1998 SEMINAR INFORMATION

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"GREAT SOLUTIONS FOR '98"

INTRODUCTION

In this years GREAT SOLUTIONS FOR '98 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 98, but in the years to come..

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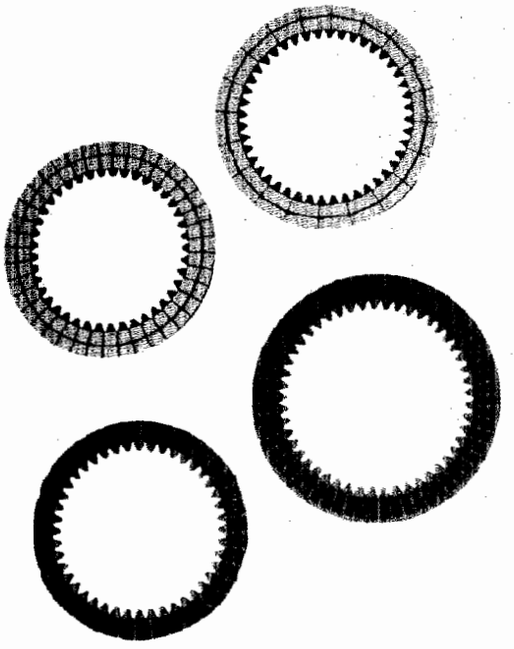
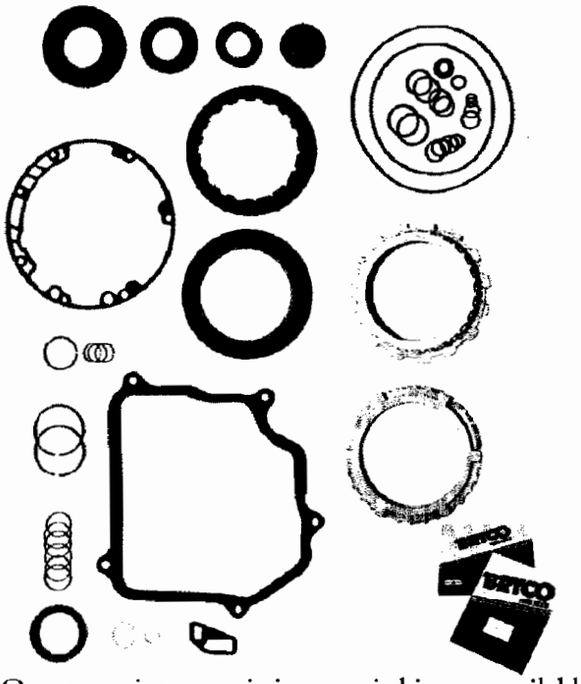


BRYCO segmented Honda friction plates are available in BRYCO automatic transmission repair kits.



BRYCO automatic transmission repair kits are available for American, European and Japanese applications.

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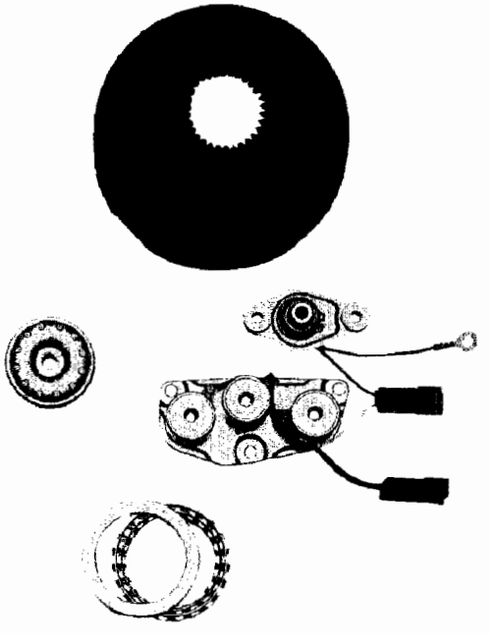

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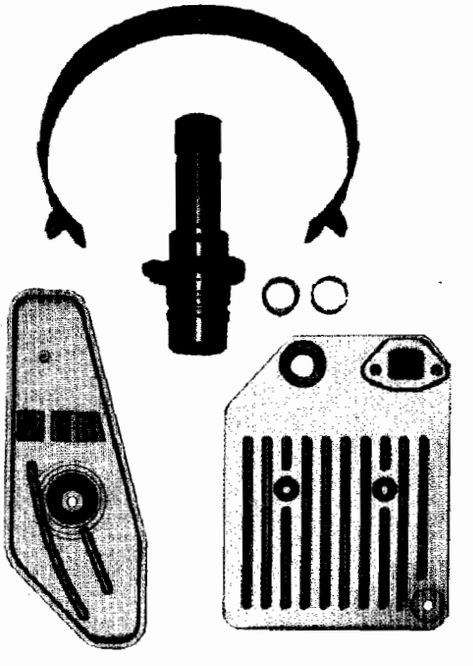

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SOLENOID TESTING

The following information has been compiled in order to help the technician determine whether or not a solenoid is good or bad both electrically and mechanically.
It is important for the user of the charts contained herein to understand the personality of the solenoid in question, such as polarity sensitivity, in what condition the solenoid normally resides, and what the resistance of that solenoid should be, at a given temperature.

1. SOLENOIDS... There are basically three types of solenoids, a simple ***ON/OFF*** solenoid which will either vent or hold pressure within a circuit, a ***PULSE WIDTH MODULATED*** solenoid which is duty cycled in order to regulate oil pressure within a circuit for a given time period, and a ***VARIABLE FORCE MOTOR*** which is constantly regulating oil pressure. This is accomplished by the computer varying the electrical signal (frequency) to the pressure control solenoid.
The PWM solenoid regulates oil by introducing oil into a circuit or opening that circuit to exhaust. This is accomplished by the computer turning the solenoid on for a period of time and off for a period of time. This is **"DUTY CYCLE"**, for example, if a PWM solenoid has a 60% duty cycle, this means this solenoid will be ON or pulsed for 60% of the time, and will be OFF for 40% of the time during each cycle of operation. PWM solenoids can be either Normally Closed (N.C.) or Normally Open (N.O.).

2. POLARITY...A solenoid is made polarity sensitive by the existence of a protective device in the solenoid circuit, such as a diode. These diodes are usually contained in the solenoid or found in circuits for solenoids that are classified as ON/OFF solenoids in order to protect the computer from a voltage spike produced by the solenoid coil when the solenoid is turned off.

CAUTION: Where the charts indicate that an ON/OFF solenoid is not polarity sensitive, that means that the solenoid itself does not contain a diode, however, this does not mean that the computer is not protected, it simply means that the diode is located elsewhere in the circuit, for example it may be in the solenoid wiring or inside the computer.
When testing a diode equipped solenoid, some solenoid testers have a diode test function which will cause the solenoid not to test correctly if polarity is reversed and to also avoid damaging the solenoid.
Pulsed, modulated or variable types of solenoids, as a rule are not polarity sensitive because, below a certain resistance diodes are not needed due to the lack of flyback voltage.

WARNING: It is recommended that when unregulated voltage is applied to PWM or VARIABLE solenoids, the voltage should not be left applied for a prolonged time period in order to avoid solenoid damage and to avoid getting burned. A dry solenoid run for a prolonged time period will get hot.

3. SOLENOID STATE... Solenoid state is the normal state of the solenoid when electrical power is removed. A solenoid can be ***normally open (N.O.) or normally closed (N.C.)*** **BUT,** not all solenoids are either open or closed. Some solenoids are classified as ***normally applied (N.A.) or normally vented (N.V.),*** which means that they are capable of some type of function whether power is removed or supplied.
An ON/OFF solenoid will either block or exhaust oil when power is removed. If oil is blocked when solenoid power is removed , then it is classified as normally closed. If oil is exhausted when power is removed then it is classified as normally open as shown in Figures 1 and 2.
Solenoids that are duty cycled are usually Pulse Width Modulated which can be TCC, BAND APPLY or even CLUTCH APPLY solenoids. These solenoids are regulating pressure by pulsing oil for a controlled time period ("on time") to a device in order to gradually apply or release that device.

SOLENOID TESTING

When that device needs regulation, the PWM solenoid will return to it"s normal state ("off time"). Refer to Figures 3 and 4 for PWM solenoids.
When the VARIABLE solenoid is supplying minimum pressure and maximum exhaust when power is removed, that solenoid is classified as ***normally vented.***
When the VARIABLE solenoid is supplying maximum pressure and minimum exhaust when power is removed, that solenoid is classified as ***normally applied***. Variable solenoids are typically used to control line pressure. Refer to Figures 5 and 6 for variable solenoids.

3. RESISTANCE (OHMS)... Solenoid resistance is determined by the internal coil of the solenoid. The more wire wrapped around the coil the greater the resistance. Resistance is affected by temperature, a high or low temperature can change a solenoids resistance. All solenoid resistance values in these charts were measured at 68° Fahrenheit. Resistance (ohms) and voltage directly affect amps. If amps are correct the resistance and voltage will usually be correct.

NOTE: When testing solenoids in a solenoid tester, the tester manufacturer may refer to all types of solenoids as either normally open or normally closed. This is a result of the solenoid test blocks being designed to either block oil or exhaust oil. We at A.T.S.G. believe that a three port solenoid in its normal environment (installed in the case or valve body) will not be either closed or open, but will be either applied or vented.

The amperage draw of a solenoid can be calculated by dividing known solenoid voltage by known solenoid resistance (ohms).
If the known solenoid voltage is 12 volts and the known solenoid resistance is 21.5 ohms, then the amp draw for that solenoid should be .558 of an amp or approximately ½ an amp.
This example would look like this.....**12 + 21.5 = .56**
VOLTS OHMS AMPS

Refer to the charts in figures 7, 8, 9 and 10 for the solenoid functions listed above.

The chart legend is: N.O.....Normally Open
N.C.....Normally Closed
N.A.....Normally Applied
N.V.....Normally Vented
N/A.....Not Applicable/Not Available
PCS.....Pressure Control Solenoid
PWM....Pulse Width Modulated
TCC.....Torque Converter Clutch
MCCC..Modulated Converter Clutch Control
EPC.....Electronic Pressure Control

Special thanks to: Jack Magoolaghan...Answermatic, Inc.
Larry Schaffer...Schaffer Enterprises
Russ Sylvis...Russ Sylvis, Inc.
without whose help and generosity, would have made the compilation of this information impossible.

SOLENOID TESTING

ON/OFF SOLENOID

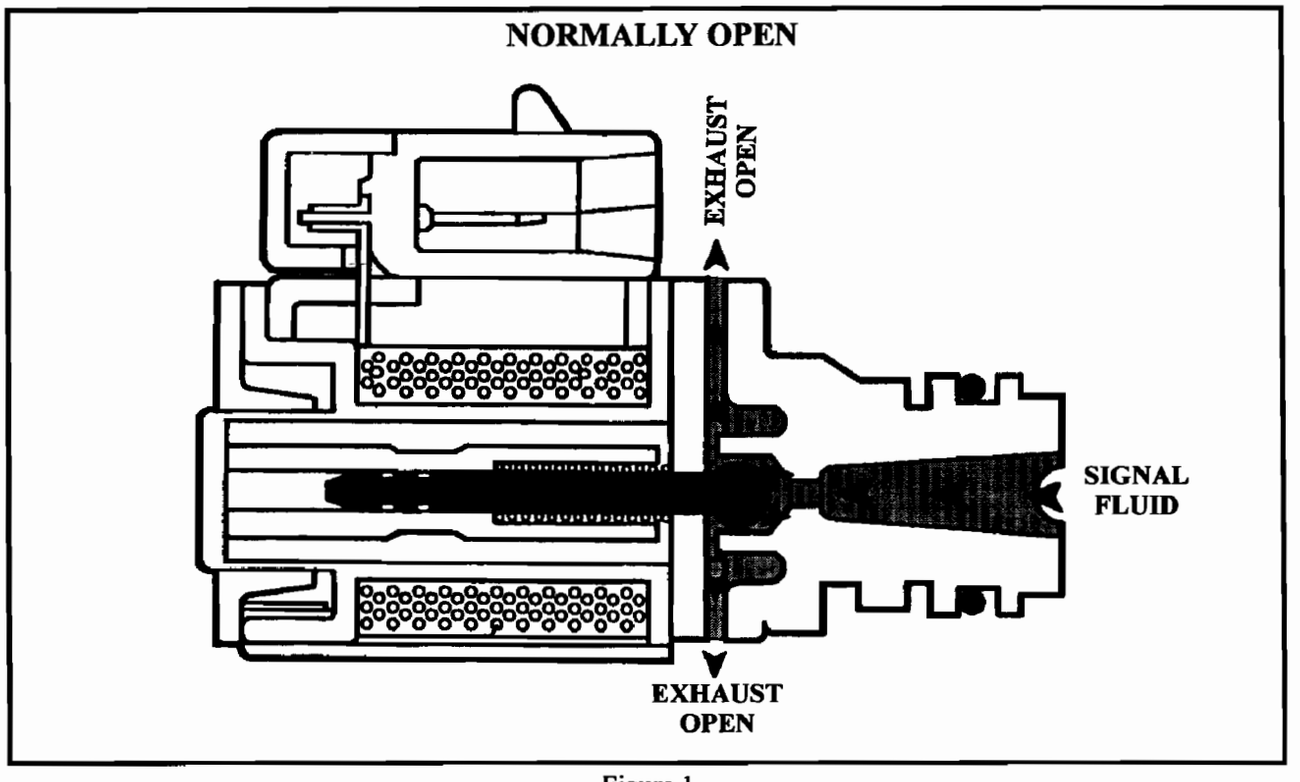

Figure 1

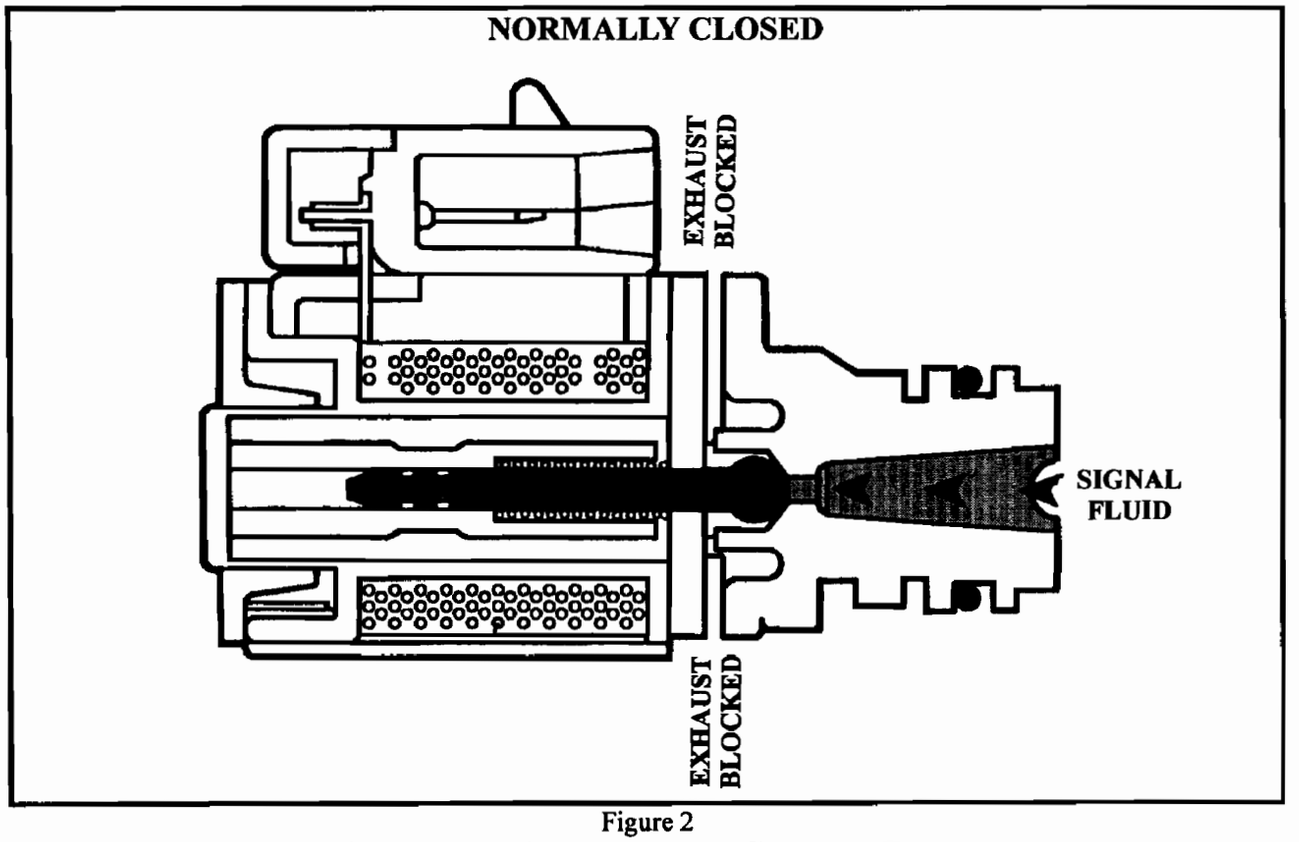

Figure 2

SOLENOID TESTING

PULSE WIDTH MODULATED (PWM) SOLENOID

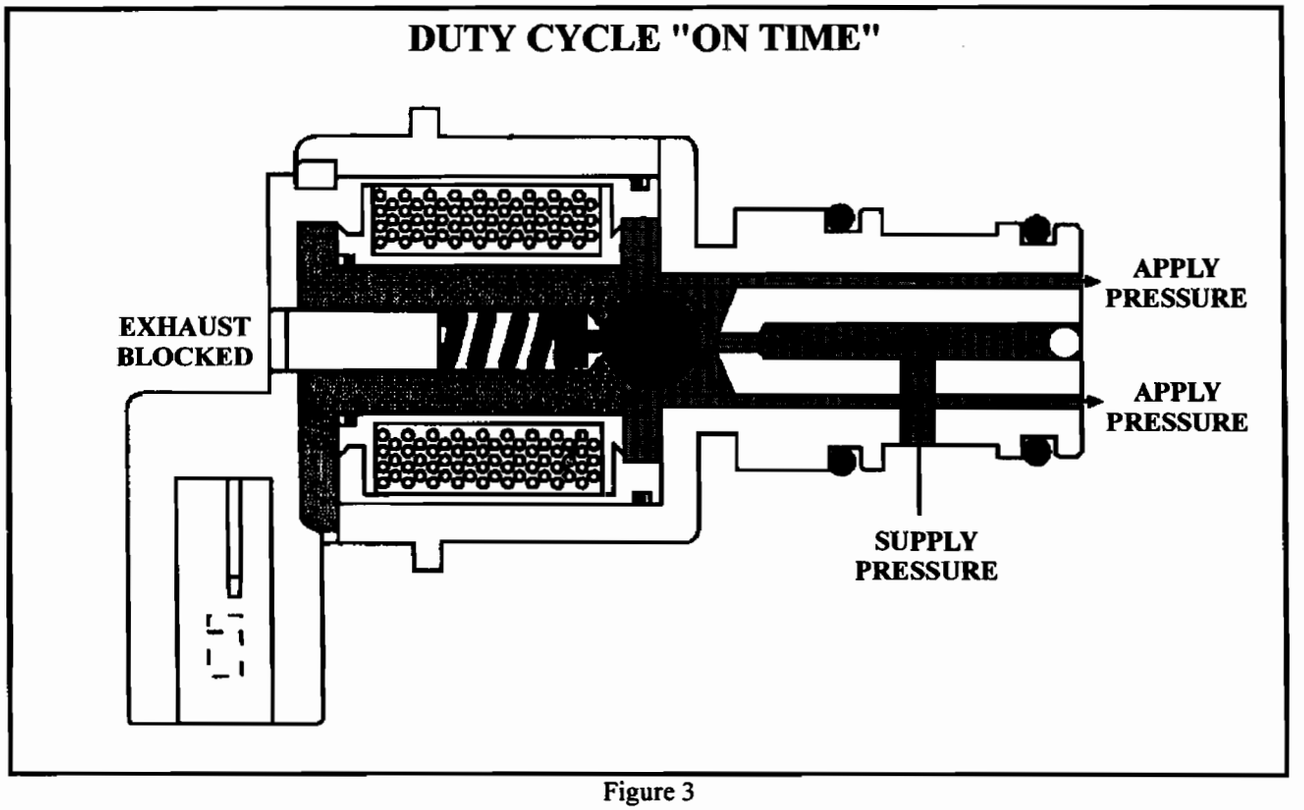

Figure 3

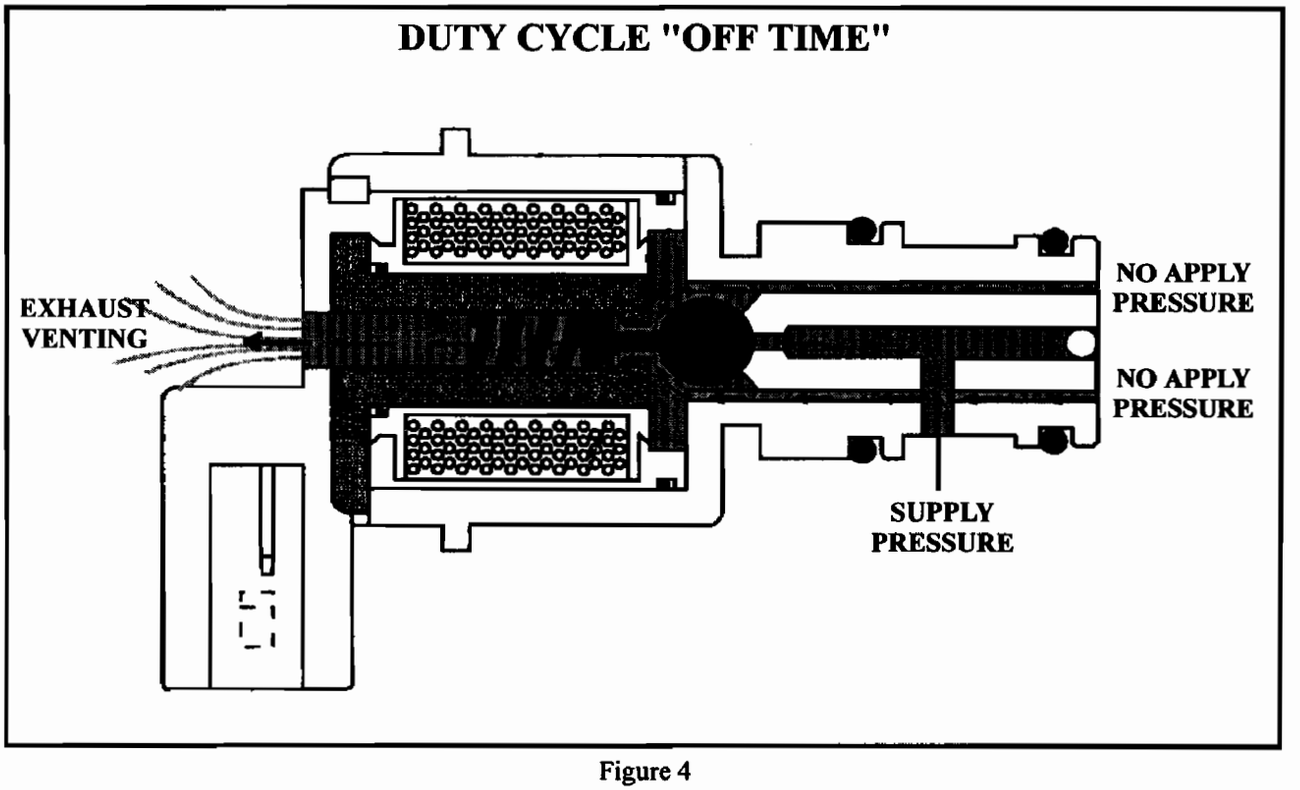

Figure 4

SOLENOID TESTING

VARIABLE FORCE SOLENOID

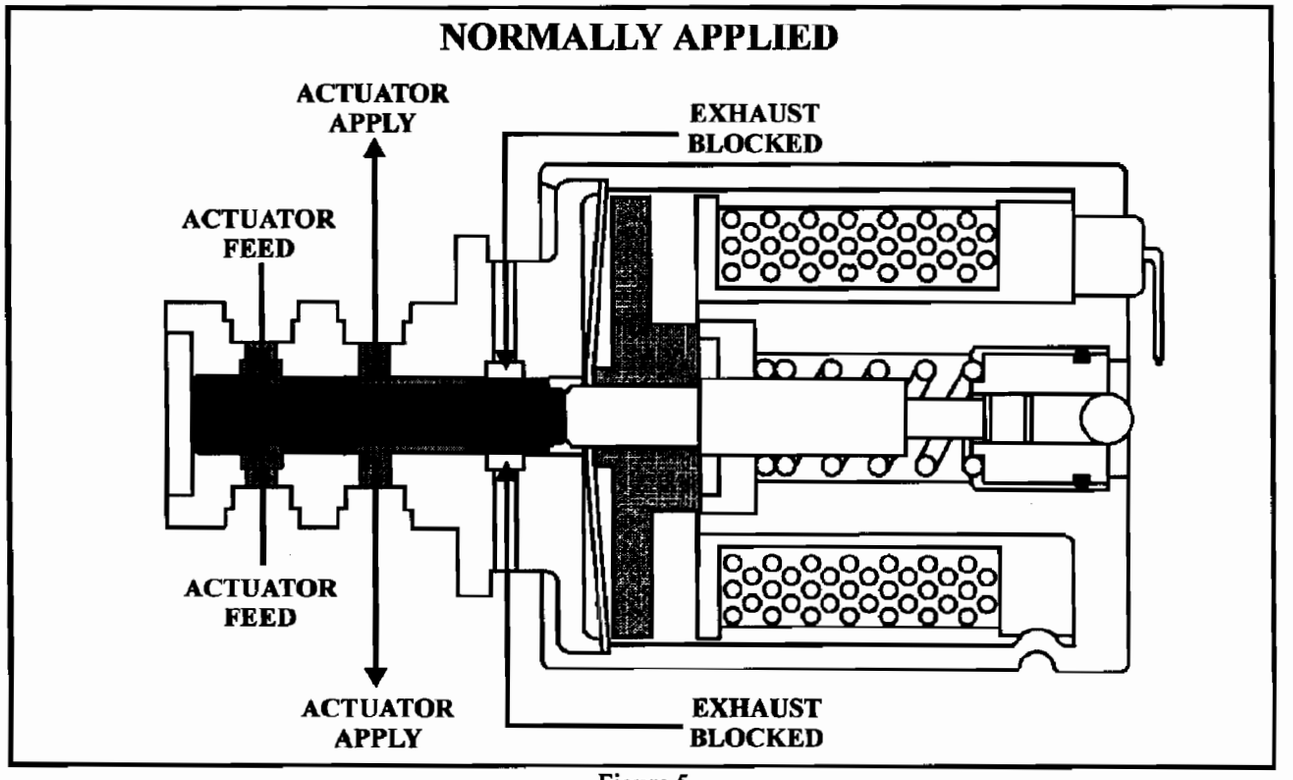

Figure 5

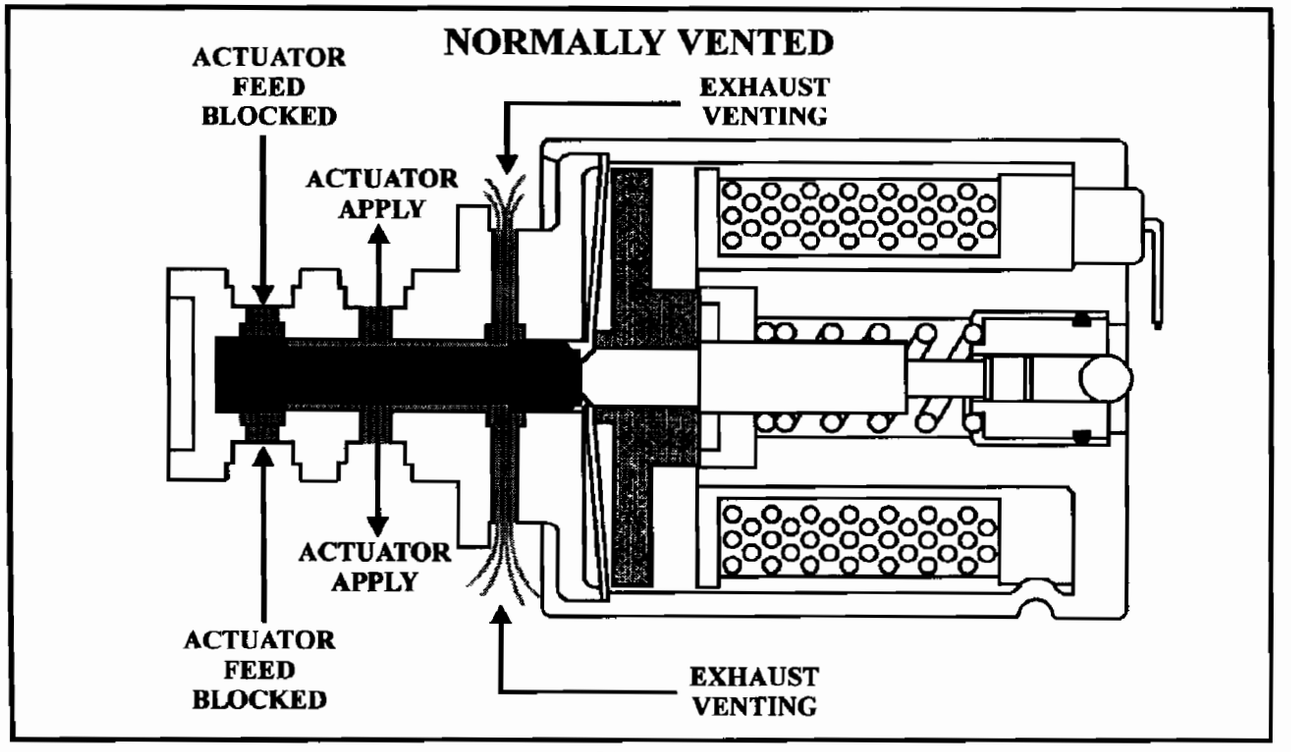

Figure 6

SOLENOID FUNCTION CHART

DOMESTIC

TRANSMISSION TYPE	SOLENOID TYPE	NORMALLY OPEN NORMALLY CLOSED NORMALLY VENTED NORMALLY APPLIED	APPROXIMATE OHMS	POLARITY SENSITIVE
250C/350C	TCC	N.O.	24.0	YES
400	TCC	N.C.	10.4	NO
180C	TCC	N.O.	20.0	YES
200C	TCC	N.O.	25.0	YES
2004R	TCC	N.O.	25.0	YES
125C	TCC	N.O.	25.0	YES
3254L	TCC	N.O.	25.0	YES
4T60	TCC	N.O.	25.0	YES
4L60	TCC	N.O.	25.0	YES
4L80E	BOSCH PCS	N.A.	3.8	NO
4L80E	HOLLEY PCS	N.A.	4.2	NO
4L80E	TCC/PWM	N.C.	10.9	NO
4L80E	SHIFT A & B	N.O.	23.7	NO
4L60E	HOLLEY PCS	N.A.	4.2	NO
4L60E	TCC	N.O.	24.2	YES
4L60E	TCC/PWM	N.C.	10.9	NO
4L60E	3-2/PWM	N.C.	10.9	NO
4L60E	3-2/ON/OFF	N.O.	23.3	NO
4L60E	SHIFT A & B	N.O.	21.3	NO
4T60E	SHIFT A & B	N.O.	21.3	NO
4T60E	TCC	N.O.	24.5	NO
4T60E	TCC/PWM	N.O.	10.8	NO
4L30E	BOSCH PCS	N.A.	3.8	NO
4L30E	BAND APPLY/PWM	N.O.	10.8	NO
4L30E	1-2/3-4 SHIFT	N.C.	17.9	NO
4L30E	2-3 SHIFT	N.O.	17.9	NO
4L30E	TCC	N.C.	17.9	NO
4T40E	SHIFT A & B	N.O.	20.8	NO
4T40E	PRESS. CTRL	N.A.	4.1	NO
4T40E	TCC/PWM	N.C.	10.7	NO
4T80E	SHIFT A & B	N.O.	21.5	NO
4T80E	PRESS. CTRL	N.A.	4.1	NO
4T80E	TCC/PWM	N.C.	10.7	NO
4T65E	1-2/3-4 SHIFT	N.O.	21.0	NO
4T65E	2-3 SHIFT	N.O.	21.0	NO
4T65E	PRESS. CTRL	N.A.	4.0	NO
4T65E	TCC/PWM	N.C.	10.5	NO
SATURN	ALL	N.A.	3.1 - BLK OR BLU	NO
SATURN	ALL	N.A.	4.5 - RED	NO

Figure 7

SOLENOID FUNCTION CHART

TRANSMISSION TYPE	SOLENOID TYPE	NORMALLY OPEN NORMALLY CLOSED NORMALLY VENTED NORMALLY APPLIED	APPROXIMATE OHMS	POLARITY SENSITIVE
A4LD	TCC	N.O.	30.5	NO
A4LD	3-4 SHIFT	N.C.	30.5	NO
4R44/55E	SS1-SS2-SS3	N.O.	26.2	NO
4R44/55E	COAST CLUTCH	N.O.	25.8	NO
4R44/55E	TCC	N.O.	9.7	NO
4R44/55E	EPC	N.A.	3.6	NO
E4OD	SS1-SS2	N.C.	19.6	89-94-YES
E4OD	COAST CLUTCH	N.C.	19.5	89-94-YES
E4OD	TCC	N.C.	19.9	89-94-YES
E4OD	EPC	N.A.	4.3	89-94-YES
AXOD	TCC	N.O.	28.6	NO
AX4S/AX4N	SS1-SS2-SS3	N.O.	17.2	NO
AX4S/AX4N	TCC/LUS	N.O.	24.2	NO
AX4S/AX4N	MCCC	N.C.	1.4	NO
AX4S/AX4N	EPC	N.A.	4.1	NO
AODE/4R70W	SS1-SS2	N.O.	24.2	NO
AODE/4R70W	MCCC(BLK CONN)	N.C.	1.3	NO
AODE/4R70W	MCCC(WHT CONN)	N.C.	10.9	NO
AODE/4R70W	EPC	N.A.	3.5	NO
CD4E	SS1-SS2	N.C.	16.3	NO
CD4E	TCC	N.V.	13.7	NO
CD4E	3-2 TIMING/COAST	N.V.	4.3	NO
CD4E	EPC	N.A.	4.3	NO
F-4EAT/F4A-EL	1-2/2-3/3-4 SHIFT	N.C.	16.1	NO
F-4EAT/F4A-EL	TCC	N.C.	16.3	NO
G-4EAT/G4A-EL	1-2/2-3/3-4 SHIFT	N.C.	16.1	NO
G-4EAT/G4A-EL	TCC	N.C.	16.4	NO
GF-4EAT/GF4A-EL	1-2/2-3/3-4 SHIFT	N.C.	16.7	NO
GF-4EAT/GF4A-EL	TCC	N.C.	16.7	NO
GF-4EAT/GF4A-EL	TCC CONTROL	N.C.	12.5	NO
GF-4EAT/GF4A-EL	3-2 DOWNSHIFT	N.C.	16.7	NO
GF-4EAT/GF4A-EL	PRESS. CNTRL	N.C.	12.5	NO
5R55E	SS1-SS2-SS3-SS4	N.O.	25.6	NO
5R55E	TCC	N.O.	10.0	NO
5R55E	EPC	N.A.	4.5	NO

Figure 8

SOLENOID FUNCTION CHART

TRANSMISSION TYPE	SOLENOID TYPE	NORMALLY OPEN NORMALLY CLOSED NORMALLY VENTED NORMALLY APPLIED	APPROXIMATE OHMS	POLARITY SENSITIVE
A604/A606	LR & OD	N.V.	1.7	NO
A604/A606	2-4 & UD	N.A.	1.7	NO
A500/A518	OVERDRIVE	N.O.	31.2	NO
A500/A518	TCC	N.O.	31.2	NO
42RE	GOV. PRESSURE	N.A.	3.8	NO
42RE	OD & TCC	N.O.	30.8	NO
999	TCC	N.O.	15.3	NO
670	TCC	N.O.	16.0	NO
IMPORTS				
A40D SERIES	OVERDRIVE	N.O.	13.0	NO
A43DE	SS1 & SS2	N.C.	13.0	NO
A43DE	TCC	N.C.	13.0	NO
A130	TCC	N.C.	13.0	NO
A140L&E	TCC	N.O.	13.0	NO
A140E	SS1 & SS2	N.C.	13.0	NO
A210 (MX17)	2ND BRAKE DIRECT CLUTCH	N.C.	13.0	NO
A240L&E	TCC	N.C.	13.0	NO
A240E SERIES	SS1 & SS2	N.C.	13.0	NO
A540E&H	TCC	N.O.	13.0	NO
A540E&H	SS1 & SS2	N.C.	13.0	NO
A540H	CNTR DIFF 1&2	N.C.	13.0	NO
A541E	SS1 & SS2	N.C.	13.0	NO
A541E	TCC	N.C.	13.0	NO
A541E	ACCUM. PRESS.	N.A.	5.2	NO
A340E,F,H	TCC	N.O.	13.0	NO
A340E,F,H	SS1 & SS2	N.C.	13.0	NO
A340H	T.C. SHIFT	N.C.	13.0	NO
A341E	SS1 & SS2	N.C.	13.0	NO
A341E	ACCUM. PRESS.	N.A.	5.2	NO
A341E	TCC CONTROL	N.A.	3.8	NO
E4N71B	OD CANCEL	N.O.	15.0	NO
E4N71B	LOCK-UP	N.O.	20.0	NO
N4A-EL	1-2/2-3/3-4 SHIFT	N.C.	20.0	NO
N4A-EL	3-2 DWNSHIFT	N.C.	20.0	NO
N4A-EL	LOCK-UP	N.O.	20.0	NO
RE4R01A	A&B SHIFT	N.O.	25.0	NO
RE4R01A	OVERRUN	N.O.	25.0	NO
RE4R01A	LOCK-UP	N.C.	13.0	NO
RE4R01A	PRESS. CNTROL	N.C.	3.5	NO

Figure 9

SOLENOID FUNCTION CHART

TRANSMISSION TYPE	SOLENOID TYPE	NORMALLY OPEN NORMALLY CLOSED NORMALLY VENTED NORMALLY APPLIED	APPROXIMATE OHMS	POLARITY SENSITIVE
RE4RO3A	**SAME AS RE4RO1A**			
R4A-EL				
R4AX-EL				
JR403E				
JF403E				
RE4FO2A				
RE4FO3A				
RE4FO4A				
4F20E				
F4A-EL	**SEE FORD LISTING**			
G4A-EL				
GF4A-EL				
G4A-HL	OD CANCEL	N.C.	20.0	NO
RL4F02A/3A	OD CANCEL	N.O.	25.0	NO
RL4F02A/3A	TCC CANCEL	N.O.	25.0	NO
RL4R01A	OD CANCEL	N.O.	21.0	NO
RL4R01A	TCC CANCEL	N.O.	21.0	NO
KM171/2	TCC	N.C.	3.0	NO
F4A21/22/23/33	SHIFT	N.C.	22.0	NO
F4A21/22/23/33	TCC	N.C.	3.0 (UP TO 1993)	NO
F4A21/22/23/33	TCC	N.C.	13.0 (1994 & UP)	NO
F4A21/22/23/33	PRESS. CNTRL	N.C.	3.0	NO
ACURA/HONDA	SHIFT	N.C.	14.4	NO
ACURA/HONDA	TCC	N.C.	14.4	NO
ACURA/HONDA	PRESS. CNTRL	N.C.	5.2	NO
M41A	KICKDOWN	N.C.	28.0	NO
M41A	TRANSFER CLUTCH	N.C.	28.0	NO
SUBARU 4SPD.	SHIFT	N.O.	25.0	NO
SUBARU 4SPD.	OVERRUN	N.O.	25.0	NO
SUBARU 4SPD.	PRESS. CNTRL	N.C.	3.5	NO
SUBARU 4SPD.	TCC	N.O.	13.0	NO
SUBARU 4SPD.	TRANSFER CLUTCH	N.O.	13.0	NO
MERCEDES	DETENT	N.C.	13.0	NO
VW 096	EV1,2,3,4,5,7	N.O.	60.0	NO
VW 096	EV 6	N.A.	5.0	NO
ZF4HP22E	SHIFT 1&2	N.O.	30.0	NO
ZF4HP22E	REV LOCK-OUT	N.O.	30.0	NO
ZF4HP22E	TCC	N.O.	30.0	NO
ZF4HP22E	PRESS. CNTRL	N.A.	3.5	NO

Figure 10

Compare the features... offers more for less:

Does your tester do this?	TranX 2000™

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MITSUBISHI F4A41/42

PRELIMINARY INFORMATION

At the start of production, 1997, Mitsubishi introduced the F4A41/42 in the Mirage. This is a totally new transmission which does not operate the same way as past KM units. With the association between Mitsubishi and Chrysler stronger than ever, the F4A41/42 resembles a KM unit, BUT, operates like a 604 transmission.

The differences immediately noticed on this transaxle are the spin-on oil filter and the side cover. This unit also has an inhibitor switch like a KM and has an input and output speed sensor similar to both the KM and the 604, BUT, has an end cover similar to the KM as shown in figure 1.

With the side cover and valve body removed, the four accumulators can be seen. These accumulators are for the low/reverse clutch, the underdrive clutch, the second clutch and the overdrive clutch. These accumulators and clutch packs as well as the other internal components can be seen in the exploded views in figures 2 and 3.
As can be seen in the clutch application chart in figure 4, there are no bands or sprags like the 604 and clutch application is virtually identical to the 604.

Each clutch has it's own solenoid and regulator valve including converter clutch which also has a damper clutch control valve like the KM as seen in the hydraulic schematic in figure 5.
The solenoids in this unit are all pulsed solenoids like the 604, BUT, unlike the 604, the KM solenoids are all normally applied and also has a damper clutch control solenoid.

An exploded view of the valve body as well as solenoid identification can be seen in figure 6.
Electrically the F4A41/42 works similar to the 604 with limp mode being third gear like the KM systems, BUT, will be in second gear if power is lost like the 604.
The F4A41/42 use a separate controller for the transmission and a relay to supply power to the transmission (Refer to Figure 7) similar to the Chrysler EATX system.

The chart in figure 8 indicates the clutch pressure in each gear selection, the pressures seen are very close to the clutch pressures seen in the 604.
The illustration in figures 9 and 10 show the location of the clutch pressure service ports.
The pressure ports are identified by the cast in letters next to each service port and relate to each clutch circuit in the transmission.
The "DA" and "DR" service ports seen at the bottom of figure 10 indicate "Damper Clutch Apply" and "Damper Clutch Release"pressures.

MITSUBISHI F4A41/42

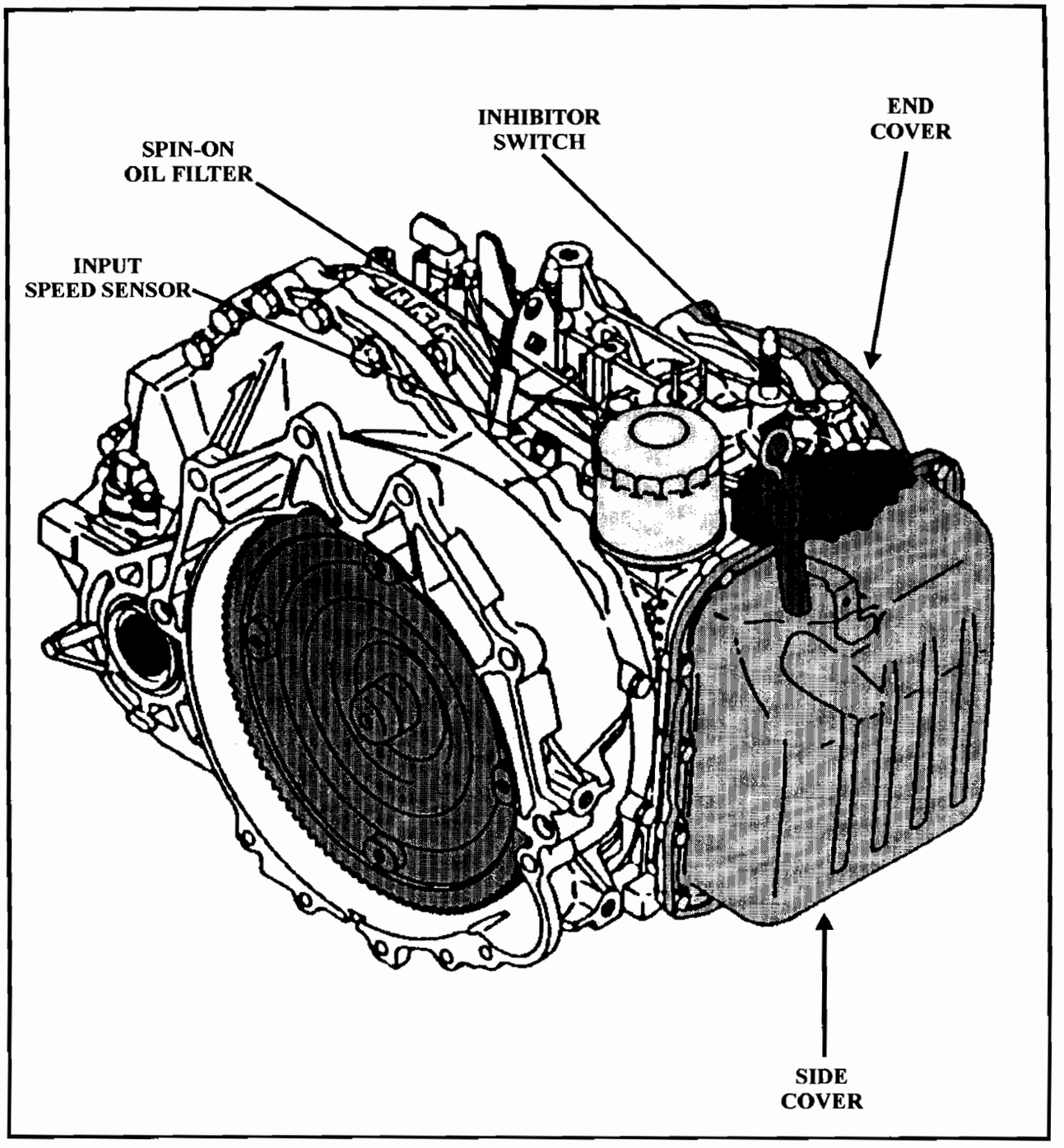
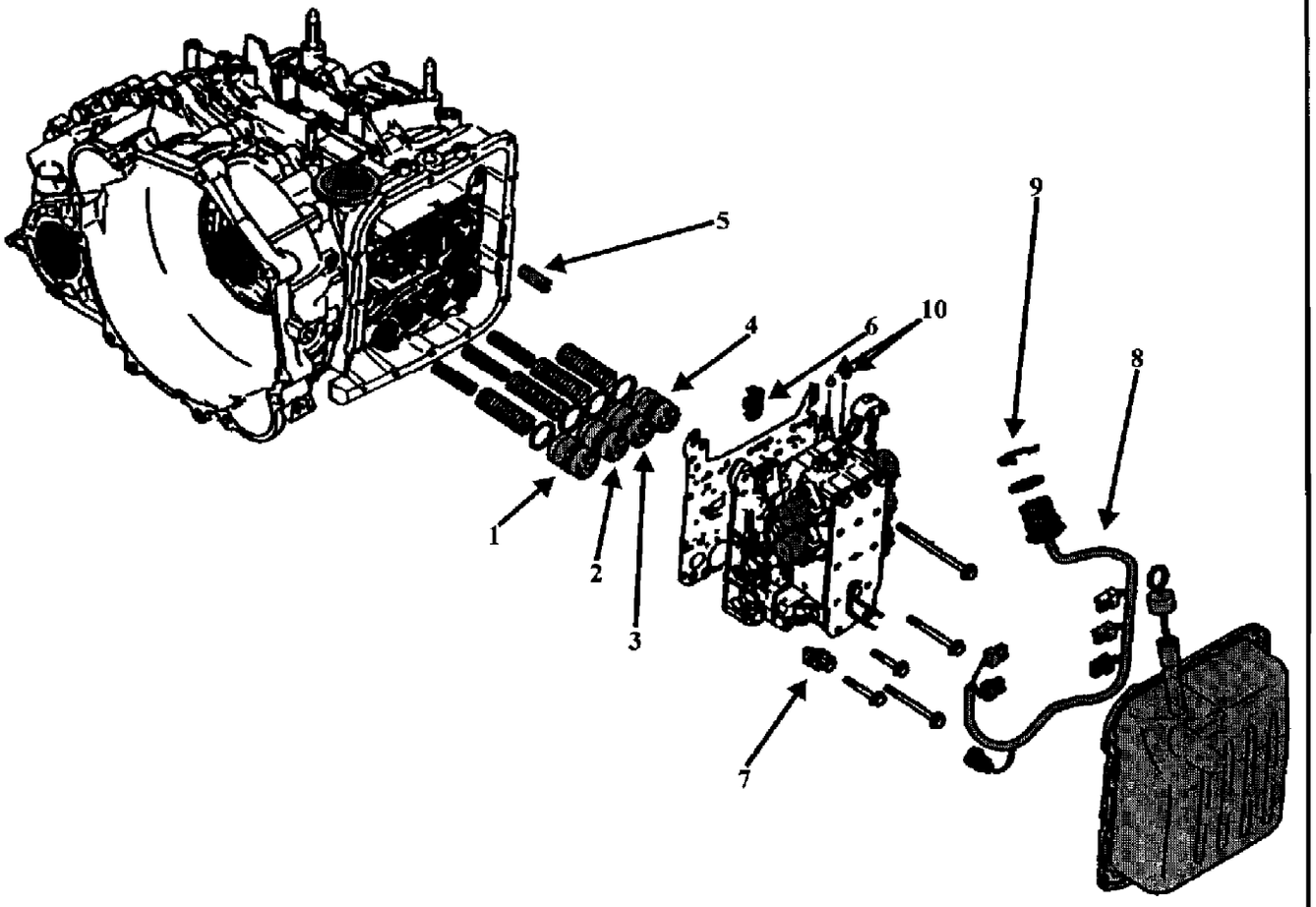


Figure 1

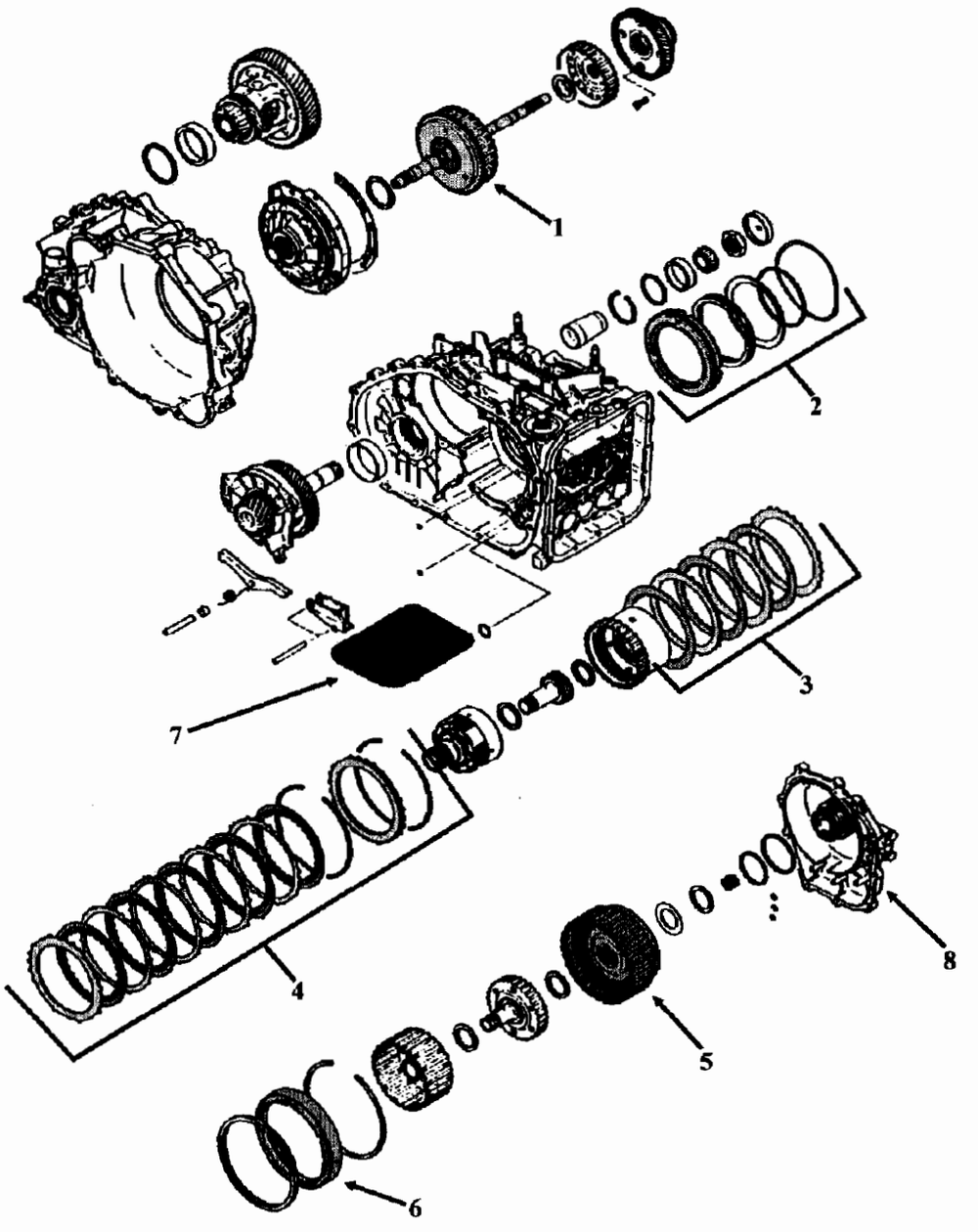
MITSUBISHI F4A41/42



1. LOW/REVERSE ACCUMULATOR
2. UNDERDRIVE ACCUMULATOR
3. SECOND BRAKE ACCUMULATOR
4. OVERDRIVE ACCUMULATOR
5. SECOND BRAKE OIL SEAL
6. SCREEN
7. ATF TEMPERATURE SENSOR
8. SOLENOID WIRING HARNESS
9. SOLENOID CONNECTOR RETAINER
10. CHECK BALLS

Figure 2

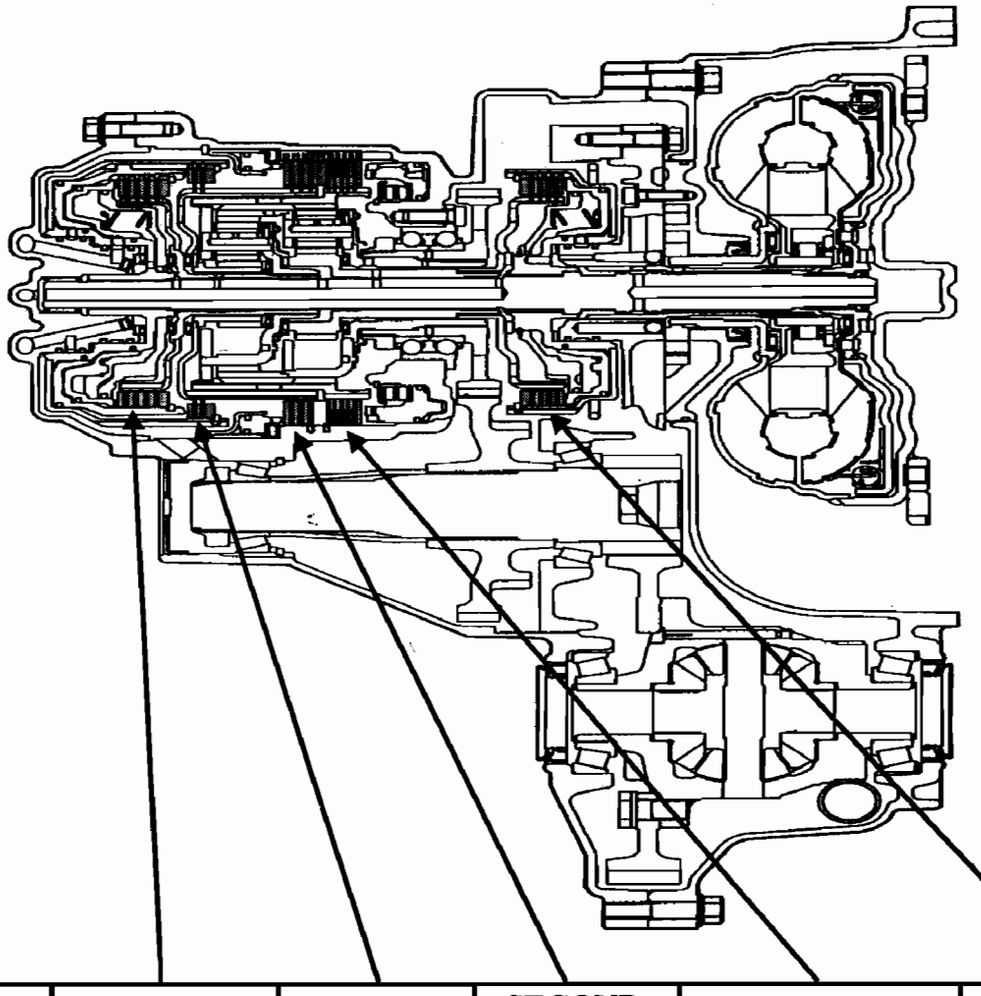
MITSUBISHI F4A41/42



1. UNDERDRIVE CLUTCH ASSEMBLY
2. LOW/REVERSE PISTON ASSEMBLY
3. SECOND BRAKE CLUTCH ASSEMBLY
4. LOW/REVERSE CLUTCH ASSEMBLY
5. REVERSE INPUT/OVERDRIVE CLUTCH
6. SECOND BRAKE PISTON ASSEMBLY
7. FILTER
8. END COVER

Figure 3

MITSUBISHI F4A41/42



GEAR		OVERDRIVE CLUTCH	REVERSE CLUTCH	SECOND BRAKE CLUTCH	LOW/REVERSE CLUTCH	UNDERDRIVE CLUTCH
PARK					ON	
REVERSE			ON		ON	
NEUTRAL					ON	
D	FIRST				ON	ON
	SECOND			ON		ON
	THIRD	ON				ON
	FOURTH	ON		ON		

Figure 4

MITSUBISHI F4A41/42

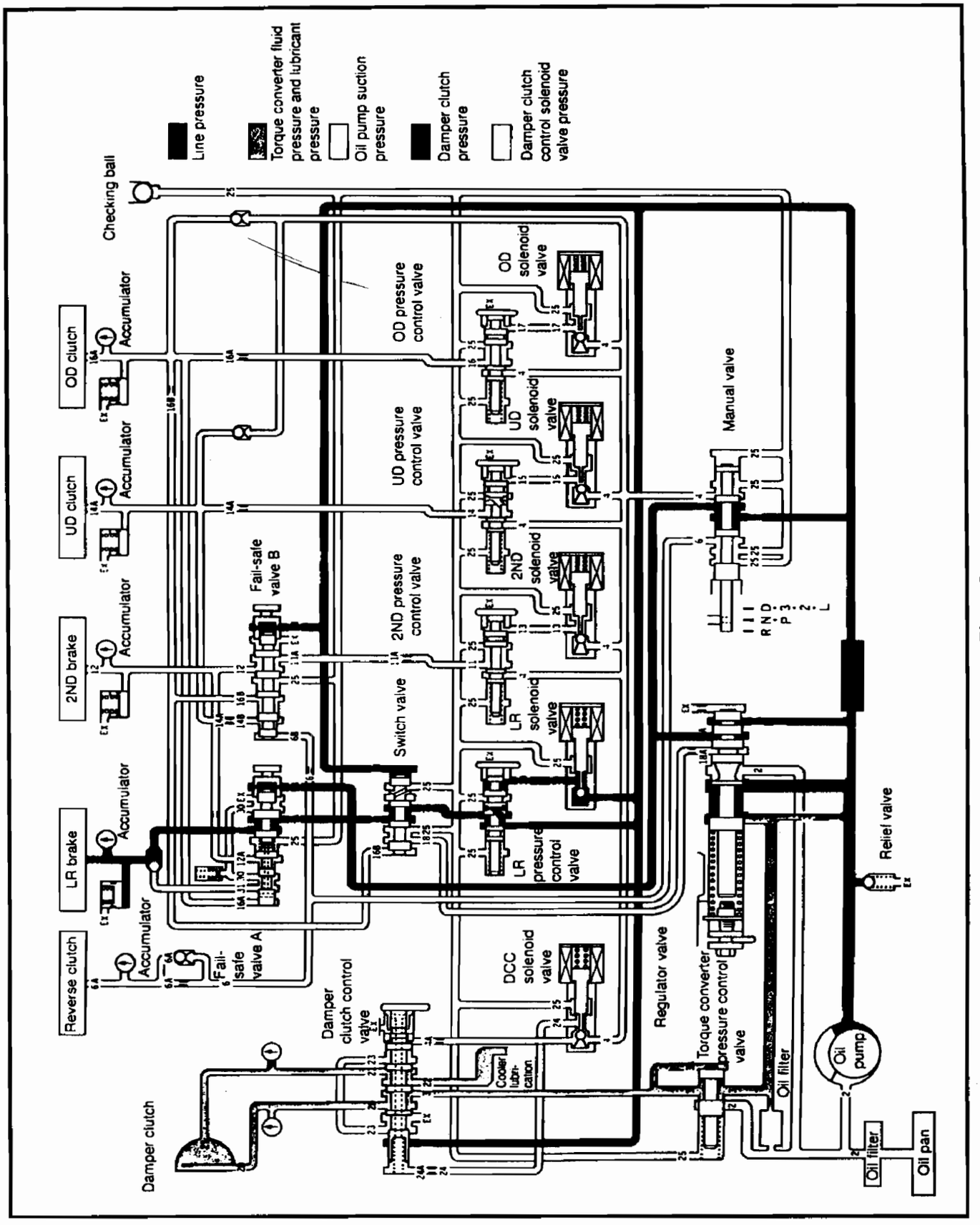
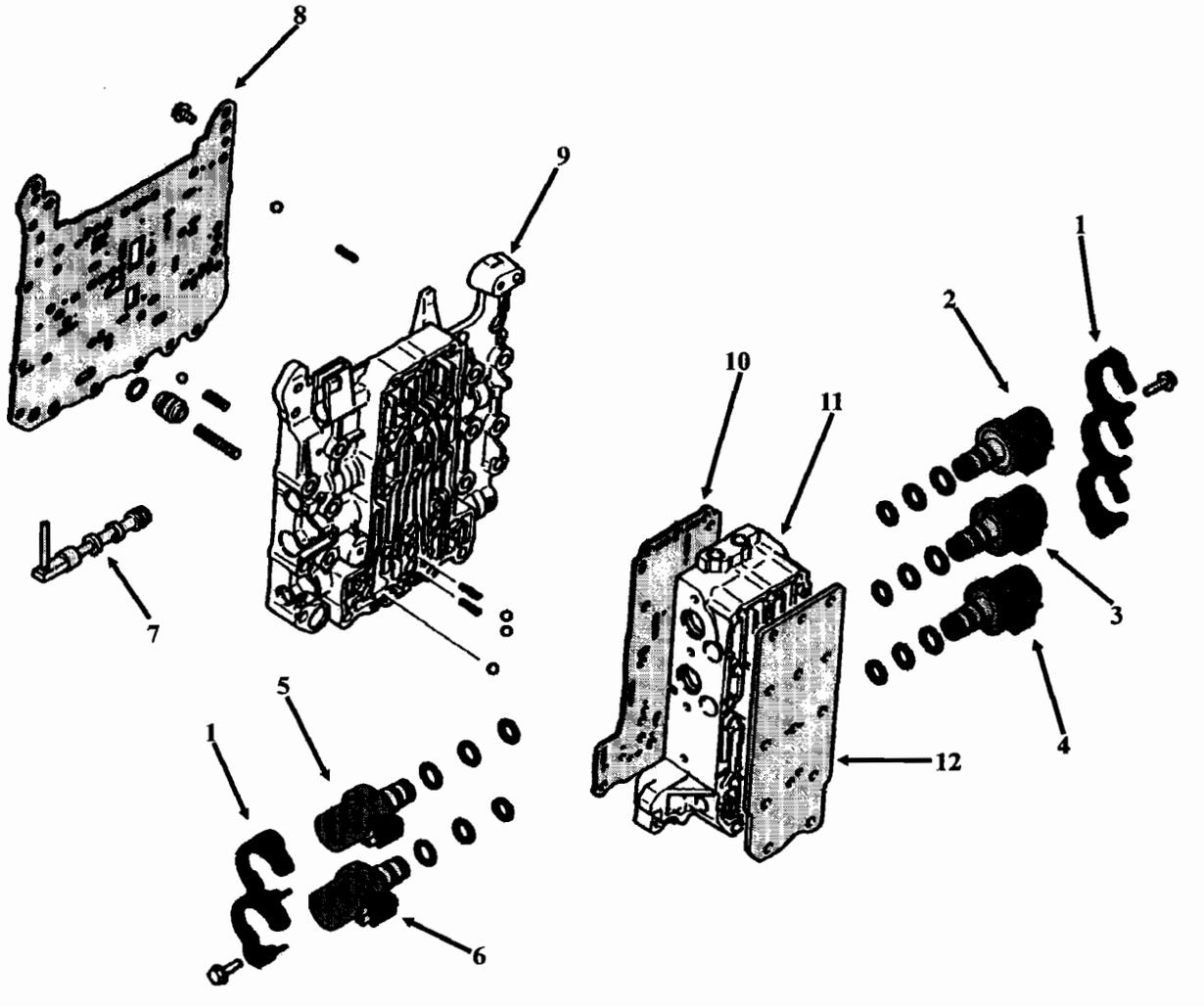


Figure 5

MITSUBISHI F4A41/42



1. SOLENOID SUPPORT
2. UNDERDRIVE SOLENOID
3. SECOND BRAKE SOLENOID
4. DAMPER CLUTCH CONTROL SOLENOID
5. OVERDRIVE SOLENOID
6. LOW/REVERSE SOLENOID
7. MANUAL VALVE
8. INNER SPACER PLATE
9. INNER VALVE BODY
10. OUTER SPACER PLATE
11. OUTER VALVE BODY
12. COVER

Figure 6

MITSUBISHI F4A41/42

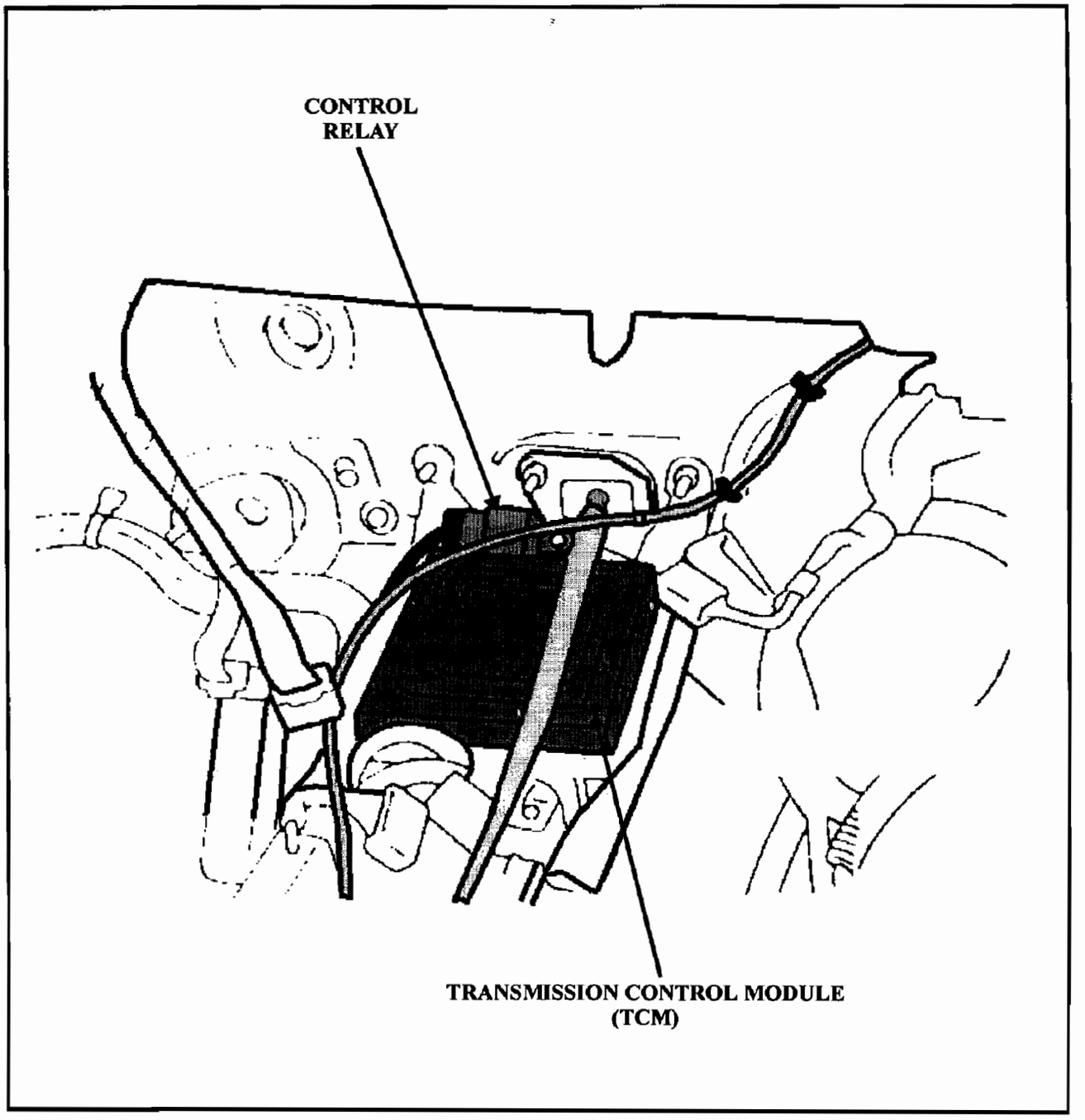


Figure 7

MITSUBISHI F4A41/42

GEAR		PRESSURES (PSI) TAKEN @ 2500 RPM					
		OVERDRIVE CLUTCH PRESSURE	REVERSE CLUTCH PRESSURE	SECOND BRAKE CLUTCH PRESSURE	LOW/REVERSE CLUTCH PRESSURE	UNDERDRIVE CLUTCH PRESSURE	TORQUE CONVERTER PRESSURE
PARK					37-50		38-50
REVERSE			184-256		184-256		72-102
NEUTRAL					37-50		38-50
D	FIRST				147-152	147-152	72-102
	SECOND			146-152		147-152	72-102
	THIRD	113-127				113-127	65-94
	FOURTH	113-127		113-127			65-94

Figure 8

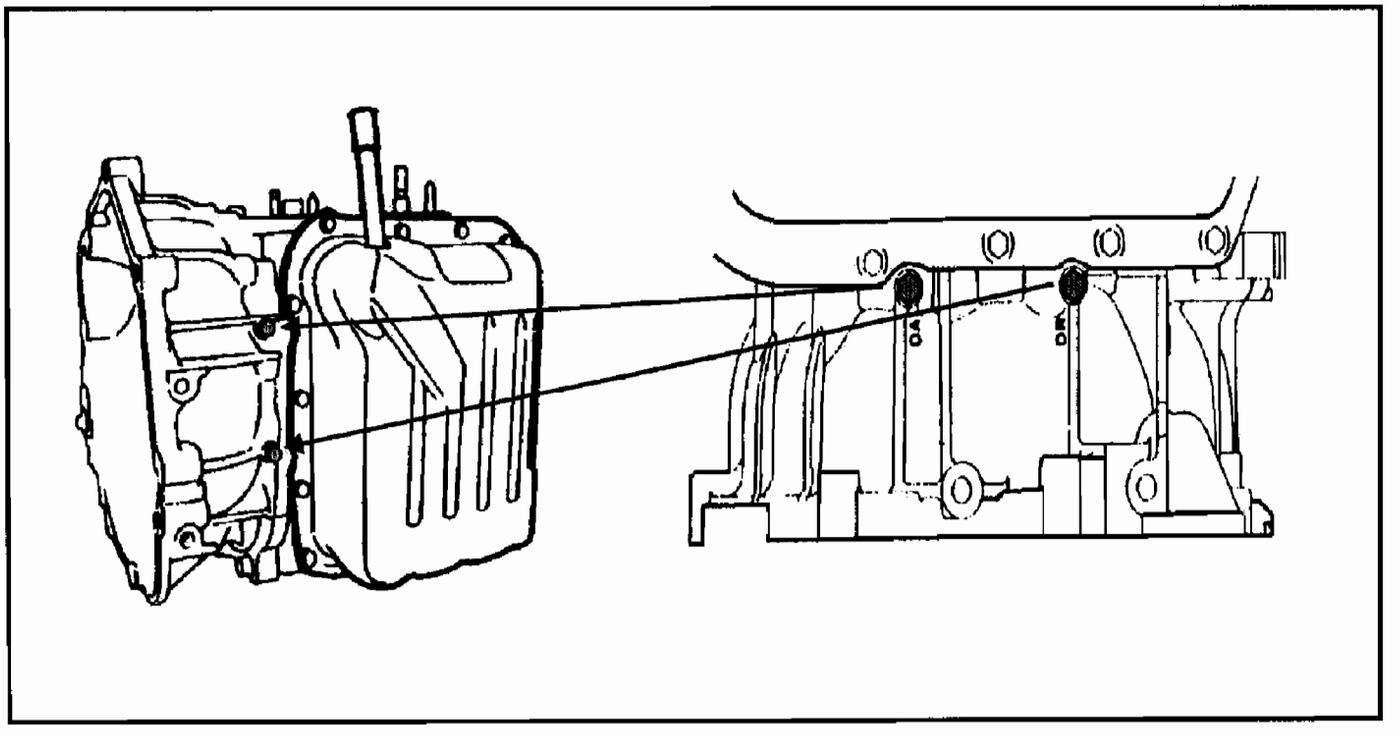


Figure 9

MITSUBISHI F4A41/42

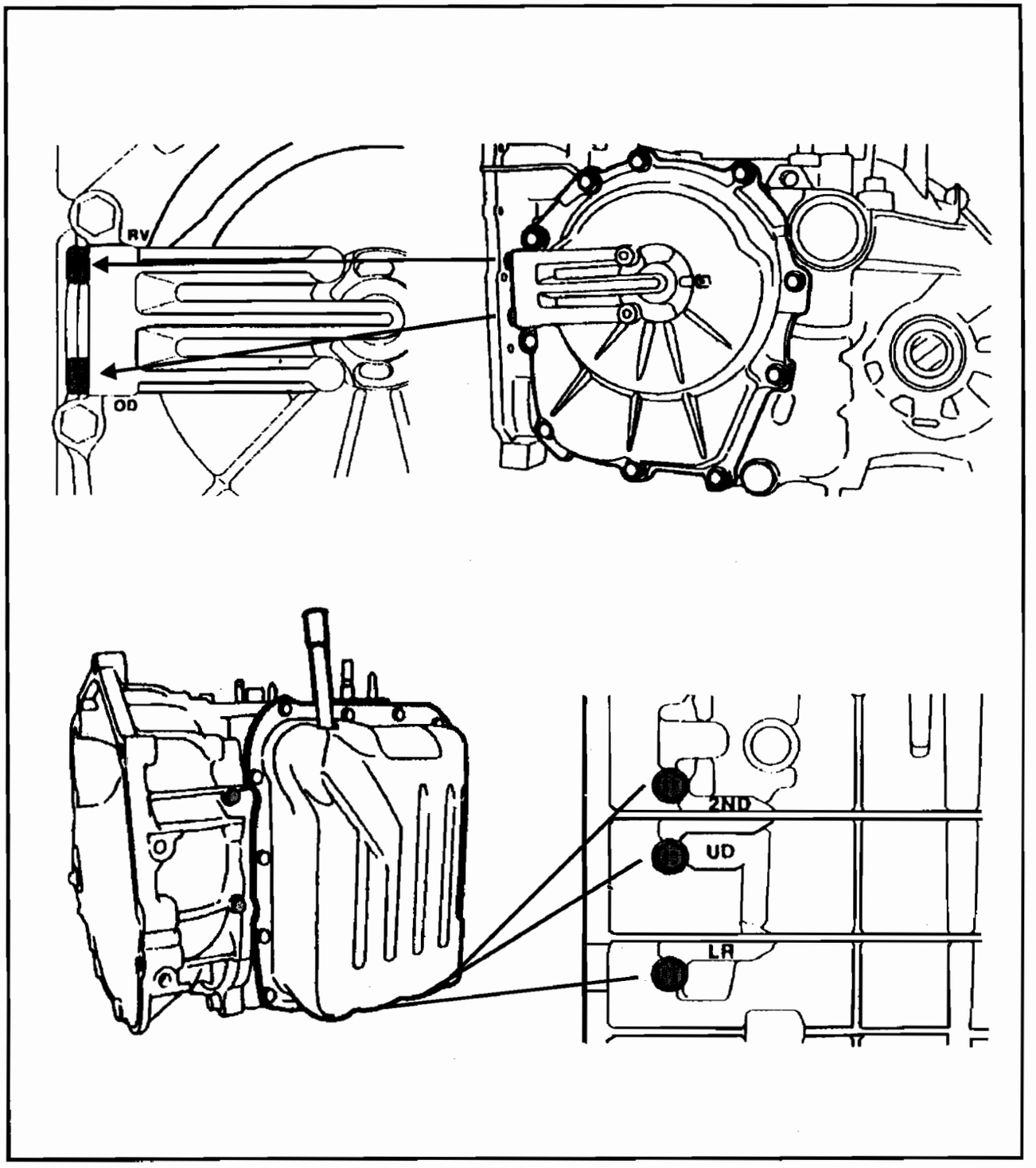


Figure 10

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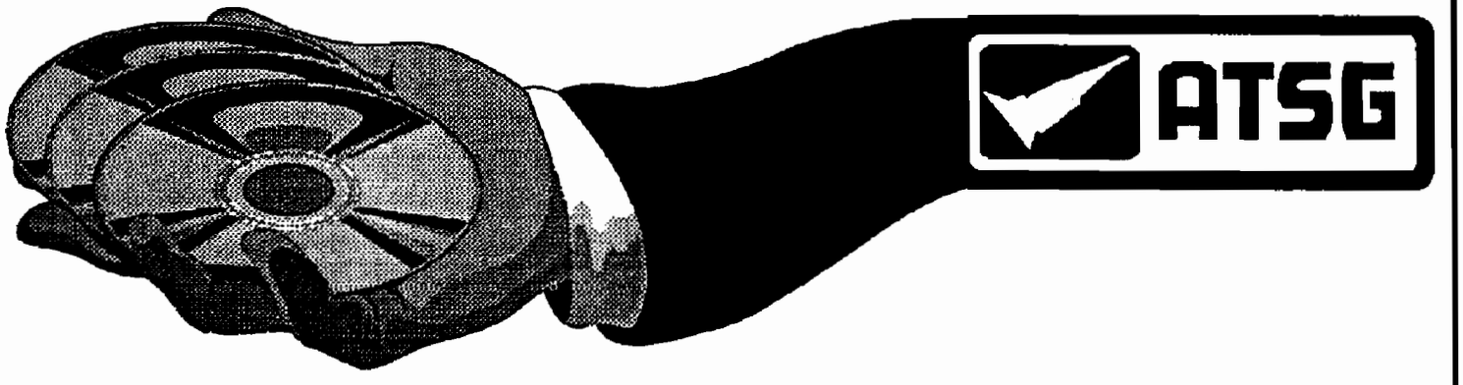

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NISSAN 5 SPEED AUTOMATIC TRANSMISSION

PRELIMINARY INFORMATION

Nissan Motor Company has been using a 5 speed automatic transmission in overseas models since the 1991 model year.
This transmission is nothing new to transmission technicians in Japan, Europe, New Zealand and Australia, however, in the North American regions it is new.
In fact it's so new, it's not even here yet. Rumor had it that it would be used in the 1997 Infiniti Q45, but, that did not happen. Rumor now has it that it will go into the Q45 for the 1998 model year.

This transmissions model designation is the RE5RO1A. Let's see how it differs from other transmissions of similar design and how it compares with the RE4RO1A.
In figures 1, 2 and 3 an exploded view of this transmission can be seen. The first major difference seen is the larger diameter extension housing which incorporates the 3-4 accumulator as compared to the 4 speed unit and is now referred to as the reduction housing.

The reduction housing contains the elements for fifth gear and is similar in operation and power flow to the Mercedes 722.5 and, even though it's a four speed unit, the Chrysler A500 transmission.
The components in the main case are almost identical to the RE4RO1A components with fifth gear components added on the rear of the unit not unlike the 722.5 and the arrangement of the overdrive components in the A500.

A cross-sectional view of the RE5RO1A showing the location of the driving elements can be seen in figure 4.
The clutch/band application chart in figure 5 indicates which elements are used to obtain each of the gear and shift positions.

In figure 6 a chart comparing the 4 speed and 5 speed gear ratios is shown. Notice that the 5 speed gear ratios for first, second and third are considerably lower than the four speed unit.
Also take note that the 5 speed units 4th gear is now one to one and 5th gear is over driven.

Of course, with the addition of a fifth speed also comes major hydraulic and electronic control changes. Figure 7 illustrates an overview of the electronic control system.
Upon removal of the pan, the first and obvious change is the elimination of feed tubes as seen in figure 8 as compared to the RE4RO1A shown in figure 9. With the valve body removed, an additional solenoid in the solenoid pack can be seen, this is shift solenoid "C". The line pressure solenoid has been moved to the case side of the valve body to make room for the additional shift solenoid as shown in figure 10. The chart in figure 11 shows solenoid operation.

Due to the hydraulic changes in order to accommodate the fifth speed, another major change is accumulator function. Although the accumulator pistons appear the same in both the four and five speed units, their functions have changed as shown in figure 12.

NISSAN 5 SPEED AUTOMATIC TRANSMISSION

COMPONENT VIEW

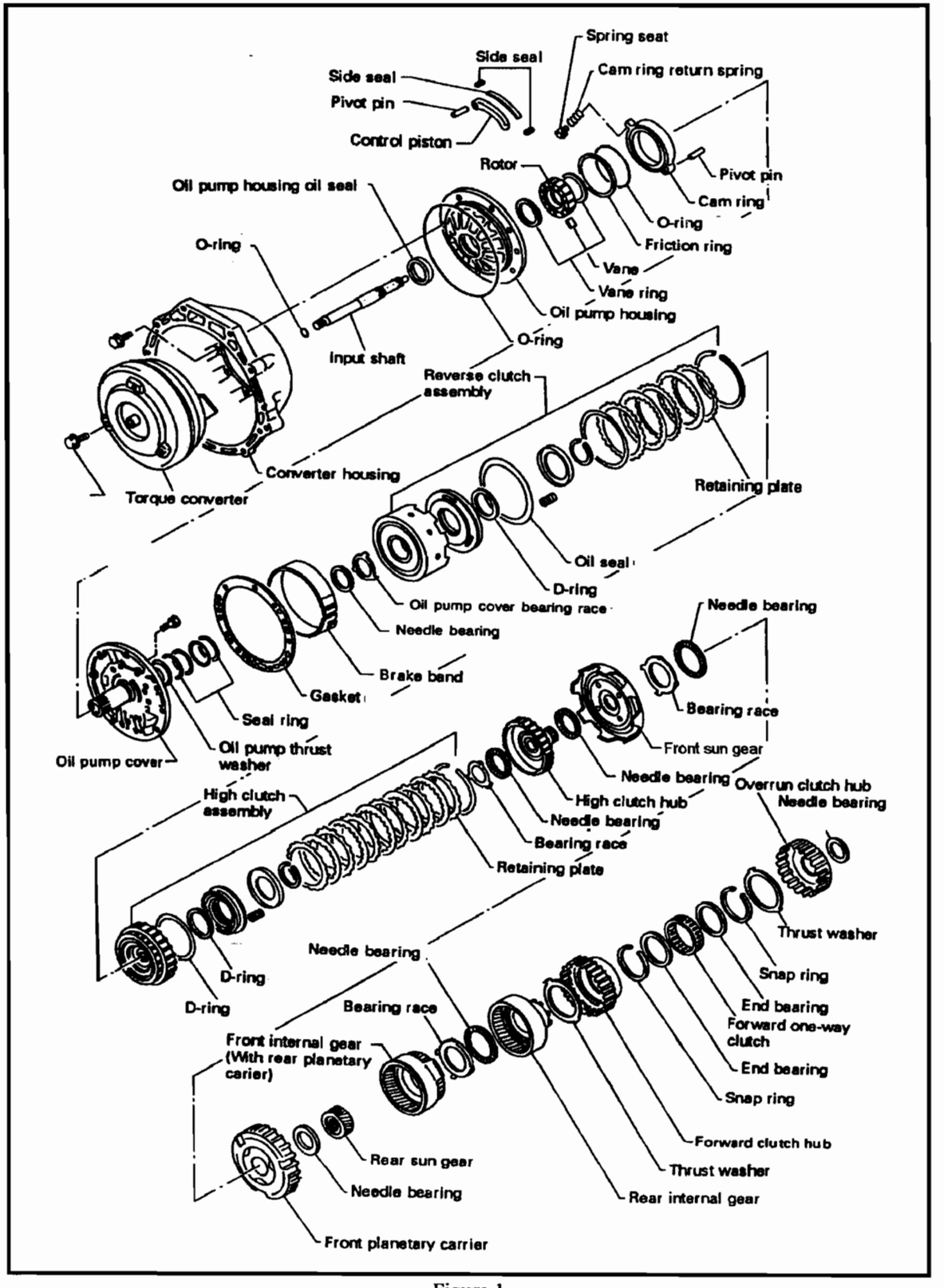


Figure 1

NISSAN 5 SPEED AUTOMATIC TRANSMISSION

COMPONENT VIEW

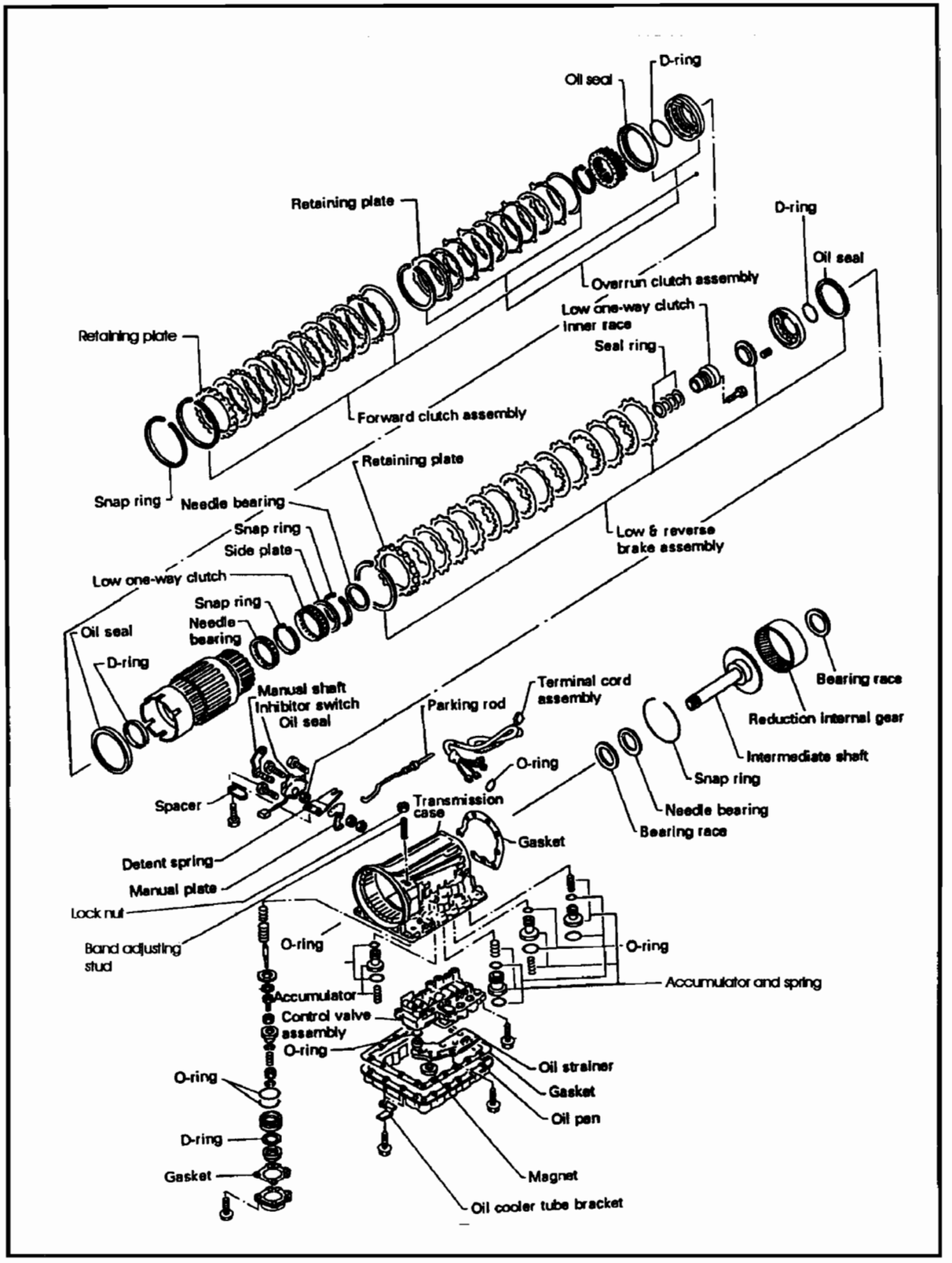


Figure 2

NISSAN 5 SPEED AUTOMATIC TRANSMISSION

COMPONENT VIEW

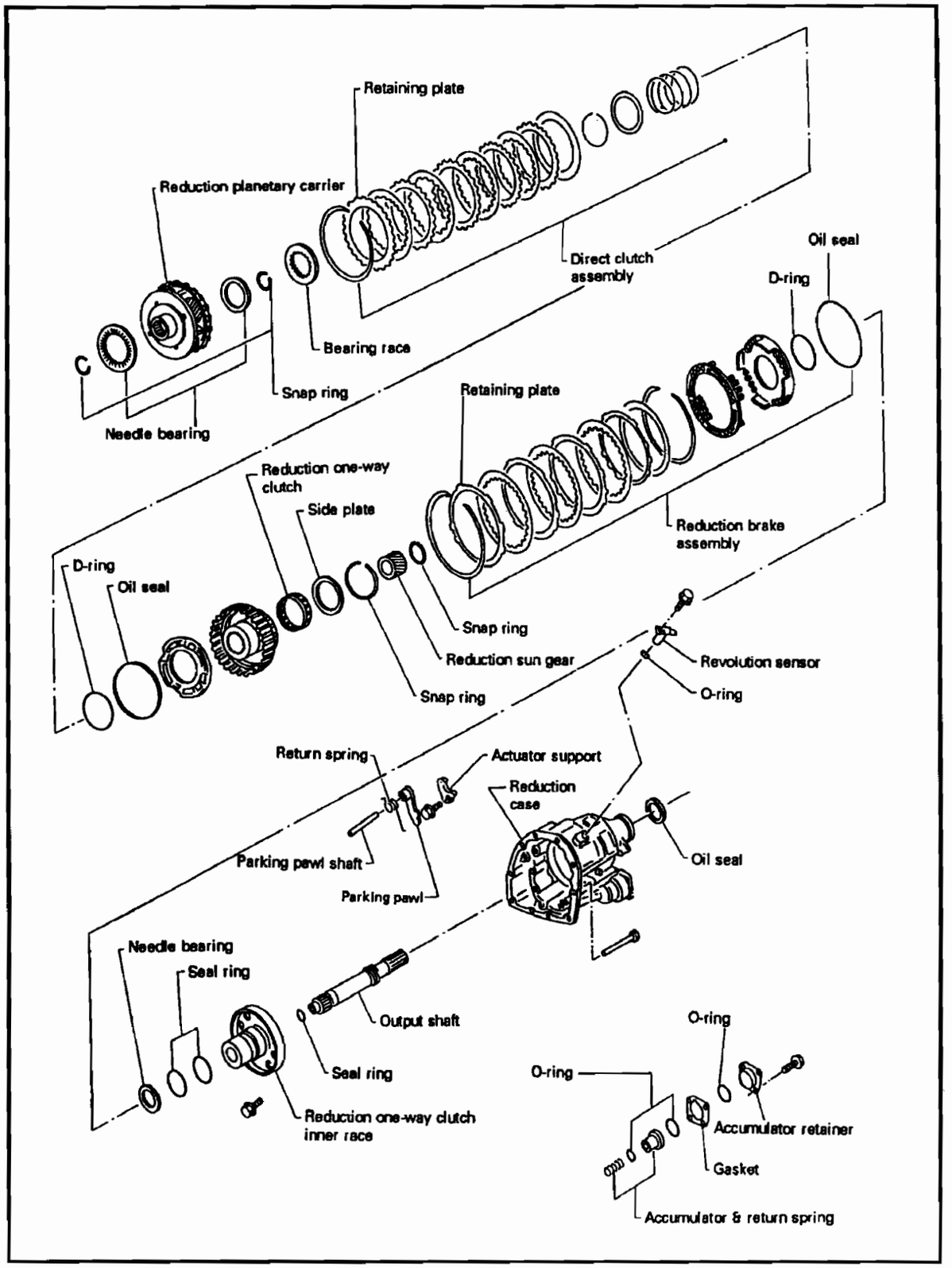


Figure 3

NISSAN 5 SPEED AUTOMATIC TRANSMISSION

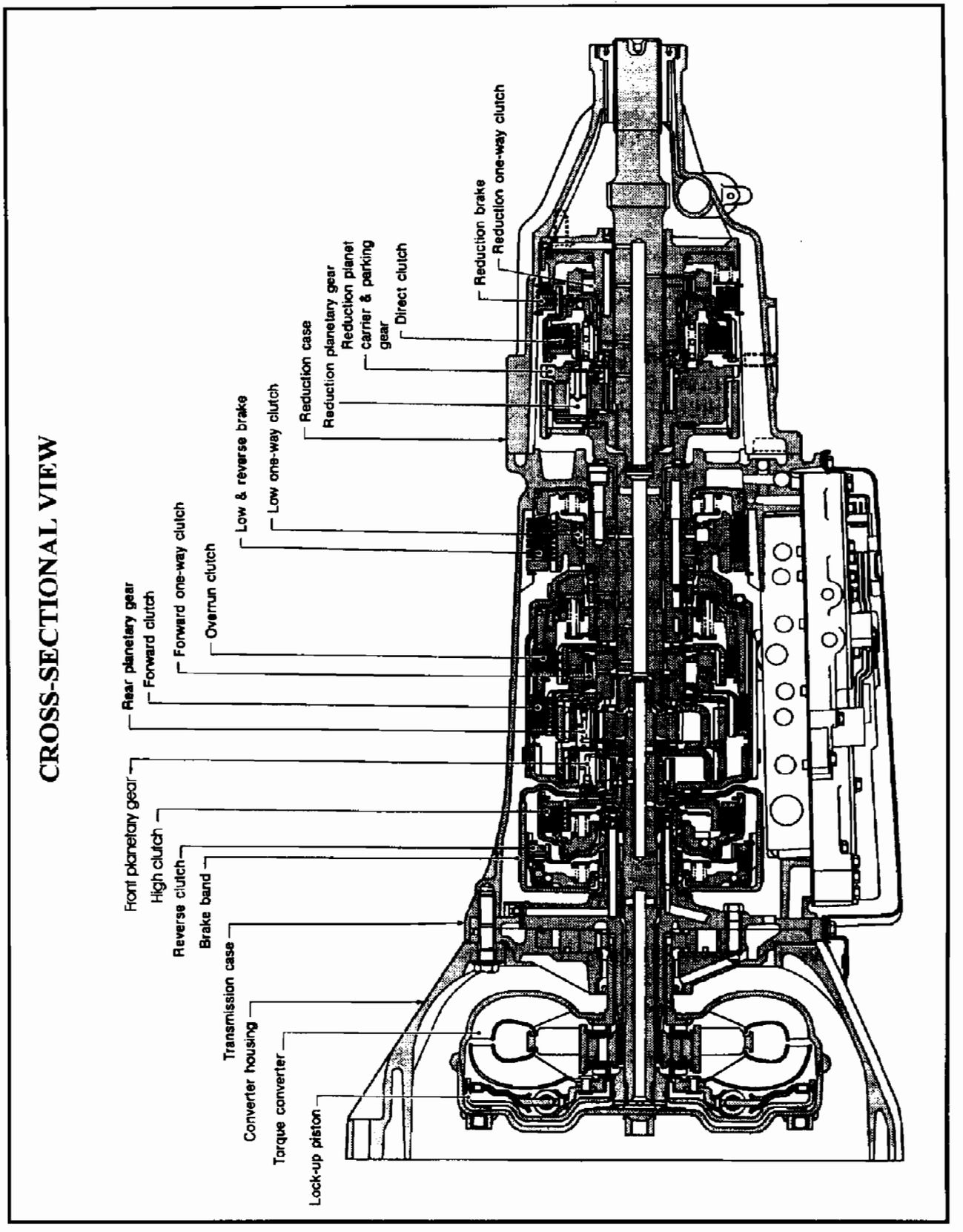


Figure 4

NISSAN 5 SPEED AUTOMATIC TRANSMISSION

CLUTCH/BAND APPLICATION CHART

GEAR/SHIFT POSITION		REVERSE INPUT CLUTCH	HIGH CLUTCH	FORWARD CLUTCH	OVERRUN CLUTCH	2-5 BAND	FORWARD ONE-WAY CLUTCH	LOW ONE-WAY CLUTCH	LOW REVERSE CLUTCH	O/D CLUTCH	O/D DIRECT CLUTCH	OVERRUN ONE-WAY CLUTCH
P												
R		ON							ON		ON	
N												
D	1			ON	1&3		HOLD	HOLD			2	HOLD
	2			ON	4	ON	HOLD				ON	HOLD
	3		ON	ON	4		HOLD				ON	HOLD
	4		ON	ON	4		HOLD			ON		
	5		ON	ON		ON				ON		
3	1			ON	3		HOLD	HOLD			2	HOLD
	2			ON	4	ON	HOLD				ON	HOLD
	3		ON	ON	4		HOLD				ON	HOLD
	4		ON	ON	4		HOLD			ON		
2	1			ON			HOLD	HOLD	2		2	HOLD
	2			ON	ON	ON	HOLD				ON	HOLD
	3		ON	ON	ON		HOLD				ON	HOLD

1.Operates when overdrive switch is set to OFF.
2.Operates when throttle opening is less than 1/16, but does not effect engine braking.
3.Operates when throttle opening is less than 1/16. Engine braking activates.
4.Operates but does not affect power flow.

Figure 5

GEAR RATIO CHART

GEAR	RE4RO5A	RE4RO1A
FIRST	3.85	2.78
SECOND	2.14	1.54
THIRD	1.38	1.00
FOURTH	1.00	0.69
FIFTH	0.69	-----
REVERSE	3.14	2.27

Figure 6

NISSAN 5 SPEED AUTOMATIC TRANSMISSION

ELECTRONIC CONTROL SYSTEM OVERVIEW

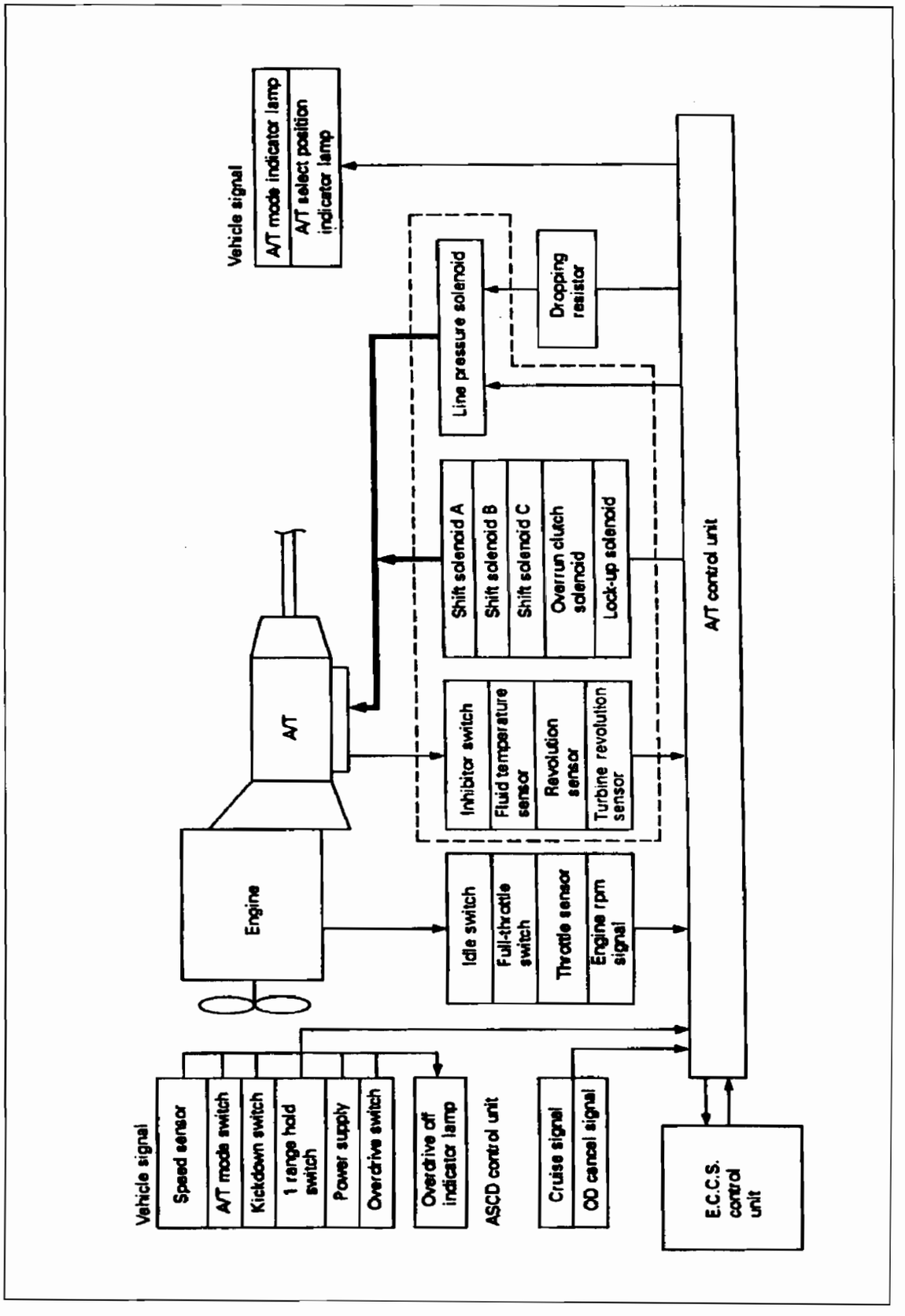


Figure 7

NISSAN 5 SPEED AUTOMATIC TRANSMISSION

VALVE BODY

RE5RO1A

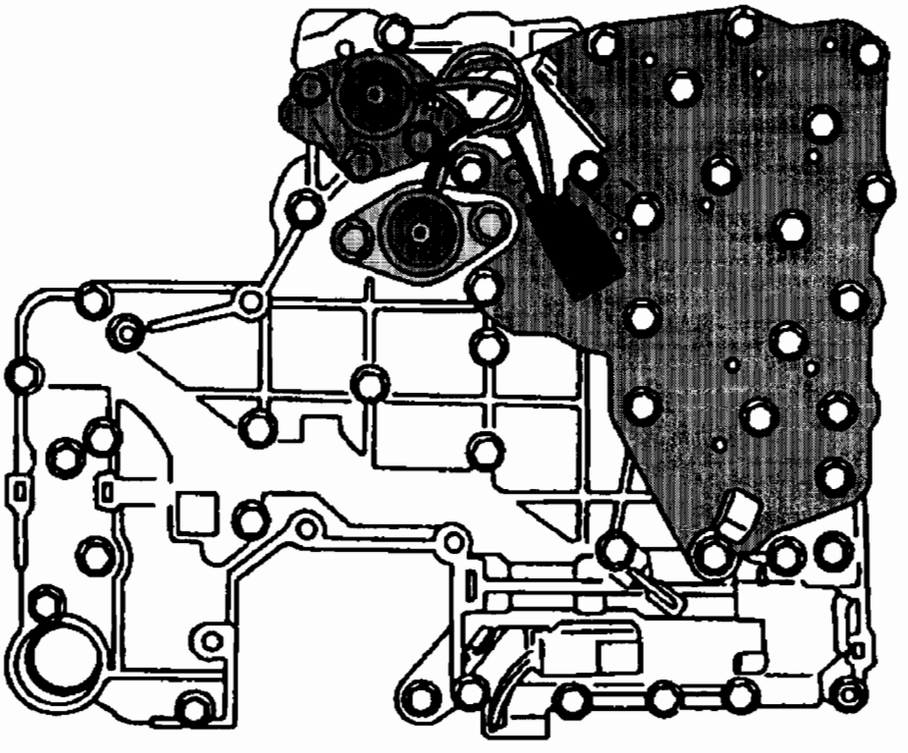


Figure 8

RE4RO1A

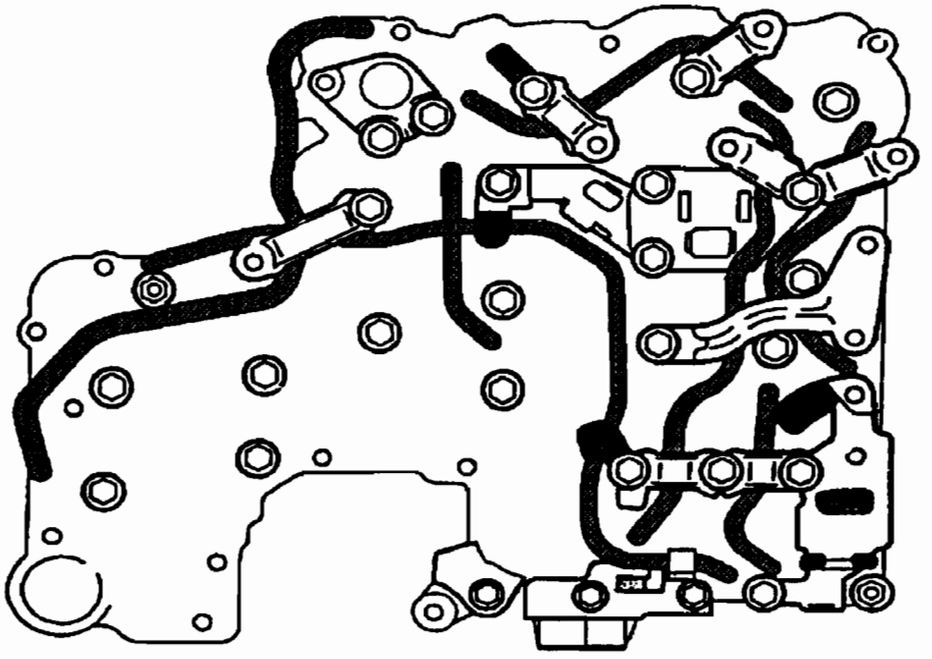


Figure 9

NISSAN 5 SPEED AUTOMATIC TRANSMISSION

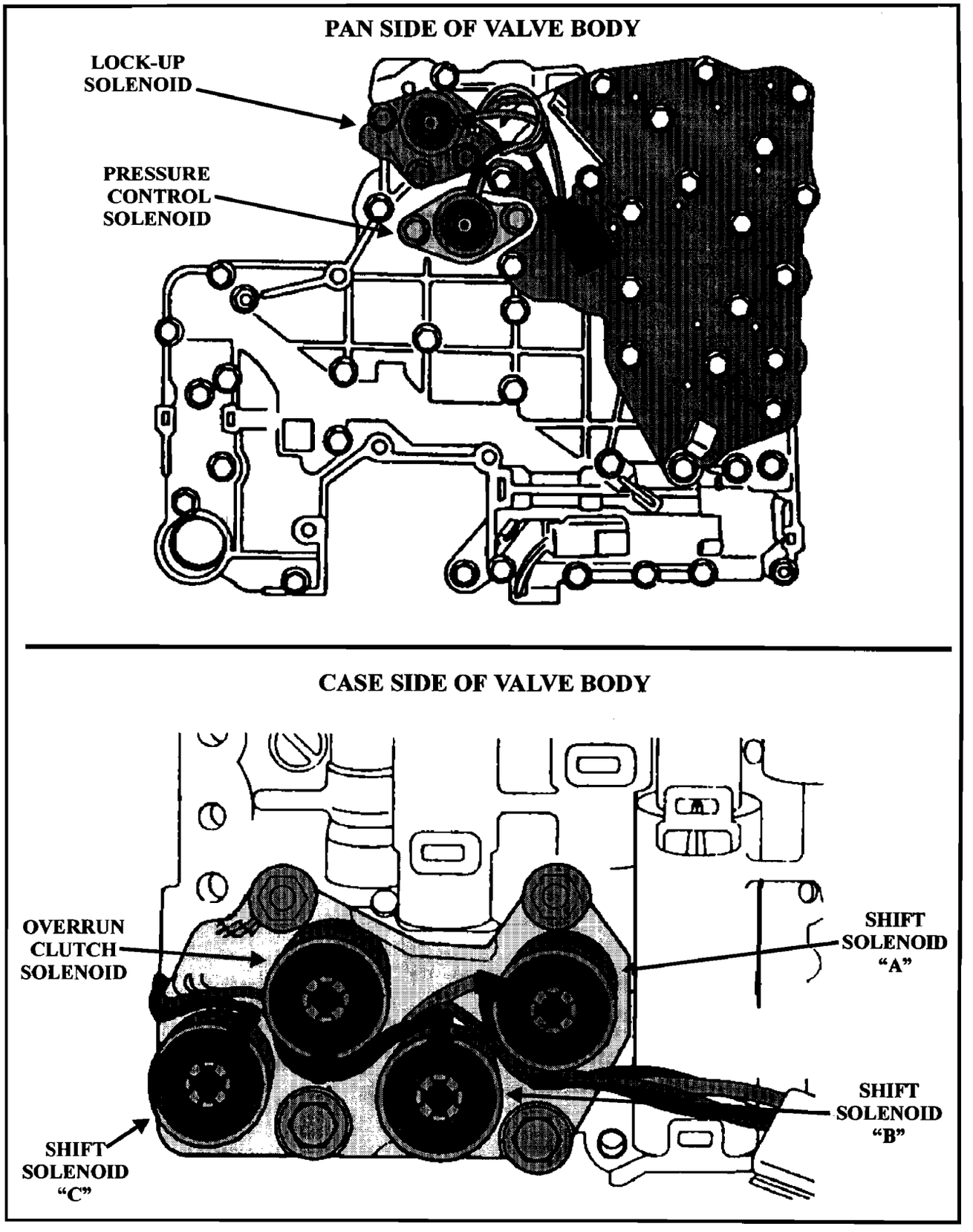
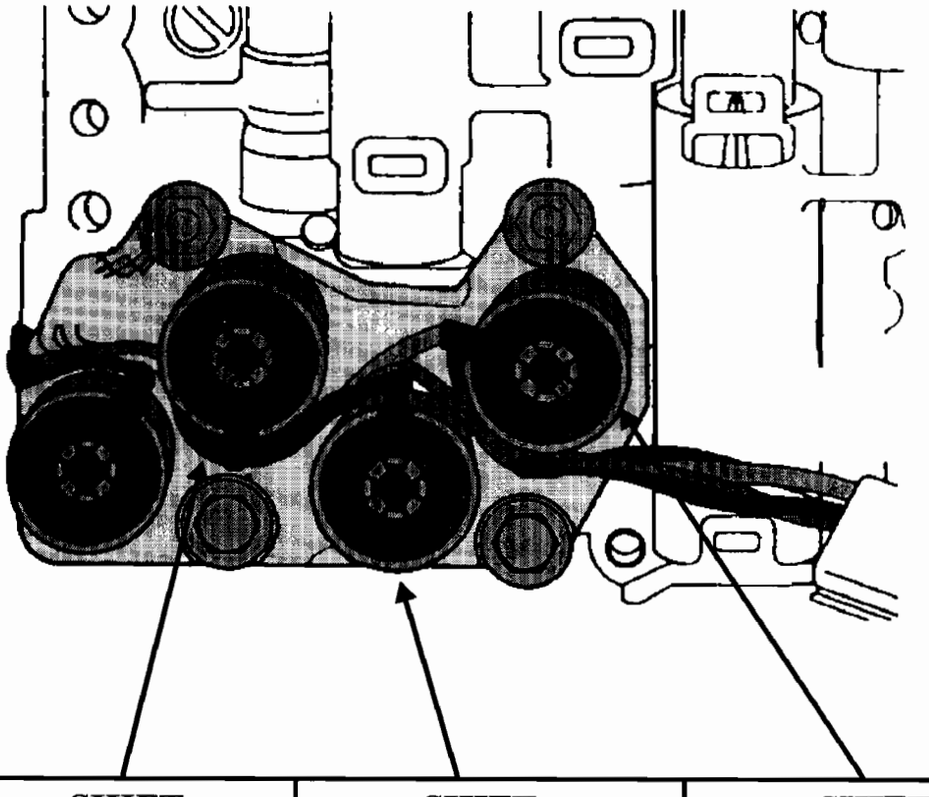


Figure 10

NISSAN 5 SPEED AUTOMATIC TRANSMISSION

SOLENOID OPERATION CHART



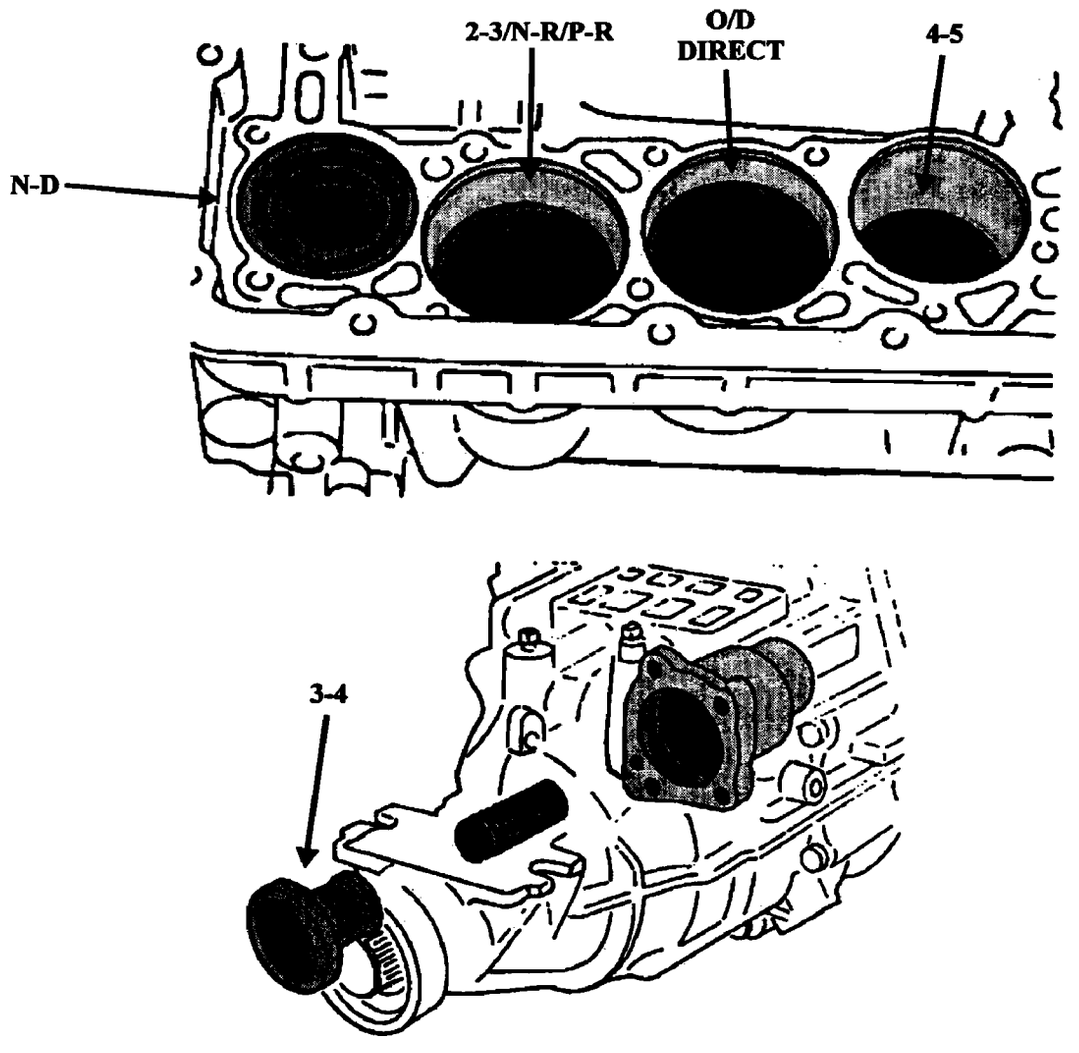
GEAR	SHIFT SOLENOID "A"	SHIFT SOLENOID "B"	SHIFT SOLENOID "C"
FIRST	ON	ON	ON
SECOND	OFF	ON	ON
THIRD	OFF	OFF	ON
FOURTH	OFF	OFF	OFF
FIFTH	ON	OFF	OFF

Figure 11

NISSAN 5 SPEED AUTOMATIC TRANSMISSION

ACCUMULATOR IDENTIFICATION

RE5RO1A



RE4RO1A

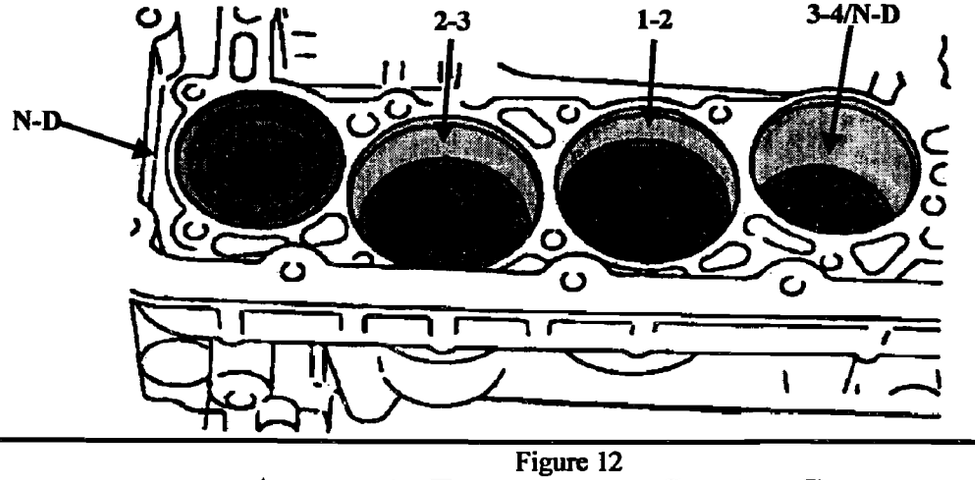


Figure 12

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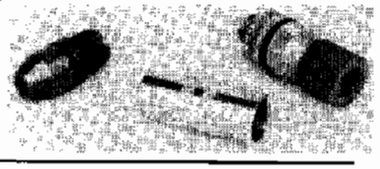

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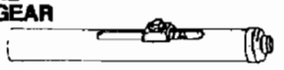

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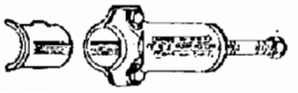
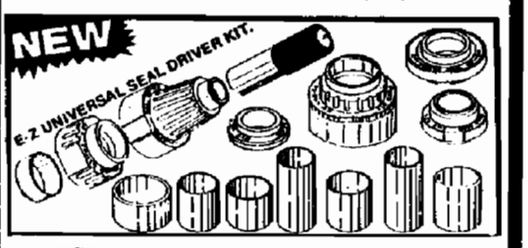
FRONT PUMP PULLER
FORD, G.M., CHRYSLER



U.S. PAT 5,243,749

NEW



E-Z SQUEEZE® SERVO PISTON REMOVER
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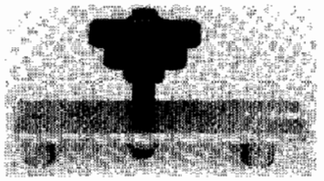

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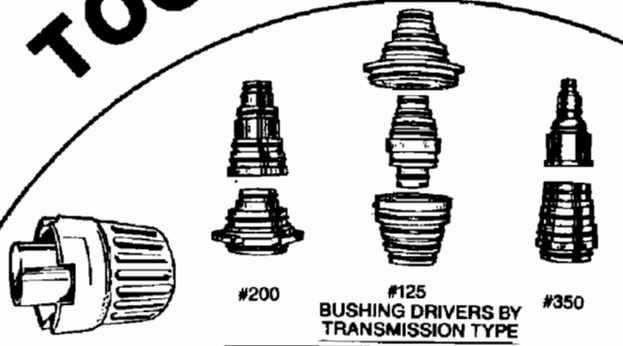

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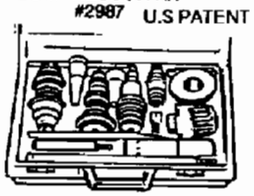
AXEL SEAL INSTALLER #1250

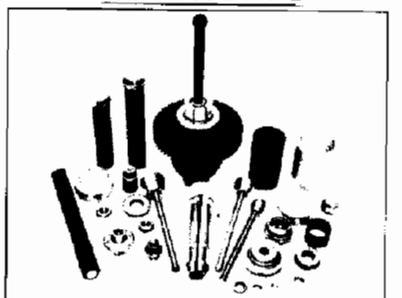
CLUTCH SPRING COMPRESSOR KIT #2987 U.S PATENT



UNIVERSAL BUSHING DRIVER SET #1001

P.R. VALVE SNAP RING INSTALLER #2993

U.S PATENT #280 SEAL PULLER



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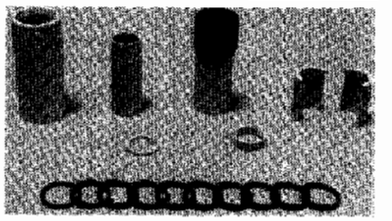

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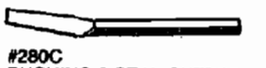
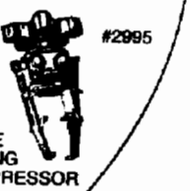
#280A #280B BUSHING EXTRACTORS



#280C BUSHING & SEAL CUTTER U.S. PATENT



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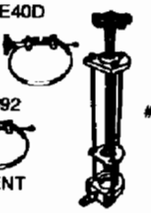

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MITSUBISHI GALANT AND ECLIPSE SPYDER

ENGINE SURGE AT 55-65 MPH.

COMPLAINT: Some 1996-1997 Mitsubishi Galant and Eclipse Spyder GS models, equipped with 2.4L SOHC engines, may exhibit a surge or hesitation at speeds between 55 and 65 mph. This surging sensation is ***commonly*** confused with torque converter shudder or torque converter clutch cycleing.

CAUSE: This condition may be caused by a mis-alignment of the throttle body on the intake manifold (See Figure 1 for location). A "Gap" caused by this mis-alignment may cause a supersonic noise or turbulence which causes the Air Flow Sensor to operate improperly (See Figure 2).

CORRECTION: Remove the 4 bolts that attach the throttle body to the intake manifold and clean mating surfaces. Replace the throttle body gasket with Mitsubishi part number MD184046. Install throttle body and temporarily finger tighten the 4 bolts. Position the throttle body as shown in Figure 3 for perfect alignment and torque the 4 bolts to 14 ft-lbs.

SERVICE INFORMATION:

Throttle Body Gasket: (Mitsubishi part no.)..... MD184046

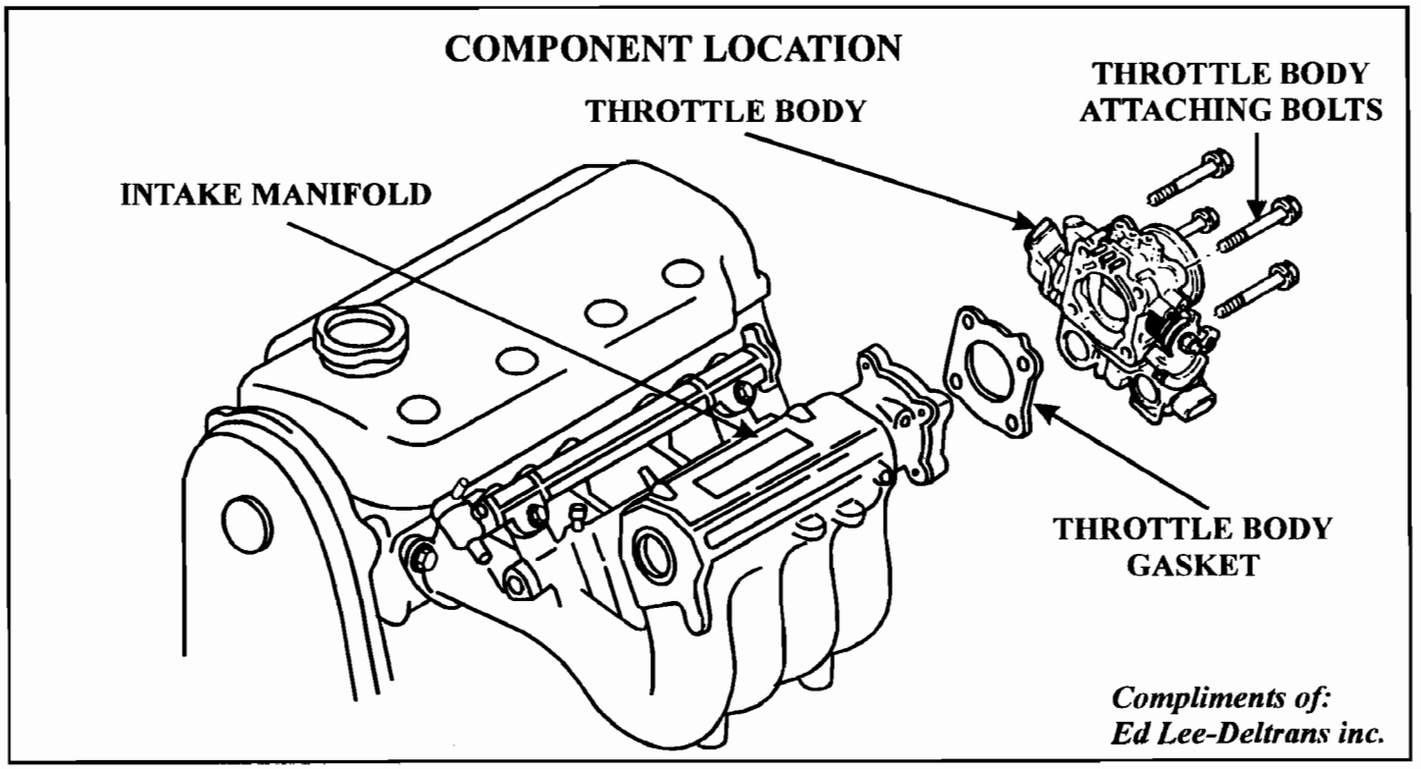


Figure 1

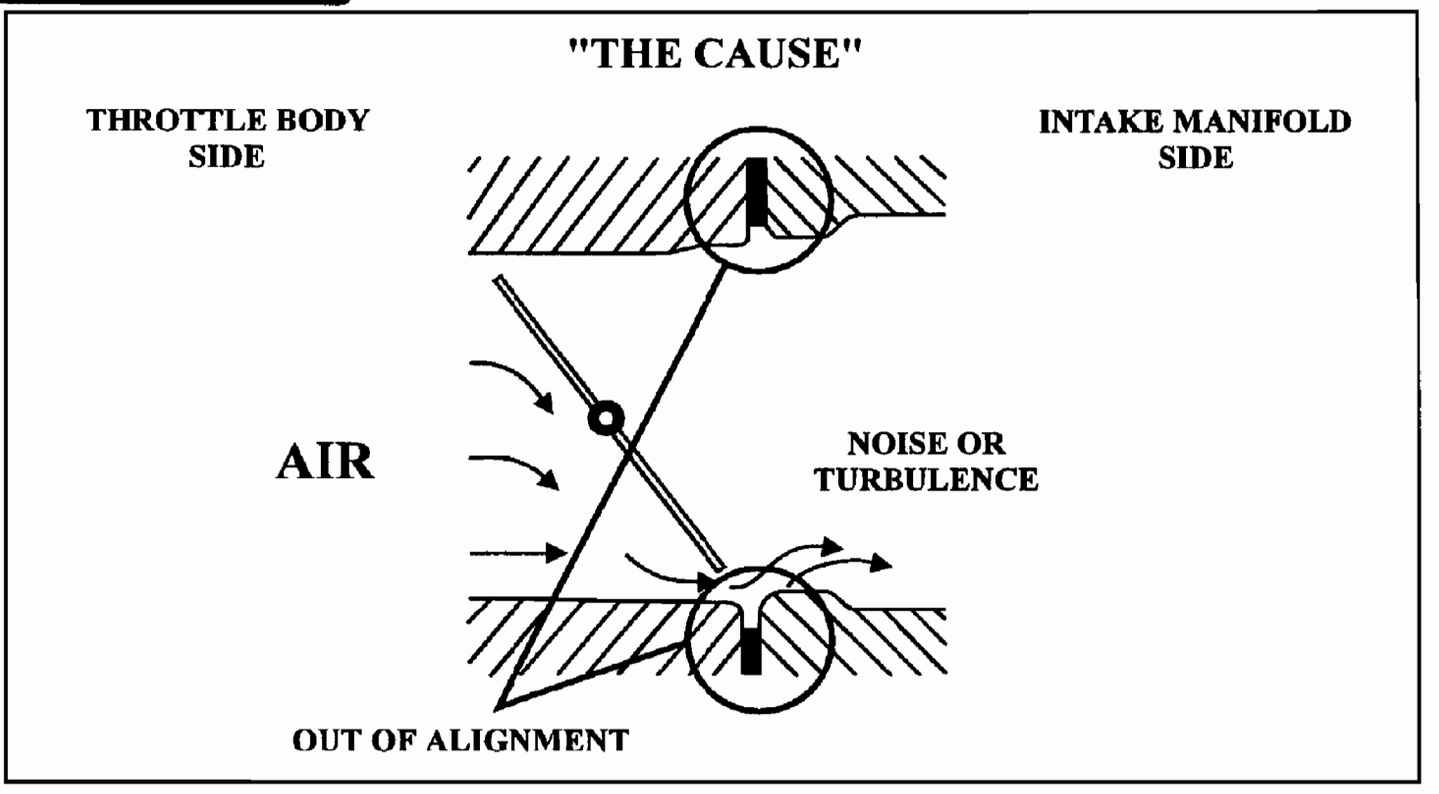


Figure 2

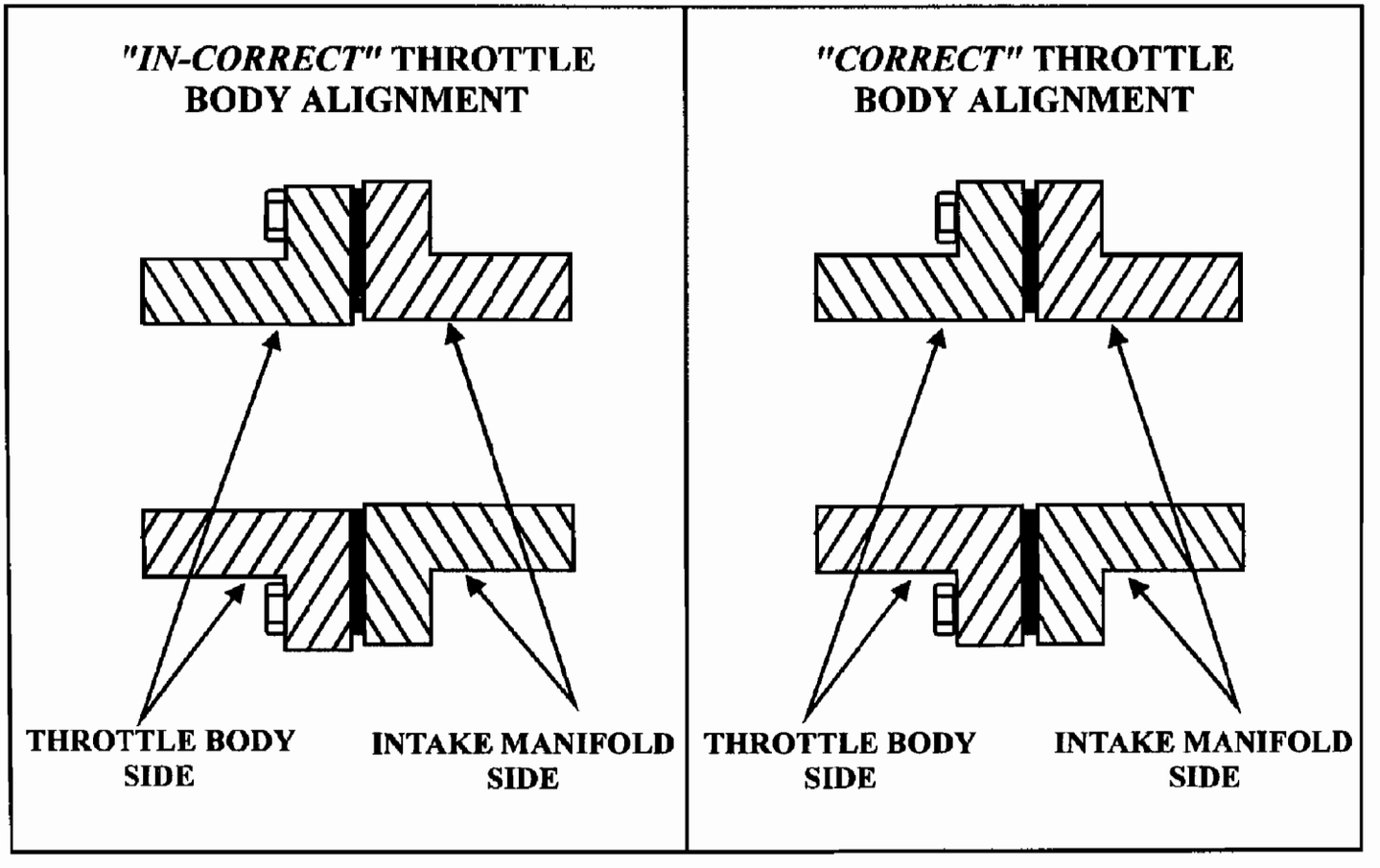


Figure 3

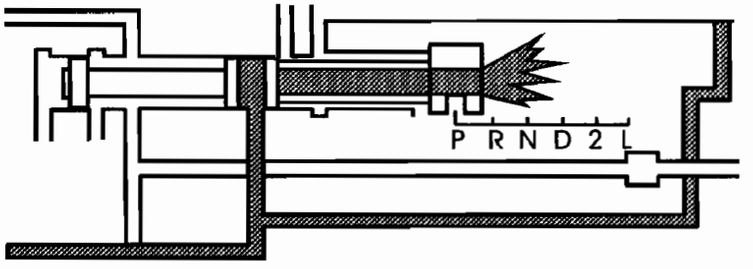
MITSUBISHI 4 SPEED UNITS

NO CONVERTER FILL/PREMATURE PUMP BUSHING FAILURE

COMPLAINT: The converter will not fill with fluid after overhaul possibly causing premature failure of the pump bushing. Signs of lubrication failure may also be present.

CAUSE: One cause may be that the manual valve is designed to exhaust line pressure while in the Park range through a passage formed inside the valve (See Figure 1). The passage is approximately .250" in diameter which allows for a rather large exhaust to occur. This large exhaust drops line pressure low enough to prevent converter fill and stops all cooler flow. With a lack of fluid flowing into the converter and a loss of front lubrication, the bushing and converter neck may be damaged before converter fill and cooler flow is

CORRECTION: Pre-fill the converter with as much fluid as possible. Also lube the pump bushing generously. Always fill the unit with the selector lever in the Neutral range, ***NOT*** in Park. To allow for cooler flow to be present while in the Park range, a cup plug supplied by ***Sonnax*** under part number 41750-01can be driven into the end of the manual valve, as shown in Figure 1. This will allow for full converter charge as well as cooler flow in Park.



Manual Valve Exhausting Line While In Park

Figure 1

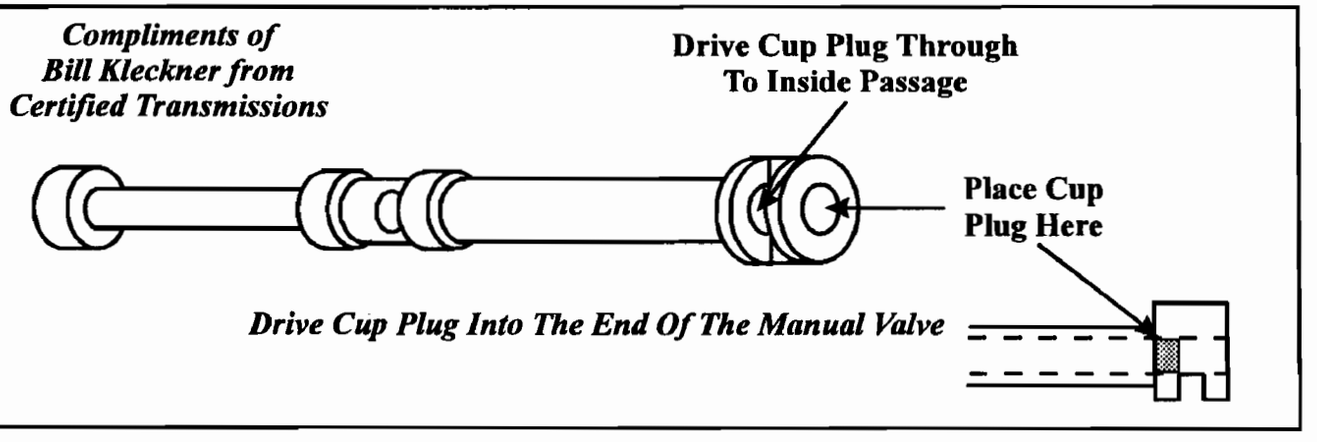


Figure 2

NISSAN RL4FO3A

HARSH 1-2 UPSHIFT

COMPLAINT: Vehicles equiped with RL4FO3A transaxles may exhibit a harsh 1-2 upshift at all throttle openings.

CAUSE: The cause may be, the 1-2 accumulator spring is broken.

CORRECTION: Remove the 1-2 accumulator plunger and spring, shown in Figure 1, and replace the broken spring with NISSAN part no. 31742-31X63.

SERVICE INFORMATION:

1-2 ACCUMULATOR SPRING (NISSAN PART NO.).....31742-31X63

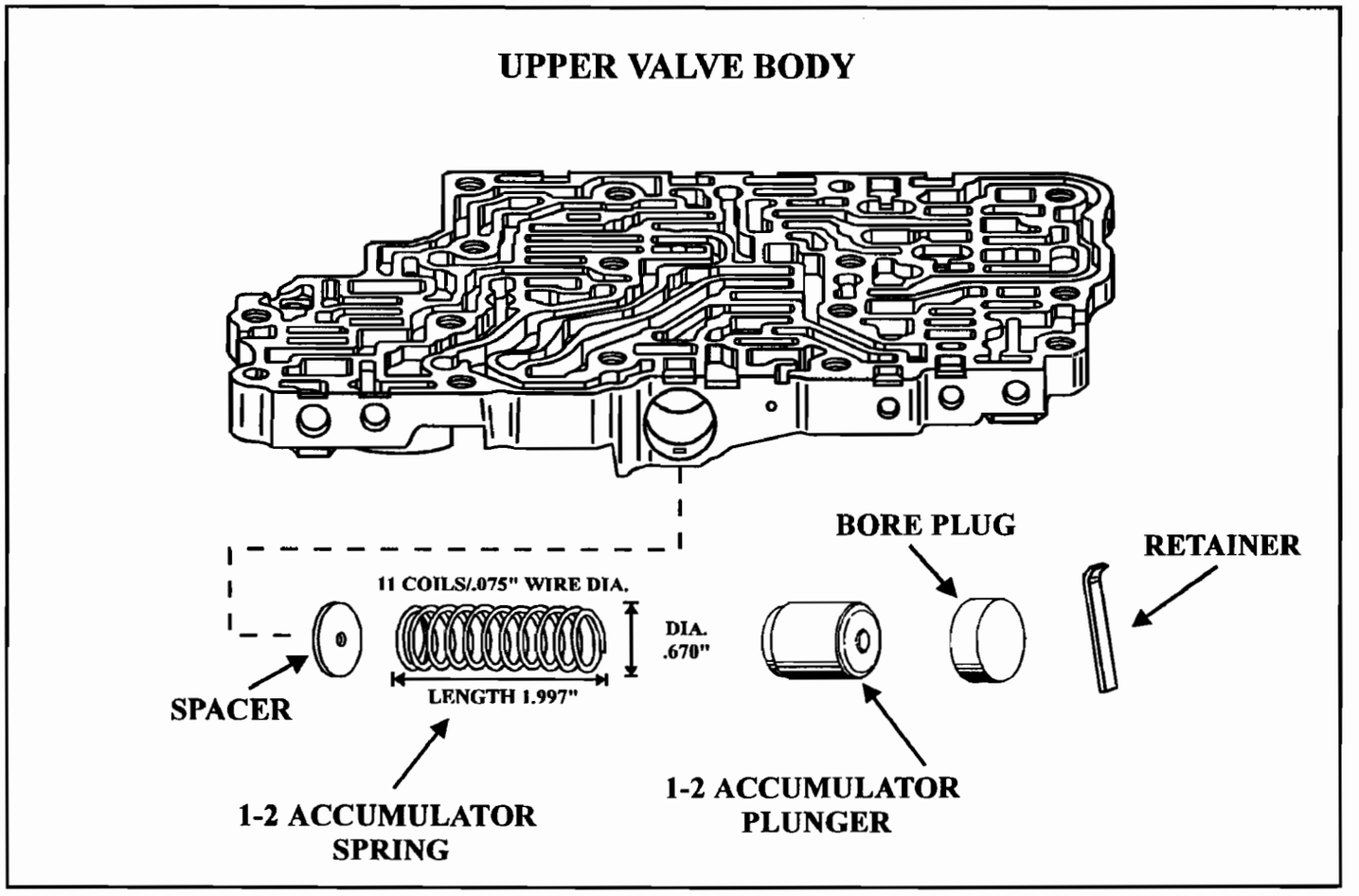


Figure 1

NISSAN RE4RO1A / RE4FO2A
SOFT OR FLARED UPSHIFTS

COMPLAINT: After overhaul, vehicles equipped with RE4RO1A or RE4FO2A transmissions, may exhibit soft or flared upshifts.

CAUSE: The cause may be, insufficient feed oil to the clutch or band servo related to the upshift taking place.

CORRECTION: Refer to Figure 1 for RE4R01A feed orifice locations. Refer to Figure 2 for RE4F02A feed orifice locations. To firm the upshift in question, enlarge the orifice marked in the spacer plate .020"-.030" larger.

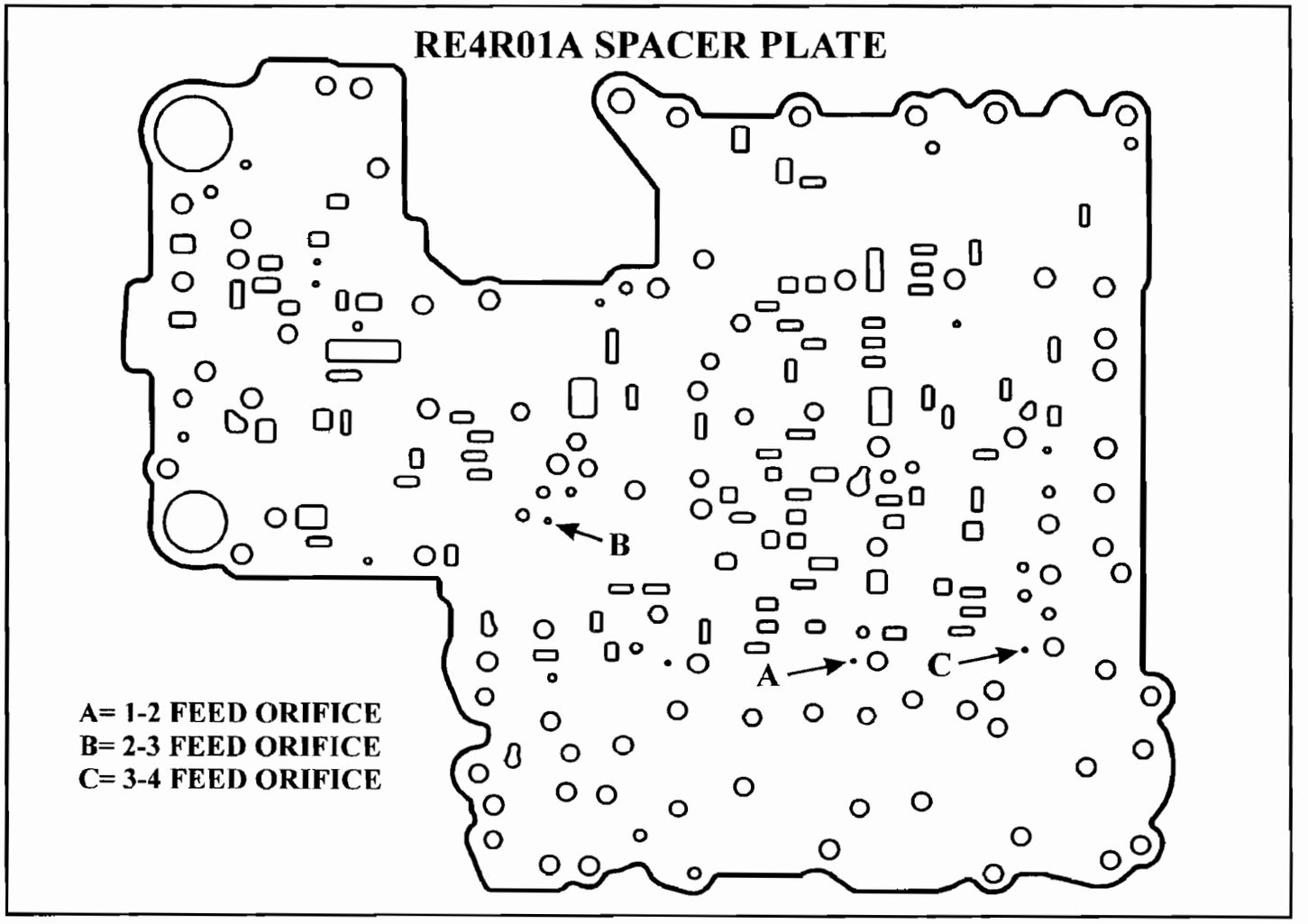
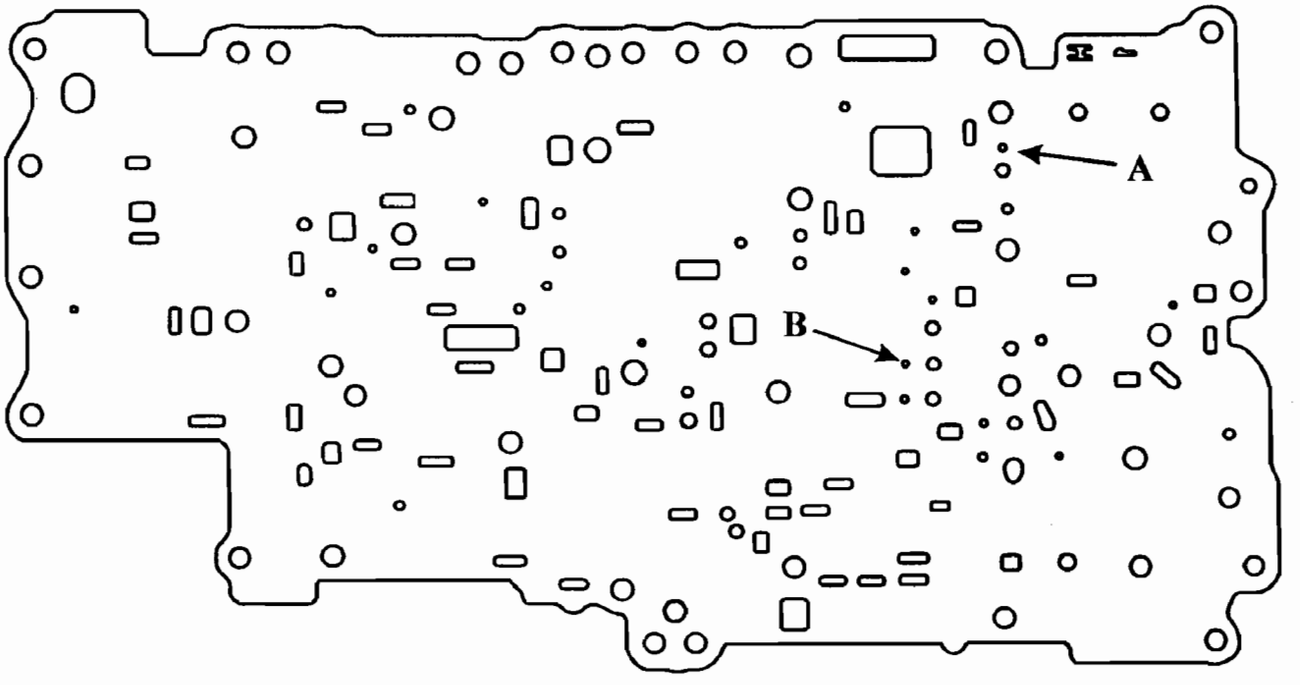


Figure 1

RE4F02A SPACER PLATE



A= 1-2 AND 3-4 FEED ORIFICE
B= 2-3 FEED ORIFICE

Figure 2

MAZDA/FORD GF4A-EL/GF4EAT
HARSH UPSHIFTS

COMPLAINT: 1993 & up, vehicles equipped with GF4A-EL transaxles, built before 1/3/95, may exhibit a harsh 1-2 upshift or harsh upshift complaints before or after overhaul. Line pressure appears to be normal or slightly higher than normal when checking in the "D" range. "Normal" line pressure readings are as follows, 60-78psi. at idle and 161-172 psi. at stall.

CAUSE: The cause may be, higher than normal control pressure passing through the main contol spacer plate.

CORRECTION: Replace the Pressure Control Solenoid as shown in Figure 1 with Ford part number F32Z-7G136-AA or Mazda part number FU9A-21-1G1A. Inspect the Pressure Regulator Valve and the Pressure Regulator Valve bore for wear or scoring. Inspect the Boost Valve and Boost Valve Sleeve for wear or scoring. Ensure that there is no ***"side to side"*** wobble of the Pressure Regulator Valve, when it is in its bore.See Figure 2. Enlarge the Pressure Regulator ***"balance"*** orifice in the rear control spacer plate to .056" as shown in Figure 3.

SERVICE INFORMATION:

PRESSURE CONTROL SOLENOID (FORD).....F32Z-7G136-AA
PRESSURE CONTROL SOLENOID (MAZDA).....FU9A-21-1G1A
NOTE: THESE TWO PART NUMBERS ARE FOR THE SAME SOLENOID.

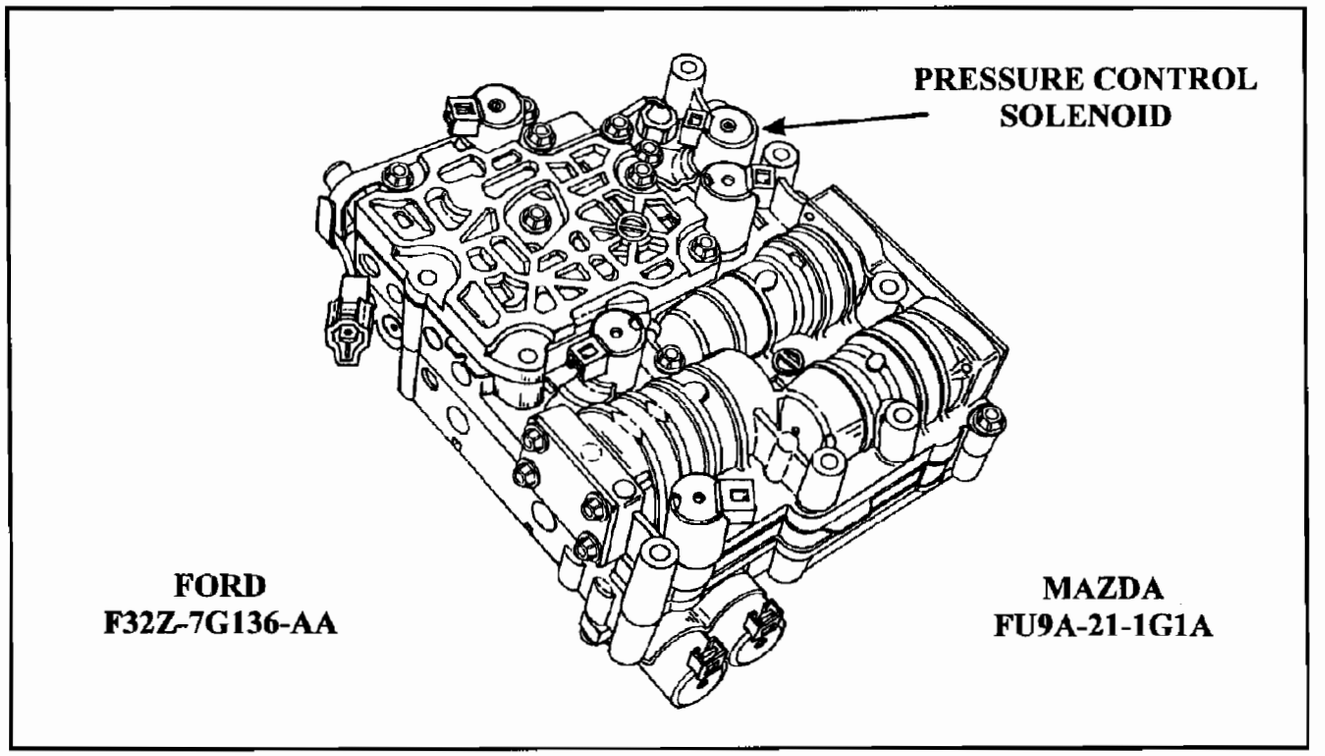


Figure 1

REAR CONTROL VALVE BODY

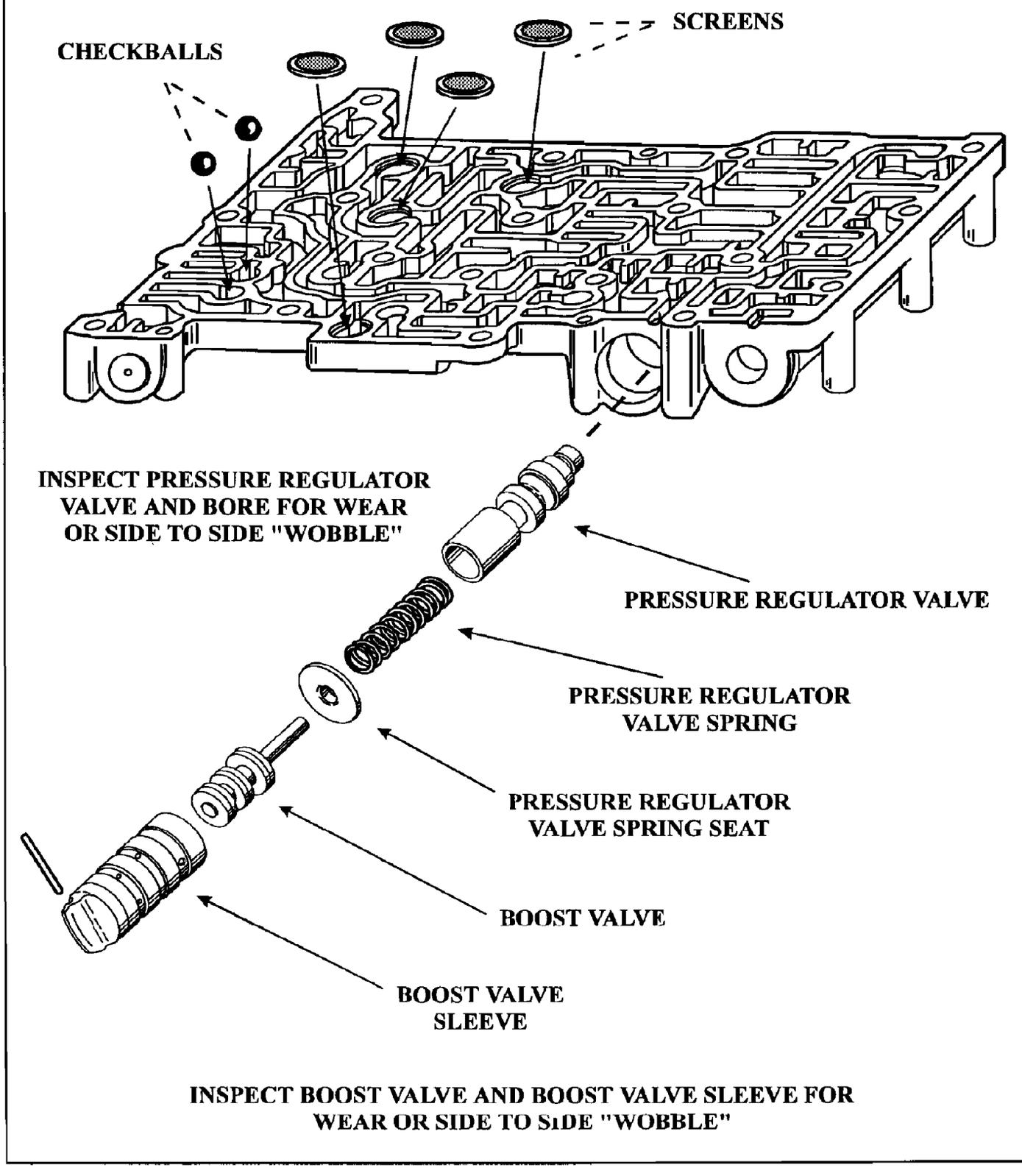


Figure 2

REAR CONTROL SPACER PLATE

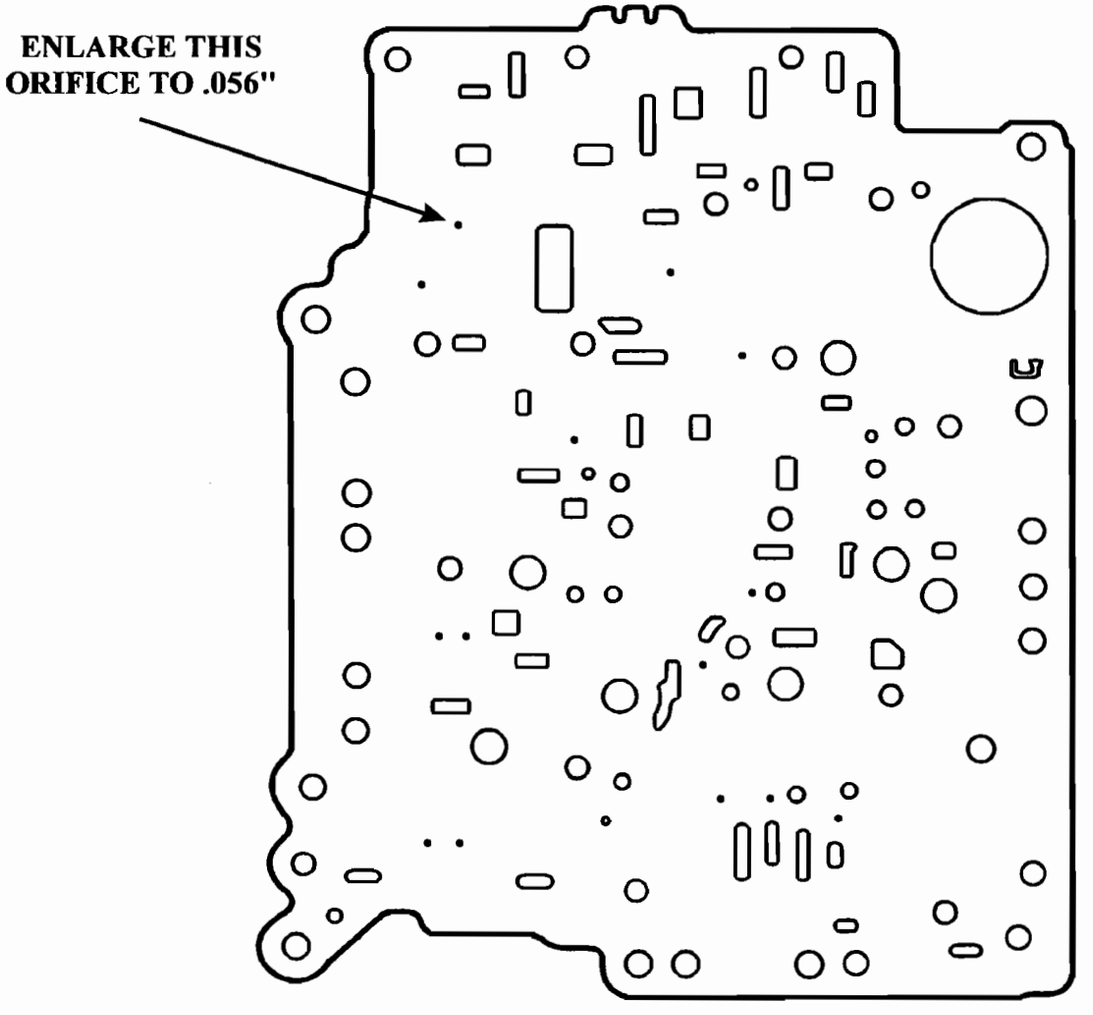


Figure 3

MAZDA/FORD G4A-EL, F4A-EL, GF4A-EL

3RD GEAR STARTS NO CODES

COMPLAINT: Vehicles equipped with G4A-EL, F4A-EL and GF4A-EL transaxles may exhibit 3rd gear starts in the OD/D and / or D/S/2 positions with 1st gear obtainable in the Manual Low or 1 position. Vehicles subject to this condition will normally have no Reverse lights and/or no trouble codes, but will be able to store trouble codes if they are induced.

CAUSE: The cause may be:

- A blown 10 or 15 amp fuse marked "METER," located in interior fuse panel.
- A broken "Switched Battery Lead" to the Inhibitor Switch. (Black with Yellow stripe).
- A faulty inhibitor switch.

CORRECTION: Follow the steps that describe the vehicles condition:

CONDITION 1. 3rd gear starts in OD/D and D/S/2 positions with 1st gear in Manual Low or 1 position. Go to STEP 1.

CONDITION 2. 3rd gear starts in the OD/D position with 1st gear starts and normal upshifts in the D/S/2 and Manual Low or 1 positions. Go to STEP 4.

CONDITION 3. 3rd gear starts in the D/S/2 position with 1st gear starts and normal upshifts in the OD/D and Manual Low or 1 positions.Go to STEP 4.

STEP 1. Place selector lever in the Reverse position with key on engine off and check for Reverse lights. If there are NO Reverse lights go to STEP 2. If there are Reverse lights go to STEP 4.

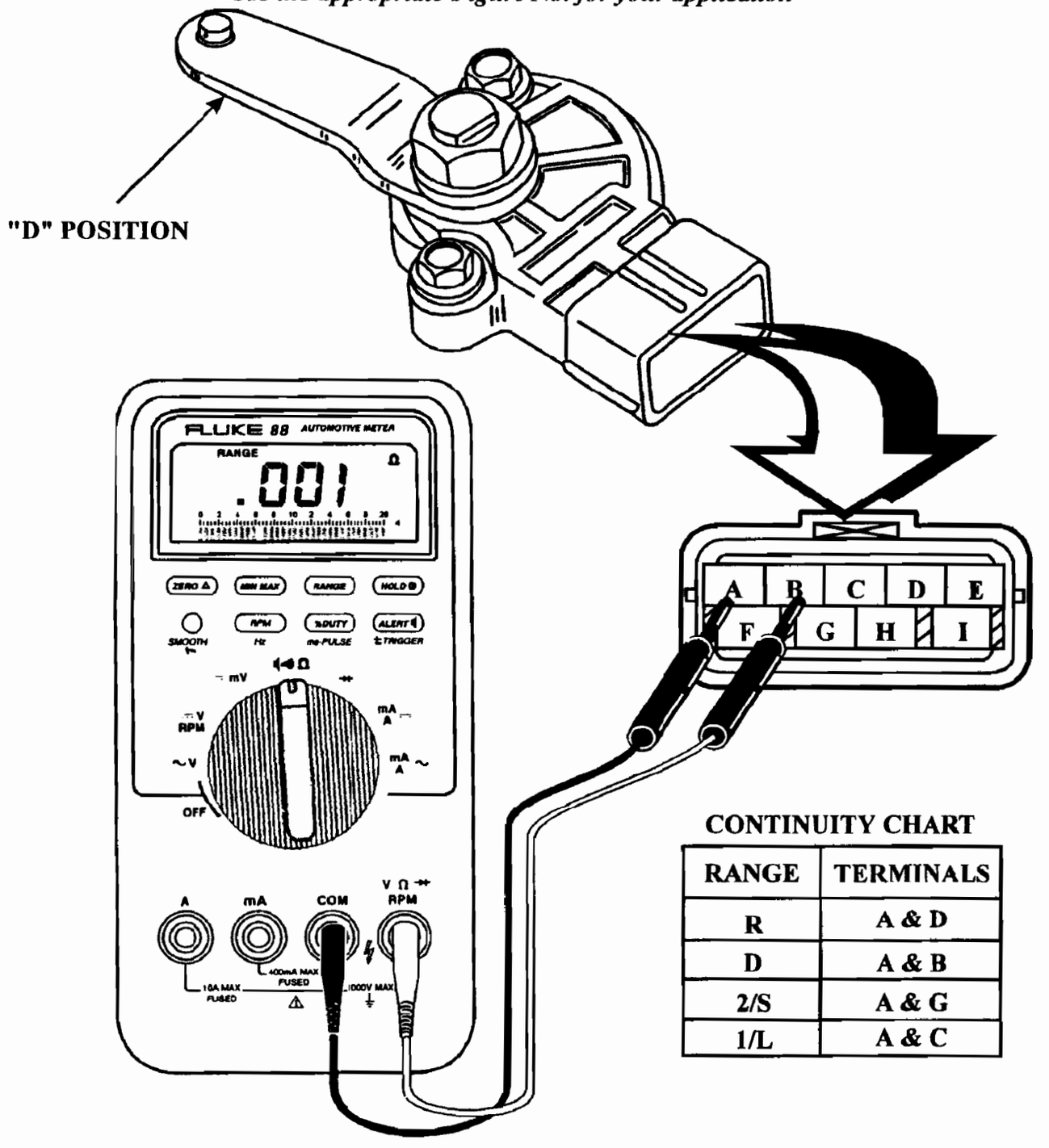
STEP 2. Locate 10 or 15 amp "METER" fuse in the interior fuse panel and replace if it's blown and ensure that there is 12 volts on both sides of the fuse with ignition in the "ON" position. If the fuse is good and there is 12 volts on both sides of the fuse, go to STEP 3.

STEP 3. Locate your vehicle application and transmission type in Figures 2-7 and back probe the Switched Battery lead (Black with Yellow stripe wire) for 12 volts with the ignition "ON." If there is NO voltage, repair the broken Black with Yellow stripe wire. If the break in the wire can not be found, cut the Black with Yellow stripe wire and tape the harness side of the wire back to the vehicle harness. Run a new wire out to the remaining Black with Yellow stripe wire from a ignition ON source through a 10 amp in-line fuse. If there is 12 volts with ignition ON at the Black with Yellow stripe wire, go to STEP 4.

STEP 4. Locate your vehicle application and transmission type in Figures 2-7 and check the inhibitor switch for continuity on the specified terminals. (see example in Figure 1). If continuity ***does not*** exist, replace the inhibitor switch. If continuity ***does*** exist, repair broken wire between the inhibitor switch and the transmission controller.

INHIBITOR SWITCH CHECK

Example shown is for the GF4A-EL models.
Use the appropriate Figure No. for your application



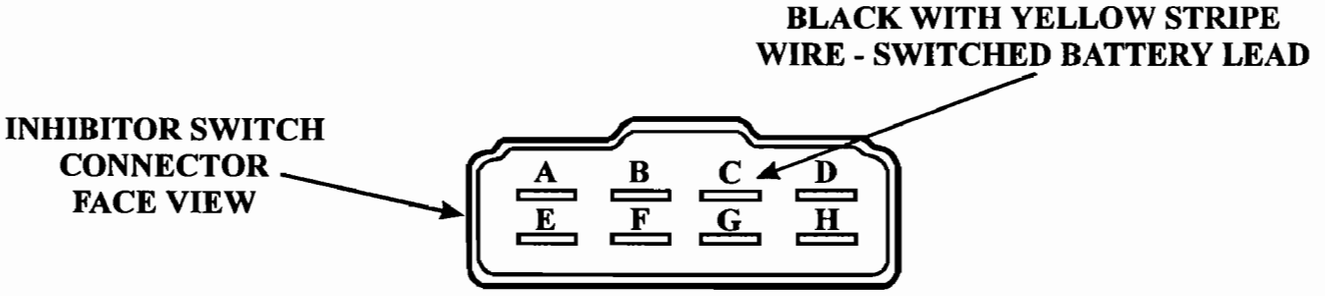
CONTINUITY CHART

RANGE	TERMINALS
R	A & D
D	A & B
2/S	A & G
1/L	A & C

TO ACCURATELY CHECK THE INHIBITOR SWITCH: 1ST. PLACE THE SELECTOR LEVER IN THE DESIRED RANGE. 2ND PLACE THE OHM METER LEADS ACROSS THE SPECIFIED TERMINALS IN THE CHART AND CHECK FOR CONTINUITY. 3RD CHECK ALL OTHER TERMINALS AND ENSURE THAT THERE IS NO CONTINUITY.

Figure 1

G4A-EL
1987 626 AND MX-6

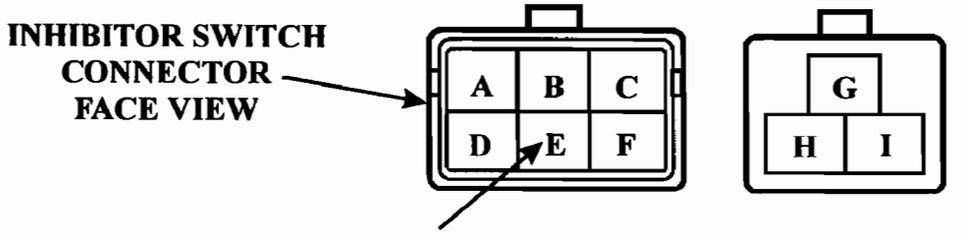


RANGE	TERMINALS
R	C & G
D	C & F
S	C & A
L	C & E

SPECIFIED TERMINALS HAVE CONTINUITY ONLY IN THE RANGES LISTED

Figure 2

G4A-EL G4AX-EL
88-92 626 AND MX-6
91-94 CAPRI AND 90-91 323 AWD



RANGE	TERMINALS
R	E & G
D	E & B
S	E & A
L	E & F

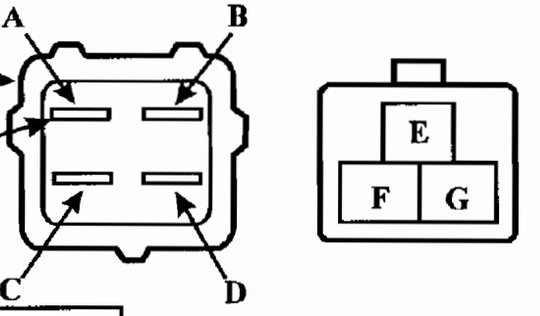
SPECIFIED TERMINALS HAVE CONTINUITY ONLY IN THE RANGES LISTED

Figure 3

G4A-EL
89-92 PROBE

INHIBITOR SWITCH CONNECTOR FACE VIEW

BLACK WITH YELLOW STRIPE WIRE - SWITCHED BATTERY LEAD



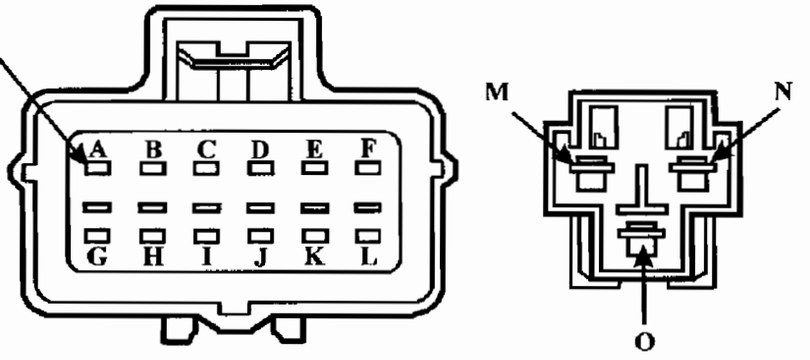
RANGE	TERMINALS
R	A & N
OD/D	A & H
D/S	A & C
1/L	A & I

SPECIFIED TERMINALS HAVE CONTINUITY ONLY IN THE RANGES LISTED

Figure 4

F4A-EL/F4EAT
91-96 ESCORT AND TRACER
90-94 323/PROTEGE, KIA SEPHIA & 92-93 MX-3

BLACK WITH YELLOW STRIPE WIRE - SWITCHED BATTERY LEAD



INHIBITOR SWITCH CONNECTOR FACE VIEW

RANGE	TERMINALS
R	A & N
OD/D	A & H
D/S	A & C
1/L	A & I

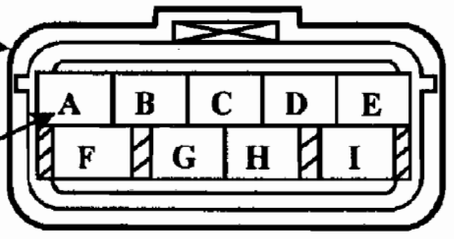
SPECIFIED TERMINALS HAVE CONTINUITY ONLY IN THE RANGES LISTED

Figure 5

F4A-EL

95-96 323/PROTEGE & 94-95 MX-3

INHIBITOR SWITCH CONNECTOR FACE VIEW



BLACK WITH YELLOW STRIPE WIRE - SWITCHED BATTERY LEAD

RANGE	TERMINALS
R	A & D
D	A & B
2/S	A & G
1/L	A & C

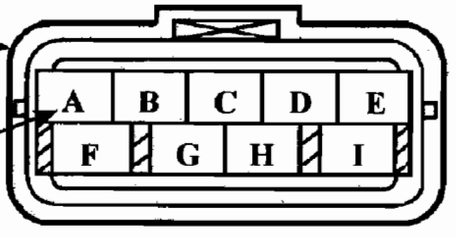
SPECIFIED TERMINALS HAVE CONTINUITY ONLY IN THE RANGES LISTED

Figure 6

GF4A-EL

93-96 626, MX6, PROBE AND MILLENIA

INHIBITOR SWITCH CONNECTOR FACE VIEW



BLACK WITH YELLOW STRIPE WIRE - SWITCHED BATTERY LEAD

RANGE	TERMINALS
R	A & D
D	A & B
2/S	A & G
1/L	A & C

SPECIFIED TERMINALS HAVE CONTINUITY ONLY IN THE RANGES LISTED

Figure 7

MAZDA 929 R4A-EL
PCM FAILURE

COMPLAINT: After overhaul, vehicle exhibits a melted wiring harness and Powertrain Control Module failure , ***that require replacement of both.***

CAUSE: The cause may be, the female Turbine Speed Sensor connector was connected to the male Heated Oxygen Sensor connector upon re-installation of the transmission into the vehicle.

CORRECTION: This problem can avoided by ensuring that both female and male harness connectors have the same amount of wires. Refer to Figure 1 for Turbine Speed Sensor location. Refer to Figure 2 for 3 pin Turbine Speed Sensor and 4 pin Heated Oxygen Sensor connector identification.

TURBINE SPEED SENSOR LOCATION

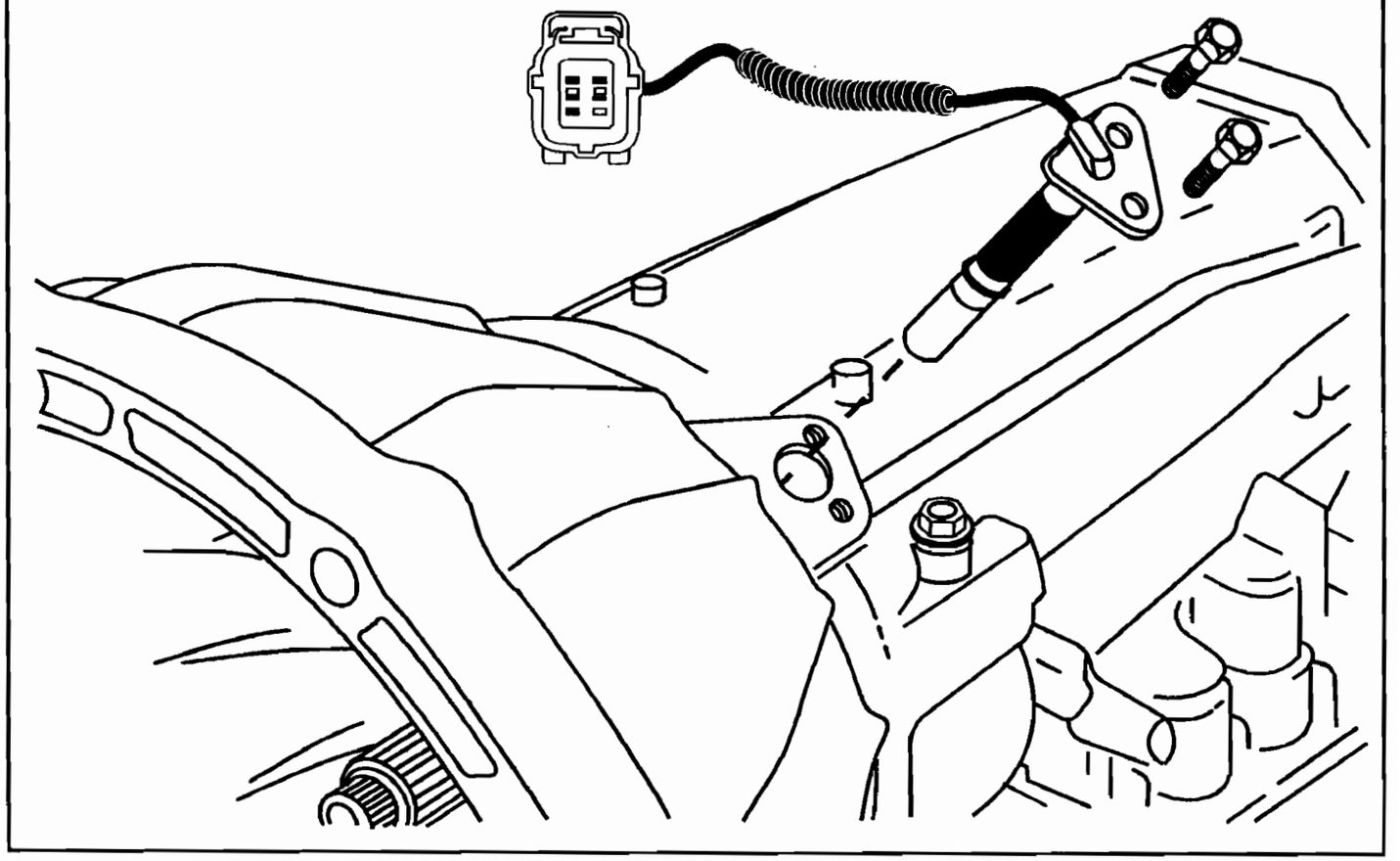
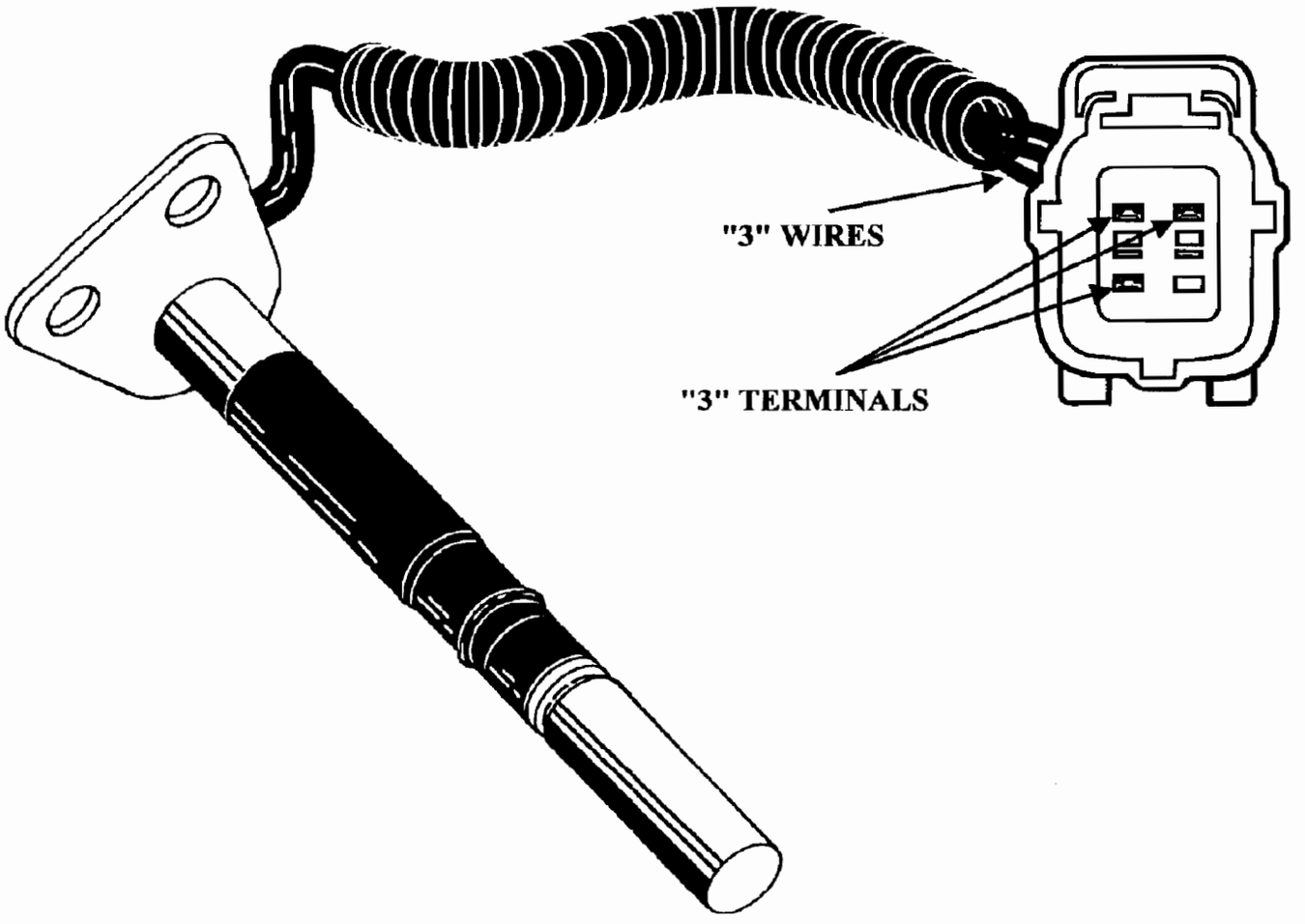


Figure 1

TURBINE SPEED SENSOR CONNECTOR



HEATED OXYGEN SENSOR AND CONNECTOR

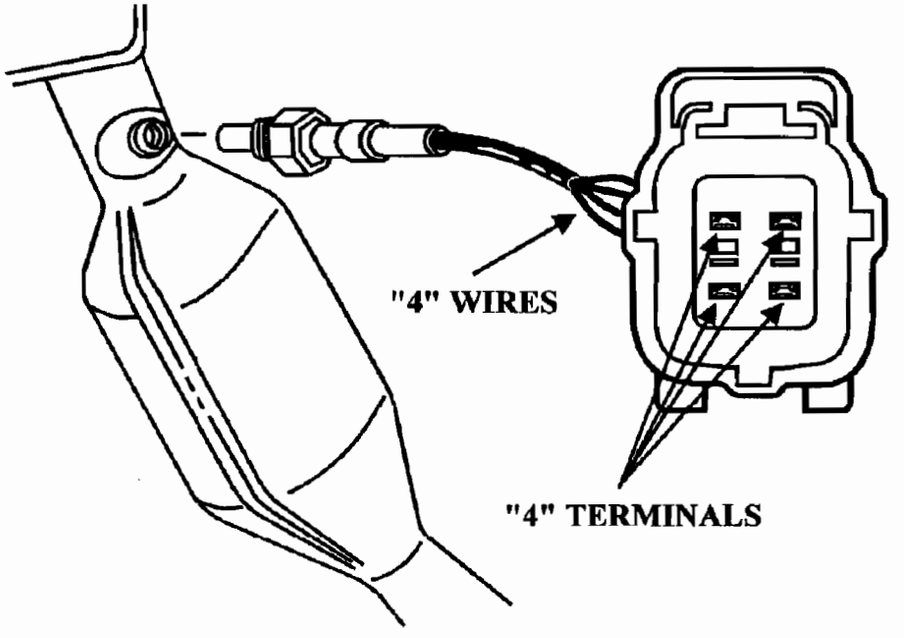


Figure 2

TOYOTA A540-E
TRANSAXLE MODIFICATIONS FOR NEW DESIGN "COMMON SUMP"

CHANGE: Beginning in Mid-May, 1991, many engineering changes were made on all Toyota and Lexus vehicles equipped with the A540-E transaxle, to accommodate a new design "Common Sump" that now allows the transaxle ***and*** differential to be filled from the transaxle fill tube.

REASON: Increased lubrication performance, and increased final drive durability.

PARTS AFFECTED:

(1) TRANSAXLE CASE - Added passage in transaxle case to allow free flow of oil between the transaxle and the differential. Refer to Figure 2.
Second added passage, near the differential area that is fed with oil from the valve body to keep the differential at a constant oil level. Refer to Figure 2.
A new fitting and tube assembly added on top of the transaxle case to give the transaxle and differential a common vent system. Refer to Figure 1.
Increased thickness in the bellhousing to accommodate 5mm (1/4") increase in the bolts that attach the transaxle to the engine. Refer to Figure 1.

(2) TRANSAXLE CASE UPPER COVER - Added fitting and tube assembly to connect the differential to the transaxles air vent system.

(3) DIFFERENTIAL COVER - Added passage in the cover to transport the oil from the valve body to fill the differential. Refer to Figure 3.
A new design rear engine mount to accommodate the added passage in the differential cover, as shown in Figure 3.

(4) VALVE BODY - Added passage to accommodate a new tube and hold down brackets to supply the differential with fluid, direct from the valve body. Refer to Figure 4.

(5) TRANSAXLE DIPSTICK - The "Full" mark increased from 1.338" to 1.929" on the Lexus vehicles, and from 1.338" to 2.047" on Toyota vehicles, which changes the transaxle and differential fluid capacity. Refer to Figure 5.

INTERCHANGEABILITY:

NONE OF THE PARTS LISTED ABOVE WILL INTERCHANGE WITH PREVIOUS DESIGN LEVEL PARTS. THE NEW DESIGN LEVEL PARTS WILL RETRO-FIT BACK TO PREVIOUS MODEL VEHICLES WHEN ALL OF THE PARTS LISTED ABOVE ARE USED AS A PACKAGE.

TRANSMISSION CASE AND UPPER COVER

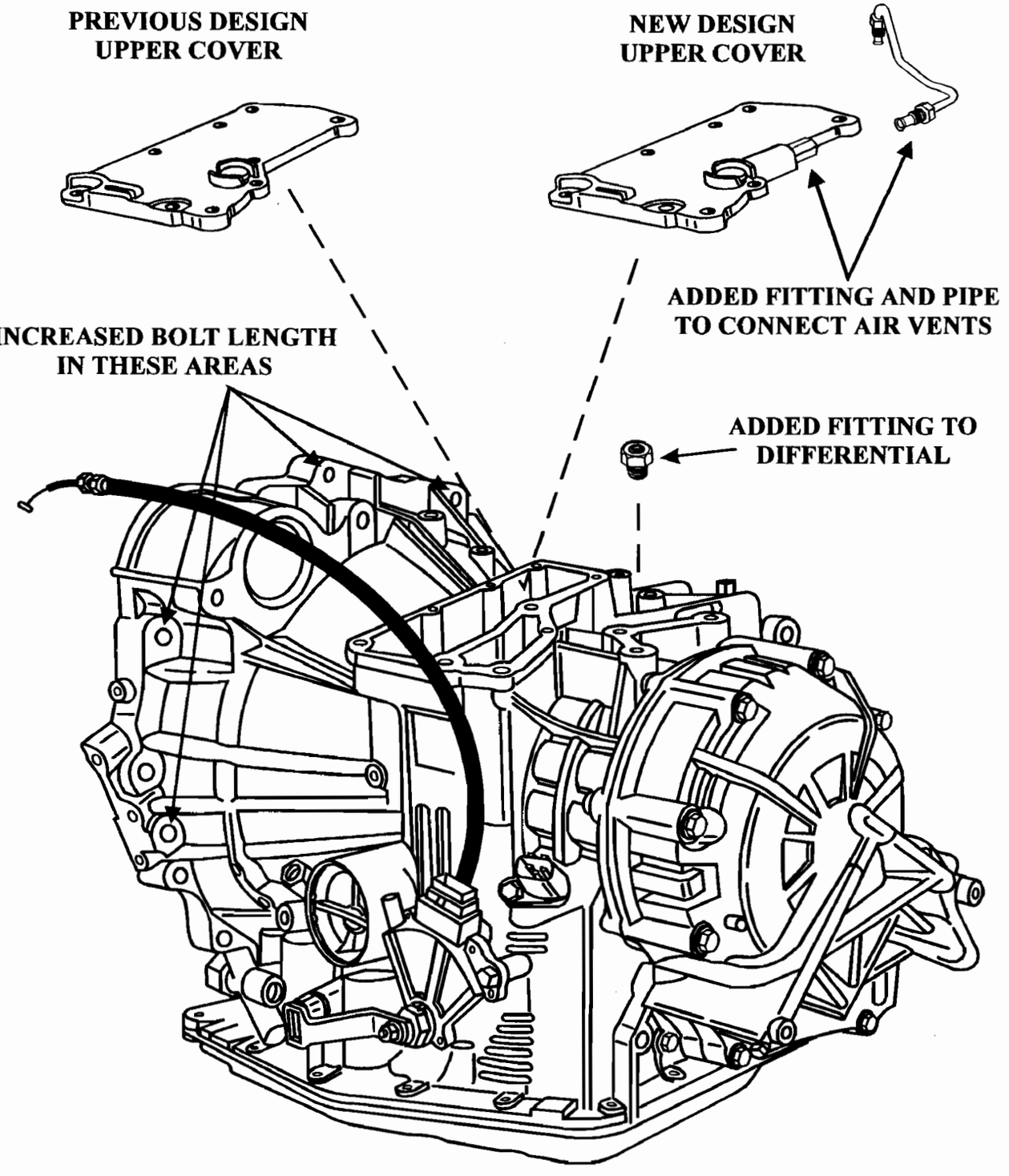


Figure 1

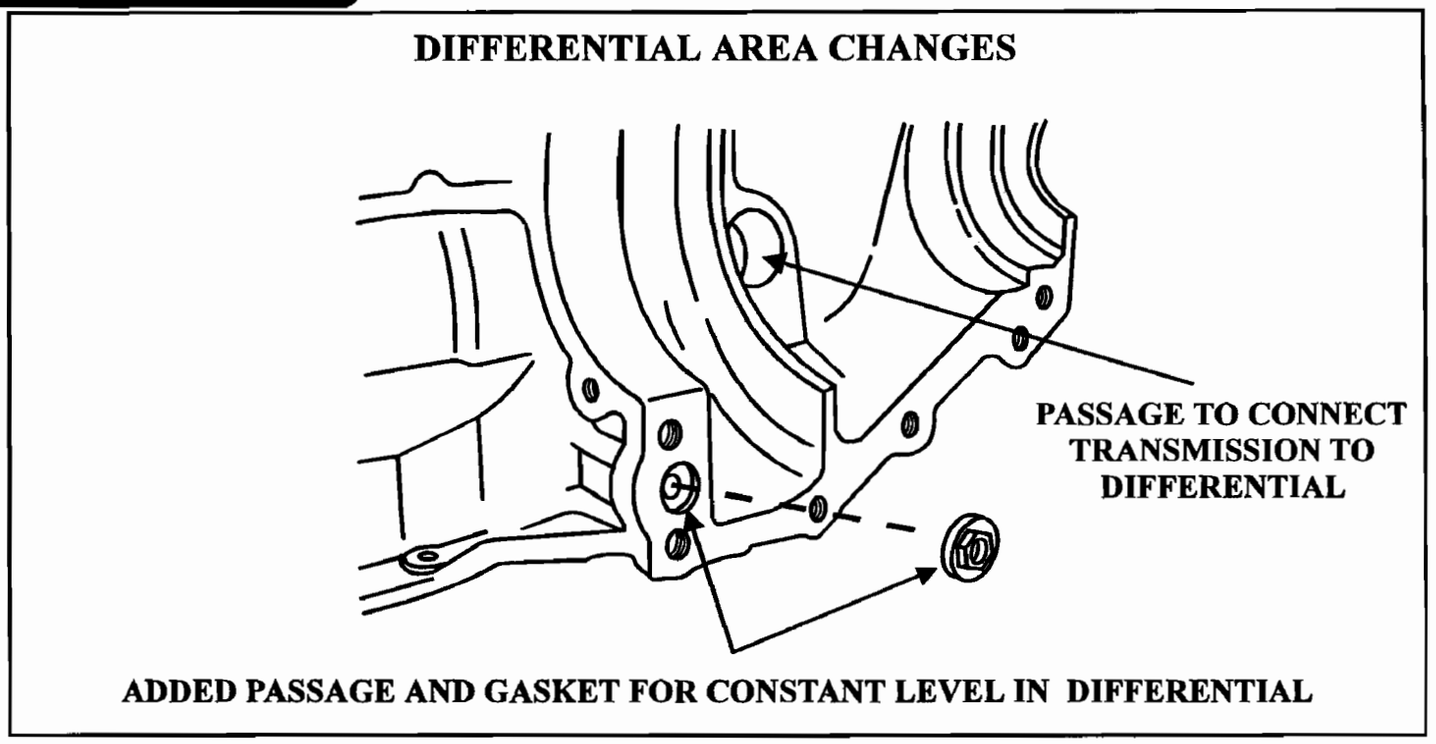


Figure 2

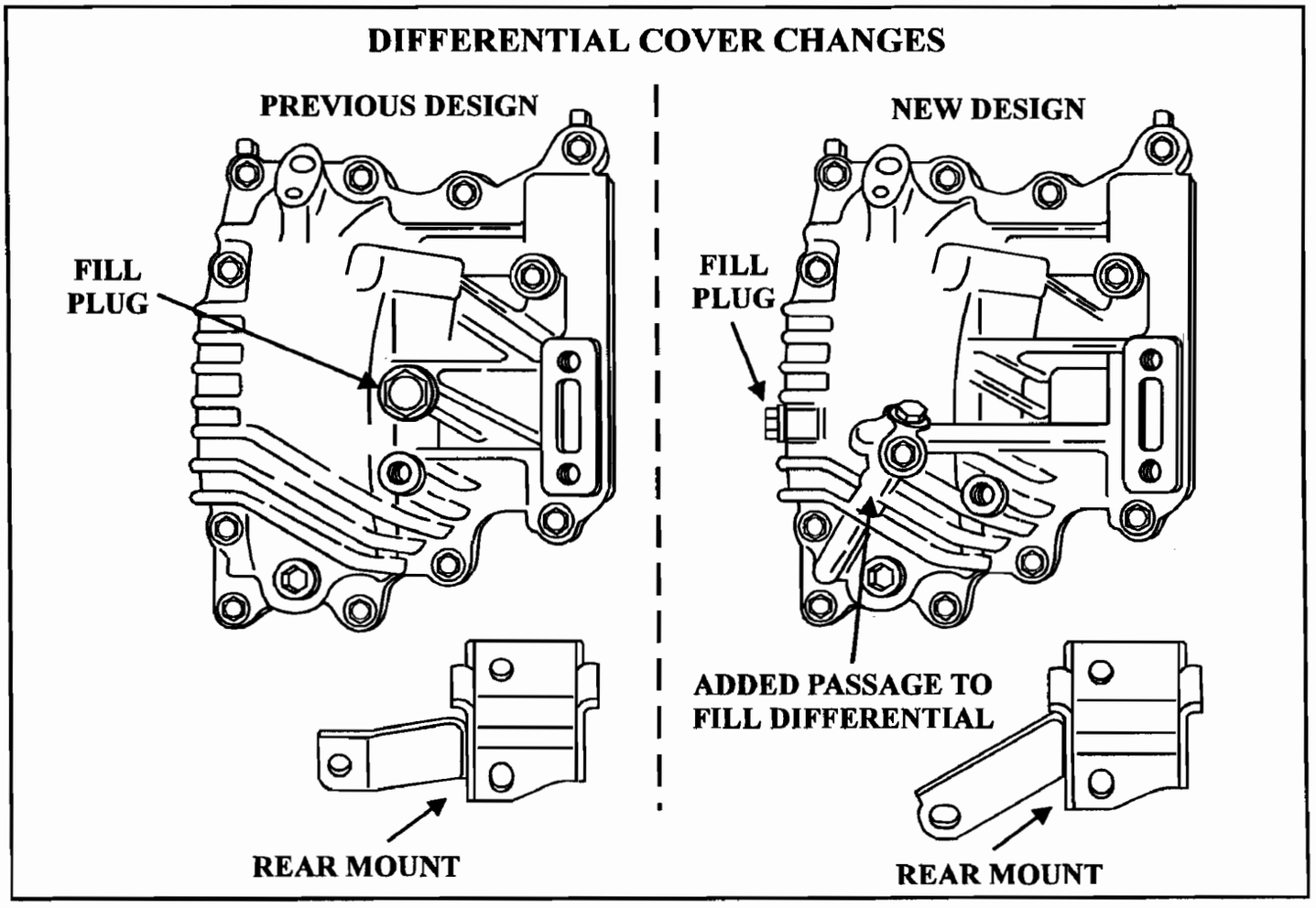


Figure 3

VALVE-BODY

ADDITIONAL TUBE
AND HOLD DOWN BRACKETS

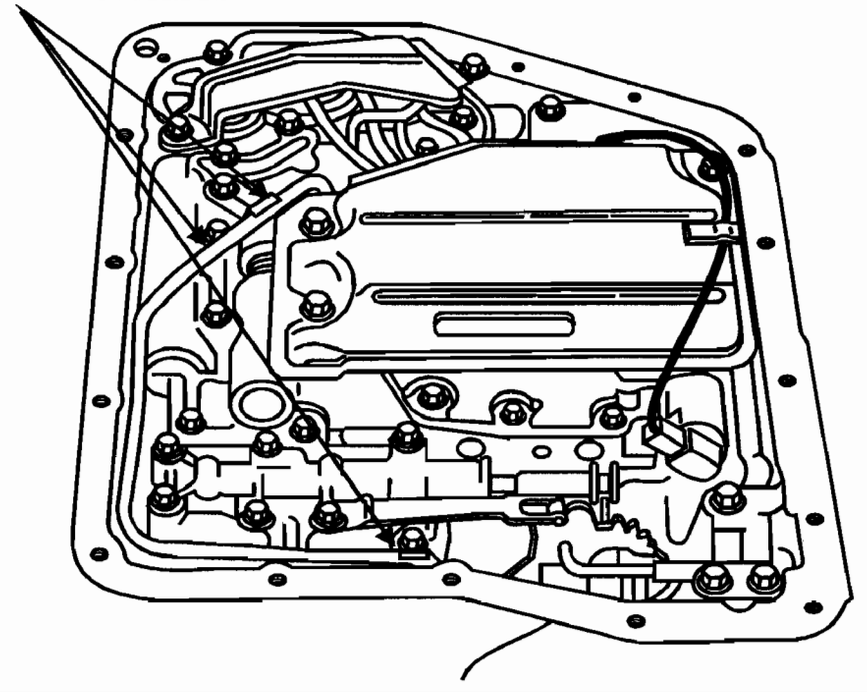
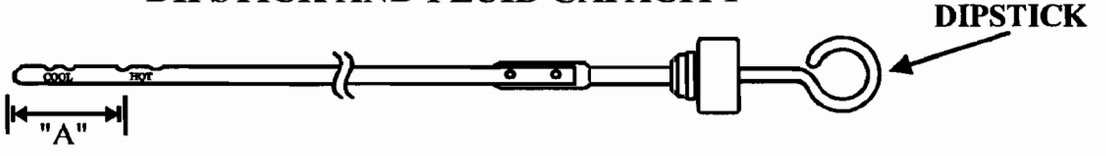


Figure 4

DIPSTICK AND FLUID CAPACITY

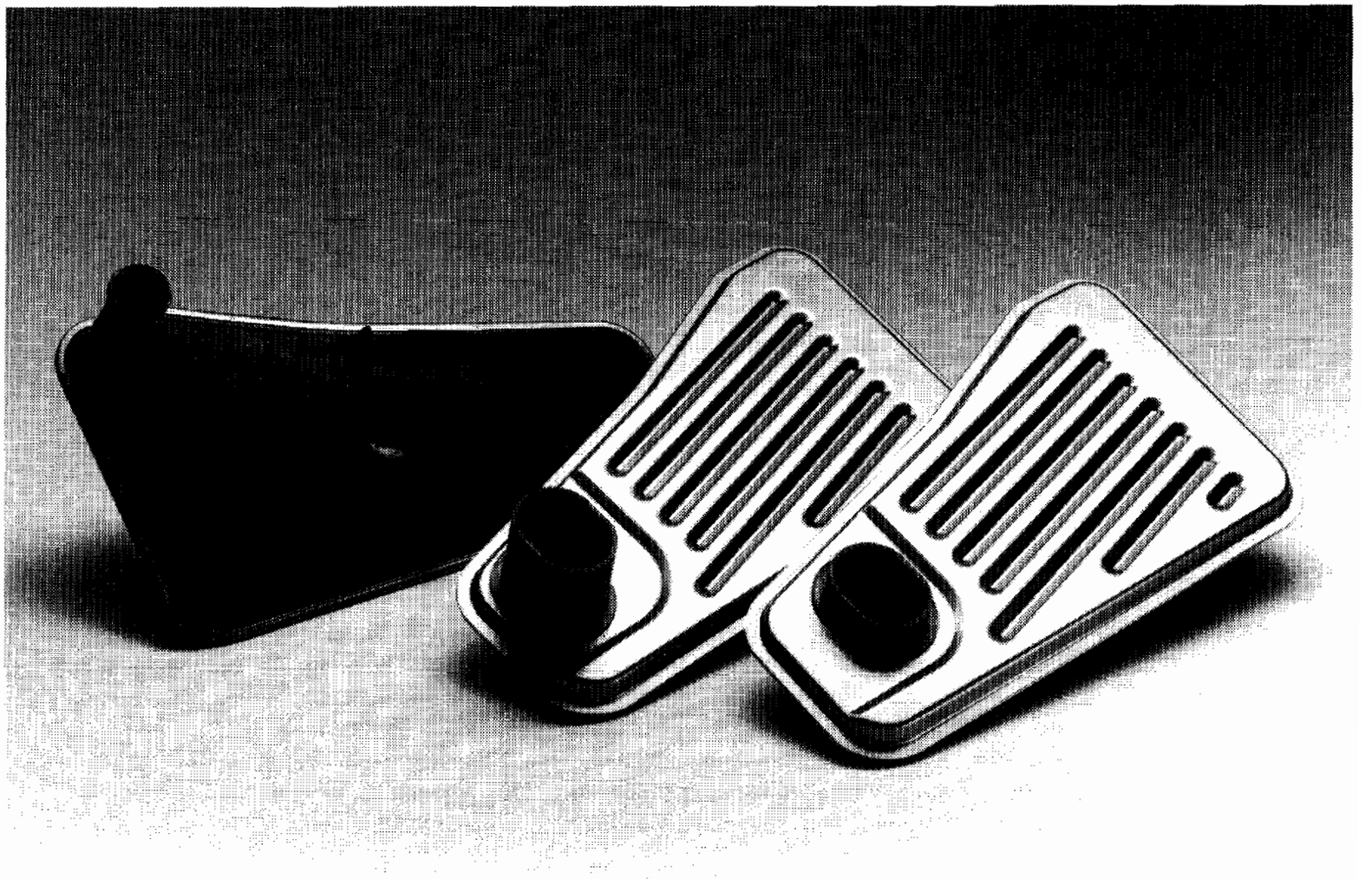


DIMENSION "A"= 34mm. (1.338") now 49mm. (1.929") on LEXUS
DIMENSION "A"= 34mm. (1.338") now 52mm. (2.047") on TOYOTA

FLUID CAPACITY'S

	PREVIOUS DESIGN	NEW DESIGN
TRANSMISSION	DRY FILL 6.2 qts. (5.9 liters)	DRY FILL 6.9 qts. (6.5 liters)
	DRAIN & REFILL 2.6 qts. (2.5 liters)	DRAIN & REFILL 3.3 qts. (3.1 liters)
DIFFERENTIAL	DRY FILL 1.1 qts. (1.0 liters)	DRY FILL 0.8 qts. (0.8 liters)
	DRAIN & REFILL 1.1 qts. (1.0 liters)	DRAIN & REFILL 0.8qts. (0.8 liters)

Figure 5



Sealed seam security.

E40D. The E40D automatic transmission filter from Filtran. No other E40D transmission filter can offer the proven sealed seam, zero leak technology that locks the filter media in place to eliminate leaks, fluid bypass and contamination. And no other E40D filter features Filtran's proprietary depth filtration media, developed and tested for cleaner and more efficient fluid flow.

The Filtran E40D filter also offers a permanent ethylene acrylate multi-lip outlet tube seal to prevent external air leaks, cavitation, and pressure loss. Plus, a composite material design that's engineered for durability and improved efficiency to provide proper filtration even in cold flow conditions.

No other E40D automatic transmission filter can deliver this kind of performance. So the next time you service a Ford E40D transmission, install the only filter that's sealed for security — the automatic transmission filter from Filtran.

FILTRAN

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Look for this Mark of Quality on every transmission filter you install.

TOYOTA A240 SERIES

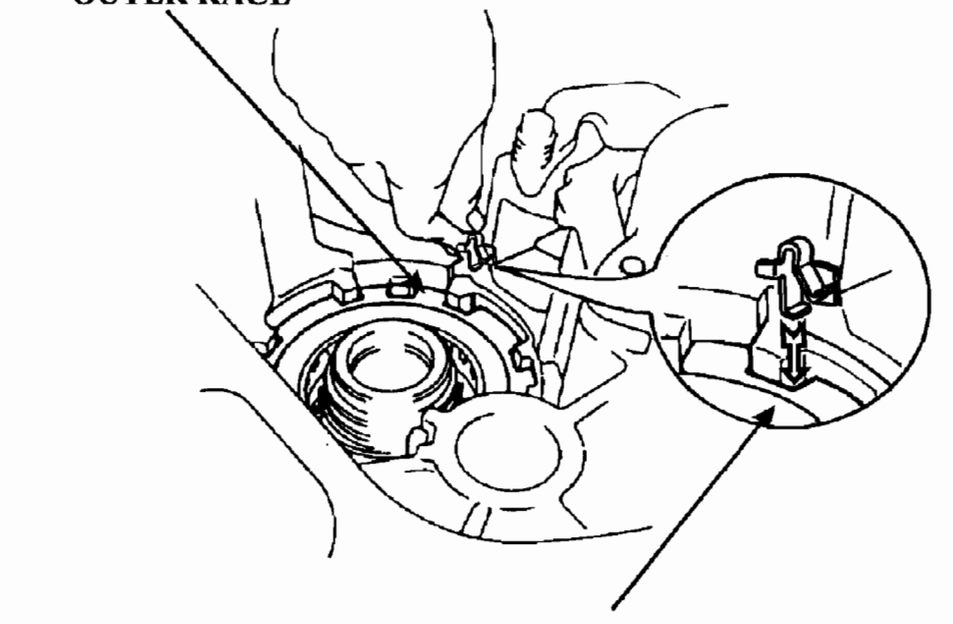
4-3 DOWNSHIFT OR DRIVE ENGAGEMENT CLUNK

COMPLAINT: After overhaul, vehicle exhibits a metallic 4-3 downhsift and/or Drive engagement "clunk."

CAUSE: The cause may be, that the "Anti-rattle" clip, shown in Figure 1, was mis-placed or was left out on reassembly of the transmission.

CORRECTION: Refer to Figure 1 for the location and installation of the "Anti-rattle" clip.

ANTI-RATTLE CLIP LOCATION



INSTALL ANTI-RATTLE CLIP BETWEEN CASE LUG AND "F_3 OUTER RACE."

Figure 1

ACURA MODEL "RO"

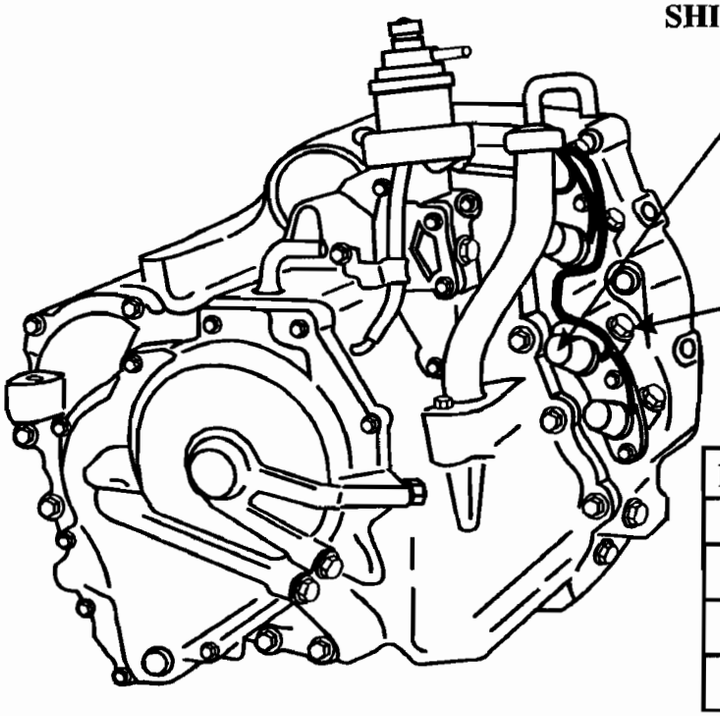
NO 2-3 UPSHIFT COLD

COMPLAINT: Some 1990 Acura Integra's, equipped with "RO" transmissions, may exhibit a normal 1-2 upshift and a "No" 2-3 upshift attempt when ***cold only***. When the vehicle begins to warm up the 2-3 upshift will be completely normal until the vehicle is cold again.

CAUSE: The cause may be, a stuck open "B" solenoid when cold or a sticking 2-3 shift valve in the valve body when cold.

CORRECTION: To correct this condition first install a 0-100 psi. pressure gage onto the solenoid "B" pressure port when cold. In first and second gear solenoid "B" pressure is between 0 and 10 psi. In third gear solenoid "B" pressure should be 70-80 psi. If the solenoid "B" pressure stays at 0-10 psi. until the vehicle warms up, replace the shift solenoids. If solenoid "B" pressure increases to 70-80psi. than the 2-3 shift should have occured. This would indicate that the 2-3 shift valve is sticking. Refer to Figure 2 to locate and ensure that the 2-3 shift valve falls in and out of it's bore on it's own weight. NOTE: Refrigerate the valve body before re-assembly to be sure that the valve is free.

SOLENOID AND PORT LOCATION



RANGE	SOL."A"	SOL."B"
1		ON
2	ON	ON
3	ON	
4		

ALL SOLENOIDS NORMALLY CLOSED

Figure 1

MAIN VALVE BODY

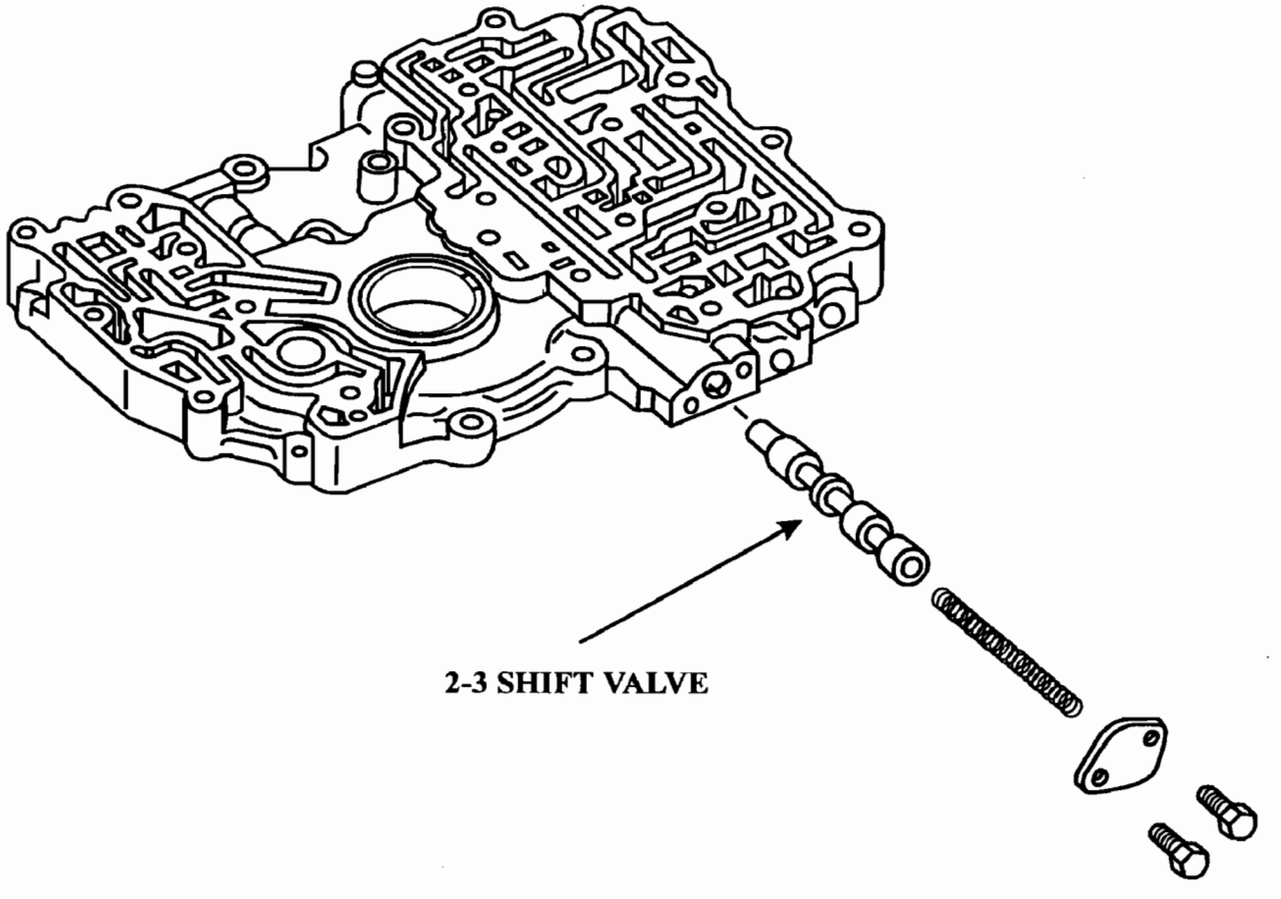


Figure 2

HONDA PX4B

NO MOVEMENT

COMPLAINT: The vehicle does not move forward or backward, but will creep when throttle is increased. This condition is created after overhaul.

CAUSE: The Honda PX4B transaxle can have the upper and lower secondary valve body spacer plates switched due to the over all shape and bolt patterns being the same, however the fluid passages in the upper and lower spacer plates are different. (Refer to Figure 1)
The reason this is common to the PX4B is because the throttle rod for the TV "B" valve is located in the throttle valve body.(Refer to Figure 2)
It does not go through the secondary valve body spacer plate as on other Honda transaxles. (Refer to Figure 3)

CORRECTION: Use caution when disassembling the valve body components so as to NOT mix them up.

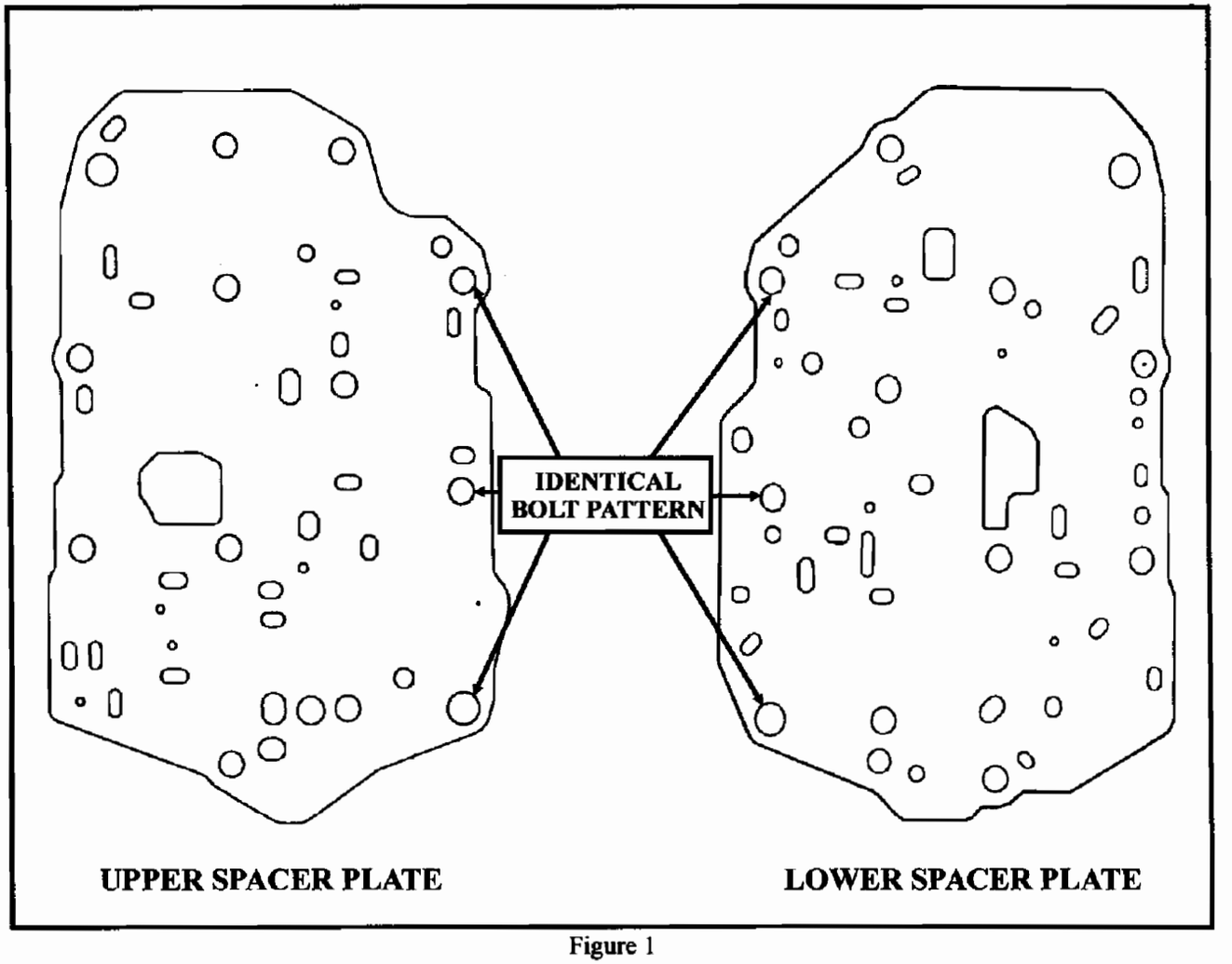


Figure 1

HONDA PX4B

NO MOVEMENT

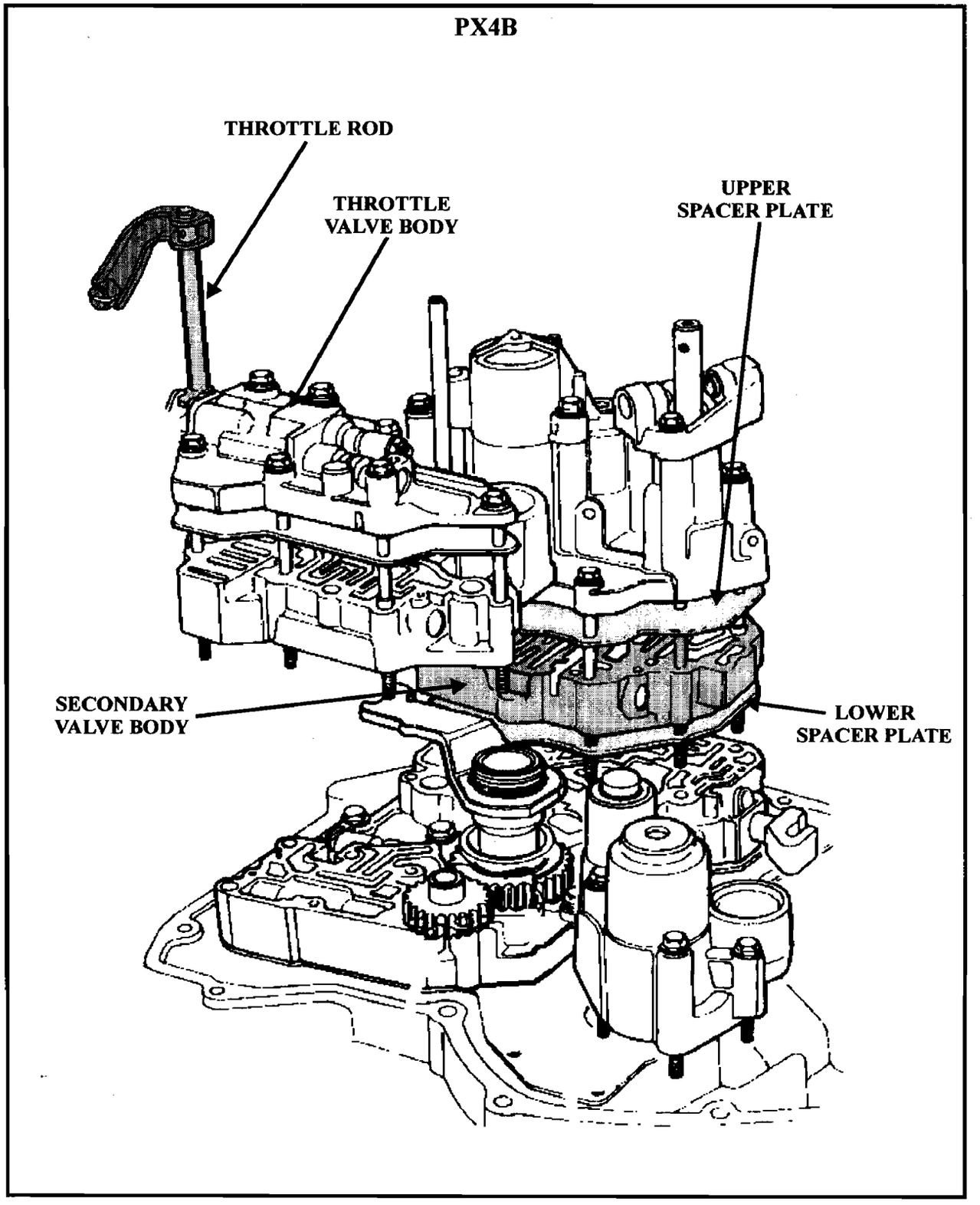


Figure 2

HONDA PX4B

NO MOVEMENT

F4

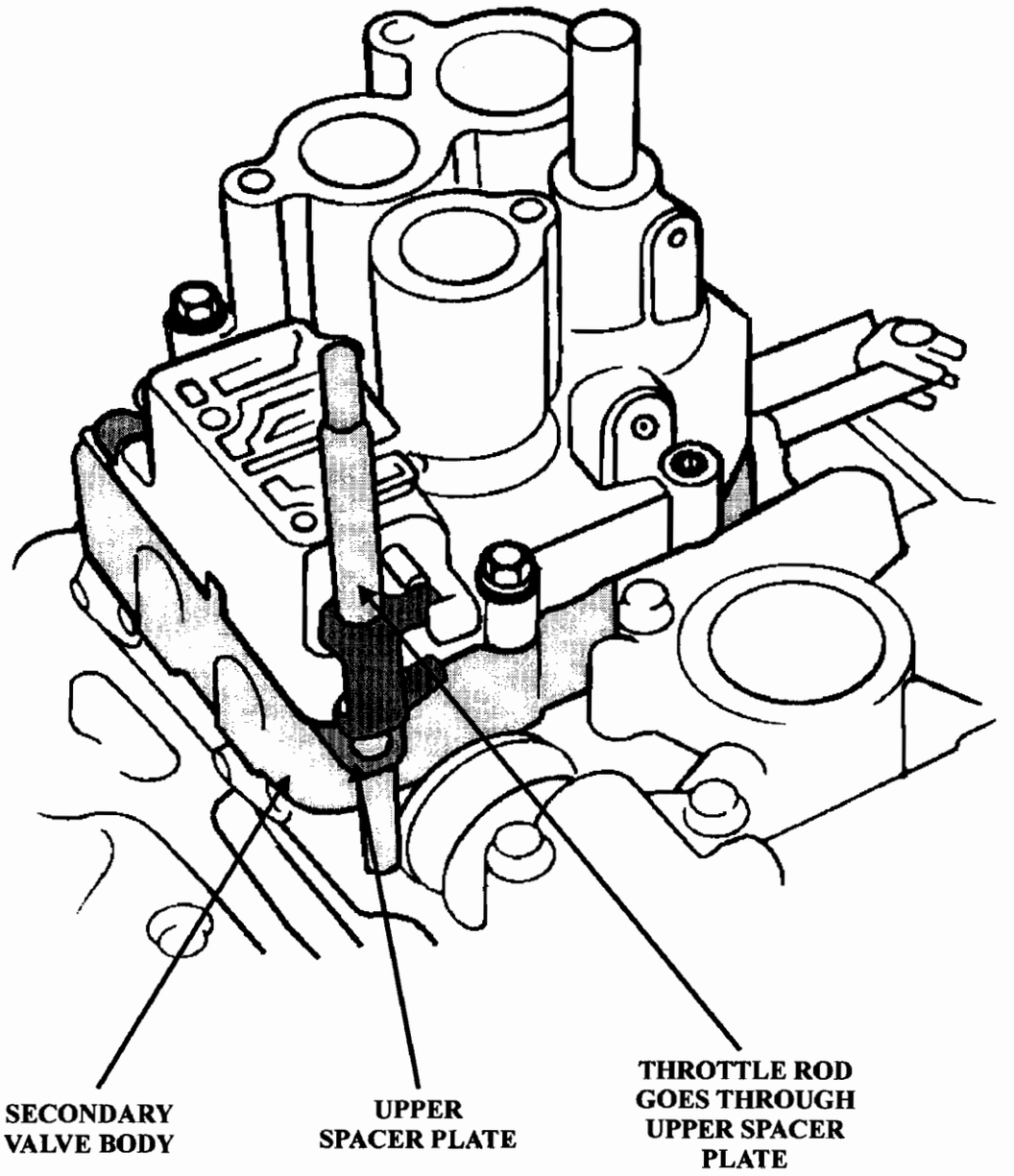


Figure 3

HONDA

1990 ACCORD

"S" LAMP ON CONTINUOUSLY

COMPLAINT: The "S' indicator lamp does not flash, it is on continuously. (Refer to Figure 1) When the service connector located behind the passenger side kick panel (Refer to Figure 2) is jumped, the "S" lamp will not flash any service codes. The shift interlock control unit,located under the driver's side of the dash. (Refer to Figure 3), may be buzzing or clicking except when the brake pedal is depressed. The transaxle may have reverse and fourth gear only and when the shift solenoid circuits are checked for voltage, instead of 12 volts, the circuits may have 4 volts.
The removal of 7.5 AMP Back-up fuse located in the under the hood fuse box (Refer to Figure 4) may temporarily clear these symptoms, but soon after, these symptoms return.

WARNING: Disconnecting the battery cable will erase anti-theft codes and radio station programming.

CAUSE: The A/T Control Unit is faulty.

CORRECTION: Replace the A/T Control Unit. (Refer to Figure 5)

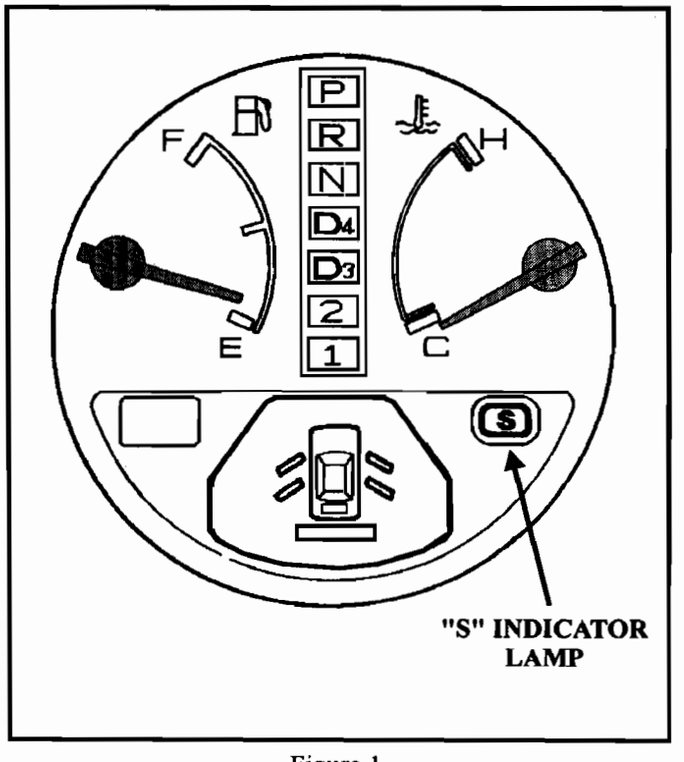


Figure 1

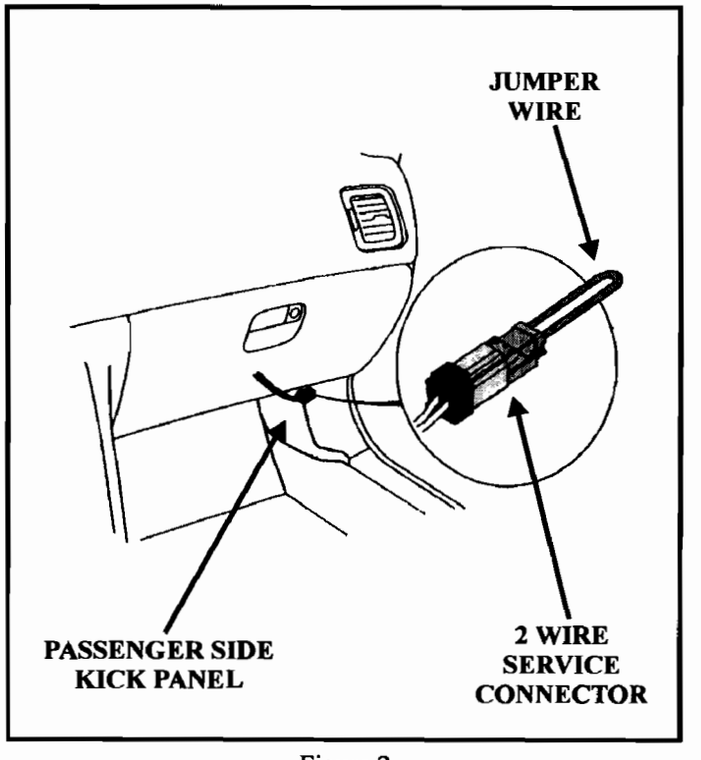


Figure 2

HONDA

1990 ACCORD

"S" LAMP ON CONTINUOUSLY

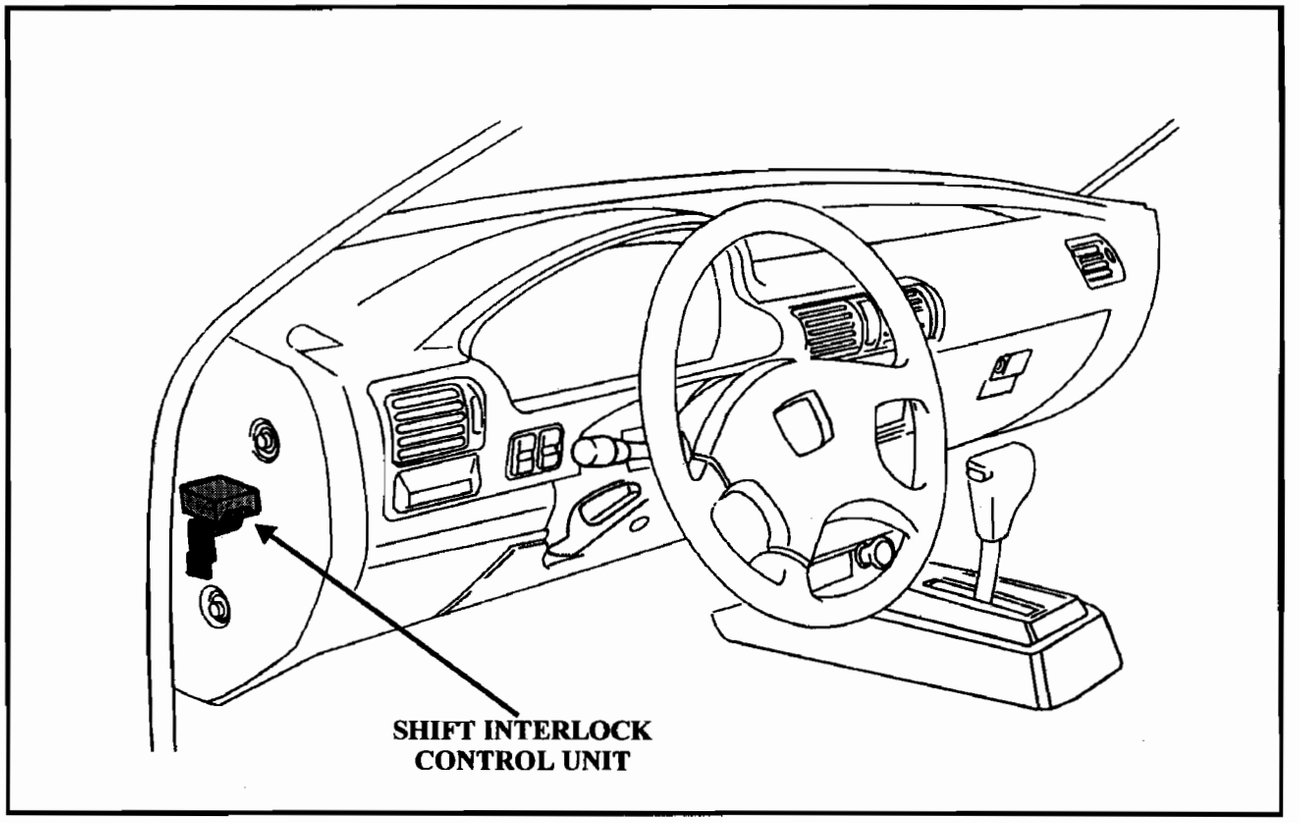


Figure 3

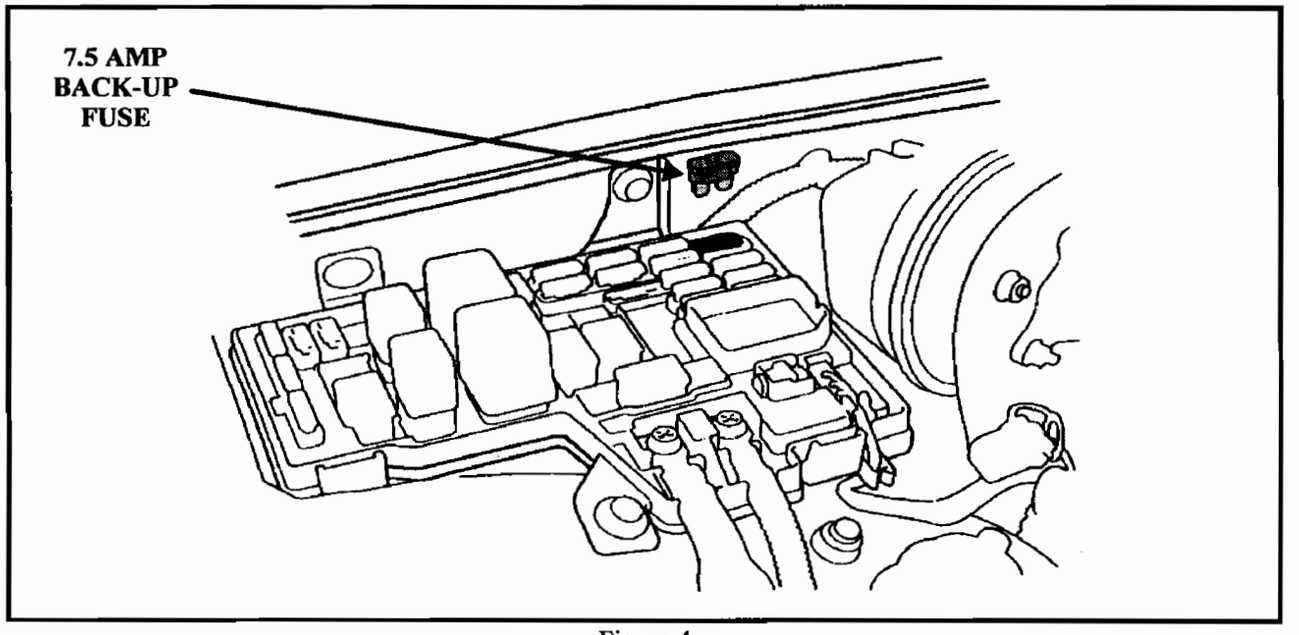


Figure 4

HONDA

1990 ACCORD

"S" LAMP ON CONTINUOUSLY

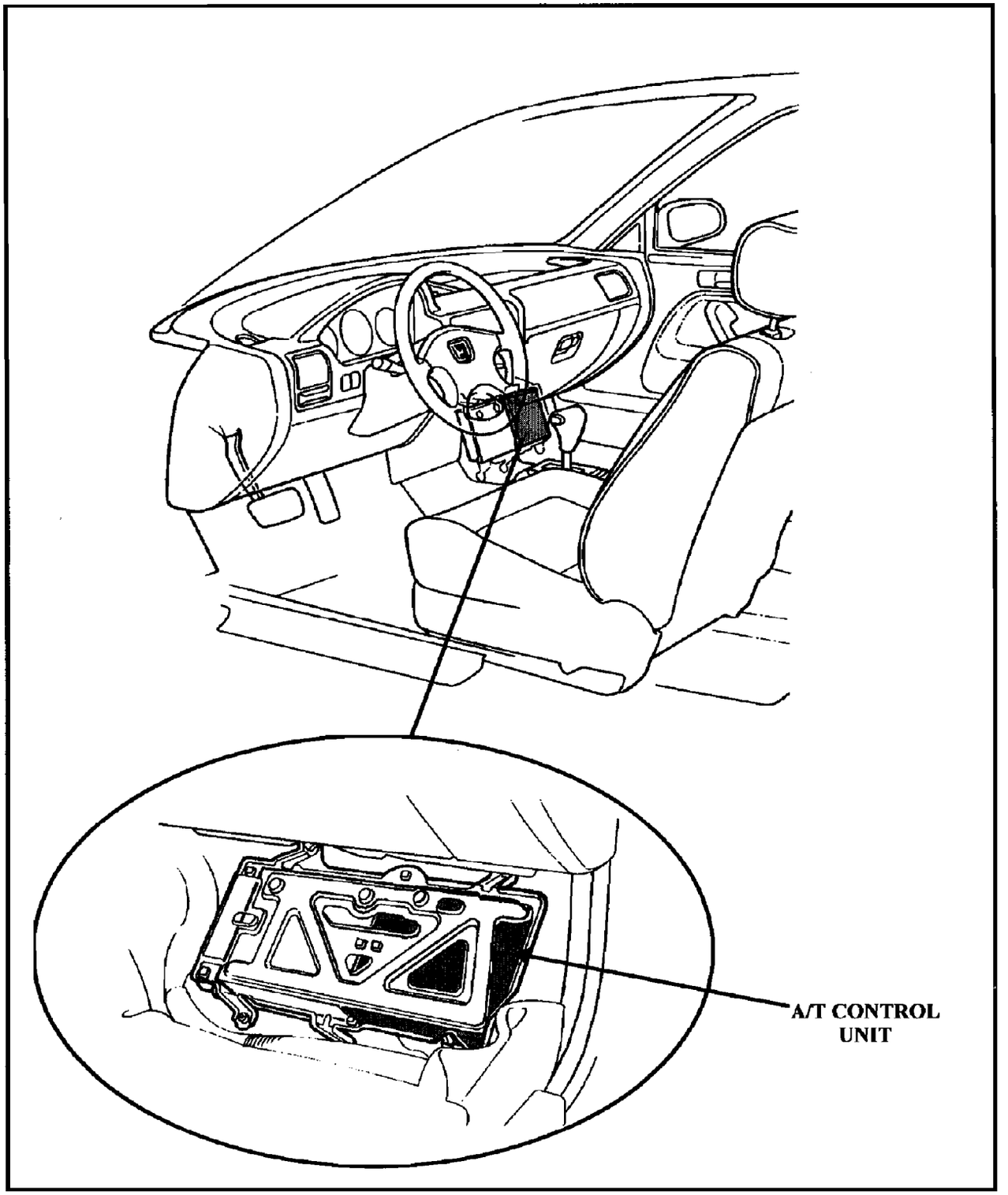
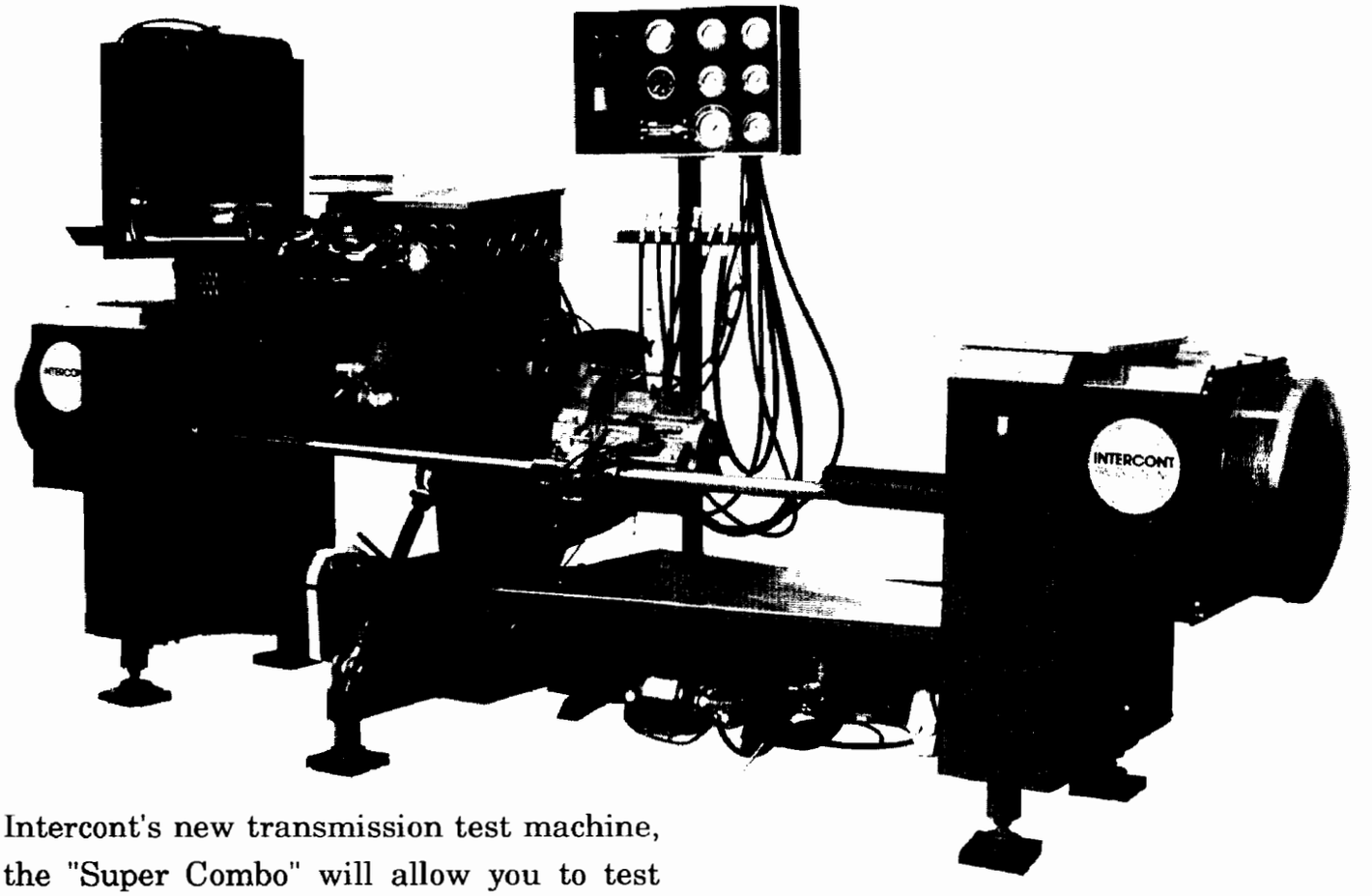


Figure 5

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.

THM 4L30-E

DIAGNOSTIC TROUBLE CODE RETRIEVAL AND DEFINITION FOR TROOPER, RODEO, ACURA SLX AND PASSPORT "ONLY"

1990-1991 TROOPER AND 1991-1992 RODEO "ONLY"

For Trouble code retrieval, locate Diagnostic 2 connector shown in Figure 2 (***White*** for Trooper and ***Black*** for Rodeo). Jump the connector as shown in Figure 2 and refer to Figures 8-10 for code definitions. The "Check Trans" lamp flash patterns for normal operation, and when DTC's are set, are shown in Figure 1.

1992-1993 TROOPER AND 1993 RODEO "ONLY"

For Trouble code retrieval, locate Diagnostic 1 connector shown in Figure 3. Jump the connector between terminals 1 and 3, as shown in Figure 3 and refer to Figures 8-10 for code definitions. The "Check Trans" lamp flash patterns for normal operation, and when DTC's are set, are shown in Figure 1.

1994 TROOPER, RODEO AND PASSPORT "ONLY"

For Trouble code retrieval, locate Diagnostic 2 connector shown in Figure 4. Jump the connector as shown in Figure 4 and refer to Figures 11 and 12 for code definitions. The "Check Trans" lamp flash patterns for normal operation, and when DTC's are set, are shown in Figure 1.

1995 TROOPER, RODEO AND PASSPORT "ONLY"

For Trouble code retrieval, locate Diagnostic 2 connector shown in Figure 5. Jump the connector as shown in Figure 5 and refer to Figures 11 and 12 for code definitions. The "Check Trans" lamp flash patterns for normal operation, and when DTC's are set, are shown in Figure 1.

1996-1997 TROOPER AND ACURA SLX "ONLY"

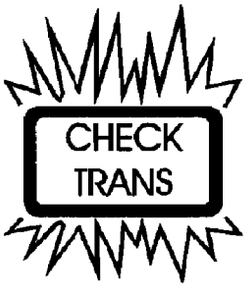
For Trouble code retrieval, locate the 16 pin ***OBD-II*** connector as shown in Figure 6. Connect a scan tool as this is the only way to retrieve trouble codes. Refer to Figures 13 and 14 for code definitions.
The "Check Trans" lamp will be flashing if codes are stored in memory.

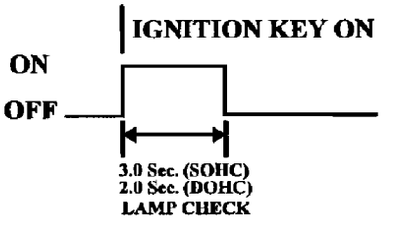
1996-1997 RODEO AND PASSPORT "ONLY"

For Trouble code retrieval, locate the 16 pin ***OBD-II*** connector as shown in Figure 7. Connect a scan tool as this is the only way to retrieve trouble codes. Refer to Figures 13 and 14 for code definitions.
The "Check Trans" lamp will be flashing if codes are stored in memory.

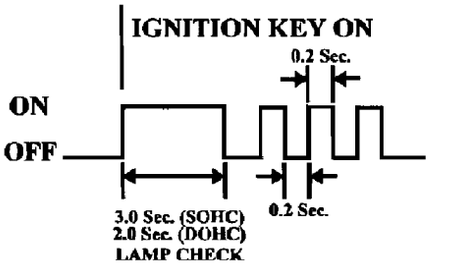
STEP 1

"NORMAL" CHECK TRANS LIGHT OPERATION





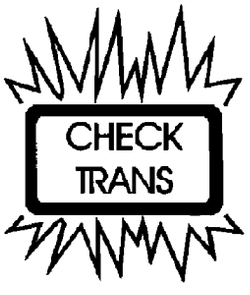
CHECK TRANS LIGHT OPERATION
"WHEN DTC'S ARE SET"

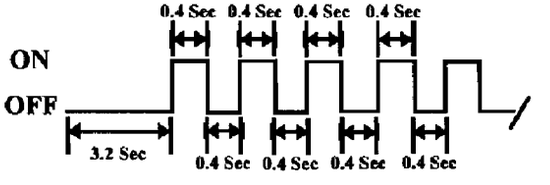


STEP 2

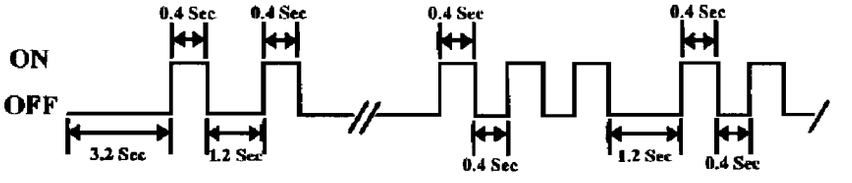
CONNECT JUMPER WIRE TO DIAGNOSTIC CONNECTOR FOR YOUR VEHICLE APPLICATION. "CHECK TRANS" LIGHT WILL FLASH AS FOLLOWS:

CONTINUOUS EVEN FLASH = *"NO CODES"*





DTC 11 **DTC 32**

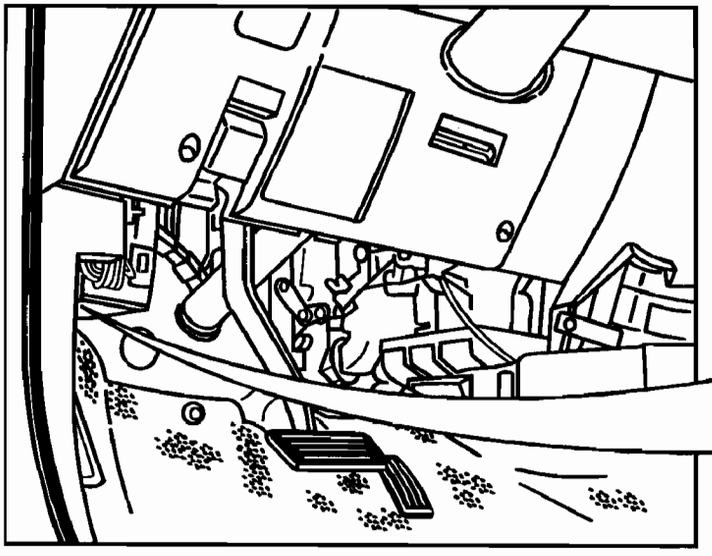


NOTE: EACH DIAGNOSTIC TROUBLE CODE WILL REPEAT 3 TIMES IN NUMERICAL ORDER

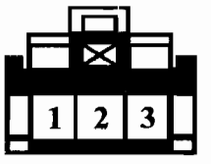
NOTE: A DTC 12 (NO DITRIBUTOR REFERENCE) IS NORMAL IF TROUBLE CODES ARE ACCESSED WITH THE ENGINE "OFF".

Figure 1

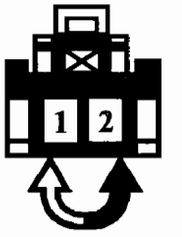
90-91 TROOPER AND 91-92 RODEO *"ONLY"*



DIAGNOSTIC 1 CONNECTOR (TECH-1 USE ONLY)



DIAGNOSTIC 2 CONNECTOR



JUMP TERMINALS 1 & 2 OF DIAGNOSTIC 2 CONNECTOR FOR CODE RETRIEVAL
"White" Connector on Trooper
"Black" Connector on Rodeo

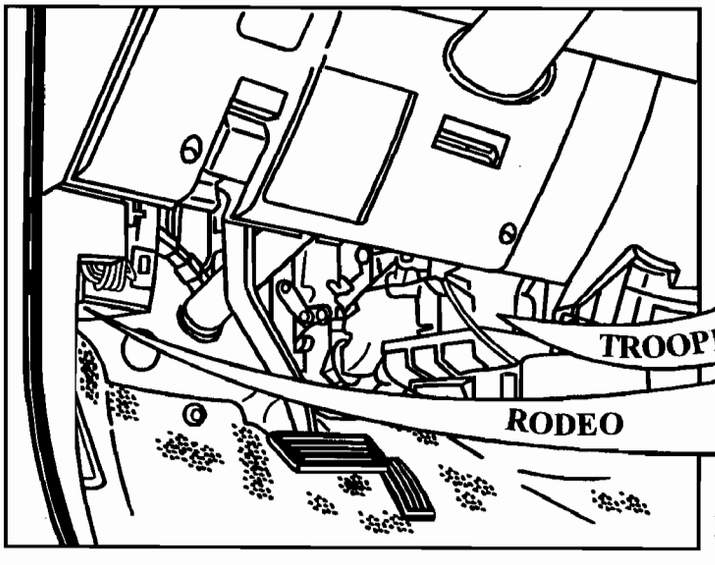
DIAGNOSTIC CONNECTOR LOCATION IS BY THE TCM FOR TROOPER, AND EITHER BY THE TCM FOR RODEO, OR TAPED NEAR THE LEFT SPEAKER.

DIAGNOSTIC 2 WIRE COLORS

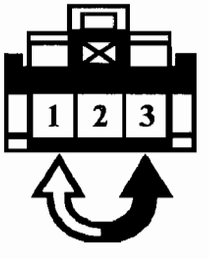
TERMINAL	WIRE COLOR
1	YEL/BLK
2	BLACK

Figure 2

92-93 TROOPER AND 93 RODEO *"ONLY"*



DIAGNOSTIC 1 CONNECTOR



JUMP TERMINALS 1 & 3 OF DIAGNOSTIC 1 CONNECTOR FOR CODE RETRIEVAL

DIAGNOSTIC CONNECTOR LOCATION IS BEHIND THE CENTER CONSOLE ON TROOPER AND BY THE TCM ON RODEO

"TROOPER" DIAGNOSTIC 1 WIRE COLORS

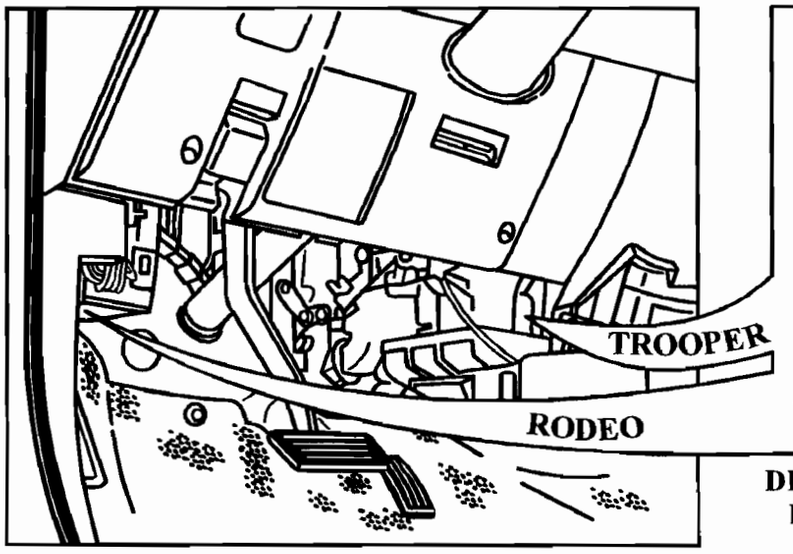
TERMINAL	WIRE COLOR
1	YELLOW/BLACK
2	WHT/RED (92) WHT/GRN (93)
3	BLACK/GREEN

"RODEO" DIAGNOSTIC 1 WIRE COLORS

TERMINAL	WIRE COLOR
1	YELLOW/BLACK
2	WHITE/RED
3	BLACK

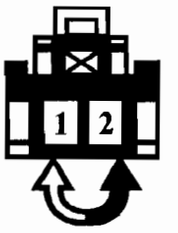
Figure 3

94 TROOPER, RODEO AND PASSPORT *"ONLY"*



DIAGNOSTIC 1 CONNECTOR (TECH-1 USE ONLY)

DIAGNOSTIC 2 CONNECTOR



JUMP TERMINALS 1 & 2 OF DIAGNOSTIC 2 CONNECTOR FOR CODE RETRIEVAL

DIAGNOSTIC CONNECTOR LOCATION IS BEHIND CONSOLE ON TROOPER AND BY TCM ON PASSPORT AND RODEO

TROOPER DIAGNOSTIC 2 WIRE COLORS

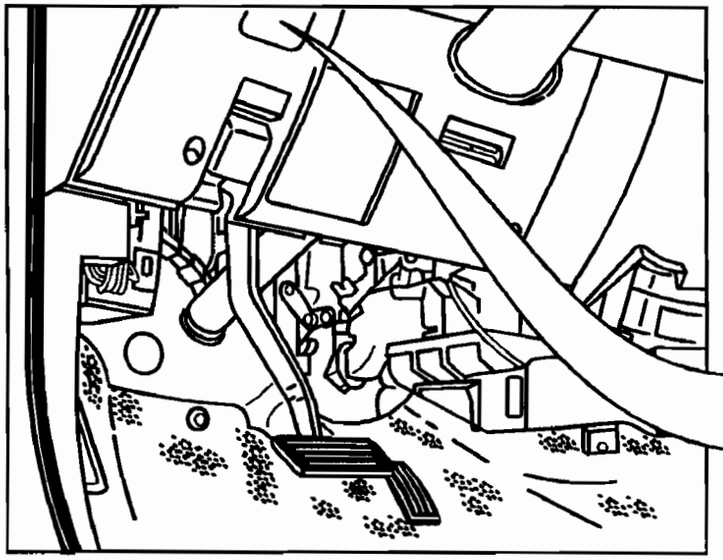
TERMINAL	WIRE COLOR
1	YELLOW/BLACK
2	BLACK/GREEN

PASSPORT/RODEO DIAGNOSTIC 2 WIRE COLORS

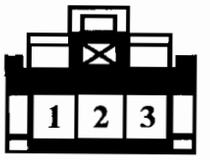
TERMINAL	WIRE COLOR
1	YELLOW/BLACK
2	BLACK/ORANGE

Figure 4

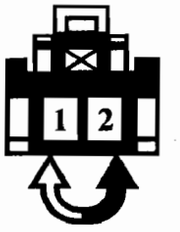
95 TROOPER, RODEO AND PASSPORT *"ONLY"*



DIAGNOSTIC 1 CONNECTOR (TECH-1 USE ONLY)



DIAGNOSTIC 2 CONNECTOR



JUMP TERMINALS 1 & 2 OF DIAGNOSTIC 2 CONNECTOR FOR CODE RETRIEVAL

DIAGNOSTIC CONNECTOR FOR TROOPER, RODEO AND PASSPORT LOCATED BEHIND ACCESS DOOR

TROOPER,PASSPORT AND RODEO DIAGNOSTIC 2 WIRE COLORS

TERMINAL	WIRE COLOR
1	YELLOW/BLACK
2	BLACK/ORANGE

Figure 5

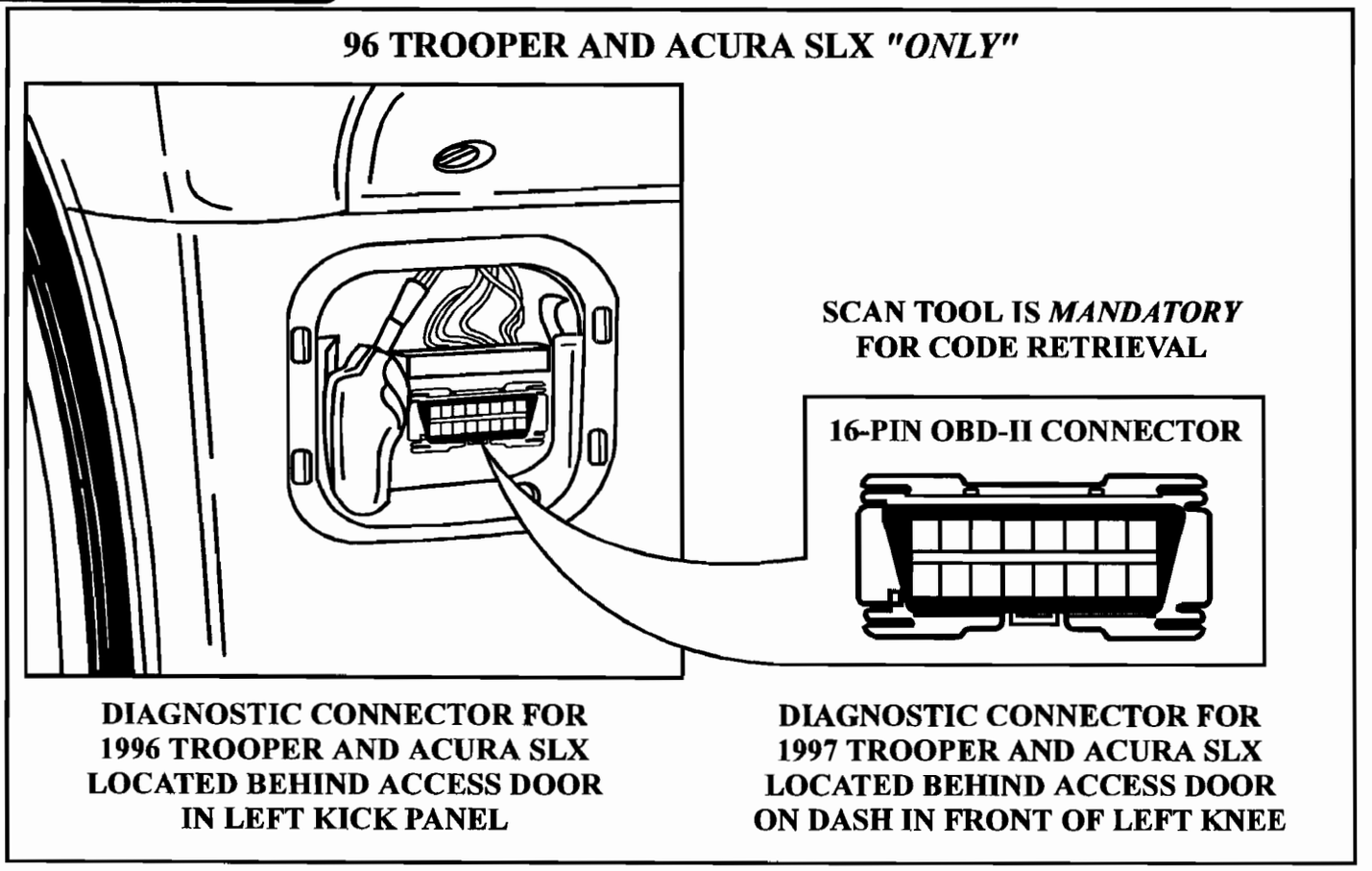


Figure 6

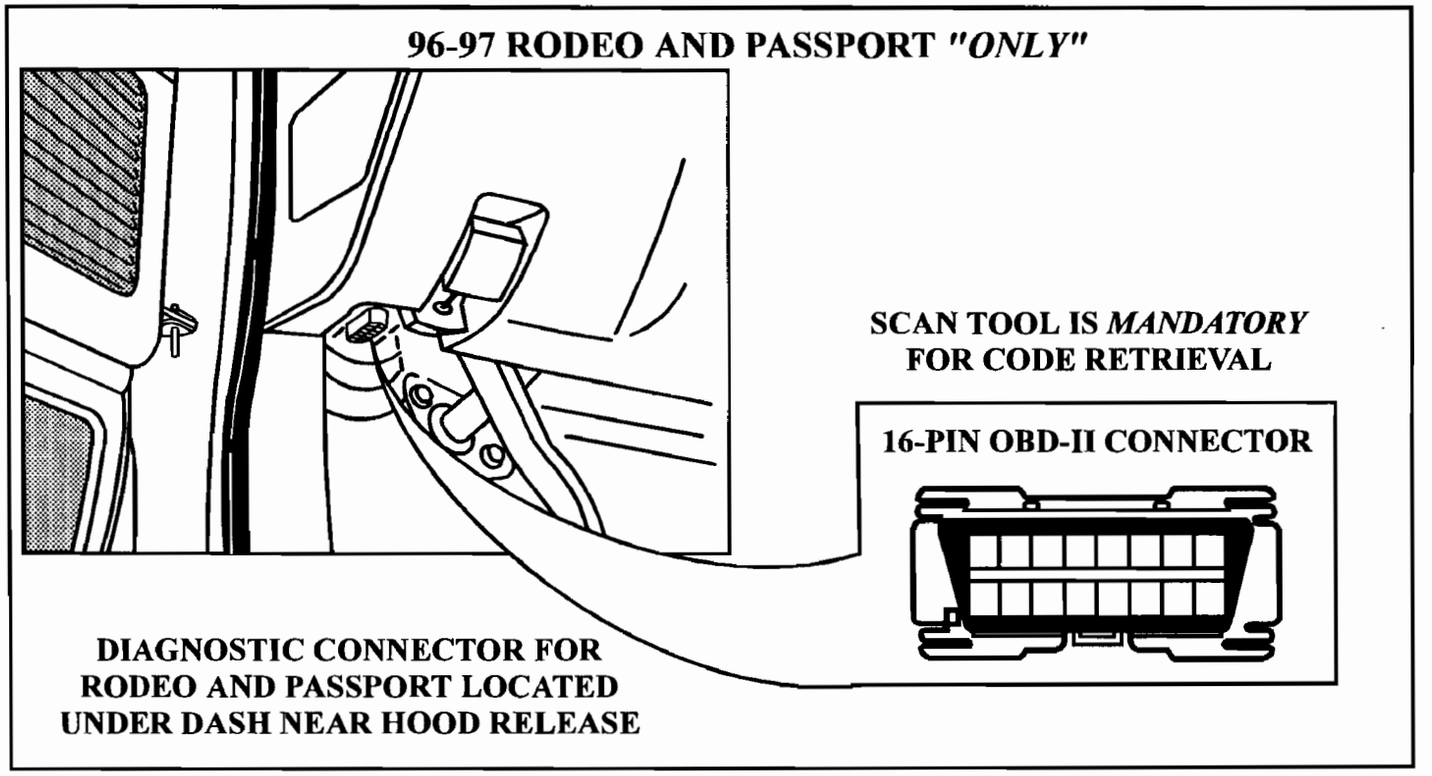


Figure 7

TROUBLE CODE	1990-1993 MODELS ONLY DESCRIPTION
17	**1-2/3-4 Shift Solenoid shorted to ground.** --The TCM sensed low voltage at the solenoid when the solenoid was switched "ON".
21	**Throttle Position Sensor voltage is too high.** --The TCM read Throttle Position Sensor voltage greater than 4.9 volts. --The Throttle Position Sensor, or wiring, may have been signaling a throttle position value of 100%.
22	**Throttle Position Sensor voltage is too low.** --The TCM read Throttle Position Sensor voltage less than 60 mv. --The Throttle Position Sensor, or wiring, may have been signaling a throttle position value of 0%.
23	**Engine Coolant Switch voltage is too high.** --The TCM read voltage high from the Engine Coolant Switch when the engine should have been warm (Over 20 minutes running time). --The TCM will not allow torque converter clutch operation. --Under normal operating conditions: Cold = high voltage (Switch Open) Warm = low voltage (Switch Closed)
25	**1-2/3-4 Shift Solenoid is open or shorted to battery voltage.** --The TCM sensed high voltage at the solenoid when the solenoid was switched "OFF".
26	**2-3 Shift Solenoid is shorted to ground.** --The TCM snesed low voltage at the solenoid when the solenoid was switched "ON".
28	**2-3 Shift Solenoid is open or shorted to battery voltage.** --The TCM sensed high voltage at the solenoid when the solenoid was switched "OFF".
29	**TCC Solenoid is shorted to ground.** --The TCM snesed low voltage at the solenoid when the solenoid was switched "ON".
31	**Engine Speed Sensor circuit is open.** --The TCM read 0 pulses from the Engine Speed Sensor when the throttle opening was greater than 12 percent and the vehicle speed was greater than 19 mph (30 kp/h).
32	**Force Motor (EPC) circuit is open.** --The TCM read a Force Motor current draw less than 95 mA (.095A).
33	**Force Motor (EPC) circuit is shorted to battery voltage.** --The TCM read a Force Motor current draw greater than 1.5A..
34	**Band Apply Solenoid is open or shorted to battery voltage.** --The TCM sensed high voltage at the solenoid when the solenoid was switched "OFF".
35	**Band Apply Solenoid is shorted to ground.** --The TCM sensed low voltage at the solenoid when the solenoid was switched "ON".

Figure 8

TROUBLE CODE	1990-1993 MODELS ONLY (Continued) DESCRIPTION
36	**TCC Solenoid is open or shorted to battery voltage.** --The TCM sensed high voltage at the solenoid when the solenoid was switched "OFF".
39	**Transmission Speed Sensor circuit is open.** --The TCM read 0 pulses from the Vehicle Speed Sensor when the engine speed was greater than 3000 rpm and the gear selector mode switch identified D, 3, 2, or L.
41	**Gear Error (May store additional codes 17, 25, 26, 28, 31, 39, or 46).** --When the engine speed was greater than 3500 rpm, the TCM read a vehicle speed which was too high for the coresponding gear.
43	**Ground Control Solenoid (TCM Internal Relay).** --The TCM read a change after reset.
46	**Downshift Error (May store additional codes 31, or 39).** --For any downshift (4-3, 3-2, 2-1), the engine rpm was above a predetermined speed.
48	**Low supply voltage.** --The TCM read a supply voltage less than 9 volts.
49	**High supply voltage.** --The TCM read a supply voltage greater than 16 volts.
55	**EPROM failure.** --TCM internal failure. Replace Transmission Control Module (TCM).
56*	**Mode Switch position is incorrect, or TPS is open.** --The TCM read a vehicle speed greater than 62 mph (100 km/h) when the gear selector mode switch identified Reverse. --The TCM read a throttle position greater than 20 percent and engine speed less thsn 3000 rpm, when the gear selector mode switch identified Park or Neutral.
65	**Transmission Oil Temperature sensor is open.** --The "Winter Program" could not be activated. --The TCM read 5 volts.
66	**Transmission Oil Temperature sensor is shorted.** --The TCM read 0 volts.
77	**Kickdown Switch is shorted, or TPS is open.** --The TCM read kickdown when the throttle position sensor was less than 70 percent.
82*	**Mode Switch is in an undefined state.** The TCM read a gear selector mode other than P, R, N, D, 3, 2, or L.

*** These codes may not set on early Trooper models.**

FOR "SPECIAL NOTE" ON 1990-1993 MODELS, SEE NEXT PAGE.

Figure 9

SPECIAL NOTES FOR 1990-1993 MODELS ONLY

1990-1991 MODELS ONLY

NOTE: On 1990-1991 models, equipped with 2.8L engine, the engine coolant temperature must be above 68°F (20°C), for Torque Converter Clutch operation.

NOTE: On 1990-1991 models, equipped with 3.1L engine, the engine coolant temperature must be above 113°F (45°C), for Torque Converter Clutch operation.

1992-1993 MODELS ONLY

NOTE: On 1992-93 models, if road test is performed with engine coolant temperature less than 158°F (70°C), shift speeds will be delayed during light throttle application and occur at a slightly higher speed.

NOTE: On 1992-1993 models, engine coolant temperature must be greater than 158°F (70°C) for TCC operation. The TCC operates in 2nd gear kickdown when engine coolant temperature is greater than 158°F (70°C). The TCC operates in 2nd, 3rd and 4th gear when transmission fluid temperature is greater than 284°F (140°C). If the transmission oil temperature is above 293°F (145°C), the "CHECK TRANS" light will be constantly ON, (Not Flashing), and goes off again when TOT is below 257°F (125°C).

Figure 10

TROUBLE CODE	1994-1995 MODELS ONLY DESCRIPTION
11	OUTPUT SPEED SENSOR SIGNAL FAILURE
13	ENGINE SPEED SENSOR SIGNAL FAILURE
*15	TRANSMISSION OIL TEMPERATURE SENSOR OPEN OR SHORTED TO VOLTAGE
*16	TRANSMISSION OIL TEMPERATURE SENSOR SHORTED TO GROUND
21	THROTTLE POSITION SENSOR OPEN OR SHORTED TO BATTERY VOLTAGE
22	THROTTLE POSITION SENSOR SHORTED TO GROUND
23	THROTTLE POSITION SENSOR CIRCUIT OPEN
25	SUPPLY VOLTAGE TOO LOW (LESS THAN 9 VOLTS)
26	SUPPLY VOLTAGE TOO HIGH (GREATER THAN 16 VOLTS)
31	1-2/3-4 SHIFT SOLENOID OPEN OR SHORTED TO GROUND
32	2-3 SHIFT SOLENOID OPEN OR SHORTED TO GROUND
**33	TCC SOLENOID CIRCUIT OPEN OR SHORTED TO BATTERY VOLTAGE
34	BAND APPLY SOLENOID CIRCUIT OPEN OR SHORTED TO GROUND
35	FORCE MOTOR SOLENOID CIRCUIT OPEN OR SHORTED TO GRND OR VOLTAGE
36	SHIFT SOLENOID CIRCUIT OPEN OR SHORTED TO GROUND
37	TORQUE MANAGEMENT SERIAL LINE FAULTY
41	1-2/3-4 SOLENOID CIRCUIT SHORTED TO BATTERY VOLTAGE
42	2-3 SHIFT SOLENOID CIRCUIT SHORTED TO BATTERY VOLTAGE
*43	TCC SOLENOID CIRCUIT SHORTED TO GROUND
44	BAND APPLY SOLENOID CIRCUIT SHORTED TO BATTERY VOLTAGE
46	SHIFT SOLENOID CIRCUIT SHORTED TO BATTERY VOLTAGE
*51	ENGINE COOLANT SWITCH SHORTED TO GROUND, VOLTAGE, OR OPEN
*52	KICKDOWN ALWAYS ON OR SHORTED TO GROUND
*53	MODE SWITCH IN "P", "N" OR "R" BAD POSITION
54	MODE SWITCH, ILLEGAL POSITION

* *No "CHECK TRANS" light and transmission will not enter "Limp Mode" when DTC is set.*
** *Flashes "CHECK TRANS" light on instrument panel, but will not enter "Limp Mode" when DTC is set.*

NOTE: If road test is performed with engine coolant temperature less than 158°F (70°C), shift speeds will be delayed during light throttle application and occur at a slightly higher speed.

NOTE: Engine coolant temperature must be greater than 158°F (70°C) for TCC operation. The TCC operates in 2nd gear kickdown when engine coolant temperature is greater than 158°F (70°C). The TCC operates in 2nd, 3rd and 4th gear when transmission fluid temperature is greater than 284°F (140°C). If the transmission oil temperature is above 293°F (145°C), the "CHECK TRANS" light will be constantly ON, (Not Flashing), and goes off again when TOT is below 257°F (125°C).

1994-1995 CODES CONTINUED ON NEXT PAGE

Figure 11

TROUBLE CODE	1994-1995 MODELS ONLY (Continued) DESCRIPTION
*55	BRAKE SWITCH OPEN, OR SHORTED TO GROUND
*56	BRAKE SWITCH SHORTED TO BATTERY VOLTAGE
61	GEAR ERROR
62	DOWNSHIFT PROTECTION
63	EPROM CSUM FAILURE
*64	TCC VALVE STUCK ON (1994 MODELS ONLY)
*65	TCC VALVE STUCK OFF (1994 MODELS ONLY)
82	SHIFT OR BAND APPLY SOLENOIDS FAULTY DURING DRIVING

* *No "CHECK TRANS" light and transmission will not enter "Limp Mode" when DTC is set.*

** *Flashes "CHECK TRANS" light on instrument panel, but will not enter "Limp Mode" when DTC is set.*

NOTE: If road test is performed with engine coolant temperature less than 158°F (70°C), shift speeds will be delayed during light throttle application and occur at a slightly higher speed.

NOTE: Engine coolant temperature must be greater than 158°F (70°C) for TCC operation. The TCC operates in 2nd gear kickdown when engine coolant temperature is greater than 158°F (70°C). The TCC operates in 2nd, 3rd and 4th gear when transmission fluid temperature is greater than 284°F (140°C). If the transmission oil temperature is above 293°F (145°C), the "CHECK TRANS" light will be constantly ON, (Not Flashing), and goes off again when TOT is below 257°F (125°C).

Figure 12

1996-1997 MODELS ONLY				
TROUBLE CODE	**DESCRIPTION**	**DTC TYPE**	**CHECK ENGINE**	**CHECK TRANS**
P0218	Transmission Fluid Over Temperature	D		
P0560	System Voltage Malfunction	D		
P0705	Transmission Range Switch (Mode Switch) Illegal Position	D		
P0706	Transmission Range Switch (Mode Switch) Performance	D		
P0711	Transmission Fluid Temperature (TFT) Sensor Circuit -- Range/Performance	D		
P0712	Transmission Fluid Temperature (TFT) Sensor Circuit Low Input	D		
P0713	Transmission Fluid Temperature (TFT) Sensor Circuit High Input	D		
P0719	TCC Brake Switch Circuit High (Stuck On)	D		
P0722	Transmission Output Speed Sensor (OSS) Low Input	A	ON	Flash
P0723	Transmission Output Speed Sensor (OSS) Intermittent	A	ON	Flash
P0724	TCC Brake Switch Circuit Low (Stuck Off)	D		
P0730	Transmission Incorrect Gear Ratio	C		Flash
P0742	Torque Converter Clutch Circuit (Stuck On)	A	ON	Flash
P0748	Pressure Control Solenoid (PCS) (Force Motor) Circuit Electrical	C		Flash
P0751	Shift Solenoid A Performance Without Input Speed	B	ON	Flash
P0753	Shift Solenoid A Circuit Electrical	A	ON	Flash
P0756	Shift Solenoid B Performance Without Input Speed	B	ON	Flash

TYPE	DEFINITION
A	*Emission related, turn on MIL (Check Engine) and flashing Check Trans on 1st failure.*
B	*Emission related, turn on MIL (Check Engine) and flashing Check Trans after two consecutive trips with a failure.*
C	*Non-emission related, flashing Check Trans on 1st failure.*
D	*Non-emission related, no warning lamps.*

1996-1997 CODES CONTINUED ON NEXT PAGE

Figure 13

1996-1997 MODELS ONLY (Continued)				
TROUBLE CODE	**DESCRIPTION**	**DTC TYPE**	**CHECK ENGINE**	**CHECK TRANS**
P0758	**Shift Solenoid B Circuit Electrical**	**A**	**ON**	**Flash**
P1790	**ROM Transmission Side Bad, Check Sum**	**A**	**ON**	**Flash**
P1792	**EEROM Transmission Side Bad, Check Sum**	**A**	**ON**	**Flash**
P1835	**Kick Down Switch Always ON**	**D**		
P1850	**Band Apply Solenoid Malfunction**	**D**		
P1860	**TCC/PWM Solenoid Electrical**	**A**	**ON**	**Flash**
P1870	**Transmission Component Slipping**	**A**	**ON**	**Flash**

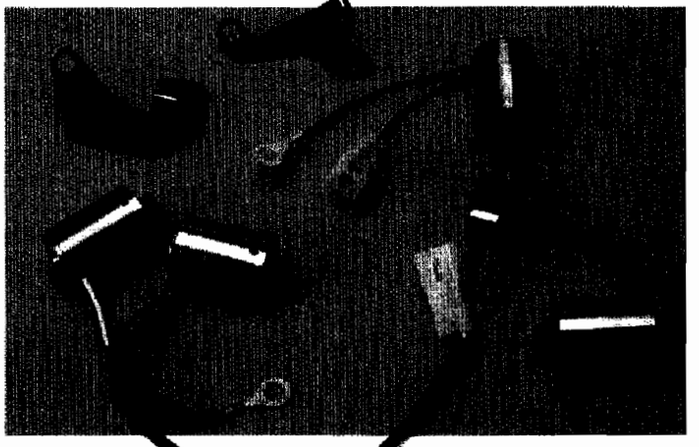
TYPE	DEFINITION
A	***Emission related, turn on MIL (Check Engine) and flashing Check Trans on 1st failure.***
B	***Emission related, turn on MIL (Check Engine) and flashing Check Trans after two consecutive trips with a failure.***
C	***Non-emission related, flashing Check Trans on 1st failure.***
D	***Non-emission related, no warning lamps.***

NOTE: If road test is performed with engine coolant temperature less than 158°F (70°C), shift speeds will be delayed during light throttle application and occur at a slightly higher speed.

NOTE: Engine coolant temperature must be greater than 158°F (70°C) for TCC operation. The TCC operates in 2nd gear kickdown when engine coolant temperature is greater than 158°F (70°C). The TCC operates in 2nd, 3rd and 4th gear when transmission fluid temperature is greater than 284°F (140°C). If the transmission oil temperature is above 284°F (140°C), the "CHECK TRANS" light will be constantly ON, (Not Flashing), and goes off again when TOT is below 266°F (130°C).

Figure 14

What's the big deal about Rostra solenoids for Toyota?



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VOLVO "960" AW30-40LE
DIAGNOSTIC TROUBLE CODE RETRIEVAL
1993-1995 MODELS ONLY

TROUBLE CODE RETRIEVAL

Faults are recorded in the Transmission Control Module (TCM) memory, in the form of Diagnostic Trouble Codes (DTC). Codes can be displayed manually using the LED Indicator on the Volvo diagnostic unit. The diagnostic unit is located in the engine compartment at the left strut tower, as shown in Figure 1. The diagnostic unit is equipped with an LED Indicator, Function Selector Cable and Activation Button, as shown in Figure 2. Diagnostic unit output socket number 1 is used to retrieve TCM diagnostic codes, as shown in Figure 2. Use the following procedure to retrieve (DTC's).

(1) Turn the ignition switch to the "OFF" position.

(2) Remove the Fuction Selector Cable from it's storage cavity, and install it into diagnostic unit output socket number 1, as shown in Figure 2.

(3) Turn the ignition switch to the "ON" position.

(4) Depress the Activation Button and keep depressed for more than one second, but not more than three seconds. Refer to Figure 2.

(5) Observe the LED Indicator on the diagnostic unit, and count the number of flashes to determine the ***first*** Diagnostic Trouble Code stored in the TCM memory. All codes contain three digits (Example: 2-1-3). Since all codes have three digits, each code requires three series of flashes on the LED Indicator. Example is shown in Figure 2.

(6) Since only one DTC can be retrieved with one push of the button, depress the Activation Button again to determine if any additional DTC's have been stored in the TCM memory.

(7) Read and record all Diagnostic Trouble Codes, pushing the activation button as many times as necessary, until the first code returns to the display.
Note: The Transmission Control Module is capable of storing a maximum of five DTC's, so these faults must be corrected and their DTC's cleared before any additional DTC's can be displayed. Refer to Figure 3 for a Diagnostic Trouble Code description and interpretation.

CLEARING TROUBLE CODES

All Diagnostic Trouble Codes must be displayed at least once ***before*** it is possible to clear the codes from the TCM memory. Only after the first DTC has returned to the display, will it be possible to clear the codes. Use the following procedure:

(1) Ensure that the Function Selector Cable is still located in diagnostic unit output socket number 1, as shown in Figure 2, and the ignition switch is in the "ON" position.

(2) Depress the activation button, and hold down for at least five seconds, and watch for LED indicator response. The LED indicator should go out three seconds after the button is released.

Depress the activation button, and hold down for at least an additional five seconds, and watch for LED indicator response. The LED indicator should go out when the button is released.

(4) Ensure that the Diagnostic Trouble Codes have been cleared by pressing once on the activation button again for more than one second, but less than three seconds, and observe LED indicator. If the code 1-1-1 is displayed on the LED indicator, the DTC's have been cleared.

DIAGNOSTIC UNIT LOCATION

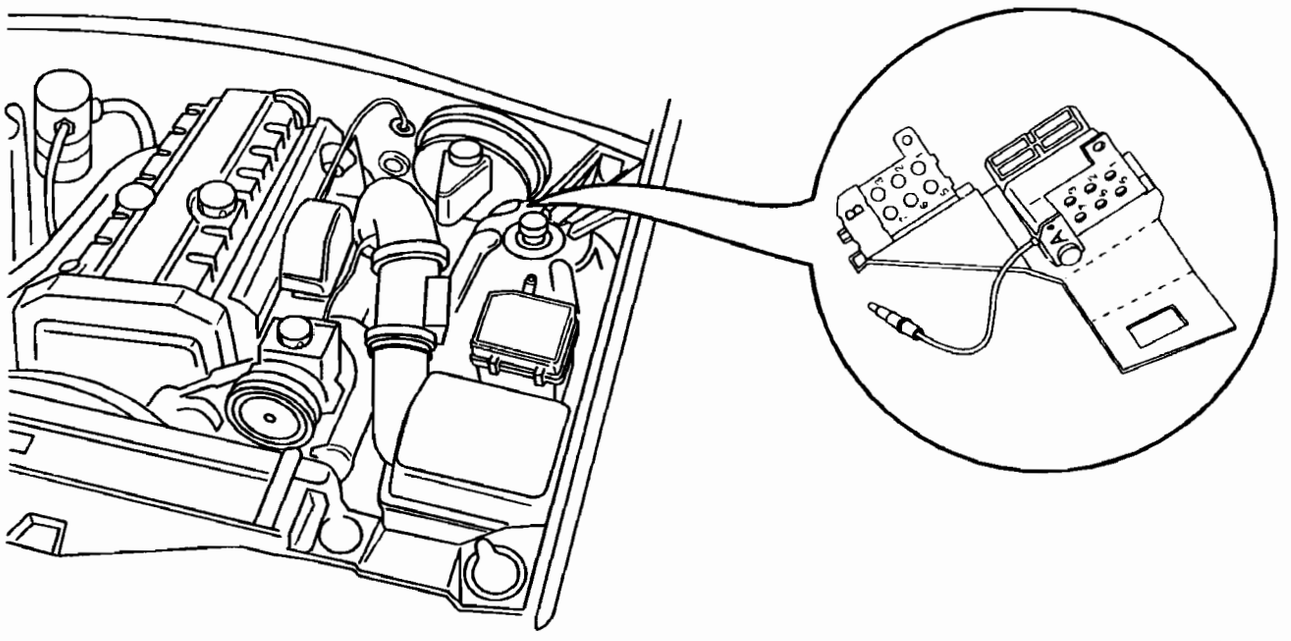
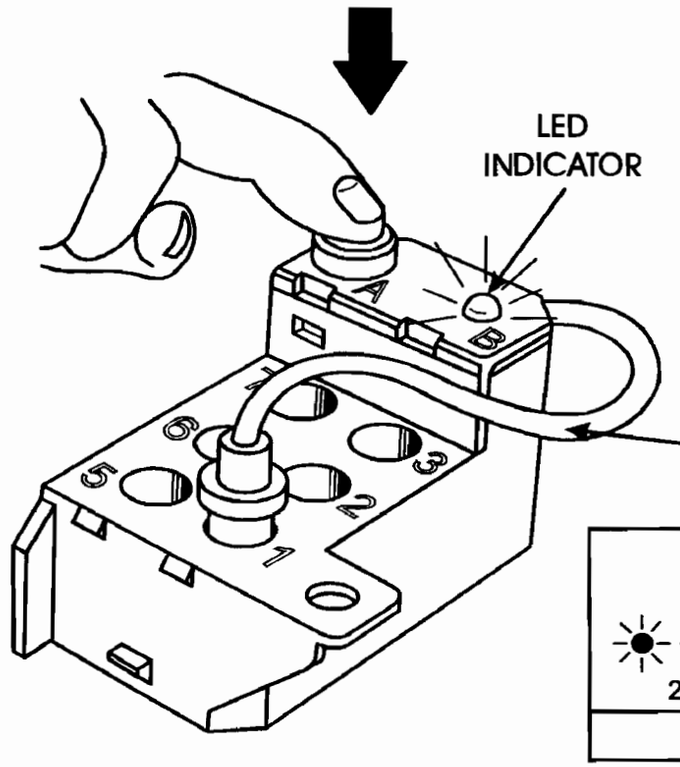


Figure 1

RETRIEVING TROUBLE CODES



Once the Function Selector Cable has been inserted in correct socket, depress button once and keep depressed for more than one second, but not more than three seconds. Diagnostic Trouble Codes are read by observing and counting LED flashes to determine the Diagnostic Trouble Code.

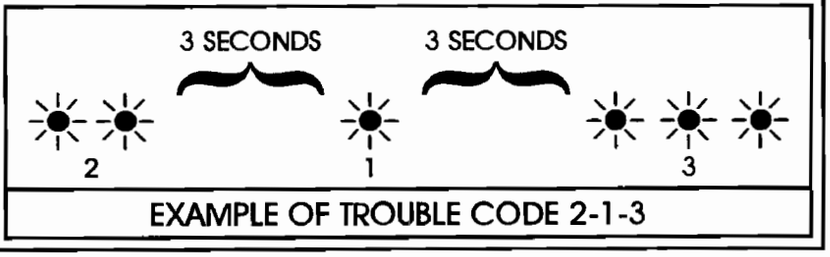


Figure 2

DTC	DESCRIPTION	WARNING LAMP **
1-1-1	NO FAULTS RECORDED	NO
1-1-2	SHORT CIRCUIT TO BATTERY VOLTAGE IN SHIFT SOLENOID S1 CIRCUIT	YES
1-1-3	FAULT IN TRANSMISSION CONTROL MODULE	YES
1-1-4	BREAK IN MODE SELECTOR CIRCUIT	NO
1-2-1	SHORT CIRCUIT TO GROUND IN SHIFT SOLENOID S1 CIRCUIT	YES
1-2-2	BREAK (OPEN) IN SHIFT SOLENOID S1 CIRCUIT	YES
1-2-3	SHORT CIRCUIT TO BATTERY VOLTAGE IN EPC SOLENOID CIRCUIT	YES
1-2-4	SHORT CIRCUIT TO GROUND IN MODE SELECTOR CIRCUIT	NO
1-3-1	BREAK OR SHORT CIRCUIT TO GROUND IN EPC SOLENOID CIRCUIT	YES
1-3-2	FAULT IN TRANSMISSION CONTROL MODULE	YES
1-3-4	INCORRECT LOAD SIGNAL	NO
1-4-1	SHORT CIRCUIT IN TRANSMISSION TEMPERATURE SENSOR CIRCUIT	NO
1-4-2	BREAK (OPEN) IN TRANSMISSION TEMPERATURE SENSOR CIRCUIT	NO
1-4-3	SHORT CIRCUIT TO GROUND IN KICKDOWN SWITCH CIRCUIT	NO
2-1-1	FAULT IN TRANSMISSION CONTROL MODULE	YES
2-1-2	SHORT CIRCUIT TO BATTERY VOLTAGE IN SHIFT SOLENOID S2 CIRCUIT	YES
2-1-3	THROTTLE POSITION SENSOR SIGNAL TOO HIGH	YES
2-2-1	SHORT CIRCUIT TO GROUND IN SHIFT SOLENOID S2 CIRCUIT	YES
2-2-2	BREAK (OPEN) IN SHIFT SOLENOID S2 CIRCUIT	YES
2-2-3	THROTTLE POSITION SENSOR SIGNAL TOO LOW	YES
2-3-1	IRREGULAR THROTTLE POSITION SENSOR SIGNAL	YES
2-3-2	SPEEDOMETER SIGNAL ABSENT	YES
2-3-3	INCORRECT SPEEDOMETER SIGNAL	YES
2-3-5	HIGH TRANSMISSION OIL TEMPERATURE	YES *
2-4-5	BREAK OR SHORT IN TORQUE LIMITING CIRCUIT	YES
3-1-1	RPM SIGNAL ABSENT	YES
3-1-2	RPM SIGNAL FAULTY	YES
3-1-3	INCORRECT SIGNAL FROM GEAR POSITION SENSOR	YES
3-2-2	INCORRECT GEAR RATIO	YES
3-2-3	LOCK-UP SLIPS OR IS NOT ENGAGED	YES
3-3-1	SHORT CIRCUIT TO BATTERY VOLTAGE IN LOCK-UP SOLENOID CIRCUIT	NO
3-3-2	BREAK (OPEN) IN LOCK-UP SOLENOID CIRCUIT	NO
3-3-3	SHORT CIRCUIT TO GROUND IN LOCK-UP SOLENOID CIRCUIT	NO

** When a fault occurs the code is stored and the "WARNING" lamp in the instrument panel comes on. If the fault is intermittent and ceases, the warning lamp will go out, but the DTC will remain.

* Only for as long as the temperature remains high.

Figure 3

VOLVO "850" 50-40LE
DIAGNOSTIC TROUBLE CODE RETRIEVAL
1992-1995 MODELS ONLY

TROUBLE CODE RETRIEVAL

Faults are recorded in the Transmission Control Module (TCM) memory, in the form of Diagnostic Trouble Codes (DTC). Codes can be displayed manually using the LED Indicator on the Volvo diagnostic unit. The diagnostic unit is located in the engine compartment at the right strut tower, as shown in Figure 1. The diagnostic unit is equipped with an LED Indicator, Function Selector Cable and Activation Button, as shown in Figure 2. Diagnostic unit output socket number 1 is used to retrieve TCM diagnostic codes, as shown in Figure 2. Use the following procedure to retrieve (DTC's).

(1) Turn the ignition switch to the "OFF" position.

(2) Remove the Fuction Selector Cable from it's storage cavity, and install it into diagnostic unit output socket number 1, as shown in Figure 2.

(3) Turn the ignition switch to the "ON" position.

(4) Depress the Activation Button and keep depressed for more than one second, but not more than three seconds. Refer to Figure 2.

(5) Observe the LED Indicator on the diagnostic unit, and count the number of flashes to determine the ***first*** Diagnostic Trouble Code stored in the TCM memory. All codes contain three digits (Example: 2-1-3). Since all codes have three digits, each code requires three series of flashes on the LED Indicator. Example is shown in Figure 2.

(6) Since only one DTC can be retrieved with one push of the button, depress the Activation Button again to determine if any additional DTC's have been stored in the TCM memory.

(7) Read and record all Diagnostic Trouble Codes, pushing the activation button as many times as necessary, until the first code returns to the display.
Note: The Transmission Control Module is capable of storing a maximum of five DTC's, so these faults must be corrected and their DTC's cleared before any additional DTC's can be displayed. Refer to Figure 3 for a Diagnostic Trouble Code description and interpretation.

CLEARING TROUBLE CODES

All Diagnostic Trouble Codes must be displayed at least once ***before*** it is possible to clear the codes from the TCM memory. Only after the first DTC has returned to the display, will it be possible to clear the codes. Use the following procedure:

(1) Ensure that the Function Selector Cable is still located in diagnostic unit output socket number 1, as shown in Figure 2, and the ignition switch is in the "ON" position.

(2) Depress the activation button, and hold down for at least five seconds, and watch for LED indicator response. The LED indicator should go out three seconds after the button is released.

Depress the activation button, and hold down for at least an additional five seconds, and watch for LED indicator response. The LED indicator should go out when the button is released.

(4) Ensure that the Diagnostic Trouble Codes have been cleared by pressing once on the activation button again for more than one second, but less than three seconds, and observe LED indicator. If the code 1-1-1 is displayed on the LED indicator, the DTC's have been cleared.

DIAGNOSTIC UNIT LOCATION

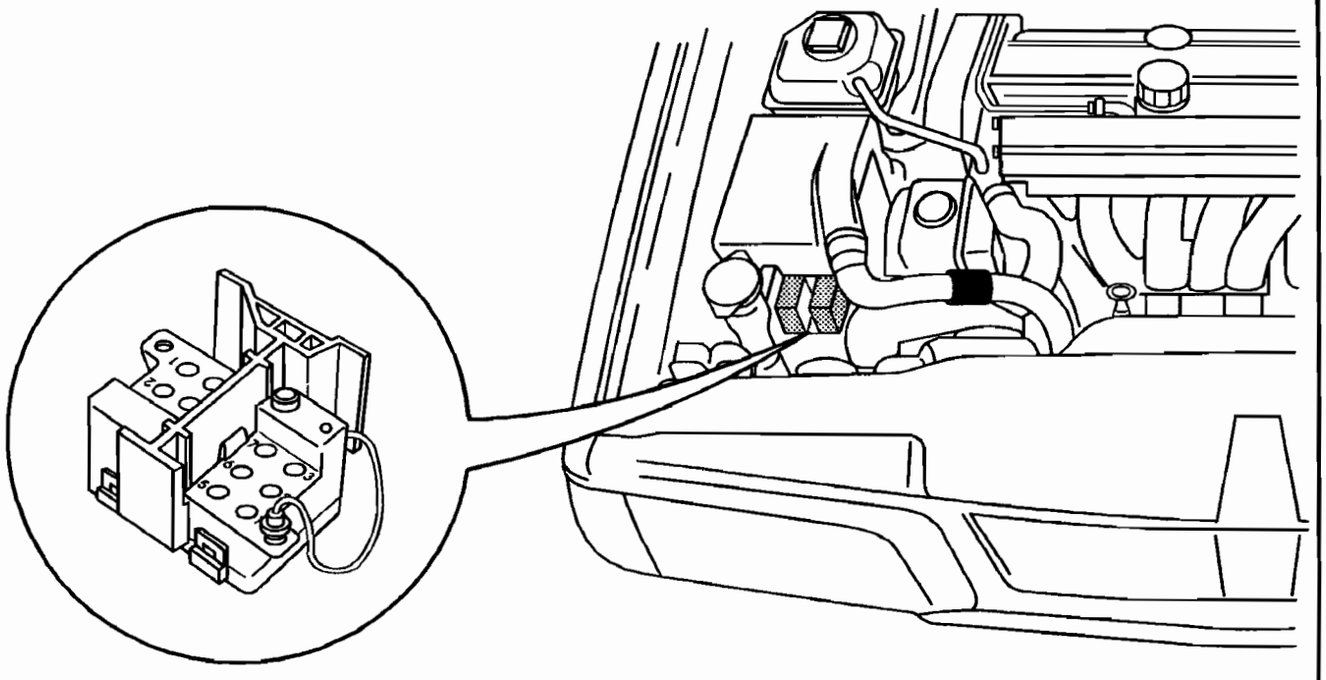
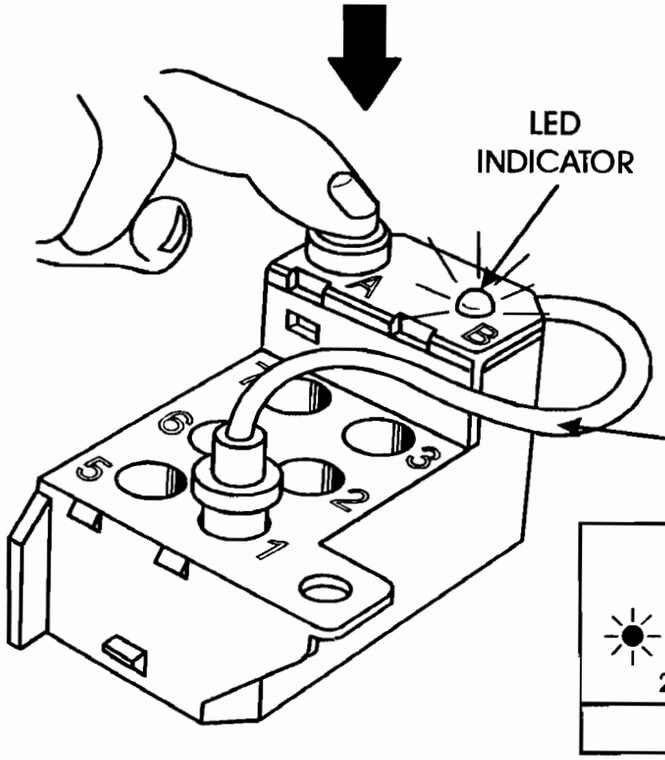


Figure 1

RETRIEVING TROUBLE CODES



Once the Function Selector Cable has been inserted in correct socket, depress button once and keep depressed for more than one second, but not more than three seconds. Diagnostic Trouble Codes are read by observing and counting LED flashes to determine the Diagnostic Trouble Code.

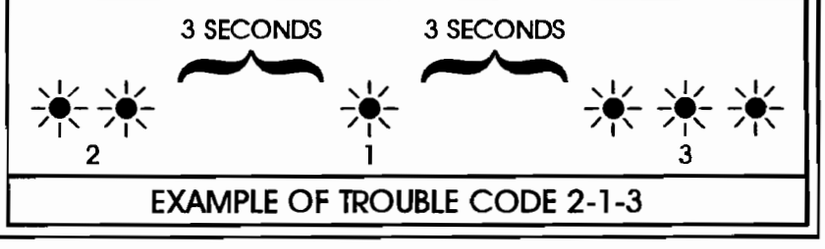


Figure 2

DTC	DESCRIPTION	WARNING LAMP **
1-1-1	NO FAULTS RECORDED	NO
1-1-2	SHORT CIRCUIT TO BATTERY VOLTAGE IN SHIFT SOLENOID S1 CIRCUIT	YES
1-1-3	FAULT IN TRANSMISSION CONTROL MODULE	YES
1-1-4	BREAK IN MODE SELECTOR CIRCUIT	NO
1-2-1	SHORT CIRCUIT TO GROUND IN SHIFT SOLENOID S1 CIRCUIT	YES
1-2-2	BREAK (OPEN) IN SHIFT SOLENOID S1 CIRCUIT	YES
1-2-3	SHORT CIRCUIT TO BATTERY VOLTAGE IN EPC SOLENOID CIRCUIT	YES
1-2-4	SHORT CIRCUIT TO GROUND IN MODE SELECTOR CIRCUIT	NO
1-3-1	BREAK OR SHORT CIRCUIT TO GROUND IN EPC SOLENOID CIRCUIT	YES
1-3-2	FAULT IN TRANSMISSION CONTROL MODULE	YES
1-3-4	INCORRECT LOAD SIGNAL	NO
1-4-1	SHORT CIRCUIT IN TRANSMISSION TEMPERATURE SENSOR CIRCUIT	NO
1-4-2	BREAK (OPEN) IN TRANSMISSION TEMPERATURE SENSOR CIRCUIT	NO
1-4-3	SHORT CIRCUIT TO GROUND IN KICKDOWN SWITCH CIRCUIT	NO
2-1-1	FAULT IN TRANSMISSION CONTROL MODULE	YES
2-1-2	SHORT CIRCUIT TO BATTERY VOLTAGE IN SHIFT SOLENOID S2 CIRCUIT	YES
2-1-3	THROTTLE POSITION SENSOR SIGNAL TOO HIGH	YES
2-2-1	SHORT CIRCUIT TO GROUND IN SHIFT SOLENOID S2 CIRCUIT	YES
2-2-2	BREAK (OPEN) IN SHIFT SOLENOID S2 CIRCUIT	YES
2-2-3	THROTTLE POSITION SENSOR SIGNAL TOO LOW	YES
2-3-1	IRREGULAR THROTTLE POSITION SENSOR SIGNAL	YES
2-3-2	SPEEDOMETER SIGNAL ABSENT	YES
2-3-3	INCORRECT SPEEDOMETER SIGNAL	YES
2-3-5	HIGH TRANSMISSION OIL TEMPERATURE	YES *
2-4-5	BREAK OR SHORT IN TORQUE LIMITING CIRCUIT	YES
3-1-1	RPM SIGNAL ABSENT	YES
3-1-2	RPM SIGNAL FAULTY	YES
3-1-3	INCORRECT SIGNAL FROM GEAR POSITION SENSOR	YES
3-2-2	INCORRECT GEAR RATIO	YES
3-2-3	LOCK-UP SLIPS OR IS NOT ENGAGED	YES
3-3-1	SHORT CIRCUIT TO BATTERY VOLTAGE IN LOCK-UP SOLENOID CIRCUIT	NO
3-3-2	BREAK (OPEN) IN LOCK-UP SOLENOID CIRCUIT	NO
3-3-3	SHORT CIRCUIT TO GROUND IN LOCK-UP SOLENOID CIRCUIT	NO

** When a fault occurs the code is stored and the "WARNING" lamp in the instrument panel comes on. If the fault is intermittent and ceases, the warning lamp will go out, but the DTC will remain.
* Only for as long as the temperature remains high.

Figure 3

VOLVO "850" 50-42LE
SLIPPING OR "NO" FORWARD ENGAGEMENT

COMPLAINT: Volvo "850" series equipped with 50-42LE transmissions may exhibit a slipping or "NO" forward engagement condition.

CAUSE: The cause may be, the forward or C1 clutch drum is cracked (See Figure 1).

CORRECTION: Locate the crack as shown in Figure 1 and have the drum welded on the inside as well as the outside of the drum. At the time of this printing, the forward or C1 drum is not sold seperately from the transmission.

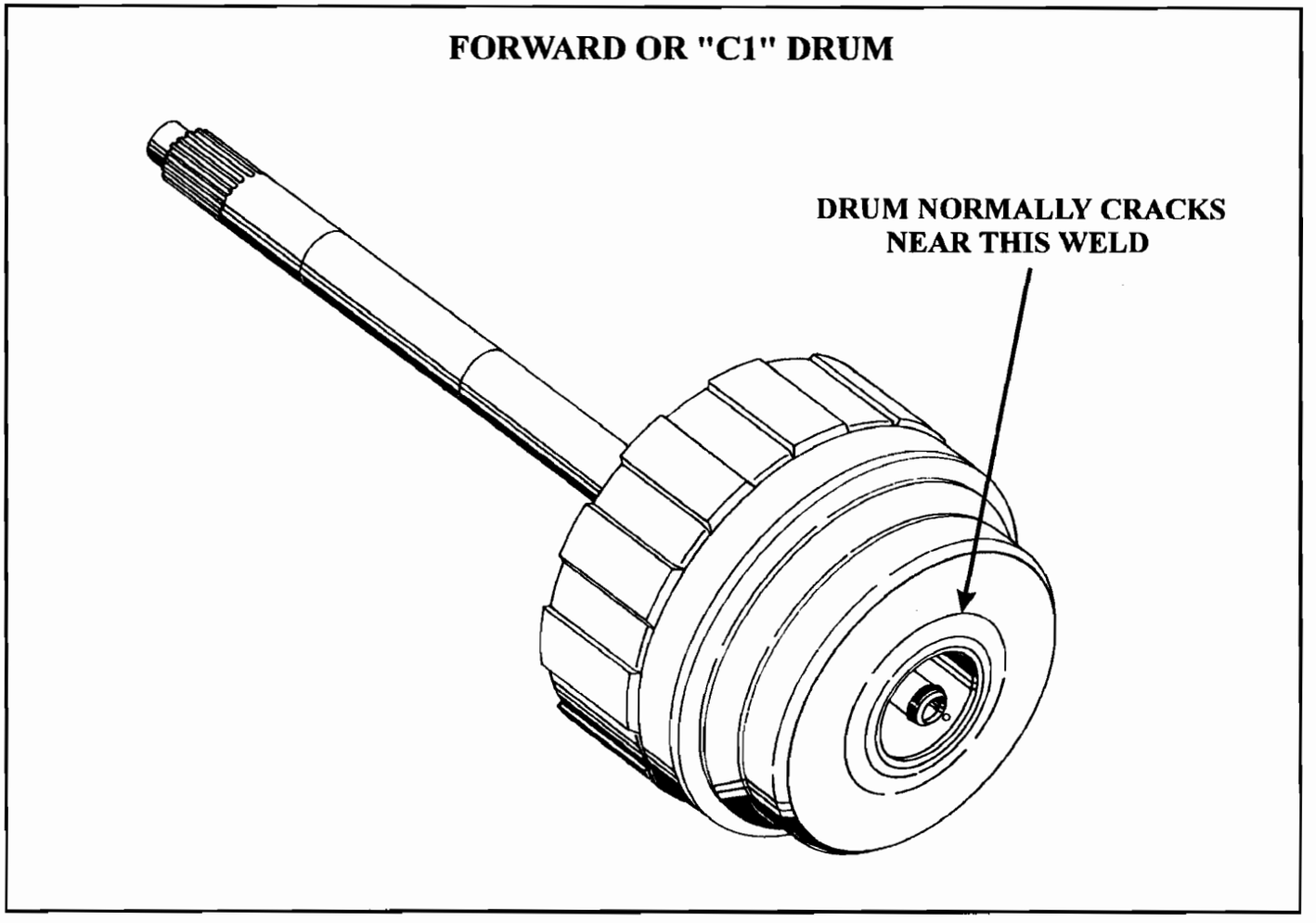


Figure 1

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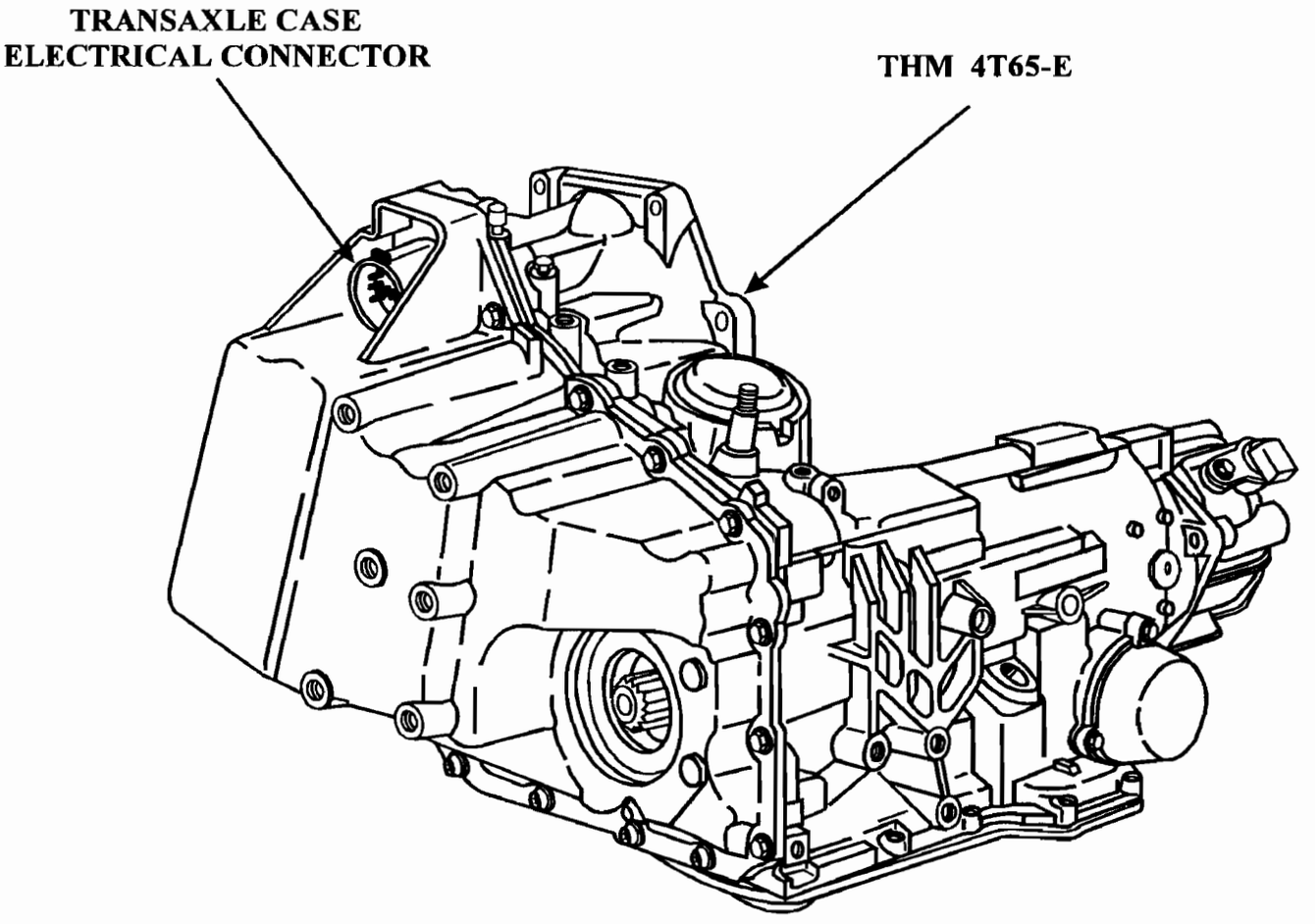
THM 4T65-E
PRELIMINARY INFORMATION



FOUND IN THE FOLLOWING 1997 MODELS;

Buick Park Avenue (C-Body), 3.8L and 3.8L Supercharged
Buick Riveria (G-Body), 3.8L and 3.8L Supercharged
Oldsmobile Eighty Eight (H-Body), 3.8L Supercharged
Pontiac Bonneville (H-Body), 3.8L Supercharged
Buick Regal (W-Body), 3.8L Supercharged
Chevrolet Lumina/Monte Carlo (W-Body), 3.4L V6 DOHC
Pontiac Grand Prix (W-Body), 3.8L Supercharged

POWERFLOW CHART										
RANGE	INPUT CLUTCH	SECOND CLUTCH	THIRD CLUTCH	FOURTH CLUTCH	FORWARD BAND	D-2 BAND	REVERSE BAND	INPUT SPRAG	1-2 ROLLER	THIRD SPRAG
PARK	ON*							ON*		
REVERSE	ON						ON	HOLD		
NEUTRAL	ON*							ON*		
"D"- 1ST	ON				ON			HOLD	HOLD	
"D"- 2ND	ON*	ON			ON			F/W	HOLD	
"D"- 3RD		ON	ON		ON			F/W	F/W	HOLD
"D"- 4TH		ON	ON	ON	ON			F/W	F/W	F/W
"3"- 1ST	ON				ON			HOLD	HOLD	
"3"- 2ND	ON*	ON			ON			F/W	HOLD	
"3"- 3RD	ON	ON	ON		ON			HOLD	F/W	HOLD
"2"- 1ST	ON				ON	ON		HOLD	HOLD	
"2"- 2ND	ON*	ON			ON	ON		F/W	HOLD	
"1"- 1ST	ON		ON		ON	ON		HOLD	HOLD	HOLD

Figure 1

SHIFT SOLENOID CHART			
RANGE	1-2 SHIFT SOLENOID	2-3 SHIFT SOLENOID	GEAR RATIO
PARK	ON	ON	
REVERSE	ON	ON	2.38:1
NEUTRAL	ON	ON	
1ST GEAR	ON	ON	2.92:1
2ND GEAR	OFF	ON	1.56:1
3RD GEAR	OFF	OFF	1.00:1
4TH GEAR	ON	OFF	0.70:1

Figure 2

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION

DTC	DESCRIPTION	DTC TYPE*	DEFAULT ACTION
P0218	Automatic Transmission Fluid Overtemperature	D	1 DTC P0218 is stored in PCM memory 2 Disable shift adapts
P0502	Vehicle Speed Sensor Circuit Low Input	B	1 DTC P0502 is stored in PCM memory 2 Maximum line pressure 3 Disable shift adapts 4 Calculate VSS from ISS and comanded gear
P0503	Vehicle Speed Sensor Circuit Performance	B	1 DTC P0503 is stored in PCM memory 2 Maximum line pressure 3 Disable shift adapts 4 Calculate VSS from ISS and comanded gear
P0560	System Voltage Malfunction	D	1 DTC P0560 is stored in PCM memory 2 Disable shift adapts 3 Inhibit TCC
P0711	Automatic Transmission Fluid Temperature Sensor Circuit Performance	B	1 DTC P0711 is stored in PCM memory 2 Disable shift adapts 3 The PCM calculates a default TFT from the ECT and IAT
P0712	Automatic Transmission Fluid Temperature Sensor Circuit Low Input	D	1 DTC P0712 is stored in PCM memory 2 Disable shift adapts 3 The PCM calculates a default TFT from the ECT and IAT
P0713	Automatic Transmission Fluid Temperature Sensor Circuit High Input	D	1 DTC P0713 is stored in PCM memory 2 Disable shift adapts 3 The PCM calculates a default TFT from the ECT and IAT
P0716	Automatic Transmission Input Speed Sensor Circuit Performance	B	1 DTC P0716 is stored in PCM memory 2 Disable shift adapts 3 The PCM calculates a default TFT from the ECT and IAT
P0717	Automatic Transmission Input Speed Sensor Circuit No Signal	B	1 DTC P0717 is stored in PCM memory 2 Disable shift adapts 3 The PCM calculates a default TFT from the ECT and IAT

*DTC TYPES
A - Emission-related, turns the MIL "ON" after the 1st failure.
B - Emission-related, turns the MIL "ON" after two consecutive trips with failure.
D - Non-emission-related, no lamps and no message.

Figure 3

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION

DTC	DESCRIPTION	DTC TYPE*	DEFAULT ACTION
P0719	TCC Brake Switch Circuit Low	D	1 DTC P0719 is stored in PCM memory 2 Disregards brake swirch input for TCC operation under the following conditions a. Throttle position greater than 6% b. Vehicle speed is greater than 44 MPH c. Throttle positionwas previously greater than 12% while the vehicle speed was greater than 47 MPH d. Brake switch has not been OFF for more than 2 seconds in this ignition cycle
P0724	TCC Brake Switch Circuit High	D	1 DTC P0724 is stored in PCM memory 2 Disable shift adapts 3 Maximum line pressure
P0730	Undefined Gear Ratio	D	1 DTC P0730 is stored in PCM memory 2 Disable shift adapts 3 Maximum line pressure
P0741	Torque Converter Clutch System Stuck OFF	B	1 DTC P0741 is stored in PCM memory 2 Disable shift adapts 3 Inhibits TCC 4 Inhibits 4th gear in Hot Mode
P0742	Torque Converter Clutch System Stuck ON	A	1 DTC P0742 is stored in PCM memory 2 Disable shift adapts 3 TCC commanded ON at maximum capacity
P0748	Pressure Control Solenoid Electrical	D	1 DTC P0748 is stored in PCM memory 2 Disable shift adapts 3 Maximum line pressure
P0751	1-2 Shift Solenoid Performance	B	1 DTC P0751 is stored in PCM memory 2 Disable shift adapts 3 Maximum line pressure 4 Inhibits 3-2 downshifts when the vehicle speed is greater than 30 MPH
P0753	1-2 Shift Solenoid Electrical	A	1 DTC P0753 is stored in PCM memory 2 Disable shift adapts 3 Maximum line pressure 4 Inhibits 3-2 downshifts when the vehicle speed is greater than 30 MPH

*DTC TYPES
A - Emission-related, turns the MIL "ON" after the 1st failure.
B - Emission-related, turns the MIL "ON" after two consecutive trips with failure.
D - Non-emission-related, no lamps and no message.

Figure 4

DIAGNOSTIC TROUBLE CODE (DTC) IDENTIFICATION

DTC	DESCRIPTION	DTC TYPE*	DEFAULT ACTION
P0756	2-3 Shift Solenoid Performance	A	1 DTC P0756 is stored in PCM memory 2 Disable shift adapts 3 Maximum line pressure 4 Defaults to 3rd gear 5 Inhibits TCC
P0758	2-3 Shift Solenoid Electrical	A	1 DTC P0758 is stored in PCM memory 2 Disable shift adapts 3 Maximum line pressure 4 Defaults to 3rd gear 5 Inhibits TCC
P1810	Automatic Transmission Fluid Pressure Manual Valve Position Switch Circuit Malfunction	B	1 DTC P1810 is stored in PCM memory 2 Disable shift adapts 3 Maximum line pressure 4 PCM assumes D4 for shifting
P1811	Maximum Adapt and Long Shift	D	1 DTC P1811 is stored in PCM memory 2 Disable shift adapts 3 Maximum line pressure
P1860	Torque Converter Clutch Pulse Width Modulation Solenoid Electrical	A	1 DTC P1860 is stored in PCM memory 2 Disable shift adapts 3 Inhibits TCC 4 Inhibits 4th gear in Hot Mode
P1887	Torque Converter Clutch Release Switch Circuit Malfunction	B	1 DTC P1887 is stored in PCM memory 2 Disable shift adapts 3 Inhibits TCC 4 Inhibits 4th gear in Hot Mode

***DTC TYPES**

A - Emission-related, turns the MIL "ON" after the 1st failure.

B - Emission-related, turns the MIL "ON" after two consecutive trips with failure.

D - Non-emission-related, no lamps and no message.

Figure 5

TRANSAXLE ELECTRONIC CONTROLS

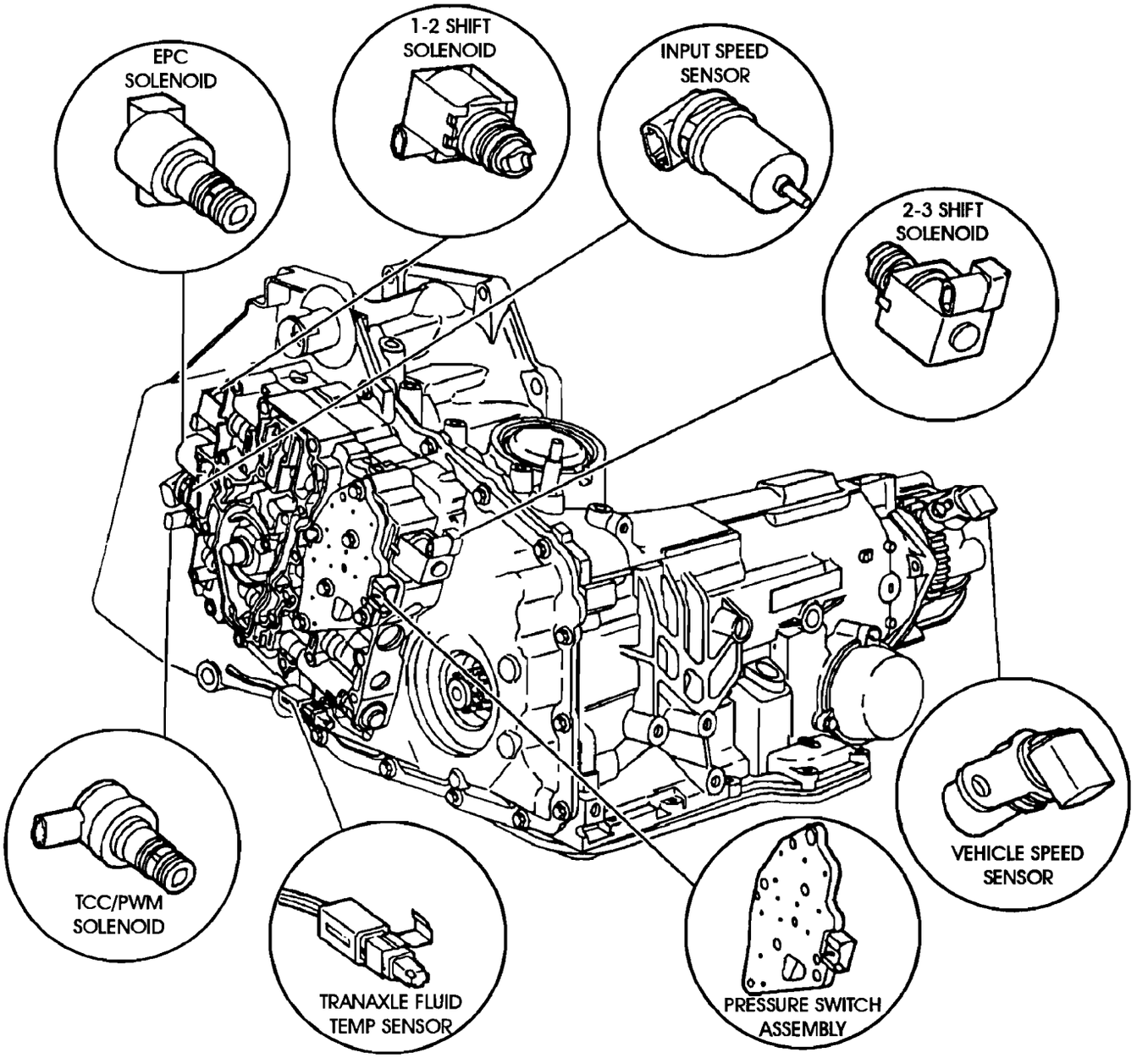
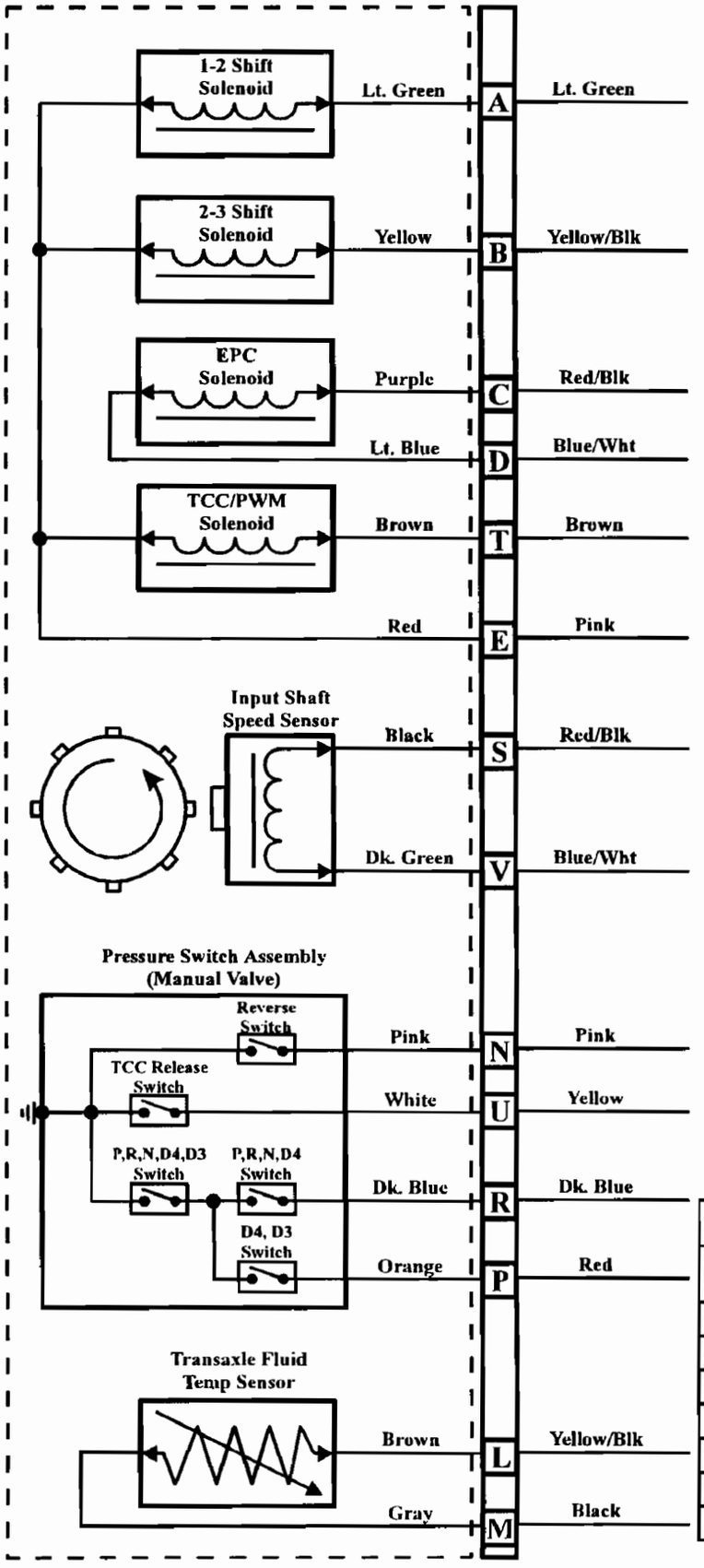
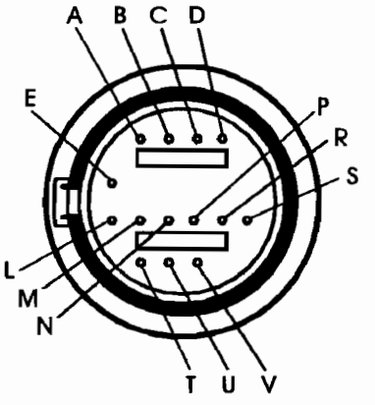


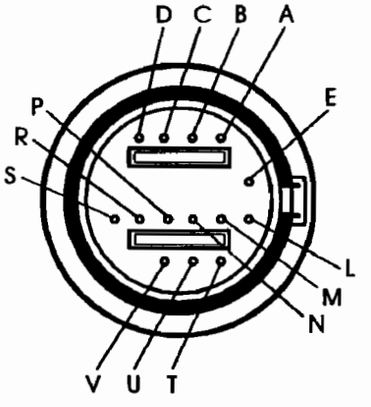
Figure 6

WIRE SCHEMATIC AND RESISTANCE CHART





View Looking Into Transaxle Case Connector



View Looking Into Vehicle Harness Connector

Ohms Resistance Chart

Cavities	Component	Resistance @ 68°F	Resistance @ 190°F
A-E	1-2 Shift Solenoid	19-24Ω	24-31Ω
B-E	2-3 Shift Solenoid	19-24Ω	24-31Ω
T-E	TCC/PWM Solenoid	10-12Ω	13-15Ω
C-D	EPC Solenoid	3-5Ω	5-6Ω
S-V	Input Speed Sensor	893-1127Ω	1132-1428Ω
M-L	TFT Sensor	3164-3867Ω	225-285Ω
	Output Speed Sensor	981-1864Ω	

Figure 7

CASE CONNECTOR PIN FUNCTION		
Pin	External Wire Color	Function
A	Light Green	Ground signal from PCM for the 1-2 Shift Solenoid (A)
B	Yellow/Black	Ground signal from PCM for the 2-3 Shift Solenoid (B)
C	Red/Black	Electronic Pressure Control Solenoid, HIGH Control
D	Blue/White	Electronic Pressure Control Solenoid, LOW Control
E	Pink	Transaxle Solenoid 12V Power In
L	Yellow/Black	Transaxle Fluid Temperature (TFT) Sensor HIGH
M	Black	Transaxle Fluid Temperature (TFT) Sensor LOW
N	Pink	Pressure Switch Assembly, Range Signal "A"
P	Red	Pressure Switch Assembly, Range Signal "C"
R	Dark Blue	Pressure Switch Assembly, Range Signal "B"
S	Red/Black	Input Speed Sensor (ISS) signal HIGH
T	Brown	Ground signal from PCM for the TCC/PWM Converter Clutch Solenoid
U	Yellow	TCC Release Switch signal to the PCM
V	Blue/White	Input Speed Sensor (ISS) signal LOW

Figure 8

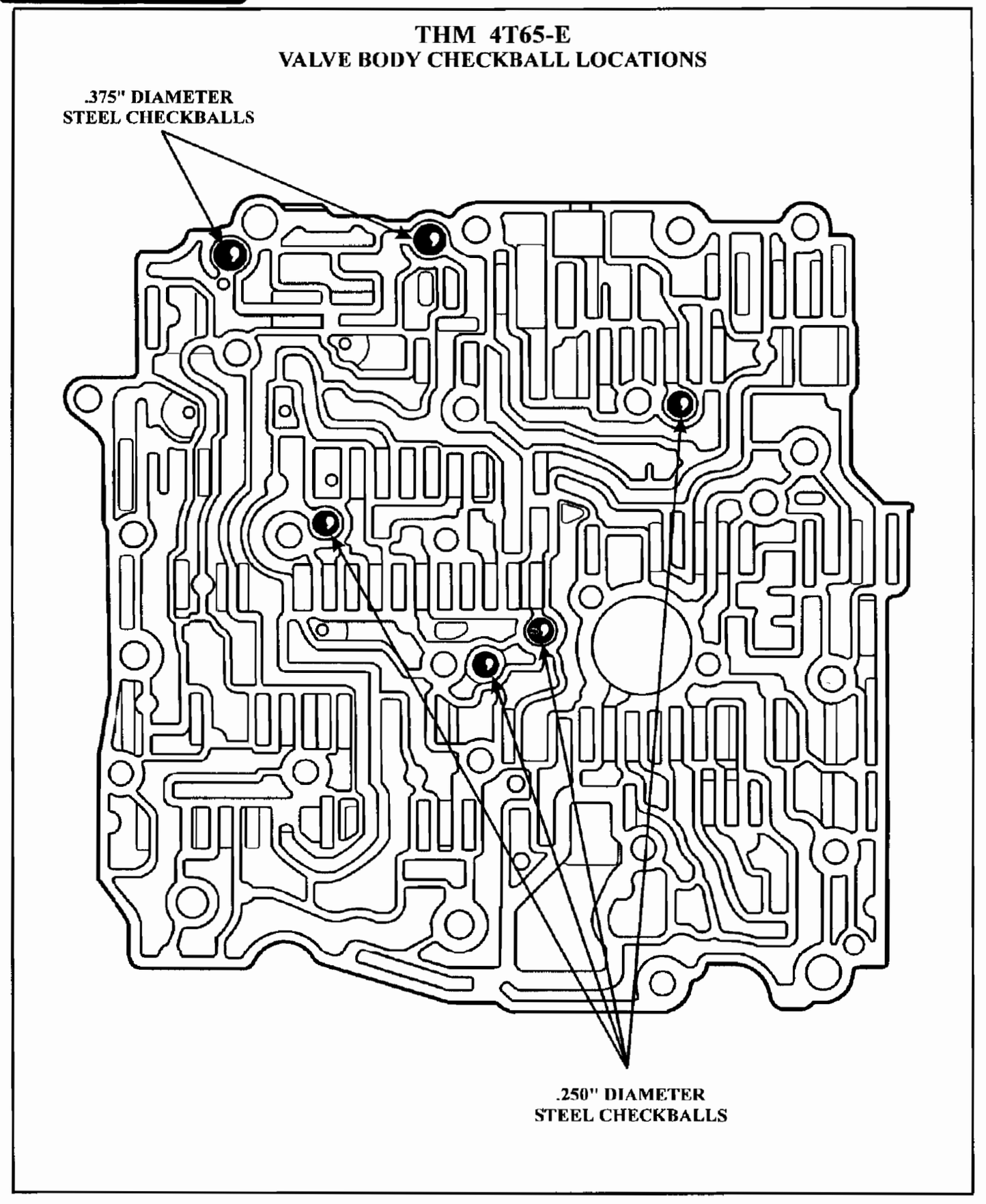

THM 4T65-E
VALVE BODY CHECKBALL LOCATIONS
.375" DIAMETER
STEEL CHECKBALLS
.250" DIAMETER
STEEL CHECKBALLS

Figure 9

THM 4T65-E
CHANNEL PLATE CHECKBALL LOCATIONS

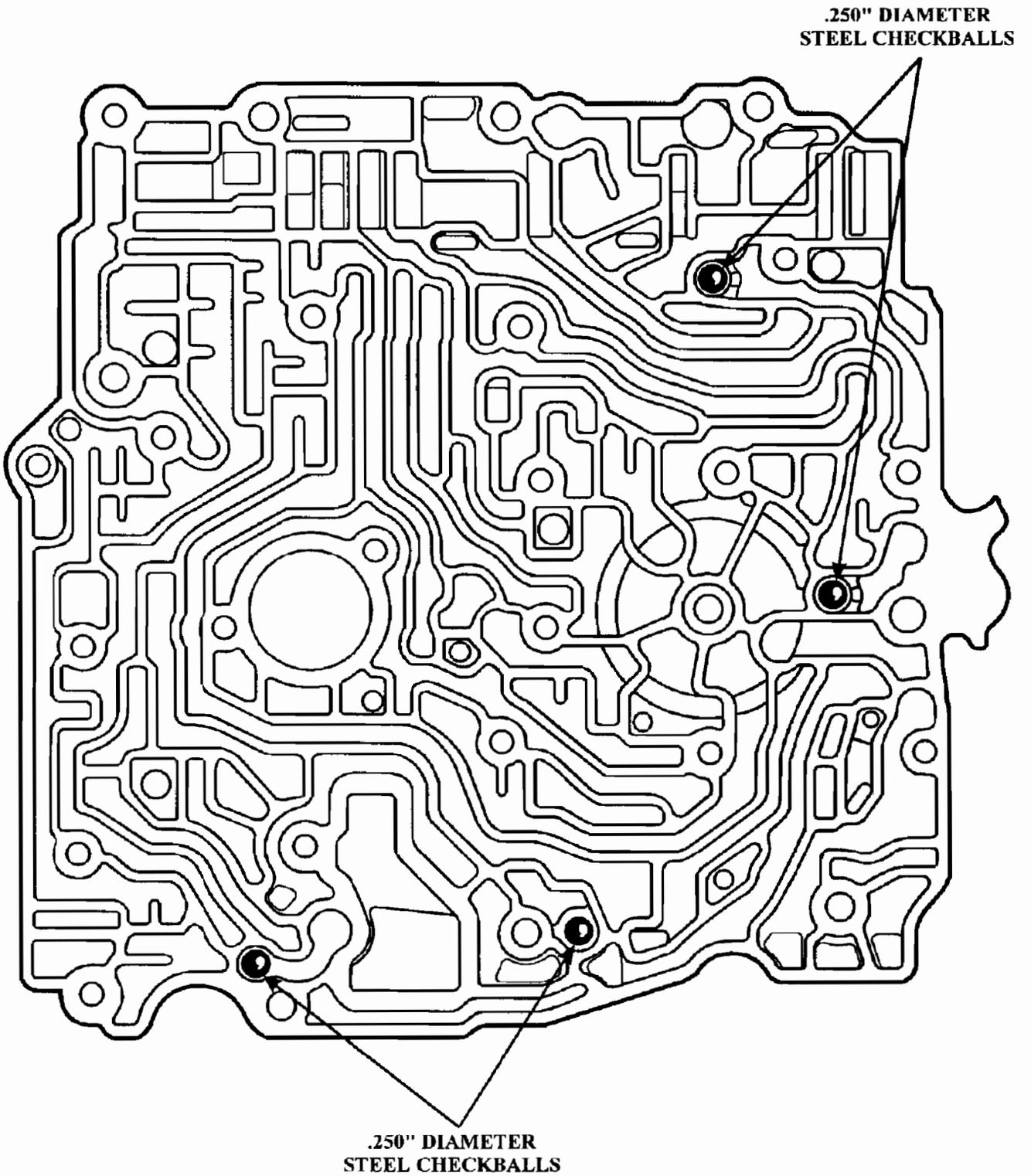
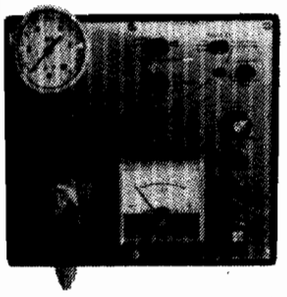


Figure 10

SCHAFFER® TEST PRODUCTS

3-IN-1 SOLENOID TEST PACKAGE

CHECK SOLENOIDS IN OR OUT OF VEHICLE!
Test All Automatic Transmission Solenoid Types:
Simple, Modulated and Variable Force



PART # MST-K
MADE IN U.S.A.

- *Duplicates Vehicle Computer Control by Varying Duty Cycle*
- *12 Volt Operation For Worldwide Usage*
- *Quick Set-Up of Components Using Couplers*
- *Durable Electronic Components*
- *Easier Comparison with Voltage Instead of Amperage with Meter Included*
- *Test Modulated Solenoids Through Their Entire Working Parameters*

NEVER OUTDATED!

PACKAGE INCLUDES: Modulated Solenoid Tester, 8 Manifolds, A4LD Test Spools, Solenoid-to-Manifold Clamp, 3 amp Bench Power Supply, MST Instructional Video and Convenient Bench Storage Tray.

MANIFOLDS INCLUDED: 4L60/80E-FM, 4L80E-MCC, 4T60E-PWM, AODE-EPC, AODE-MCC, AXODE-EPC, AXODE-MCC, RE4-EPC and two A4LD Solenoid Test Spools.

OPTIONAL MANIFOLDS: KM EPC & L/U Solenoid
42RE Govenor Pressure Solenoid

Other Related Products:

E4OD SOLENOID PACK TEST MANIFOLD
(Part # BTM)

A604 SOLENOID PACK BENCH TEST PLATE
(Part # BTP)

The E4OD and A604 work with the following Schaffer® Test Products:

3 in 1 Modulated Solenoid Tester
Schaffer Shifter®
Smartester II™

LONG ARMS

(DMM Breakout Box, Electronic Test Light and Monitor)

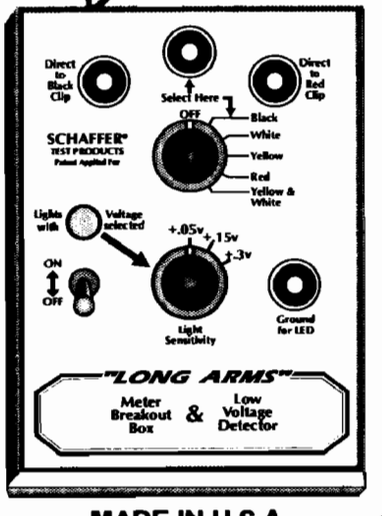
THREE FEATURES IN ONE:

① MULTI-METER BREAKOUT BOX
- Allows one meter to work as four.
- Rotary Switch allows circuit selection at will while driving.
- Compare different circuits up to 18 ft. apart.
- Two patch cords provided for connection to a meter.

② TRUE ELECTRONIC TEST LIGHT
- Test for voltages seen by the computer, but **NOT** seen by other test lights.
- The **Low Voltage Detecting (LVD) LED** has an adjustable sensitivity range of .05 volts, .15 volts, and .3 volts.
- Switch between as many as four circuits at a time.
- Nine volt battery included.

③ WORKS AS A SIGNAL MONITOR
- Monitor transmission solenoid signals
- Monitor various computer inputs.
- Monitor four circuits at once due to rapid switching.

THE ONLY EQUIPMENT OF ITS KIND IN THE WORLD



MADE IN U.S.A.

VIDEO

4L60E/4L80E

FALSE CODES 81, 82 AND 83

COMPLAINT: Shift solenoid codes 81, 82 and possibly TCC code 83 are stored the moment the vehicle is started. If the codes are cleared after start-up, they will not return until the ignition is turned off and the vehicle is restarted.
Both shift solenoid circuits have circuit integrity and computer replacement does NOT cure the problem and the battery and charging system voltage check good.

CAUSE: A faulty ignition switch may be the cause of this problem due to the fact that when the ignition switch contacts burn, the voltage drop across the shift solenoid circuit is to great, which occurs during cranking of the starter motor.
To verify this, connect a 12 volt jumper lead to the shift solenoid feed terminal at the transmission, if the problem is gone check the voltage drop across the battery connection at the back of the alternator and the alternator frame during cranking. (Refer to Figure 1)
Next, remove the "TRANS" fuse from the fuse box and check the voltage drop across the battery feed side of the fuse holder during cranking.(Refer to Figure 2) If the voltage drop is less across the alternator than it is across the "TRANS" fuse terminal, the ignition switch is the cause of the problem.
The reason for this is, battery voltage is sent to the shift solenoid circuits during cranking of the starter motor through the ignition switch as illustrated in the schematic in figure 3. If the computer does not see enough system voltage for 2 seconds or longer across that circuit during cranking, it will store code 81 or 82 or possibly code 83.

CORRECTION: Replace the ignition switch.

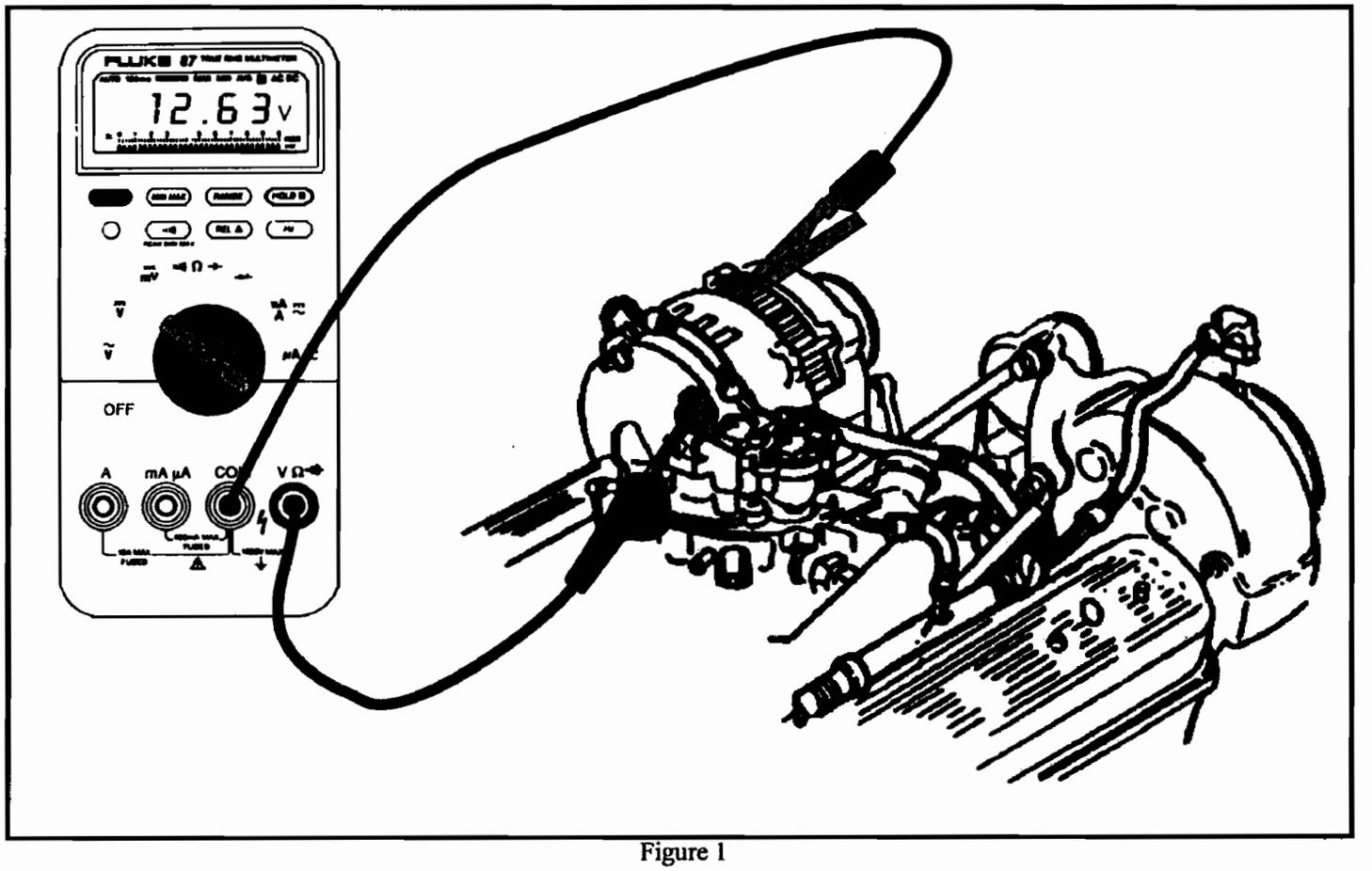


Figure 1

4L60E/4L80E

FALSE CODES 81, 82 AND 83

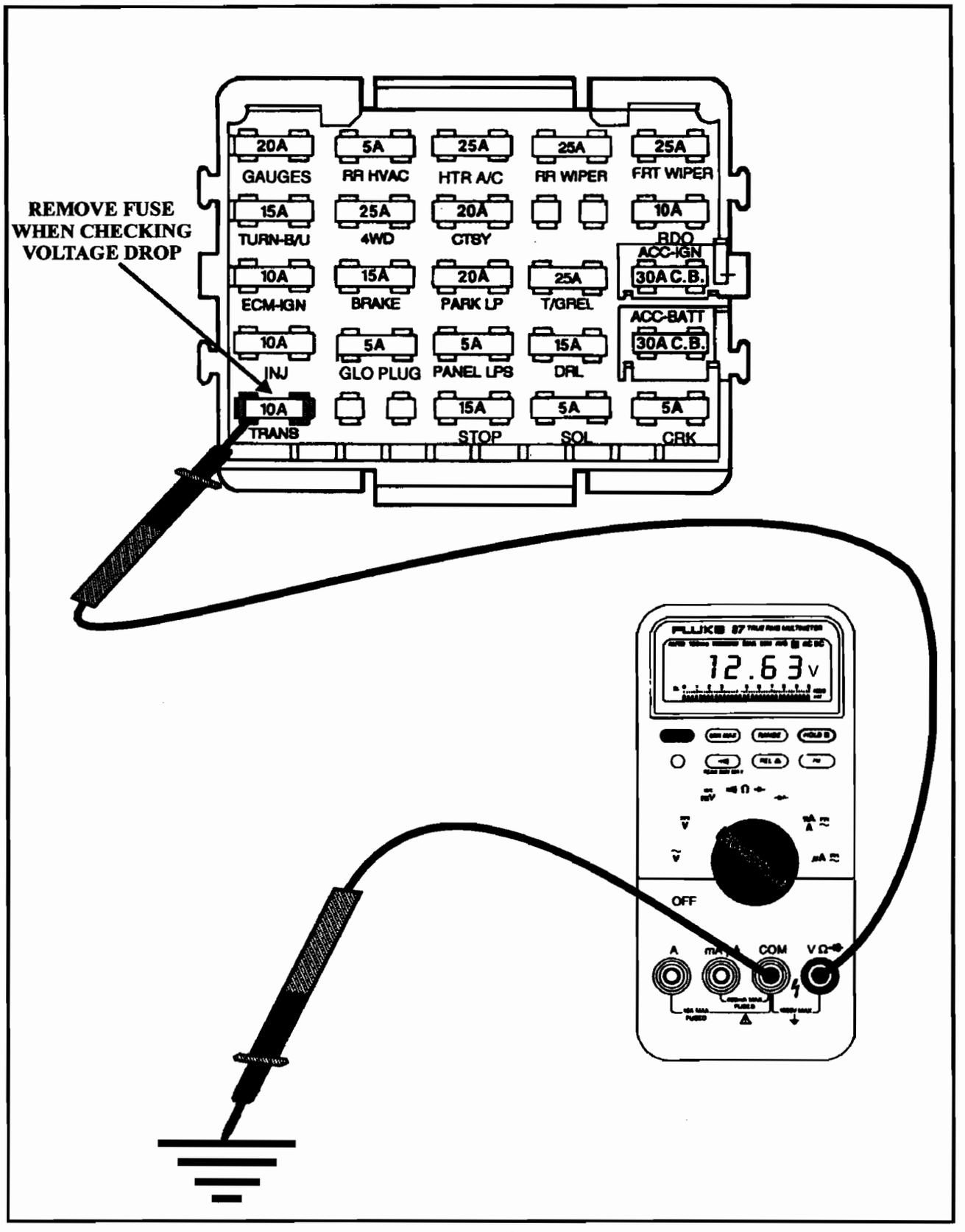


Figure 2

4L60E/4L80E

FALSE CODES 81, 82 AND 83

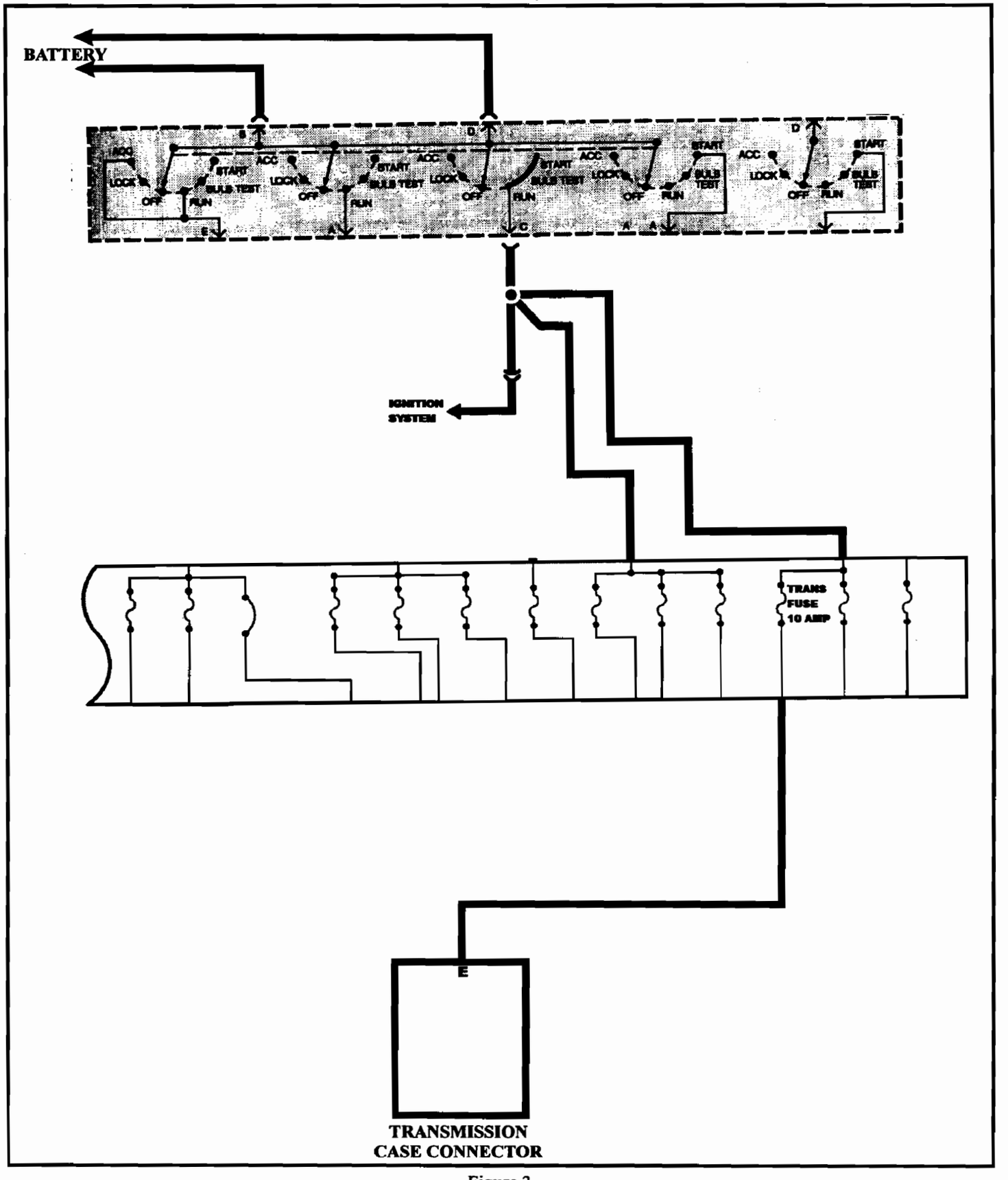


Figure 3

SCHAFFER® "LONG ARMS"™

BREAKOUT BOX AND ELECTRONIC TEST LIGHT

Schaffer® Enterprises has recently introduced to the after market automotive repair industry, another test product that can be added to the diagnostic equipment arsenal.
This piece of equipment is called the "LONG ARMS"™ mainly because it's test leads can extend to 9½ feet which gives it a span of 19 feet.
The "LONG ARMS"™ can also act as an extension of the users multi meter when used as a breakout box, enabling the user to check up to FOUR electrical circuits at one time.
The "LONG ARMS"™ also provides the user with a low voltage indicator which can detect as little as .05 volts. An illustration of the Schaffer® "LONG ARMS"™ can be seen in Figure 1.
The "LONG ARMS"™ is powered by an easily replaceable 9 volt battery.

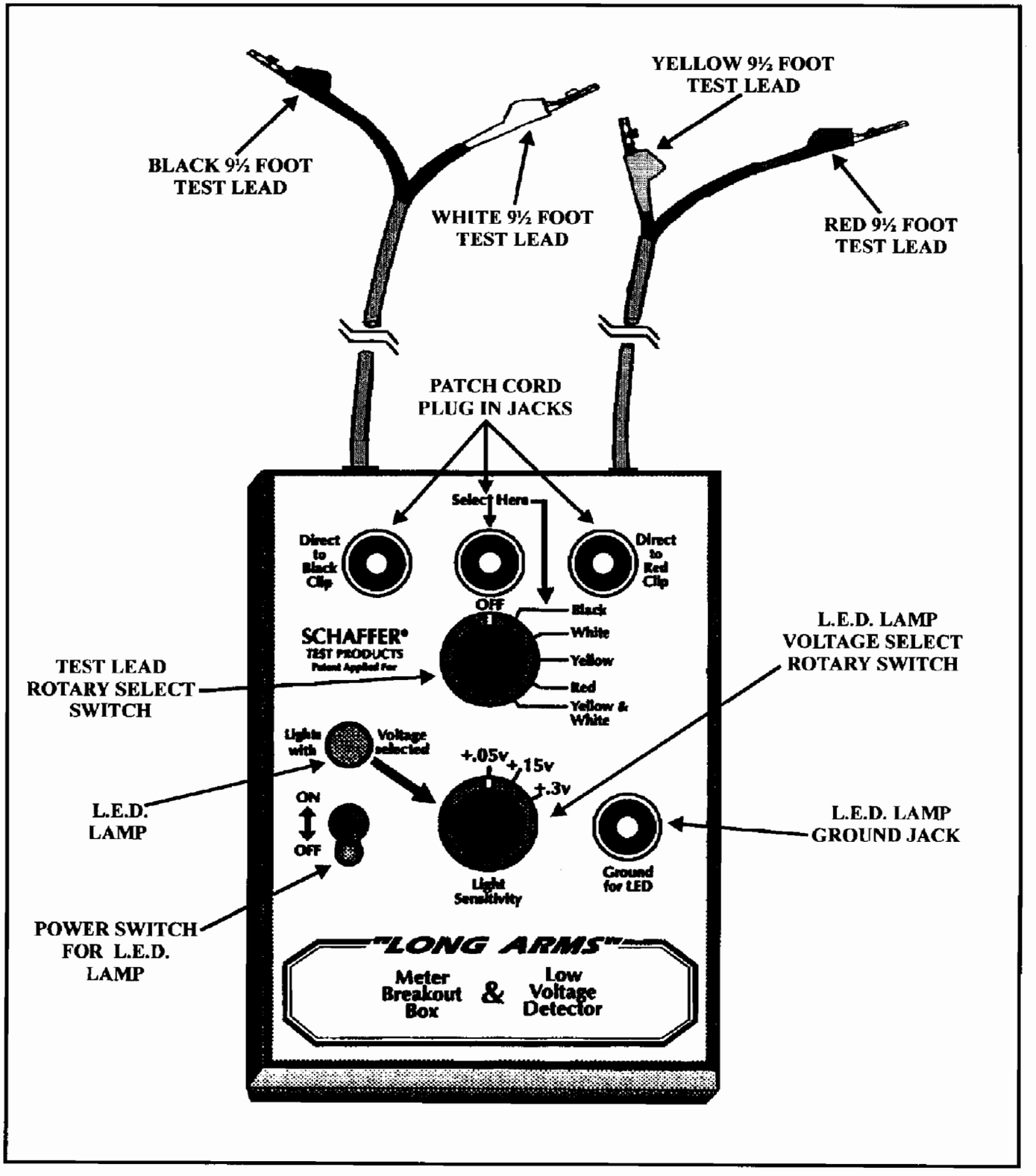
An example of breakout box usage can be seen in the illustration in Figure 2. In this example the long arms has become an extension of the users multi meter.
With each of the "LONG ARMS"™ four color coded test leads connected to four circuits of a speed buffer, the technician can check VSS +, VSS-, system voltage supply and 5 volt sensor reference voltage just by turning the rotary switch on the "LONG ARMS"™ control panel.
If the "LONG ARMS"™ four test leads were connected to the transmission case connector, up to four solenoid circuits could be checked at once, or all four circuits of a Mass Airflow Sensor, Etc.

The next example shows how the "LONG ARMS"™ can be used to check ground circuit integrity.
In Figure 3 the test leads are connected to various ground circuits and the "LONG ARMS"™ is set up to check as many as four ground circuits at once.
Turn the L.E.D. switch to "ON" and set the L.E.D. rotary switch to the .05 volt setting which is the most sensitive setting or, either of the other less sensitive settings.
With a load on the electrical system, each ground circuit can be checked simply by selecting each test lead with the test lead selection rotary switch. If the L.E.D. light illuminates, the ground circuit being checked is faulty.

Schaffer Enterprises.....Phone.....941-859-1070
Fax.....941-853-1548

SCHAFFER® "LONG ARMS"™

BREAKOUT BOX AND ELECTRONIC TEST LIGHT



SCHAFFER® "LONG ARMS"™

BREAKOUT BOX AND ELECTRONIC TEST LIGHT

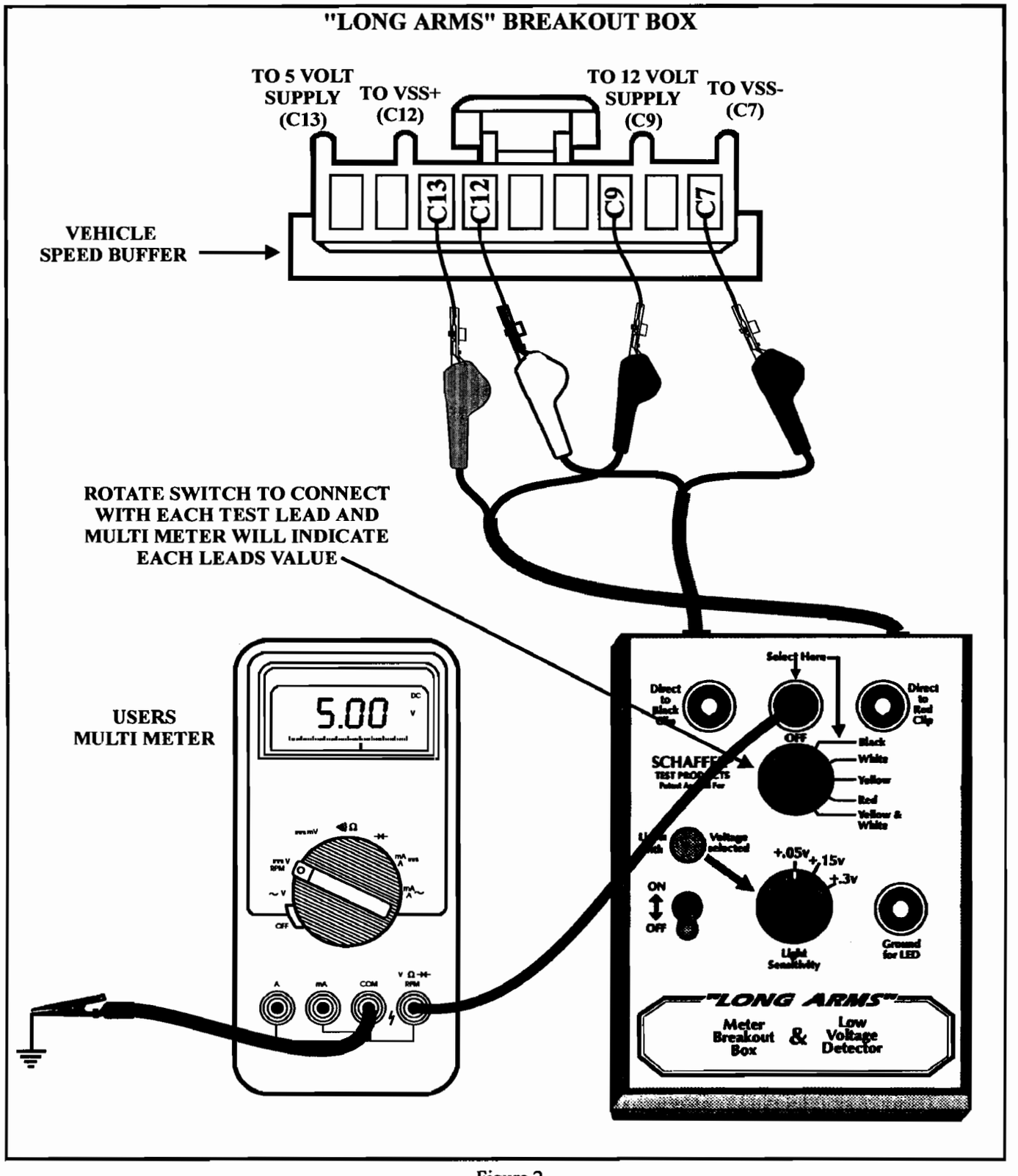


Figure 2

SCHAFFER® "LONG ARMS"™

BREAKOUT BOX AND ELECTRONIC TEST LIGHT

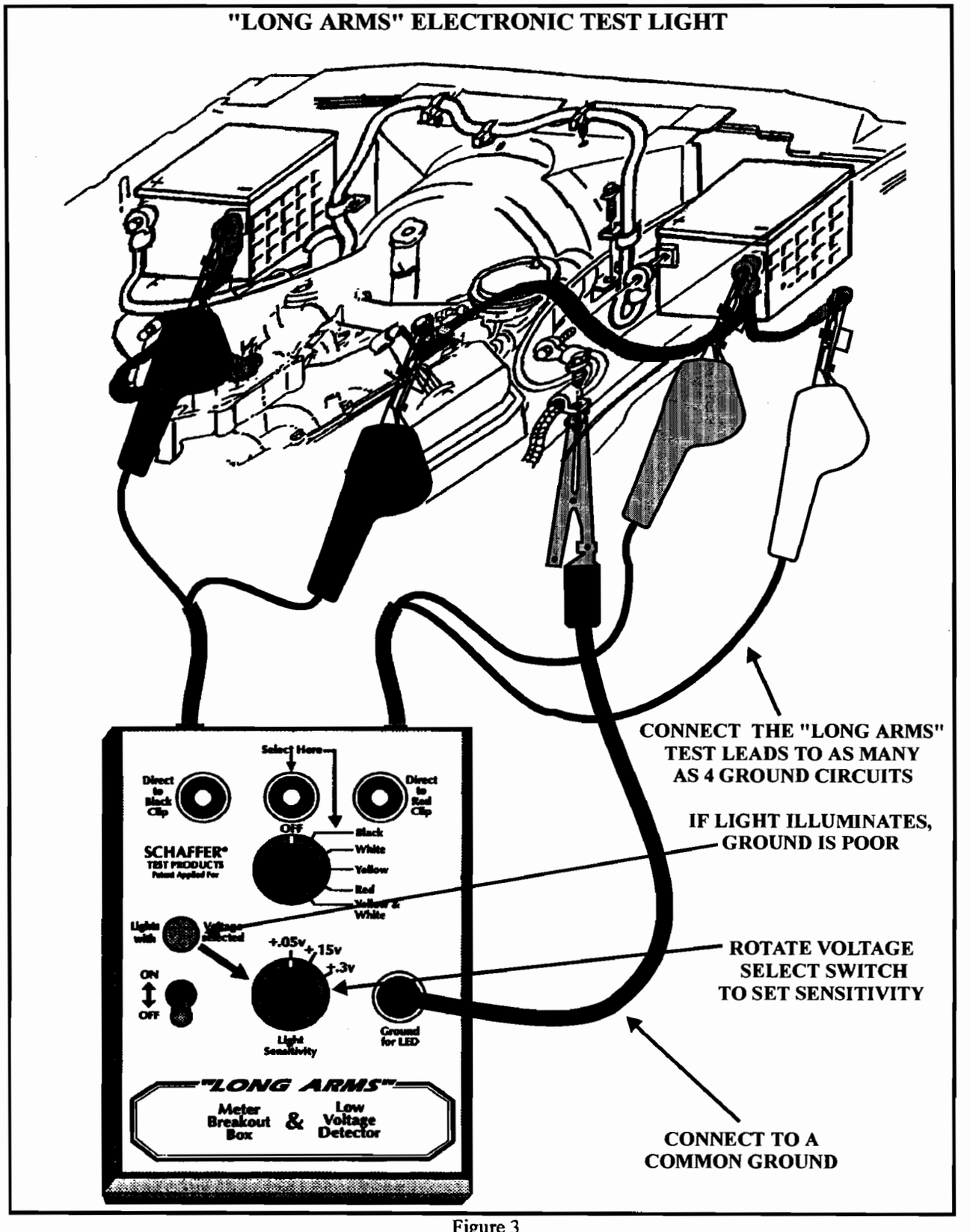


Figure 3

THINK OF THEM AS CASH MACHINES ON WHEELS.

Losing valuable time and income due to superficially worn hard parts or non-sealing soft parts? Then bank on the original Answermatic® VBT-4000, or our AMI® Hydraulic Circuit Analyzer.

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- *Custom calibrate your transmissions.*
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- *Very affordable, units start at $3,995.*
- *Easy-to-learn and easy-to-use.*
- *Fits virtually all foreign and domestic front and rear wheel cars and trucks.*

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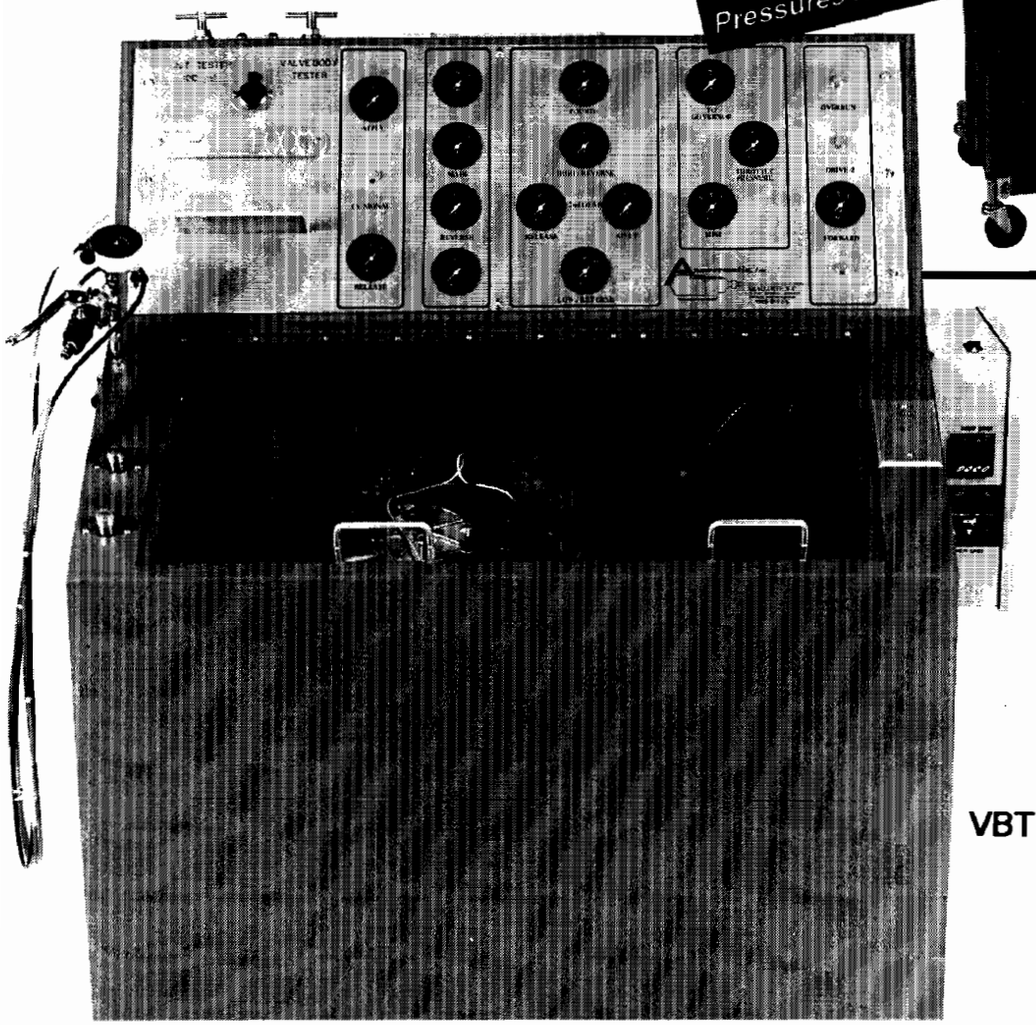


VBT 4000 Shown with optional Fluid Heating System.

Answermatic®
Patent #4809544, 4998437. Other patents pending.

VBT 4000

THM 4L60-E

INTERMITTENT PRESSURE RISE ON 1996 MODELS ONLY

COMPLAINT: Beginning at the start of production for all 1996 model vehicles equipped with the THM 4L60-E transmission, there was a VCM (Vehicle Control Module) installed on the vehicles with an internal ground wire that connects the two printed circuit boards together. Some vehicles with the VCM will display very erratic and unstable line pressure rise in the transmission, and in some instances, premature failure of the transmission.

CAUSE: Bad ground connection from one printed circuit board to the other.

CORRECTION: There is now available from OEM parts sources, a new service repair kit with an instruction sheet, to repair 1996 vehicles with this condition, and is available under OEM part number 12167310.

Step Number One:
Remove the wire and terminal from location 18 in the "Clear" connector, and install one end of the jumper wire that is included in the service kit into location 18 in the "Clear" connector, and reinstall the clear connector, as shown in Figure 1.

Step Number Two:
Install the wire and terminal that was removed from cavity location 18 in the clear connector, into empty cavity location 23 of the "Blue" connector, as shown in Figure 1.

Step Number Three:
Install the other end of the included jumper wire that was previously installed in cavity 18 of the clear connector, into empty cavity location 26 of the "Red" connector, as shown in Figure 1.

SERVICE INFORMATION:

Service Repair Kit 12167310

VEHICLE CONTROL MODULE

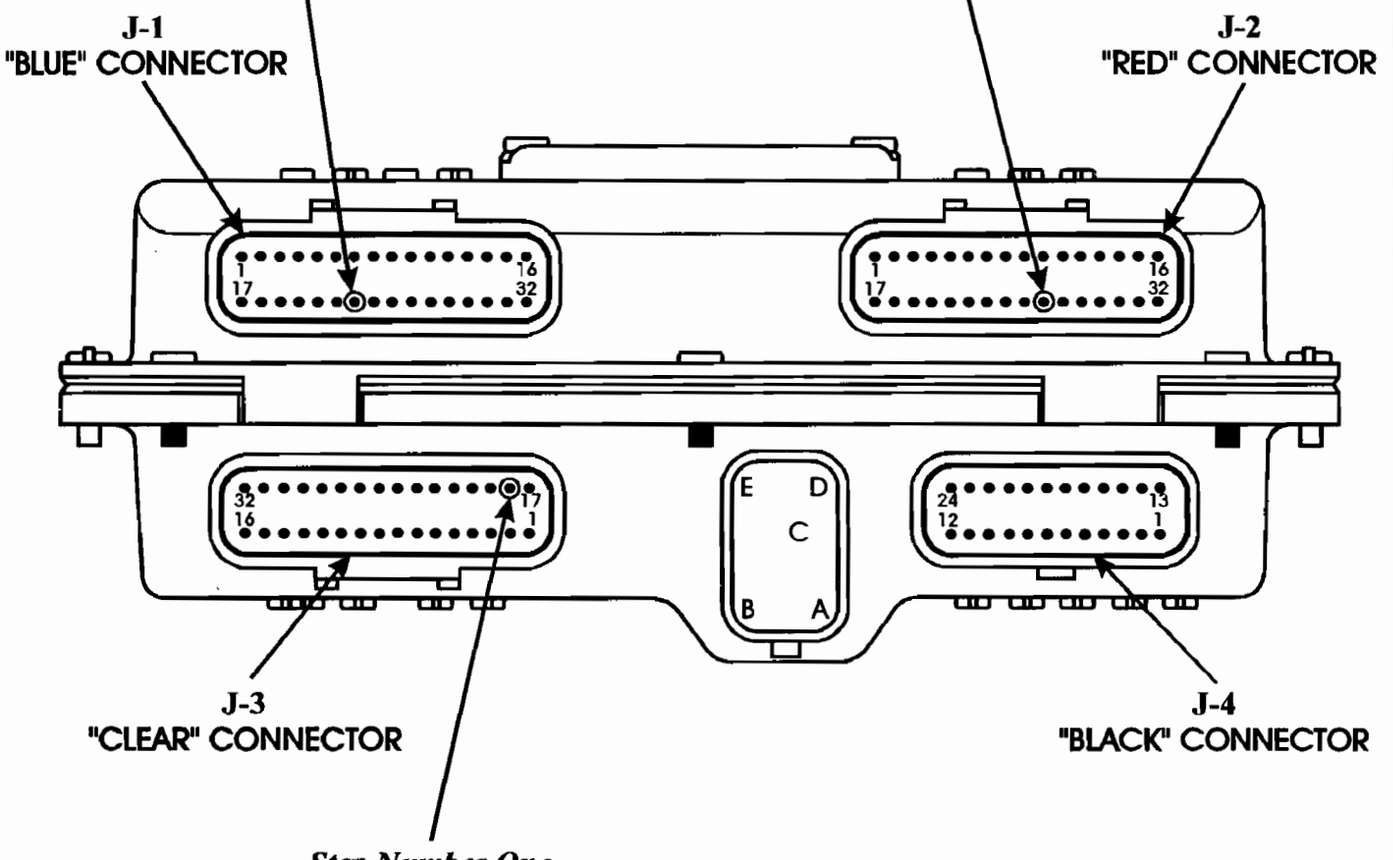
OEM Harness Repair Kit
Part Number 12167310

Step Number Two

INSTALL THE WIRE AND TERMINAL THAT WAS REMOVED FROM LOCATION 18 IN THE CLEAR CONNECTOR, INTO CAVITY LOCATION 23 OF THE BLUE CONNECTOR.

Step Number Three

INSTALL THE OTHER END OF THE INCLUDED JUMPER WIRE THAT WAS PREVIOUSLY INSTALLED INTO THE CLEAR CONNECTOR, INTO CAVITY LOCATION 26 OF THE RED CONNECTOR.



Step Number One

REMOVE THE WIRE AND TERMINAL FROM LOCATION 18 ON THE CLEAR CONNECTOR, AND INSTALL ONE END OF THE INCLUDED JUMPER WIRE INTO LOCATION 18 ON THE CLEAR CONNECTOR.

"REFERENCE COLORS NOT VISIBLE UNTIL CONNECTOR IS REMOVED"

Figure 1

THM 4L60-E

TRANSMISSION AND ENGINE OVERHEATS
1994-1996 CHEVROLET CAPRICE

COMPLAINT: Some models of 1994-1996 Chevrolet Caprice may exhibit a engine and/or transmission overheating condition, and usually occurs in heavy duty operation, such as Police and Taxi use.

CAUSE: The Primary Cooling Fan Relay may overheat and fail, rendering the cooling fan inoperative and resulting in the overheat condition. The Secondary fan may operate, but will not provide enough cooling air tp prevent the overheat condition.

CORRECTION: A new service package is available under OEM part number 12167644, that moves the Primary Cooling Fan Relay to a new location and upgrades the terminal ends. No instructions are provided in the service package, so you will need this bulletin for installation instructions. Contents of the service package are shown in Figure 1.

(1) Disconnect the Negative battery cable.

(2) Locate the underhood Electrical Center, located at the top rear of the right front wheel housing, and remove the cover.

(3) Remove the Electrical Center from the casing, by releasing the tabs using a small screwdriver, as shown in Figure 2.

(4) Remove the current Primary Cooling Fan Relay and the 40 Amp, number 12 Maxi-fuse, as shown in Figure 2.

(5) From the back of the Electrical Center, as shown in Figure 3:
- (A) Remove the 10 gauge "Red" jumper wire and terminals from cavities "K2" and "C4", and discard this jumper wire.
- (B) Remove the 10 gauge "Blue" wire and terminal from cavity "B6". Cut off the terminal end and discard, and tape the wire end.
- (C) Remove the 22 gauge "Brown" wire and terminal from cavity "B4", and the 22 gauge "Green" wire and terminal from cavity "C6". These wires will be reused in step seven.

(6) Locate connector number "C103", located just in front of the Electrical Center, as shown in Figure 4. Unplug the connector and remove the "Blue" 10 gauge wire and terminal from cavity "A". Cut off the terminal end and discard, and tape the bare end of the wire.

Continued on Next Page.

Installation procedure continued.

(7) Locate the new cooling fan relay and harness assembly from the service package, and insert the "Red" wire and terminal int cavity "K2" of the Electrical Center, as shown in Figure 5. Cut the old terminal ends from the "Brown" and "Green" wires that were previously removed from the Electrical Center in Step 5, and discard. Using the crimp connectors from the service package, connect the "Brown" wire from the new harness assembly to the "Brown" wire removed from terminal "B4", as shown in Figure 5. Using the remaining crimp connector from the service package, connect the "Green" wire from the new harness assembly to the "Green" wire removed from terminal "C6", as shown in Figure 5. Heat shrink the connections to insure a water tight seal, and reinstall the Electrical Center into the case.

(8) Reinstall the 40 Amp, number 12 Maxi-fuse.

(9) At connector number "C103", install the "Blue" wire and terminal from the new harness assembly into cavity "A", as shown in Figure 6, and plug the connector back together.

(10) Remove the hex nut that secures the hood ground strap to the cowl, as shown in Figure 7. Install the new cooling fan relay bracket on top of the ground strap, leaving the ground strap in place, and reinstall the hex nut. Refer to Figure 7.

(11) Secure the new harness into position, making sure there are no rub or pinch points, reconnect the Negative battery cable, and verify the operation of the cooling fan.

ADDITIONAL "IMPORTANT" INFORMATION

It has come to our attention that some models have the external transmission cooler mounted directly behid the front bumper, and greatly restricted from the air flow. Make sure you check the mounting in the vehicle that you are working on, and if in this location, it would be advisable to "remount" the external transmission cooler so that it is higher, and in the direct air flow from the front of vehicle.

CONTENTS OF SERVICE PACKAGE
PART NUMBER 12167644

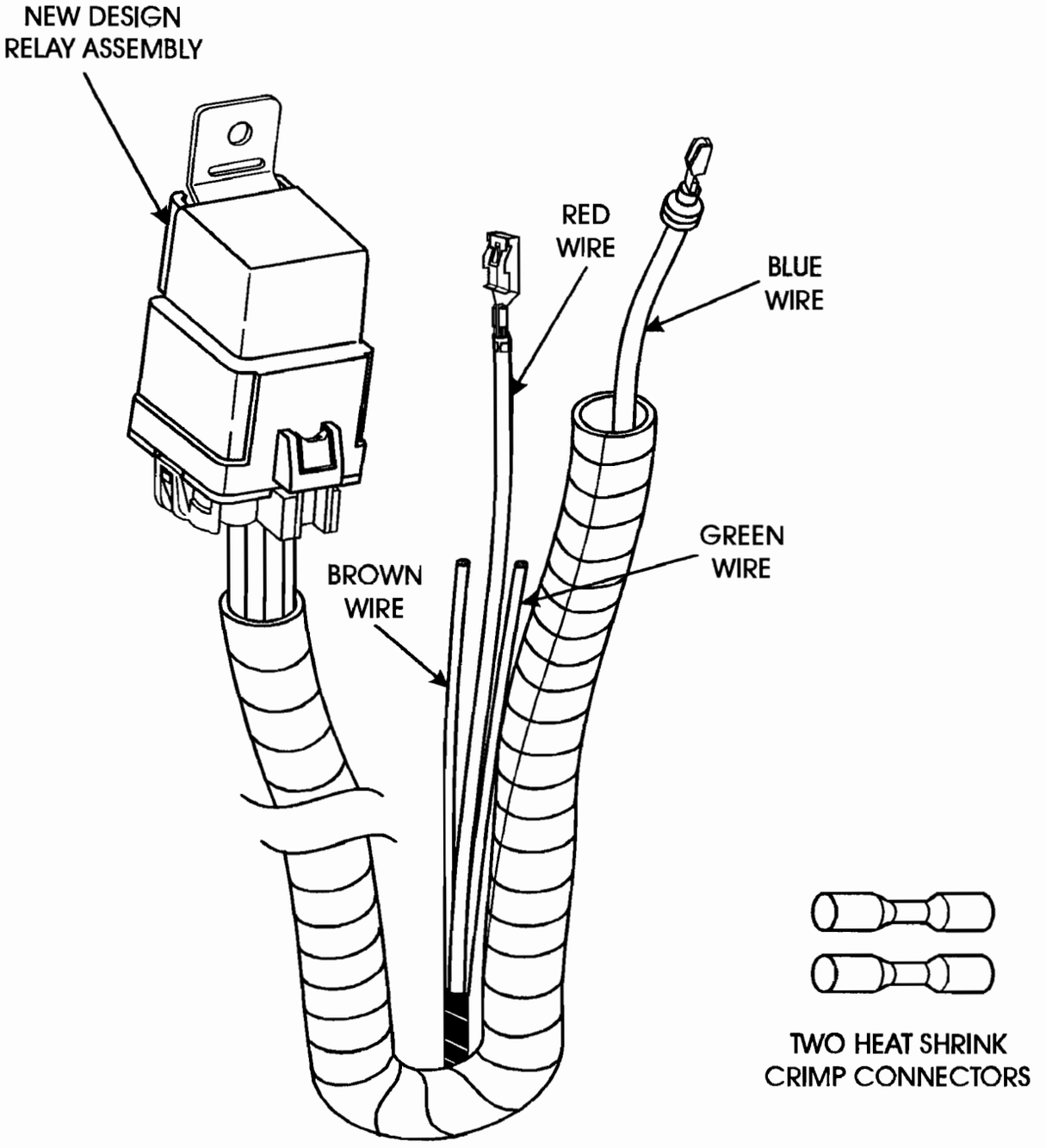


Figure 1

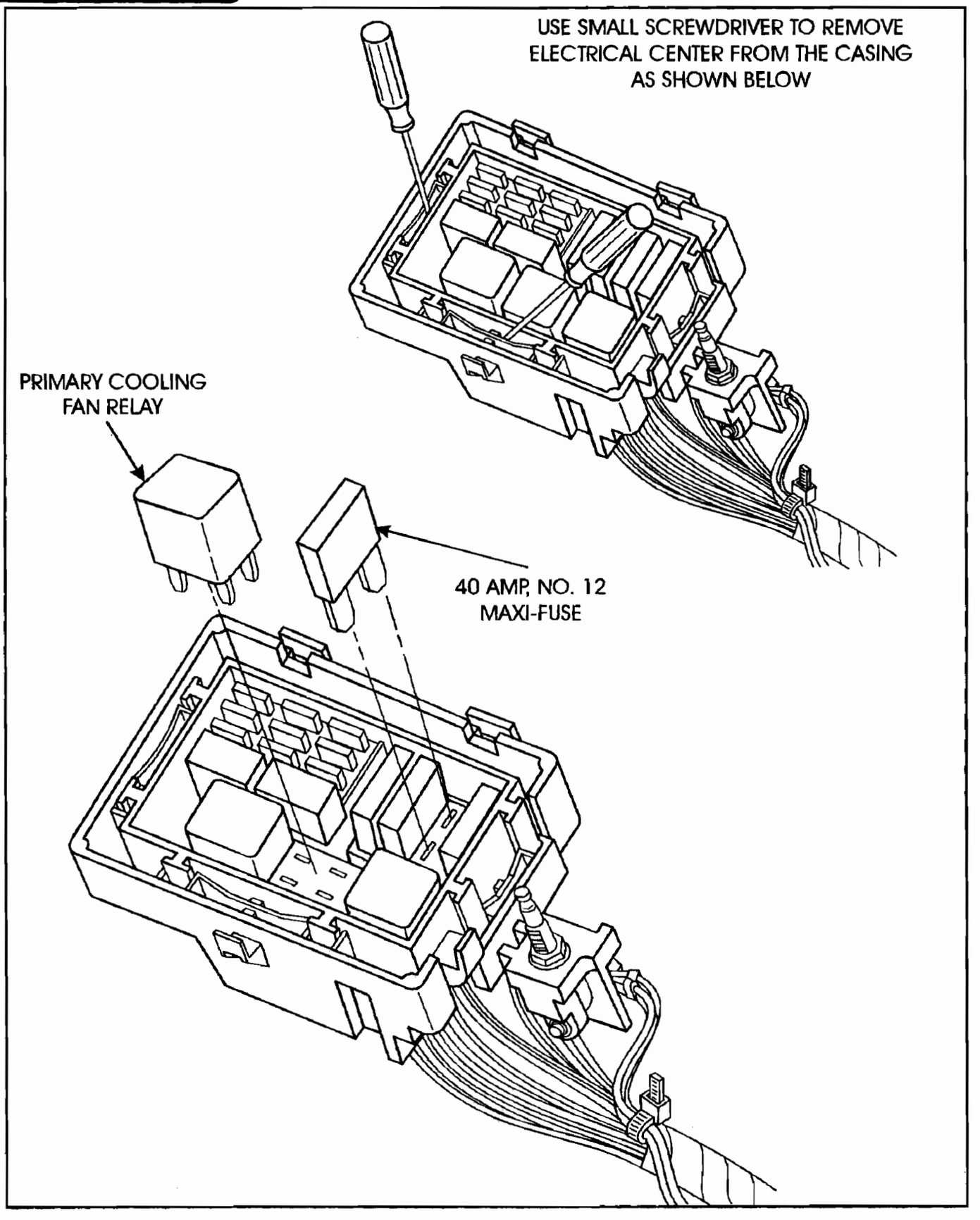

USE SMALL SCREWDRIVER TO REMOVE
ELECTRICAL CENTER FROM THE CASING
AS SHOWN BELOW
PRIMARY COOLING
FAN RELAY
40 AMP, NO. 12
MAXI-FUSE

Figure 2

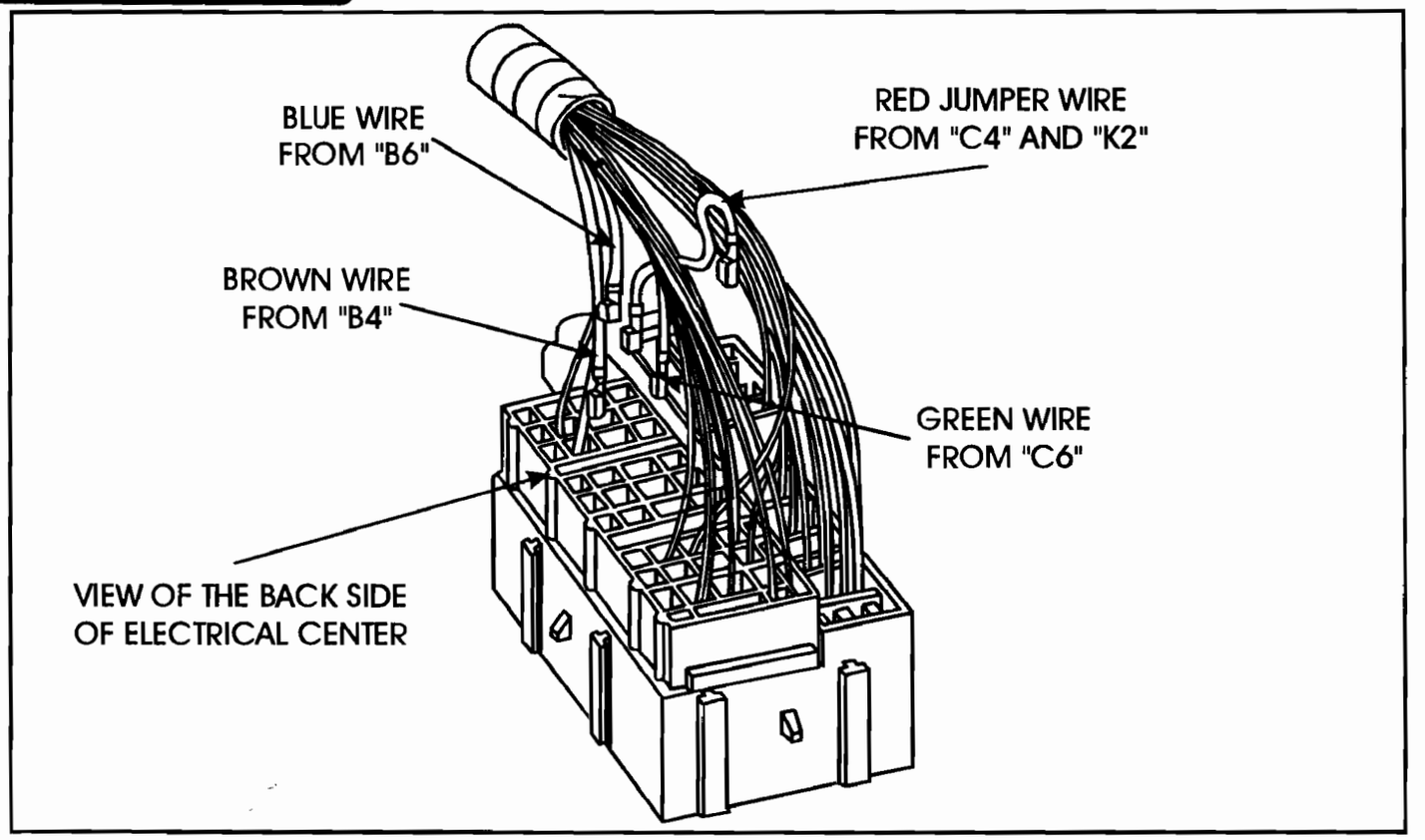


Figure 3

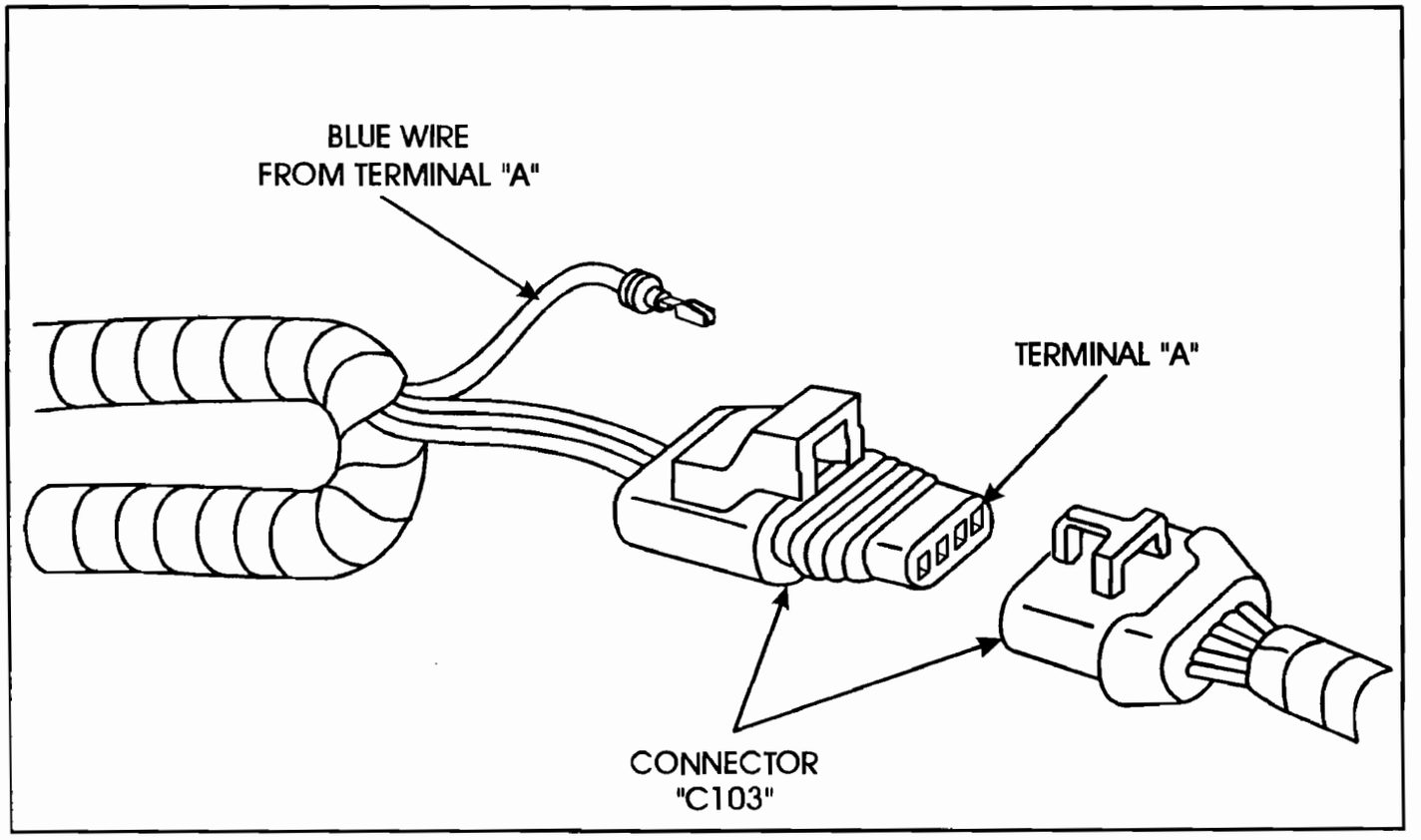


Figure 4

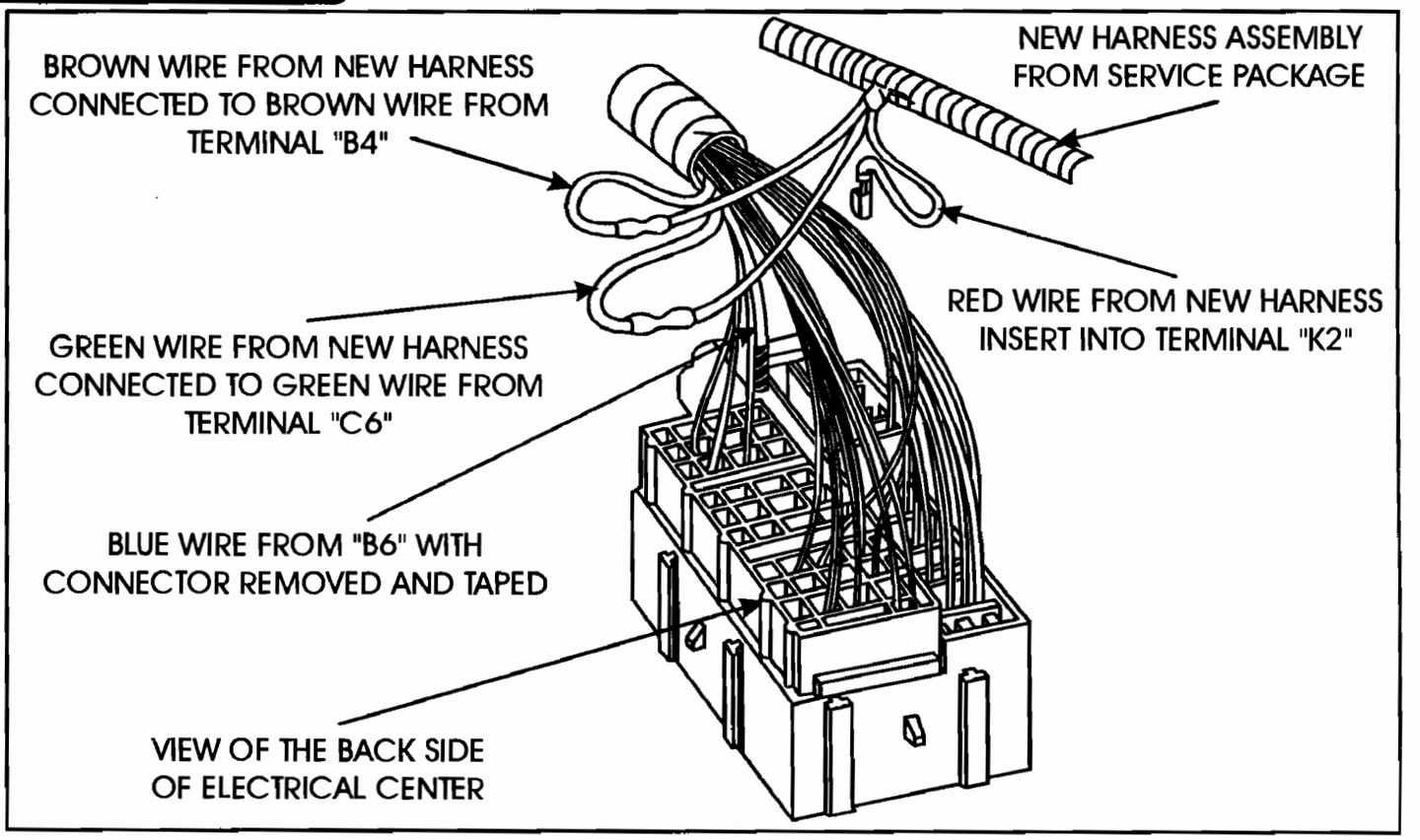


Figure 5

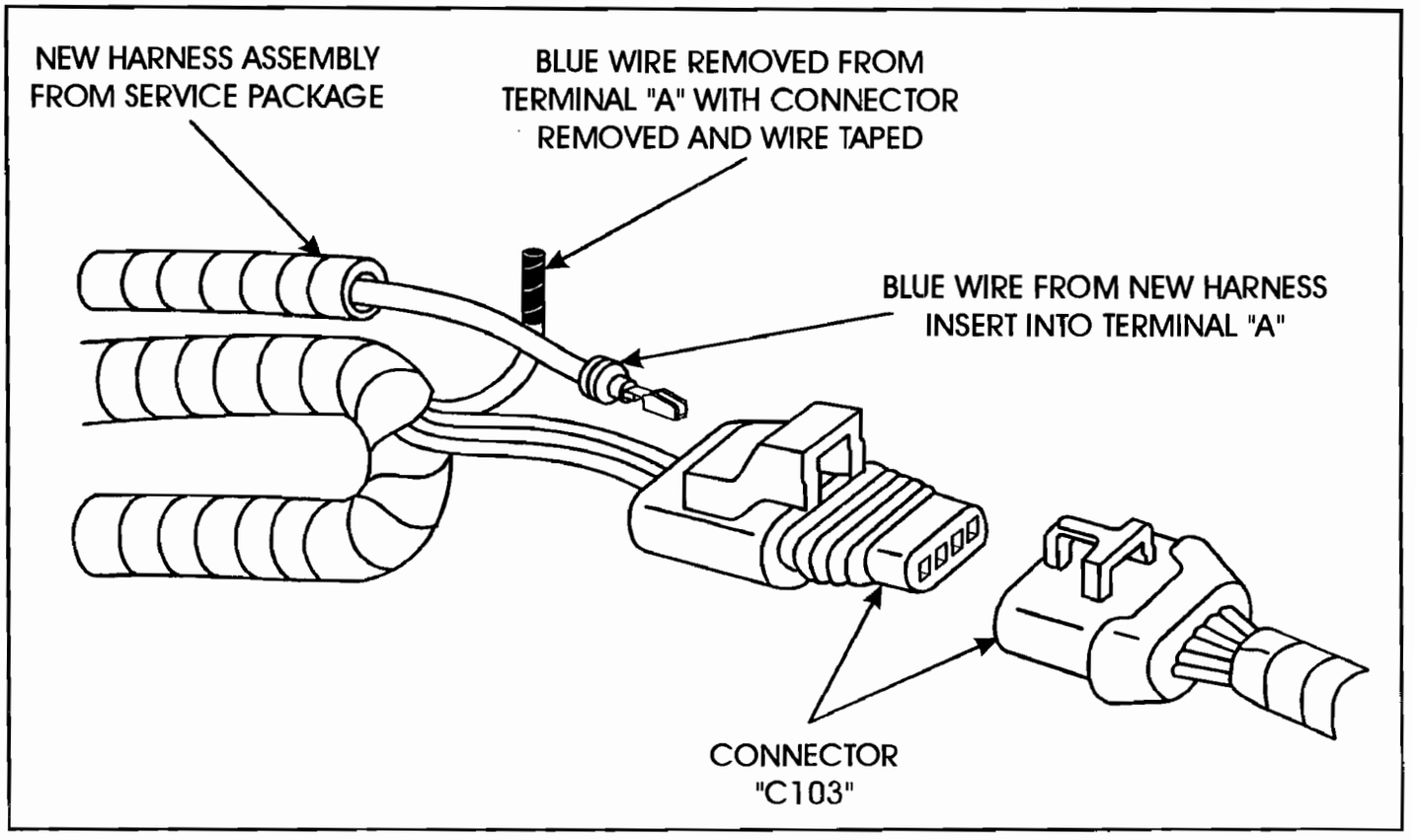


Figure 6

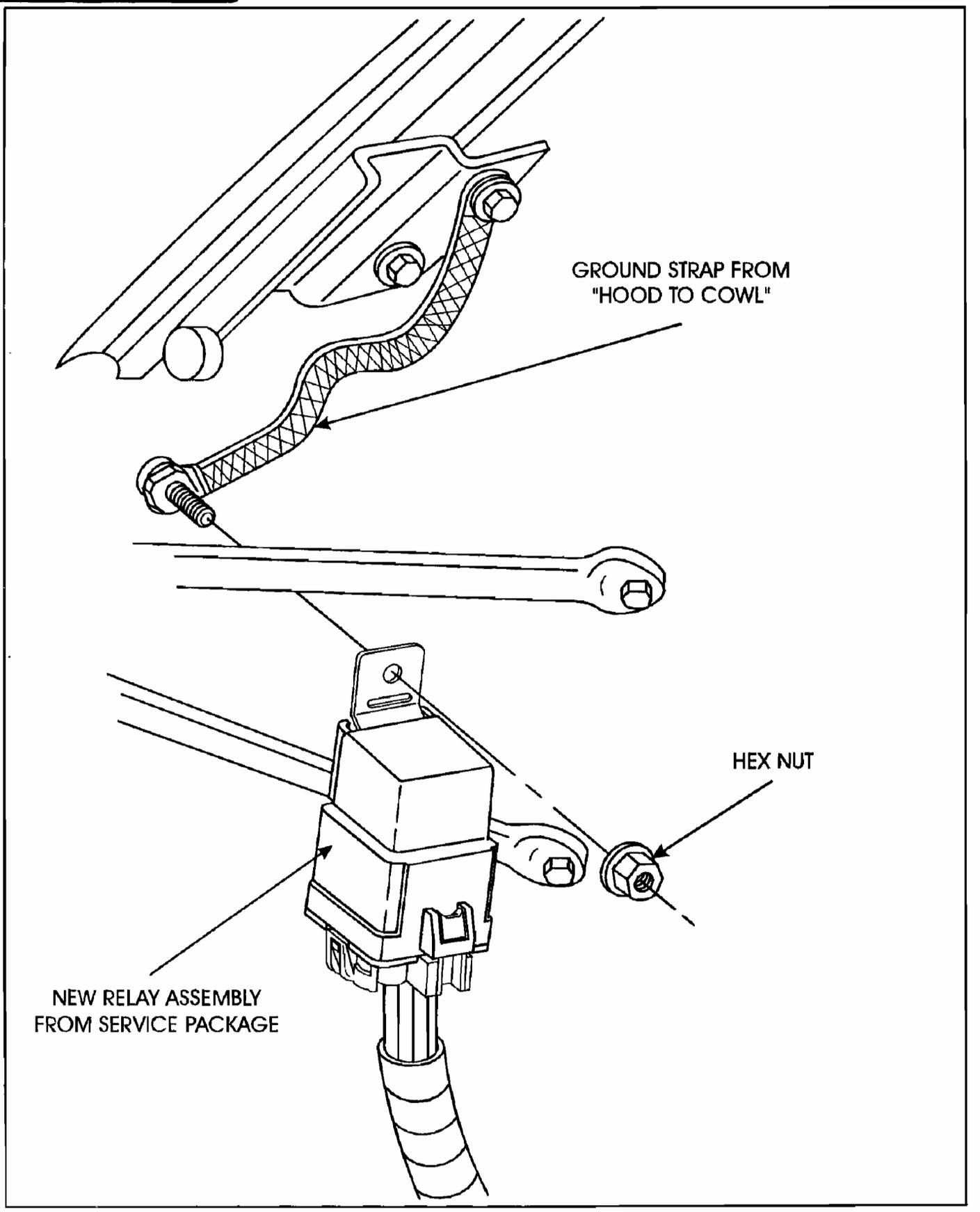

GROUND STRAP FROM
"HOOD TO COWL"
HEX NUT
NEW RELAY ASSEMBLY
FROM SERVICE PACKAGE

Figure 7

THM 4L60-E

TRANSMISSION OVERHEATING AND/OR CONVERTER DISCOLORED

COMPLAINT: Before and/or after rebuild the torque converter is severely discolored from an overheating condition, and this sometimes happens on the road test, after installing a new torque converter.

CAUSE: The cause may be, no regulated apply oil available because of a TCC/PWM solenoid filled with debris that does not allow TCC Signal oil to stroke the TCC Regulator valve in the valve body. There are no codes stored, as the TCC/PWM Solenoid is still working electrically.

CORRECTION: To eliminate the possibility of this overheating condition happening to you or to your customer, we are recommending that the TCC Regulator Valve located in the valve body be machined with two flats on the first land as shown in Figure 1. This will completely by-pass the TCC Regulator Valve, provide a more positive lock-up apply feel, and guarantee that you will always have apply oil available.

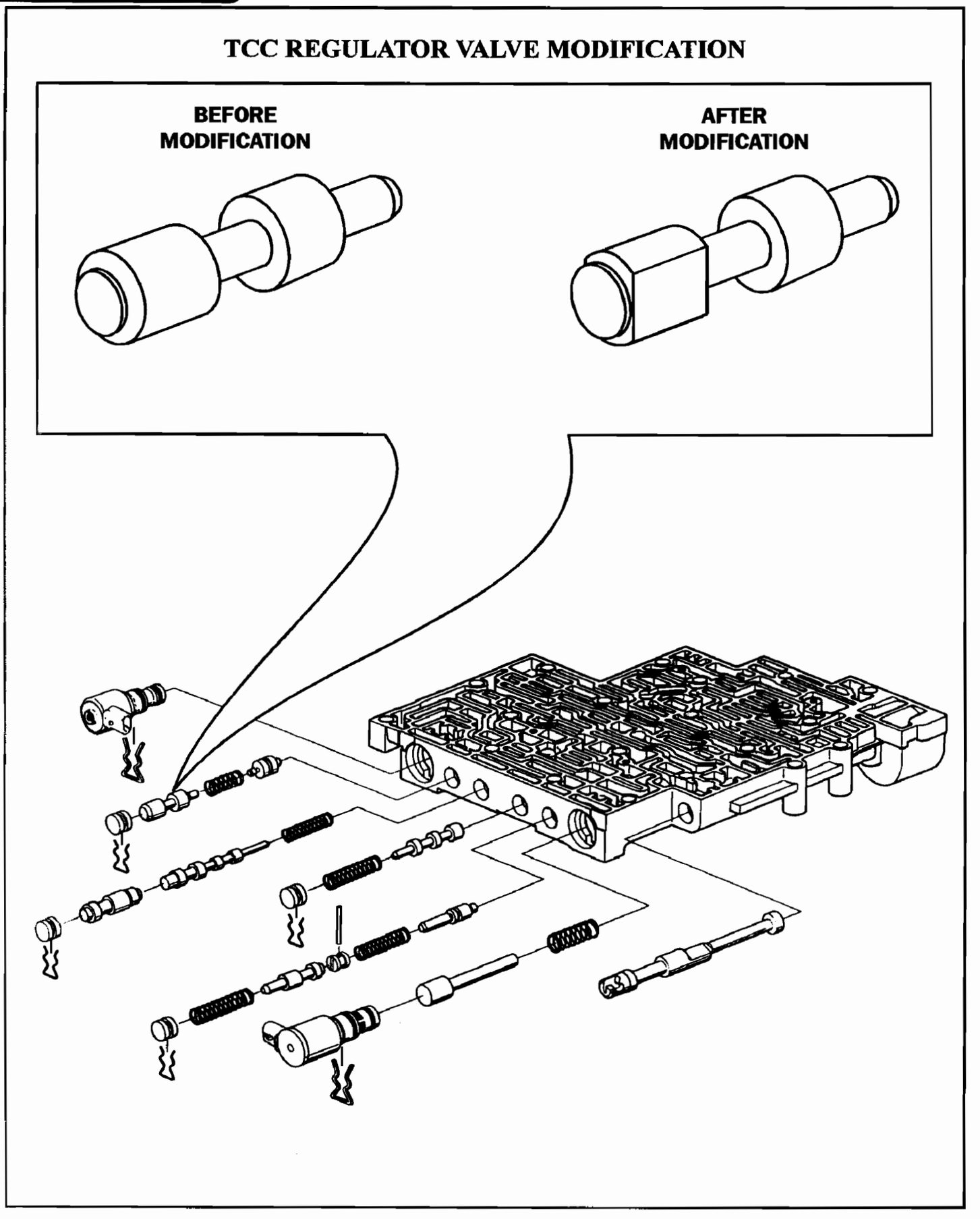

TCC REGULATOR VALVE MODIFICATION
BEFORE MODIFICATION
AFTER MODIFICATION

Figure 1