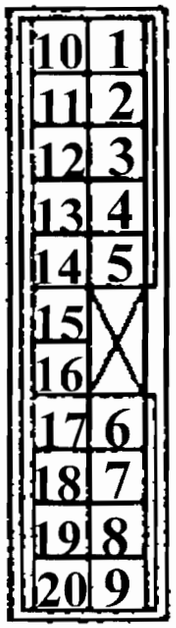
51 PULSE GENERATOR A
52 PULSE GENERATOR B
53 KICKDOWN SERVO SWITCH
54 KICKDOWN SERVO SWITCH
55 BLANK
56 COMPUTER 12V POWER SUPPLY (FUSE #1)
57 PULSE GENERATOR A
58 PULSE GENERATOR B
59 KICKDOWN SERVO SWITCH
60 THROTTLE POSITION SENSOR
61 VEHICLE SPEED SENSOR
62 A/T FLUID TEMPERATURE SENSOR
63 COMPUTER GROUND (13 PIN CONNECTOR)

*** INDICATES PIN DIFFERENCES FOR 1989-90 SIGMA 20 PIN CONNECTOR**
SEE PAGE 21 FOR 1990 DIFFERENCES

1990 SIGMA ONLY

20 PIN CONNECTOR ID

20 PIN CONNECTOR



1 BLANK
2 CRUISE CONTROL
3 INHIBITOR SWITCH (R)
4 INHIBITOR SWITCH (D)
5 INHIBITOR SWITCH (L)
6 BLANK
7 SHIFT CONTROL SOLENOID B*
8 ACCELERATOR PEDAL SWITCH
9 POWER/ECONOMY MODE SWITCH
10 DIAGNOSTIC CONNECTOR*
11 INHIBITOR SWITCH 12V POWER SUPPLY (FUSE #10)
12 INHIBITOR SWITCH (P)
13 INHIBITOR SWITCH (N)
14 INHIBITOR SWITCH (2)
15 OIL PRESSURE CONTROL SOLENOID (PCSV)
16 SHIFT CONTROL SOLENOID A*
17 MPI COMPUTER*
18 NOISE FILTER*
19 COMPUTER GROUND (20 PIN CONNECTOR)
20 MPI COMPUTER*

***INDICATES 1989-90 SIGMA 20 PIN CONNECTOR DIFFERENCES**
THE 13 PIN CONNECTORS ARE IDENTICAL

OEM's use

- Softens harsh shifts with no loss of lock-up time
- Eliminates objectionable noises during shifts
- Optimizes overall transmission performance
- Prevents lock-up torque converter shudder
- Inhibits oxidation and overheating
- Eliminates hung-up governors
- Prevents clutch chatter
- Increases fluid life
- Keeps valves free
- **OEM endorsed**

shouldn't you?

SAAB

Parts & Service Information

CATEGORY	
Transmission	
SECTION 4	PAGE 14
ISSUE 06/93–0352	CODE 442

Subject: Automatic Transmission Upshift Noise

Application: 9000 Models with ZF Automatic Transmission

Some complaints have been received from owners of 9000 cars equipped with the ZF 4HP18 automatic transmission of a noise that occurs at the 2 - 3 upshift point. The noise may be described as a "squawk" or "moan" that usually occurs under light throttle pressure. A transmission fluid additive has been tested and approved for use as a service solution to address these complaints.

Before this fluid supplement can be added, the condition of the transmission fluid must be checked. If there are any indications of either burned or contaminated fluid, this may be the actual cause of the noise. In this case, addition of the fluid supplement will not cure the complaint.

It should be noted that the specific noise described in this PSI does not indicate any mechanical failure, or impending failure. It may, however, be an irritant to the car owner and should be addressed.

Cars Affected:

9000 models with ZF automatic transmission.

Parts:

LUBEGARD ATF SUPPLEMENT, 10 fl.oz. (296ml) bottle (5.0 fl.oz. (150ml) required per car).

NOTE

LUBEGARD ATF SUPPLEMENT can be obtained through any of the distributors listed on the following pages. Minimum order quantities and prices may vary.

Action:

1. Evaluate the condition of the transmission fluid. If coolant or other contaminants are found in the fluid, do not add this supplement. The source of the contamination must be determined and rectified.
2. Add 5.0 fl.oz. (150ml) of LUBEGARD to the transmission fluid. Check the fluid level and top off with Dexron II if necessary.
3. Road test the vehicle to ensure that no other transmission related problems exist.
4. Return the vehicle to the owner and counsel them on the following:

   The vehicle should be driven under their normal driving conditions to allow the LUBEGARD to circulate throughout the transmission.

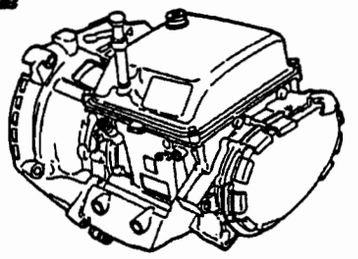
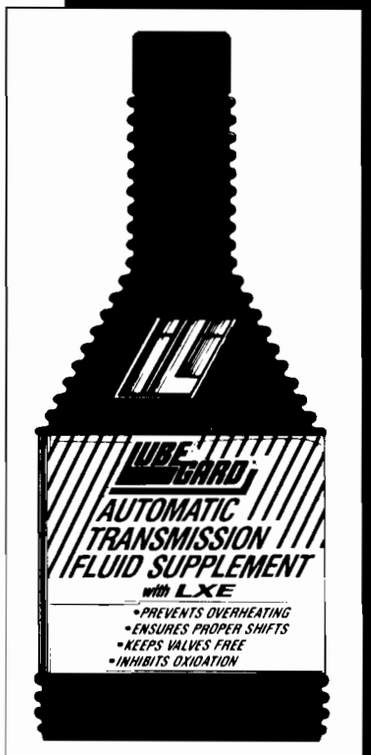


Figure 1. LUBEGARD ATF SUPPLEMENT



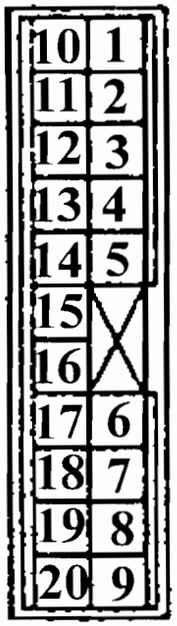
☐ FILE	☐ CIRCULATE			

INTERNATIONAL LUBRICANTS INC.
SEATTLE, WA 98108
(206) 762-5343
1-800-333-LUBE (5823)

1989-90 GALANT
1990 ECLIPSE
1990 LASER/TALON

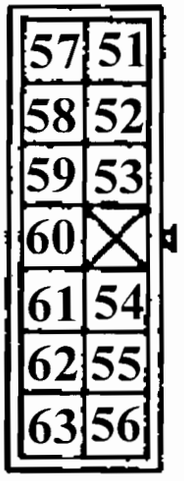
Transaxle Computer Pin ID

20 PIN CONNECTOR



1 DIAGNOSTIC CONNECTOR
*2 CRUISE CONTROL
3 INHIBITOR SWITCH (R)
4 INHIBITOR SWITCH (D)
5 INHIBITOR SWITCH (L)
6 DAMPER CLUTCH CONTROL SOLENOID (DCCSV)
*7 SHIFT SOLENOID A
8 ACCELERATOR SWITCH
9 POWER / ECONOMY SWITCH
10 COMPUTER GROUND (20 PIN CONNECTOR)
11 INHIBITOR SWITCH 12V POWER SOURCE (FUSE #6)
(FUSE #7-LASER/TALON)
12 INHIBITOR SWITCH (P)
13 INHIBITOR SWITCH (N)
14 INHIBITOR SWITCH (2)
15 OIL PRESSURE CONTROL SOLENOID (PCSV)
*16 SHIFT SOLENOID B
*17 OVERDRIVE SWITCH
*18 IGNITION COIL
19 DIAGNOSTIC CONNECTOR
*20 ENGINE COMPUTER

13 PIN CONNECTOR



51 PULSE GENERATOR A
52 PULSE GENERATOR B
53 KICKDOWN SERVO SWITCH / A/T FLUID TEMP SENSOR
54 KICKDOWN SERVO SWITCH
55 BLANK
**56 COMPUTER 12V POWER SOURCE (FUSE #17)*
57 PULSE GENERATOR A
58 PULSE GENERATOR B
59 KICKDOWN SERVO SWITCH
60 THROTTLE POSITION SENSOR
61 VEHICLE SPEED SENSOR
62 A/T FLUID TEMPERATURE SENSOR
63 COMPUTER GROUND (13 PIN CONNECTOR)

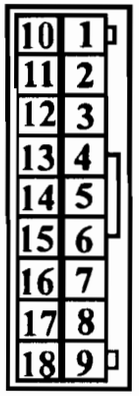
***1990 ECLIPSE ONLY**
2 OVERDRIVE SWITCH/CRUISE CONTROL
7 SHIFT SOLENOID B
16 SHIFT SOLENOID A
17 BLANK
18 NOISE FILTER
20 DUAL PRESSURE SWITCH
56 COMPUTER 12V POWER SOURCE (FUSE #19)

VIDEO

1991-92 GALANT
1991-93 ECLIPSE
1991-92 LASER/TALON
1992 EXPO, SUMMIT WAGON & VISTA WAGON
1991-92 STEALTH & 3000GT
1992 DIAMANTE

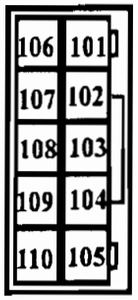
TRANSAXLE COMPUTER PIN ID

18 PIN CONNECTOR



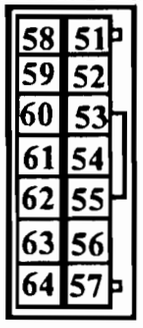
1 COMPUTER GROUND (18 PIN CONNECTOR)
2 BLANK
3 ACCELERATOR PEDAL SWITCH
4 BLANK
5 DIAGNOSTIC CONNECTOR
6 ENGINE COOLANT TEMP SWITCH\A/C DUAL PRESSURE SWITCH
7 BLANK (ENGINE COMPUTER-DIAMANTE ONLY)
8 DIAGNOSTIC CONNECTOR
9 BLANK (ENGINE COMPUTER-DIAMANTE ONLY)
10 COMPUTER 12V POWER SOURCE (FUSE #17-GALANT, FUSE #19-ECLIPSE, LASER & TALON)
11 KICKDOWN SERVO SWITCH
12 BLANK (ENGINE COMPUTER-ECLIPSE, LASER & TALON)(THROTTLE POSITION SENSOR-DIAMANTE ONLY)
13 BLANK (TRACTION CONTROL-DIAMONTE ONLY)
14 A/T FLUID TEMPERATURE SENSOR
15 A/T FLUID TEMPERATURE SENSOR
16 THROTLE POSITION SENSOR
17 A/T FLUID TEMPERATURE SENSOR
18 VEHICLE SPEED SENSOR (AUTOMATIC CLIMATE CONTROL-DIAMANTE ONLY)

10 PIN CONNECTOR



101 DAMPER CLUTCH CONTROL SOLENOID (DCCSV)
102 SHIFT CONTROL SOLENOID A
103 BLANK (GALANT) A/T FLUID TEMP INDICATOR (ECLIPSE, LASER & TALON)
104 COMPUTER 12V POWER SUPPLY (FUSE #6-GALANT ONLY) (INHIBITOR SWITCH 12V POWER SUPPLY-FUSE #7, ECON/POWER SWITCH, CRUISE CONTROL-STEALTH, 3000GT & DIAMANTE ONLY)
105 COMPUTER GROUND
106 OIL PRESSURE CONTROL SOLENOID (PCSV)
107 SHIFT CONTROL SOLENOID B
108 BLANK(GALANT) (ENGINE COMPUTER-STEALTH, 3000GT & DIAMANTE ONLY)
109 INHIBITOR SWITCH 12V POWER SUPPLY (FUSE #18) (FUSE #6 GALANT ONLY) COMPUTER 12V POWER (FUSE #7-STEALTH, 3000GT & DIAMANTE ONLY)
110 COMPUTER GROUND (10 PIN CONNECTOR)

14 PIN CONNECTOR



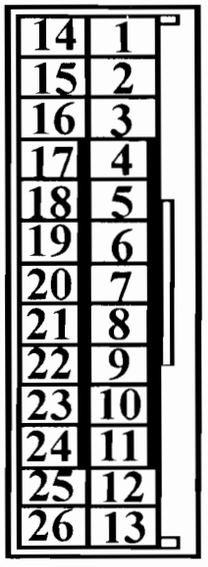
51 INHIBITOR SWITCH (P)
52 INHIBITOR SWITCH (R)
53 INHIBITOR SWITCH (N)
54 INHIBITOR SWITCH (D)
55 INHIBITOR SWITCH (2)
56 INHIBITOR SWITCH (L)
57 CRUISE CONTROL
58 PULSE GENERATOR B
59 PULSE GENERATOR B
60 PULSE GENERATOR A
61 PULSE GENERATOR A
62 COMPUTER GROUND (14 PIN CONNECTOR)
63 NOISE FILTER/POWER TRANSISTOR
64 POWER/ECONOMY SWITCH/OVERDRIVE SWITCH

VIDEO

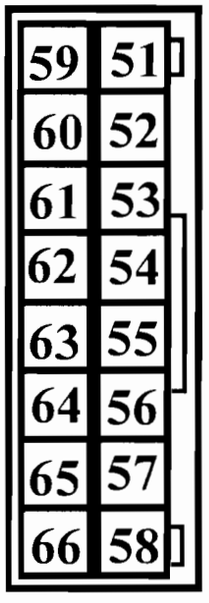
1993-94 GALANT
1993 COLT VISTA, EXPO & SUMMIT WAGON
1993 STEALTH, 3000GT & DIAMANTE

TRANSAXLE COMPUTER PIN ID

26 PIN CONNECTOR



16 PIN CONNECTOR



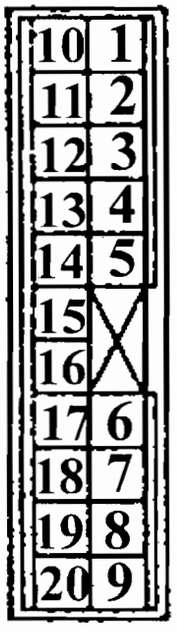
1 DAMPER CLUTCH CONTROL SOLENOID (DCCSV)
2 SHIFT CONTROL SOLENOID A
3 BLANK-GALANT & DIAMANTE (A/T TEMP.INDICATOR LAMP-EXPO, SUMMIT &VISTA)(ACCELERATOR SWITCH-STEALTH & 3000GT ONLY)
4 BLANK (ENGINE COMPUTER-STEALTH , 3000GT & DIAMANTE ONLY)
5 BLANK
6 BLANK
7 KICKDOWN SERVO SWITCH
8 DUAL PRESSURE SWITCH
9 DIAGNOSTIC CONNECTOR
10 BLANK (TRACTION CONTROL-DIAMANTE ONLY)
11 DIAGNOSTIC CONNECTOR
12 INHIBITOR SWITCH 12V POWER SUPPLY (FUSE #6)(O/D SWITCH-VISTA, EXPO & SUMMIT)(INHIBITOR SWITCH 12V POWER SUPPLY, POWER/ECONOMY SWITCH & CRUISE CONTROL-STEALTH, 3000GT & DIAMANTE ONLY-FUSE #7)
13 COMPUTER GROUND (26 PIN CONNECTOR)
14 OIL PRESSURE CONTROL SOLENOID (PCSV)
15 SHIFT CONTROL SOLENOID B
16 BLANK
17 BLANK (ENGINE COMPUTER-DOHC STEALTH, 3000GT & DIAMANTE)
18 BLANK (ENGINE COOLANT TEMP. SENSOR-STEALTH & 3000GT ONLY)(ENGINE COMPUTER-DIAMANTE ONLY)
19 BLANK
20 THROTTLE POSITION SENSOR (5V POWER SUPPLY)
21 THROTTLE POSITION SENSOR (SENSOR OUTPUT)
22 BLANK
23 ATF FLUID TEMPERATURE SENSOR
24 ATF FLUID TEMPERATURE SENSOR
25 COMPUTER 12V POWER SUPPLY (FUSE #6)(FUSE #7 STEALTH & 3000GT ONLY)(SAME AS PIN #12 DIAMANTE ONLY)
26 COMPUTER GROUND (26 PIN CONNECTOR)

51 INHIBITOR SWITCH (P)
52 INHIBITOR SWITCH (R)
53 INHIBITOR SWITCH (N)
54 INHIBITOR SWITCH (D)
55 INHIBITOR SWITCH (2)
56 INHIBITOR SWITCH (L)
57 CRUISE CONTROL (O/D SWITCH-STEALTH & 3000GT ONLY)
58 POWER/ECONOMY MODE SWITCH (BLANK-EXPO, SUMMIT & VISTA)
59 COMPUTER 12V POWER SOURCE (FUSE #17)(CRUISE CONTROL SWITCH-STEALTH, 3000GT & DIAMANTE ONLY)
60 VEHICLE SPEED SENSOR (CLIMATE CONTROL-DIAMANTE ONLY)
61 PULSE GENERATOR B
62 PULSE GENERATOR B
63 PULSE GENERATOR A
64 PULSE GENERATOR A
65 COMPUTER GROUND (16 PIN CONNECTOR)
66 ENGINE RPM SIGNAL

1990 COLT, MIRAGE & SUMMIT

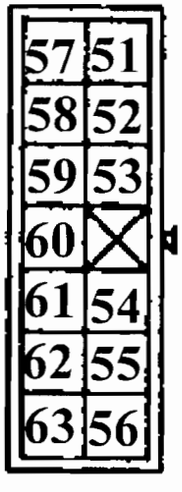
TRANSAXLE COMPUTER PIN ID

20 PIN CONNECTOR



1 DIAGNOSTIC CONNECTOR
2 CRUISE CONTROL
3 INHIBITOR SWITCH (R)
4 INHIBITOR SWITCH (D)
5 INHIBITOR SWITCH (L)
6 DAMPER CLUTCH CONTROL VALVE (DCCSV)
7 SHIFT CONTROL SOLENOID B
8 ACCELERATOR PEDAL SWITCH
9 BLANK
10 COMPUTER GROUND (20 PIN CONNECTOR)
11 COMPUTER 12V POWER SUPPLY (FUSE #4)
12 INHIBITOR SWITCH (P)
13 INHIBITOR SWITCH (N)
14 INHIBITOR SWITCH (2)
15 OIL PRESSURE CONTROL SOLENOID (PCSV)
16 SHIFT CONTROL SOLENOID A
17 BLANK
18 POWER TRANSISTOR
19 DIAGNOSTIC CONNECTOR
20 DUAL PRESSURE SWITCH

13 PIN CONNECTOR

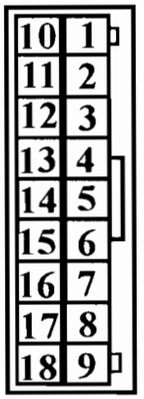


51 PULSE GENERATOR A
52 PULSE GENERATOR B
53 A/T FLUID TEMPERATURE SENSOR
54 KICKDOWN SERVO SWITCH
55 BLANK
56 COMPUTER 12V POWER SUPPLY (FUSE #8)
57 PULSE GENERATOR A
58 PULSE GENERATOR B
59 KICKDOWN SERVO SWITCH
60 MPI COMPUTER/THROTTLE POSITION SENSOR
61 VEHICLE SPEED SENSOR
62 A/T FLUID TEMPERATURE SENSOR
63 COMPUTER GROUND (13 PIN CONNECTOR)

1991-92 COLT, MIRAGE & SUMMIT

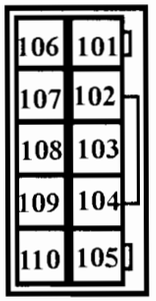
TRANSAXLE COMPUTER PIN ID

18 PIN CONNECTOR



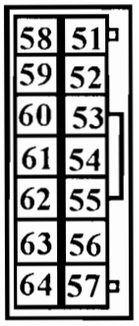
1 COMPUTER GROUND
2 BLANK
3 ACCELERATOR PEDAL SWITCH
4 BLANK
5 DIAGNOSTIC CONNECTOR
6 DUAL PRESSURE SWITCH (A/C)
7 BLANK
8 DIAGNOSTIC CONNECTOR
9 BLANK
10 COMPUTER 12V POWER SUPPLY (FUSE #8)
11 KICKDOWN SERVO SWITCH
12 COMPUTER GROUND
13 POWER TRANSISTOR/NOISE FILTER
14 A/T FLUID TEMPERATURE SENSOR
15 BLANK
16 THROTTLE POSITION SENSOR
17 A/T FLUID TEMPERATURE SENSOR
18 VEHICLE SPEED SENSOR

10 PIN CONNECTOR



101 DAMPER CLUTCH CONTROL SOLENOID (DCCSV)
102 SHIFT CONTROL SOLENOID A
103 BLANK
104 COMPUTER 12V POWER SUPPLY (FUSE # 4)
105 COMPUTER GROUND
106 OIL PRESSURE CONTROL VALVE (PCSV)
107 SHIFT CONTROL VALVE B
108 BLANK
109 INHIBITOR SWITCH 12V POWER SUPPLY (FUSE #4)/O/D SWITCH
110 COMPUTER GROUND

14 PIN CONNECTOR

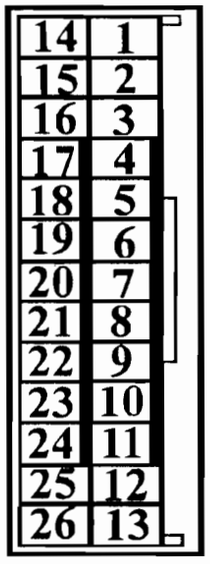


51 INHIBITOR SWITCH (P)
52 INHIBITOR SWITCH (R)
53 INHIBITOR SWITCH (N)
54 INHIBITOR SWITCH (D)
55 INHIBITOR SWITCH (2)
56 INHIBITOR SWITCH (L)
57 CRUISE CONTROL
58 PULSE GENERATOR B
59 PULSE GENERATOR B
60 PULSE GENERATOR A
61 PULSE GENERATOR A
62 BLANK
63 BLANK
64 BLANK

1993 COLT, MIRAGE & SUMMIT

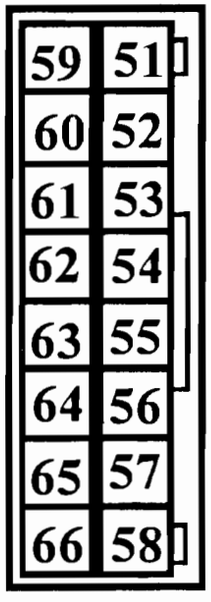
TRANSAXLE COMPUTER PIN ID

26 PIN CONNECTOR



1 DAMPER CLUTCH CONTROL SOLENOID (DCCSV)
2 SHIFT CONTROL SOLENOID B
3 BLANK
4 BLANK
5 BLANK
6 BLANK
7 KICKDOWN SERVO SWITCH
8 A/C TRIPLE SWITCH
9 DATA LINK CONNECTOR
10 BLANK
11 DATA LINK CONNECTOR
12 COMPUTER 12V POWER SOURCE (FUSE #17)
13 COMPUTER GROUND
14 OIL PRESSURE CONTROL SOLENOID (PCSV)
15 SHIFT CONTROL SOLENOID A
16 BLANK
17 BLANK
18 BLANK
19 BLANK
20 ENGINE COMPUTER (ECM)
21 ENGINE COMPUTER (ECM)
22 BLANK
23 A/T FLUID TEMPERATURE SENSOR
24 A/T FLUID TEMPERATURE SENSOR
25 OVERDRIVE SWITCH
26 COMPUTER GROUND

16 PIN CONNECTOR

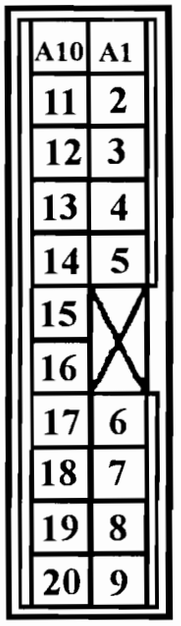


31 INHIBITOR SWITCH (P)
32 INHIBITOR SWITCH (R)
33 INHIBITOR SWITCH (N)
34 INHIBITOR SWITCH (D)
35 INHIBITOR SWITCH (2)
36 INHIBITOR SWITCH (L)
37 CRUISE CONTROL
38 BLANK
39 COMPUTER 12V POWER SOURCE (FUSE #14)
40 VEHICLE SPEED SENSOR
41 PULSE GENERATOR B
42 PULSE GENERATOR B
43 PULSE GENERATOR A
44 PULSE GENERATOR A
45 COMPUTER GROUND
46 COMPUTER 12V POWER SOURCE (FUSE #14)

1989 HYUNDAI SONATA

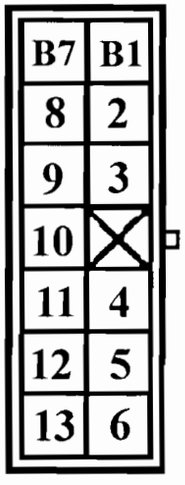
TRANSAXLE COMPUTER PIN ID

20 PIN CONNECTOR



A1 ENGINE COOLANT TEMPERATURE SENSOR
2 OVERDRIVE SWITCH
3 INHIBITOR SWITCH (R)
4 INHIBITOR SWITCH (D)
5 INHIBITOR SWITCH (L)
6 DAMPER CLUTCH CONTROL SOLENOID (DCCSV)
7 SHIFT CONTROL SOLENOID B (SCSV)
8 ACCELERATOR PEDAL SWITCH
9 BLANK
10 COMPUTER GROUND
11 COMPUTER & INHIBITOR SWITCH 12V POWER SUPPLY
12 INHIBITOR SWITCH (P)
13 INHIBITOR SWITCH (N)
14 INHIBITOR SWITCH (2)
15 OIL PRESSURE CONTROL SOLENOID (PCSV)
16 SHIFT CONTROL SOLENOID A (SCSV)
17 BLANK
18 ENGINE RPM SIGNAL
19 DIAGNOSTIC CONNECTOR
20 A/C LOAD SIGNAL

13 PIN CONNECTOR

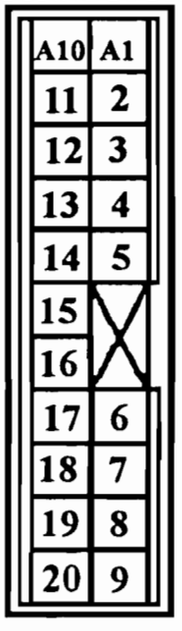


B1 PULSE GENERATOR A
2 PULSE GENERATOR B
3 BLANK
4 BLANK
5 BLANK
6 BLANK
7 PULSE GENERATOR A
8 PULSE GENERATOR B
9 KICKDOWN SERVO SWITCH
10 THROTTLE POSITION SENSOR
11 VEHICLE SPEED SENSOR
12 BLANK
13 COMPUTER GROUND

1990-93 MITSUBISHI PRECIS
1990-93 HYUNDAI EXCEL
1990-93 HYUNDAI SONATA
1991-93 HYUNDAI SCOUPE
1992-93 HYUNDAI ELANTRA

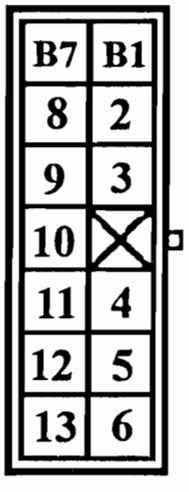
TRANSAXLE COMPUTER PIN ID

20 PIN CONNECTOR



1 ECT SWITCH
2 ACCELERATOR PEDAL SWITCH
3 SHIFT CONTROL SOLENOID B (SCSV)
4 DAMPER CLUTCH SOLENOID (DCSV)
5 INHIBITOR SWITCH (L)
6 INHIBITOR SWITCH (D)
7 INHIBITOR SWITCH (R)
8 OVERDRIVE SWITCH
9 DIAGNOSTIC CONNECTOR
10 A/C SIGNAL
11 DIAGNOSTIC CONNECTOR (OUTPUT)
12 ENGINE RPM SIGNAL
13 BLANK
14 SHIFT CONTROL SOLENOID A (SCSV)
15 OIL PRESSURE CONTROL SOLENOID (PCSV)
16 INHIBITOR SWITCH (2)
17 INHIBITOR SWITCH (N)
18 INHIBITOR SWITCH (P)
19 INHIBITOR SWITCH 12V POWER SUPPLY (FUSE #10)
20 COMPUTER GROUND

13 PIN CONNECTOR



1 *COMPUTER 12V POWER SUPPLY (FUSE #5)*
2 BLANK
3 BLANK
4 A/T FLUID TEMPERATURE SENSOR (GROUND)
5 PULSE GENERATOR B
6 PULSE GENERATOR A
7 COMPUTER GROUND
8 A/T FLUID TEMPERATURE SENSOR
9 VEHICLE SPEED SENSOR
10 THROTTLE POSITION SENSOR
11 KICKDOWN SERVO SWITCH
12 PULSE GENERATOR B
13 PULSE GENERATOR A

HONDA TRANSAXLE MODEL APPLICATION CHART

CIVIC

1986-87	CIVIC	4 SPEED	CA
1988-90	CIVIC	4 SPEED	L4
1989-90	CIVIC WAGON	4 SPEED...4WD...3 SHAFT	S5
1991	CIVIC	4 SPEED	ML4A
1991	CIVIC WAGON	4 SPEED...4WD...3 SHAFT	MPSA
1992-94	CIVIC	4 SPEED...3 SHAFT	M24A

ACCORD

1983	ACCORD	4 SPEED...W/LOCK-UP	AK
1984-85	ACCORD	4 SPEED ...CARBURETED	AS
1986-89	ACCORD	4 SPEED...FUEL INJECTED	F4
1990	ACCORD	4 SPEED...3 SHAFT	PX4B
1991-93	ACCORD...U.S. BUILT	4 SPEED...3 SHAFT	APX4
1991-93	ACCORD...JAPAN BUILT	4 SPEED...3 SHAFT	*MPWA
1994	ACCORD	4 SPEED...3 SHAFT	MPOA

NOTE: The ACCORD MPWA is totally different than the VIGOR MPWA. The ACCORD unit is transversely mounted, while the VIGOR unit is longitudinally mounted.

PRELUDE

1983	PRELUDE	4 SPEED	AK
1984	PRELUDE	4 SPEED...CARBURETED	AS
1985-87	PRELUDE	4 SPEED...FUEL INJECTED	F4
1988-89	PRELUDE	4 SPEED	K4
1990	PRELUDE	4 SPEED	PY8A
1991	PRELUDE	4 SPEED	MY8A
1992-93	PRELUDE	4 SPEED...3 SHAFT	MP1A

PASSPORT

1994	PASSPORT	4 SPEED...RWD...4WD	4L30E

ACURA TRANSAXLE MODEL APPLICATION CHART

INTEGRA

1986-87	INTEGRA	4 SPEED	CA
1988-89	INTEGRA	4 SPEED	P1
1990	INTEGRA	4 SPEED...3 SHAFT...W/MODULATOR	RO
1991-93	INTEGRA	4 SPEED...3 SHAFT...W/MODULATOR	MPRA

LEGEND

1986-87	LEGEND...SEDAN	4 SPEED	G4
1987	LEGEND...COUPE	4 SPEED	L5
1988-89	LEGEND	4 SPEED	L5
1990	LEGEND	4 SPEED	PPL5X
1991-1993	LEGEND	4 SPEED...IN-LINE...W/PAN	MPYA

VIGOR

1992-93	VIGOR	4 SPEED...IN-LINE...W/PAN	*MPWA

***NOTE:** The VIGOR MPWA unit is totally different than the ACCORD MPWA unit. The VIGOR unit is longitudinally mounted, while the ACCORD unit is mounted transversely.

NSX

1991-93	NSX	4 SPEED...3 SHAFT	M9RA

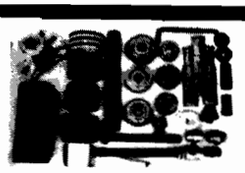
STERLING

1986-87	825-827 SI	4 SPEED	G4
1988-90	825-827SI	4 SPEED	L5

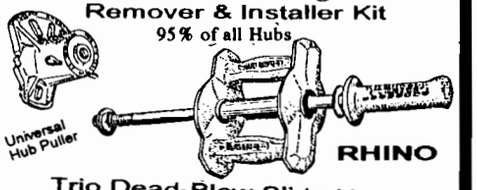
TIME SAVING TOOLS DESIGNED FOR YOU, THE TRANSMISSION TECHNICIAN

ALL TOOLS IN STOCK
READY FOR IMMEDIATE
DELIVERY

NEW

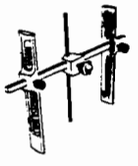


Universal Front Wheel Drive
Hub & Bearing
Remover & Installer Kit
95% of all Hubs

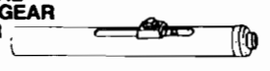


Trio Dead-Blow Slide Hammer

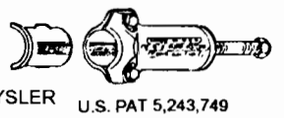
"Longer"
UNIVERSAL
END CLEARANCE
GAUGE



E-Z UNIVERSAL
SPEEDOMETER GEAR
INSTALLER

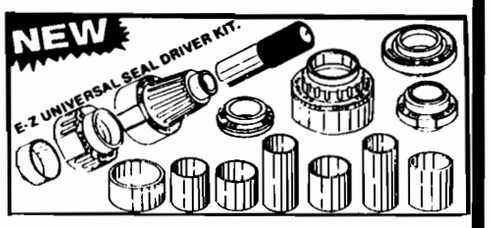


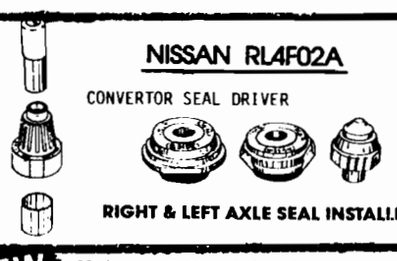
BIG 3
FRONT PUMP
PULLER
FORD, G.M., CHRYSLER



U.S. PAT 5,243,749

NEW





NISSAN RL4F02A

CONVERTOR SEAL DRIVER

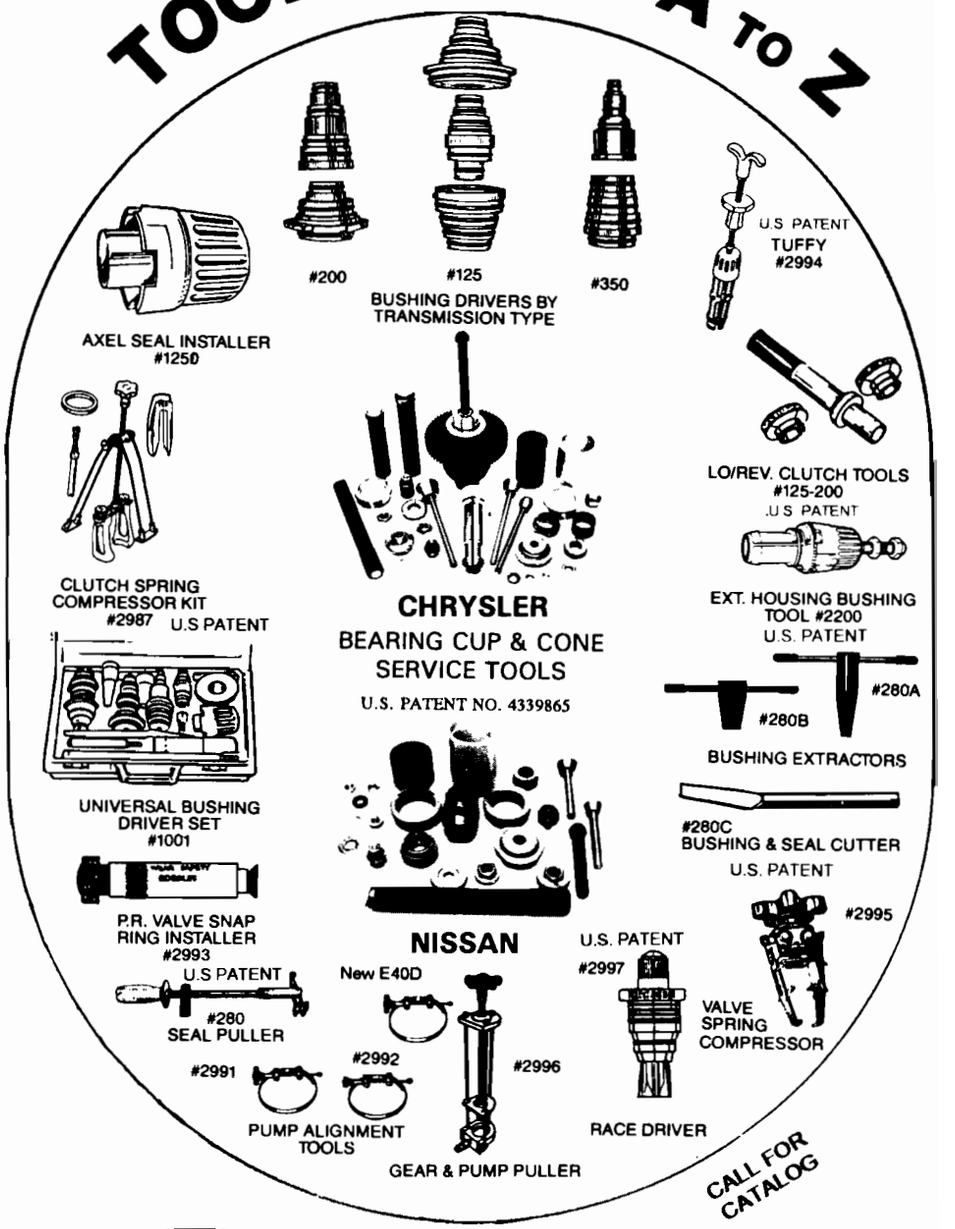
RIGHT & LEFT AXLE SEAL INSTALLER

NEW Universal Quick Lock
Clutch Spring Compressor
Model No: 2987A

Ideal for all clutches
even GM 350 and Chrysler
604 - in the case.

Ring Adapters for
Compressing Diaphram Springs

TOOLS FROM A TO Z



A TO Z TOOL, INC.

ALL TOOLS AND PARTS MADE IN USA

CALL US TODAY AND SAVE!
To take advantage of our
A.T.S.G. Seminar promotional pricing.

VISA MasterCard DISCOVER COD Welcome

GUARANTEED AGAINST DEFECTS IN QUALITY AND WORKMANSHIP.

A to Z TOOL, INC. • 446 W. ST. CHARLES ROAD • VILLA PARK, ILLINOIS 60181 • (708) 279-4118
FAX: (708) 279-4134

CALL US TODAY!

HONDA/ACURA

BINDS IN REVERSE; MOVES FORWARD IN NEUTRAL; WANTS TO MOVE IN PARK

COMPLAINT: Binds in reverse; moves forward in neutral; wants to move in park.

CAUSE: Improper indexing of the first gear hub to the low friction plates causing the last friction plate to be caught between the first gear hub and the piston.

CORRECTION: Make certain all three clutches have splined to the first gear hub. After tightening the mainshaft nut, make certain you can turn the clutch drum while holding the first gear hub. (Refer to Figure 24)

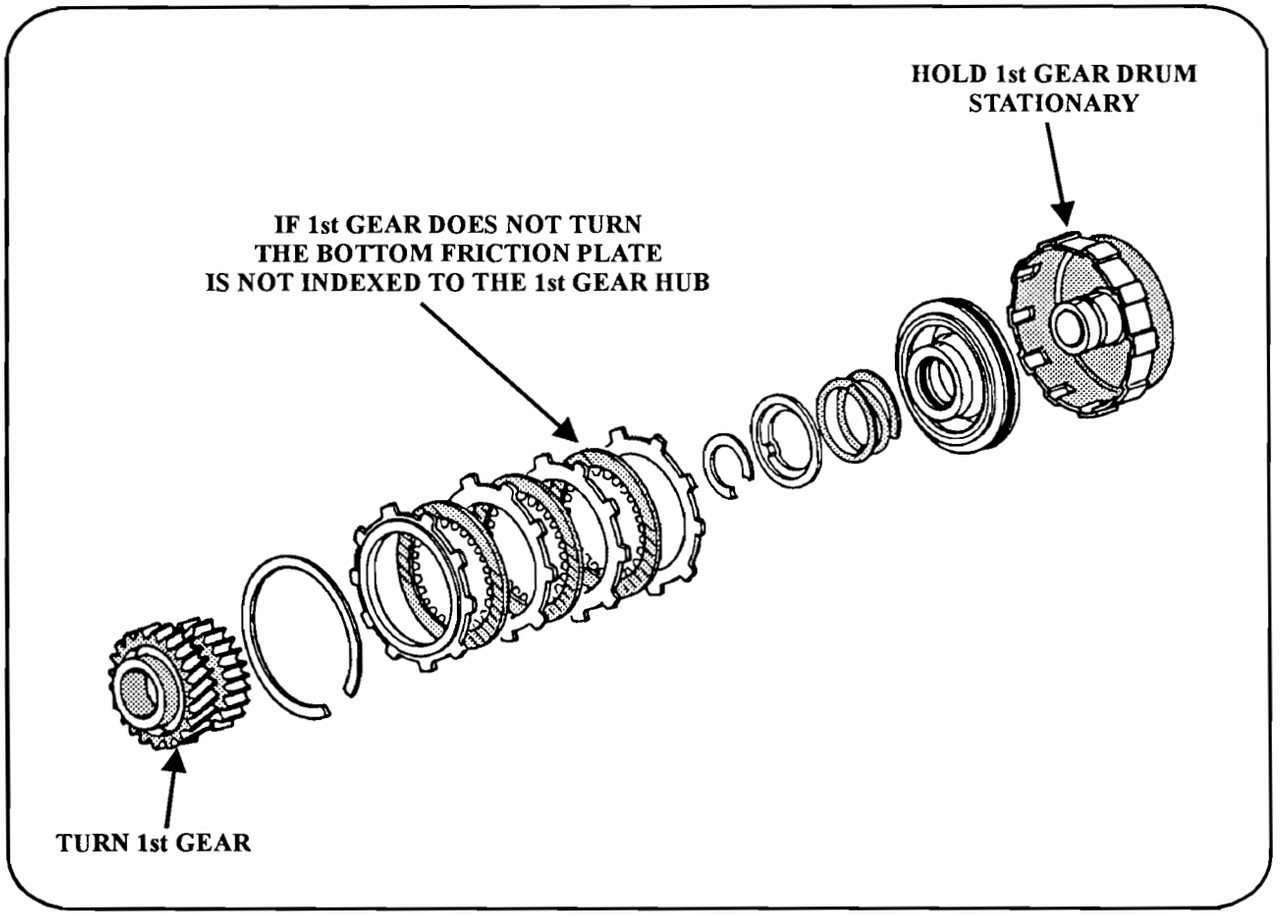


Figure 24

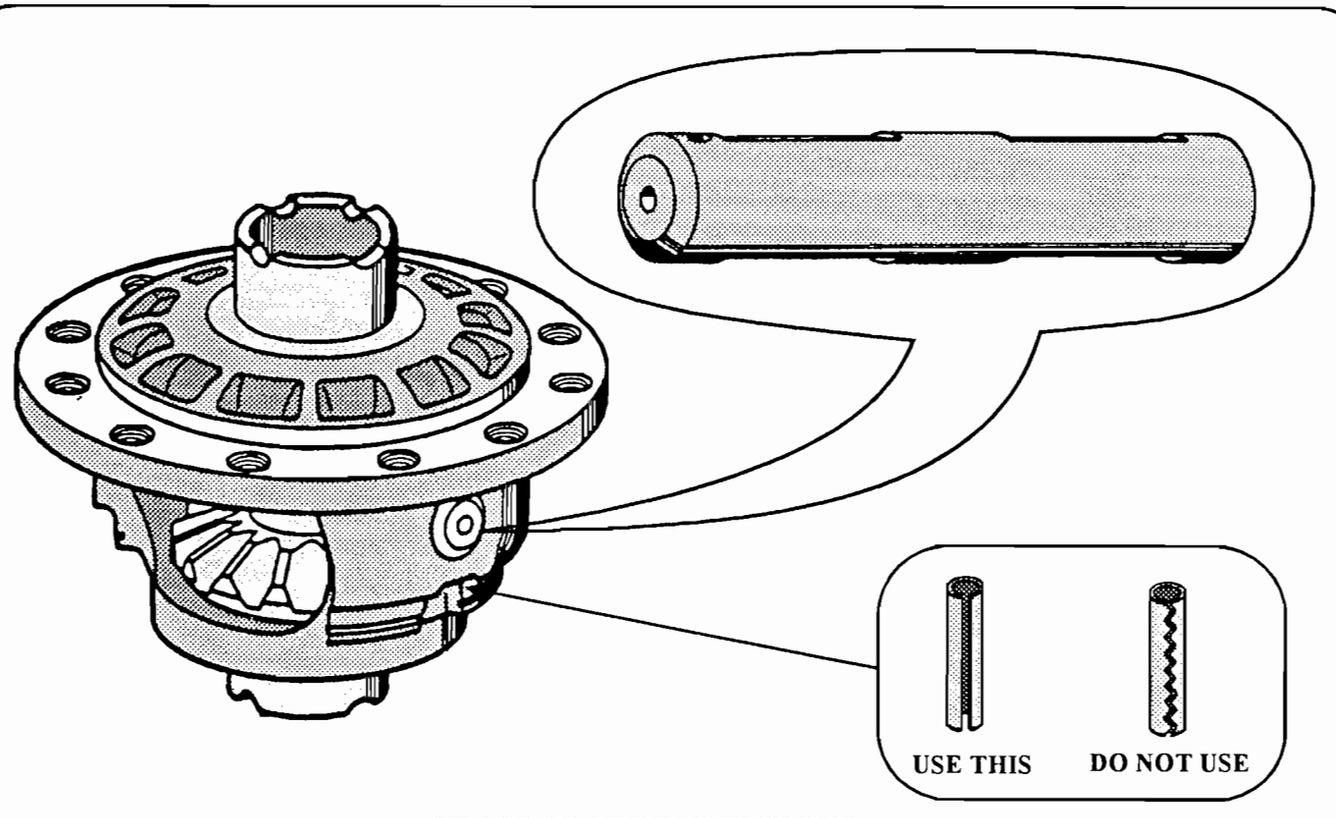
HONDA TRANSAXLES

DIFFERENTIAL CROSS SHAFT FAILURE

COMPLAINT: Failure of the differential cross shaft in the area of the cross shaft where the pinion gears rotate.

CAUSE: The cause may be the material from which the cross shaft was made.

CORRECTION: There is available from Honda, two new design differential cross shafts made of Titanium, that will eliminate the above complaint and should be installed during routine overhaul. (See figure 23) These Titanium cross shafts can easily be identified by their gold color.
The rolled pin that retains the cross shaft in the differential carrier should also be replaced with a different design. The original rolled pin, with the split that resembles a "ZIPPER" (See figure 23), should NEVER be used. ALWAYS replace it with a regular split type rolled pin of the proper dimension.
Refer to the chart in figure 23 for the dimensions and part numbers for the design differential cross shaft.



CROSS SHAFT DIMENSIONS

APPLICATION	SHAFT DIAMETER	SHAFT LENGTH	ROLL PIN HOLE DIAMETER	PART NUMBER
4 CYL.	.708"	4.069"	.161"	41321-PL3-TOO
6 CYL.	.708"	4.522"	.238"	41321-PL5-ZOO

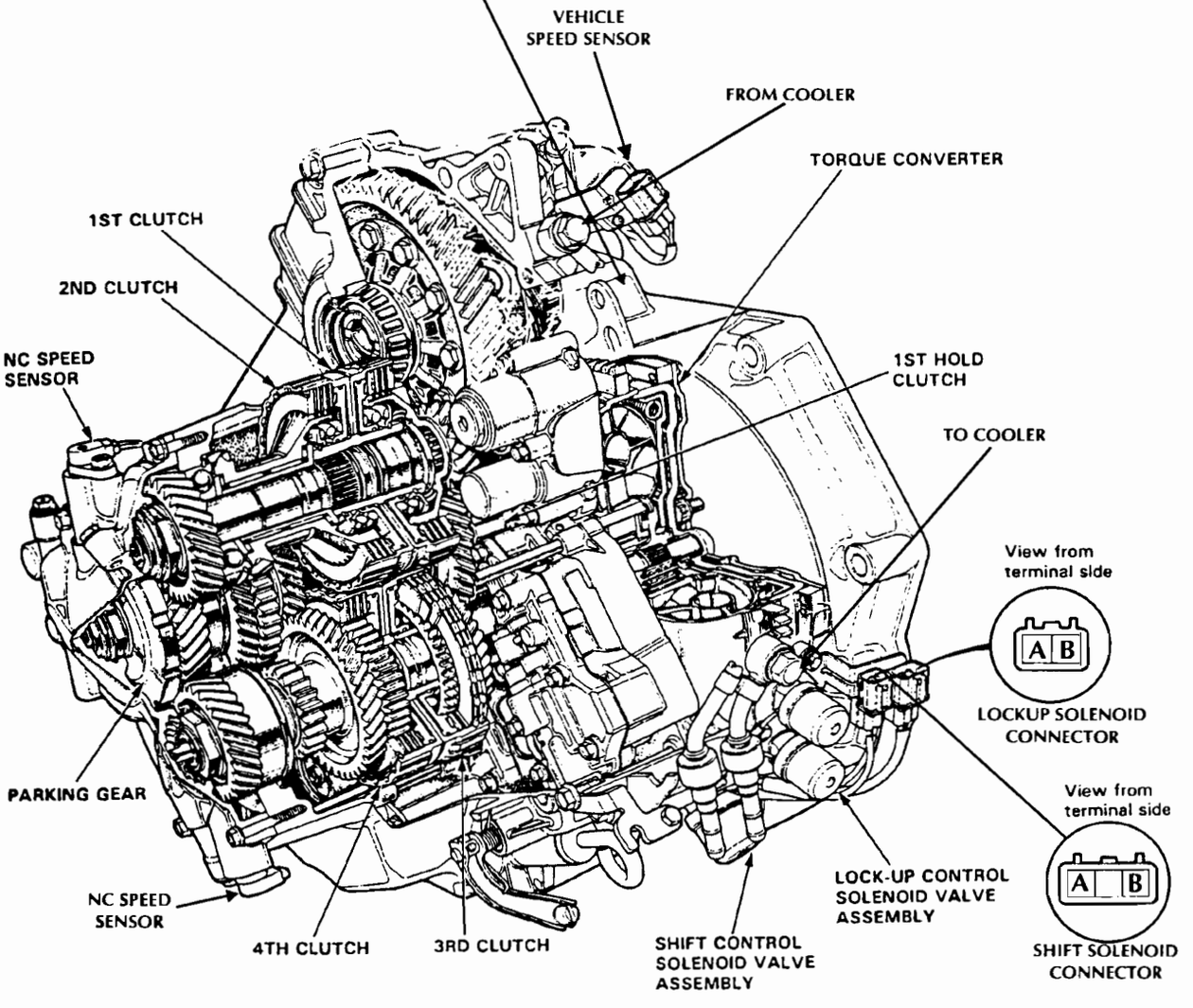
Figure 23

HONDA PX4B

1990 ACCORD

4 EXTERNAL SOLENOIDS
2 EXTERNAL SPEED SENSORS
STEERING PUMP DRIVEN VEHICLE SPEED SENSOR
ELBOW VENT ON TOP REAR OF CASE
PUSH-IN DIP STICK

PX4B-0000000



SHIFT SOLENOIDS-12 TO 24 OHMS...TCC SOLENOIDS-12 TO 24 OHMS
VEHICLE SPEED SENSOR-0 TO 5V PER 1 REVOLUTION...NM & NC SPEED SENSORS-400 TO 600 OHMS

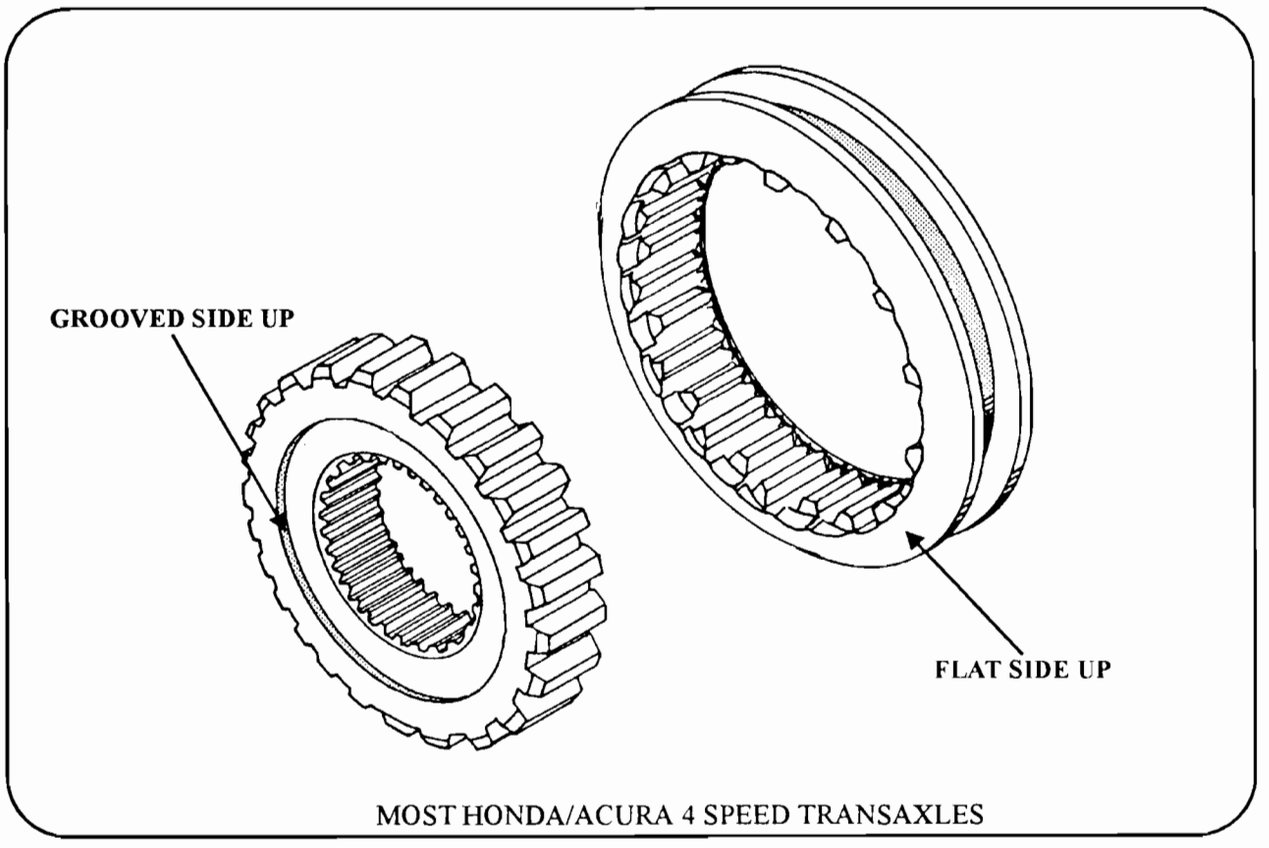
HONDA PX4B

GRINDING WHEN SHIFTING FROM DRIVE TO REVERSE

Complaint: Grinding noise when shifting from drive to reverse

Cause: Misassembly of the reverse selector assembly

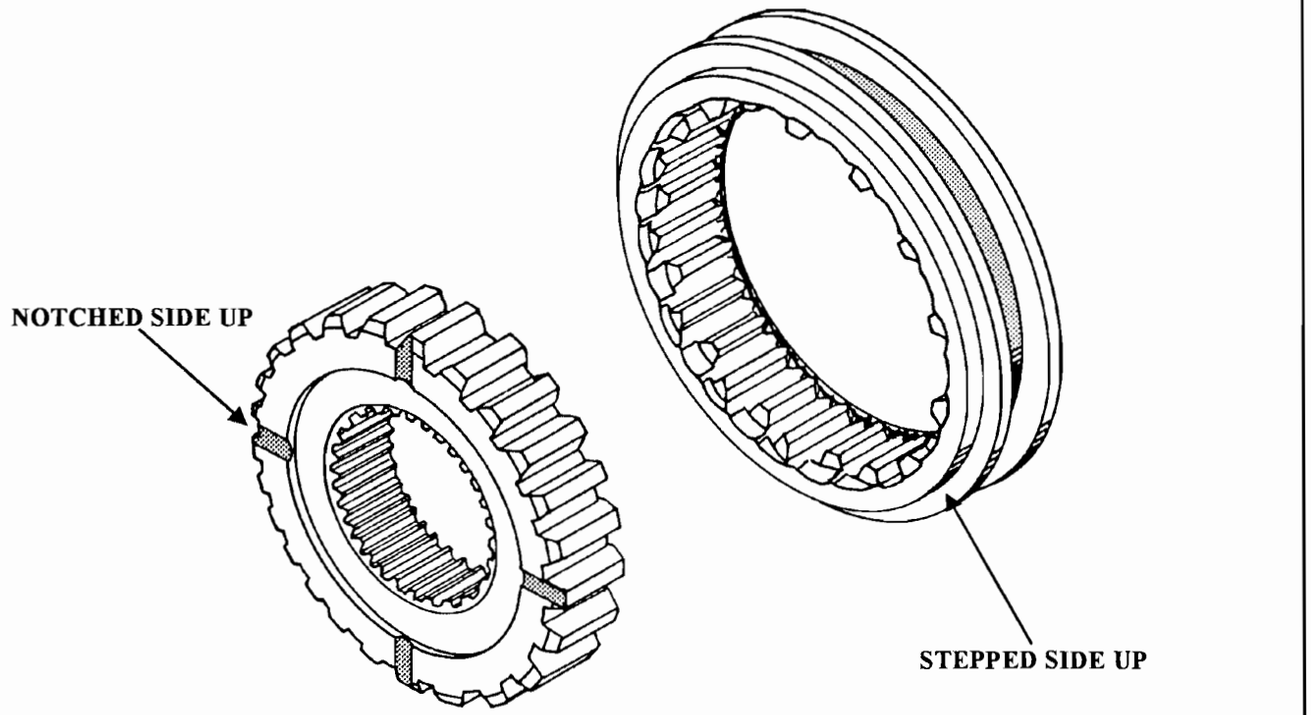
Correction: In most Honda 4 speed transaxles, the reverse selector is installed with the FLAT SIDE UP, and the selector hub is installed with the groove facing up. (See Figure 25)
The PX4B found in 1990 Accords, is just the OPPOSITE!
The reverse selector is installed with the STEPPED SIDE UP, and the selector hub is installed with the notches facing up. (See Figure 26 on the following page).



MOST HONDA/ACURA 4 SPEED TRANSAXLES

Figure 25

HONDA PX4B



HONDA PX4B

Figure 26

NOTE: The HONDA/ACURA transaxles listed below also use the stepped side up/notched side up reverse selector assembly design.

1. MP1A
2. APX4
3. MPWA-JAPAN BUILT ACCORD
4. MPOA
5. MPWA-VIGOR

HONDA PX4B

SOFT OR FLARED 3-4 SHIFT

COMPLAINT: Soft or flared 3-4 shift; good reverse.

CAUSE: The PX4B uses a double action 4th/reverse accumulator. If the small accumulator "o" ring seal is leaking, (See figure 27) only the 3-4 shift will be affected as 4th gear oil leaks into the reverse circuit and could cause a soft or flared 3-4 shift.
The 4th/reverse accumulator is the center accumulator piston located in the servo body section of the valve body assembly.

CORRECTION: Replace accumulator seals.

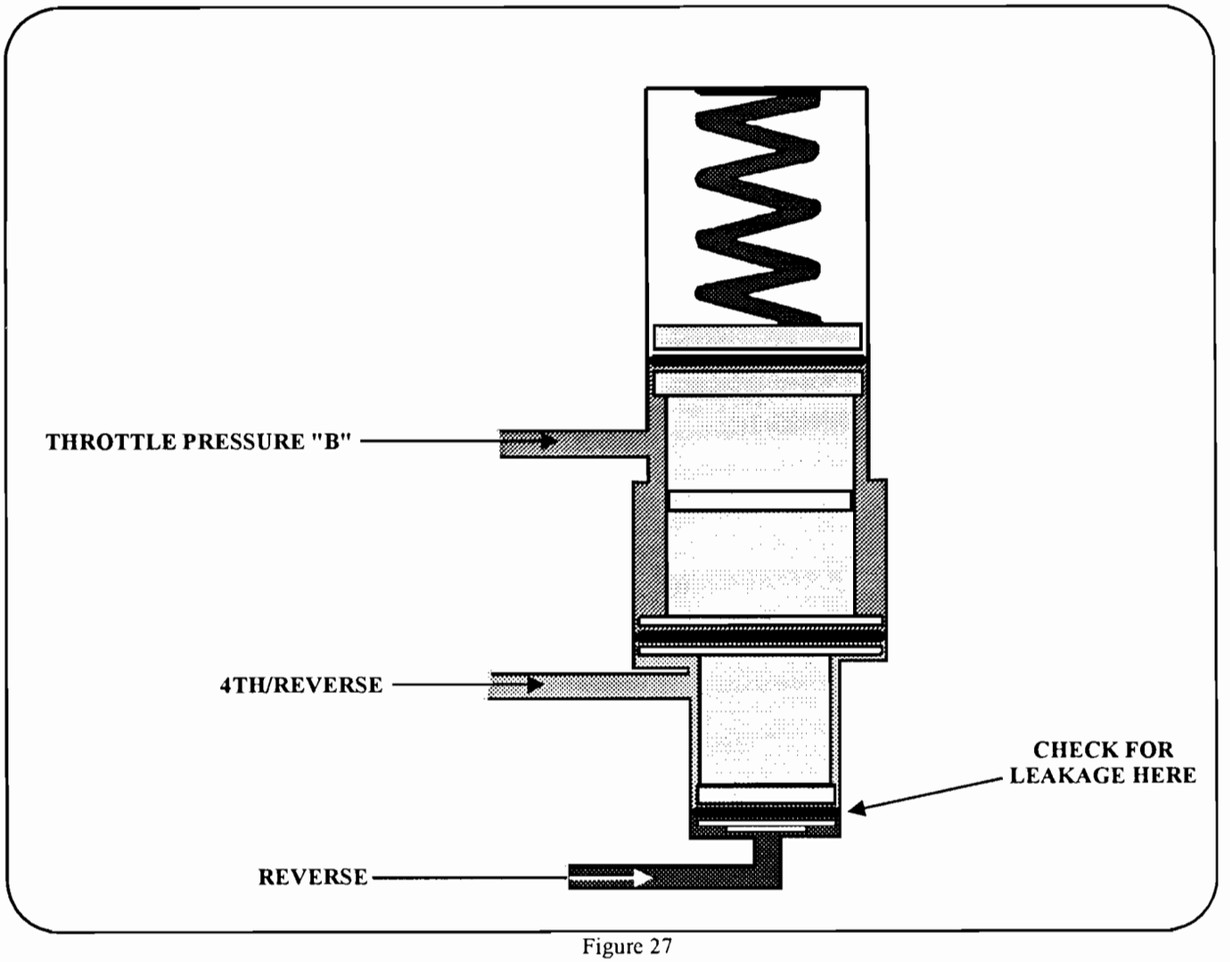


Figure 27

HONDA PX4B

TRANSAXLE END PLAY

Complaint: Setting endplay adjustments and measurements

Cause: Other than the final drive, the PX4B uses NO SELECTIVES to adjust endplay

Correction: The countershaft distance collar must measure 46mm (1.811") in length. (See figure 28)
The secondary shaft distance collar must measure 5mm (.1969") in thickness. (See figure 29)
All clutch collars and hardparts should not be undercut.
The counter shaft nut should be torqued to no more than 145 ft. lbs.
The main shaft and secondary shaft nuts should be torqued to no more than 116 ft. lbs.

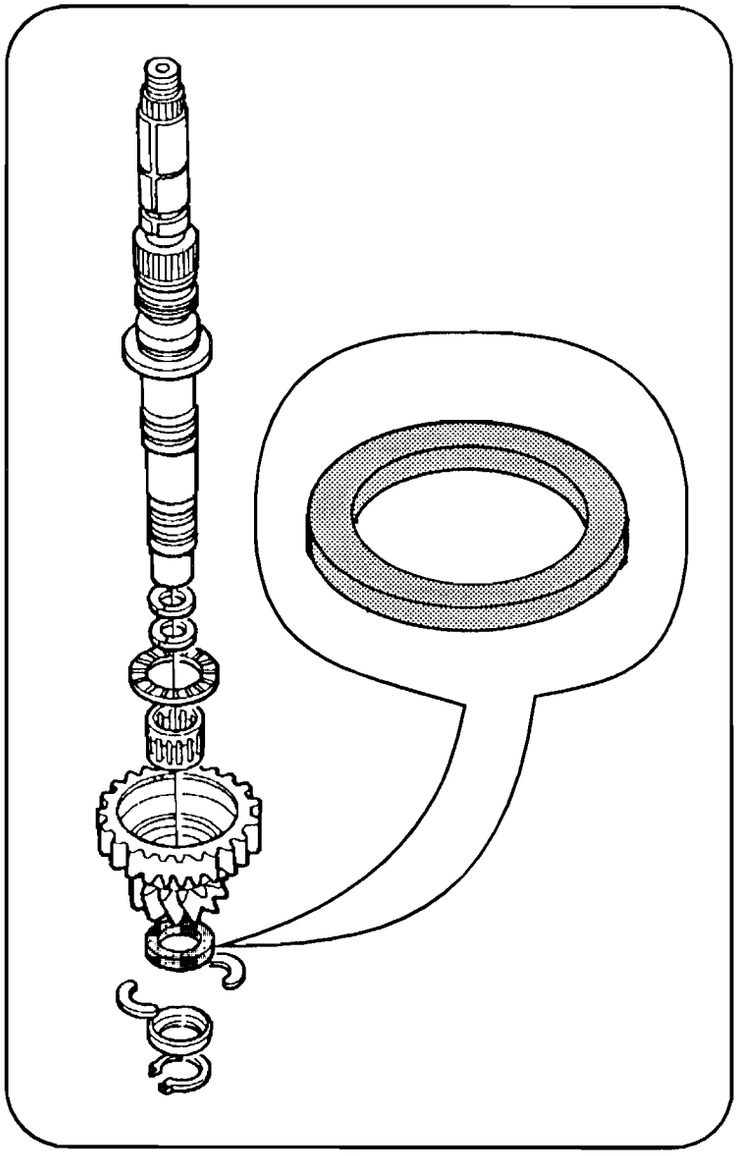


Figure 28

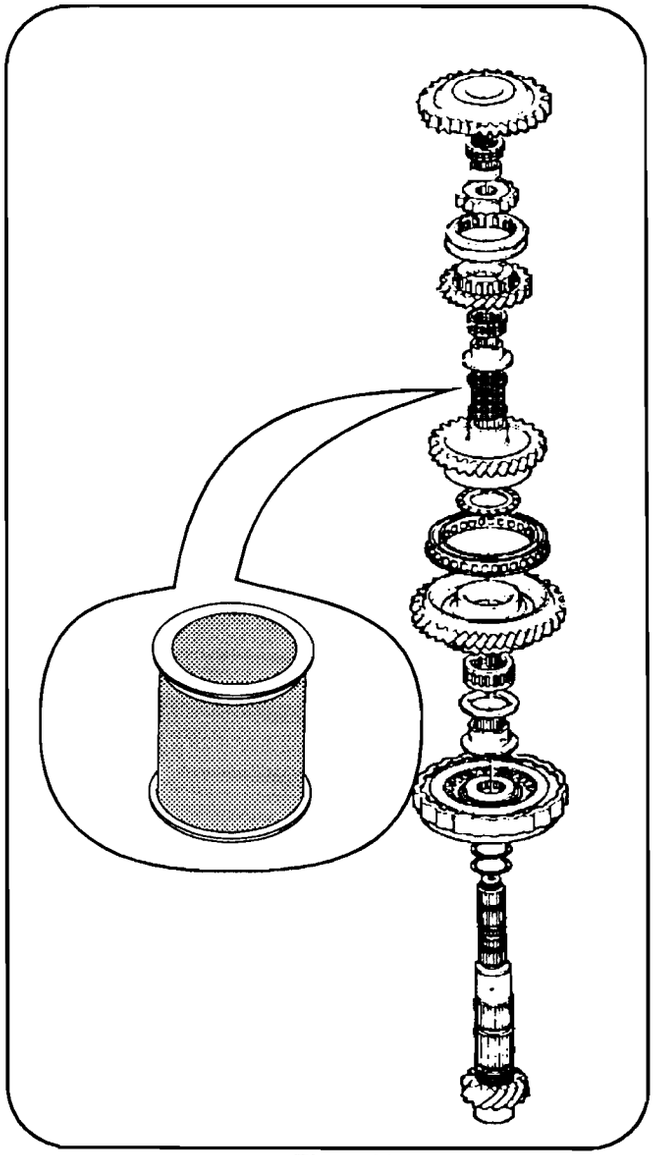


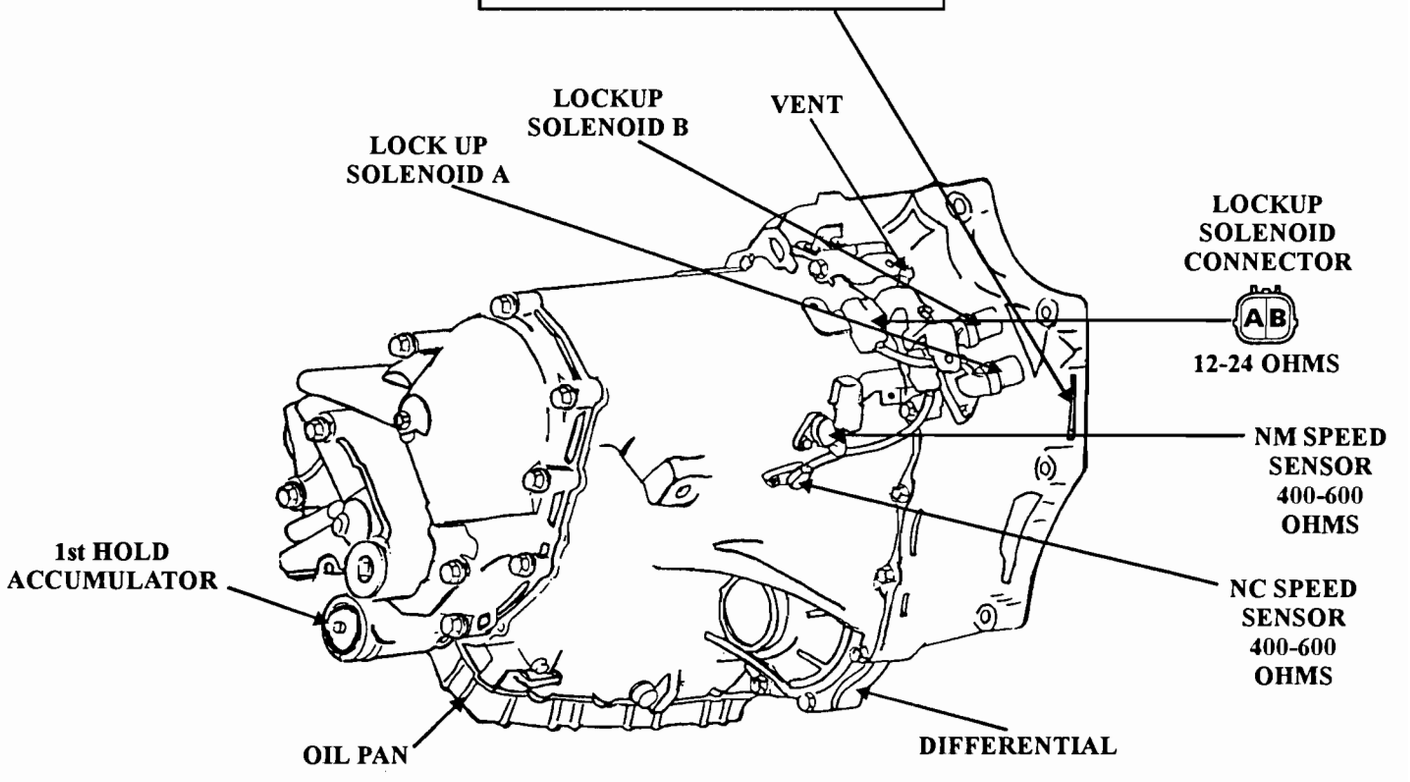
Figure 29

ACURA MPYA

1991-93 ACURA LEGEND

2 EXTERNAL SOLENOIDS
2 EXTERNAL SPEED SENSORS
REMOVABLE OIL PAN
FILLER TUBE WITH PUSH-IN DIP STICK
VENT ON TOP, CENTER OF BELL HOUSING

MPYA-0000000



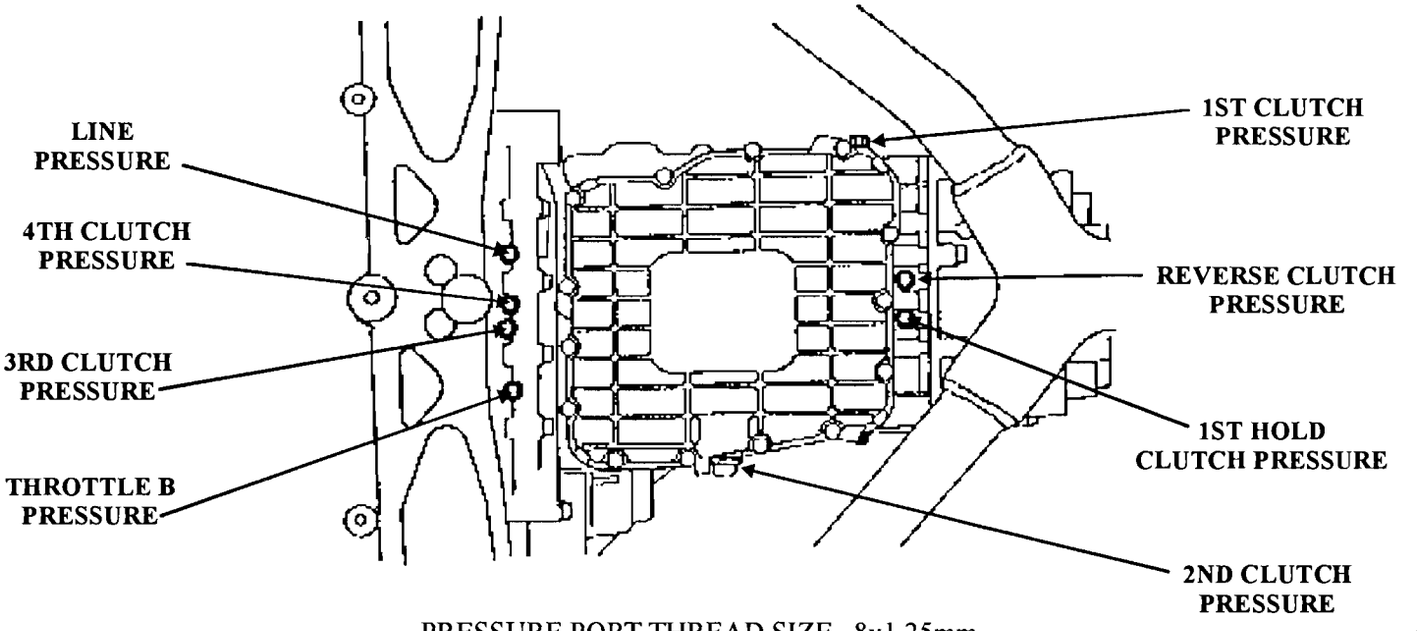
SHIFT SOLENOID/ LINEAR SOLENOID CONNECTOR
LOCATED ON DRIVER SIDE OF TRANSAXLE

SHIFT SOLENOID TERMINAL A...GREEN WIRE...12-24 OHMS
SHIFT SOLENOID TERMINAL B....BLUE WIRE.....12-24 OHMS
LINEAR SOLENOID TERMINAL C.....RED WIRE (+)....5.0-5.6 OHMS
LINEAR SOLENOID TERMINAL D...WHITE WIRE (-)...5.0-5.6 OHMS

ACURA MPYA

OIL PRESSURE CHECKS

PRESSURE TAP LOCATIONS



PRESSURE PORT THREAD SIZE...8x1.25mm

Figure 30

PRESSURE SPECIFICATIONS

LINE PRESSURE	@ 2000 rpm	in NEUTRAL or PARK	114-122 psi (800-860 kPa)
1st CLUTCH PRESSURE	@ 2000 rpm	in D4 or D3	113-123 psi (800-860 kPa)
2nd, 3rd & 4th CLUTCH PRESSURE	@ CLOSED THROTTLE	in D4	65 psi (460 kPa)
2nd, 3rd & 4th CLUTCH PRESSURE	@ HALF THROTTLE	in D4	123 psi (860 kPa)
1st & 2nd CLUTCH PRESSURE	@ 2000 rpm	in 2 or 1	113-123 psi (800-860 kPa)
1st HOLD CLUTCH PRESSURE	@ 2000 rpm	in 1	113-123 psi (800-860 kPa)
REVERSE CLUTCH PRESSURE	@ 2000 rpm	in REVERSE	169-181 psi (1190-1270 kPa)
THROTTLE "B" PRESSURE	@ 1000rpm	in D4	*12 VOLTS TO LINEAR SOLENOID...0-2 psi (0-15 kPa)
THROTTLE "B" PRESSURE	@ 1000rpm	in D4	LINEAR SOLENOID DISCONNECTED..... 84-91 psi (590-640 kPa)

*This should be done quickly to avoid Linear Solenoid damage.

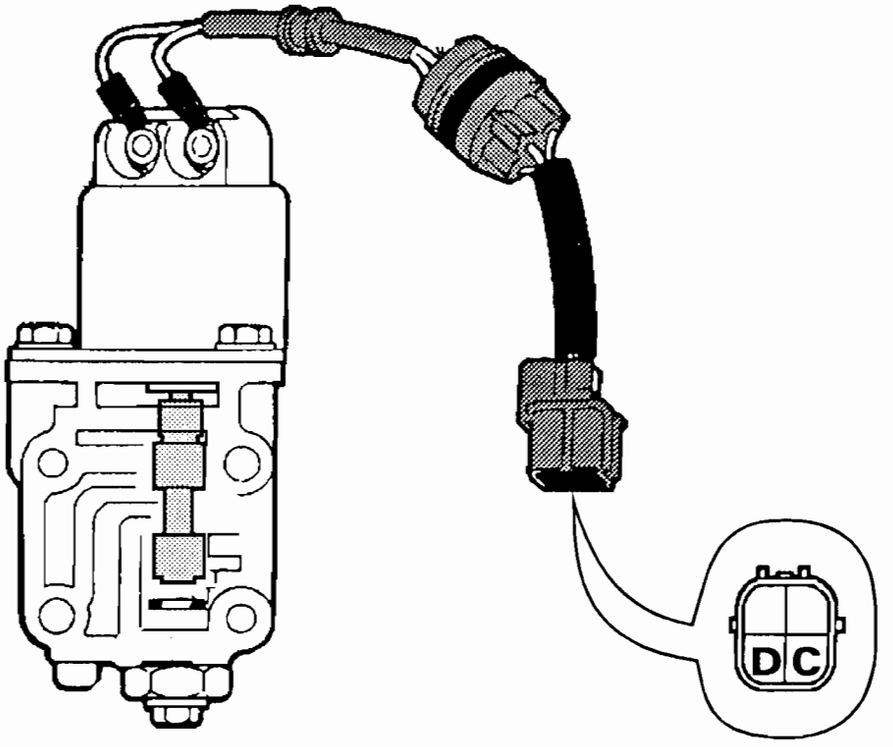
ACURA MPYA

HARSH SHIFT CONCERNS

Complaint: Harsh upshifts and harsh coast downshifts

Cause: Failure of the Linear Solenoid

Correction: The 1991 & up Acura Legend with the MPYA transaxle uses a pressure control solenoid called a Linear Solenoid, which is normally closed, to adjust shift feel. This now eliminates the need of a throttle cable to control throttle pressure "B".
The throttle "B" valve still regulates pressure to the accumulators and the clutch pressure control valve as it did in past designs, but now the computer is controlling throttle "B" pressure through the Linear Solenoid.
Therefore, failure of the Linear Solenoid or the signal to it or a sticking throttle valve could cause harsh upshifts, harsh coast downshifts or harsh kickdown.
The Linear Solenoid and the Shift Solenoids share a common connector, the Linear Solenoid specifications are listed below in figure 31.



LINEAR SOLENOID TERMINAL "C" (RED WIRE +)
TO TERMINAL "D" (WHITE WIRE -)....5.0 -5.6 OHMS

Figure 31

ACURA MPYA

REVERSE SELECTOR ELIMINATED

In all Honda/Acura transaxles, a mechanical sliding clutch is used as a reaction member to assist in backward movement. This design has also resulted in noisy garage shifts and bind-ups in reverse. In the 1991 and up Acura Legend the sliding clutch has been eliminated and been replaced with a reverse clutch. Hydraulic pressure applies the reverse clutch. Power is transmitted from the mainshaft reverse gear through the reverse idler gear to the countershaft reverse gear. Rotation direction of the countershaft reverse gear is changed through the reverse idler gear in the rear cover. Power is then transmitted to the secondary drive gear and drives the secondary gear. The power flow in reverse is illustrated below in figure 32.

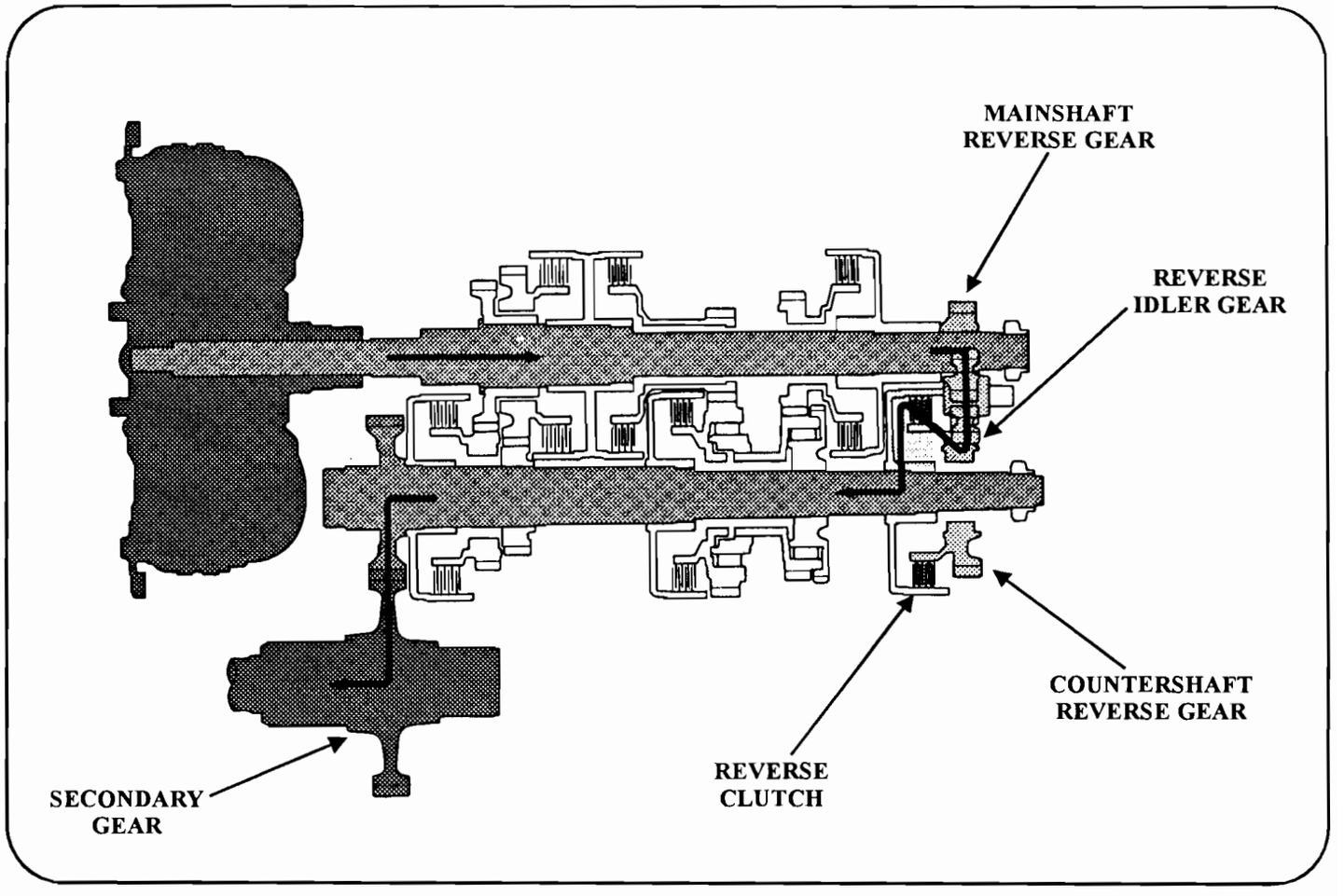
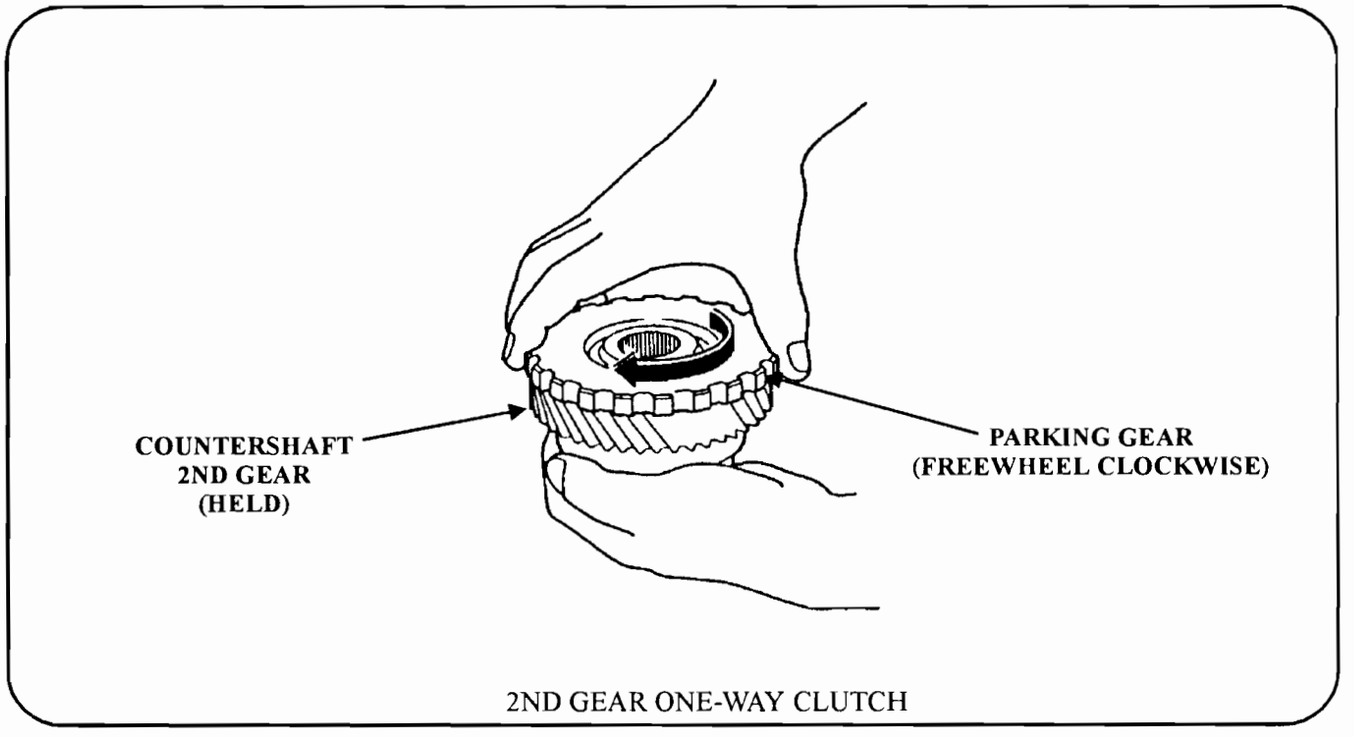


Figure 32

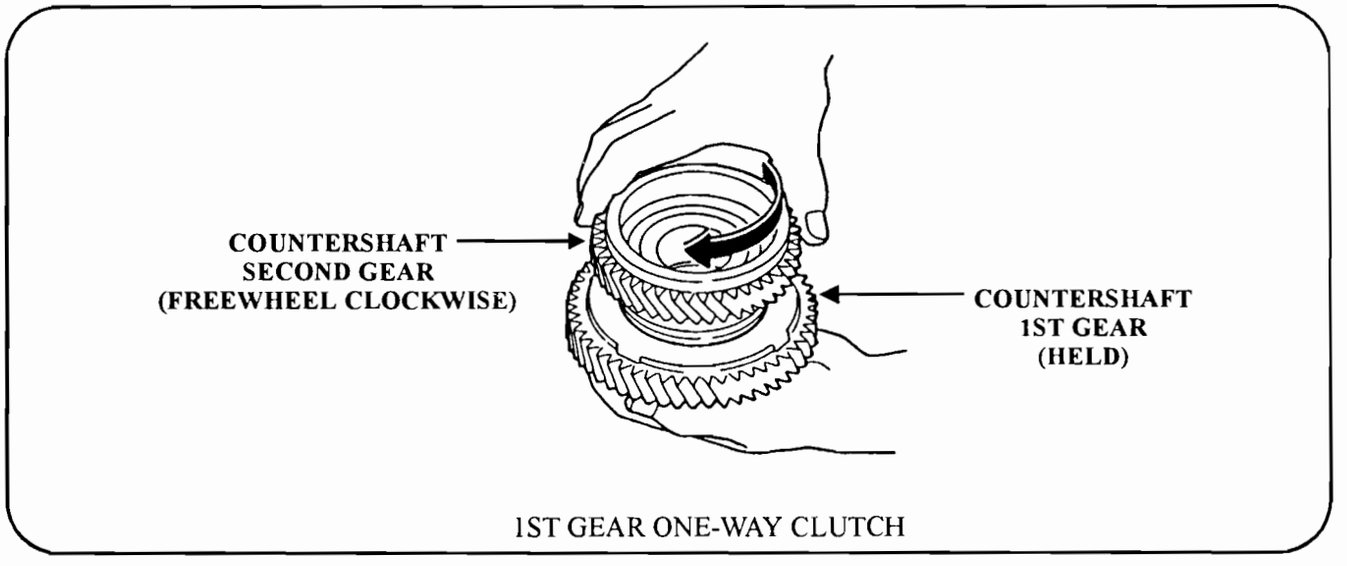
ACURA MPYA

ONE-WAY CLUTCH ROTATION



2ND GEAR ONE-WAY CLUTCH

FIGURE 33



1ST GEAR ONE-WAY CLUTCH

FIGURE 34

MAZDA G4A-HL

SLIPPING IN DRIVE POSITION
ALL SHIFTS SOFT AND/OR SLIPPING
LOW LINE PRESSURE

COMPLAINT: Some MAZDA 323 models equipped with the G4A-HL transaxle may exhibit a slipping condition with selector lever in the Drive (D) position, all shifts will be soft and/or slipping, and if line pressure has been checked, line pressure will be low.

CAUSE: The cause is low line pressure, and may be created by misassembly of the Throttle Modulator Line-up in the valve body.

CORRECTION: Install the Throttle Modulator Valve Line-up into the valve body as shown in Figure 35. Install throttle modulator sleeve "C", throttle modulator rear spring, throttle modulator plug, throttle modulator valve and throttle modulator sleeve "B", throttle modulator front spring, throttle modulator sleeve "A", and the retaining pin, as shown in Figure 35.

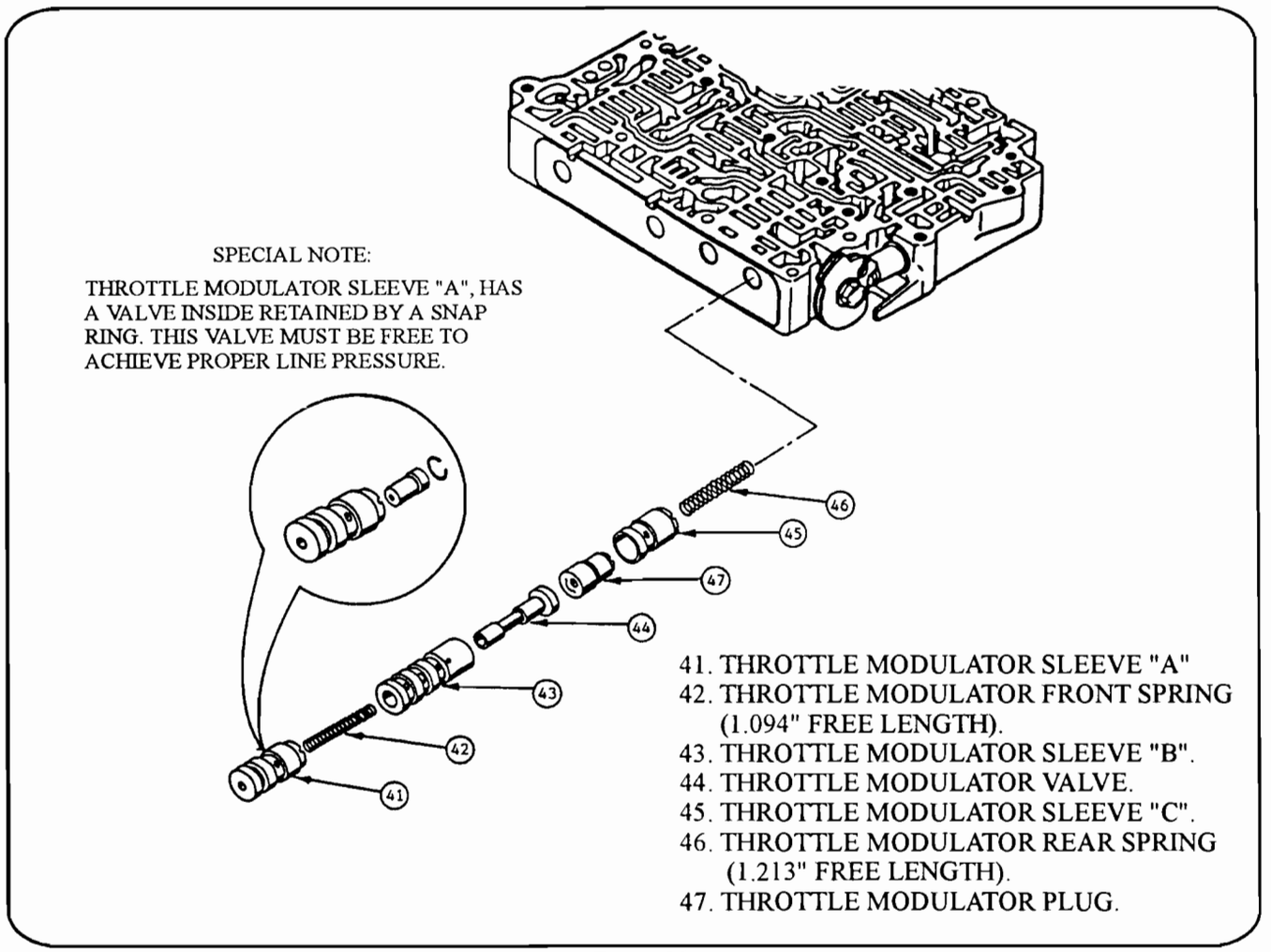


Figure 35

FORD PROBE 4EAT/MAZDA 626 G4A-EL

DISPLAYS 4-2-3-1 SHIFT PATTERN (AFTER REBUILD)

COMPLAINT: After you have finished the rebuild and installed the transaxle back into the vehicle, it starts off in 4th gear, followed by a shift into 2nd gear, followed by a shift into 3rd gear, and then shifts into 1st gear. The last shift is sometimes described as a shift into neutral, because of vehicle speed at the time of the shift. The vehicle could also display a 1-2 Neutral shift when manual shifting through the shift pattern, and a slipping condition on heavy acceleration.

CAUSE: The cause may be the 1-2 shift solenoid and the 2-3 shift solenoid reversed in their locations in the valve body (See Figure 36).

CORRECTION: Install the shift solenoids in their proper locations, as shown in Figures 36 and 37. Use Figure 36 for the 1-2 and 2-3 shift solenoids, and Figure 37 on the following page, for the 3-4 and lockup.

1-2 AND 2-3 SHIFT VALVE LOCATION

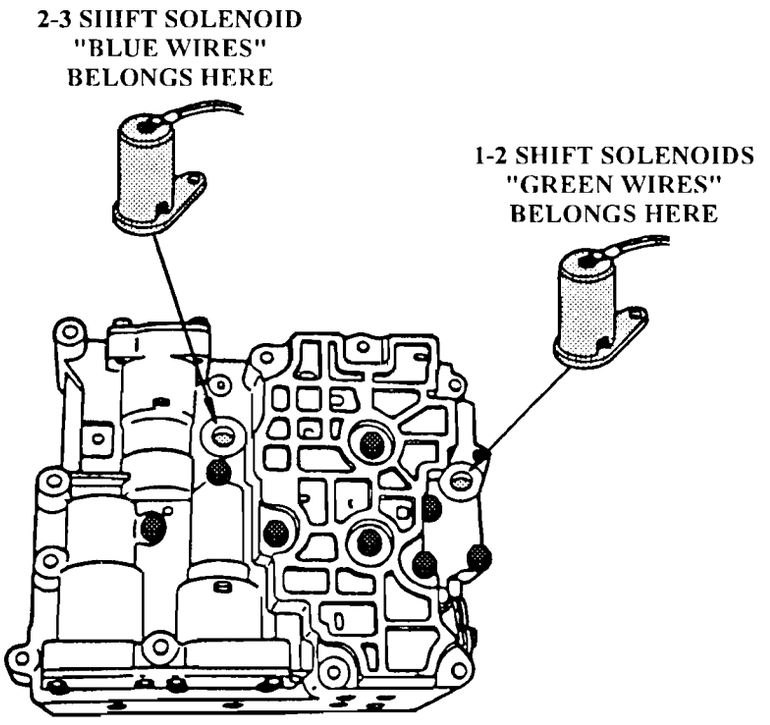


Figure 36

3-4 SHIFT AND LOCKUP SOLENOID LOCATIONS

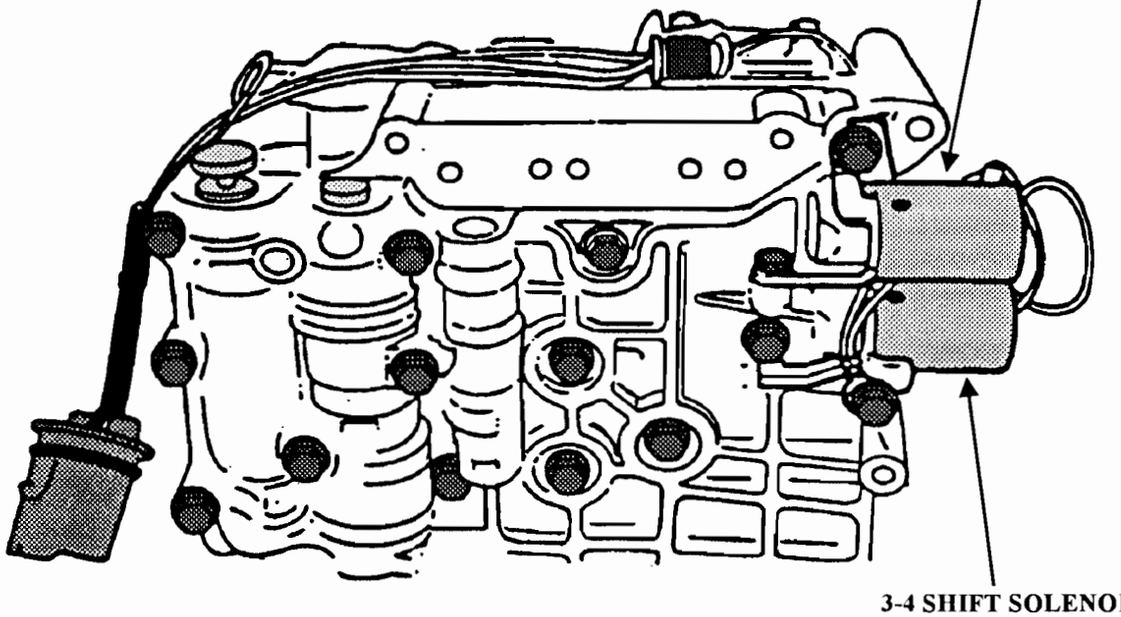


Figure 37

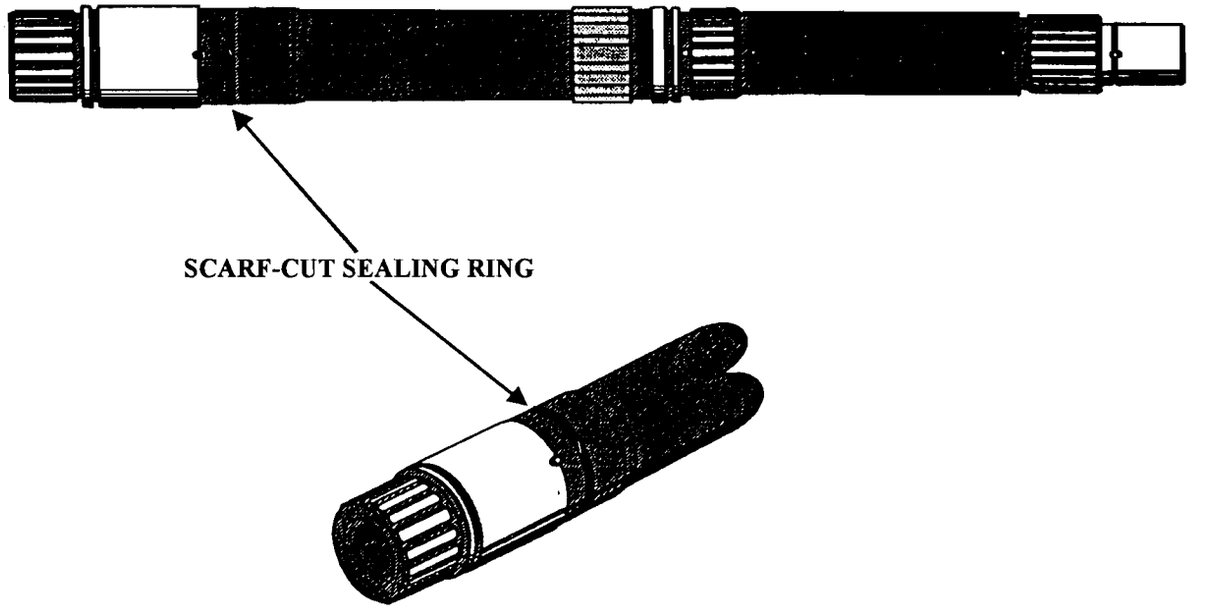
FORD PROBE 4EAT/MAZDA 626 G4A-EL
BIND UP IN REVERSE AND MANUAL LOW

COMPLAINT: Bind-up when the selector lever is placed in Reverse or the Manual Low positions. Also may display premature 3-4 clutch failure.

CAUSE: The cause may be the scarf-cut Teflon sealing ring on the input shaft, leaking, which would allow converter release oil into the 3-4 clutch passage and apply the 3-4 clutch pack (See Figure 38).

CORRECTION: Install a new Teflon scarf-cut sealing ring in the input shaft groove, as shown in Figure 38.
CAUTION: THERE ARE TWO DIFFERENT DIAMETERS OF THE G4A-EL INPUT SHAFT AND THEY REQUIRE DIFFERENT SIZE SEALING RINGS.
One shaft has 21 turbine splines, and the journal diameter behind the splines is .902" in diameter.
One shaft has 25 turbine splines, and the journal diameter behind the is 1.092" in diameter.
Be very careful to select the proper size scarf cut sealing ring for the input shaft.

G4A-EL INPUT SHAFT



CAUTION: THERE ARE TWO DIFFERENT DIAMETERS OF THE G4A-EL INPUT SHAFT, AND THEY REQUIRE DIFFERENT SIZE SCARF-CUT SEALING RINGS.

Figure 38

FORD 4EAT/MAZDA G4A-EL

FRONT SEAL BLOWOUT OR CHRONIC LEAK

COMPLAINT: Continuous front seal leak or front seal forced out on to the Torque Converter "Hub" repeatedly.

CAUSE: **A:** Insufficient drainback passages in the Stator Support.

B: Worn or misplaced bushing in Torque Converter.

CORRECTION: **A:** Remove Stator Support and bearing race. With Drill or Die Grinder enlarge and deepen the factory drainback passage in the "Rear" of the Stator Support as shown in Figure 39. Notice the drainback hole and the passage to "Dotted Line" enlarged.

B: Measure dimension "A" in figure 40, then measure dimension "C" in Figure 41. Subtract C from A and ensure the difference is .003"-.006". Also check the clearance between the bushing and the top of the converter hub. The bushing should be "Recessed" approximately .078" to .125" as shown in Figure 40, dimension "B".

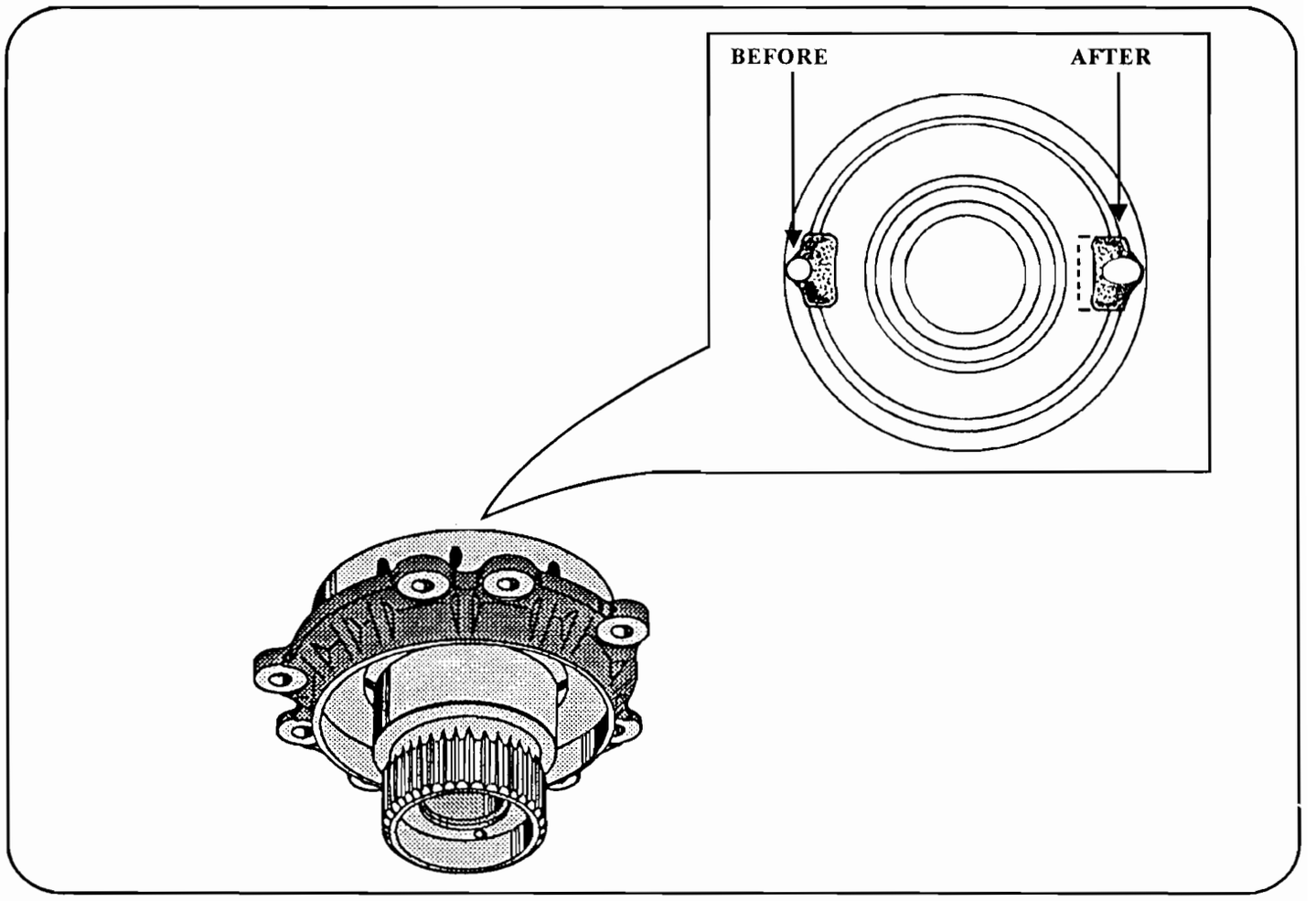


Figure 39

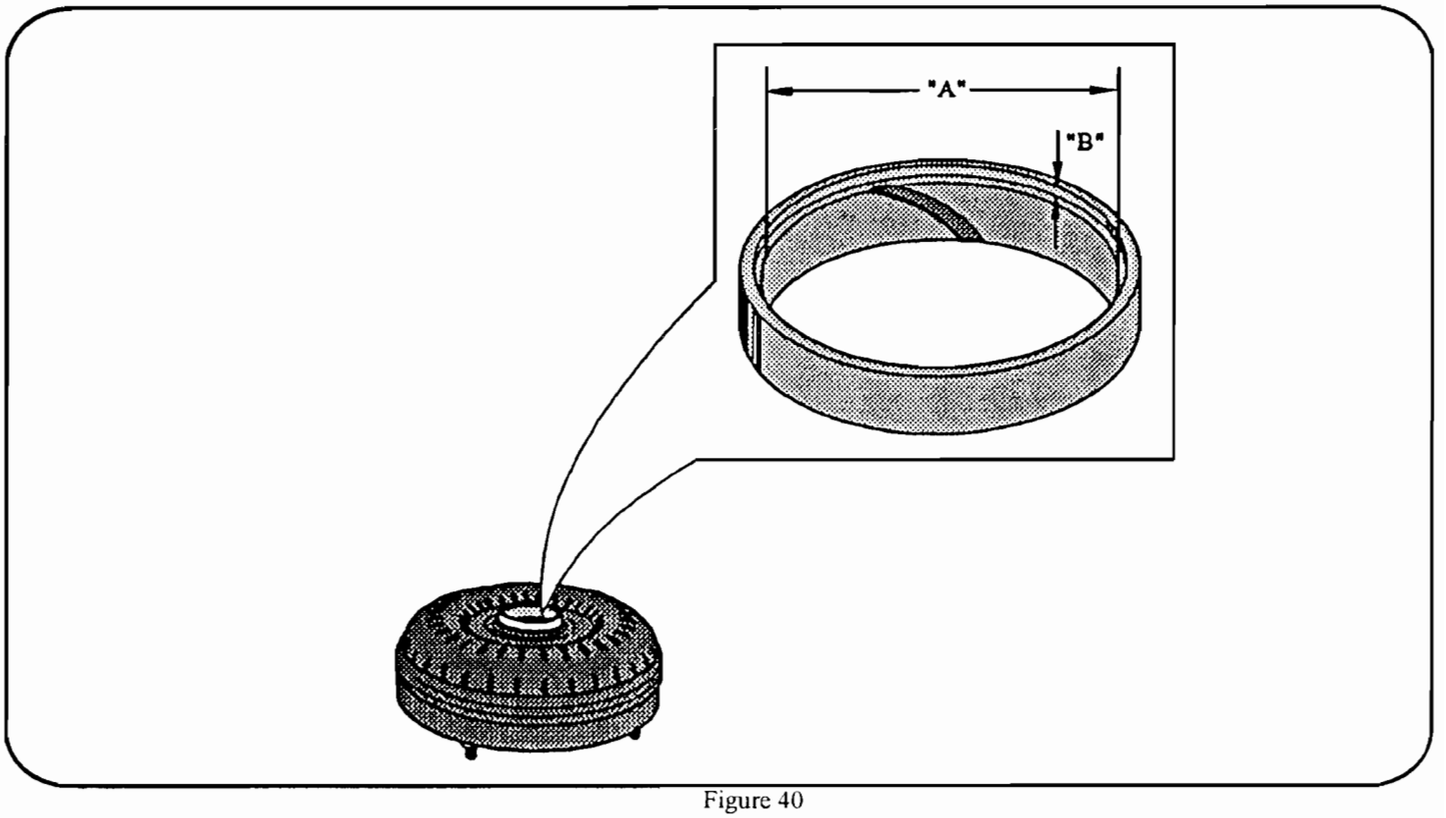


Figure 40

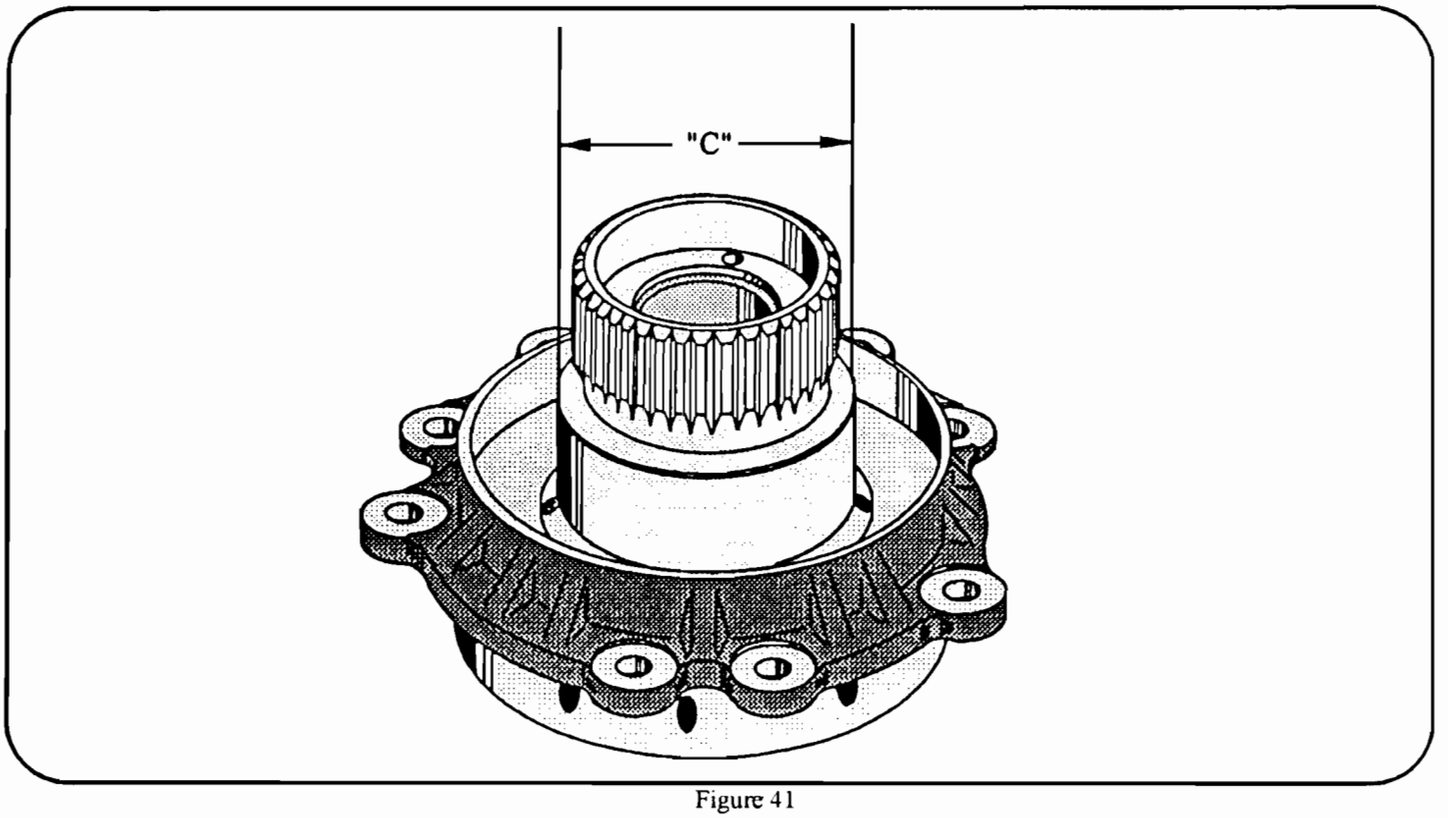


Figure 41

FORD F4EAT

SLIPS IN 2ND AND 4TH AND/OR NO 2ND AND 4TH

COMPLAINT: Vehicle exhibits a slipping condition going into 2nd gear, at times slipping through 2nd and on into 3rd gear, and a slipping condition going into 4th gear. Obviously this will also burn the 2-4 band. In severe conditions there will be NO 2nd gear, and NO 4th gear. The vehicle will shift 1-3 only.

CAUSE: The cause may be a clogged or partially clogged 2-4 servo feed orifice. The 2-4 servo feed orifice is only .038" in diameter, and will not tolerate much debris before the slipping condition will exist. If the 2-4 servo orifice becomes totally closed, there will be NO 2nd gear, and NO 4th gear. Another cause for NO 2nd and NO 4th gears could be a checkball that has been installed in the wrong location in the Premain valve body, as shown in Figure 43.

CORRECTION: Remove the 2-4 servo feed orifice assembly using a 10mm Hex socket. Refer to Figure 42 for the location in the case. Thoroughly clean the 2-4 servo orifice and all case passages with clean solvent. The spring in this assembly is larger on one end, and the larger end goes into the Hex bolt (See Figure 42). Also ensure that you have only TWO .243" diameter checkballs installed into the Premain valve body, in the locations shown in Figure 43.

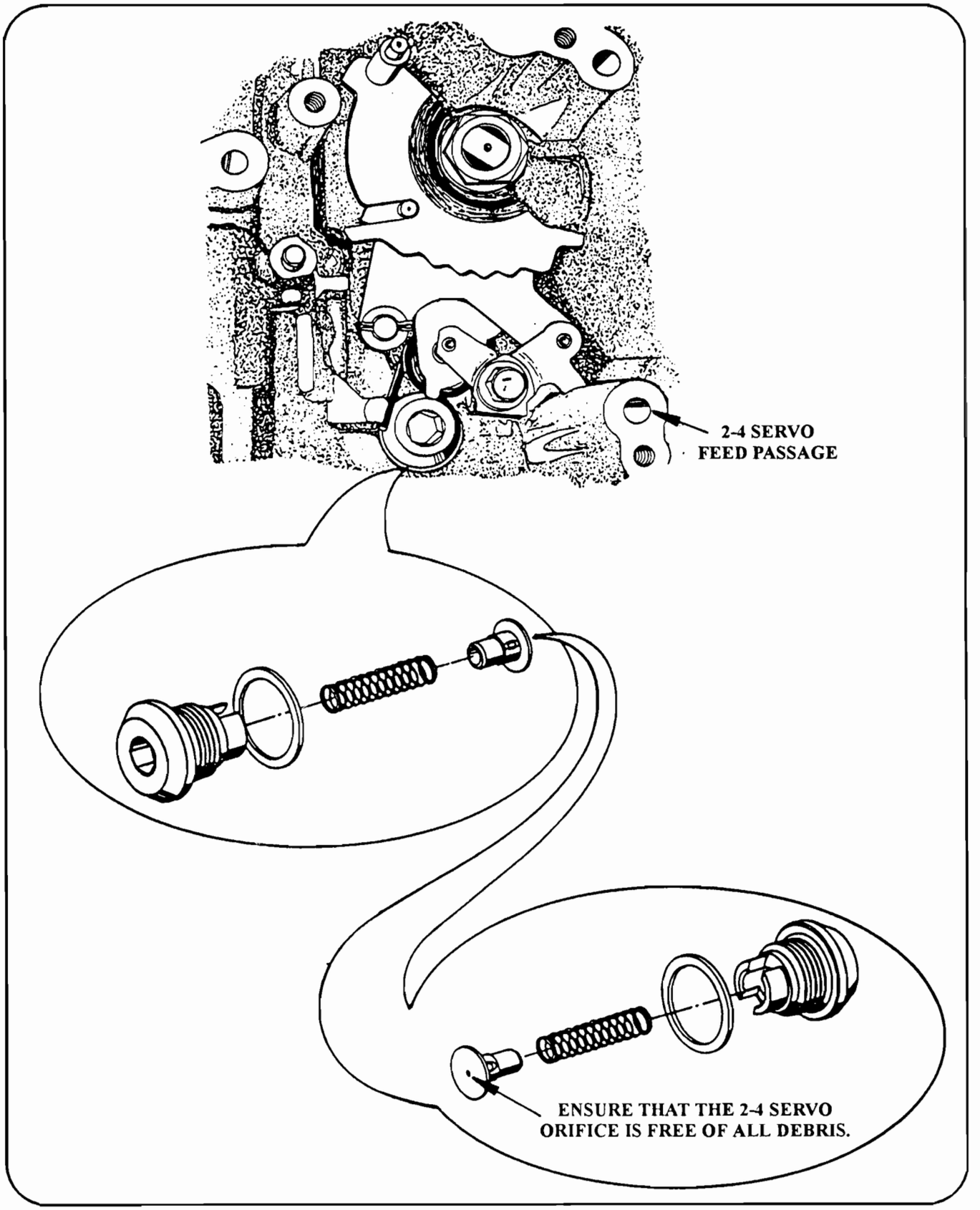

2-4 SERVO
FEED PASSAGE
ENSURE THAT THE 2-4 SERVO
ORIFICE IS FREE OF ALL DEBRIS.

Figure 42

F4EAT PREMAIN VALVE BODY

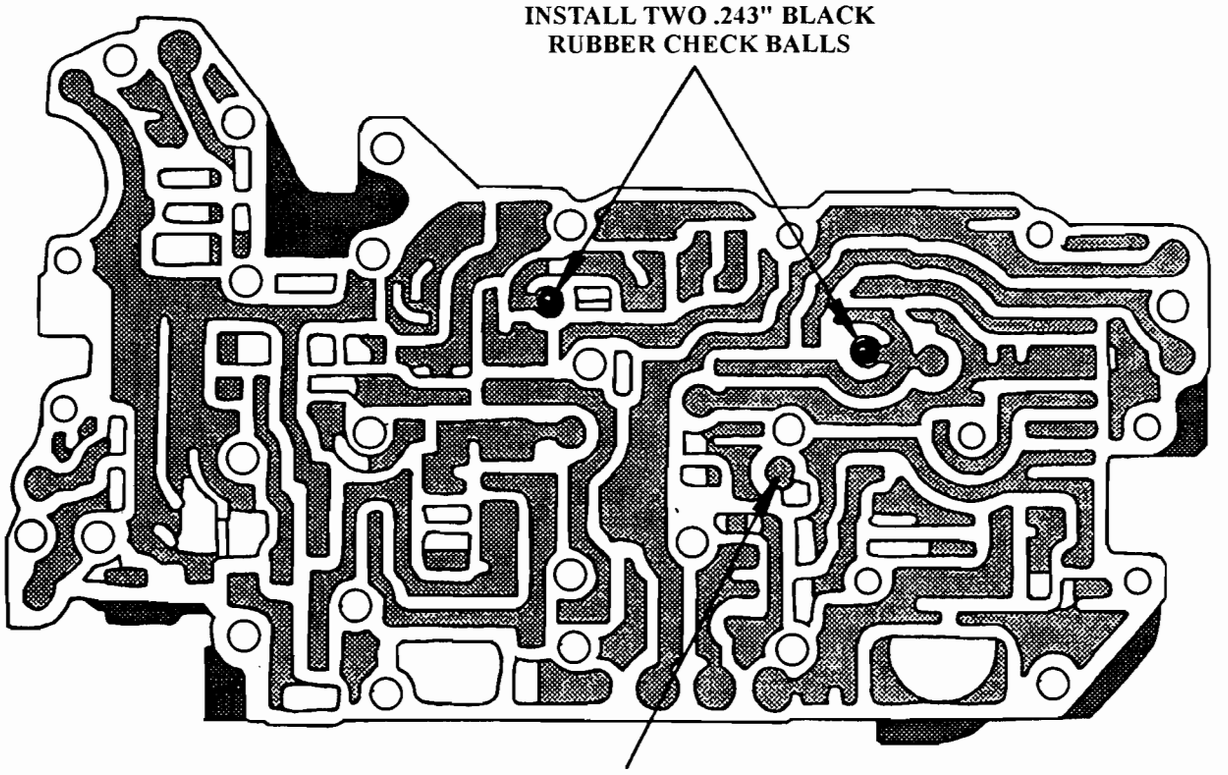


Figure 43

FORD F4EAT

BIND UPS AND WRONG GEAR STARTS

COMPLAINT: A: After "overhaul" vehicle "Binds up" on the 1-2 shift.

B: After "overhaul" vehicle binds up in reverse and manual low and makes a third gear start.

CAUSE: A: The cause may be, the 2-3 accumulator piston was installed into the 1-2 accumulator bore. Because of the difference in overall length, when the 2-3 accumulator piston is installed into the 1-2 accumulator bore, the sealing ring of the 2-3 accumulator piston provides an "Orifice" for 1-2 accumulator pressure (band apply) to enter the 3-4 clutch apply "circuit" on the 1-2 upshift.

B: The cause may be the 2-3, N-D or N-R accumulator was installed into the 1-2 accumulator bore, or the sealing ring at the small diameter of the 1-2 accumulator was damaged on installation into it's bore.
Because of the difference in overall length, when the 2-3 or N-D accumulator is installed into the 1-2 accumulator bore, "LINE PRESSURE" can be forced past the accumulator piston into the 3-4 clutch circuit. (Refer to figure 44)
When the N-R accumulator is installed into the 1-2 accumulator bore, "LINE PRESSURE" can also enter the 3-4 clutch circuit through the "factory" hole bored through the center of the small diameter of the piston or the "factory gap" in the small diameter sealing ring.

CORRECTION: A: See figure 45 for the correct accumulator identification and assembly.

B: See figure 45 for the correct accumulator identification and assembly or replace the damaged sealing ring.

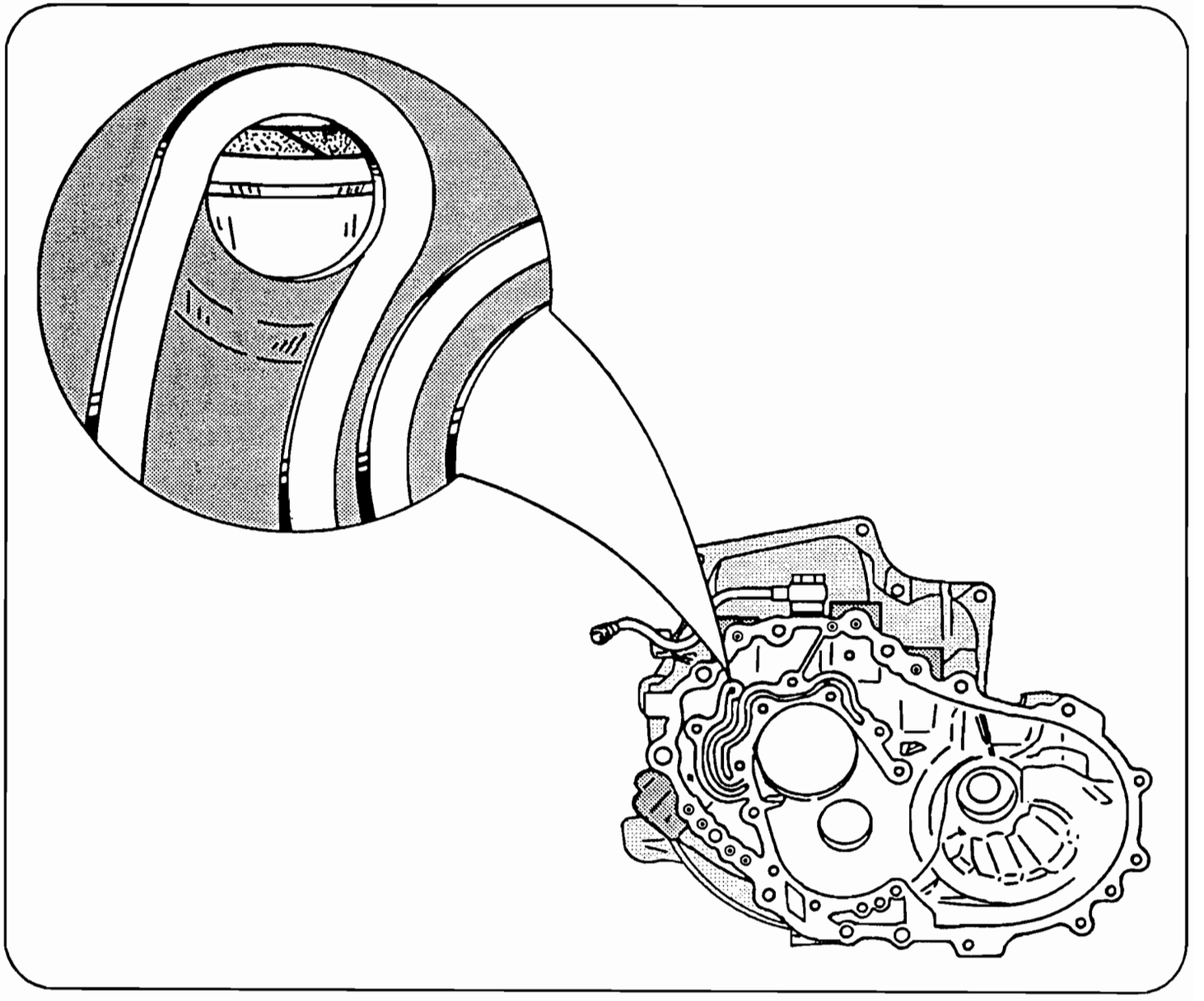
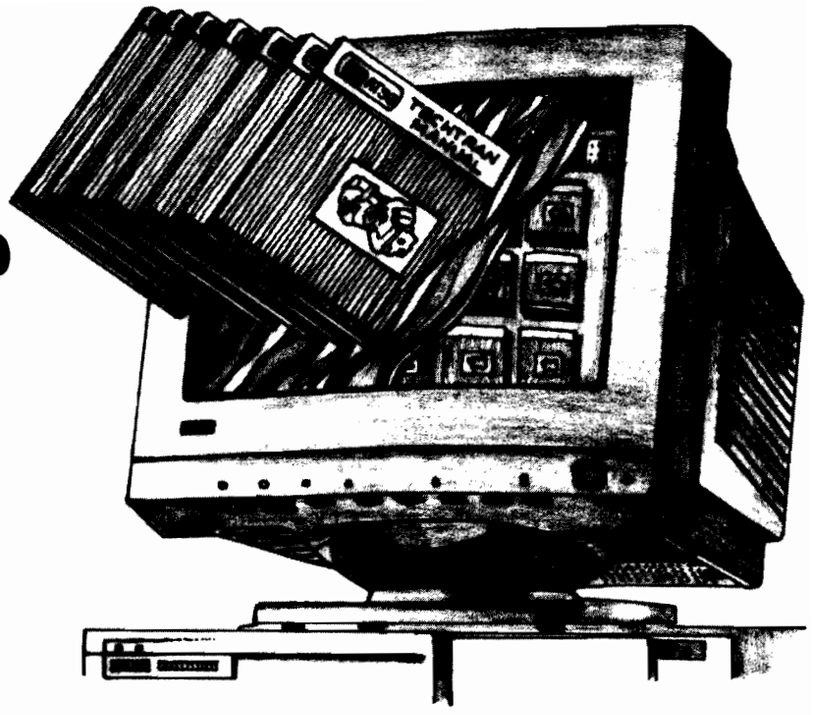


Figure 44

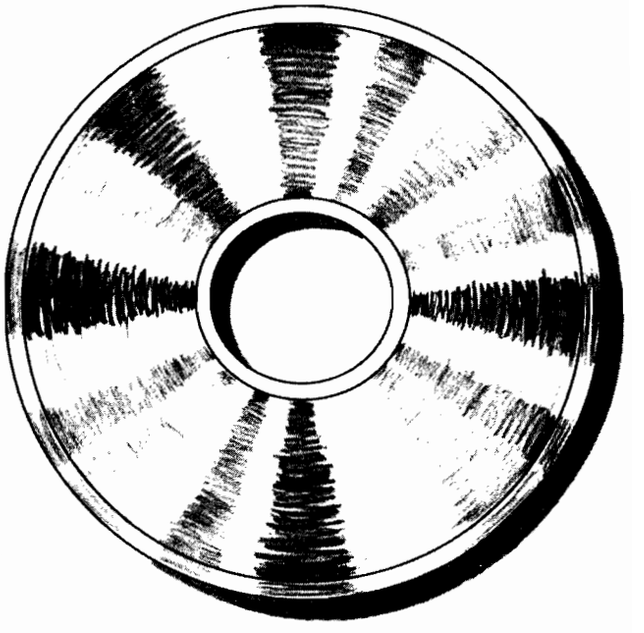
Another First ...



Transmission Manuals Now On CD Rom

DOMESTIC TRANSMISSIONS
General Motors, Ford, Chrysler,
Pass Books, Updates and Transfer Cases

IMPORT TRANSMISSIONS
Toyota, Honda, Nissan, Mercedes,
BMW, Mitsubishi, Mazda and more



ATSG TECH BULLETINS
1986 - 1993 on CD Rom

Call Our Toll Free Number for Prices and Information

ATSG

1-800-245-7722
9200 S. DADELAND BLVD.
SUITE 720 • MIAMI, FL 33156

ACCUMULATOR I.D.		
ACCUM.	PISTON COLOR	LENGTH
"A" 2 - 3	GREEN	2.108"
"B" 1 - 2	RED	2.313"
"C" N - D	BEIGE / WHITE	2.152"
"D" N - R	TURQUOISE / BLUE	2.152"

ACCUMULATOR SPRING I.D. (1.9)		
ACCUM.	SPRING COLOR INNER / OUTER	SPRING LENGTH INNER / OUTER
"A" 2 - 3	GREY / GREY	2.345" / 2.813"
"B" 1 - 2	NA 1.9 / WHITE	NA 1.9 / 3.080"
"C" N - D	YELLOW / PLAIN	2.100" / 2.080"
"D" N - R	ORANGE/ORANGE	3.670" / 4.115

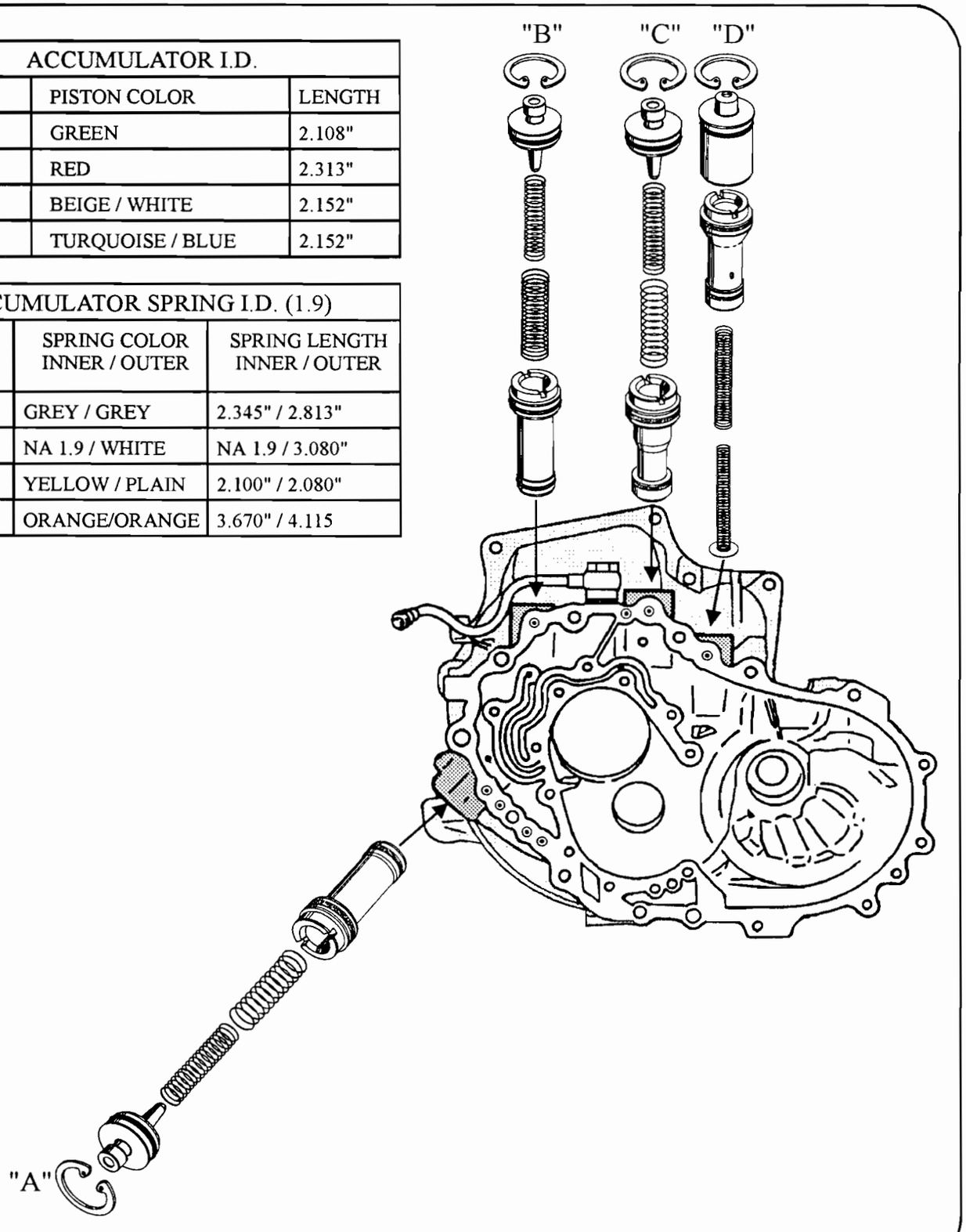


Figure 45

MAZDA 929

STACKED SHIFTS

COMPLAINT: After overhaul, it may be noted that the N4AEL Transmission found in 1987-1991 Mazda 929s shift early or "stack shift" at light throttle openings. It will seem that 2nd gear is missing and 3rd gear will occur on top of 1st gear at about 12-14 mph. 4th gear may occur as low as 19 mph. These shift characteristics may feel wrong, as the vehicle feels sluggish after the first shift at low speeds. This feeling usually goes away and the shifts spread out if the vehicle is driven more aggressively.

CAUSE: The EC-AT Computer strategy allows 1-2 upshifts as early as 7 mph at light throttle when the "normal" mode is selected. The shifts at 1/8 throttle or less occur at 7 mph, 13 mph, and 19 mph. (See Figure 46) It is not until 1/4 throttle or more that the shifts are perceptibly spread out.

CORRECTION: As long as other shift quality concerns have been addressed, no other action is necessary or possible.

THIS IS NORMAL OPERATION!

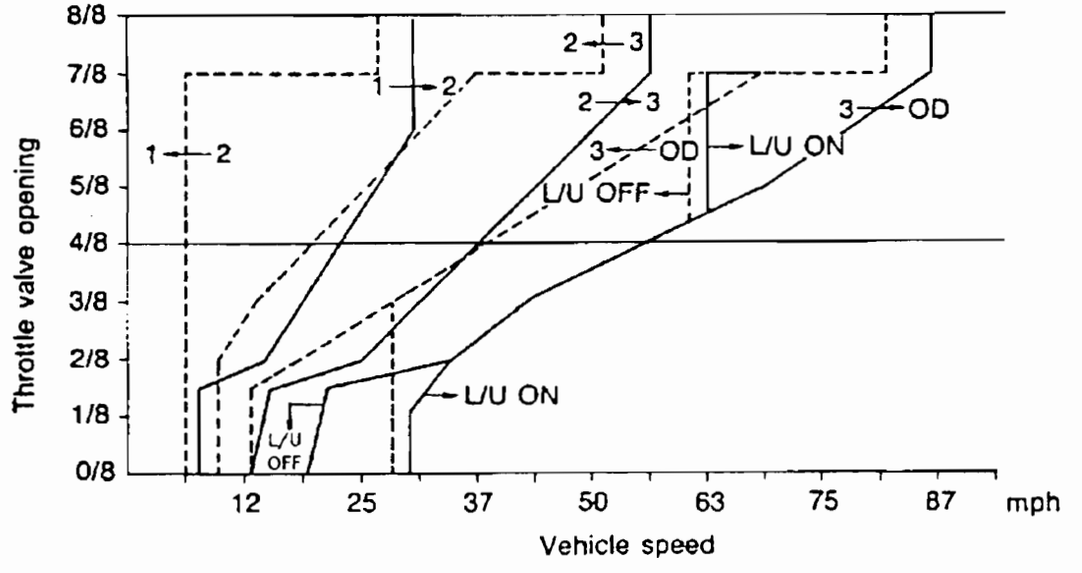


Figure 46

MAZDA MPV

ENGINE DOES NOT START WHEN VEHICLE IS PARKED ON AN INCLINE.

COMPLAINT: Some 1990 - 1992 Mazda MPV vehicles with the RE4RO1A transmission may not start when the vehicle is parked on a steep incline. The automatic transmission lever may also not move from the "P" position.

CAUSE: Because of some play in the transmission linkage, a steep incline (20° or more) can pull the linkage so that the park/neutral circuit in the inhibitor switch does not close. Also because of the configuration of the manual plate (rooster cone), the shift lock mechanism may not disengage and allow movement of the gearshift lever.

CORRECTION: Beginning on May 1, 1991, the inhibitor switch was modified to correct the no start condition. If the vehicle has a Vin. number lower than M0348547, replace the inhibitor switch.
Beginning on October 1, 1991, the round configuration of the manual plate between the "P" and "R" ranges was changed to facilitate lever movement. If the vehicle has a VIN number lower than N0414408, replace the manual plate (rooster comb) and manual shaft as well as the inhibitor switch.
Parts information is found below in Figure 47.

PART NUMBER	DESCRIPTION	QTY
BU36 19 444A	Inhibitor Switch	1
BU36 19 440	Manual Plate	1
BU67 19 431	Manual Shaft	1
0338 19 432	"O" Ring	1
0338 19 446	"O" Ring	1
BU67 21 465	Spring Pin	1

Figure 47

NISSAN RE4F02A

ENGINE KILL WHEN TRANSAXLE IS PUT INTO DRIVE OR REVERSE

COMPLAINT: When the transaxle is put into drive or reverse, the engine is instantly killed.

CAUSE: The torque converter clutch is immediately applied due to a broken lock up shuttle valve retainer (See figure 48), which has jammed the valve in the apply position.

CORRECTION: Free the lock up shuttle valve and replace the retainer

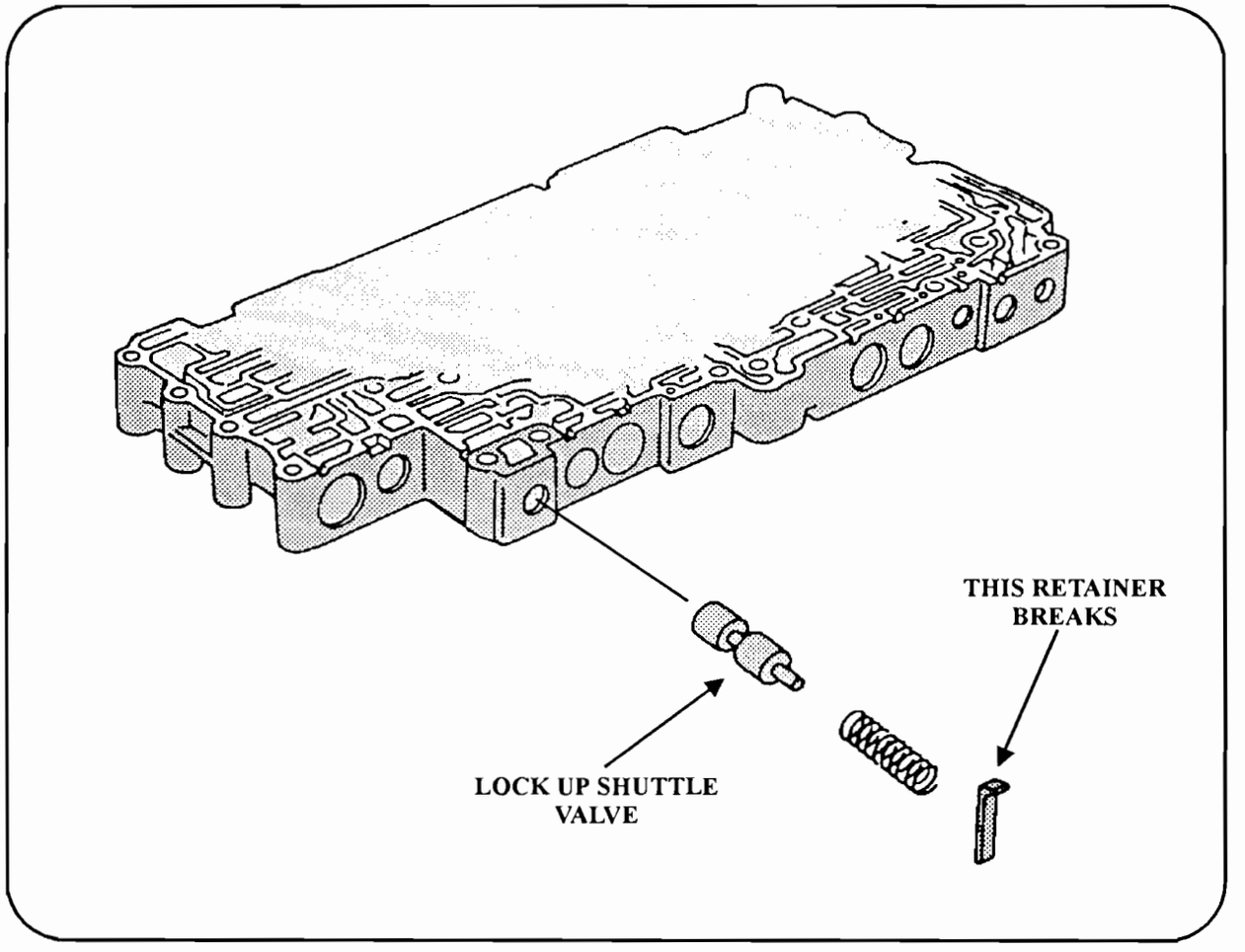


Figure 48

NISSAN RE4F02A
PREMATURE HIGH CLUTCH FAILURE

COMPLAINT: Premature failure of the high gear clutch.

CAUSE: Premature failure of the high gear clutch may be caused by a leaking high clutch check valve, which is located in the pump cover /support. (See figure 49)

CORRECTION: With a GOOD FITTING set of sealing rings in place, install the high gear drum onto the pump cover/support. Then pour some solvent into the high gear check valve and air check the high gear drum through the high gear clutch feed passage in the pump side of the pump cover/support while checking the high gear check valve for leakage. (See figure 50)

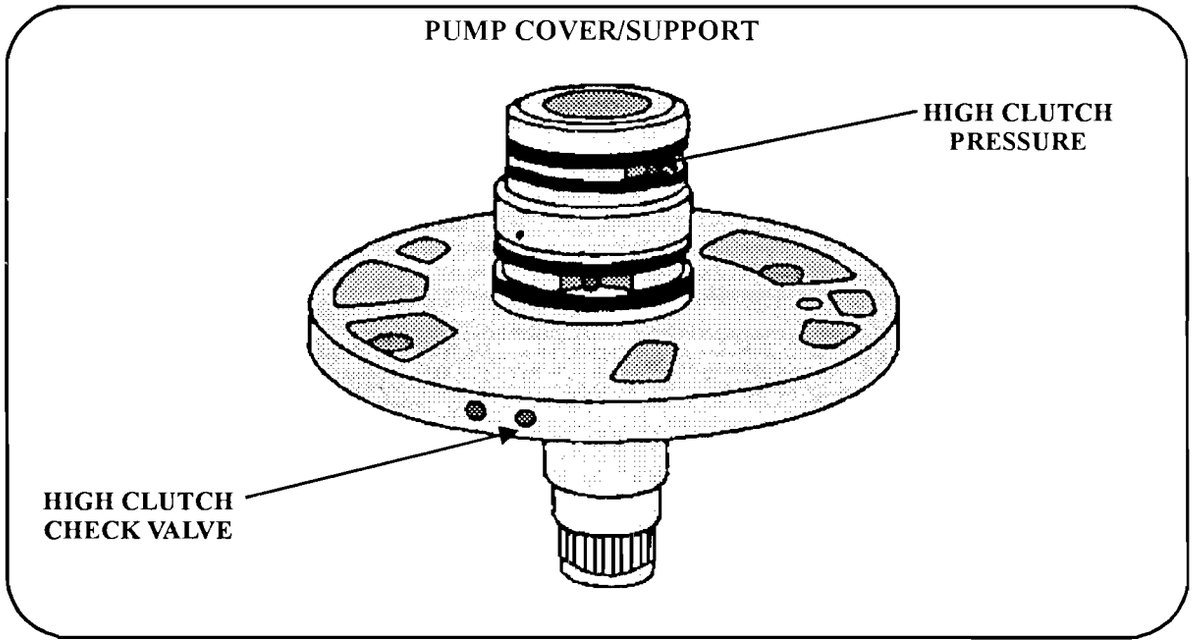


Figure 49

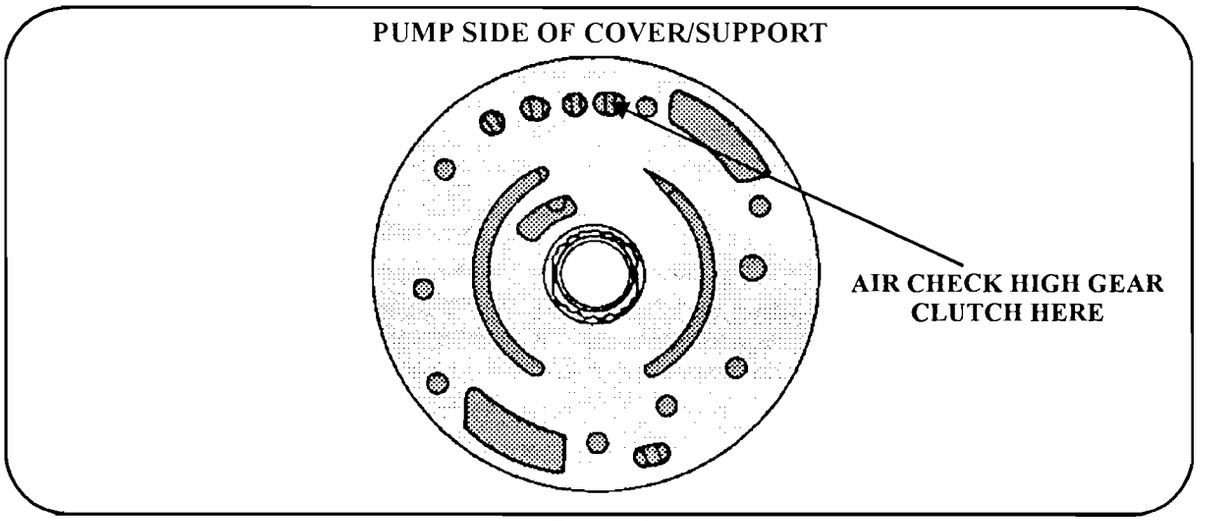


Figure 50

NISSAN RL4F03A AND RL4F03V

FLARED 2-3 SHIFT OR NO 2-3 SHIFT ONLY WHEN HOT

COMPLAINT: Some low mileage vehicles equipped with the RL4F03A/V Transaxle may exhibit a flared or slipping 2-3 upshift, or have no 2-3 upshift at all, after the transaxle is warm. UPON DISASSEMBLY AND INSPECTION THERE IS NO VISUAL ROOT CAUSE FOUND FOR THE CONDITION LISTED ABOVE.

CAUSE: #1-It has been determined that the inner "D" ring on the direct clutch piston wears badly and/or shrinks, creating a leak of direct clutch oil at the inner seal. (See figure51)

#2-It has also been found that the direct drum is prone to cracking in the area around the inside diameter of the drum where the input shaft is attached to the drum, and is sometimes difficult to see visually. (See figure 52)

CORRECTIO #1-Remove the outer lip seal from the direct clutch piston and install the piston back into the direct drum with only the "D" ring in the piston. Rotate the piston and check the "D" ring for "DRAG", as shown in figure 53. "D" ring wear and/or shrinkage is what normally creates this complaint, and simply replacing the "D" ring solves the problem.

#2-If when checking the "D" ring for "DRAG" as explained above, you determine the "D" ring DOES have sufficient "DRAG", than a close inspection of the direct drum for cracks, in the area shown in figure 52, is MANDATORY. Replace the direct drum as necessary.

NOTE: ATSG has found that the Chrysler 413/470 scarf-cut Teflon sealing rings provide much better sealing of direct clutch oil, when they are used on the input shaft in this unit. (See figure 52)

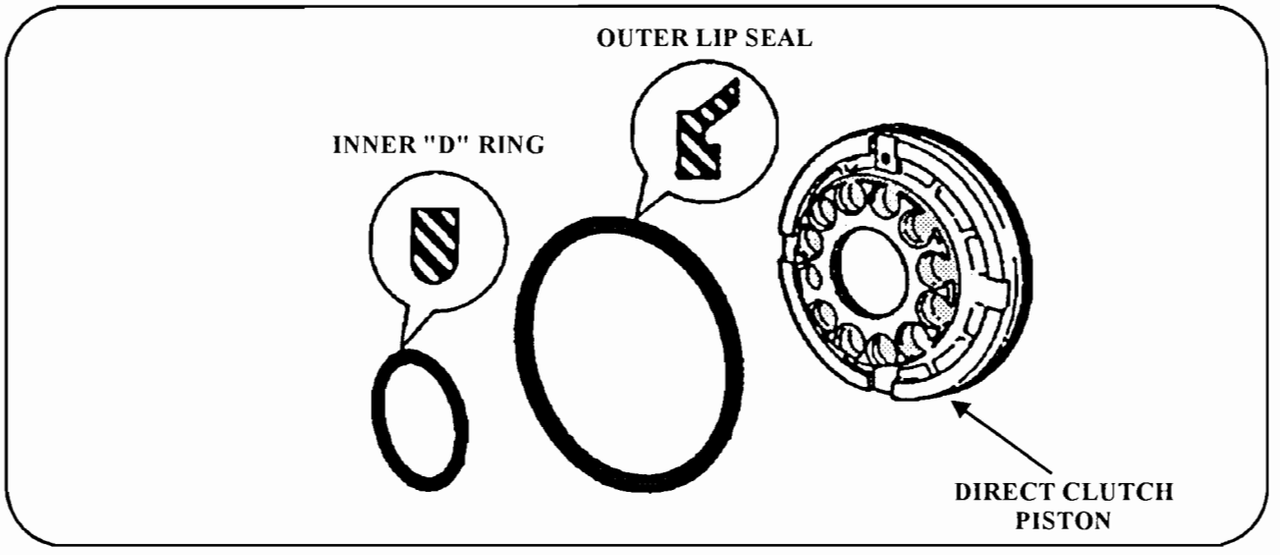


Figure 51

NISSAN RL4F03A AND RL4F03V

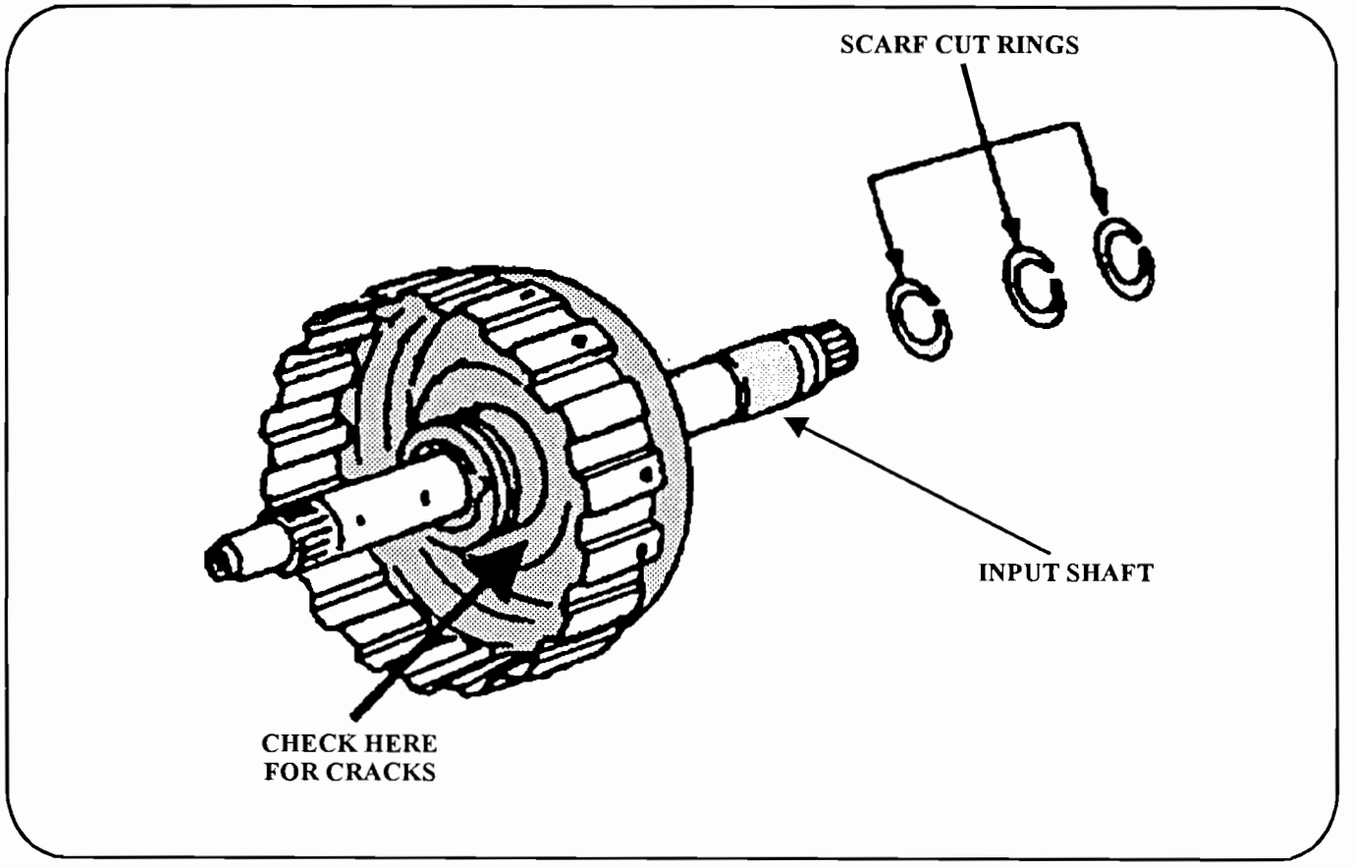


Figure 52

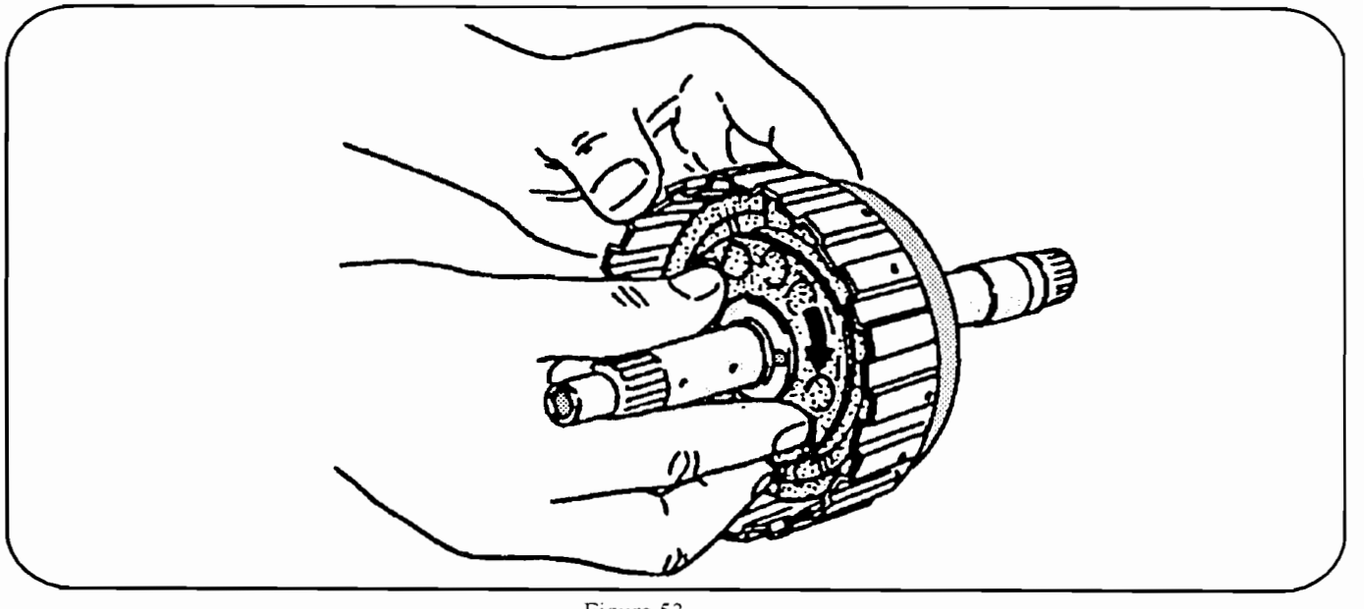


Figure 53

NISSAN RL4R01A

HARSH MANUAL SHIFT FROM DI TO D2

COMPLAINT: Some 1990-1991 Nissan trucks equipped with the RL4R01A transmission may exhibit a harsh manual upshift from D1 to D2.

CAUSE: This complaint may be caused by a worn and broken Orifice Check Valve, which is located in the lower valve body to figure 54) When wear occurs in the Orifice Check valve, it may break, causing pieces of the check valve to become lodged in the Accumulator Control Valve, (Refer to figure 55) which is located in the upper valve body section.

CORRECTION: Remove the Orifice Check Valve and spring and check to see if it is broken. If it is broken, clean the broken pieces out of the Accumulator Check Valve and reassemble the valve body WITHOUT the Orifice Check Valve.
The removal of the Orifice Check Valve will not affect the operation of the transmission.
All transmissions built after June 13, 1991 will have the Orifice Check Valve. eliminated.
NOTE: When reassembling the valve body be sure to reinstall the check ball shown in figure 55A. This check ball is not shown in repair manuals.

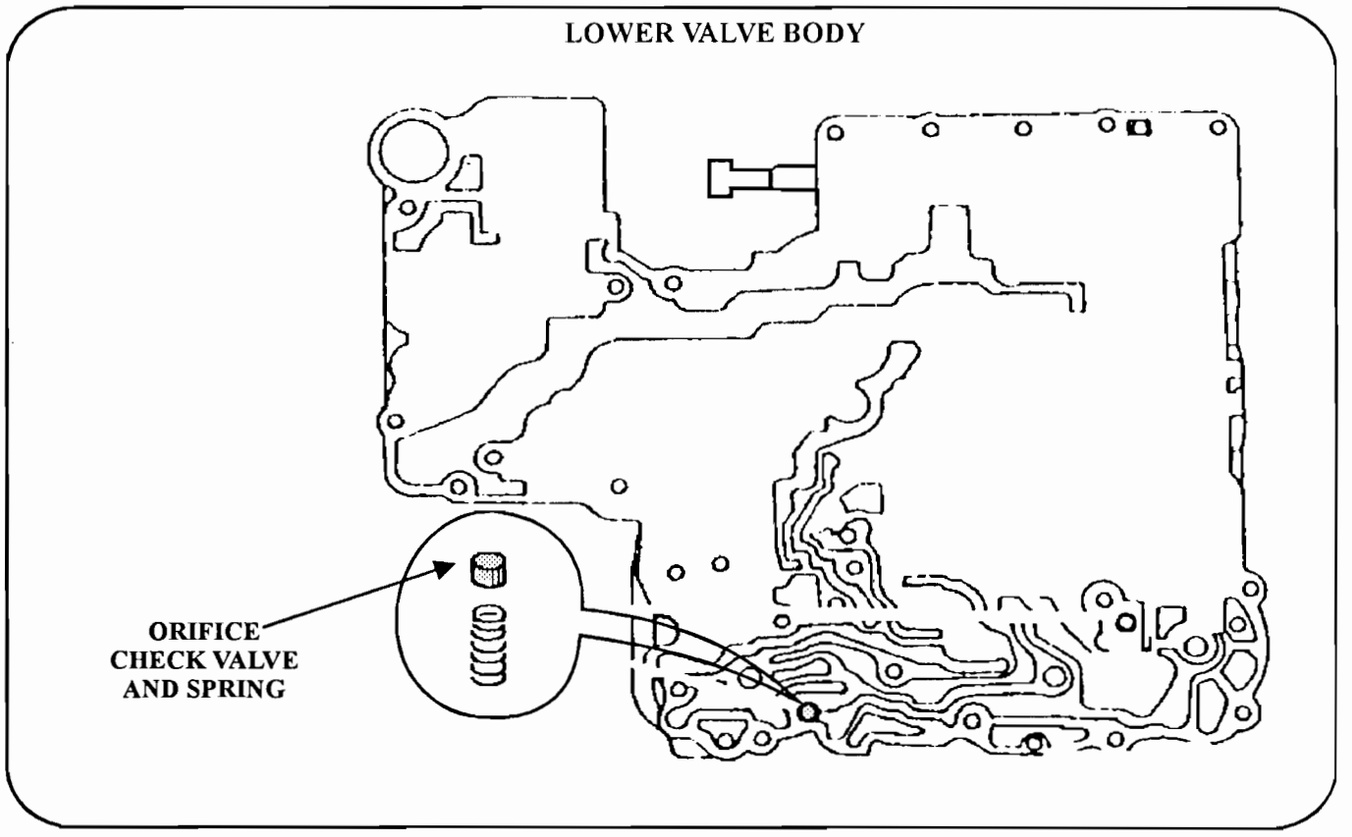
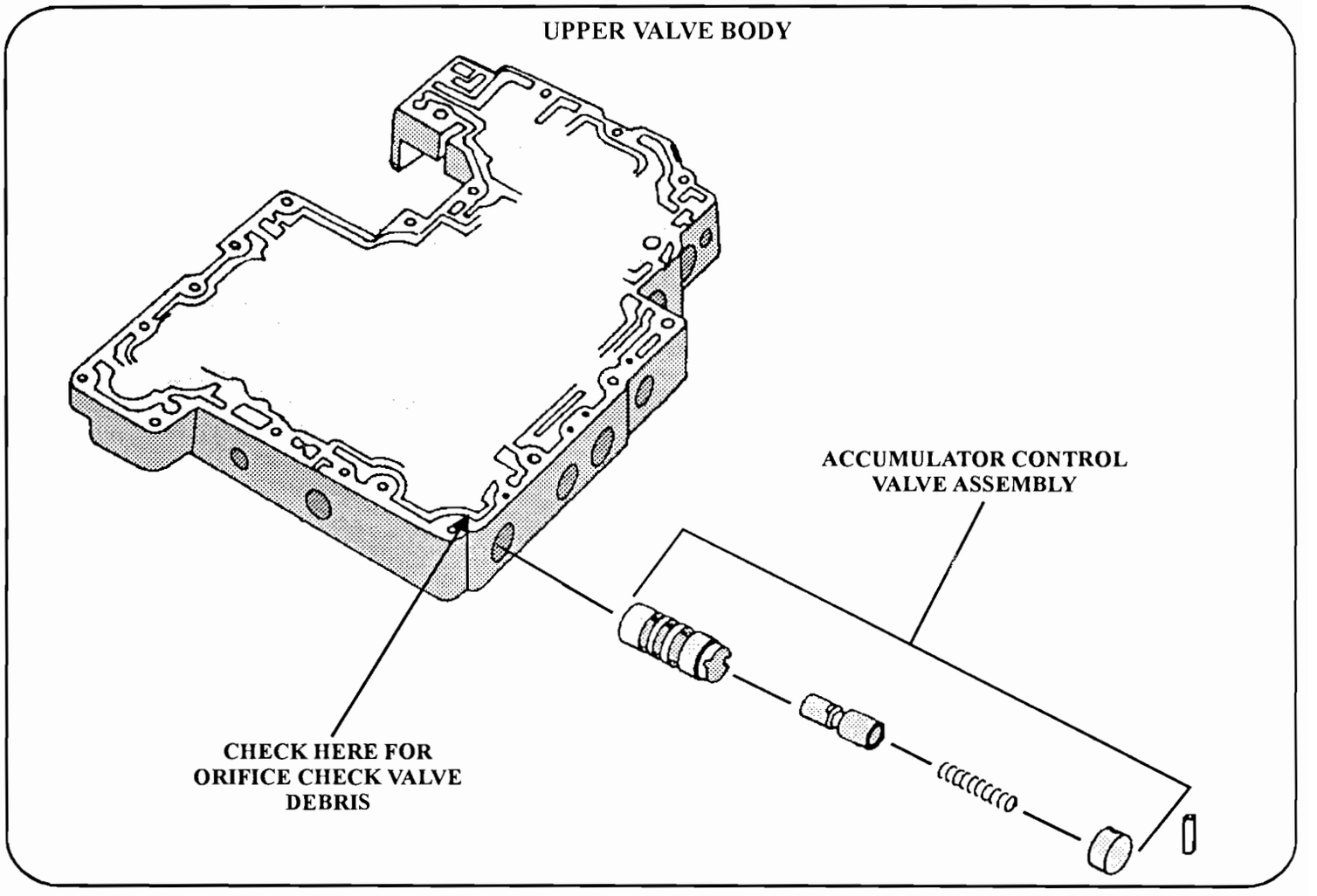


Figure 54

NISSAN RL4R01A



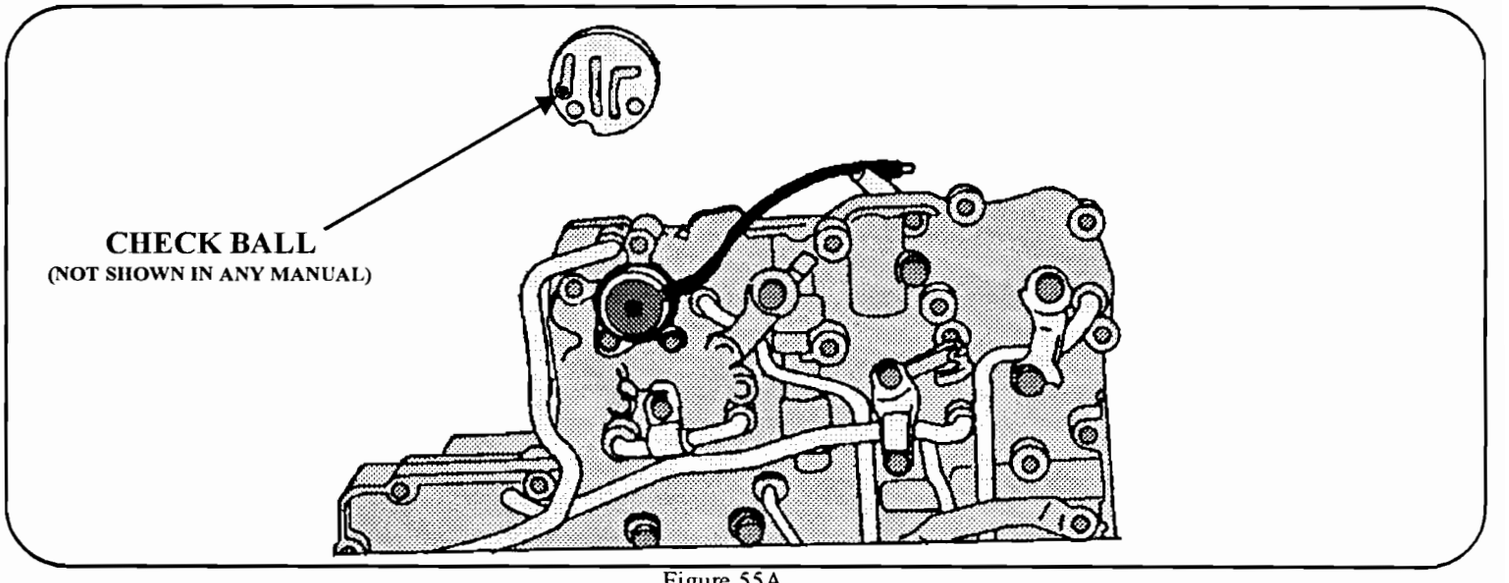


Figure 55A

Automatic Transmission Service Group

NISSAN RL4RO1A

FALLS OUT OF FOURTH GEAR

COMPLAINT: Vehicles equipped with the RL4RO1A may exhibit a complaint of falling out of 4th gear at "Highway" speeds, although the vehicle will hold 4th gear at lower speeds.

CAUSE: The cause may be a "Broken" or "Cracked" bore plug at the end of the "Lock-up Control Valve Train". The reason is, when vehicle speed and governor pressure is high enough, (approx. 44 - 49 mph), governor pressure moves the 4th speed cut valve against spring pressure allowing 4th apply pressure to enter the "lock-up control valve", at the bore plug side, which in turn moves the lock-up control valve and applies the "torque converter clutch". When this action takes place the broken bore plug can act as an exhaust for 4th apply oil pressure causing the loss of 4th gear.

CORRECTION: Replace the bore plug ensuring the new bore plug fits "snug" in the valve body bore, See Figure 56.

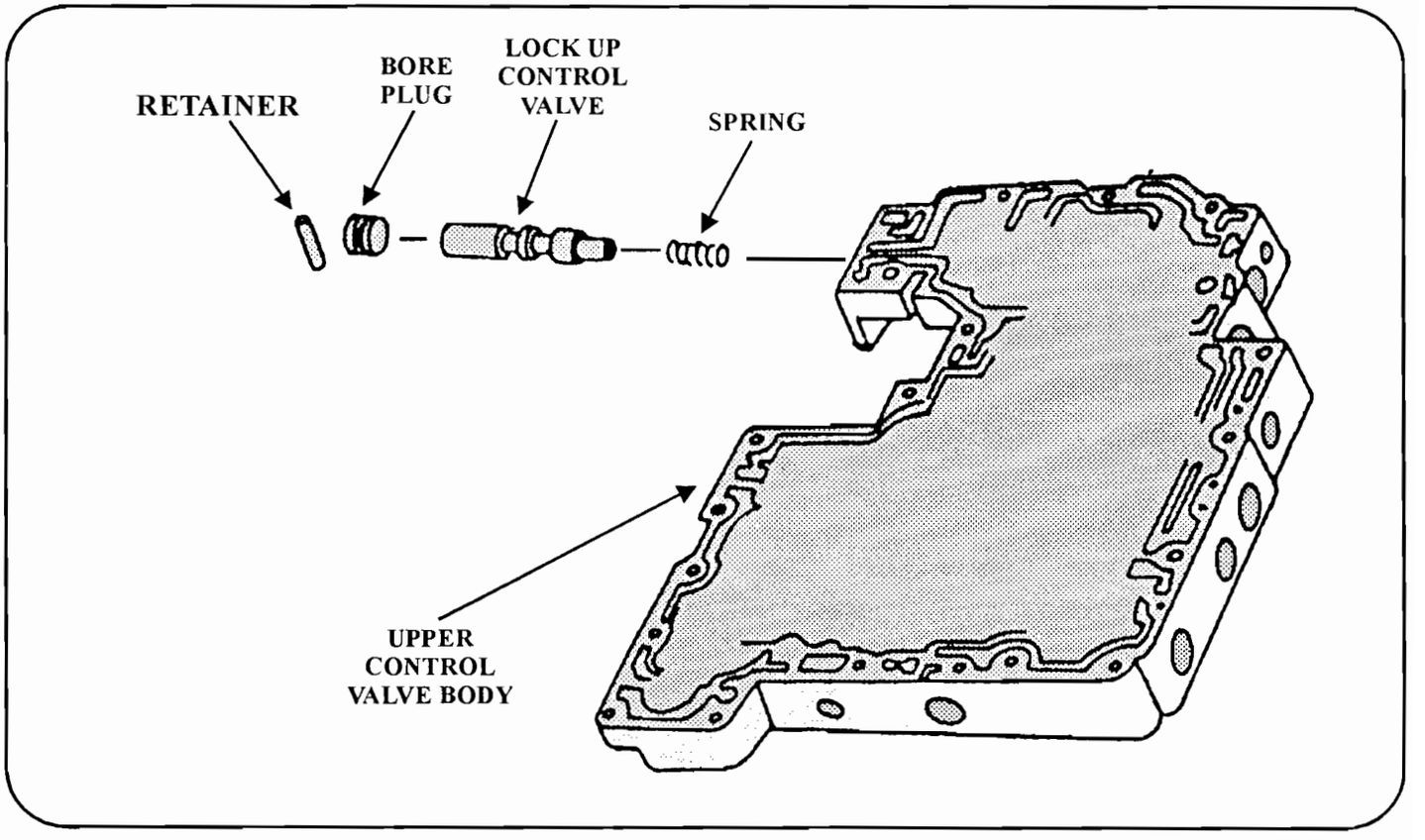


Figure 56

NISSAN RL4R01A

WRONG GEAR STARTS

COMPLAINT: Vehicle starts off in a gear other than low

CAUSE: Installing the primary valve into the governor body incorrectly as shown in figure 57 will cause the vehicle to make a wrong gear start.
The reason for the incorrect installation may be caused by the fact that the incorrect primary valve line-up shown in figure 57 is also shown incorrectly in various repair manuals.

CORRECTION: Install the primary valve line-up as it is seen in figure 58. This is the correct line-up.

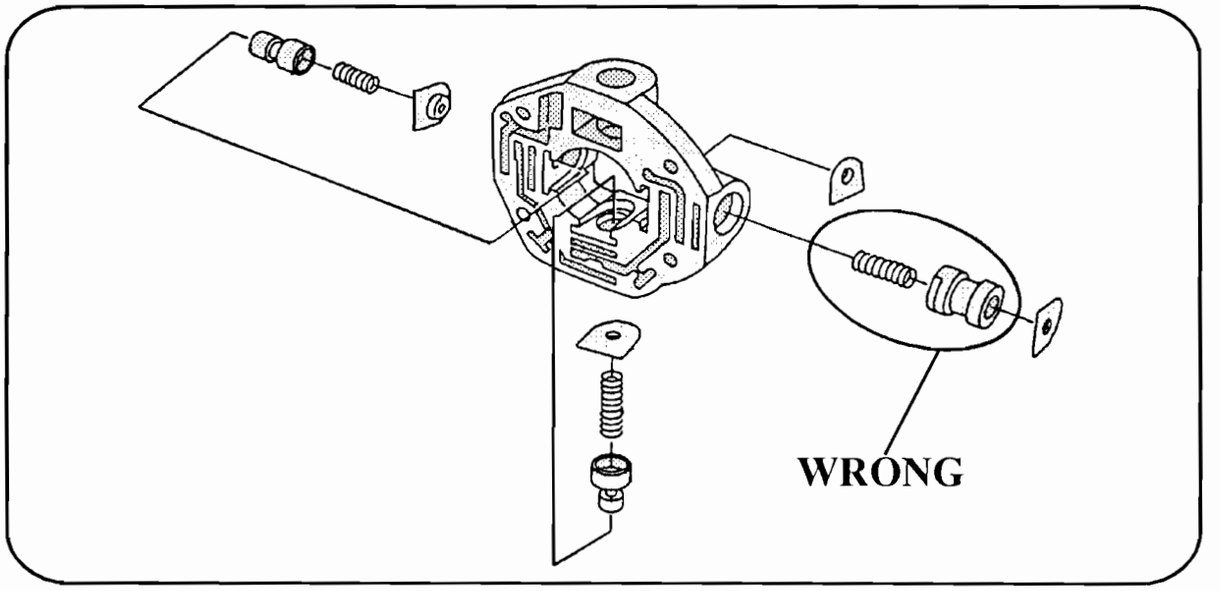


Figure 57

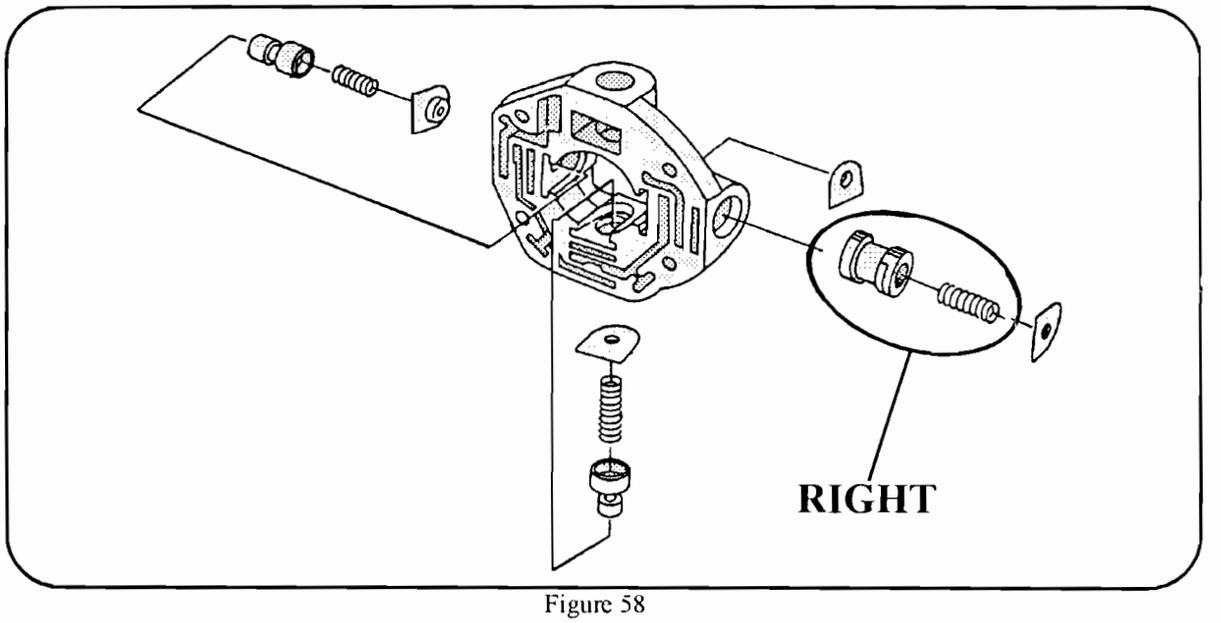
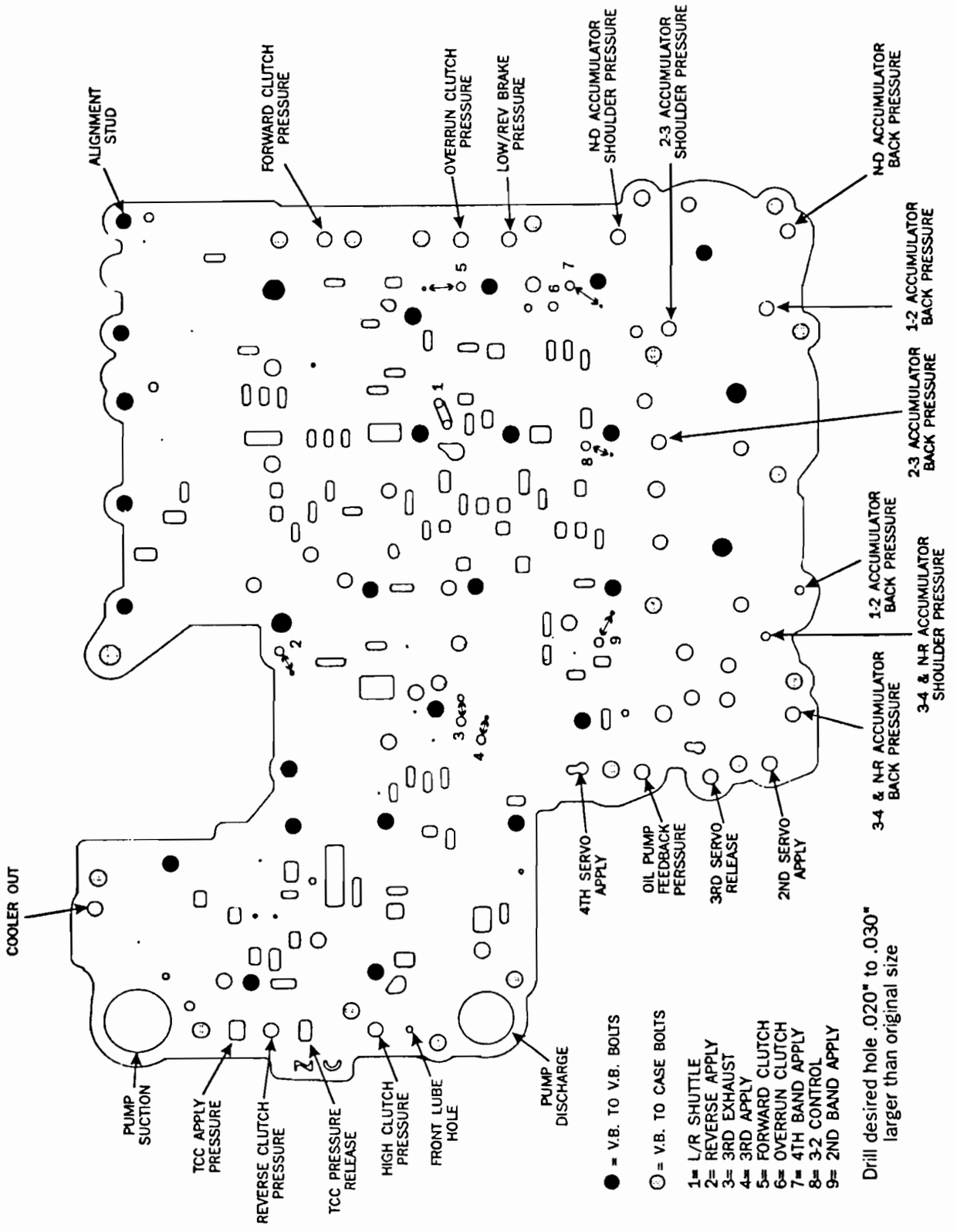


Figure 58

NISSAN RE4RO1A



NISSAN INFINITI RE4R03A

SECOND GEAR STARTS

Information only:
1991-1992 Nissan Infiniti Q45 models with the RE4R03A transmissions are calibrated through the A/T Control Unit to start from a stop in second gear at less than 5/8 throttle opening. THIS IS NORMAL! The transmission will start in first gear if the throttle is opened to 5/8 or higher. The shift schedule for 1991-1992 Q45 models is shown in figure 59.

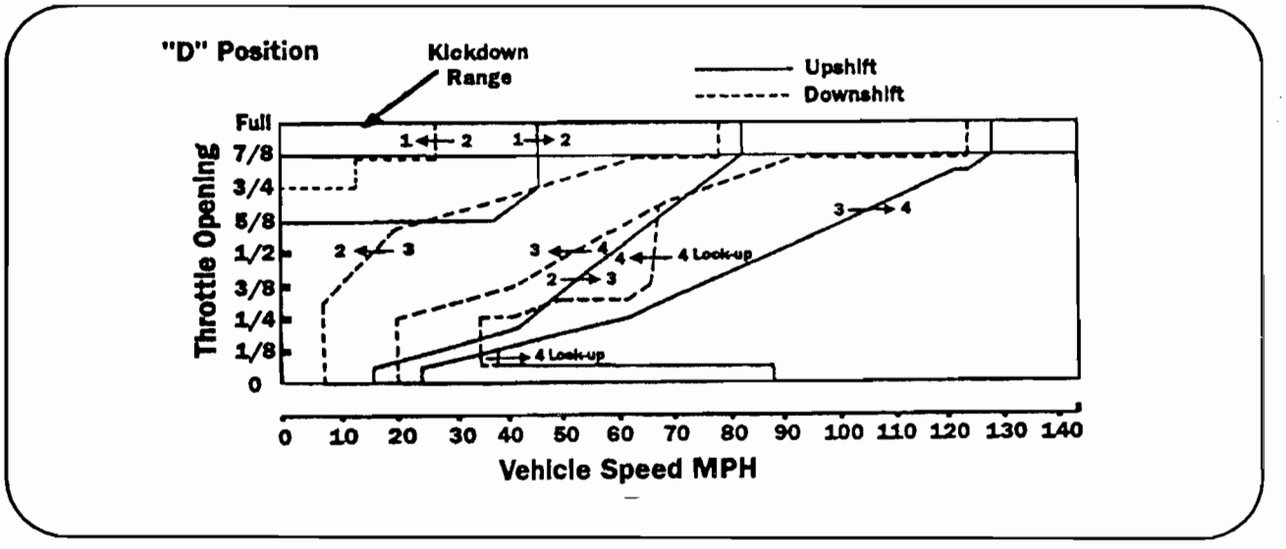


Figure 59

Information Only:
1993 Nissan Infiniti Q45 models with the RE4R03A transmissions are calibrated to start in first gear from a stop under all conditions. The change was made to the program in the A/T Control Unit. The shift schedule for the 1993 Q45 model is shown in figure 60.

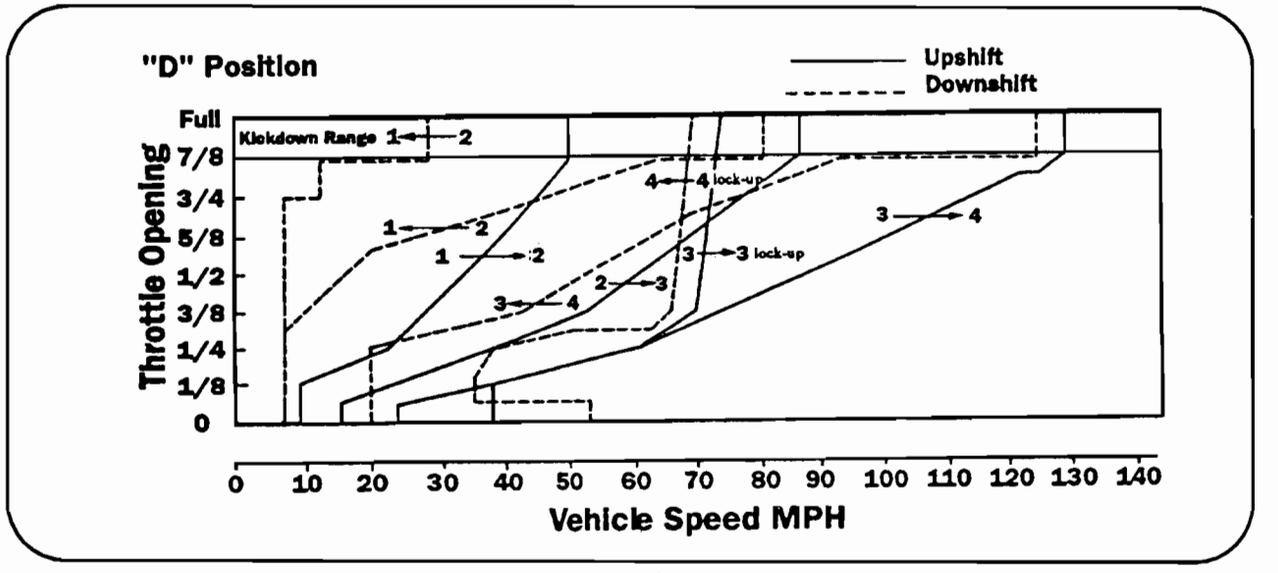


Figure 60

RE4RO1A/JR4O3E
SECOND GEAR STARTS WITH NO FIRST OR FOURTH

COMPLAINT: Vehicles may exhibit second gear starts with no first or fourth gears . The vehicle does shift to third automatically. No external electrical problem is evident and there is still no first gear even when the solenoids are energized using test equipment.

CAUSE:
1. Shift solenoid A is stuck open or has electrically failed.
2. Shift valve A is stuck.
3. The bore plug between shift valve A and the 4-2 relay valve has broken at the roll pin and is preventing shift solenoid A pressure from stroking the shift valve.

CORRECTION:
1. Check shift solenoid A resistance. It should be 20 - 40 ohms to ground. Check shift solenoid A with battery voltage to make sure that it closes when it is energized. See Figure 61.
2. Disassemble the valve body and clean thoroughly.
3. Replace the broken bore plug, making sure that no pieces are lodged in the worm tracks. Clean the bore so that the plug fits smoothly and the the roll pin holds it securely in place. See Figure 62.

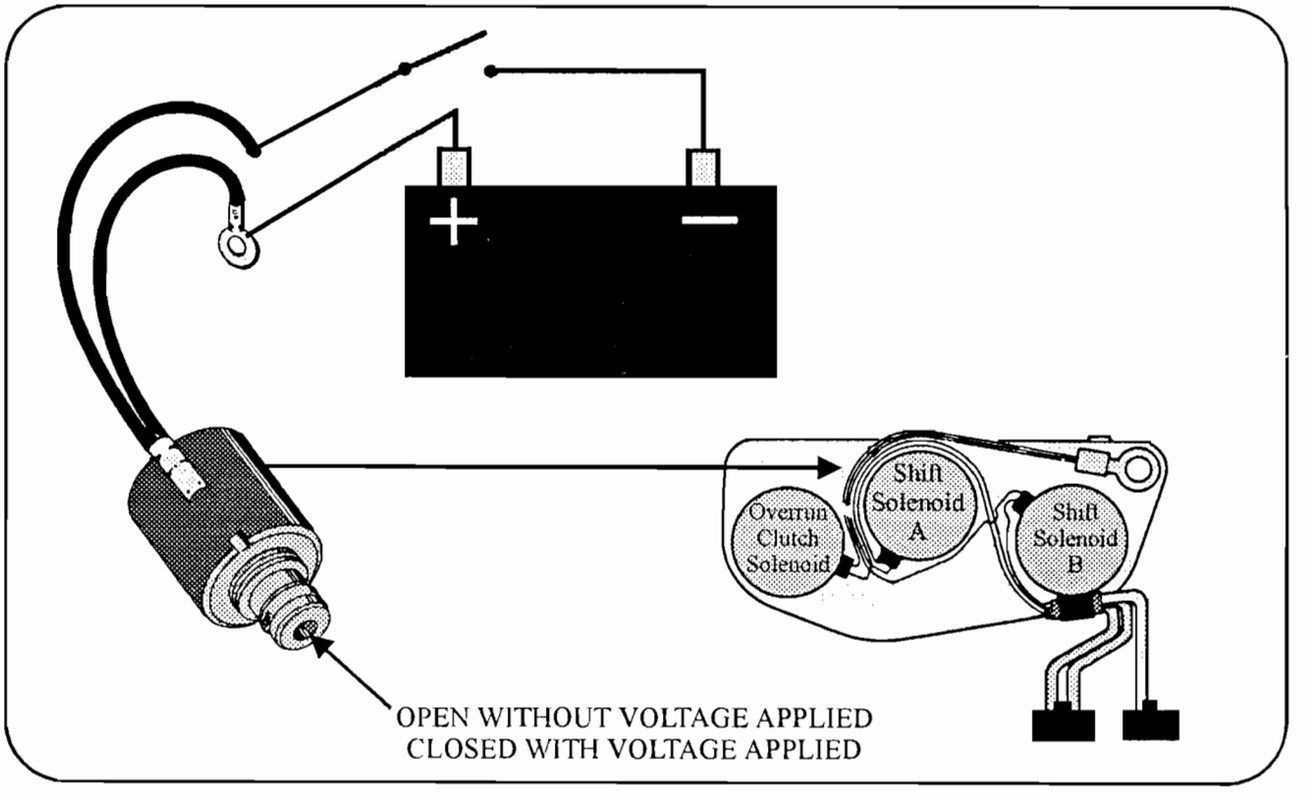
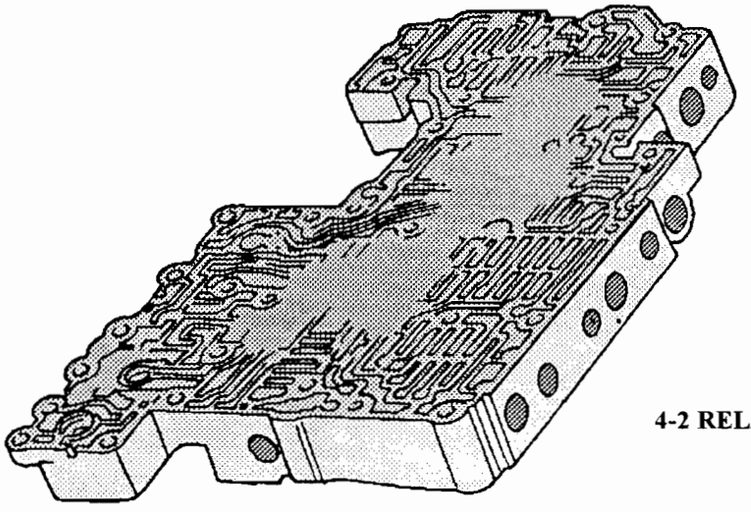


Figure 61

RE4RO1A/JR4O3E
SECOND GEAR STARTS CONTINUED



The bore plug may break and prevent Shift Valve A to stroke
or Shift Valve A may be stuck.

Figure 62

* Due to differences in certain line ups between the RE4RO1A valve bodies and the JR4O3-E valve bodies, only the shift valve A line up is addressed in Figure 62. For other line up identification, refer to the proper Techtran Manual.

SAAB 9000/EAGLE PREMIER (ZF-4HP-18)

SAAB TURBO 9000

Saab 9000 vehicles that are turbo equipped, will have a tube that connects the turbo charger to the valve body. Its function is to provide pressure to the spring side of the 4-3 downshift valve during turbo boost periods. When a turbo 4-3 downshift takes place, the forward clutch will fully apply before the 2-4 band is fully released. This added shift overlap is needed during a turbo 4-3 downshift due to the increased torque demand. If the "O" ring that seals the pipe to the valve body end plate is missing or damaged, transmission fluid will be drawn up through the turbo during non-boost periods. This will allow the oil to be burned by the engine resulting in excessive white smoke exiting the tail pipe. (See Figure 13 below)

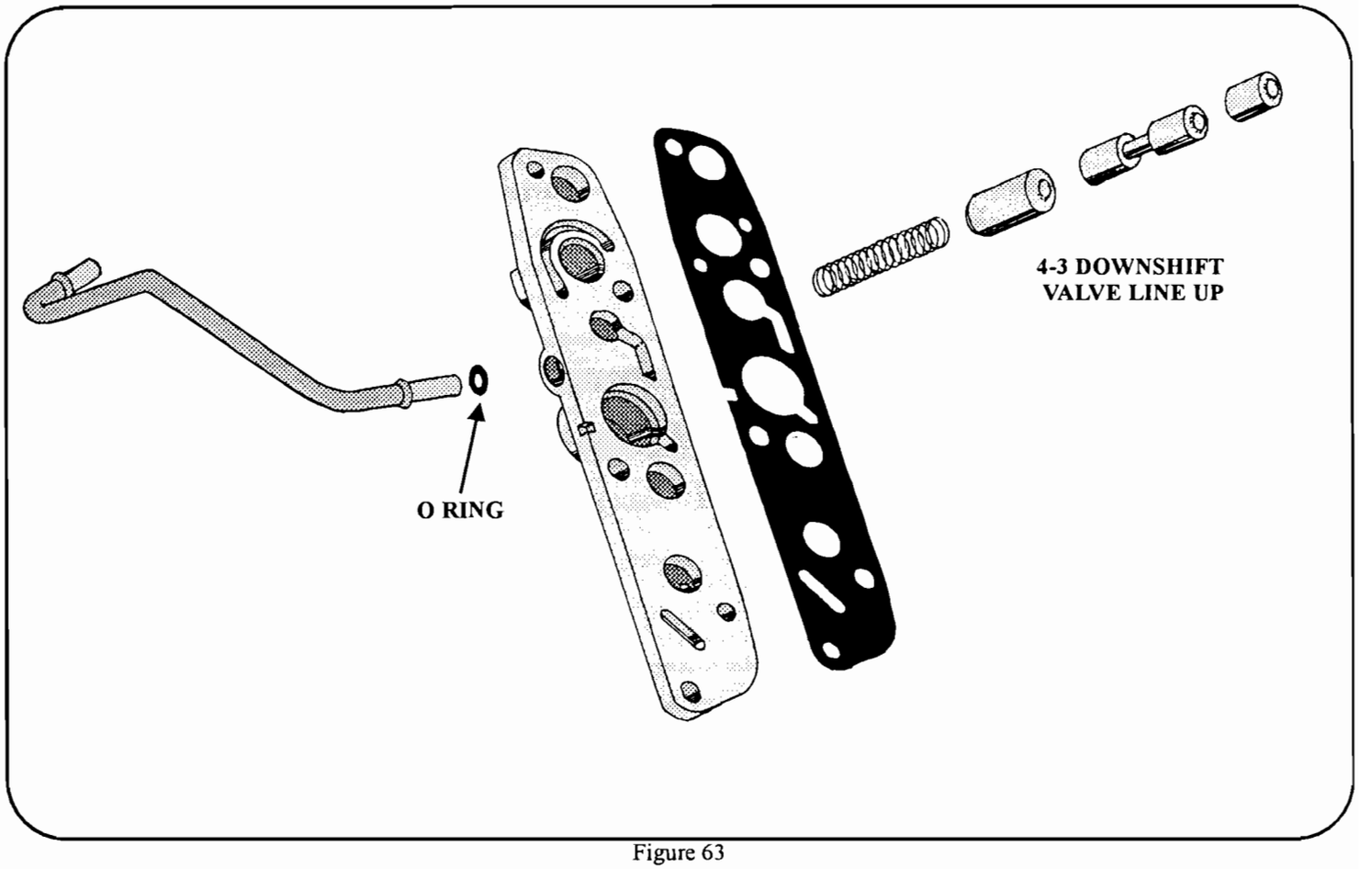


Figure 63

SAAB 9000/EAGLE PREMIER (ZF-4HP-18)
NO FORWARD GOOD REVERSE

COMPLAINT: ZF-4HP-18 transmissions may exhibit a no move condition in any forward range and works fine in reverse.

CAUSE: One cause may be that either the 3-4 or 4-3 traction valve in the valve body has stuck in a stroked position preventing forward clutch apply (See Figure 64).

CORRECTION: Remove the valve body from the transaxle. Inspect and free the valve that is stuck.

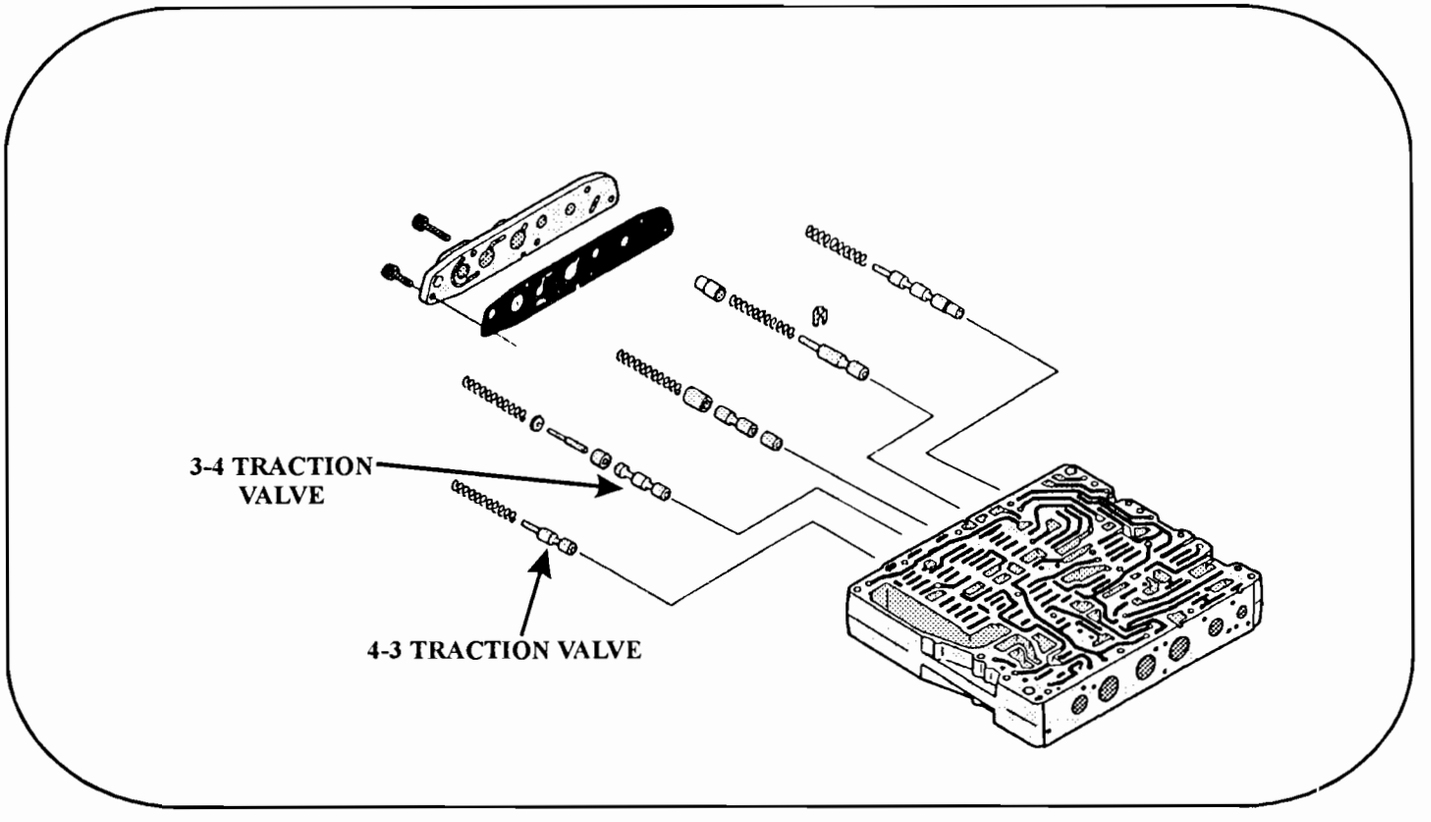


Figure 64

SAAB 9000/EAGLE PREMIER (ZF-4HP-18)

DELAYED FORWARD ENGAGEMENT OR PREMATURE FAILURE OF THE FORWARD CLUTCH

COMPLAINT: ZF-4HP-18 transmissions may exhibit a delayed forward engagement or premature forward clutch failure after overhaul.

CAUSE: One cause may be that the top sealing ring on the stator may have machined its groove wider causing a leak in the forward clutch circuit. The widening of the groove by the sealing ring is done so well that it may be overlooked during overhaul. Another cause may be the bushing in the stator having a ring groove cut into it by the turbine shaft sealing ring. This will also cause a forward clutch leak (See Figure 65).

CORRECTION: If a .040" or greater feeler gauge can fit into the groove along side the sealing ring, the stator will need to be replaced (See Figure 65). If the sealing ring groove is good and the bushing is bad, the bushing is serviced separately by aftermarket companies. Refer to your local supplier.

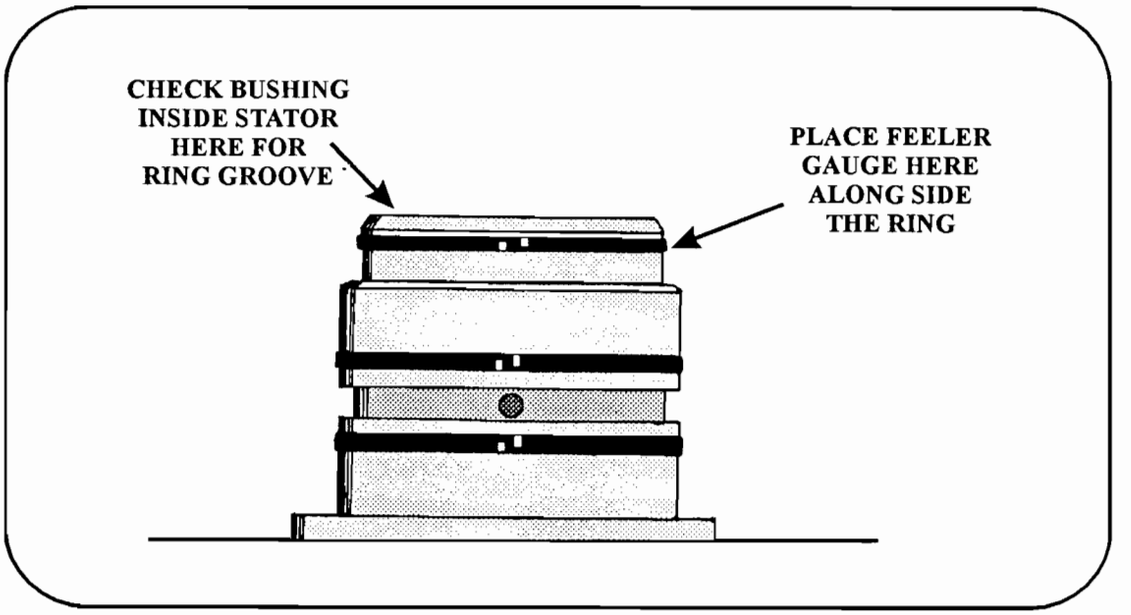
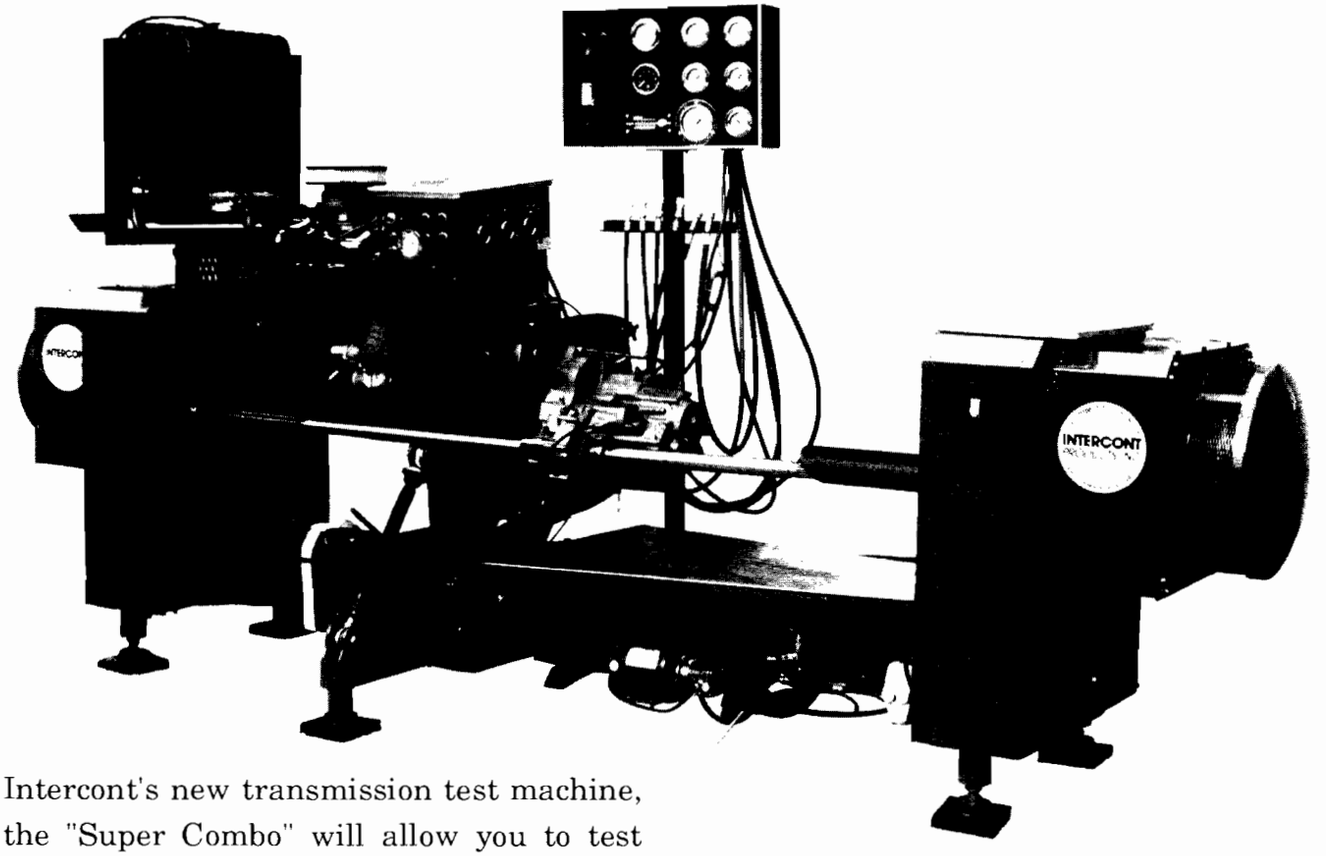


Figure 65

TEST YOURSELF

with Intercont's new Super Combination Transmission Test Machine



Intercont's new transmission test machine, the "Super Combo" will allow you to test virtually every transmission known. With an exclusive 1:1 gear ratio from a gas powered engine, the "Super Combo" is designed to test right hand rotations, rear wheel drive, and even the left hand rotation Honda transmission.

Hand-built by skilled professionals, the "Super Combo", as well as all of Intercont's quality products, is built to withstand day-to-day use for years. At Intercont, we know the problems associated with testing transmission effectively, so we build the solutions.

Call your Intercont sales representative at 1-800-749-3939 for more details about the "Super Combo" or other quality testing and washing equipment.

SAAB 9000/EAGLE PREMIER (ZF-4HP-18)

NO 3-4 OR STACKED 3-4 SHIFT

Both Saab and Eagle Premiers may exhibit a no 3-4 shift or a stacked 3-4 shift. One cause may be that the plastic spacer in the 3-4 shift valve line up had melted. The spacer could melt and block the 3-4 shift valve preventing the 3-4 shift, or it could melt and cause a loss of spring tension causing a stacked 3-4 shift. (see figure 66 below). This spacer can be purchased through a local authorized ZF distributor under the part # 1036 326 223. Dimensions of the spacer is provided below in figure 14 in the event one needs to be fabricated.

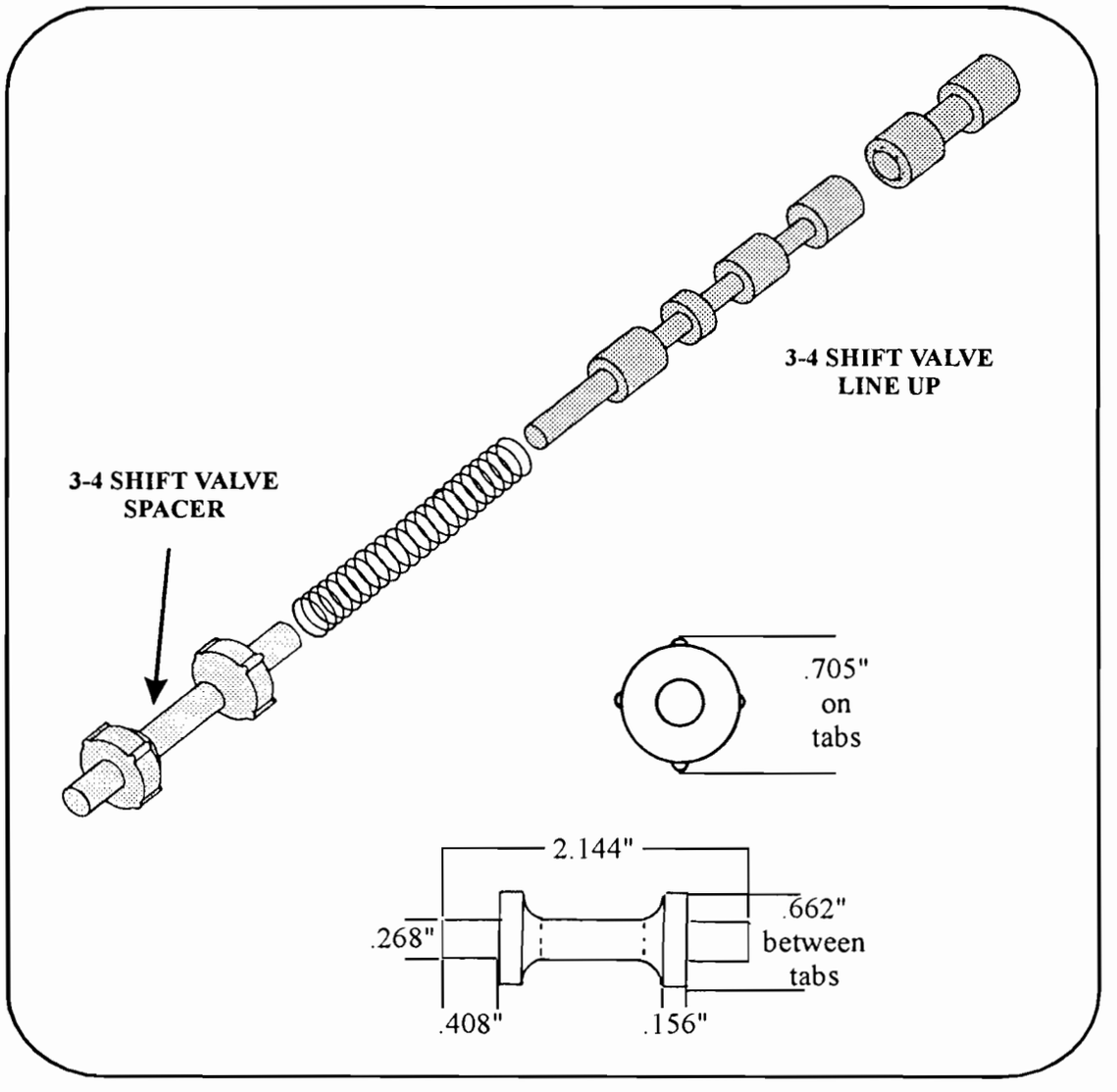


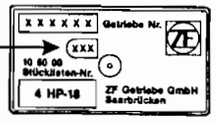
Figure 66

SAAB 9000/EAGLE PREMIER (ŻF-4HP-18)

HARSH ENGAGEMENT INTO DRIVE AND A HARSH 4-3 DOWNSHIFT

Both the Saab and Eagle Premiers may exhibit a harsh engagement into drive and a harsh 4-3 downshift. One cause may be a faulty forward clutch (A clutch) accumulator spring (See Figure 67). This allows the forward clutch to come on abruptly when doing a 4-3 downshift or placing the selector lever into any forward ranges. If upon inspection of this spring you find that it is not broken, collapse the spring and see if there is uneven coil binding. A new spring can be ordered through a local authorized ZF distributor. To order the properly calibrated spring for the transmission you are working on, obtain the 3 digit number that is pressed into the identification plate (See Chart Below). Saab has this plate mounted on top of the bellhousing and Premiers mount the plate on the side of the case next to the servo. Once the number has been located, cross reference the number in the chart below to obtain the appropriate part number.

OBTAIN NUMBER HERE



SAAB		PREMIER	
CODE #	PART #	CODE #	PART #
023 024 031 032	0732 042 051	010 015	0732 042 170
		006	0732 042 211
048 049 058 059 065	0732 042 219	021	0732 042 185

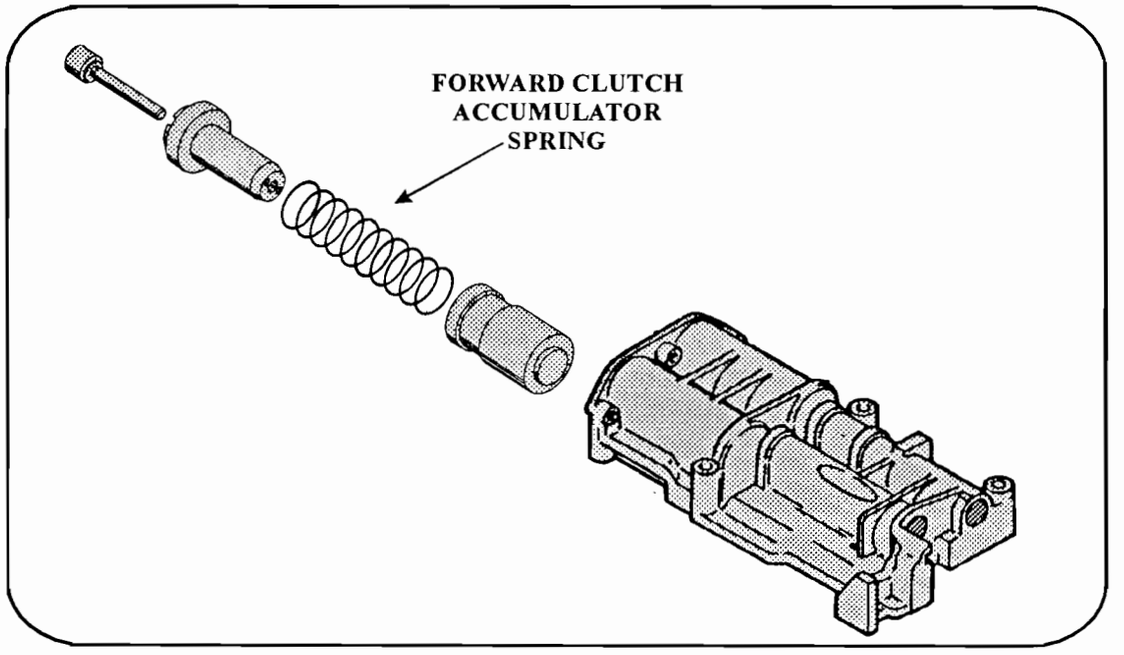


Figure 67

ZF4HP22

NO OR SLIPPING 2ND GEAR

COMPLAINT: A: Vehicle slips in second gear and may, after one shift cycle, loose second gear entirely.

B: Unable to install snap ring into groove in case due to center support assembly not seated all the way into the case.

CAUSE: A: Incorrectly assembling the intermediate and intermediate overrun friction and steel plates into the front half of the center support assembly will create a space between the intermediate overrun clutches and the intermediate/intermediate overrun pressure plate, depending on where the assembly error was made, causing either of the clutch pistons to over extend its travel, thereby cutting the piston seal on the return travel of the piston. Refer to figure 68 for the correct order of assembly.

B: When installing the center support assembly into the case, an incorrect stack-up of the components will cause the intermediate overrun piston assembly to be located above the snap ring groove in the case, making it impossible to install the snap ring. (Refer to figure 70)

CORRECTION: A: Refer to the illustration in figure 68 and assemble the intermediate section as follows:

1. Install the intermediate one-way clutch onto the sun gear shaft. Make certain that the word "OBEN" stamped into the one-way clutch surface is facing UP. Align the upper and lower halves of the intermediate one-way clutch.
2. Install the intermediate clutch pack , beginning with a steel plate and ending with a friction plate. The outside lugs of the intermediate steel plates index into the "Y" shaped slot "A"" as shown in figure 69.
3. Index the outer lugs of the intermediate/intermediate overrun clutch pressure plate into the "Y" shaped slot ""A" as shown in figure 69.
4. Install the intermediate overrun clutch pack, beginning with a friction plate and ending with a steel plate making certain that the outside lugs of the intermediate overrun steel plates index into the "SQUARE" shaped slot "B" as shown in figure 69.
5. Install the intermediate overrun piston housing onto the clutch drum, making certain to index the "V" shaped tab of the intermediate overrun piston housing into the "Y" shaped slot marked "A", checking to see that all 4 oil feed holes in the clutch drum and the intermediate overrun piston housing are aligned as shown in figure 69.

B: Follow the above procedure, making certain that the snap ring groove in the case is exposed after the center support assembly is installed into the case. (Refer to figure 70)

ZF4HP22

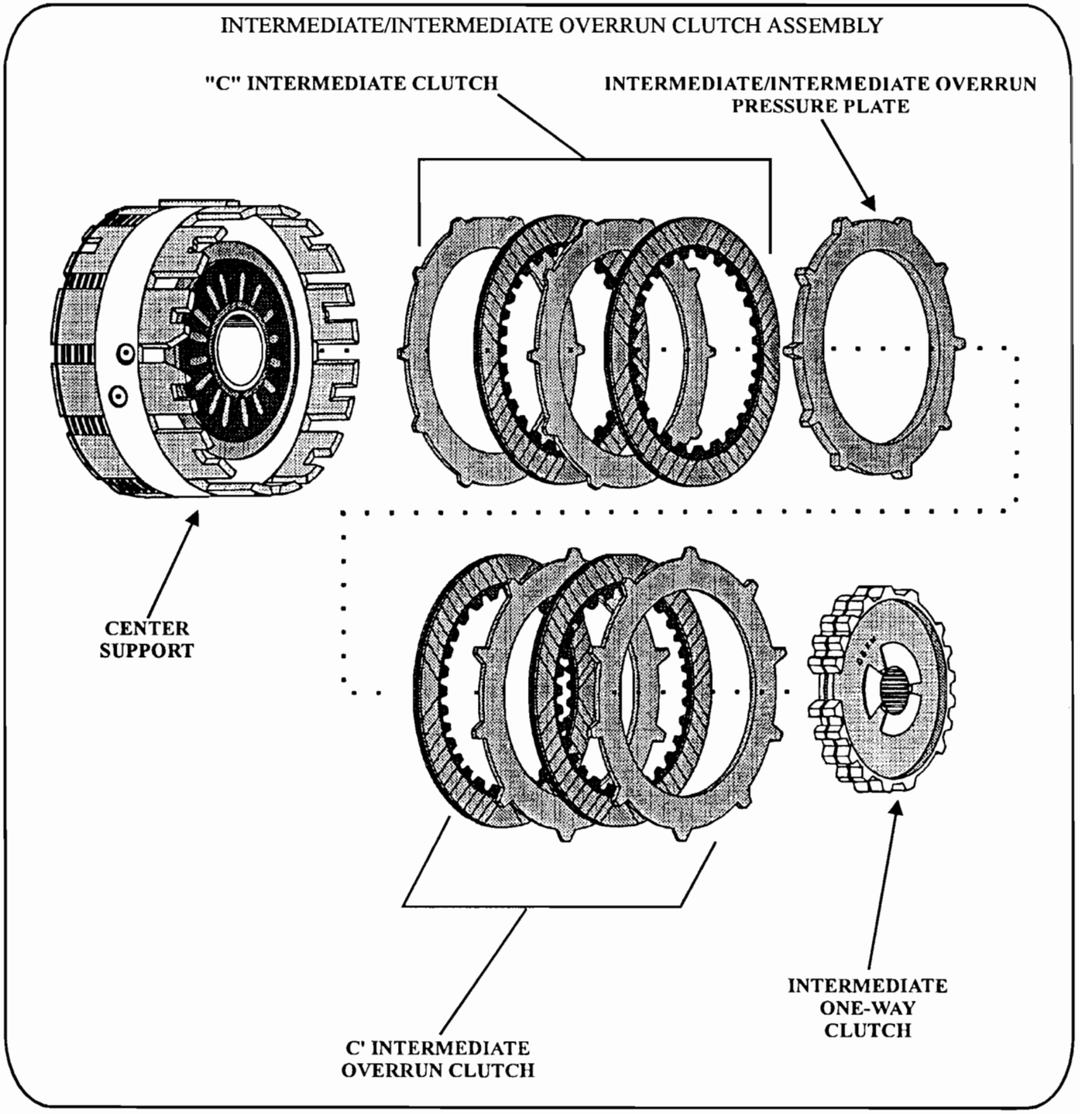


Figure 68

ZF4HP22
CENTER SUPPORT ASSEMBLY

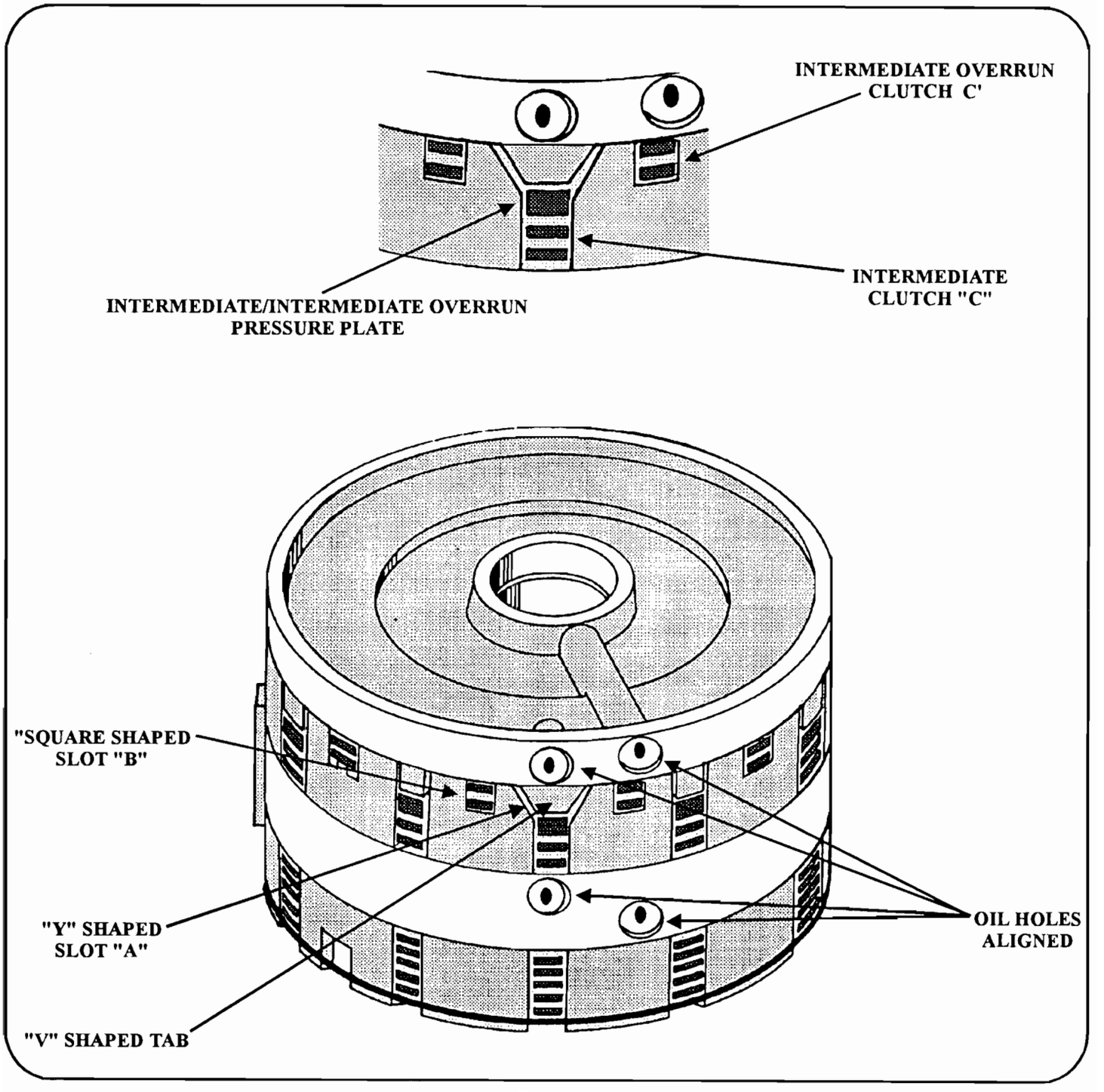


Figure 69

ZF4HP22

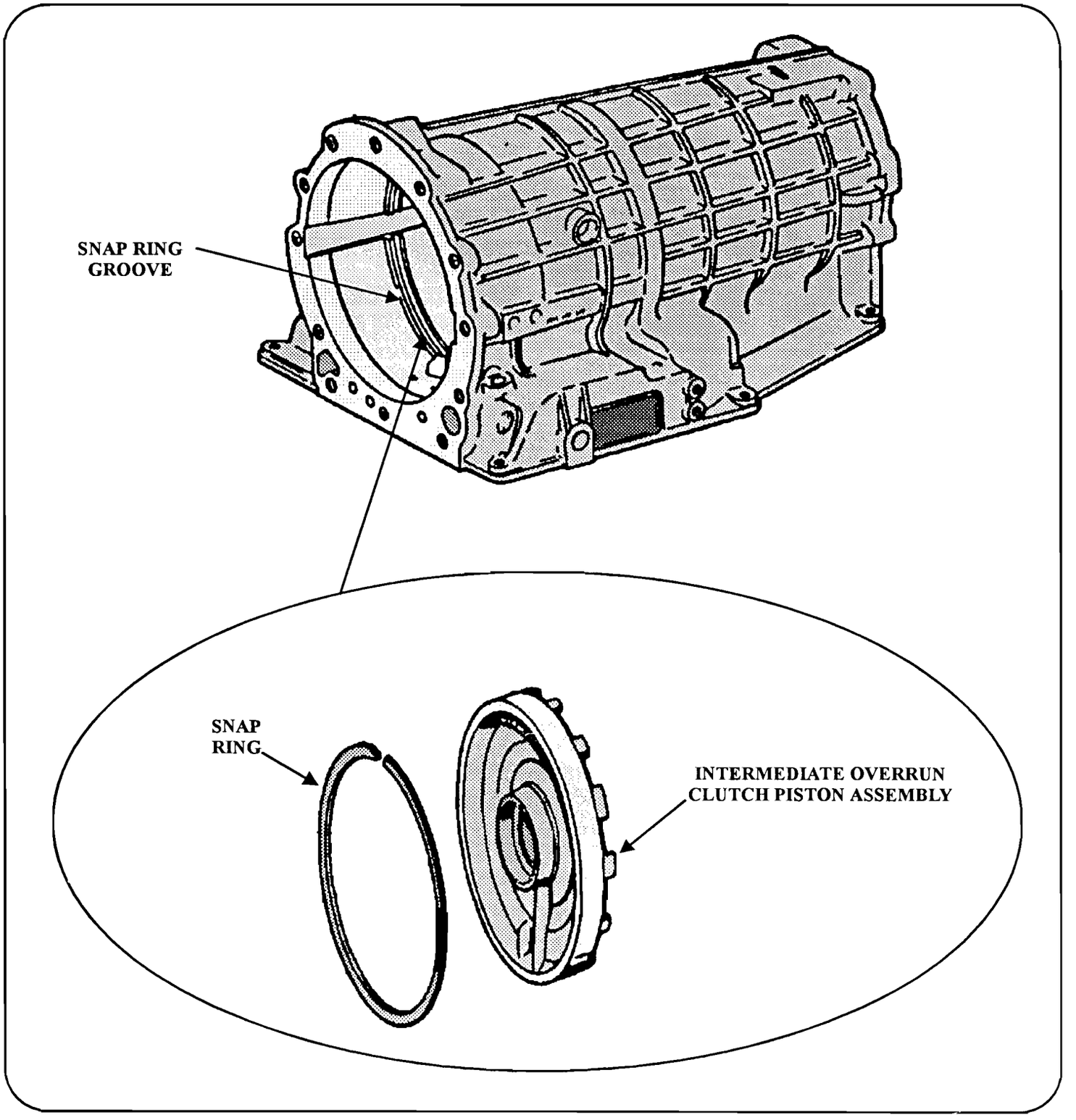


Figure 70

PASSAT - 096
PRELIMINARY INFORMATION

There are 7 solenoids mounted on the valve body of the Passat 096 transaxle. These solenoids connect to a detachable plastic harness retainer. The harness itself travels through the case with the main round connector attached to a plate that is bolted to the top of the case beside the linkage. The main voltage supply is fed through pin # 1 as shown in figure 73 on the next page. This terminal feeds battery voltage through a brown wire which travels all the way to the end of the detachable plastic retainer. There, it is soldered, to a temperature sensor and 6 other brown wires which goes on to feed battery voltage to 6 out of the 7 solenoids (See Figure 71 below).

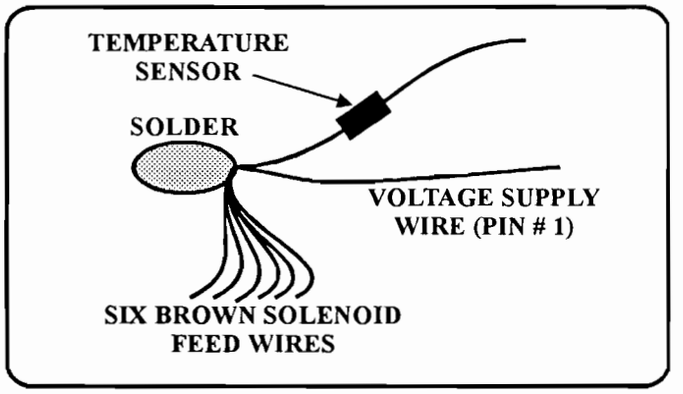


Figure 71

TEMPERATURE SENSOR
The Temperature Sensor shown above measures approximately 200K ohms at room temperature and drops in resistance as the transmission fluid heats up. The Temperature Sensor signal wire is red in color and goes to pin # 12 in the connector as shown in figure ? on the next page. This sensor monitors the transmission's fluid temperature continuously.

When transmission fluid temperatures exceed a predetermined limit, the ECU is programmed to cause later shifts resulting in higher engine revs. This produces greater coolant flow in an attempt to bring the fluid temperature down. Also, this transaxle has a hydraulic and a mechanical third gear. The ECU will command a mechanical third gear sooner in an attempt to reduce converter slip which produces heat. As soon as the transmission fluid cools down, the normal driving program is resumed.

SOLENOIDS
The resistance of six out of the seven solenoids (Solenoid #'s 1, 2, 3, 4, 5, and 7) measure approximately 60 ohms each. The remaining #6 solenoid measures approximately 5 ohms in resistance (See Figure 73 on the following page for the solenoid locations on the valve body). All six solenoids that measure 60 ohms in resistance are **normally open** solenoids and close to hold pressure when they are energized. The # 6 solenoid is a pulsed width modulated pressure control solenoid and it is a **normally closed** solenoid. This solenoid has its own voltage supply through pin # 2 as shown in figure 73 on the next page. A 200 ohm resistor is soldered in a parallel circuit with the pressure control solenoid (See Figure 72 Below).

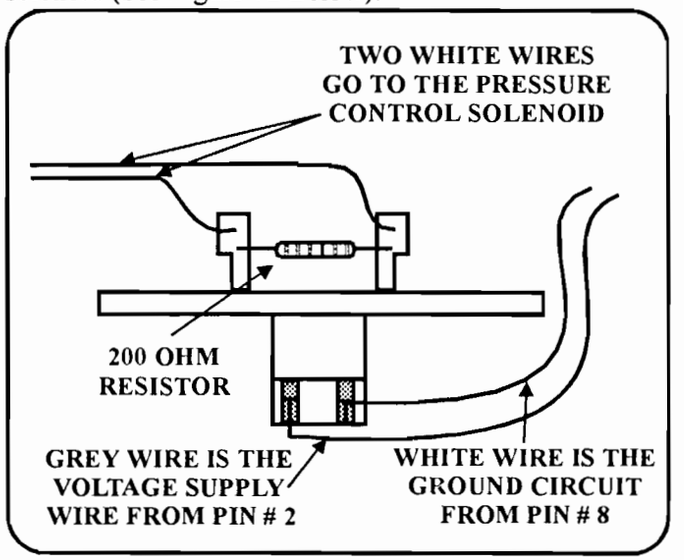
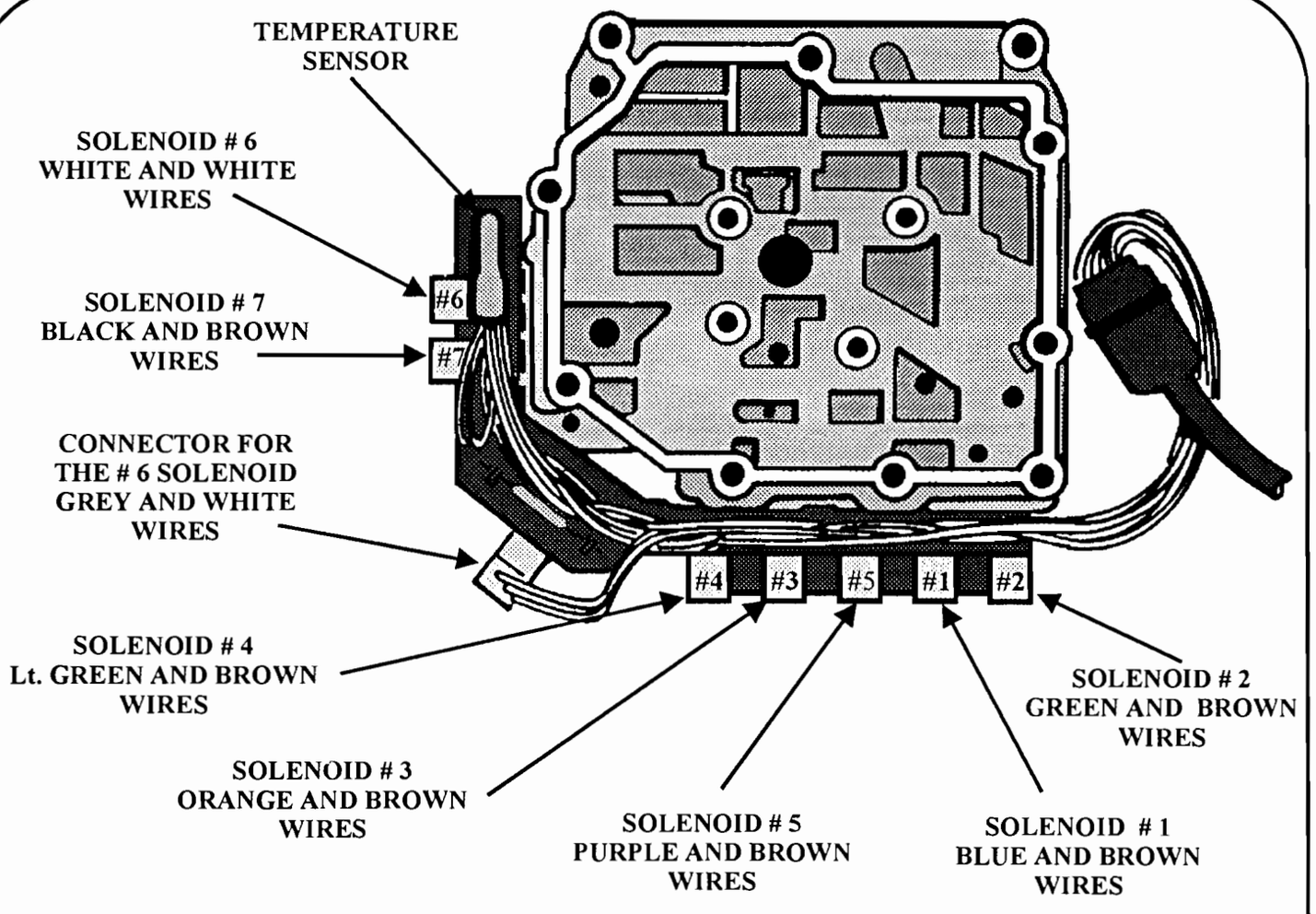


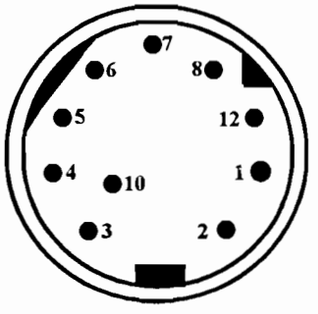
Figure 72

The ECU controls shift timing and shift feel by providing ground signals for each of the seven solenoids. Solenoid #'s 1, 2, 3 and 4 are used to control shift timing. The gearshift transitions are controlled by solenoids # 5 and # 7. Solenoid # 6 controls main line pressure as previously stated.

If all power was lost so that the solenoids could not be energized, the transaxle would have third gear starts. Manual low and reverse could also be achieved if power to the solenoids were lost. The ECU will also cause third gear starts as a failsafe in the event it had monitored a problem within the system.

PASSAT - 096
SOLENOIDS





TRANSAXLE CONNECTOR PIN NUMBER IDENTIFICATION

CONNECTOR PIN NUMBER	PIN FUNCTION
#1	VOLTAGE SUPPLY TO SOLENOIDS AND ATF SENSOR
#2	VOLTAGE SUPPLY TO #6 SOLENOID
#3	GROUND FOR SOLENOID # 1
#4	GROUND FOR SOLENOID # 2
#5	GROUND FOR SOLENOID # 3
#6	GROUND FOR SOLENOID # 4
#7	GROUND FOR SOLENOID # 5
#8	GROUND FOR SOLENOID # 6
#10	GROUND FOR SOLENOID # 7
#12	ATF SENSOR SIGNAL RETURN

Figure 73

PASSAT - 096
SOLENOIDS

SOLENOIDS Continued
To check each solenoid for resistance, place the positive lead of a multimeter to pin # 1 in the connector. With the ground lead of the meter, check each solenoid by touching the appropriate ground pin (Use Figure 73 for pin location). Below is a chart that can be used as a quick reference guide.

DEVICE TO BE CHECKED	NEGATIVE METER LEAD TO PIN #	OHMS VALUE *
Solenoid #1	Pin # 3	60
Solenoid #2	Pin # 4	60
Solenoid #3	Pin # 5	60
Solenoid #4	Pin # 6	5
Solenoid #5	Pin # 7	60
Solenoid #6	Pin # 8	60
Solenoid #7	Pin # 10	60
ATF Sensor	Pin # 12	200K

* All values are approximate at room temperatue.

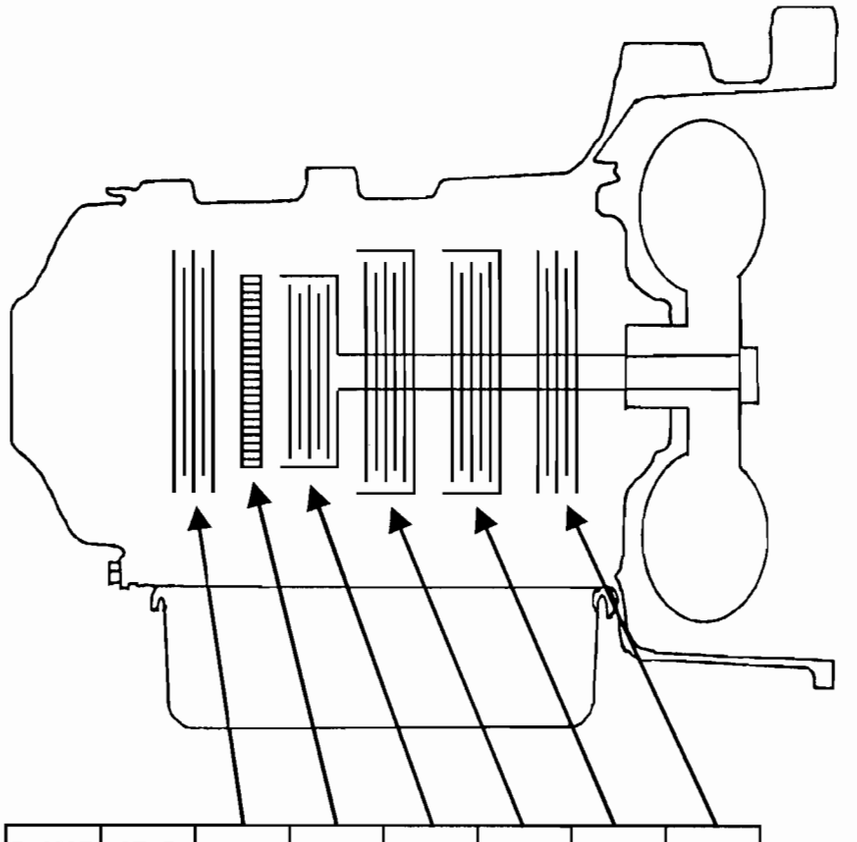
The electrical management system that operates or controls this transaxle is called DIGIMAT. No it is not misspelled, it is just a strange name. Unfortunately, this Digimat ECU has a permanent fault memory and self diagnosis capability with stored codes that can only be retrieved with the use of a VAG 1551 scanner by, guess who? Fahrvergnugen! Short for V.W.. This means that when this unit comes into your shop in failsafe, you'll have to run it down to your FRIENDLY and COOPERATIVE Volkswagen Dealership and ask them to hook up their scanner to retrieve the codes.
If you want to shift the transmission separate from the computer, it can be done if you have patience. First supply 12 volts through a 20 amp fuse to pin # 1 in the connector and keep it there. Now you can begin to ground the appropriate pins:

Ground pin 6 to get 1st gear.
Ground pins 4 and 6 to get 2nd gear.
No grounds is a hydraulic 3rd gear.
Ground pin 5 for a mechanical 3rd gear.
Here is the Grand Finale':
Ground pins 3, 4, 5 and 6 to get 4th gear.

This test can be helpful in a pinch, but the best way to diagnose this guy is with a scanner.

As you can see the solenoid shift pattern is quite different when it is compared to any other solenoid shifted transmission. This shouldn't have come at much of a surprise, after all, it is a Digimat electrical system.
When the selector lever is placed into Drive, line pressure is fed to the K1 and K2 clutch. The K1 clutch can be thought of as a 1st to 3rd clutch and the K2 as a 3rd and reverse clutch. When solenoid #4 is energized by grounding pin # 6, the K2 clutch feed is exhausted allowing just the K1 clutch to be applied. A spring and roller one way clutch now becomes effective and the transaxle has first gear.
To make a shift into 2nd, solenoid # 4 remains energized to keep the K2 clutch from applying. Solenoid # 2 is energized by grounding pin # 4 which allows the B2 clutch (2/4 clutch) to come on.
A shift into a hydraulic 3rd gear takes place when all the grounds are removed. The K1 clutch is still applied, the B2 clutch comes off and now the K2 clutch finally comes on because the # 4 solenoid was turned off. With both the K1 and K2 clutch on at the same time, the planetary gear set is locked spinning 1:1.
A mechanical 3rd gear can be achieved by grounding the # 5 pin which energizes the # 3 solenoid. This allows the K3 clutch (3/4 clutch) to be applied. The K3 clutch drum is splined into a damper plate in the torque converter which provides a direct mechanical link to the crank shaft eliminating the need for a converter clutch. This also produces the mechanical 3rd gear. Remember, the K1 and K2 clutch is still applied, by energizing the # 3 solenoid, we add the K3 clutch connecting the gear train to the crank shaft which eliminates all converter slip.
The shift into 4th gear occurs when a ground is made to the # 3 pin to energize the # 1 solenoid. This exhaust oil from the K1 clutch turning this clutch off. Solenoid # 2 is turned back on to apply the B2 clutch (2/4 clutch), the K3 clutch (3/4 clutch) is already on from the mechanical 3rd shift. Solenoid # 4 is turned back on to exhaust the oil from the K2 clutch (3rd and reverse). All this happens at once leaving the B2 and K3 clutches as the only two clutch packs on to achieve 4th gear. A powerflow chart has been provided for you in figure 74 Also, Mario Aristides from Independent Transmissions has provided us with valve body illustrations (See Figures 75 - 78), Thanks Mario!

PASSAT - 096
CLUTCH APPLY CHART



RANGE	GEAR	B1 CLUTCH	LOW ONEWAY CLUTCH	K3 CLUTCH	K2 CLUTCH	K1 CLUTCH	B2 CLUTCH
D4	1ST		ON			ON	
	2ND					ON	ON
	3RD (H)				ON	ON	
	3RD (M)			ON	ON	ON	
	4TH			ON			ON
L	1ST	ON			ON		
R	REV	ON			ON		

D3 - IS THE SAME AS D4 BUT NO 4TH GEAR
D2 - IS THE SAME AS D4 BUT NO 3RD OR 4TH GEAR

Figure 74

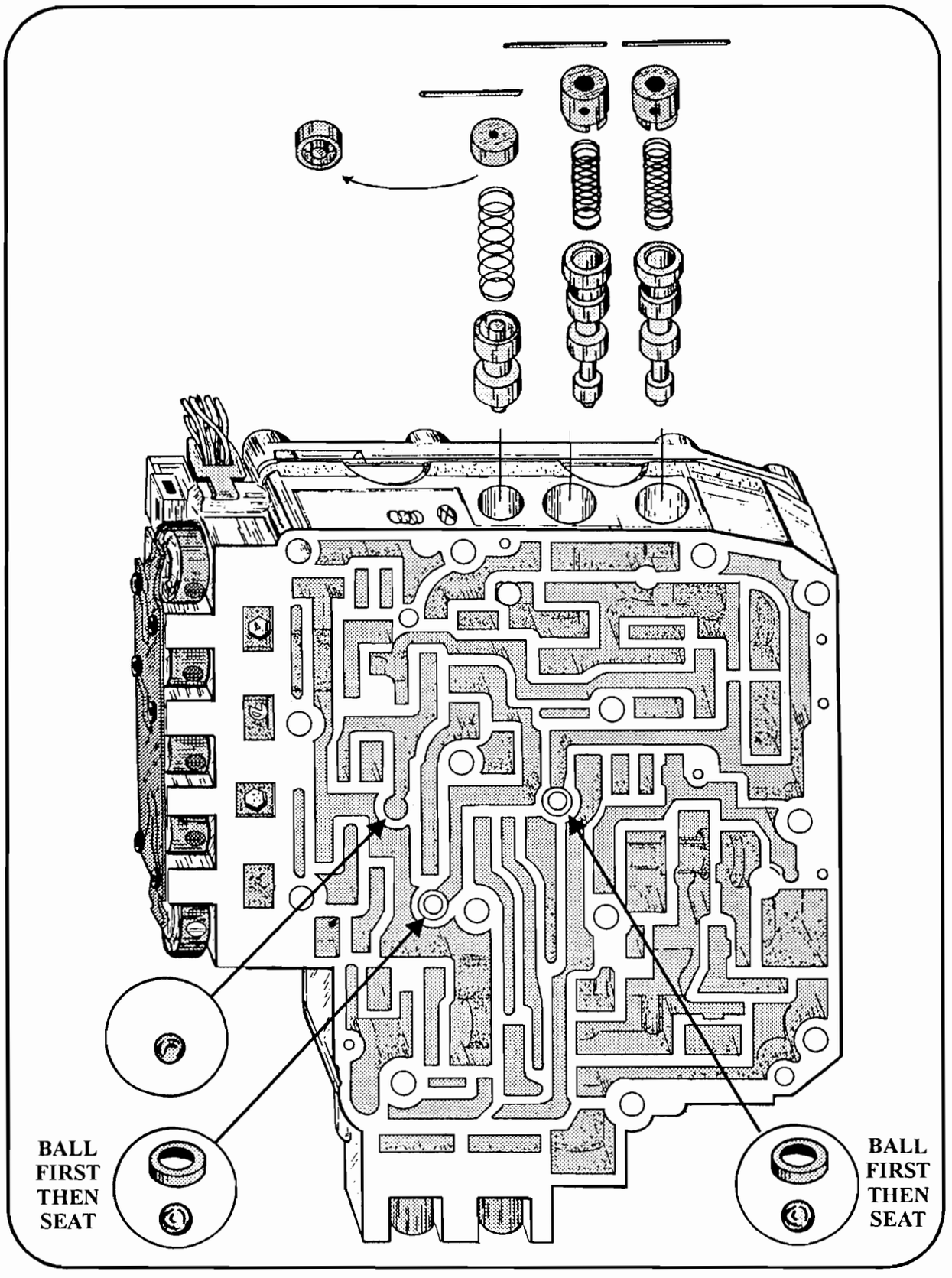
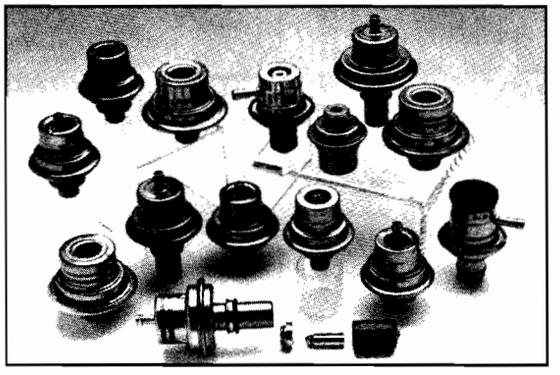


Figure 75
Automatic Transmission Service Group

ROSTRA

THE TRADITION CONTINUES

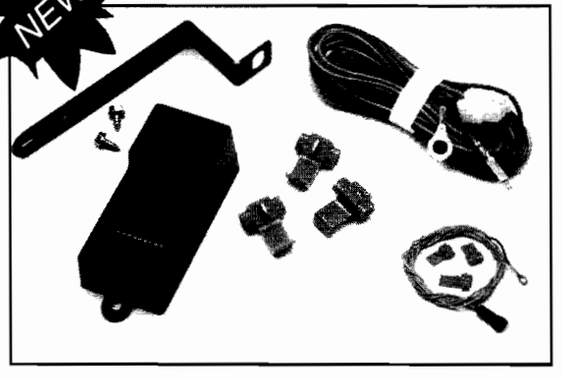
From Modulators To Diagnostic Test Equipment And More . . .



Rostra Modulators are recognized as the highest quality in our industry. Complete and universal, problem solving designs, function perfectly first time. . . every time! When quality counts, no one matches Rostra!

The Rostra Analytical Tool: The RAT system is the most universal, expandable, and easy to use diagnostic tool for the transmission repair industry. This diagnostic system allows you to monitor outputs from the ECU or bypass the ECU and manually control the transmission. You can pinpoint hydraulic and electronic problems without even dropping the pan. State of the art RAT PAK modules expand coverage to the latest models. Free technical service is available to assist you in your diagnosis. Let a RAT loose in your shop and save time, improve diagnoses, and get rid of come-backs.

NEW



Rostra proudly introduces the LU-1 lockup delay module. The LU-1 is an electronic device that delays lockup until a preset speed is reached. The unit may be installed on any lockup system including all GM, Ford A4LD, AXOD, and Chrysler lockup systems. Plus with Rostra's Adapter Harness 250-4233 coverage is expanded to the Ford E40D. The LU-1 eliminates common problems such as early lockup, lockup hunting and lockup on top of shifting. Installation is easy. Just connect the appropriate color coded wires as shown in the illustrated instruction manual and set your desired lockup speed! All the necessary hardware is included too! Our free technical support is available to assist in your installation.

As always, Rostra is committed to engineering the highest quality product, with performance unmatched by anyone. Our manufacturing represents the best in American expertise and craftsmanship. Rely on Rostra for the quality products you and your customer deserve.

ROSTRA PRECISION CONTROLS INC.

2519 Dana Drive, Laurinburg, NC 28351 • 910-276-4853 • Technical support: 910-276-8211

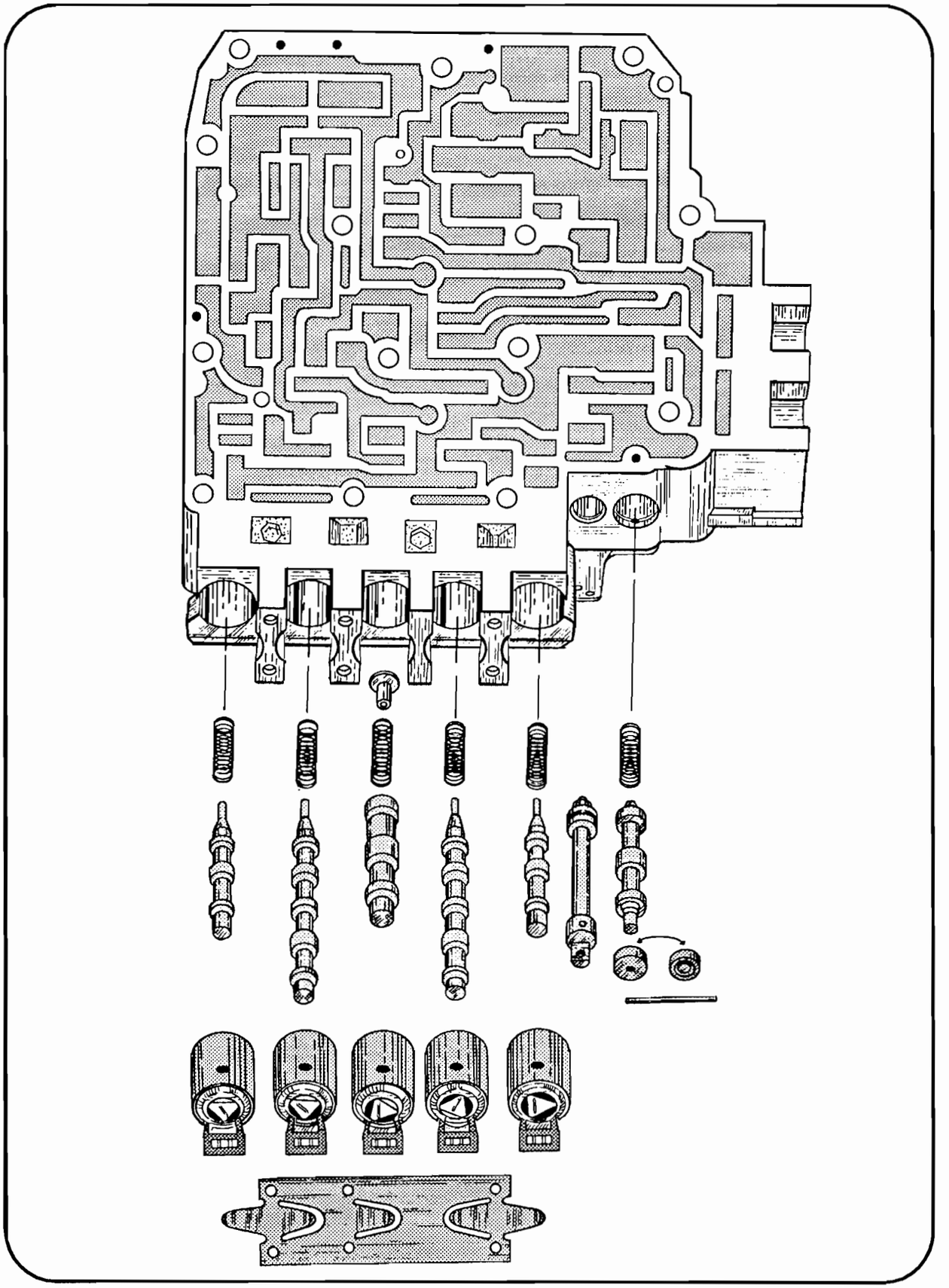


Figure 76
Automatic Transmission Service Group

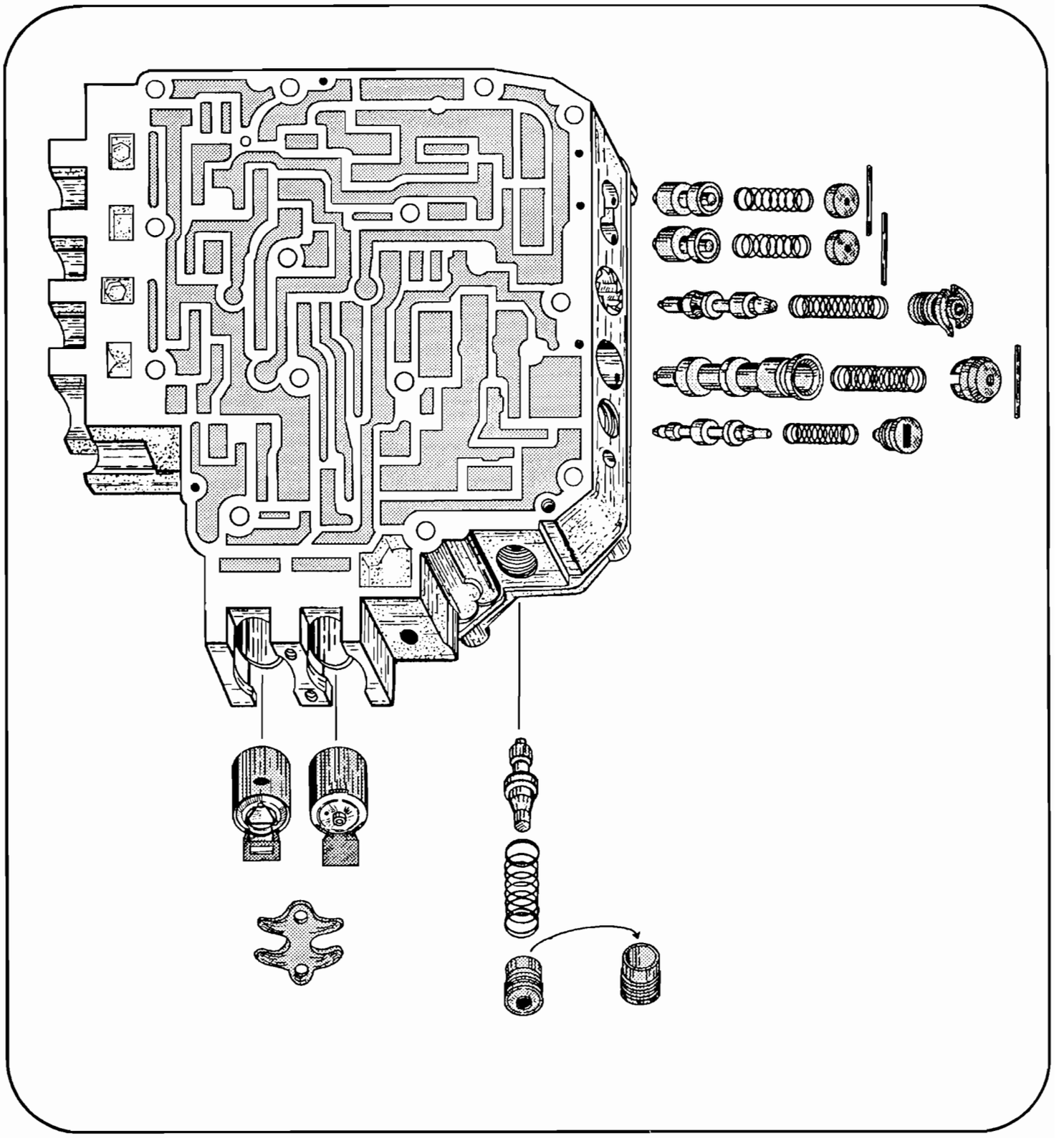


Figure 77

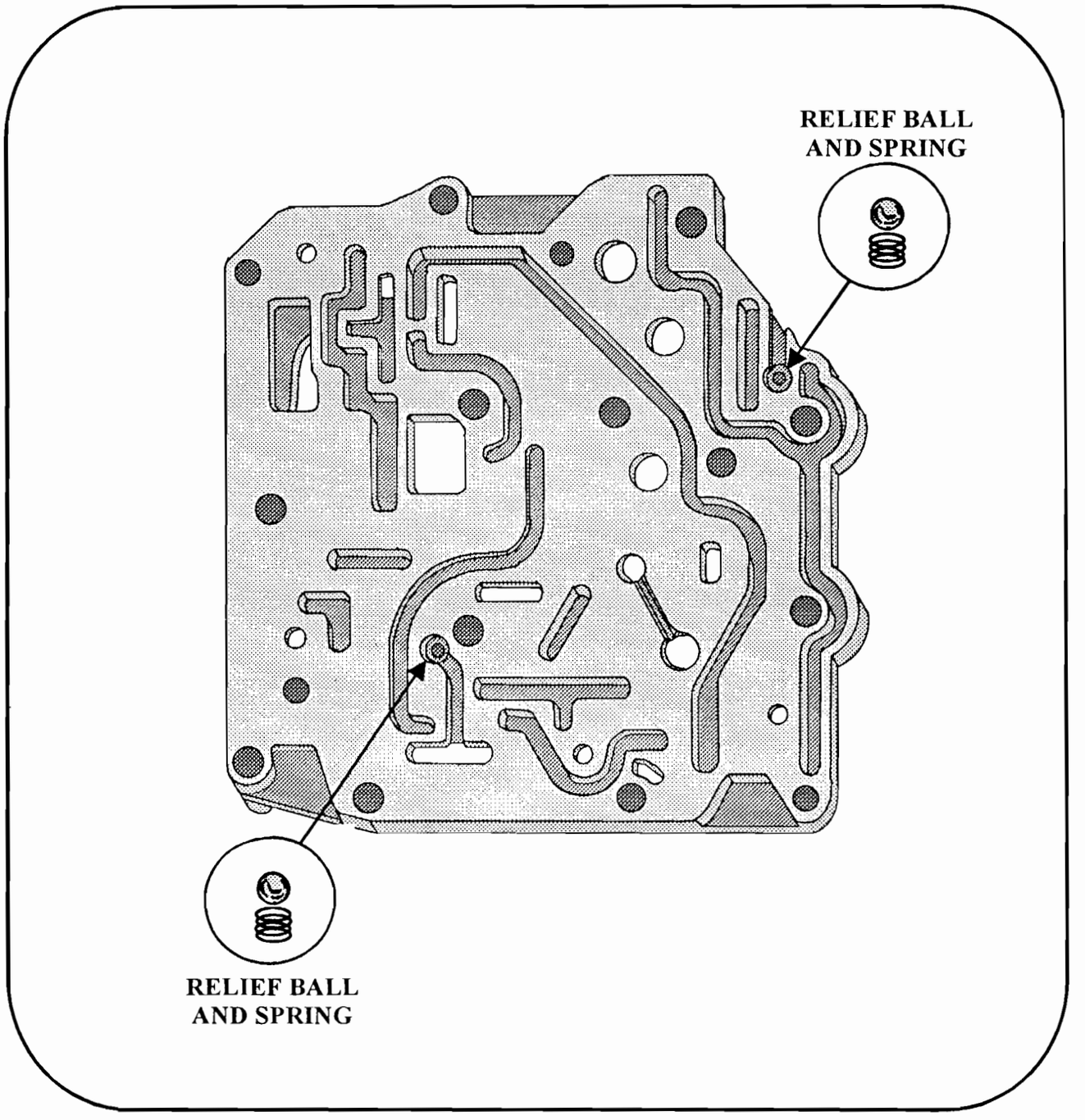
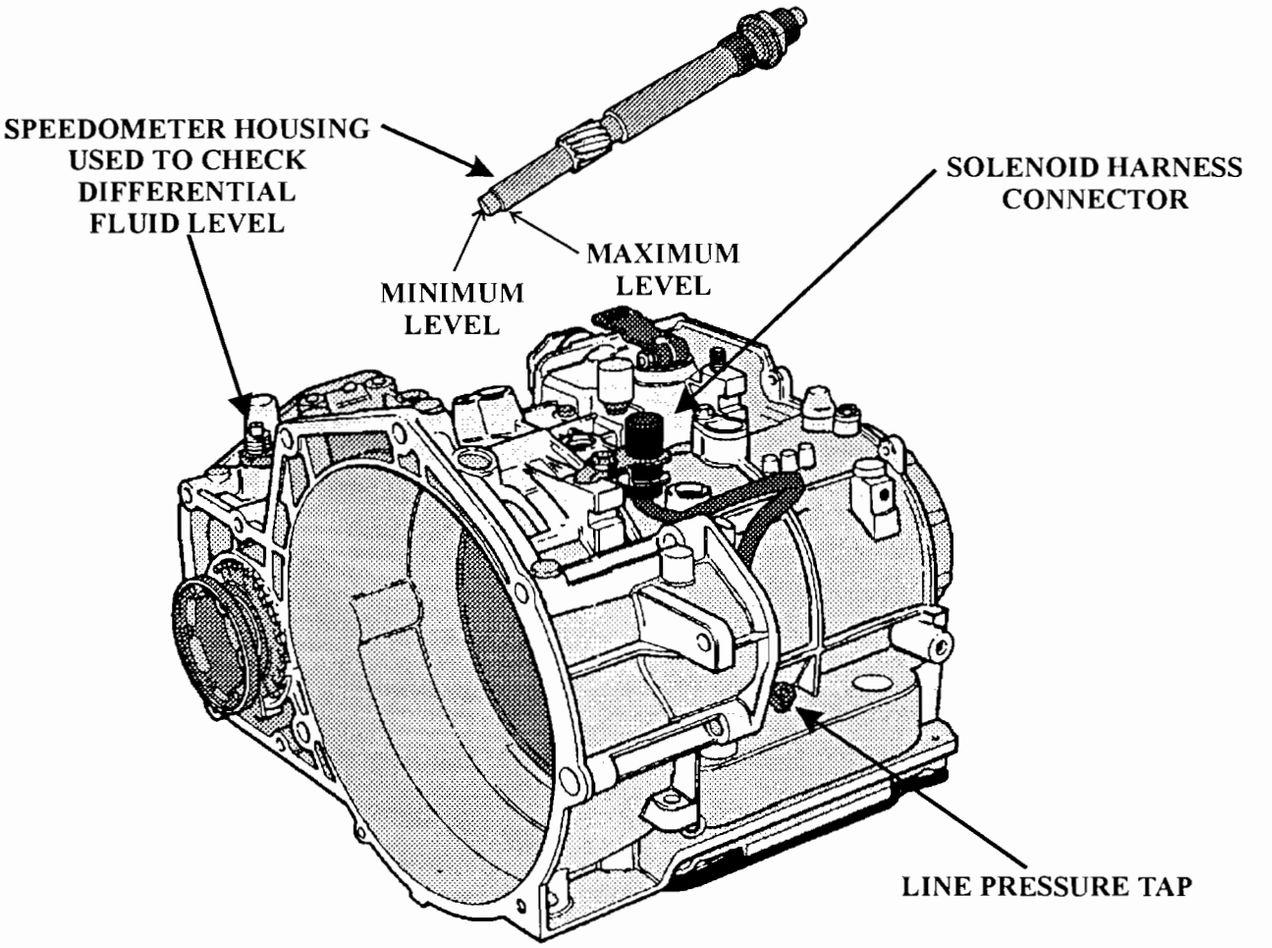


Figure 78



GEAR	TEST CONDITION	PRESSURE (psi)	BARS
Drive	Idling with solenoid connector plugged in	49 - 55	3.4 - 3.8
Reverse	Idling with solenoid connector plugged in	94 - 109	6.5 - 7.5
Drive	2000 Rpm's with solenoid connector unplugged	146 - 164	10.1 - 11.3
Reverse	2000 Rpm's with solenoid connector unplugged	333 - 349	23 - 24

Figure 79

THM 3T40 (125C)

RE-DESIGNED FORWARD CLUTCH PACK

CHANGE: Beginning June 24, 1993 (Julian Date 154) ALL 3T40 (125C) transaxles were built with a re-designed Forward Clutch Pack, as shown in Figure 2.

REASON: Improved garage shift from "Reverse to Drive" after removal of the thermo element from the manual valve. The thermo element was eliminated from the manual valve in production models effective April 1, 1993, on all models except "A" Car and "T" Car applications (See Figure 1).

PARTS AFFECTED:

(1) WAVE PLATES - The two previous "Wave" plates have been eliminated, as shown in Figure 2.

(2) BELLVILLE PLATE - Added to the forward clutch pack to replace the two wave plates, and provides more resistance to improve the forward clutch apply feel (See Figure 2).

(3) STEEL PLATE - There is one "Flat" Steel plate added next to bellville plate, as shown in Figure 2.

(4) BACKING PLATE - The backing plate used in the re-designed forward clutch pack happens to be the thinnest of the current design selective backing plates, and was used to make the forward clutch clearance correct. Because of the elimination of the "Wave" plates there is no longer any need for selective backing plates and this backing plate will be used in all models. The backing plate being used is .125"-.131" thick and is stamped "D" for identification.

(5) BACKING PLATE SNAP RING - The backing plate snap ring used in the new design forward clutch pack is also a previous design level snap ring that is slightly larger in diameter (Stronger) than the current snap ring, to accomodate the added bellville plate. The stronger snap ring is identified with "Square" cut ends instead of "Stepped" cut ends as shown in Figure 3. The "Stepped" cut snap ring is now used ONLY in the direct clutch pack.

INTERCHANGEABILITY:

The new design parts listed above will service ALL 3T40 (125C) transaxles back to 1987 when used as a package, AND THE THERMO ELEMENT IS REMOVED FROM THE MANUAL VALVE.

NOTE: We recommend that the thermo element be removed from the manual valve on ALL models so equipped, and install the conversion package part number listed below.

Removing the thermo element will eliminate premature Lo/Reverse clutch failure (ATSG Bulletin 92-40), and installing the conversion package will restore the proper shift feel from "Reverse to Drive" with the thermo element removed.

Continued on next Page.

SERVICE INFORMATION:

Forward Clutch Bellville Plate (New Design)	8685867
Forward Clutch Backing Plate (Stamped "D")	8664163
Forward Clutch Backing Plate Snap Ring (Stronger)	8631028
Conversion Kit Service Package (Includes 3 Parts Listed Above)	24200477
Forward Clutch Steel Plate (Current Design)	8683084

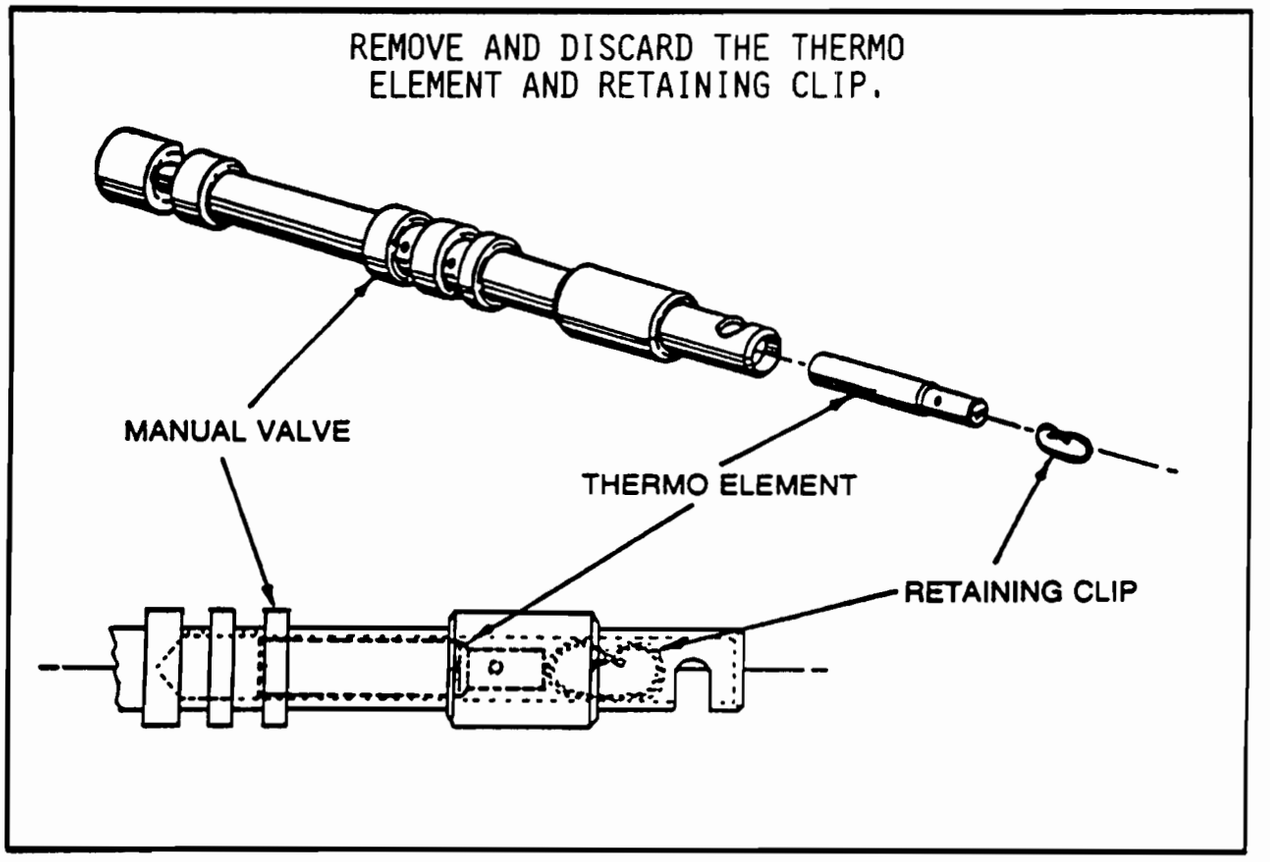
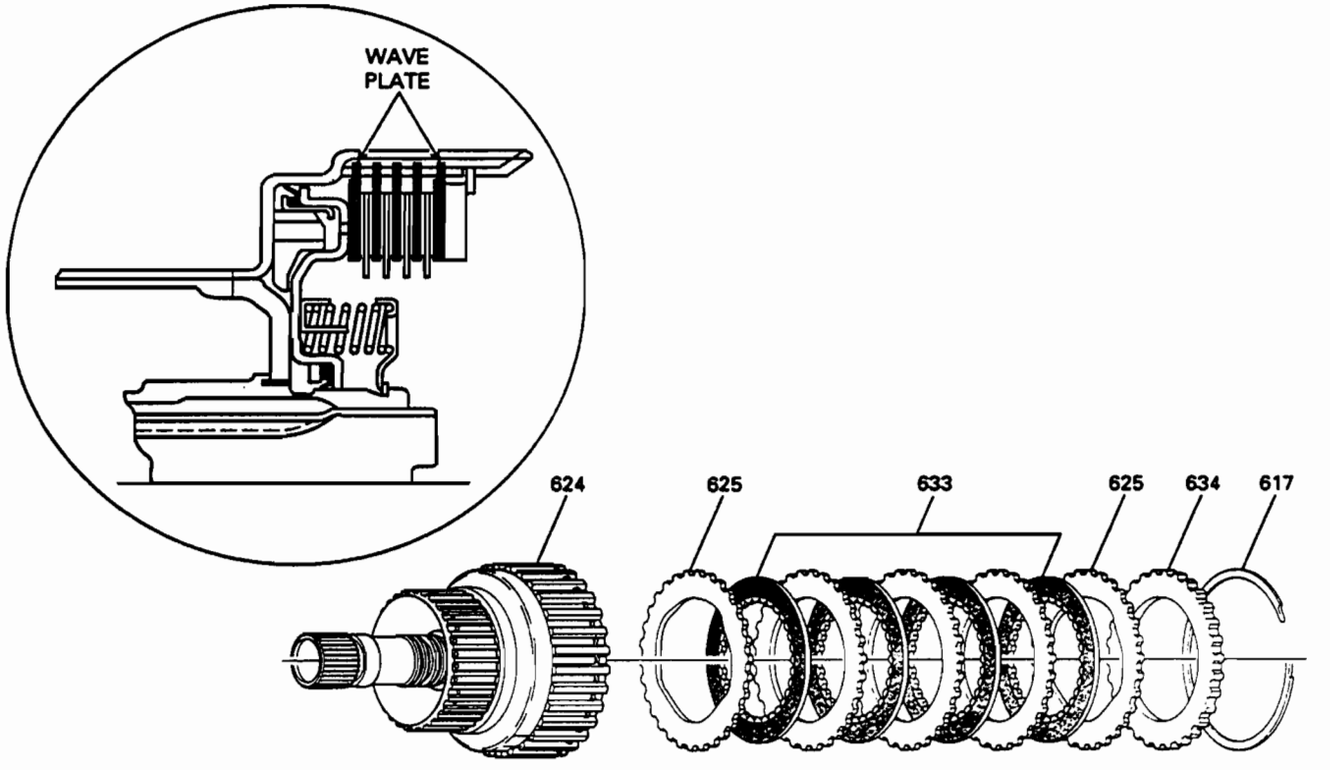


Figure 1

PREVIOUS DESIGN FORWARD CLUTCH



RE-DESIGNED FORWARD CLUTCH

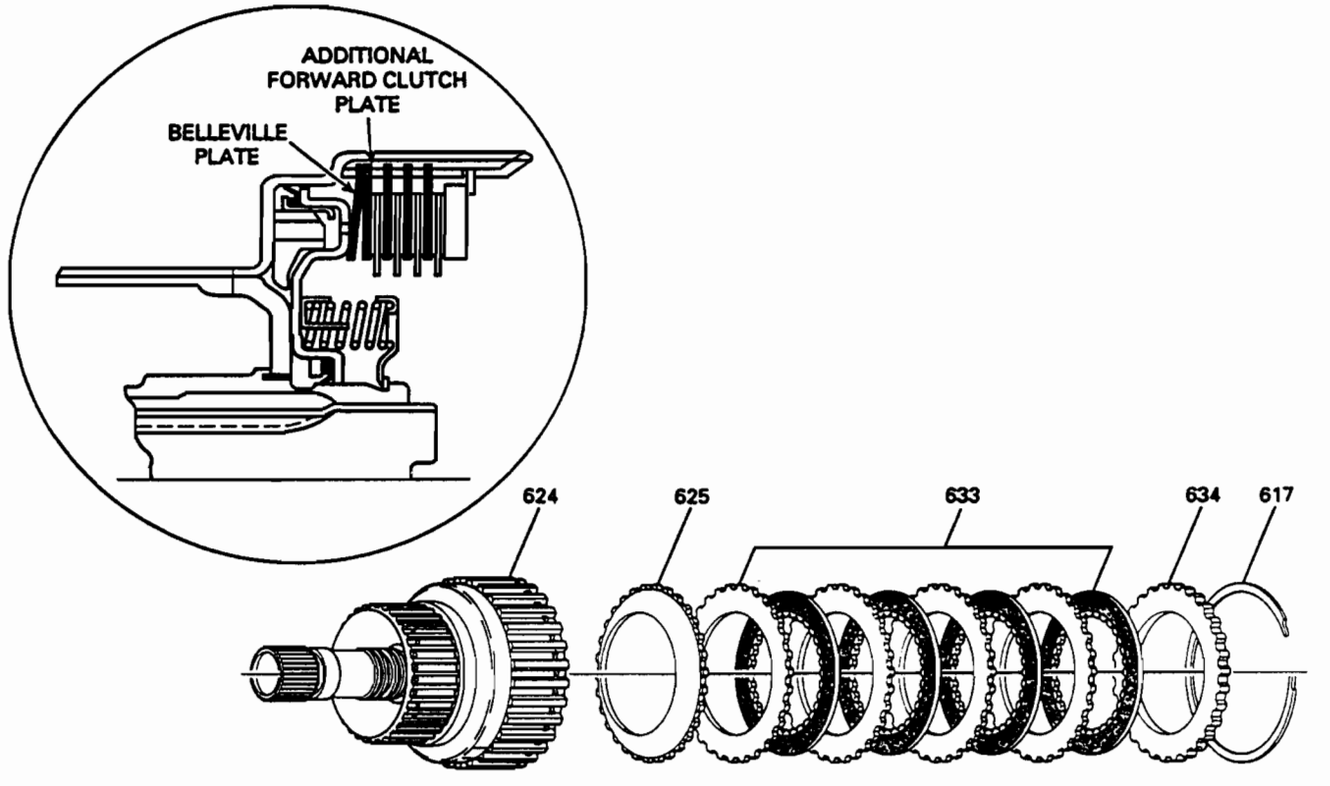


Figure 2

FORWARD CLUTCH BACKING PLATE SNAP RING

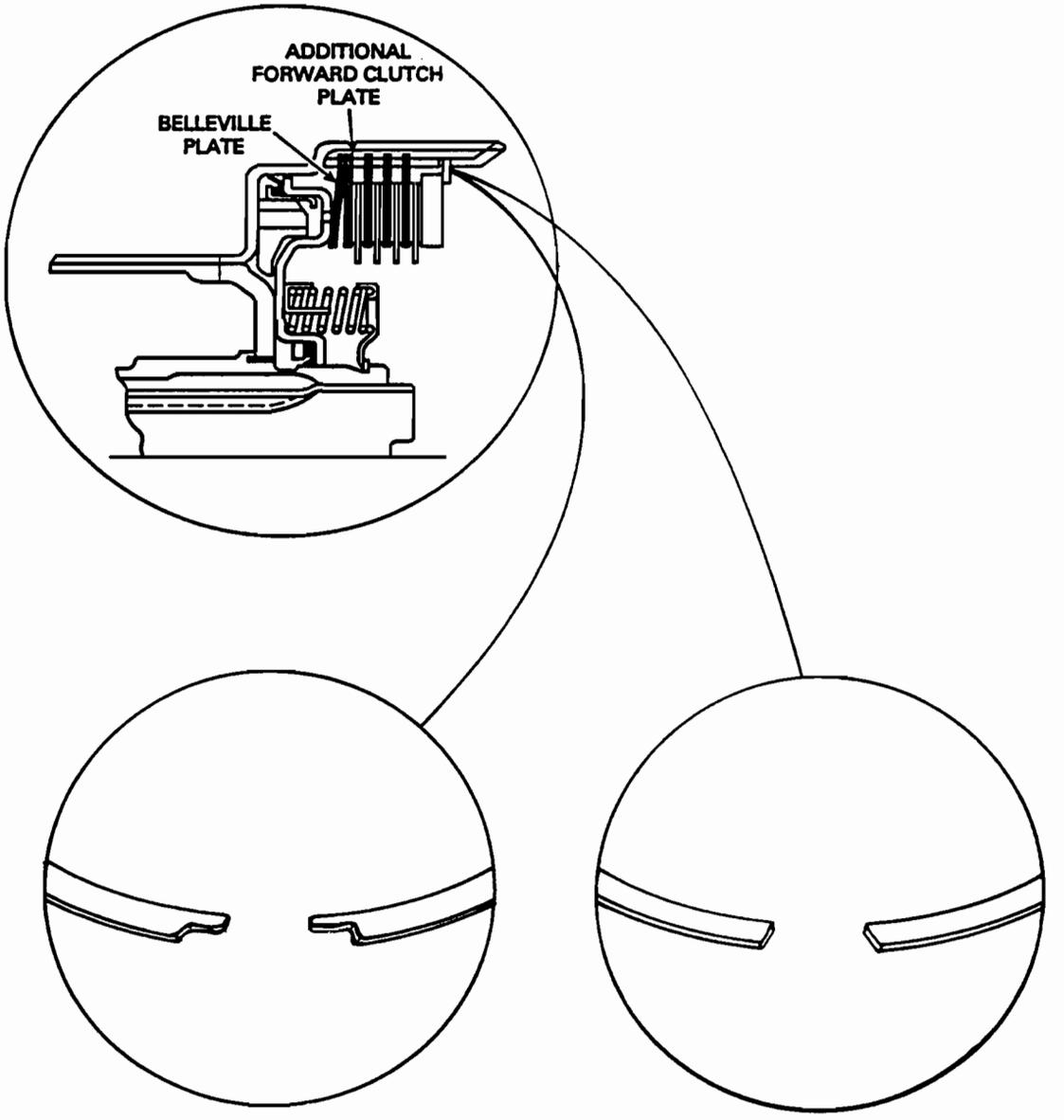


Figure 3

SATURN

NO CONVERTER CLUTCH APPLY

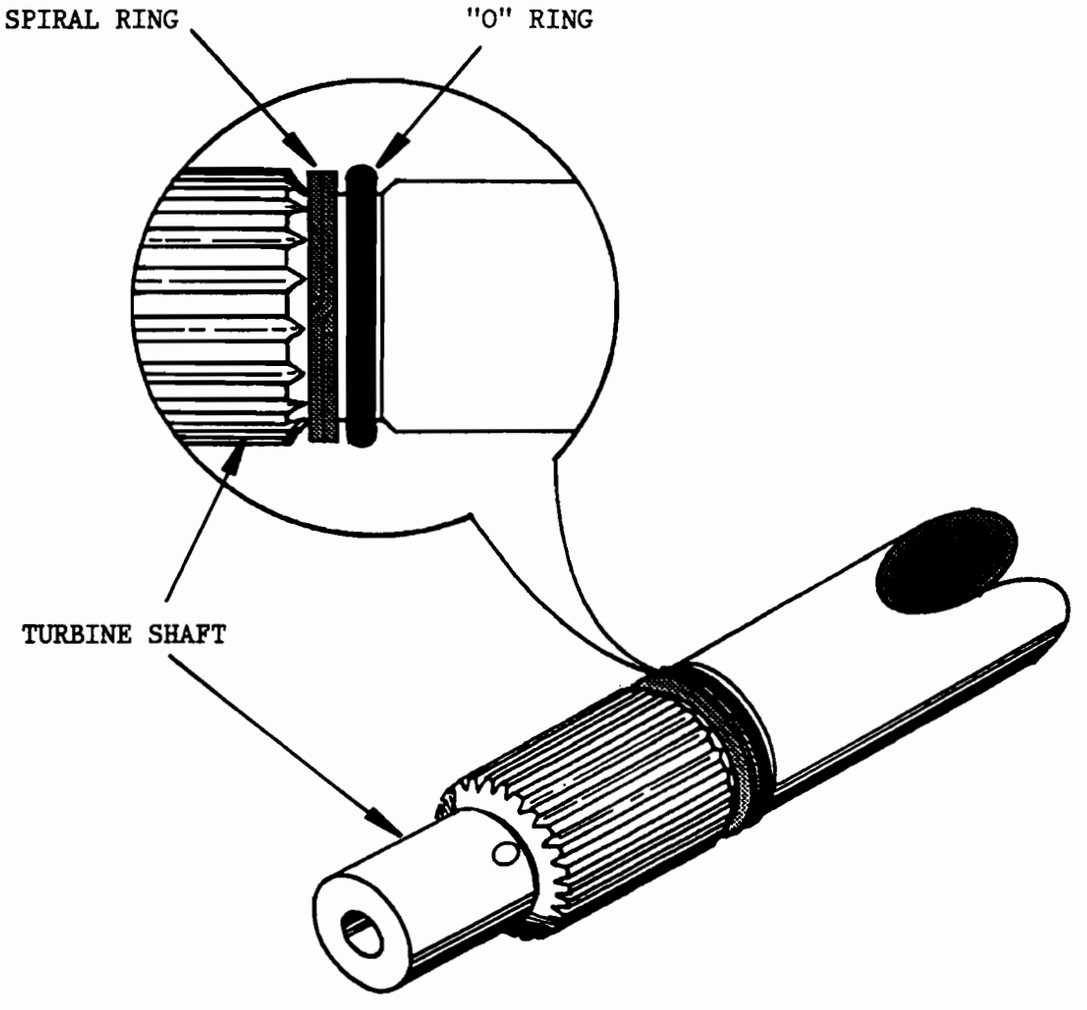
COMPLAINT: After rebuilding a Saturn transaxle, you have no converter clutch apply at any speed and the computer is sending the proper signals at the proper time to the transaxle.

CAUSE: The cause may be, the "O" ring on the turbine shaft missing. The "O" ring MUST be installed in the turbine shaft groove BEHIND the spiral ring, as shown in Figure 4, and NOT next to the turbine shaft splines.
If the "O" ring is installed next to the splines, the "O" ring will roll off and remain in the torque converter as the converter is removed from the transaxle.

CORRECTION: Install a new, proper size, "O" ring into the turbine shaft groove. Make sure the "O" ring is placed BEHIND the spiral ring, as shown in Figure 4, and NOT next to the turbine shaft splines. It is not necessary to remove the spiral ring to install the "O" ring into the groove in the proper position.

NOTE: We have recieved several reports of this complaint on transaxles that have been disassembled for the first time, which can only mean that the "O" ring was installed in the wrong position when it was originally assembled.

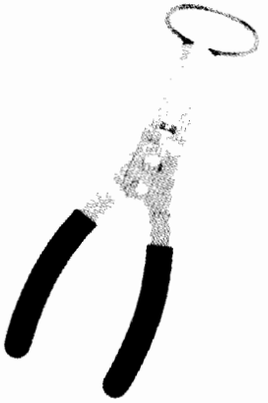
SATURN TURBINE SHAFT



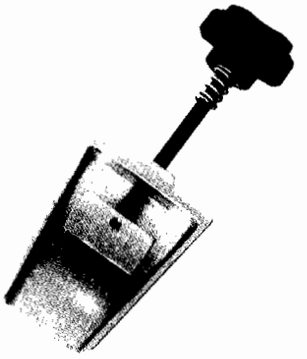
THE "O" RING MUST BE INSTALLED IN THE TURBINE SHAFT GROOVE BEHIND THE SPIRAL RING, AS SHOWN ABOVE.

Figure 4

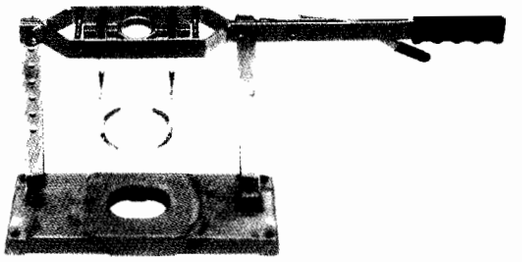
DEMAND THE BEST



T-0025-A
RINGLOC SNAP RING PLIERS



T-1703
FRONT PUMP SPRING LOADER TOOL FOR GM 700R4, 2004R AND 440-T4



T-0158-SP
SNAPRESS CLUTCH SPRING COMPRESSOR

T-0157
QUICK LOCK SPRING COMPRESSOR

T-1571
GM 700-R4 DAMAGED SUN GEAR PULLER

T-1453
CHRYSLER BEARING CUP AND CONE REMOVER AND INSTALLER KIT

YOUR COMPLETE TRANSMISSION TOOL SOURCE

HAYDEN Trans-Tool
110 Connelly, San Antonio, TX 78203
1-800-531-5978/FAX (210) 225-2114

SATURN

MANUAL VALVE ORIENTATION GRINDING NOISE IN REVERSE

COMPLAINT: After overhaul, you have a bad gringing noise when the selector lever is placed in reverse, and the vehicle feels as if it wants to move forward.

CAUSE: The cause may be, the manual valve installed improperly, with the "Flat" oriented so that it is facing down towards the case.

CORRECTION: Remove the valve body and rotate the manual valve so that the "Flat" is facing UP TOWARDS THE TOP PAN, as shown in Figure 5. Re-install the valve body and torque to proper specifications.

SATURN MANUAL VALVE ORIENTATION

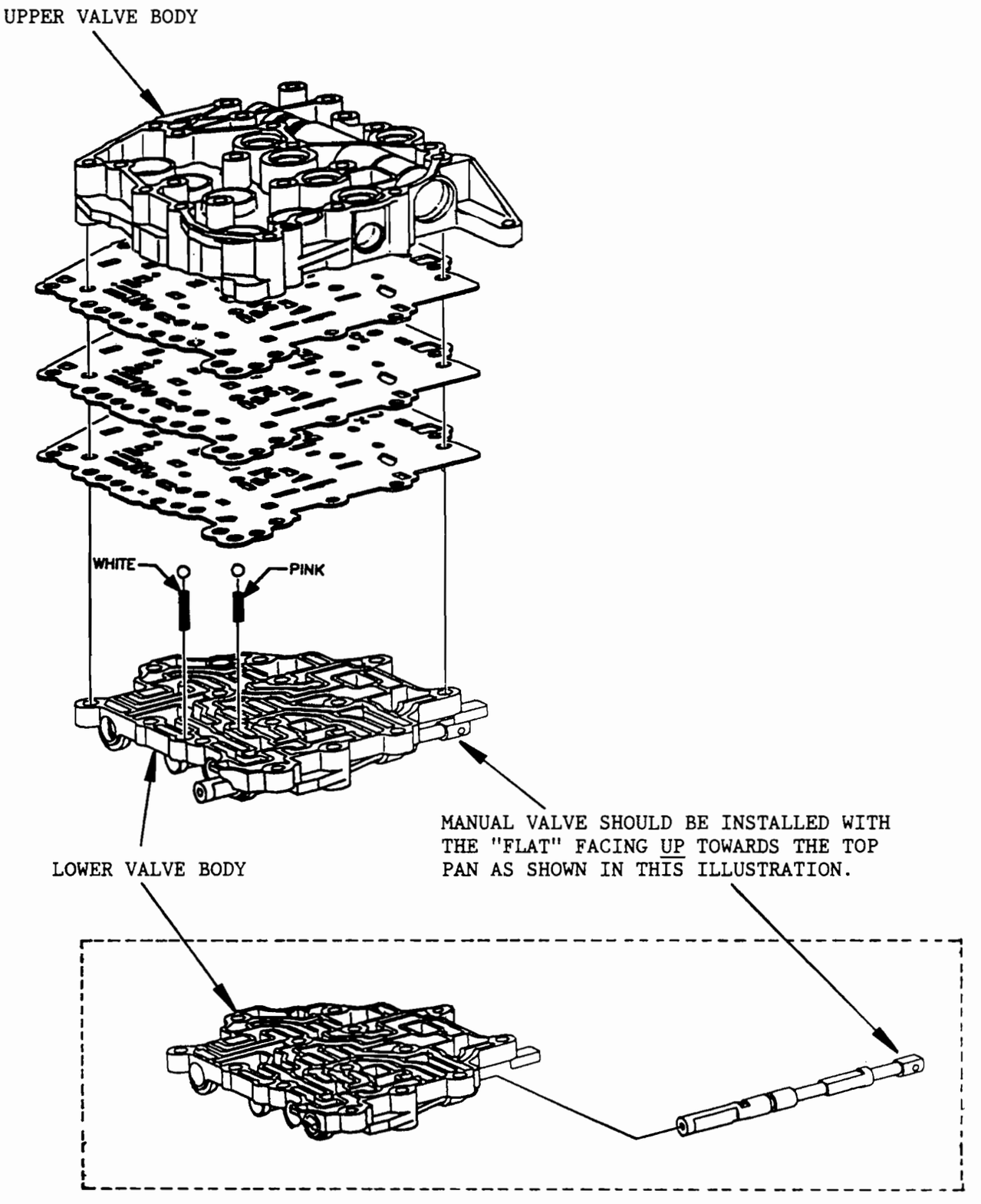


Figure 5

SATURN

MOVES FORWARD ALL GEAR SELECTIONS REVERSE AND/OR FORWARD WITH THE SELECTOR IN PARK OR NEUTRAL

There are currently 3 different design levels of the Manual Valve, and 2 different design levels of the Manual Valve Link, that can create the complaints listed above if they are installed wrong, and/or parts mis-matched.

COMPLAINT NO. ONE:
The vehicle moves forward in all selector lever positions, including Neutral, and tries to move forward in Park, on all late 1992 and all 1993 model Saturn transaxles that use the 2nd design Manual Valve.

COMPLAINT NO. TWO:
The vehicle tries to move Forward and/or Reverse with the selector lever in Park, and can move unexpectedly Forward and/or Reverse with selector lever in eutral, on 1993/1994 Saturn transaxles.

CAUSE NO. ONE:
2nd design Manual Valve installed improperly with the "Notch" facing down towards the case. The "Notch" MUST face up towards the top pan (See Figure 6).

CAUSE NO. TWO:
1994 (3rd Design) Manual Valve used with a 91-93 "Stamped Form" Manual Valve Link, that allows extra play in the shift linkage because of mis-matched parts. Refer to Figure 7 for dimension differences.

CORRECTION NO. ONE:
On ALL 1991 to 1993 models, remove the valve body and orient the Manual Valve with the "Flat" (1st Design) or "Notch" (2nd Design) on the Manual Valve facing UP TOWARDS THE TOP PAN, as shown in Figure 6. Reinstall the valve body and torque to proper specifications.

CORRECTION NO. TWO:
Install the proper design level Manual Valve Link with the matching Manual Valve. Functionally, the 1994 (3rd Design) Manual Valve is the same as the late 1992 and 1993 (2nd Design) Manual Valve. There are two different stem diameters on the Manual Valve Links, where it goes into the manual valve.

1st design "Stamped Form" Manual Valve Link is used on all 91-93 models, and the stem diameter is .153" (See Figure 6).

2nd design "One Piece Wire" Manual Valve Link is used on all 1994 models, and the stem diameter is .194" (See Figure 7).

As a result of the change to the Manual Link, the hole in the Manual Valve also had to increase in diameter from .161" to .202", to accommodate the 2nd design manual link (See Figure 7). There was also a plastic cap added to the 1994 (3rd Design) Manual Valve as an assembly aid to prevent the manual valve from being installed to the manual link backwards (See Figure 7).

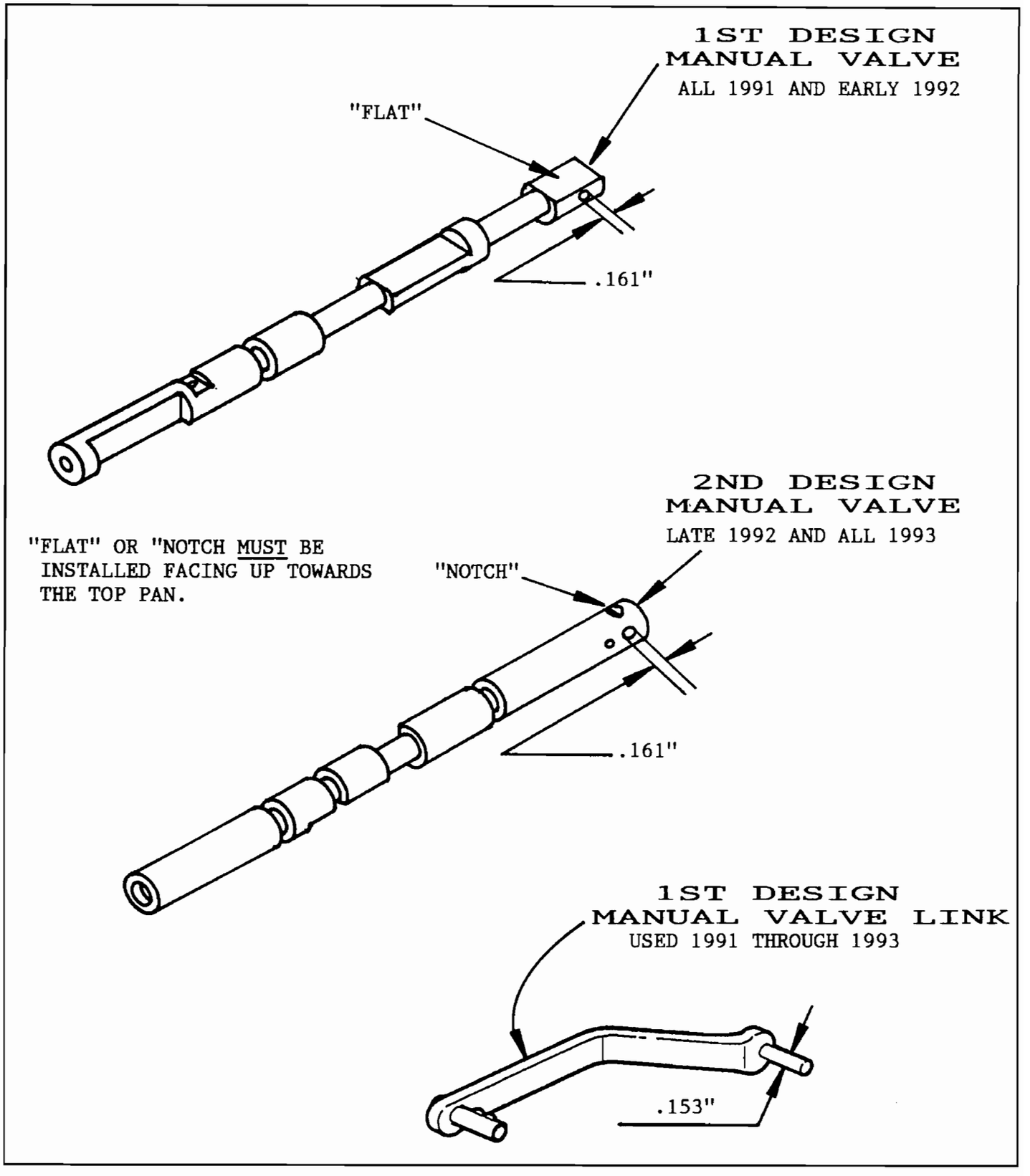

1ST DESIGN
MANUAL VALVE
ALL 1991 AND EARLY 1992
"FLAT"
.161"
2ND DESIGN
MANUAL VALVE
LATE 1992 AND ALL 1993
"FLAT" OR "NOTCH MUST BE
INSTALLED FACING UP TOWARDS
THE TOP PAN.
"NOTCH"
.161"
1ST DESIGN
MANUAL VALVE LINK
USED 1991 THROUGH 1993
.153"

Figure 6

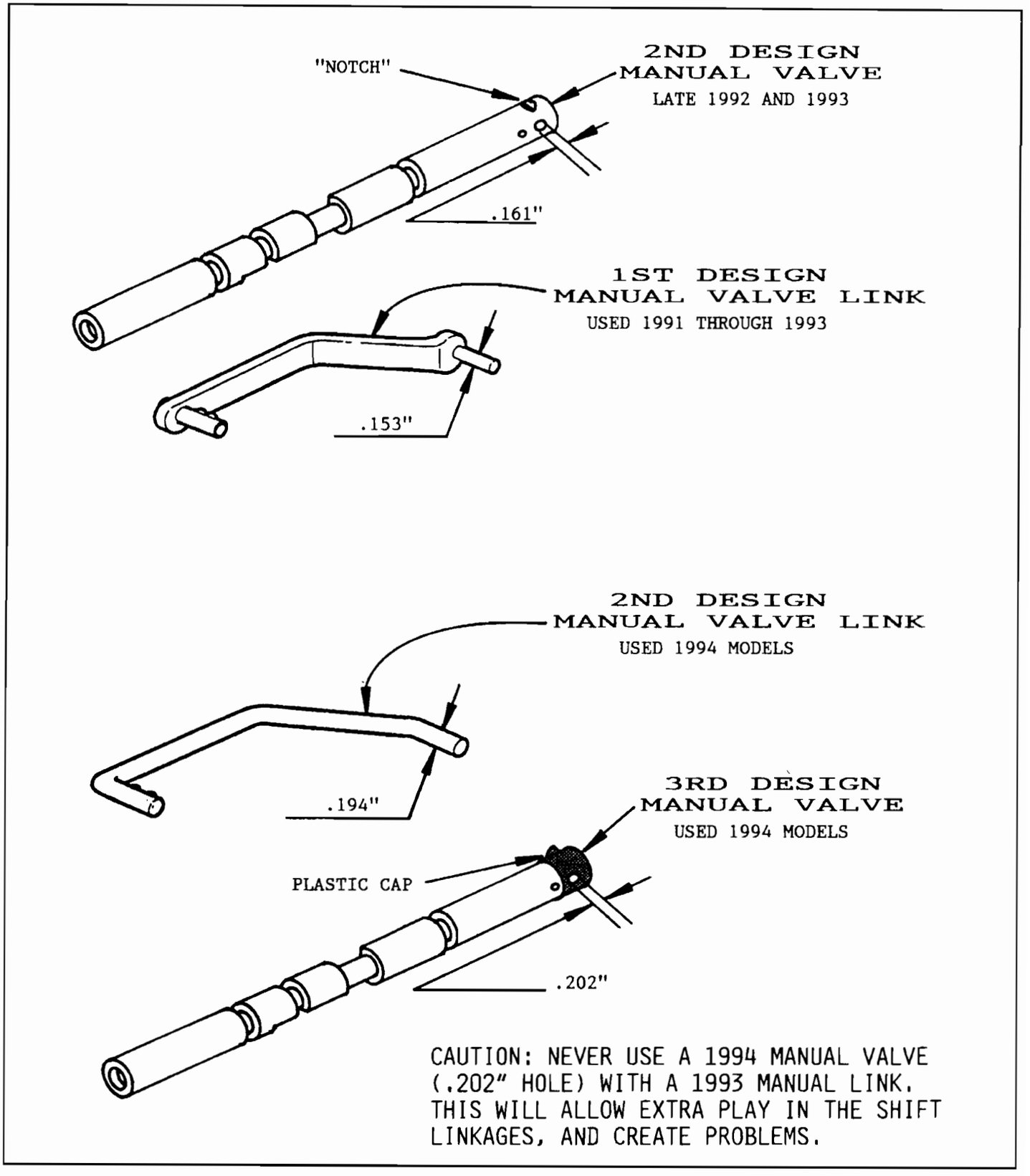
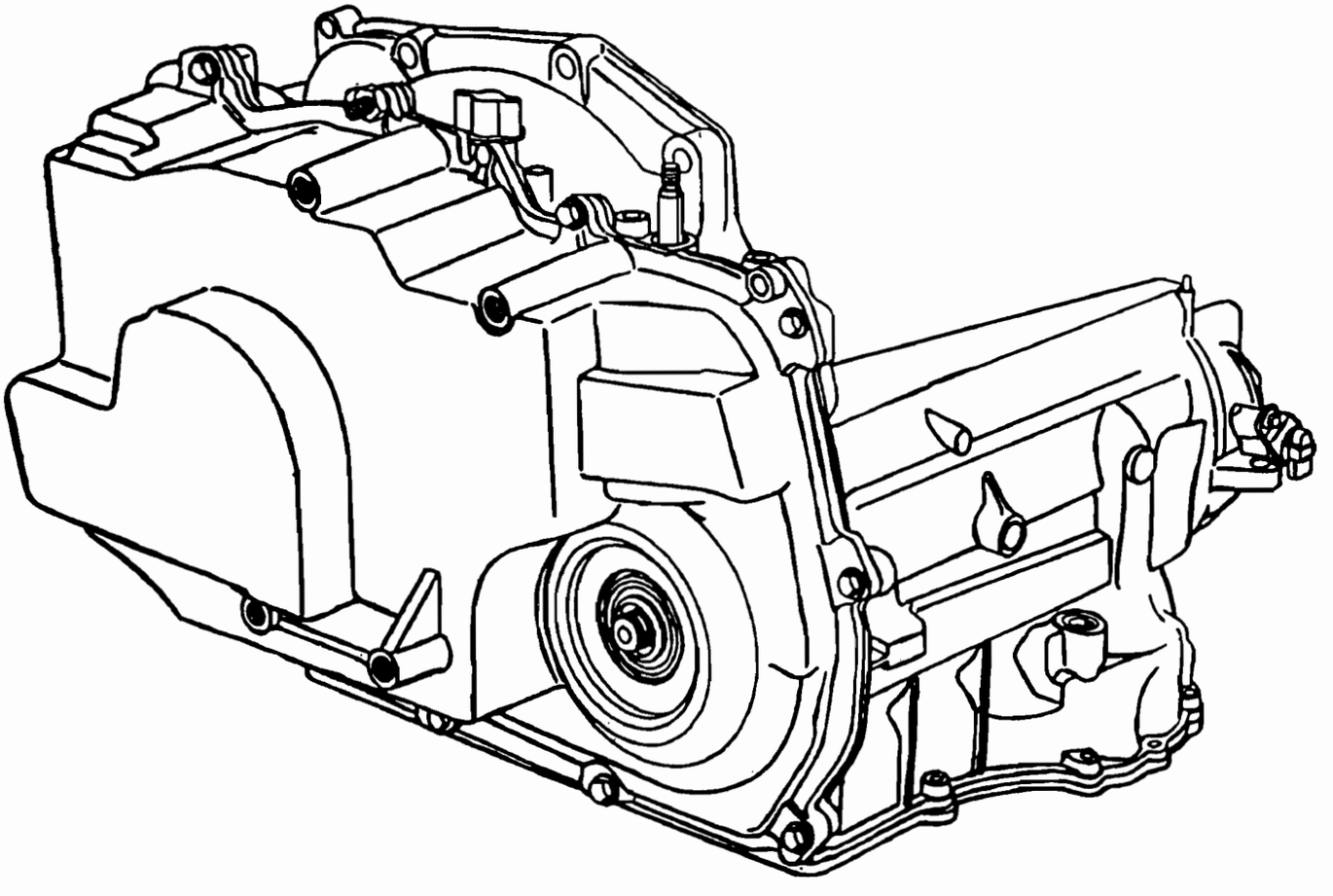

"NOTCH"
2ND DESIGN
MANUAL VALVE
LATE 1992 AND 1993
.161"
1ST DESIGN
MANUAL VALVE LINK
USED 1991 THROUGH 1993
.153"
2ND DESIGN
MANUAL VALVE LINK
USED 1994 MODELS
.194"
3RD DESIGN
MANUAL VALVE
USED 1994 MODELS
PLASTIC CAP
.202"
CAUTION: NEVER USE A 1994 MANUAL VALVE
(.202" HOLE) WITH A 1993 MANUAL LINK.
THIS WILL ALLOW EXTRA PLAY IN THE SHIFT
LINKAGES, AND CREATE PROBLEMS.

Figure 7

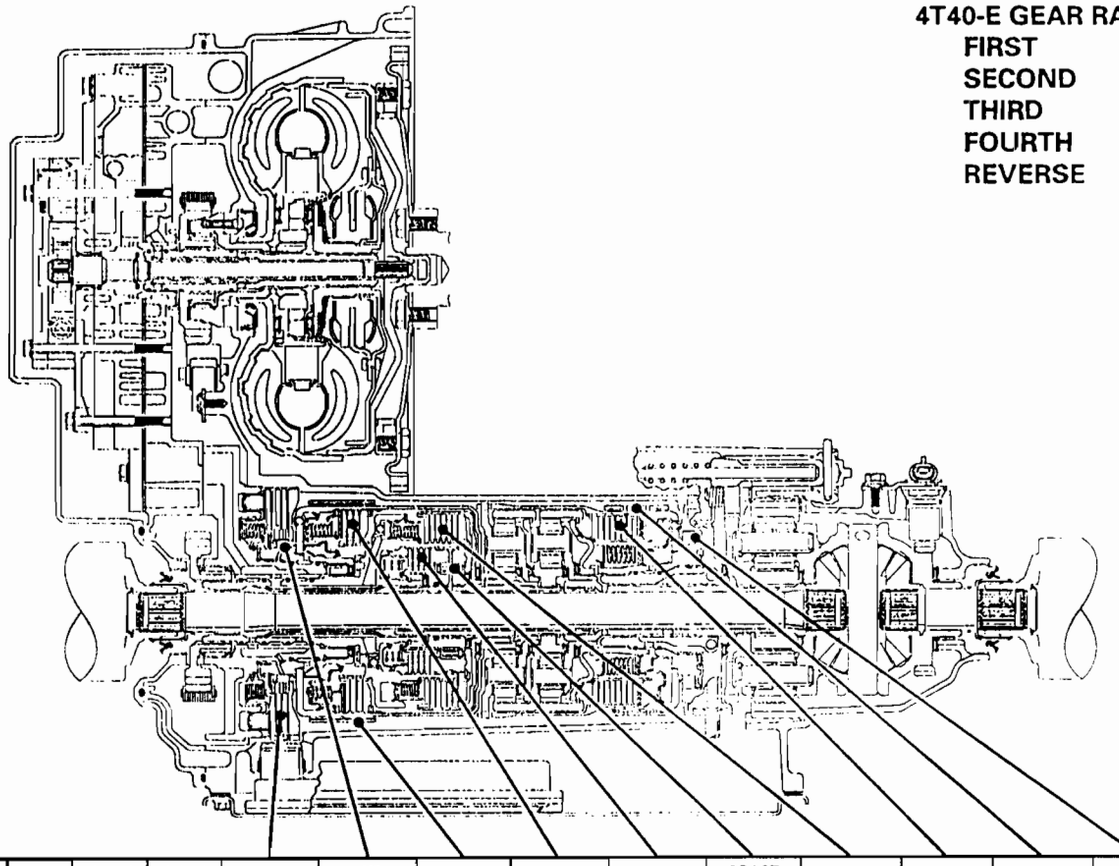
HYDRA-MATIC 4T40-E

PRELIMINARY INFORMATION



4T40-E GEAR RATIOS

FIRST	2.96
SECOND	1.62
THIRD	1.00
FOURTH	0.68
REVERSE	2.14



RANGE	GEAR	SHIFT "A" SOL	SHIFT "B" SOL	2ND CLUTCH	2ND ROLLER CLUTCH	2-4 BAND	REVERSE CLUTCH	COAST CLUTCH	COAST CLUTCH SPRAG	DIRECT CLUTCH	FORWARD CLUTCH	LO/REV. BAND	LO ROLLER CLUTCH
PARK	N	ON	OFF									APPLIED	
REV	R	ON	OFF				APPLIED					APPLIED	
NEU	N	ON	OFF									APPLIED	
D4	1st	ON	OFF						HOLDING		APPLIED		HOLDING
	2nd	OFF	OFF	APPLIED	HOLDING				HOLDING		APPLIED		OVER-RUNNING
	3rd	OFF	ON	APPLIED*	OVER-RUNNING				HOLDING	APPLIED	APPLIED		OVER-RUNNING
	4th	ON	ON	APPLIED	OVER-RUNNING	APPLIED				APPLIED	APPLIED*		OVER-RUNNING
D3	1st	ON	OFF					APPLIED	HOLDING		APPLIED	APPLIED	HOLDING
	2nd	OFF	OFF	APPLIED	HOLDING	APPLIED		APPLIED	HOLDING		APPLIED		OVER-RUNNING
	3rd	OFF	ON	APPLIED*	OVER-RUNNING			APPLIED	HOLDING	APPLIED	APPLIED		OVER-RUNNING
D2	1st	ON	OFF					APPLIED	HOLDING		APPLIED	APPLIED	HOLDING
	2nd	OFF	OFF	APPLIED	HOLDING	APPLIED		APPLIED	HOLDING		APPLIED		OVER-RUNNING
D1	1st	ON	OFF					APPLIED	HOLDING		APPLIED	APPLIED	HOLDING
	2nd	OFF	OFF	APPLIED	HOLDING	APPLIED		APPLIED	HOLDING		APPLIED		OVER-RUNNING

ON = SOLENOID ENEGERIZED
OFF = SOLENOID DE-ENEGERIZED
* = APPLIED WITH NO LOAD.
** = MANUAL FIRST – SECOND GEAR IS ONLY AVAILABLE ABOVE APPROXIMATELY 30 TO 35 MPH.

Figure 8

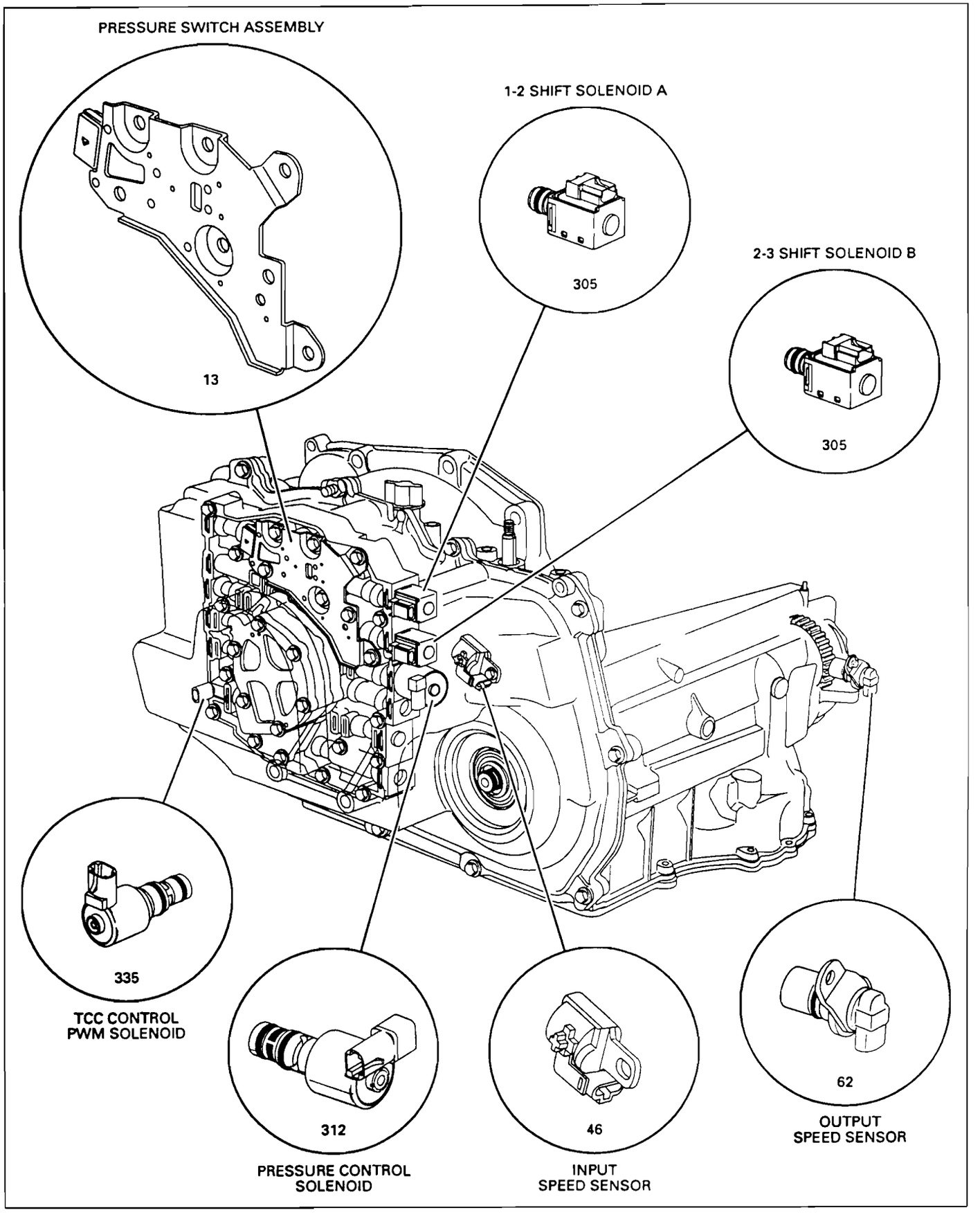
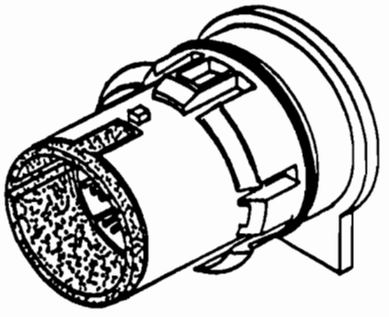

PRESSURE SWITCH ASSEMBLY
13
1-2 SHIFT SOLENOID A
305
2-3 SHIFT SOLENOID B
305
335
TCC CONTROL
PWM SOLENOID
312
PRESSURE CONTROL
SOLENOID
46
INPUT
SPEED SENSOR
62
OUTPUT
SPEED SENSOR

Figure 9

THM 4T40-E CASE CONNECTOR



PRESSURE SWITCH ASSEMBLY (PSA) CONNECTOR

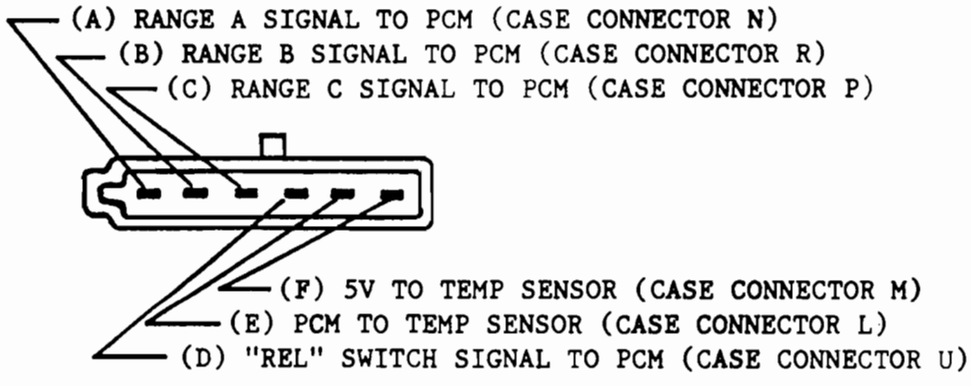


Figure 10

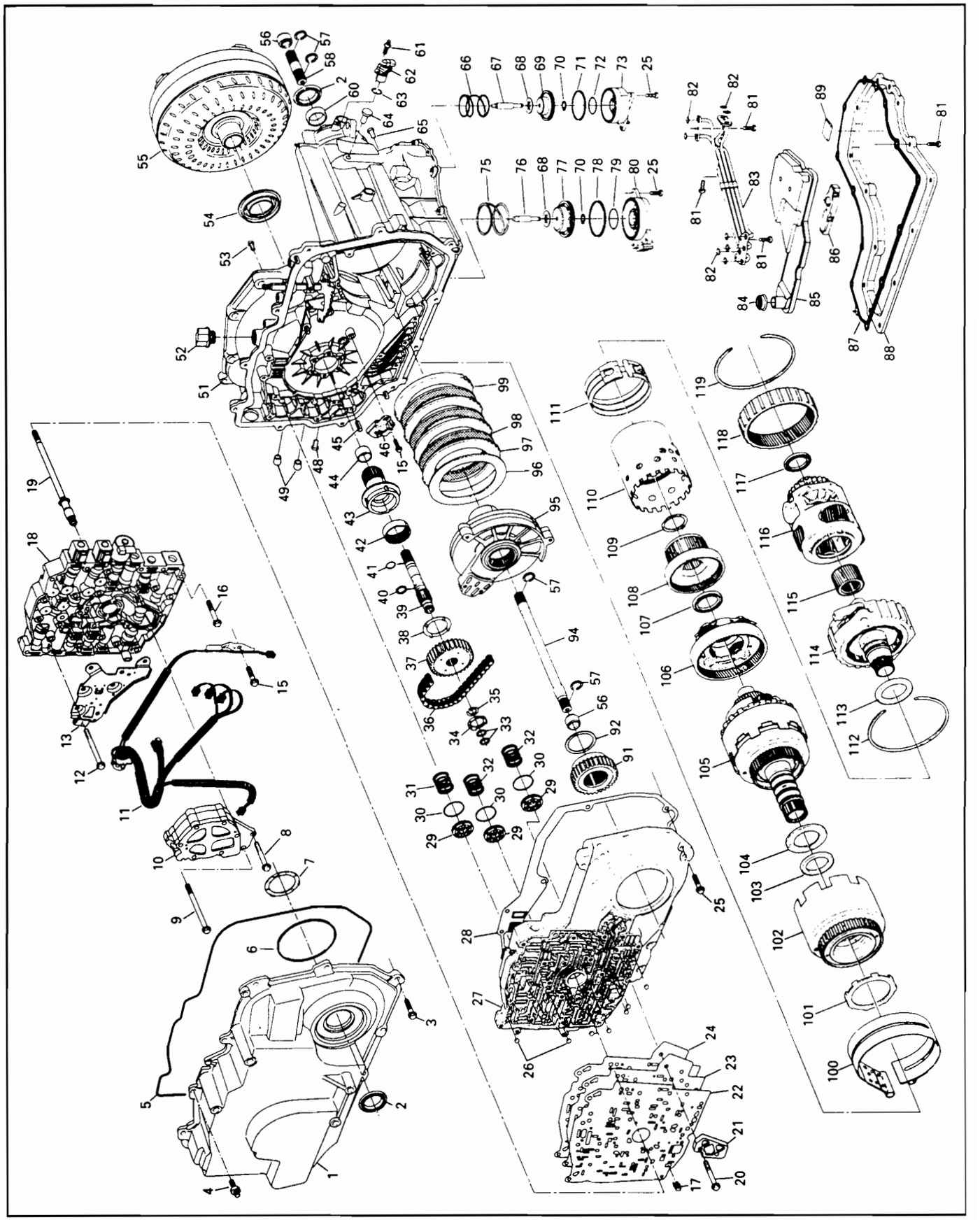
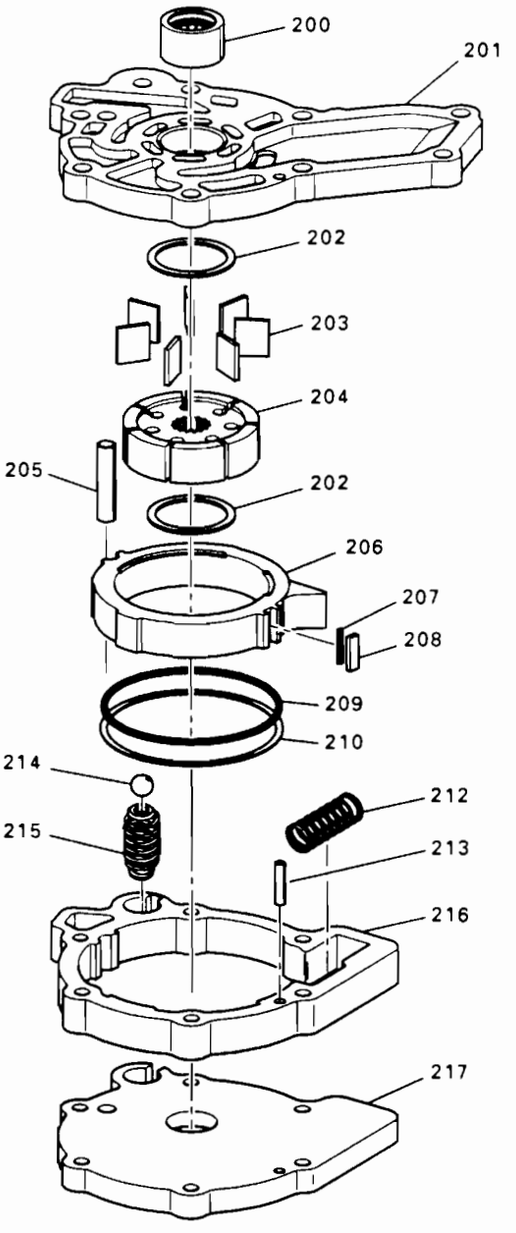


Figure 11

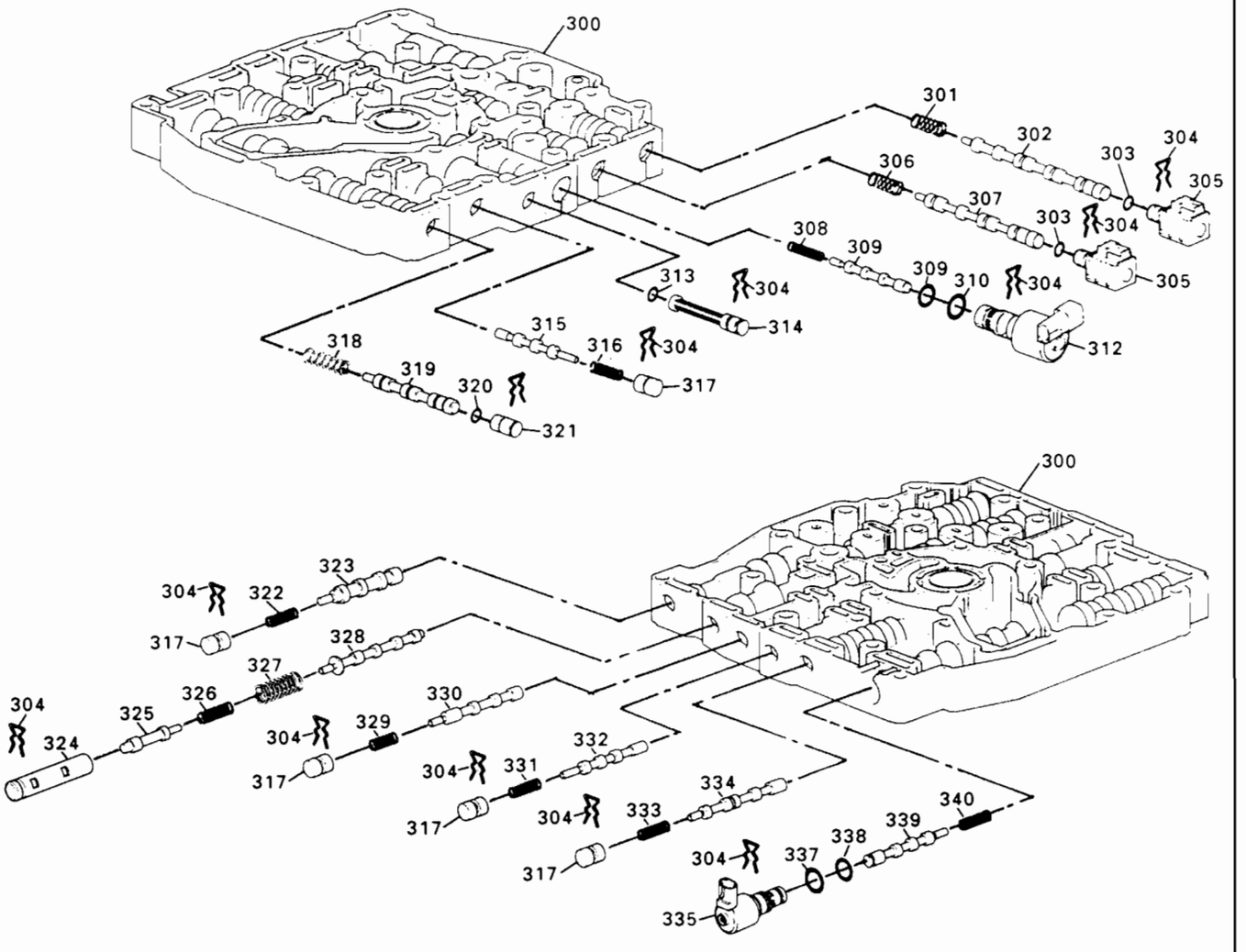
1 COVER, SIDE (STRUCTURAL)
2 SEAL, AXLE OIL
3 BOLT, SIDE COVER
4 STUD, SIDE COVER
5 GASKET, SIDE COVER
6 GASKET, SIDE COVER OIL LEVEL CONTROL
7 WASHER, THRUST (SIDE COVER TO DRIVEN SPROCKET)
8 BOLT, OIL PUMP
9 BOLT, OIL PUMP
10 PUMP ASSEMBLY, TRANSAXLE OIL
11 WIRING ASSEMBLY, TRANSAXLE
12 BOLT, PRESSURE SWITCH ASSEMBLY
13 PRESSURE SWITCH ASSEMBLY (PSA)
15 BOLT, WIRING HARNESS BRACKET
BOLT, INPUT SPEED SENSOR
16 BOLT, VALVE BODY
18 BODY ASSEMBLY, CONTROL VALVE
19 SHAFT, OIL PUMP DRIVE
20 BOLT, SPACER PLATE SUPPORT
21 SUPPORT, SPACER PLATE
22 GASKET, VALVE BODY TO SPACER PLATE
23 PLATE, VALVE BODY SPACER
24 GASKET, SPACER PLATE TO CHANNEL PLATE
25 BOLT, CHANNEL PLATE
BOLT, SERVO COVER
26 CHECKBALLS (7)
27 PLATE, CHANNEL
28 GASKET, CASE TO CHANNEL PLATE
29 PISTON, ACCUMULATOR (1-2, 2-3 AND 3-4)
30 SEAL, ACCUMULATOR PISTON (1-2, 2-3 AND 3-4)
31 SPRING, 1-2 ACCUMULATOR PISTON
32 SPRING, 2-3 AND 3-4 ACCUMULATOR PISTON
33 SEAL, O-RING (TURBINE SHAFT TO SPROCKET)
34 WASHER, THRUST (CHANNEL PLATE TO DRIVE SPROCKET)
35 RING, SNAP (TURBINE SHAFT TO DRIVE SPROCKET)
36 LINK ASSEMBLY, DRIVE
37 SPROCKET, DRIVE
38 WASHER, THRUST (DRIVE SPROCKET TO SUPPORT)
39 SHAFT, TURBINE
40 SEAL, O-RING (TURBINE SHAFT TO SUPPORT)
41 SEAL, O-RING (TORQUE CONVERTER)
42 BEARING, DRIVE SPROCKET SUPPORT
43 SUPPORT, DRIVE SPROCKET
44 BUSHING, DRIVE SPROCKET SUPPORT
45 PIN, DOWEL (CHANNEL PLATE TO CASE)
46 SENSOR, INPUT SPEED
48 PLUG, LINE PRESSURE TAP
49 SEAL, COOLER PIPE
51 CASE, TRANSAXLE
52 CAP, VENT
53 SCREW, DRIVE SPROCKET SUPPORT
54 SEAL, CONVERTER
55 TORQUE CONVERTER ASSEMBLY
56 SLEEVE, OUTPUT/STUB SHAFT
57 RING, OUTPUT/STUB SHAFT SNAP
58 SHAFT, OUTPUT STUB
60 BUSHING, CASE TO FINAL DRIVE
61 STUD, OUTPUT SPEED SENSOR
62 SENSOR, OUTPUT SPEED
63 SEAL, O-RING (OUTPUT SPEED SENSOR)
64 PIN, BAND ANCHOR - LO/REVERSE
65 PLUG, OIL LEVEL CONTROL
66 SPRING, SERVO RETURN (LO/REVERSE)
67 PIN, SERVO APPLY (LO/REVERSE)
68 SPRING, SERVO CUSHION
69 PISTON, SERVO (LO/REVERSE)
70 RING, SERVO SNAP
71 SEAL, SERVO PISTON (LO/REVERSE)
72 SEAL, SERVO COVER (LO/REVERSE)
73 COVER, SERVO (LO/REVERSE)
75 SPRING, SERVO RETURN (INTERMEDIATE/4TH)
76 PIN, SERVO APPLY (INTERMEDIATE/4TH)
77 PISTON, SERVO (INTERMEDIATE/4TH)
78 SEAL, SERVO PISTON (INTERMEDIATE/4TH)
79 SEAL, SERVO COVER (INTERMEDIATE/4TH)
80 COVER, SERVO (INTERMEDIATE/4TH)
81 BOLT, TUBE ASSEMBLY
BOLT, BOTTOM PAN
82 SEAL, OIL FEED TUBE ASSEMBLY
83 TUBE ASSEMBLY, OIL FEED
84 SEAL, TRANSAXLE OIL FILTER
85 FILTER ASSEMBLY, TRANSAXLE OIL
86 VALVE, OIL LEVEL CONTROL
87 GASKET, TRANSAXLE BOTTOM PAN
88 PAN, TRANSAXLE OIL
89 MAGNET, CHIP COLLECTOR
91 SPROCKET, DRIVEN
92 WASHER, THRUST (DRIVEN SPROCKET TO SUPPORT)
94 SHAFT, OUTPUT
95 SUPPORT ASSEMBLY, DRIVEN SPROCKET
96 PLATE, 2ND CLUTCH WAVED
97 PLATE, 2ND CLUTCH STEEL
98 PLATE, 2ND CLUTCH FIBER
99 PLATE, 2ND CLUTCH BACKING
100 BAND, INTERMEDIATE/4TH
101 WASHER, THRUST (SUPPORT TO REVERSE INPUT CLUTCH)
102 CLUTCH ASSEMBLY, REVERSE INPUT
103 BEARING, THRUST
104 WASHER, THRUST (SELECTIVE)
105 CLUTCH ASSEMBLY, DIRECT & COAST
106 CARRIER ASSEMBLY, INPUT
107 BEARING, THRUST
108 INPUT FLANGE & FORWARD CLUTCH HUB ASSEMBLY
109 WASHER, THRUST
110 CLUTCH ASSEMBLY, FORWARD
111 BAND, LO/REVERSE
112 RING, SNAP (FORWARD CLUTCH SUPPORT TO CASE)
113 BEARING, THRUST
114 SUPPORT ASSEMBLY, FORWARD CLUTCH
115 GEAR, SUN (FINAL DRIVE)
116 DIFFERENTIAL AND FINAL DRIVE ASSEMBLY
117 BEARING, THRUST
118 GEAR, FINAL DRIVE INTERNAL
119 RING, FRETTING (INTERNAL GEAR TO CASE)

Figure 12



200 BEARING & SEAL ASSEMBLY, OIL PUMP
201 BASE, OIL PUMP
202 RING, OIL PUMP VANE
203 VANE, OIL PUMP
204 ROTOR, OIL PUMP
205 PIN, PIVOT (OIL PUMP SLIDE)
206 SLIDE, OIL PUMP
207 SUPPORT, OIL PUMP SLIDE SEAL
208 SEAL, OIL PUMP SLIDE
209 SEAL, O-RING (OIL PUMP SLIDE)
210 RING, FLUID SEAL (SLIDE TO BODY)
212 SPRING, OIL PUMP PRIMING
213 PIN, LOCATING
214 BALL, PRESSURE RELIEF
215 SPRING, PRESSURE RELIEF
216 BODY, OIL PUMP
217 COVER, PUMP

Figure 13



300	BODY, CONTROL VALVE ASSEMBLY
301	SPRING, 1-2 SHIFT VALVE
302	VALVE, 1-2 SHIFT
303	O-RING, SHIFT SOLENOID A AND B
304	RETAINER CLIP
305	SOLENOID, SHIFT (A AND B)
306	SPRING, 2-3 SHIFT VALVE
307	VALVE, 2-3 SHIFT
308	SPRING, TORQUE SIGNAL REGULATOR VALVE
309	VALVE, TORQUE SIGNAL REGULATOR
310	O-RING, PRESSURE CONTROL SOLENOID
311	O-RING, PRESSURE CONTROL SOLENOID
312	SOLENOID, PRESSURE CONTROL
313	O-RING, ACTUATOR OIL FILTER
314	FILTER, ACTUATOR OIL
315	VALVE, ACTUATOR FEED LIMIT
316	SPRING, ACTUATOR FEED LIMIT VALVE
317	PLUG, BORE
318	SPRING, 3-4 SHIFT VALVE
319	VALVE, 3-4 SHIFT
320	O-RING, 3-4 SHIFT VALVE PLUG
321	PLUG, BORE
322	SPRING, 1-2/3-4 ACCUMULATOR VALVE
323	VALVE, 1-2/3-4 ACCUMULATOR
324	BUSHING, PRESSURE REGULATOR BOOST
325	VALVE, PRESSURE REGULATOR BOOST
326	SPRING, ISOLATOR
327	SPRING, PRESSURE REGULATOR VALVE
328	VALVE, PRESSURE REGULATOR
329	SPRING, 2-3 ACCUMULATOR VALVE
330	VALVE, 2-3 ACCUMULATOR
331	SPRING, TCC FEED LIMIT VALVE
332	VALVE, TCC FEED LIMIT
333	SPRING, TCC CONTROL VALVE
334	VALVE, TCC CONTROL
335	SOLENOID, TCC CONTROL
337	O-RING, TCC CONTROL SOLENOID
338	O-RING, TCC CONTROL SOLENOID
339	VALVE, TCC REGULATED APPLY
340	SPRING, TCC REGULATED APPLY VALVE

Figure 14

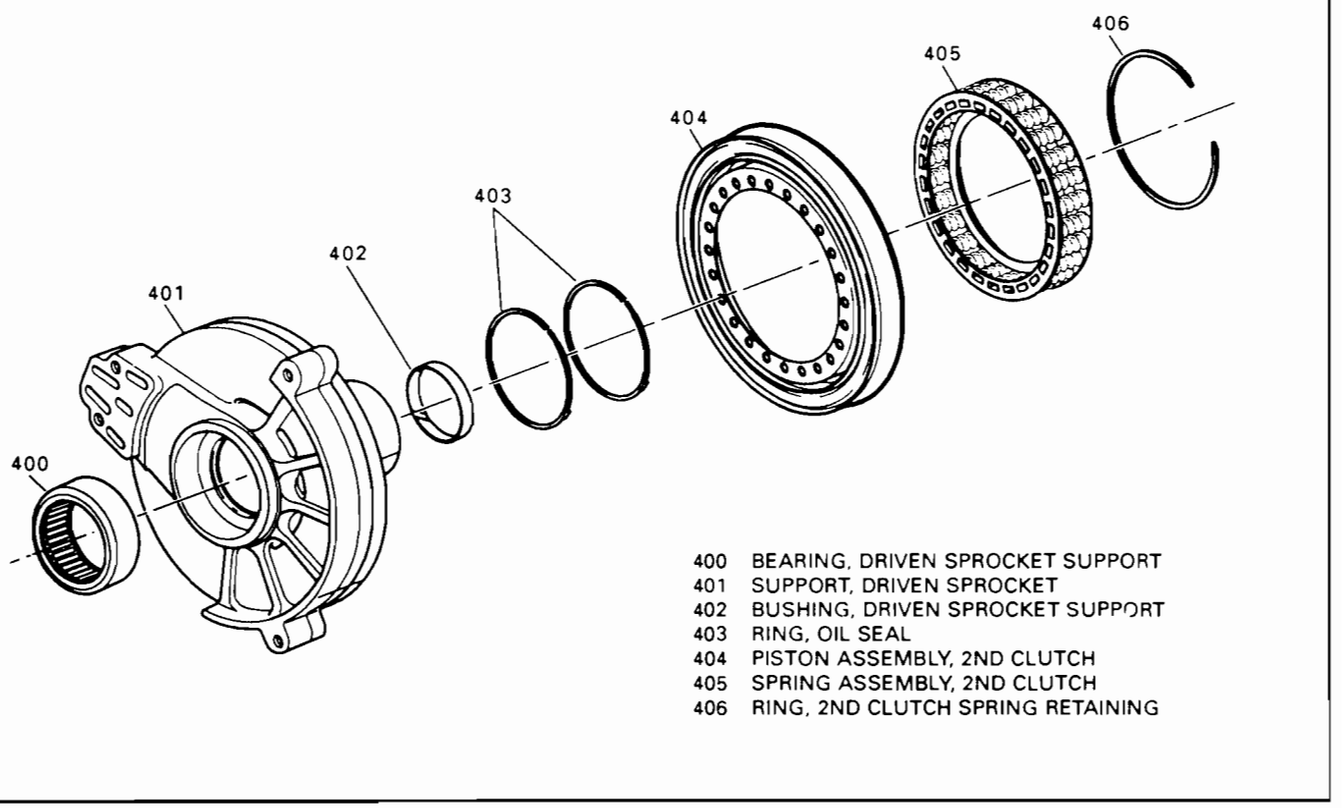


Figure 15

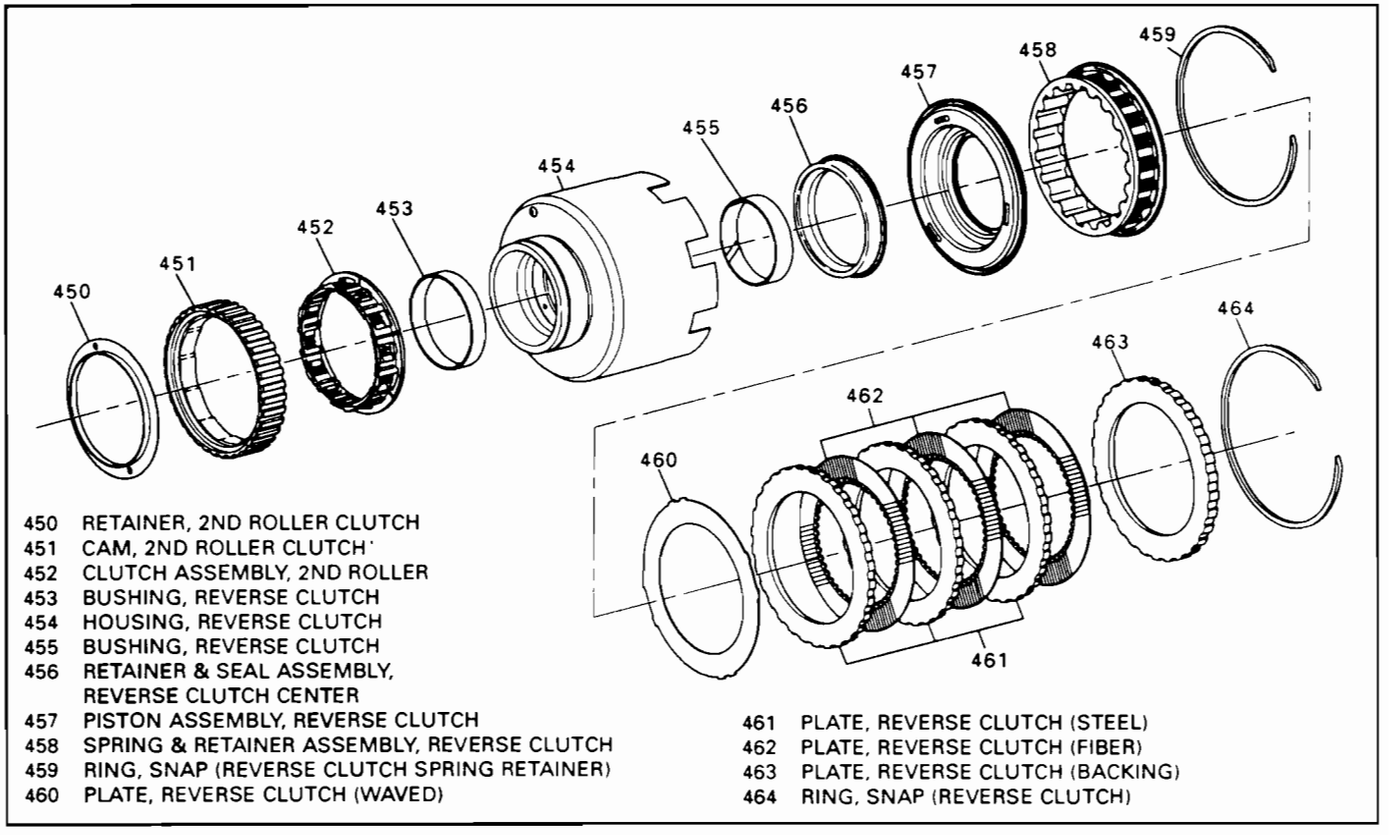
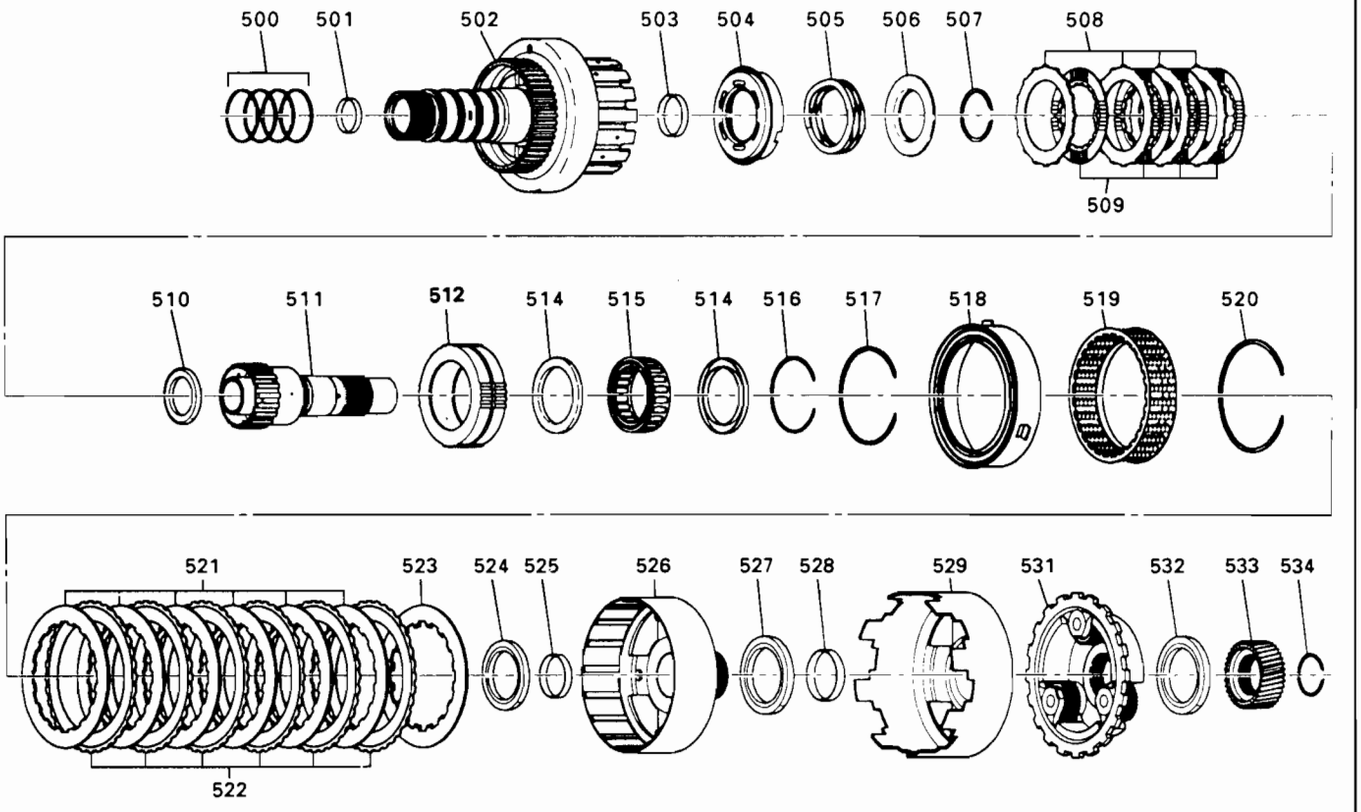
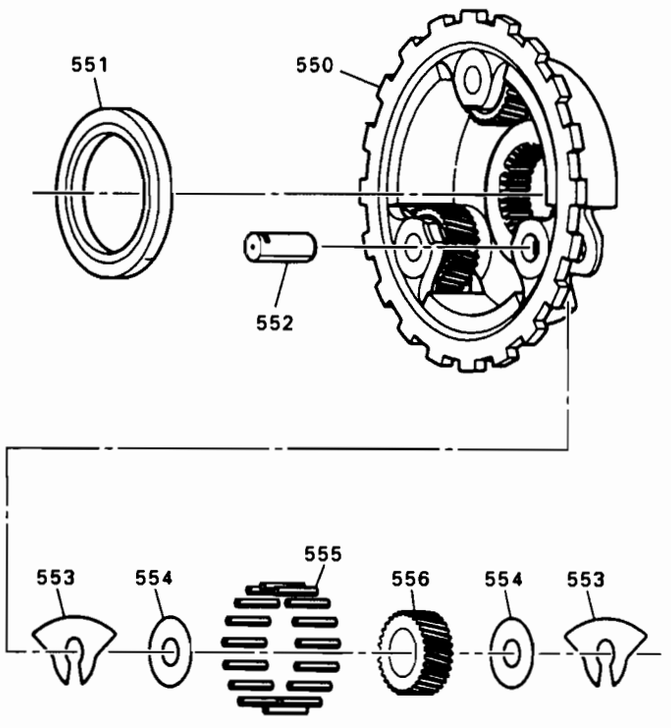


Figure 16



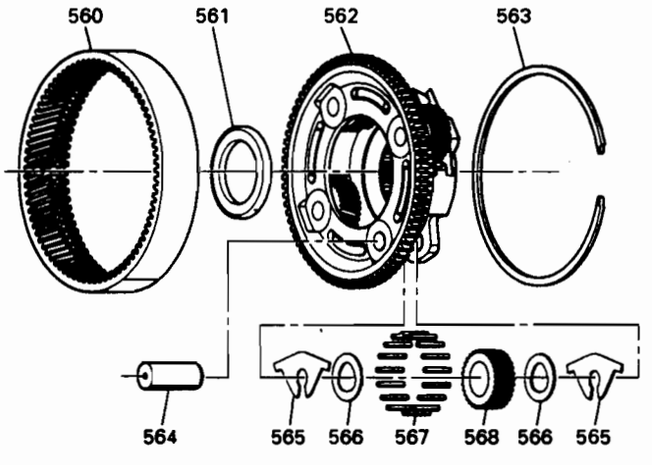
500 RING, OIL SEAL - INPUT SHAFT
501 BUSHING, INPUT SHAFT
502 HOUSING, DIRECT & COAST CLUTCH AND INPUT SHAFT
503 BUSHING, DIRECT CLUTCH HOUSING TO OUTPUT SHAFT
504 PISTON ASSEMBLY, COAST CLUTCH
505 SPRING, COAST CLUTCH RELEASE
506 RETAINER, COAST CLUTCH SPRING
507 RING, SNAP (COAST CLUTCH SPRING RETAINER)
508 PLATE, COAST CLUTCH (STEEL)
509 PLATE, COAST CLUTCH (FIBER)
510 BEARING, THRUST
511 SHAFT AND INNER RACE ASSEMBLY, INPUT SUN GEAR
512 RACE, OUTER (INPUT SPRAG)
514 END BEARINGS, SPRAG CLUTCH (2)
515 SPRAG ASSEMBLY, INPUT
516 RING, SNAP (OUTER RACE TO SPRAG ASSEMBLY)
517 RING, SNAP (DIRECT/COAST CLUTCH RETAINING)
518 PISTON ASSEMBLY, DIRECT CLUTCH
519 SPRING AND RETAINER ASSEMBLY, DIRECT CLUTCH
520 RING, DIRECT CLUTCH SPRING RETAINER
521 PLATE, DIRECT CLUTCH (STEEL)
522 PLATE, DIRECT CLUTCH (FIBER)
523 PLATE, DIRECT CLUTCH (BACKING)
524 BEARING, THRUST
525 BUSHING, REACTION CARRIER SHAFT
526 SHELL, REACTION CARRIER SHAFT
527 BEARING, THRUST (CARRIER SHAFT TO SHELL)
528 BUSHING, REACTION SUN GEAR
529 SHELL, REACTION SUN
531 CARRIER ASSEMBLY, REACTION
532 BEARING, THRUST (REACTION CARRIER TO SUN GEAR)
533 GEAR, REACTION SUN
534 RING, SNAP

Figure 17



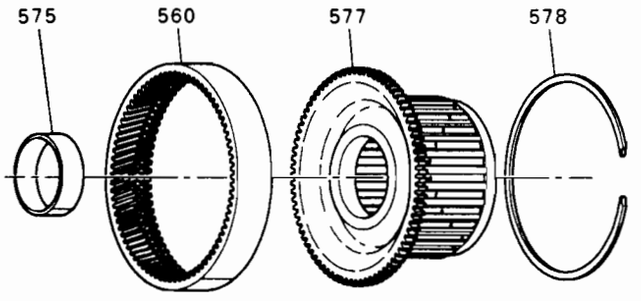
550 CARRIER, REACTION
551 BEARING, THRUST
552 PIN, PLANET PINION
553 WASHER, PINION THRUST REACTION
554 WASHER, PINION THRUST INNER
555 ROLLER NEEDLE BEARINGS
556 GEAR, REACTION PLANET PINION

Figure 18



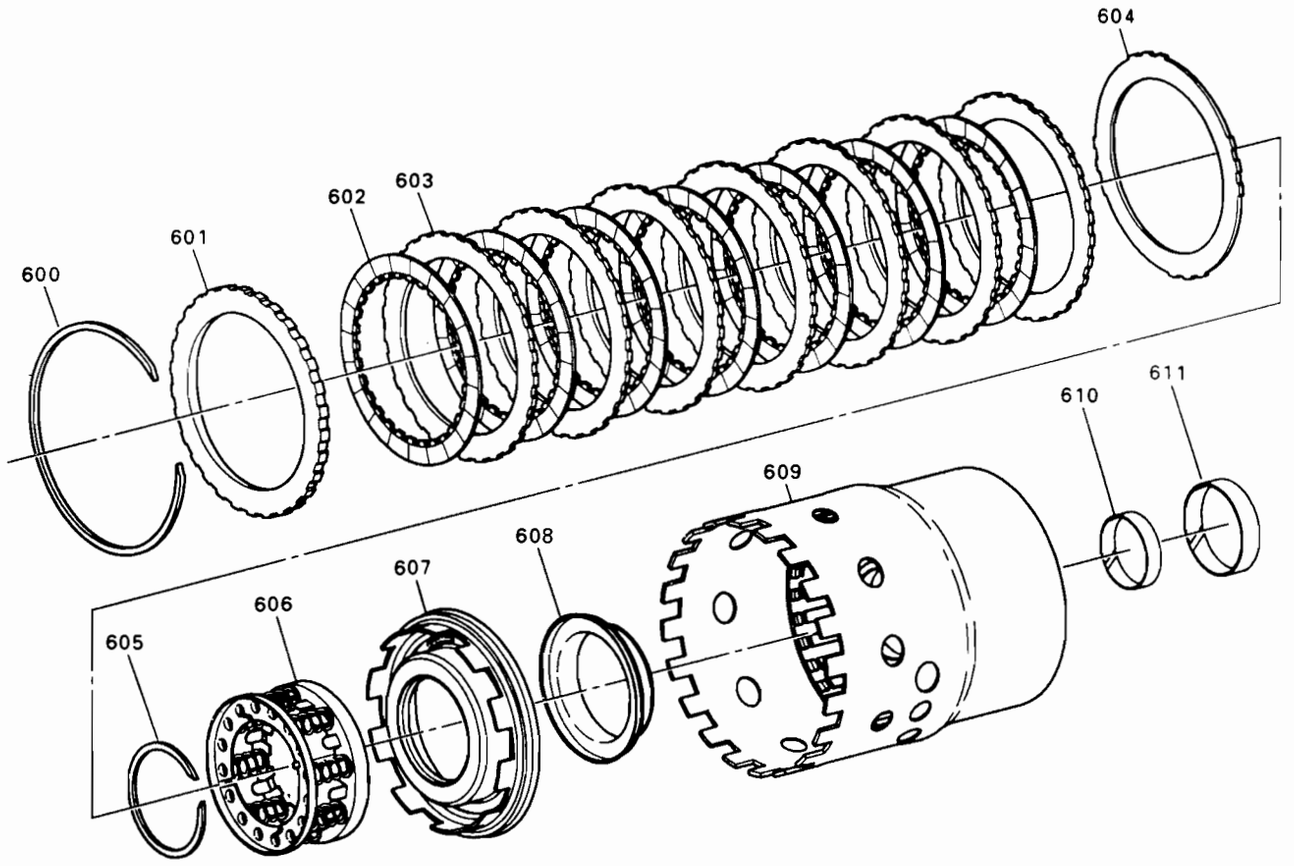
560 GEAR, INTERNAL REACTION
561 BEARING, THRUST
562 CARRIER, INPUT
563 SNAP RING (INPUT CARRIER TO INTERNAL GEAR)
564 PIN, PLANET PINION
565 WASHER, PINION THRUST INPUT
566 WASHER, PINION THRUST INNER
567 ROLLER NEEDLE BEARINGS
568 GEAR, PINION

Figure 19



575 BUSHING, INPUT FLANGE
560 GEAR, INTERNAL INPUT
577 INPUT FLANGE AND FORWARD CLUTCH HUB
578 SNAP RING (INPUT RING GEAR TO INPUT FLANGE

Figure 20



600 RING, SNAP (FORWARD CLUTCH)
601 PLATE, FORWARD CLUTCH (BACKING)
602 PLATE, FORWARD CLUTCH (FIBER)
603 PLATE, FORWARD CLUTCH (STEEL)
604 PLATE, FORWARD CLUTCH (WAVED)
605 RING, SNAP (FORWARD CLUTCH SPRING ASSEMBLY)
606 SPRING ASSEMBLY, FORWARD CLUTCH RETURN
607 PISTON ASSEMBLY, FORWARD CLUTCH
608 SEAL AND SLEEVE ASSEMBLY, FORWARD CLUTCH INNER
609 HOUSING, FORWARD CLUTCH
610 BUSHING, FORWARD CLUTCH SUPPORT
611 BUSHING, FORWARD CLUTCH SUPPORT

Figure 21

650 BUSHING, FINAL DRIVE SUN SHAFT
651 SHAFT, FINAL DRIVE SUN
652 CLUTCH ASSEMBLY, LO ROLLER
653 BEARING, THRUST
654 RING, OIL SEAL (FORWARD CLUTCH SUPPORT)
655 BUSHING, FORWARD CLUTCH SUPPORT
656 SUPPORT, FORWARD CLUTCH
657 BUSHING, FORWARD CLUTCH SUPPORT
658 BEARING, THRUST (FORWARD SUPPORT TO PARK GEAR)
659 GEAR, PARK LOCK
660 RING, SNAP (FINAL DRIVE SUN SHAFT)
661 SHAFT, PARKING LOCK PAWL
662 SPRING, PARKING LOCK PAWL RETURN
663 PAWL, PARKING LOCK

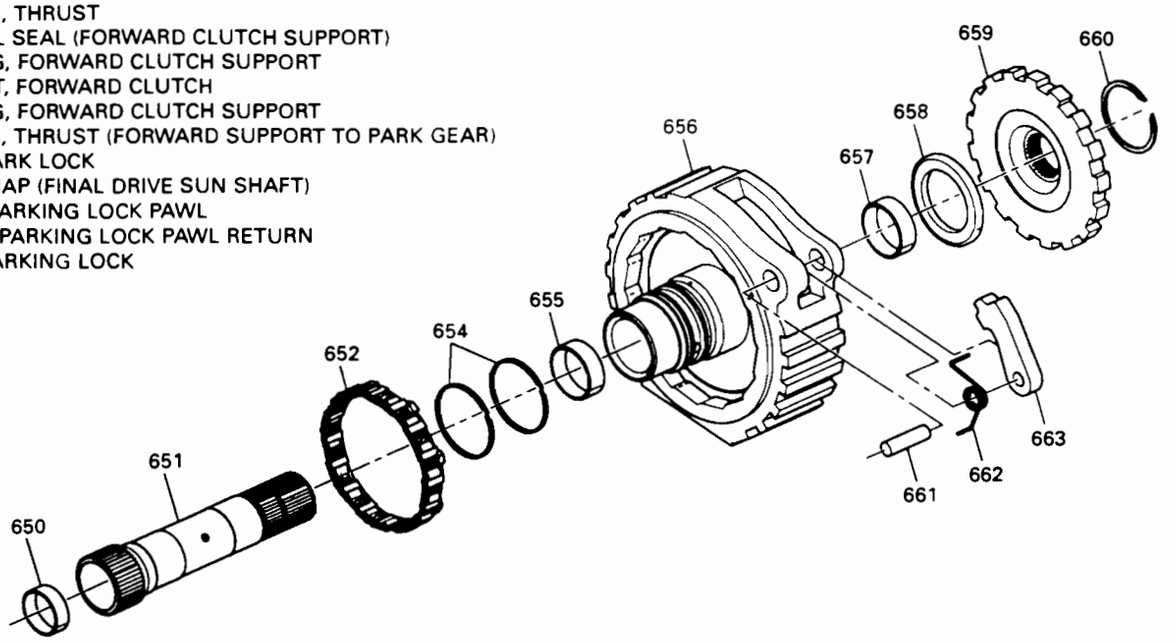


Figure 22

700 BEARING, THRUST
701 RING, SPIRAL PIN RETAINING
702 CARRIER, DIFFERENTIAL & FINAL DRIVE
703 SHAFT, DIFFERENTIAL PINION
704 PIN, DIFFERENTIAL PINION SHAFT RETAINING
705 ROTOR, SPEED SENSOR
706 WASHER, THRUST (DIFFERENTIAL PINION)
707 GEAR, DIFFERENTIAL PINION
708 WASHER, THRUST (DIFFERENTIAL SIDE GEAR)
709 GEAR, DIFFERENTIAL SIDE
710 WASHER, PINION THRUST
711 GEAR, PINION (FINAL DRIVE PLANET)
712 ROLLER NEEDLE BEARING
713 SPACER, PINION NEEDLE BEARING
714 PIN, PLANET PINION

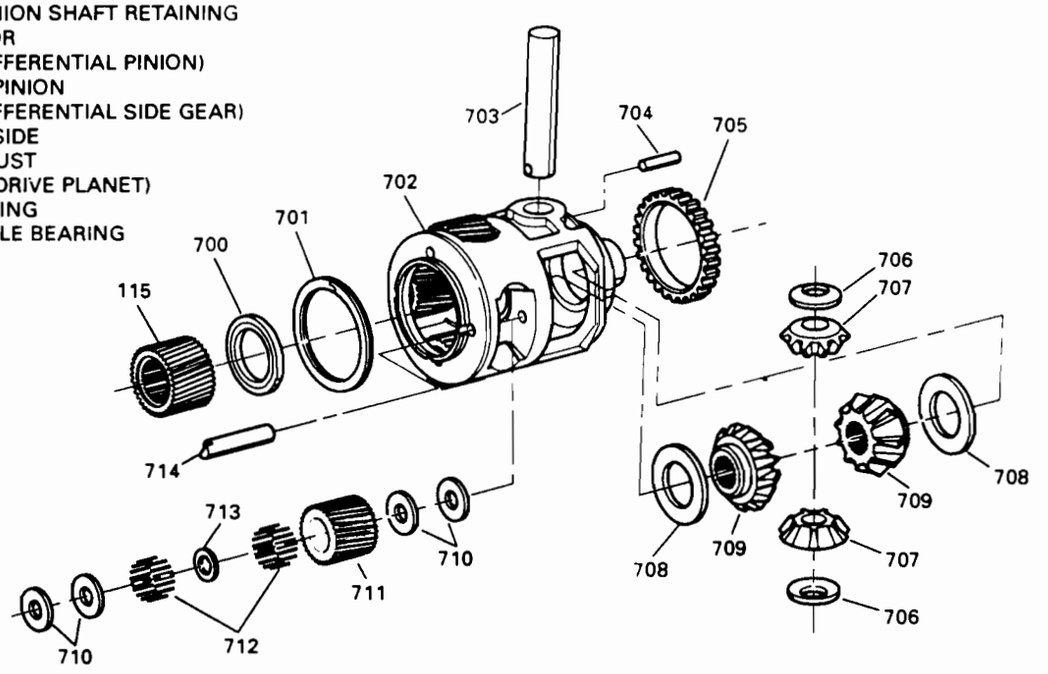
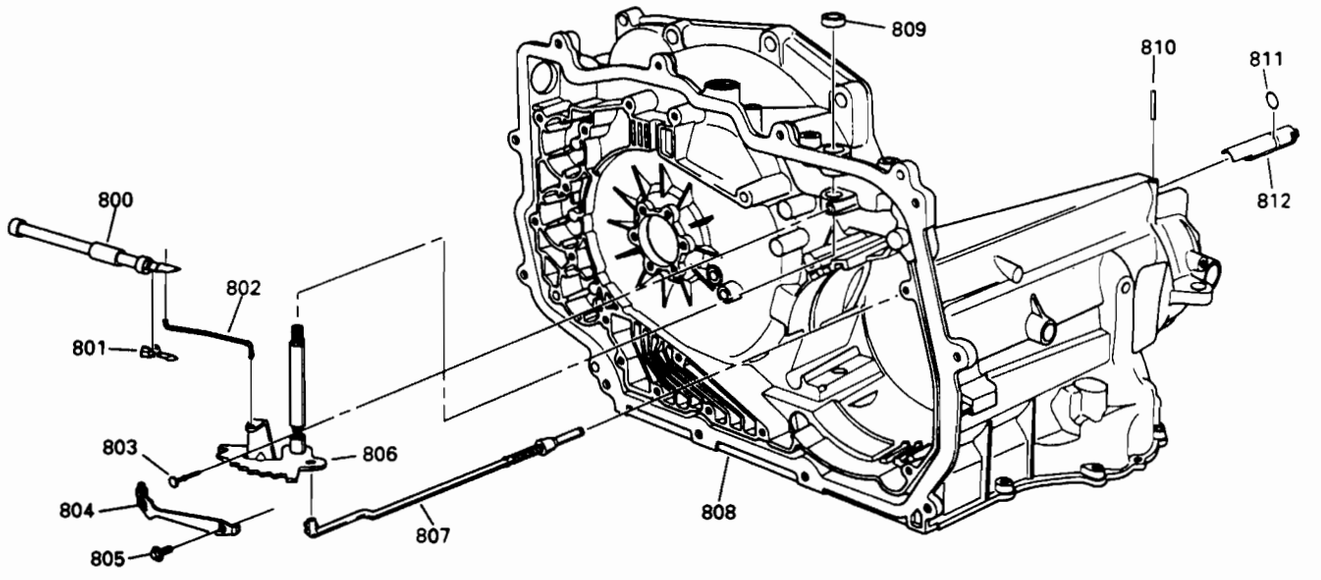


Figure 23



800 VALVE, MANUAL
801 CLIP, MANUAL VALVE TO LINK
802 LINK, MANUAL VALVE TO DETENT LEVER
803 PIN, MANUAL SHAFT TO CASE
804 SPRING AND ROLLER ASSEMBLY, MANUAL DETENT
805 BOLT, SPRING AND ROLLER ASSEMBLY TO CHANNEL PLATE
806 MANUAL SHAFT AND DETENT LEVER ASSEMBLY
807 PARKING LOCK ACTUATOR ASSEMBLY
808 CASE, TRANSAXLE
809 SEAL, MANUAL SHAFT TO CASE
810 PIN, SPRING (ACTUATOR GUIDE)
811 SEAL, ACTUATOR GUIDE
812 ACTUATOR GUIDE

Figure 24