



"2000" SEMINAR INFORMATION "FIXES TODAY FOR Y2K"

INDEX CHRYSLER & IMPORTS

Slides (Chrysler)

42RE.....	4
-----------	---

Video (Import)

HONDA/ACURA TEST FIXTURES.....	14
ZF-5HP-30.....	19

Slides (Import)

ZF-5HP-18.....	26
ZF-4HP-22/24.....	55
ZF-5HP-30.....	69
HONDA/ACURA.....	74
MAZDA.....	80
MITSUBISHI.....	90
NISSAN.....	96
ISUZU.....	99
HALL EFFECT SENSORS.....	112
RFI/EMI.....	117

ADVERTISER'S

Borg Warner.....	IFC	Rockland Standard & Gear.....	63
Bryco.....	2	ATC.....	68
Independent Transmissions.....	10	SPX.....	73
Alto.....	22	Precision.....	98
Raybestos.....	28	Torrington.....	111
Zoom Technology.....	36	Intercont.....	116
Transtar.....	44	Toledo Trans Kits.....	IBC
Dacco.....	54	Lube Guard.....	BC



"2000" SEMINAR INFORMATION
"FIXES TODAY FOR Y2K"

1

INTRODUCTION

The third and final manual for the "FIXES TODAY FOR Y2K" seminar continues to present practical information on Chrysler vehicles. The seminar and this manual ends with the Import section.

ATSG is a dedicated technical support group providing the latest and greatest fixes on today's transmissions. It helps to belong to a tech service but belong to a tech service that helps. ATSG, the tech service that helps. Sign up today!

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

Copyright © 2000 ATSG

ROBERT D. CHERRNAY
TECHNICAL DIRECTOR

JIM DIAL
TECHNICAL CONSULTANT

JERRY GOTT
TECHNICAL CONSULTANT

DAVID CHALKER
TECHNICAL CONSULTANT

ED KRUSE
TECHNICAL CONSULTANT

GREGORY LIPNICK
TECHNICAL CONSULTANT

WAYNE COLONNA
TECHNICAL SUPERVISOR

PETER LUBAN
TECHNICAL CONSULTANT

GERALD CAMPBELL
TECHNICAL CONSULTANT

JON GLATSTEIN
ELECTRICAL CONSULTANT

MARIO ARISTIDES
MERCEDES CONSULTANT

DALE ENGLAND
FIELD SERVICE CONSULTANT

AUTOMATIC TRANSMISSION SERVICE GROUP

9200 South Dadeland Boulevard Suite 720

Miami, Florida 33156

WWW.TRANSONLINE.COM

(305) 670-4161

WWW.ATSGMIAMI.COM

Alignment Tools

Bands • Band Adjusting Nuts •
Banner Overhaul Kits • Boot Kit • Bushings
Kits • Bushings • Bushings Power Steel
Cables • Clutch Plates • Convert G
• Crank Tensioners • Drive Chain
• Engine Components • Fan
• Fuel Pump Kits • Gasket &
• Injectors • Gasket With Rings
• Power Steering • Ignition
• Valve Train Parts • Timing
• Timing Kits • Timing

Valves • D Rings And D Rings • Oil
Seals & Gaskets • Orings • Power
Steering • Bearings • Power Steering Kit Comp
• Pump Shafts • Rack And Pinion •
• Power Steering • Sealing Ring Ki
• Suspension Kits • Sprockets • Sta
• Wheel Covers • Standard C
• Standard Clutch Pl
• Standard Clutch K

- We're not
saying you can
improve your IQ by
using BRYCO parts,
but everyone else
may think so



BRYCO 
PROVEN THE BEST

www.bryco.com



"2000" SEMINAR INFORMATION SLIDE

4

CHRYSLER 42RE AND 47RE CHECKBALL LOCATIONS AND FUNCTIONS, PLUS NEW CHECKBALL ADDED IN TRANSFER PLATE

CHANGE: Beginning with the 1996 model year all of the 42RE and 47RE models, with the electronic controlled governor pressure, were produced with an added number 10 checkball located in the transfer plate, as shown in Figure 3.

REASON: To ensure sequential downshifts.

PARTS AFFECTED:

- (1) **TRANSFER PLATE** - Casting changes to accommodate the added number 10 checkball and illustrated in Figure 3.
- (2) **OVERDRIVE SPACER PLATE** - Changes in the hole configuration to accommodate the added number 10 checkball, as illustrated in Figure 4
- (3) **OVERDRIVE VALVE BODY** - Casting changes to accommodate the added number 10 check ball, as illustrated in Figure 5.

INTERCHANGEABILITY:

*None of the individual parts listed above will interchange with previous design level parts.
When used as a complete service package, will back service any 42RE or 47RE.*

NOTE: We have also provided you with the main valve body checkball locations in Figure 2 and the transfer plate checkball locations in Figure 3. The function of all checkballs are provided for you in Figure 1.



"2000" SEMINAR INFORMATION

SLIDE

5

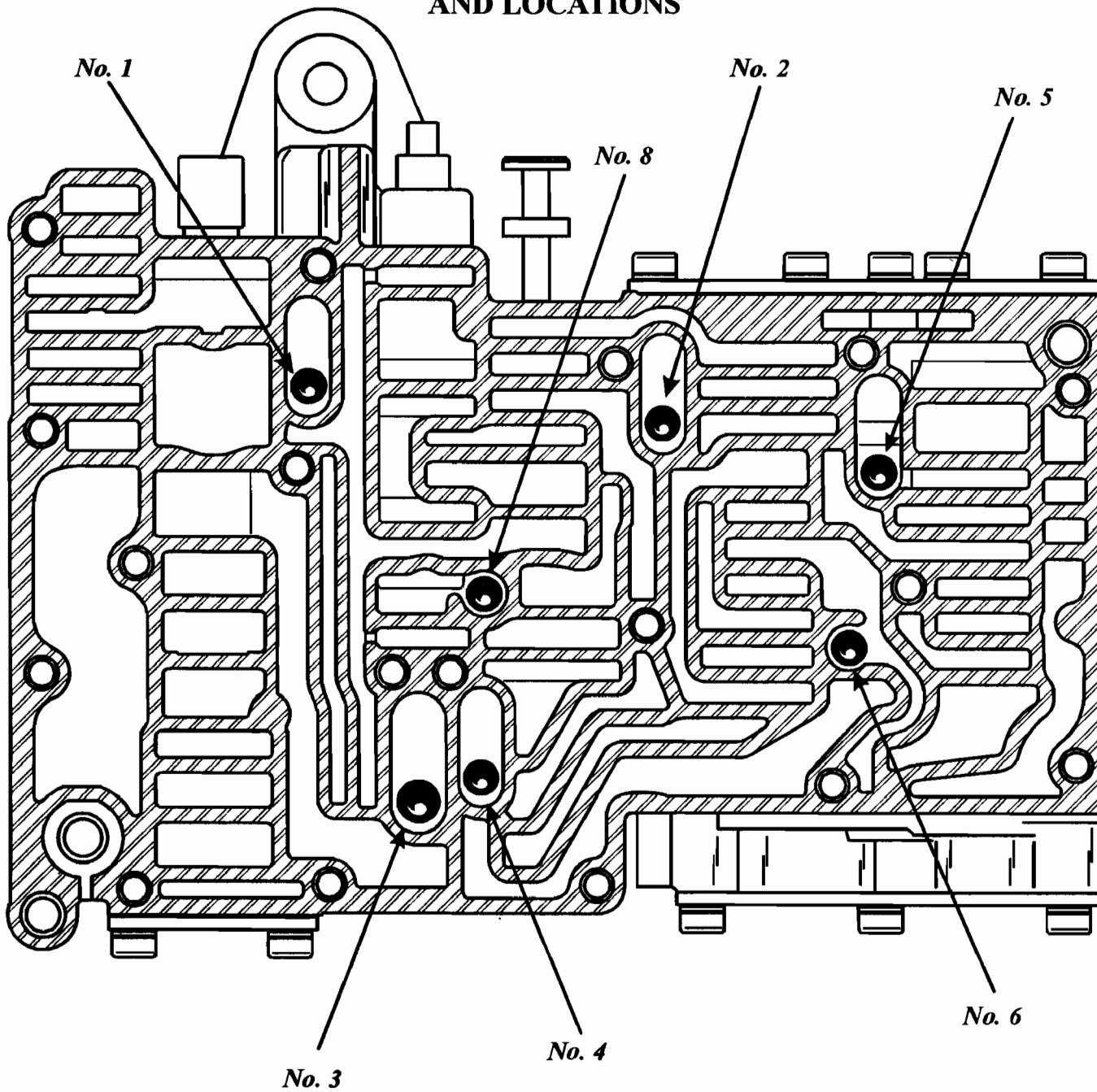
CHECKBALL IDENTIFICATION AND FUNCTIONS

Checkball	Size	Function
No. 1	1/4" Steel	A) Checkball No. 1 forces line pressure behind the 1-2 shift control valve and both the 1-2 and 2-3 governor plugs to prevent an upshift into 2nd and/or 3rd gear when the selector lever is placed into Manual Low. B) Checkball No. 1 directs throttle pressure behind the 1-2 shift control valve and blocks the passage to the 1-2 governor plug in order to inhibit a 3-1 downshift during a forced 3-2 downshift when the vehicle is above the calibrated speed.
No. 2	1/4" Steel	A) Checkball No. 2 forces line pressure behind the 2-3 shift valve to prevent a 2-3 upshift when the selector lever is placed into Manual 2nd. B) Checkball No. 2 blocks the manual 2nd circuit and directs throttle pressure to the 2-3 shift valve during a forced 3-2 downshift.
No. 3	11/32" Steel	A) Checkball No. 3 blocks front (Direct) clutch oil, after a 2-3 upshift, from entering the reverse band circuit and allows front (Direct) clutch oil to enter the intermediate band release circuit. B) Checkball No. 3 blocks the intermediate band release circuit and allows reverse oil to apply the front (Direct) clutch when the selector lever is placed into Reverse.
No. 4	1/4" Steel	A) Checkball No. 4 blocks rear band apply pressure from entering the front (Direct) clutch circuit when the selector lever is placed into Manual Low. B) Checkball No. 4 blocks the manual low circuit and directs line pressure into the rear band circuit when the selector lever is placed into Reverse.
No. 5	1/4" Steel	A) Checkball No. 5 blocks the manual 2nd circuit and directs throttle pressure to the back side of both shift valves and the shuttle valve, when the selector lever is placed into either Drive or Reverse. B) Checkball No. 5 blocks the throttle pressure circuit and directs line pressure to back side of 2-3 shift valve to prevent a 2-3 upshift when selector lever is placed in Manual 2nd.
No. 6	1/4" Steel	A) Checkball No. 6 forces intermediate band apply oil through an orifice to apply the intermediate band and stroke the 1-2 accumulator on a 1-2 upshift.
No. 7	1/4" Steel	A) Checkball No. 7 forces rear (Forward) clutch through an orifice for a smooth garage shift into any forward range.
No. 8	1/4" Steel	A) Checkball No. 8 blocks line pressure from entering the rear (Forward) clutch circuit when the selector lever is placed into Park, Reverse or Neutral.
No. 9	1/4" Steel	A) Checkball No. 9 forces rear band apply oil through an orifice for a smooth reverse band apply when the selector lever is placed into Reverse or Manual Low. (Not used in 47RE)
No. 10	3/16" Steel	A) Checkball No. 10 blocks orificed rear (Forward) clutch oil from entering the converter clutch apply circuit and allows orificed rear (Forward) clutch oil to pre-fill the overdrive clutch circuit. B) Checkball No. 10 prevents converter clutch apply oil from entering the overdrive circuit, and allows converter apply oil to stroke the 3-4 timing valve, which in turn loads the 2-3 shift valve in the upshifted position when the converter clutch is on in third gear.

Figure 1

Copyright © 1999 ATSG

**MAIN VALVE BODY CHECKBALL I.D.
AND LOCATIONS**

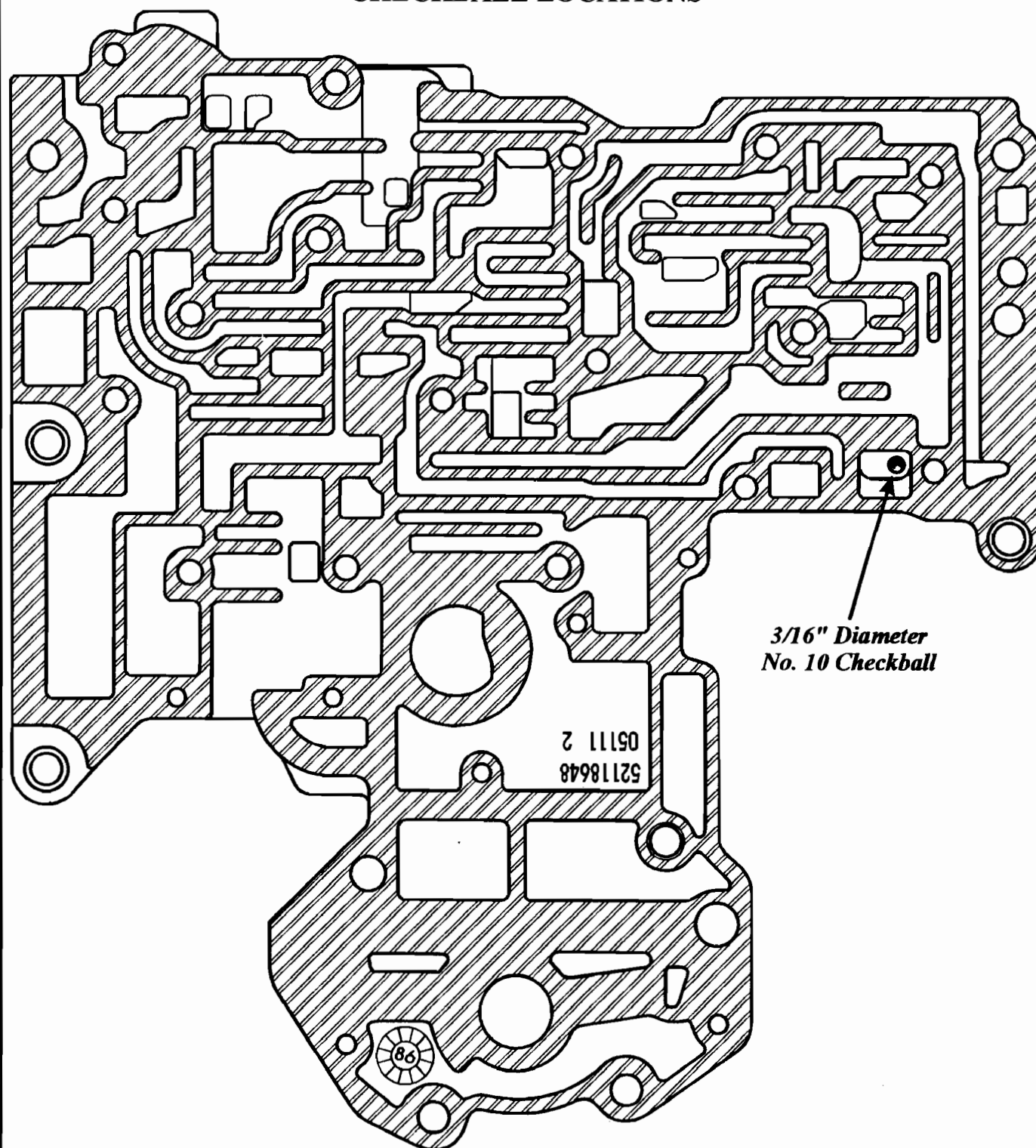


Copyright © 1999 ATSG

Figure 2

Automatic Transmission Service Group

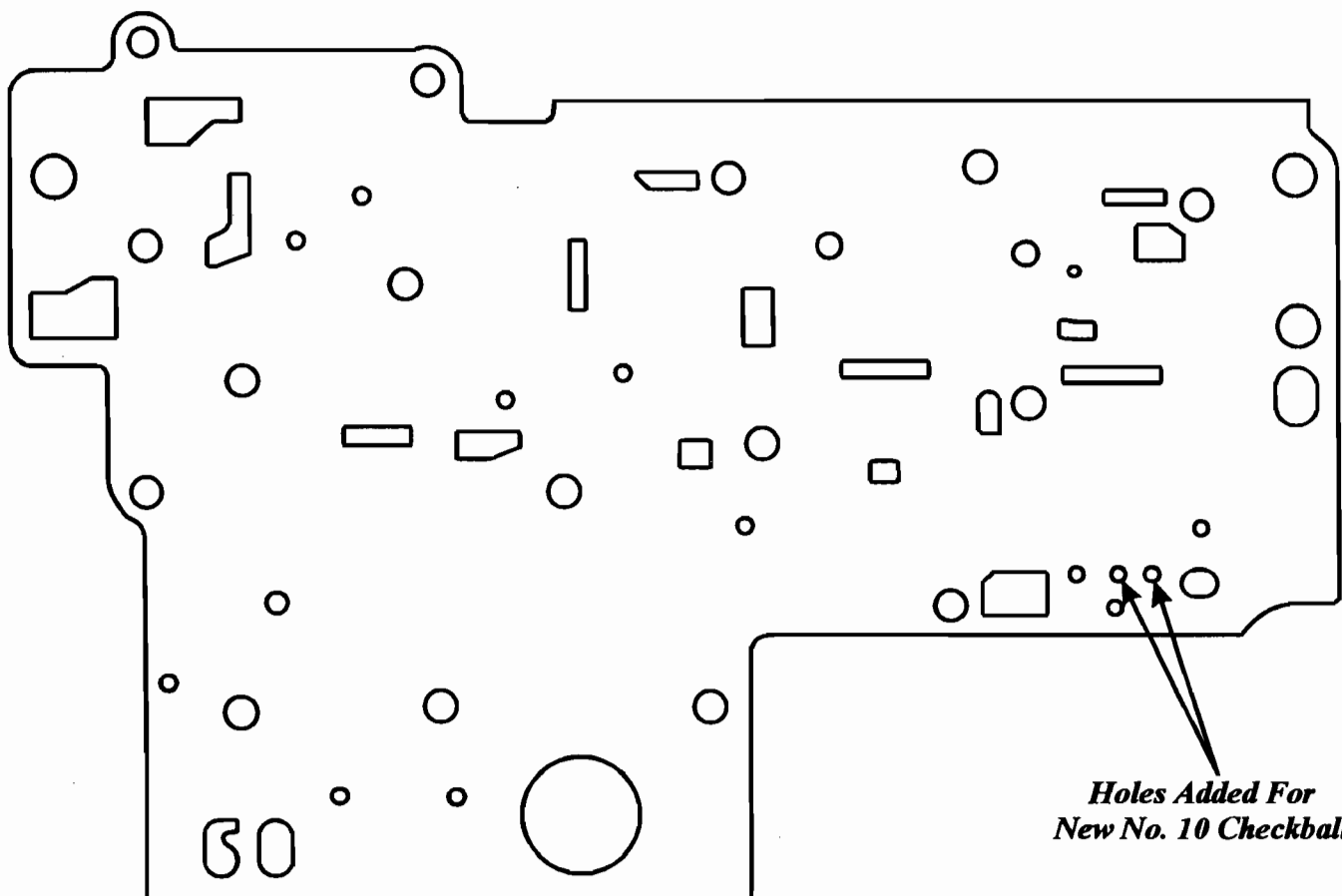
**TRANSFER PLATE "LOWER SIDE"
CHECKBALL LOCATIONS**



Copyright © 1999 ATSG

Figure 3

**OVERDRIVE VALVE BODY
SPACER PLATE**

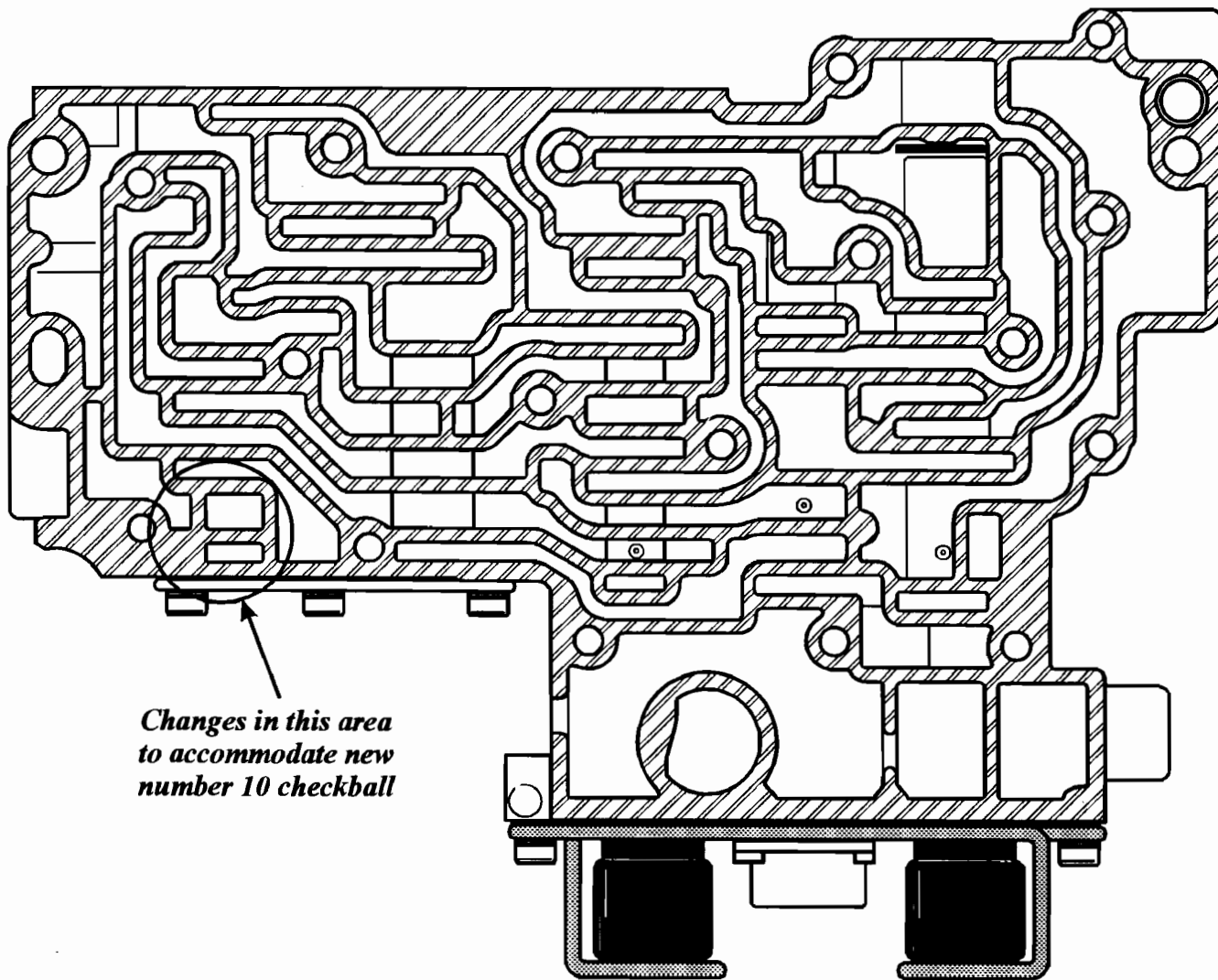


*Holes Added For
New No. 10 Checkball*

Copyright © 1999 ATSG

Figure 4

OVERDRIVE VALVE BODY



*Changes in this area
to accommodate new
number 10 checkball*

Figure 5

MARIO ARISTIDES
 5846 SW 68 Street
 South Miami Florida 33143
 Ph: 305-666 3544
 Fax: 305-666 8238

[°Technical Expertise on: Mercedes Benz & ZF Automatic
 [Transmissions. °Manufacturer of Special Tools, Valve Body
 [Modification Repair Kits & After Market Fix Parts Kits.
 [°Trouble Shooter. A.S.E. Certified. °Since 1970
 [°Kalibrator System for Mercedes Benz Amerikanisiert.



Mercedes-Benz

A None Authorized MB Transmission
 Research Developer & Manufacturer.



P R O F E S S I O N A L

AUTHORIZED SOFT PARTS DISTRIBUTOR

"Kalibrator System for MERCEDES BENZ 722.1,3,4,5 solves the following problems":

°Harsh 1-2 Shift & Stacked 2-3-4 °Slip or flare 2-3 & 3-4 shift
 °Delayed/NO Engagement to Drive & Reserve °Slip during take off

°Clunk or harsh downshift °No passing gear condition

°Kalibrate & extent or shorten shifting pattern

°TV plunger suck in DR position/No Shifting

°First-gear-start valve-body conversion Kit

°Broken springs, valves & misc. in valve body

°Air-test plate for 722.3,4,5 & Porsche 928

°Drum/Cylinder O-Ring & Screws Repair Kit

°Pumps for all years & models

°MERCEDES-BENZ Valve-body Training School

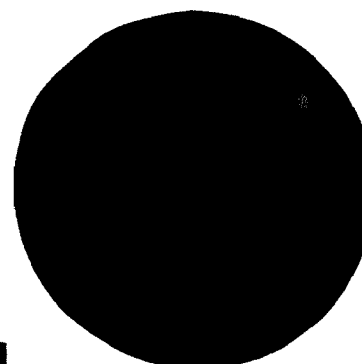
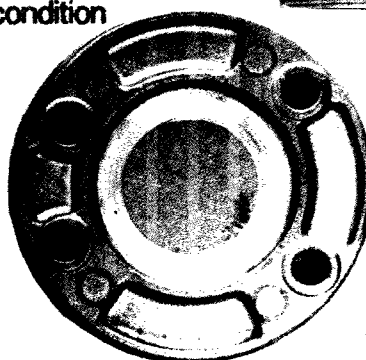
°Rebuilt & Re-Engineered Valve-bodies

°722.4 Rear Pump & Governor Retrofit Fix

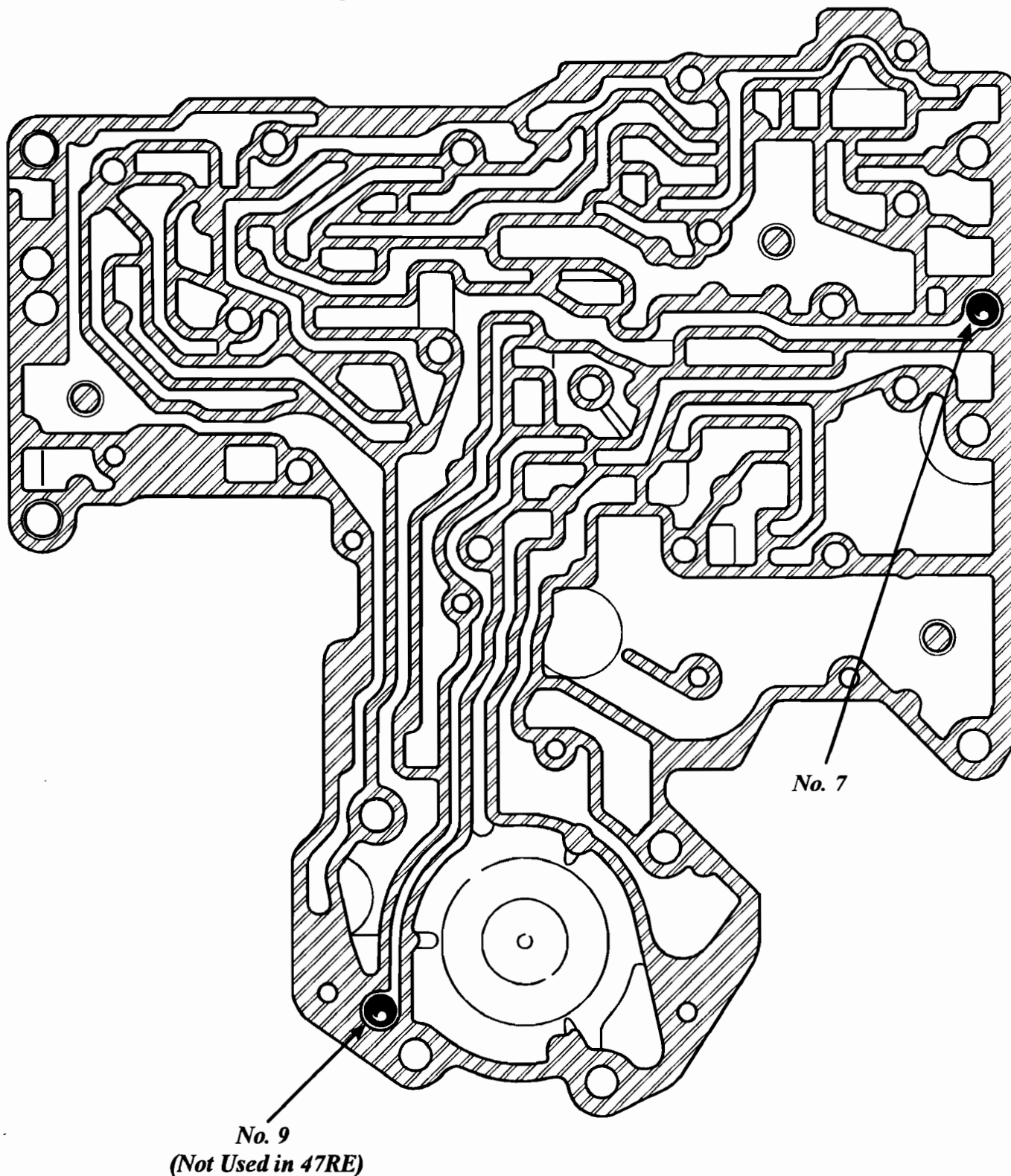
°MERCEDES BENZ hard parts 1962 to 1995

°BMW Electronic Control Test Tool & technical

°Technical Assistant in English & Spanish; German via fax
 30 Years of Re-Engineering & Fixes of German Automatic Transmissions



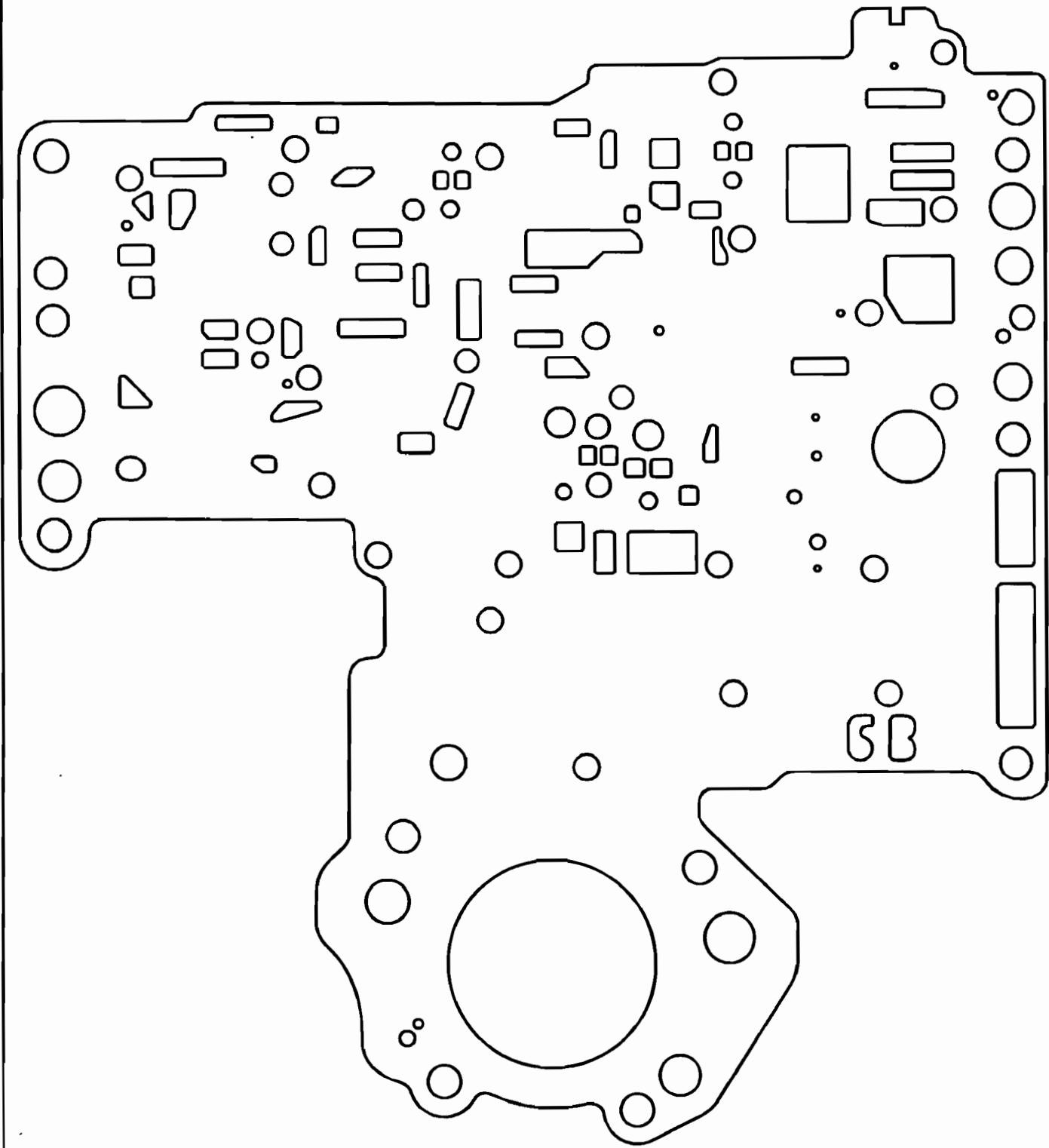
**TRANSFER PLATE "UPPER SIDE"
CHECKBALL LOCATIONS**



Copyright © 1999 ATSG

Figure 6

MAIN SPACER PLATE



Copyright © 1999 ATSG

Figure 7

SLIDE**A500/A518****NO OD**

COMPLAINT: No 3-4 shift before and after rebuild

CAUSE: ATSG and ATRA has produced bulletins addressing this complaint. A bad VSS, TPS, ECT, OD Cancel Switch, Solenoid and or Solenoid Gasket, Ignition Switch or the Park Neutral Switch are mostly the cause of a no 3-4 shift or TCC apply. But ATSG has had many incidents where early model trucks had been equipped with the incorrect SMEC directly from the factory (See Figure 1). Vehicle owners were unaware of a no 3-4 shift. After overhaul the technician know struggles to correct this condition. At some point and time the computer is determined to be defective. When the computer is replaced, it may once again be replaced with an incorrect computer. The confusion is that Ram Vans, Wagons, Pickups and Ram Chargers could have a 3 speed transmission (904, 999 or 727). They may also be equipped with a 4 speed A500 or 518. When ordering a computer, it is imperative to specify that the vehicle has a 4 speed transmission. Do not rely on engine size alone. A 1989 5.2 liter Pickup with a 3 speed would have a SMEC part number of 894379887 while the same vehicle equipped with a 4 speed will have a part number 894379889.

CORRECTION: Install the correct computer.

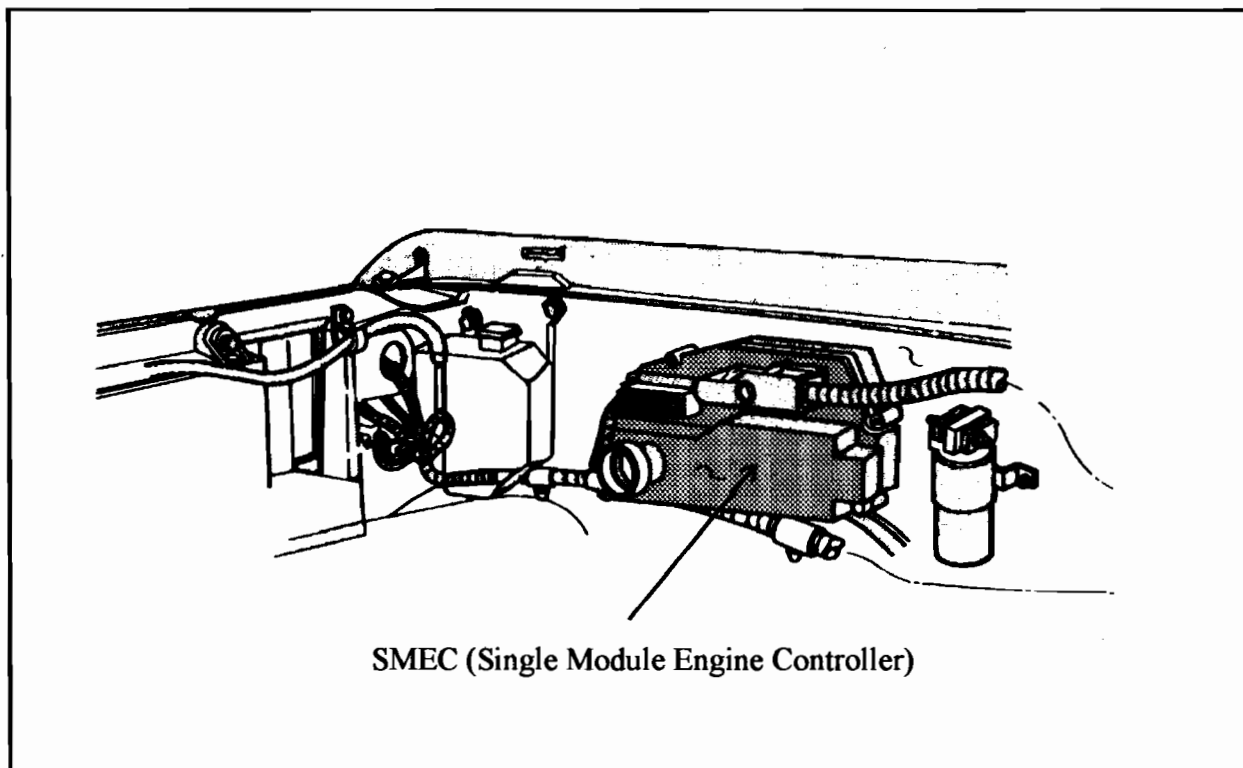


Figure 1



HONDA/ACURA
CHRONIC INTERNAL LEAKS

COMPLAINT: Transmission experiences problems such as premature clutch failure, poor shift quality or shift hunting.

CAUSE: The above mentioned complaints can be caused by internal leaks caused by damaged o ring seals, worn feed tube bushings, undersized clutch piston seals, leaking reed valves and cracked drums which can be extremely difficult to locate due to the design of Honda/Acura transmissions.
The main difficulty is in pressure checking the clutch circuits while being able to see if there is any unacceptable leakage.

CORRECTION: There is now available from Answermatic, Division of Zoom Technology, pressure test fixtures designed to pressurize clutch circuits before the transmission is completely assembled and installed in the vehicle.

The test fixtures in figures 1 and 2 illustrate how the 3rd and 4th clutch circuits can be pressure checked.

Pressure testing the 2nd clutch with the 2nd clutch test collar is shown in figure 3, the test collar is presently available for the CA; L4; P1; G4; L5 and F4 transmissions.

In figure 4 the 1st clutch test plug is shown testing the 1st clutch drum, the 1st clutch test plug is currently available for the L4; P1; CA; M24; G4; L5; F4 and RO transmissions.

These test fixtures can be used with the Answermatic VB2000 or the AMI test machines to check oil retention of these clutch circuits or wet air tests with regulated air and oil for leakage.

HONDA/ACURA
CHRONIC INTERNAL LEAKS

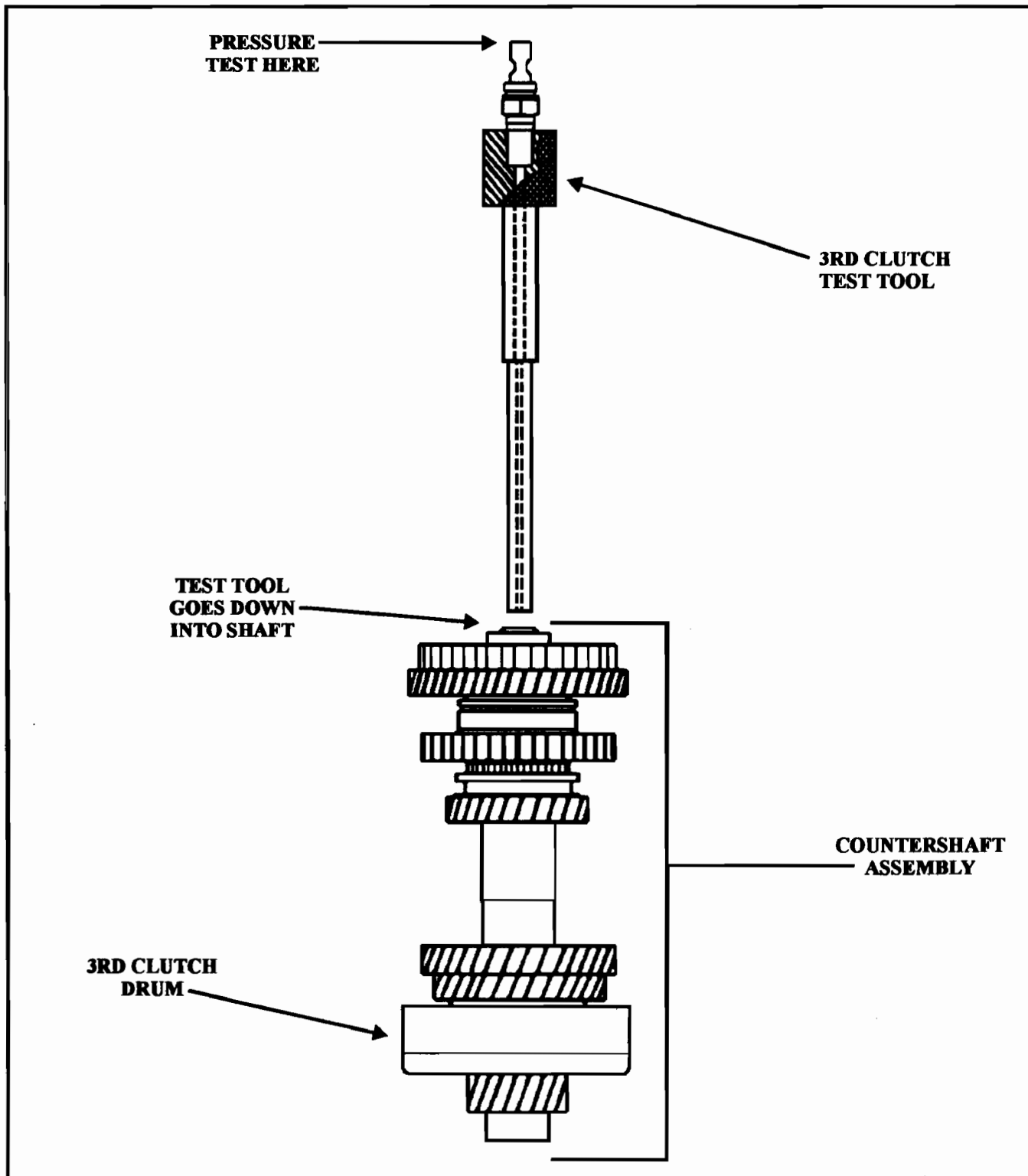


Figure 1

HONDA/ACURA
CHRONIC INTERNAL LEAKS

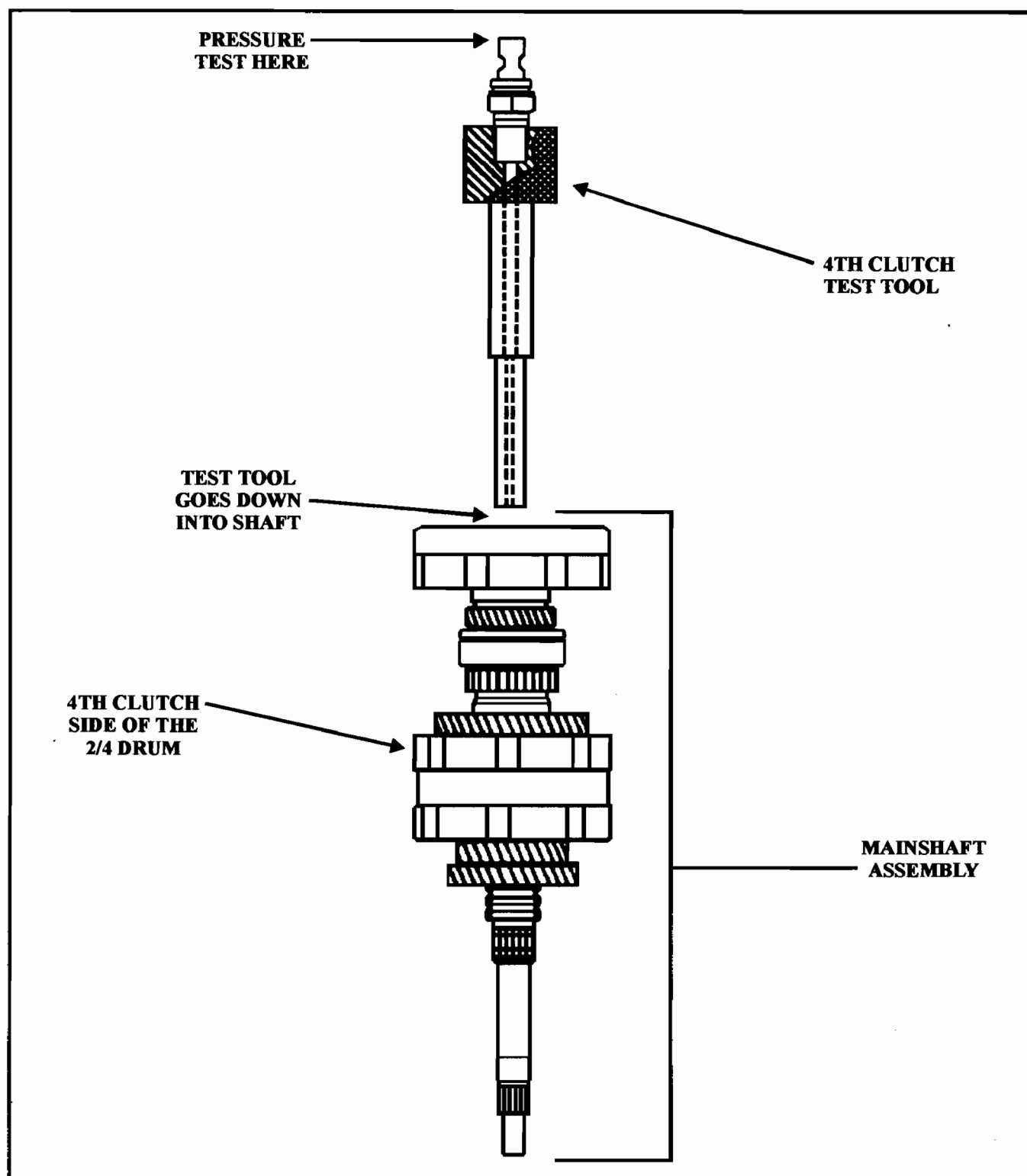


Figure 2

HONDA/ACURA
CHRONIC INTERNAL LEAKS

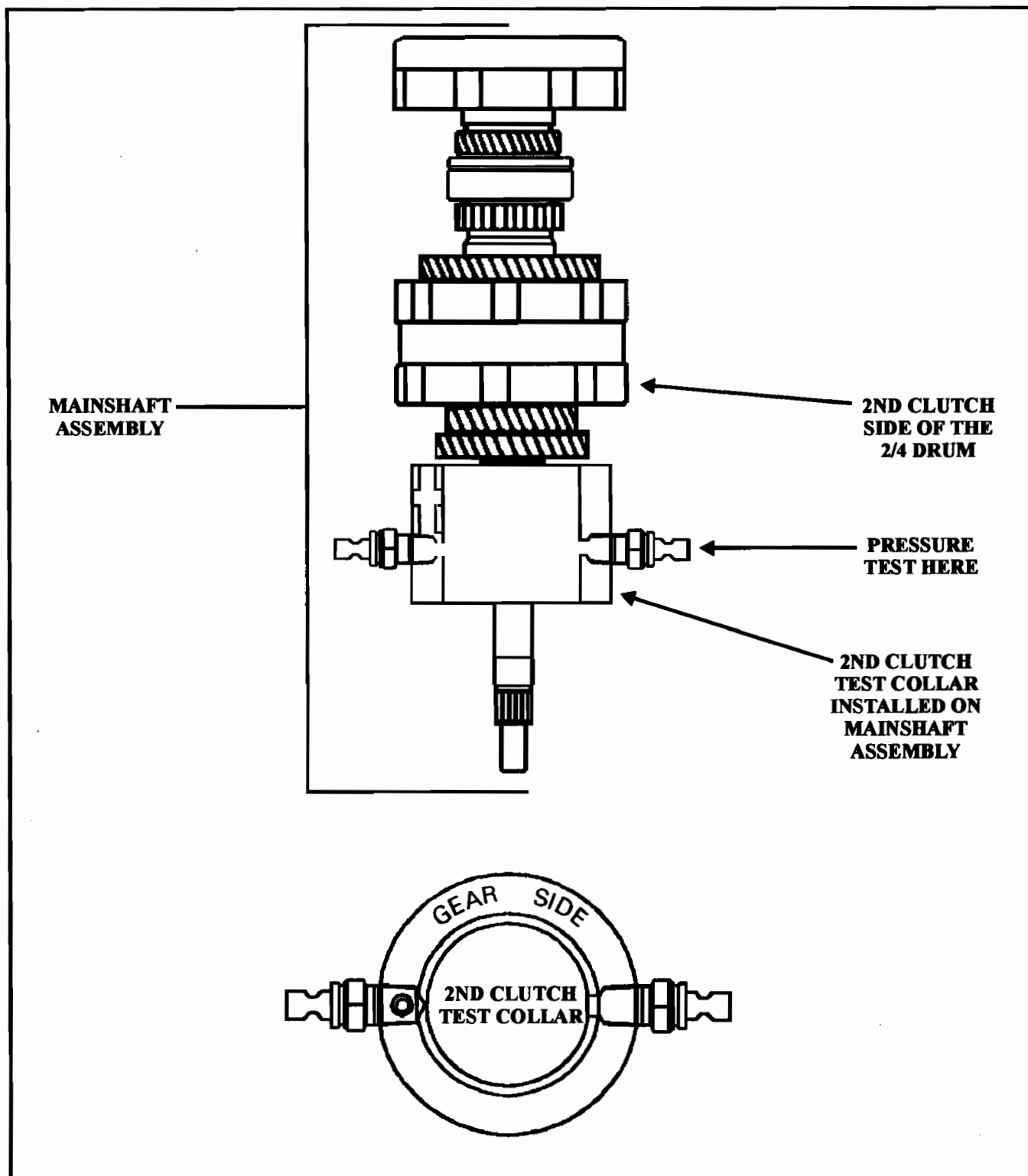


Figure 3

HONDA/ACURA
CHRONIC INTERNAL LEAKS

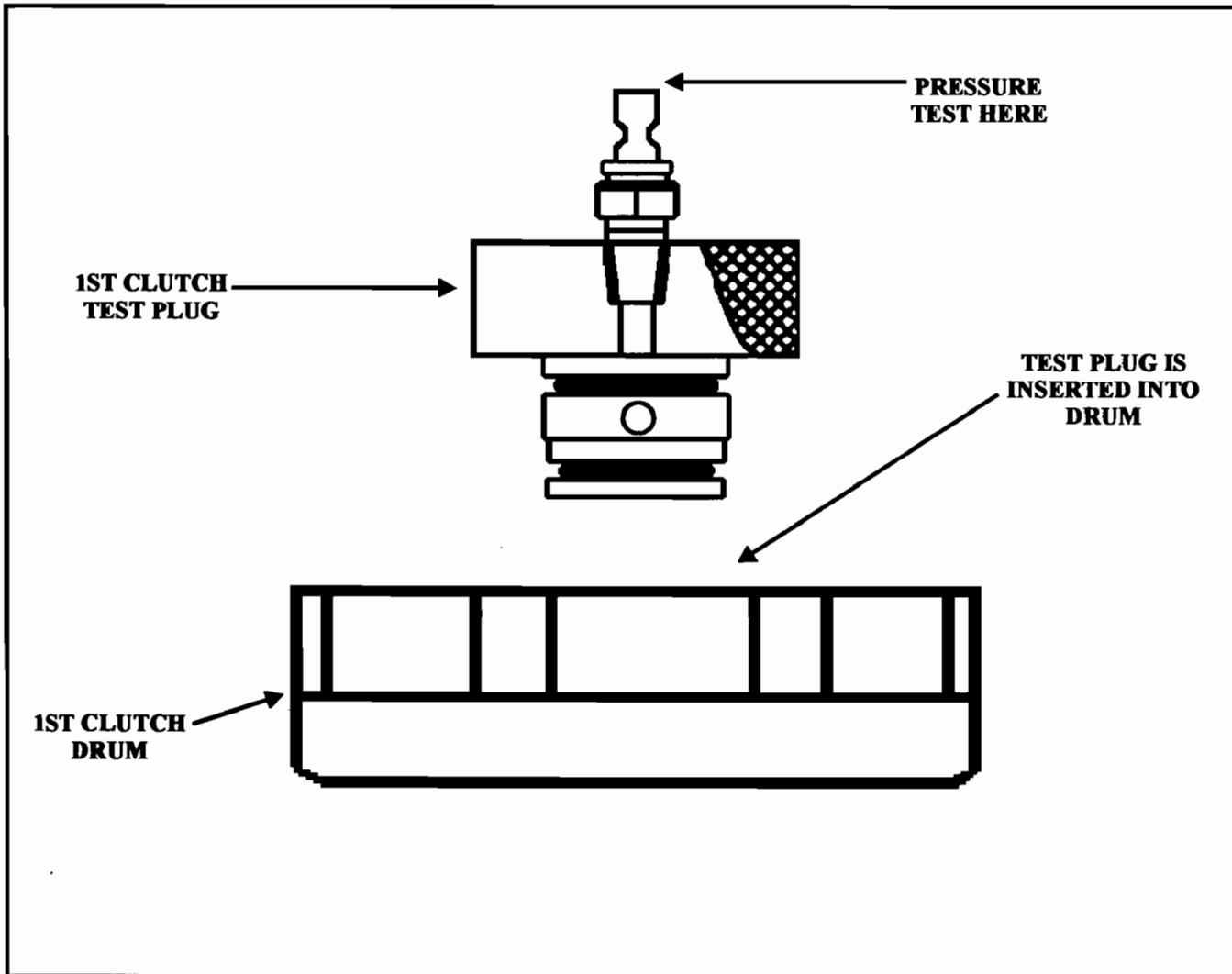


Figure 4

ZF5HP18**NO MOVE OR DELAYED ENGAGEMENT**

COMPLAINT: Vehicles equipped with ZF5HP18 may exhibit a No movement or a delayed engagement condition, before or after overhaul.

CAUSE: The cause may be, that the "Bypass Ball," located in the pump as shown in Figure 1, may have shrunken down and traveled back through the pump passage leading to the Torque Converter Valve, sticking the valve in the "stroked" position (See Figure 2). When this valve is stuck in this position it may cause the Torque Converter to drain-back after sitting for a prolonged period of time. When the vehicle is started after sitting, it may take 10 to 15 minutes for the Torque Converter to fill back up, this all depends on the positioning of the stuck Torque Converter Valve.

CORRECTION: Locate the Torque Converter Valve, as shown in Figure 3 , and free the valve up, removing the shrunken Bypass Ball from binding the valves movement. Contact **Mario Aristides Ph.# 305-666-3544 or Fax# 305-666-8238** for a replacement ball if the capsule can be removed from the pump body.

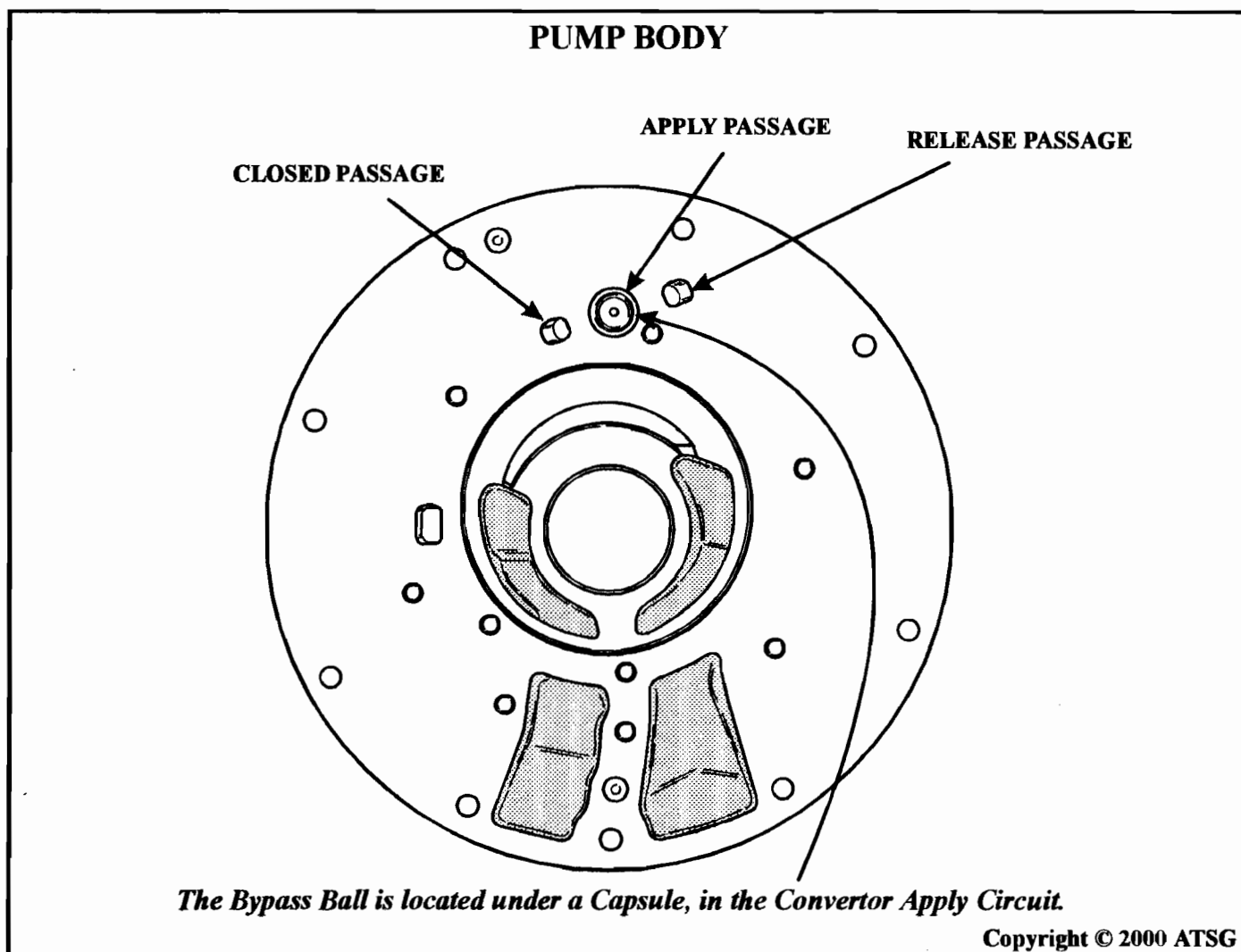
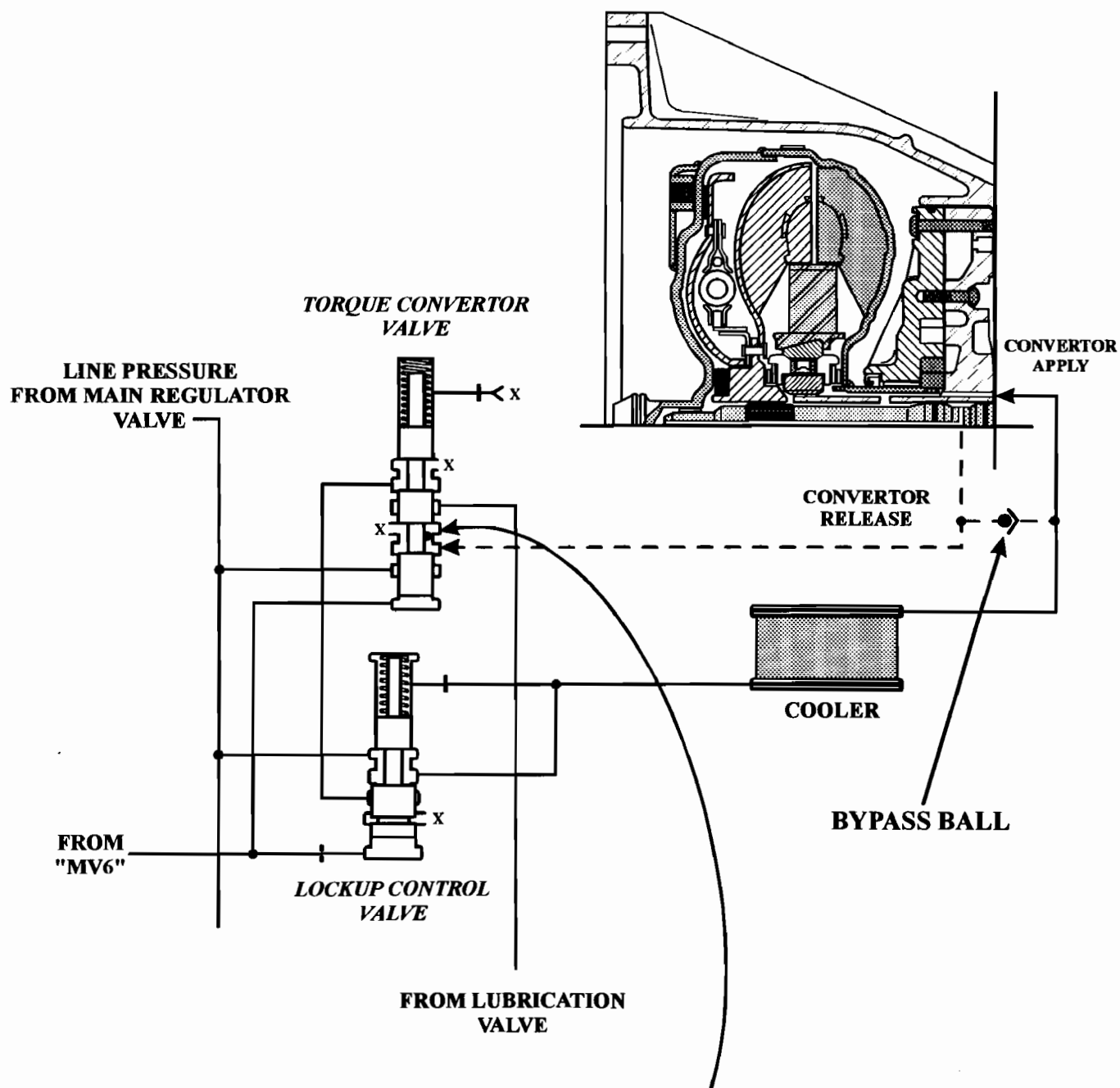


Figure 1

LOCKUP HYDRAULIC CIRCUIT

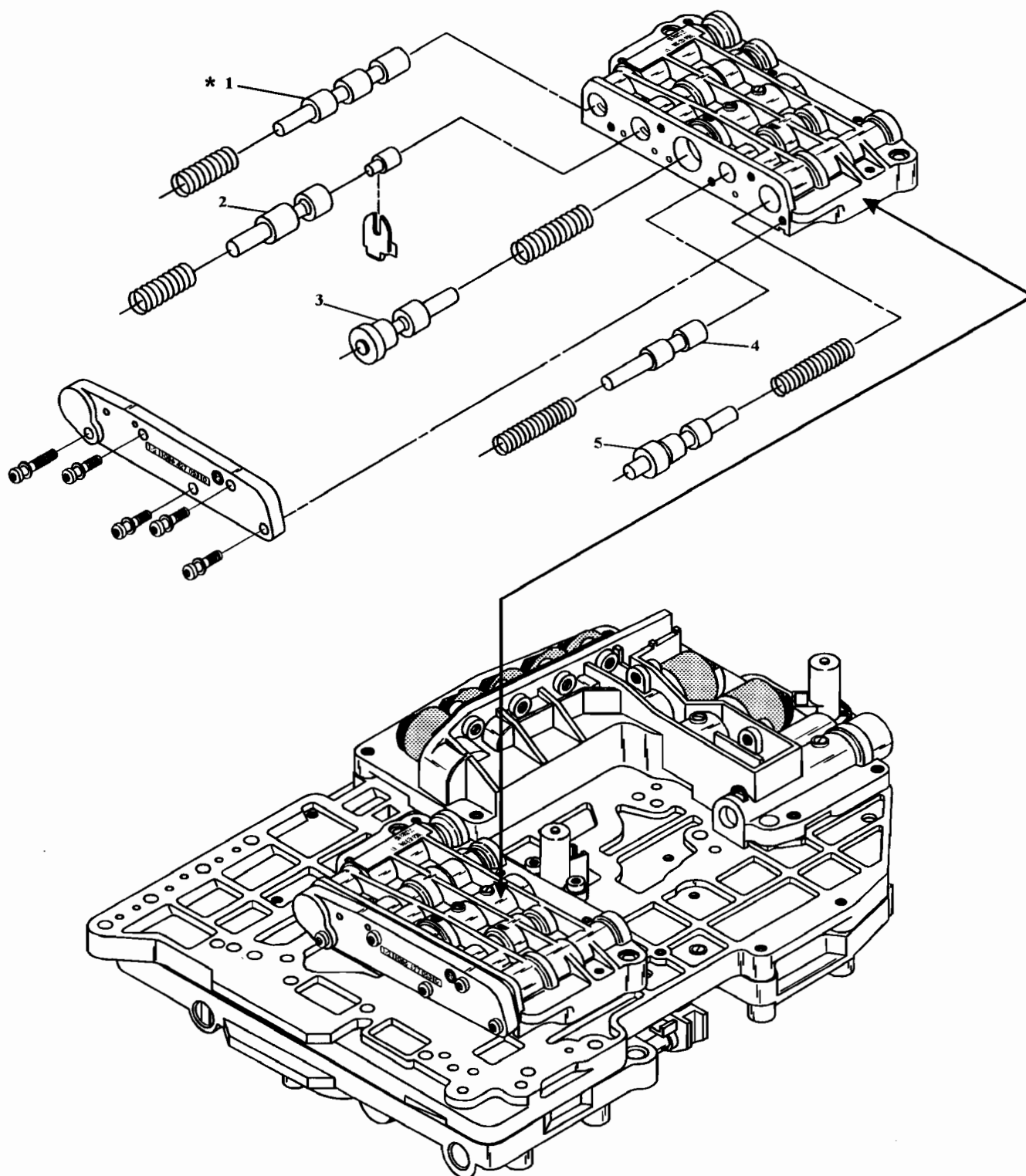


The "Bypass Ball" shrinks and travels back through to the Torque Converter Valve and lodges itself in this passage, sticking the valve in this approximate position.

Copyright © 2000 ATSG

Figure 2

UPPER FRONT VALVE BODY



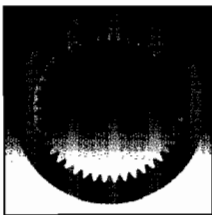
- *1. Torque Converter Valve
- 2. Lubrication Valve Train
- 3. Lock-Up Control Valve
- 4. 5-4 Traction Valve
- 5. 4-5 Traction Valve

Copyright © 2000 ATSG

Figure 3



Honda Power Solutions™



GREEN FRICTION PLATES™

Problem: Poor friction plate performance, chatter or squawk noises

PowerSolution™: Alto Green Friction
 • Plate meets or exceeds OE specifications.
 • Improves shift quality.



HONDA SMOOTH STEELS™

Problem: Poor steel plate performance, chatter or squawk noises

PowerSolution™: Smooth steel plate provides excellent shift, reduces noises and improves durability • Meets or exceeds OE specifications. • Low Ra finish provides for a smooth or polished appearance.



HONDA WAVE SPRING™

Problem: Belleville spring wears a groove in the bottom steel

PowerSolution™: Alto Wave Spring™ eliminates the groove wear in the bottom steel. • Allows for the apply piston to be reused and prevents comebacks.

PowerBand™



Problem: Limited holding capacity

PowerSolution™: Increased band width provides 18% more holding power.
 • No drum modifications required.
 • Available in Red Eagle® Hi-Performance.

Transmission: TH700-R4

PowerPacks™

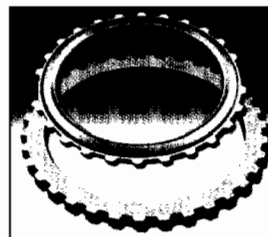


Problem: Insufficient clutch capacity

PowerSolution™: Increase the clutch capacity for improved performance. • Additional clutch plates are added to the drum allowing energy to be distributed over more surface. • Reduces heat, eliminates clutch plate stress, improves shift feel.

Transmission: Powerglide, 4L60, 4T60, TH400, C6/E4OD, AOD, AOD-E, A4LD and ZF

Pressure Plates



- Pressure plates and wave springs available for many transmissions.
- Ensures proper clutch clearance.

ALTO Products Corp.

Shift . . . Your Thinking

One Alto Way • Post Office Box 1088 • Atmore, AL 36504 • www.altoUSA.com • email: sales@altoUSA.com
 (334) 368-7777 • (334) 368-7774 fax



"2000" SEMINAR INFORMATION
VIDEO

23

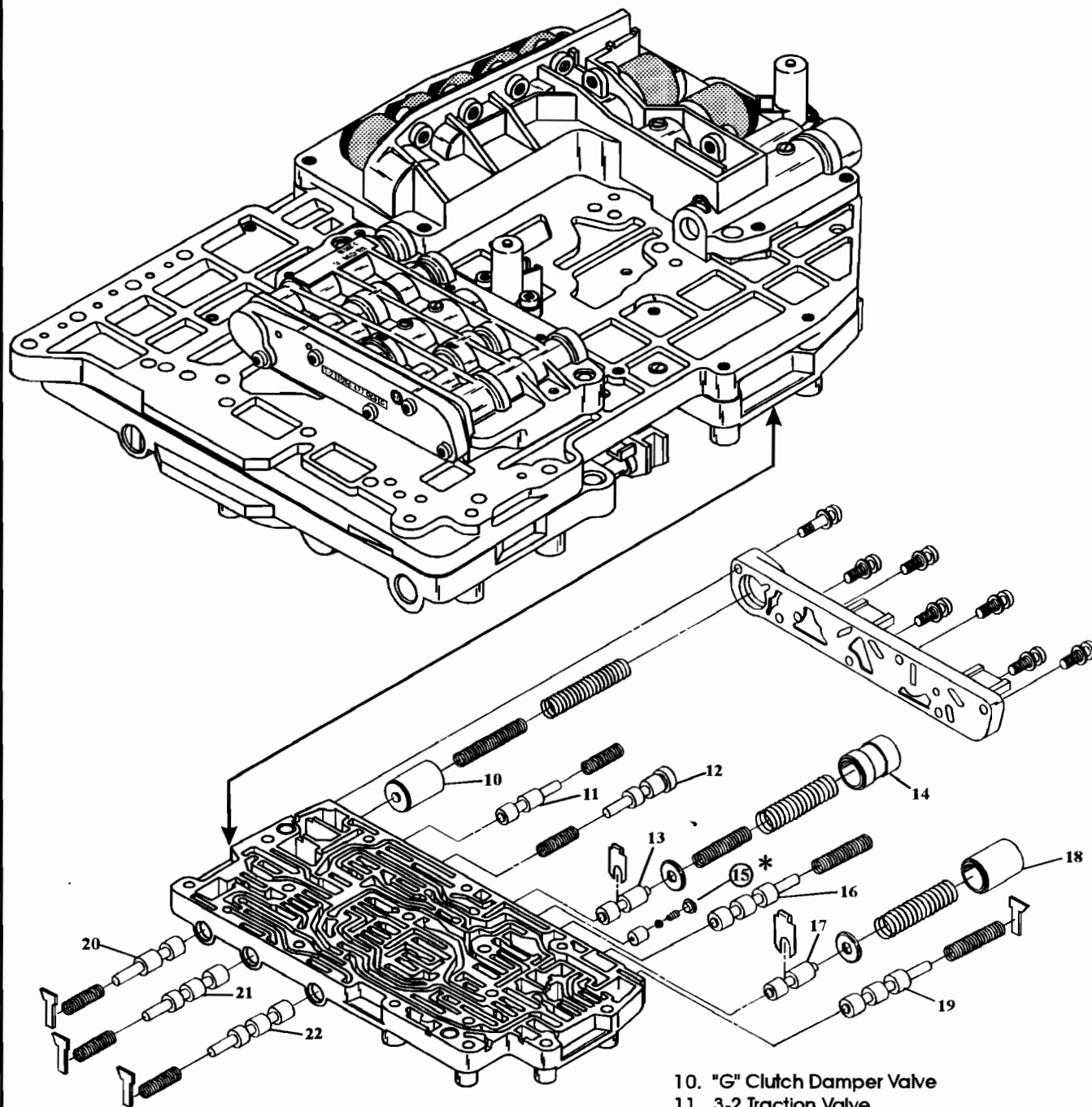
ZF5HP18
BIND-UP IN
MANUAL "2" POSITION 1st GEAR

COMPLAINT: Before or after overhaul, vehicles equipped with ZF5HP18, may exhibit a binding condition in the Manual "2" position, 1st gear.

CAUSE: The cause may be, the plastic "D" Clutch One-way Check Valve assembly located in the Lower Rear valve body, shown in Figure 1, may be broken allowing the "B" Clutch (Reverse Input Clutch) to be on while the "D" Clutch (Low / Reverse Clutch) is on in 1st gear.

CORRECTION: Replace the "D" Clutch One-way Check Valve assembly , as shown in Figure 2, with a new "Alluminum" check valve assembly offered by *Mario Aristides. Ph.# 305-666-3544 or Fax# 305-666-8238.*

LOWER REAR VALVE BODY



- 10. "G" Clutch Damper Valve
- 11. 3-2 Traction Valve
- 12. 2-3 Traction Valve
- 13. "D" Clutch Accumulator Regulator Valve
- 14. "D" Clutch Damper Valve
- * 15. "D" Clutch One-Way Check Valve Assembly
- 16. Reverse Lock-Out Valve
- 17. "F" Clutch Accumulator Regulator Valve
- 18. "F" Clutch Damper Valve
- 19. Shift Valve Number 2
- 20. Pressure Reduction Valve For MV 1 thru MV 6
- 21. Traction Coast Valve Number 2
- 22. Traction Coast Valve Number 1

Copyright © 2000 ATSG

Figure 1

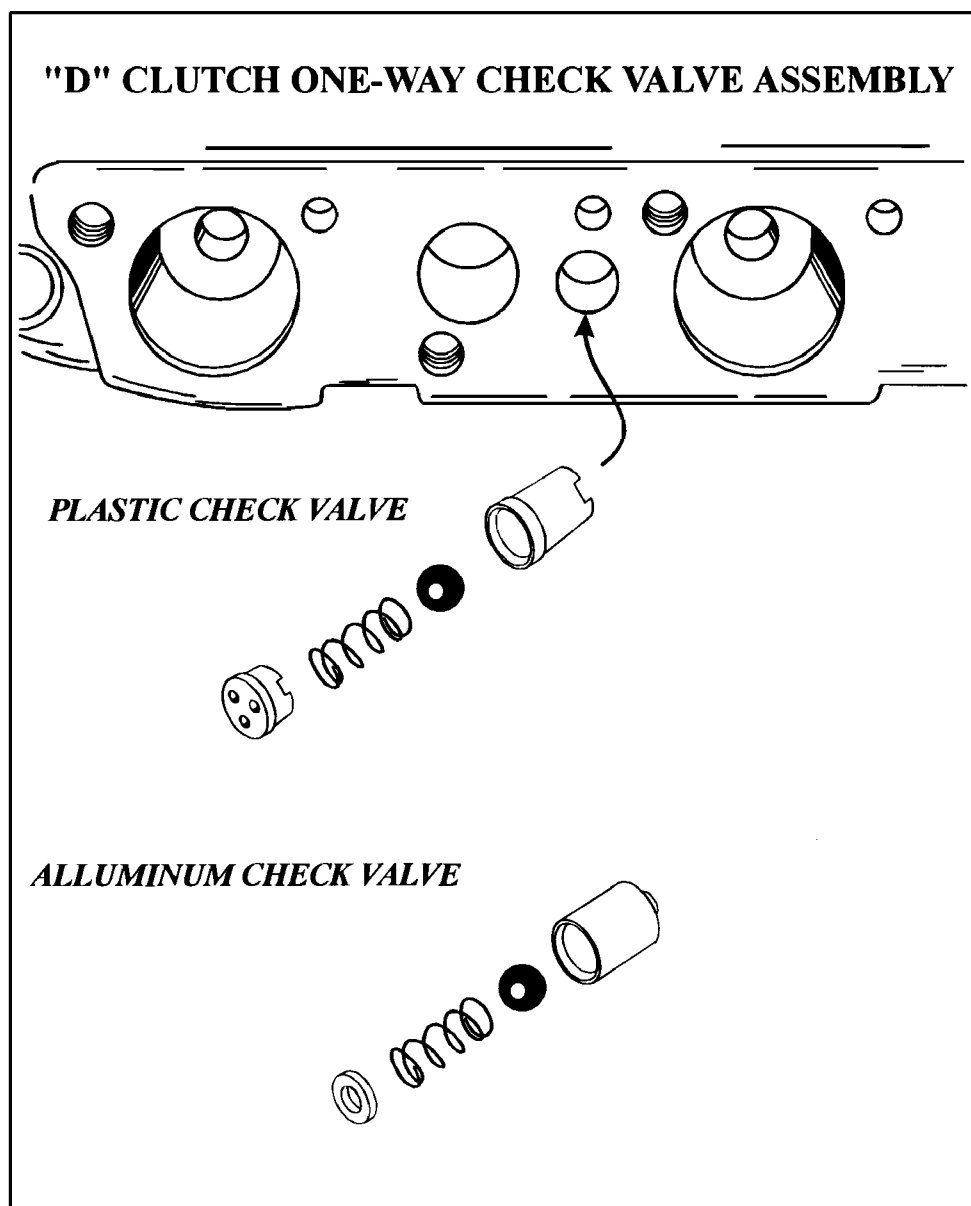
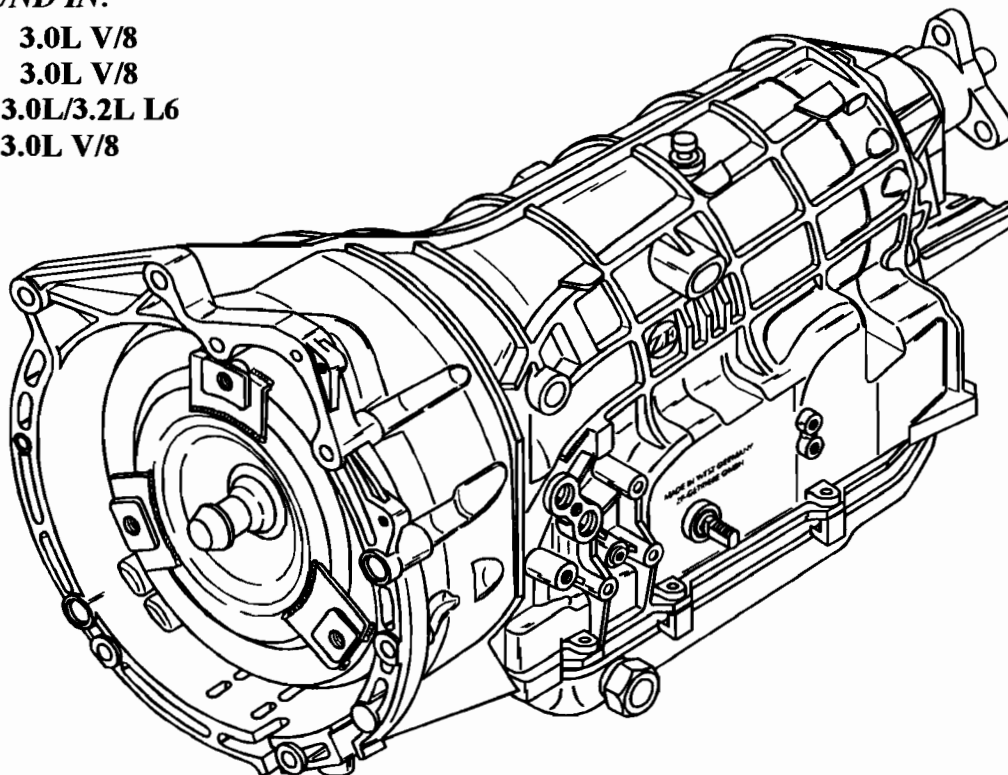


Figure 2

BMW ZF-5HP-18 PRELIMINARY INFORMATION

FOUND IN:

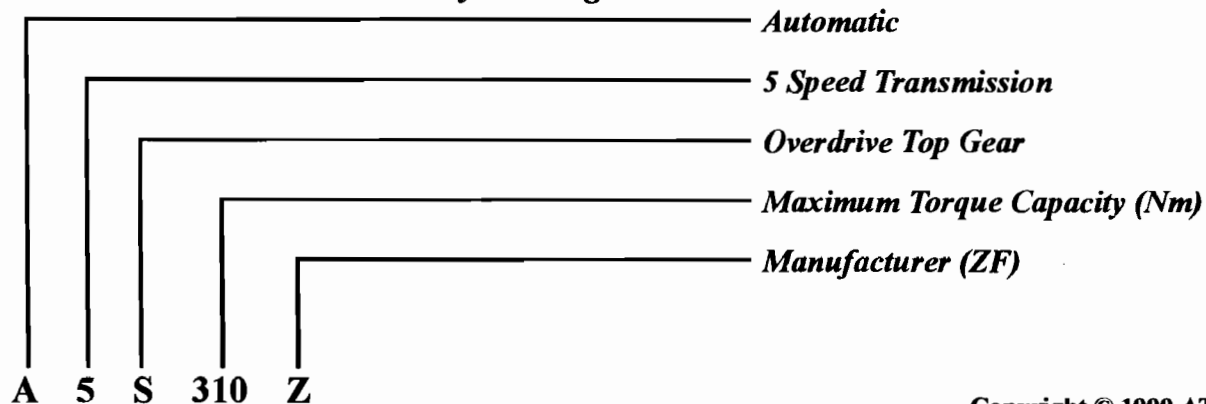
93-94 320i 3.0L V/8
93-95 530i 3.0L V/8
95-98 M3 3.0L/3.2L L6
730 3.0L V/8



This transmission is manufactured in Germany by ZF and carries the BMW designation A5S 310Z.

The A5S 310Z (ZF-5HP-18) is an electronically controlled, five speed automatic transmission with a lock-up clutch type torque converter. Two planetary gear sets, one Ravigneaux gear set and one standard planetary gear set on the output side, four rotating multiple disc clutches, three multiple disc brake clutches, one brake band, and two sprag clutches (Freewheels) are used to provide the five forward speeds and reverse.

Key to designation:



Copyright © 1999 ATSG

Figure 1



"2000" SEMINAR INFORMATION

SLIDE

27

Refer to Figure 2 for Clutch and Band Application Chart.

Refer to Figure 3 for Manual Shift Lever Operation, Mode Switch Operation and location, and Failsafe Operation.

Refer to Figure 4 for both MV Solenoid Operation and EDS Solenoid Operation and Tests.

Refer to Figure 5 for Shift Solenoid Application chart and their locations. Notice that the MV 6 Solenoid is used only for Converter Clutch application and that it is identified by a White connector on the solenoid, where all the others are Black. Notice also that EDS 1 Solenoid is used for line pressure control. MV 4 and MV 5 Solenoids are used only for downshifts.

Refer to Figure 6 for wiring harness identification, internal wiring schematic, and transmission case connector pin identification and functions.

Refer to Figure 7 for identification and internal components resistance chart.

Refer to Figure 8 and 9 for retrieving trouble codes and the Trouble Code charts.

Refer to Figure 10 for Solenoid and Sensor resistance chart with the pins identified for both the case connector and the Transmission Control Unit connector.

Refer to Figure 11 for case passage identification to air check this unit before installation of the valve body assembly.

Refer to Figure 12 for pressure tap locations on the case, and notice that some cases you must drill and tap for access to a particular pressure.

Refer to Figure 13 for exploded view of the Upper Front Valve Body with valves identified.

Refer to Figure 14 for speed sensor locations on the channel plate.

Refer to Figure 15 for exploded view of the Solenoid Valve Body with valves identified. Notice that there is an "O" ring on the adjustment screw that goes in the groove.

Refer to Figure 16 for exploded view of the Lower Rear Valve Body with the valves identified.

Refer to Figure 17 for exploded view of the Lower Front Valve Body with the valves identified.

Refer to Figures 18 thru 21 for the retaining clip locations in the various valve bodies.

Refer to Figure 22 for the locations of the orifices, checkballs, screens, and the check valves and springs that are located in the channel plate.

Raybestos
Best in Clutches

*Real Cars,
Real People*

Main Street

Pride Ave



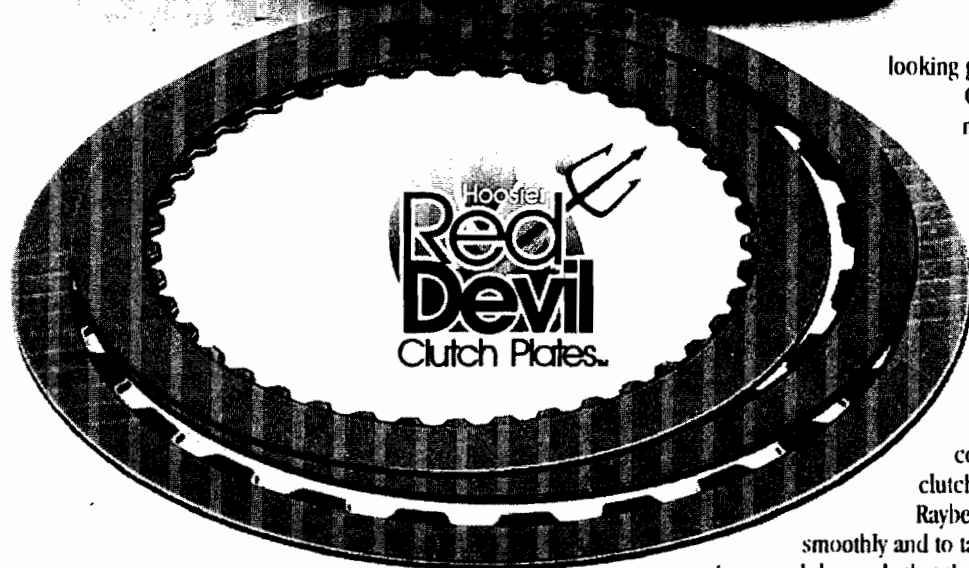
Raybestos Application Engineer Chris Horbach is more than a little particular about his pickup. His beautiful Ford SVT 2751P Lightning is a limited edition - one of only 5,276 made. However, looking good is only half the story.

Chris outfitted "The Lightning" with Raybestos' new E40D Intermediate Red Devil™ Clutches and Raybestos' aTs® Advanced Technology Forward and Direct Clutches. It was one of the first vehicles used to evaluate the shift feel and durability of the Red Devils™ in actual service.

Chris could feel the superior shifting qualities of the Red Devils™, and as a Raybestos engineer, he has the data to back that up. For example, using Ford Mercon® fluid, dyno tests show a more consistent relationship between dynamic and static frictions, resulting in a more consistent shift that beats the competition's "red" clutches.

Raybestos Red Devil™ Clutches are designed to shift

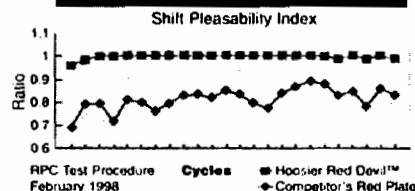
smoothly and to take the increased demands that the OE manufacturers are planning for the future. Give your rebuild performance for tomorrow, and the confidence of durability for everyday use today. Just ask Chris at 800-RAY-PROD!



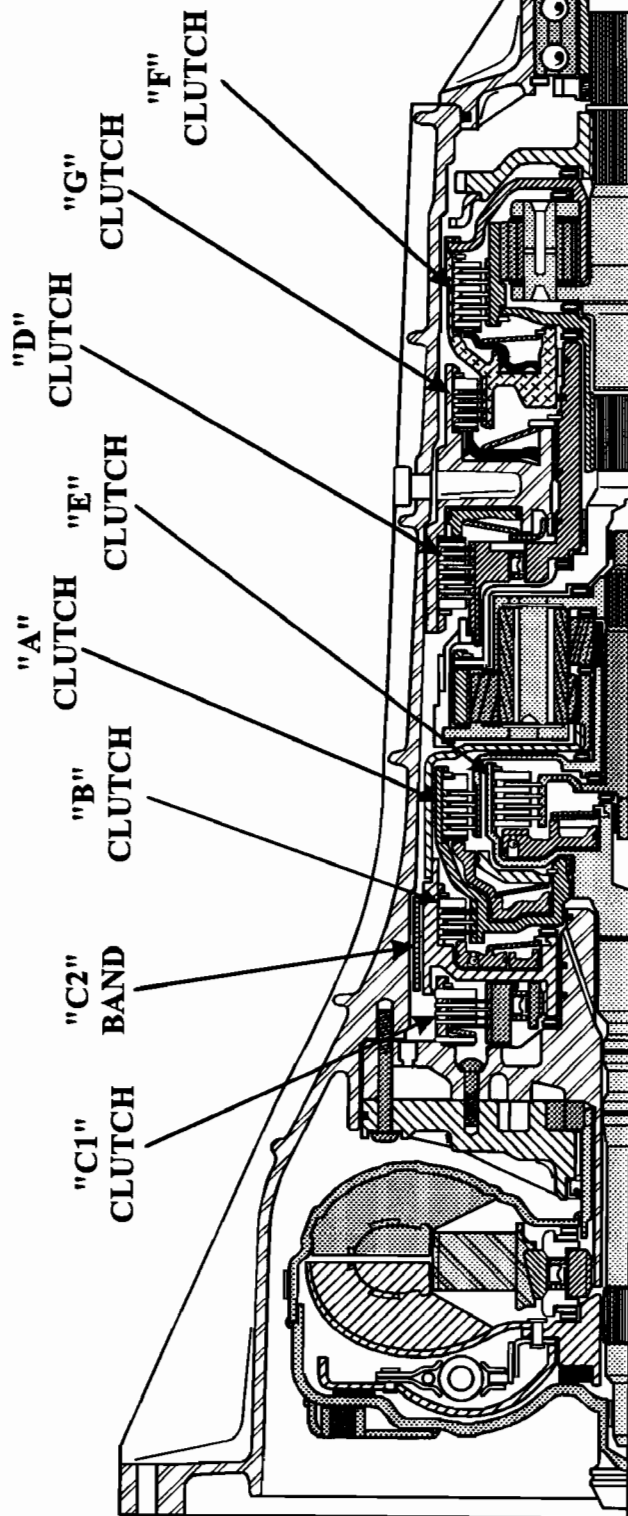
Raybestos
AFTERMARKET PRODUCTS COMPANY

© 1999, Raybestos Aftermarket Products Company
964 East Market Street, Crawfordsville, IN 47933

Red Devil™ Clutches



CLUTCH AND BAND APPLICATION CHART



RANGE	"A" CLUT	"B" CLUT	"C1" CLUT	"C2" BAND	"INT" SPRAG	"D" CLUT	"LOW" SPRAG	"E" CLUT	"F" CLUT	"G" CLUT	CONV CLUT	GEAR RATIO
Park										ON		
Reverse		ON				ON				ON		4.08
Neutral										ON		
"D"-1st	ON						HOLD			ON		3.66
"D"-2nd	ON		ON	ON	HOLD					ON		1.99
"D"-3rd	ON		ON	ON	HOLD				ON		*	1.40
"D"-4th	ON		ON					ON	ON		*	1.00
"D"-5th			ON	ON				ON	ON		*	0.74
"4"	Same as above, Automatic Shift 1st thru 4th, 5th gear is inhibited.											
"3"	Same as above, Automatic Shift 1st thru 3rd, 4th and 5th gear are inhibited.											
"2"	Same as above, Automatic Shift 1st thru 2nd, 3rd, 4th and 5th gear are inhibited.											

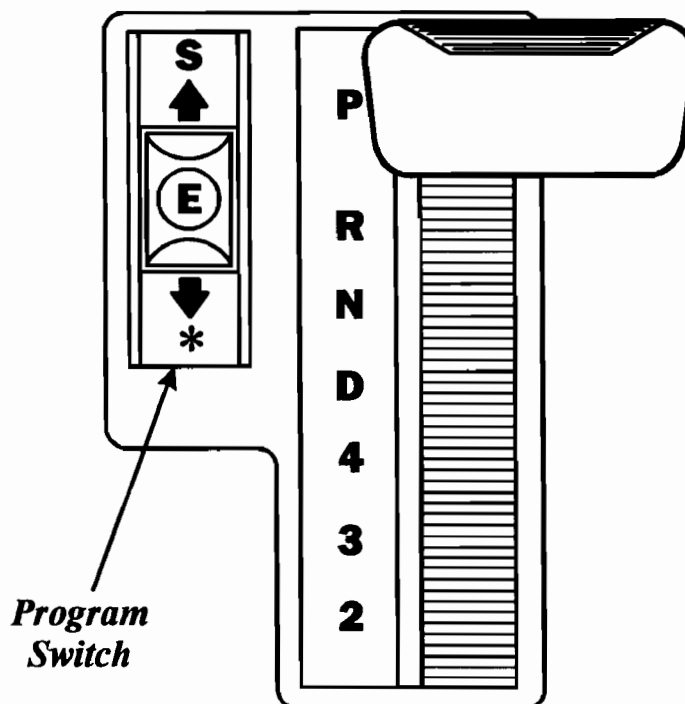
* Converter Clutch may be ON or OFF depending on vehicle speed and throttle position.

Copyright © 1999 ATSG

Figure 2

SELECTOR LEVER

- P** = Park
- R** = Reverse
- N** = Neutral
- D** = Automatic Shift 1st thru 5th gear.
- 4** = Automatic Shift 1st thru 4th gear.
5th gear is locked out.
- 3** = Automatic Shift 1st thru 3th gear.
4th and 5th gear are locked out.
- 2** = Automatic Shift 1st thru 2th gear.
3rd, 4th and 5th gear are locked out.



The "Program Switch" can be used to select one of three programs.

E = *ECONOMY* (Fuel Efficient Driving Style)

The "E" program is activated every time the engine is started. Once the engine has been started, either Sport or Winter programs can be selected with the Program Switch. The transmission changes automatically from 1st thru 5th gear in any throttle position up to full throttle. When throttle position is in the kick-down range, the transmission changes automatically from 1st thru 4th gears. The change into 5th gear is a forced upshift and occurs just before engine speed reaches the upper limit for controlled cut-back.

S = *SPORT* (Full Exploitation of Engine Performance)

The "S" program is performance oriented and must be re-selected every time the engine is started. The transmission changes automatically from 1st thru 4th gear regardless of throttle position. The change into 5th gear is a forced upshift and occurs just before engine speed reaches the upper limit for controlled cut-back.

***** = *WINTER* (Manual Shifts)

The "Winter" program provides manual shifts and is designed for situations of driving on snow or ice, driving on mountain roads or towing a trailer. The driver has the same free choice of gears as with a manual transmission, as the transmission remains in the gear selected with the selector lever. This makes it possible to utilize the engines full braking power. The transmission never changes into 1st or 5th gears in the "Winter" mode.

FAILSAFE OPERATION:

When a system fault is detected which would impair normal reliable operation, the transmission control module interrupts the power supply to Pin 13 at the transmission case connector. The transmission control module also alerts the driver of any faults by signaling the vehicles "Check Control" system. To enable the vehicle to be driven to a repair shop, the following manual gear selections are permitted:

<i>Selector Lever Position</i>	P	R	N	D	4	3	2
<i>Actual Gear Obtained</i>	P	R	N	4	4	4	4

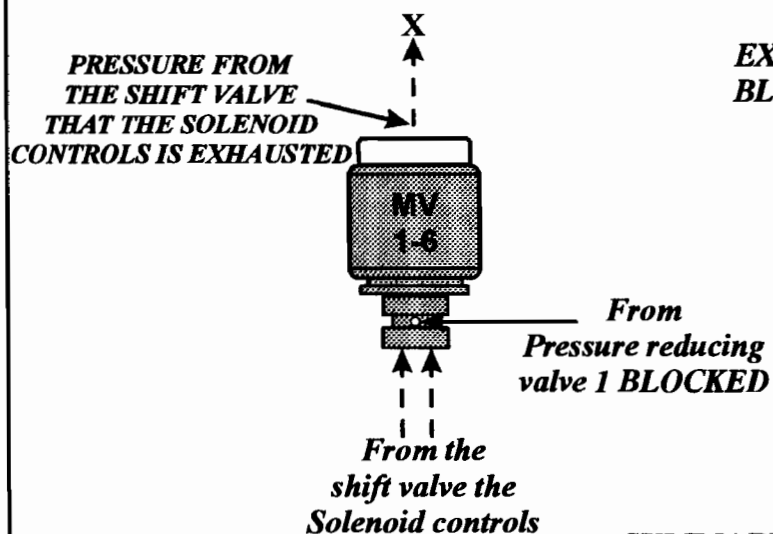
Copyright © 1999 ATSG

Figure 3

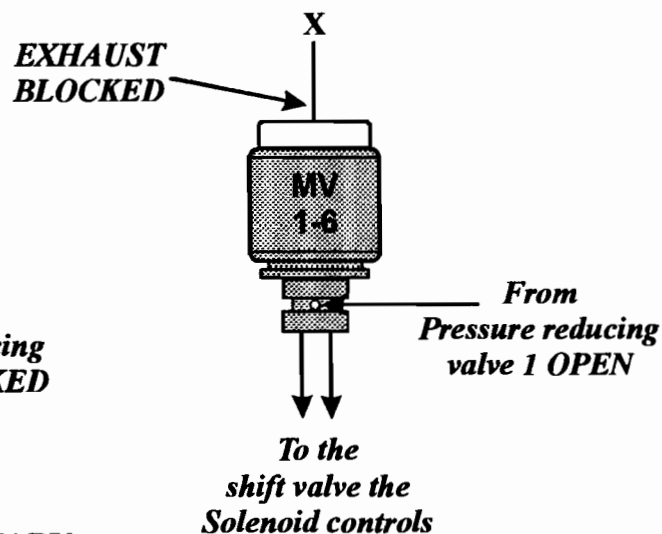
SLIDE

MV1-MV6

SOLENOID "OFF"



SOLENOID "ON"



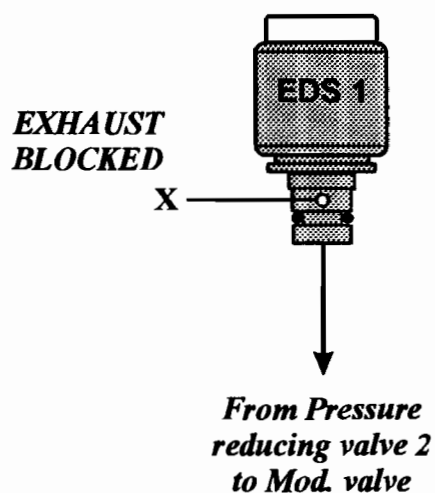
SUMMARY:

When MV 1 thru 6 is in the "OFF" state, Solenoid reducing pressure, from Pressure reducing valve 1, is blocked by the solenoid and oil pressure from the valve that the solenoid controls is exhausted at the rear of the solenoid.

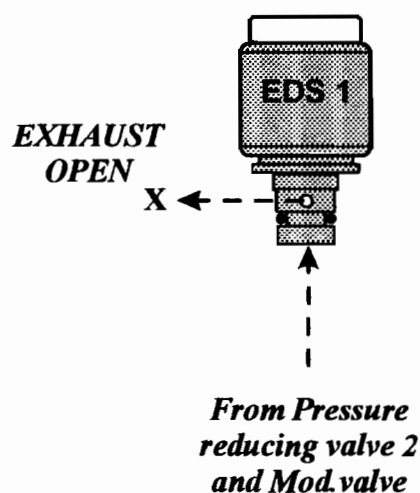
When MV 1 thru 6 is in the "ON" state, Solenoid reducing pressure, from Pressure reducing valve 1, is open through the solenoid and is applied to the valve that the solenoid controls. The exhaust at the rear of the solenoid is closed.

EDS 1

SOLENOID "OFF"



SOLENOID "ON"



SUMMARY:

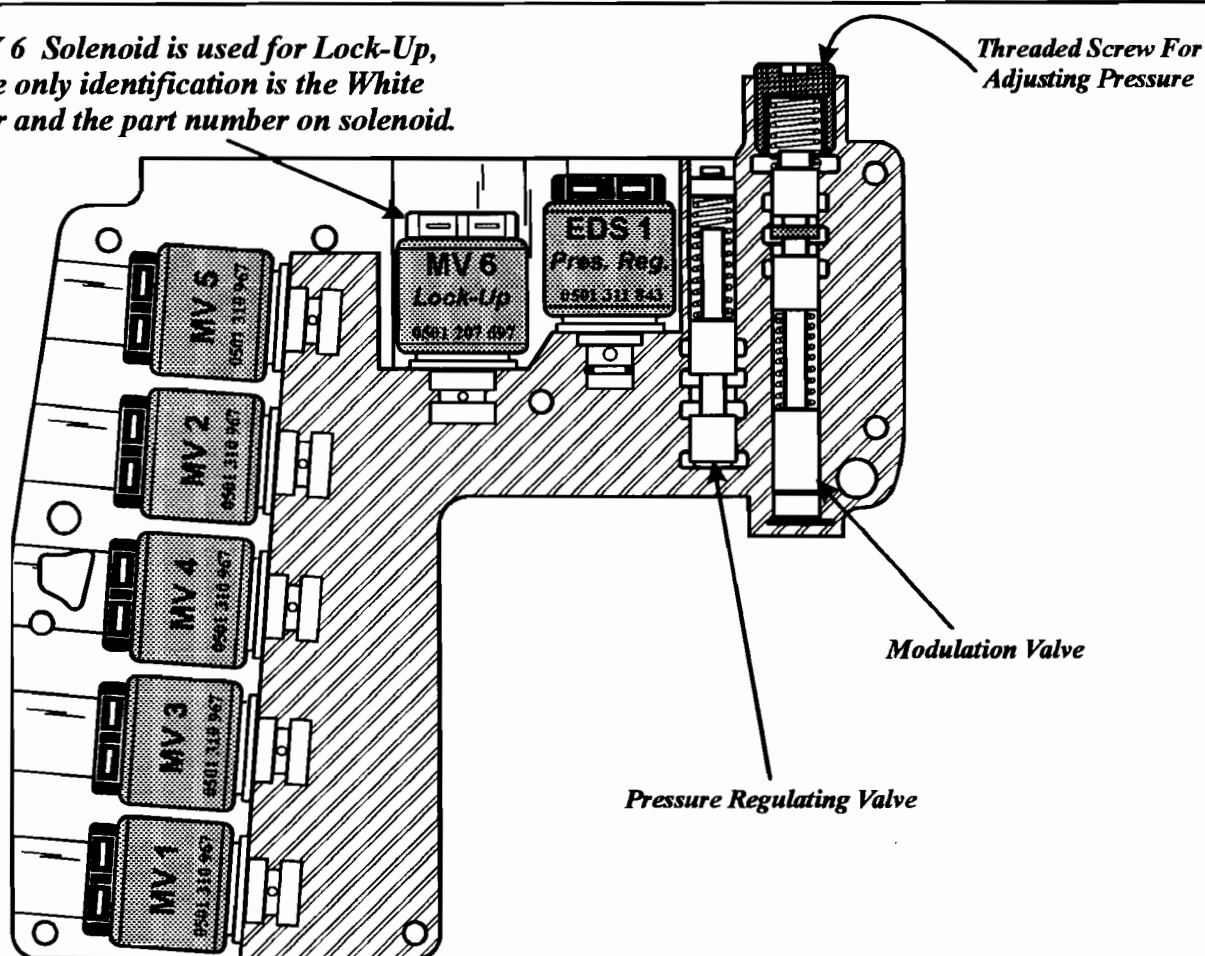
When EDS 1 solenoid is "OFF," solenoid reducing pressure, from Pressure reducing valve 2, is high to the Modulating valve which creates high line pressure.

When EDS 1 solenoid is "ON," solenoid reducing pressure, from Pressure reducing valve 2, is low to the Modulating valve which creates low line pressure.

Copyright © 1999 ATSG

Figure 4

The MV 6 Solenoid is used for Lock-Up, and the only identification is the White connector and the part number on solenoid.



RANGE	SHIFT SOLENOID APPLICATION CHART							RATIO
	MV 1	MV 2	MV 3	MV 4	MV 5	MV 6	EDS 1	
Park	ON	ON	ON				**	
Reverse	ON	ON					**	4.08
Neutral	ON	ON	ON				**	
"D"-1st	ON	ON	ON				**	3.66
"D"-2nd		ON	ON				**	1.99
"D"-3rd			ON			*	**	1.40
"D"-4th						*	**	1.00
"D"-5th	ON					*	**	0.74
"D", 3-2				ON			**	
"D", 5-4					ON		**	
"Failsafe"	OFF	OFF	OFF	OFF	OFF	OFF	OFF	1.00

* Converter Clutch may be ON or OFF depending on vehicle speed and throttle position.

** Line Pressure is Modulating, depending on vehicle speed and throttle position.

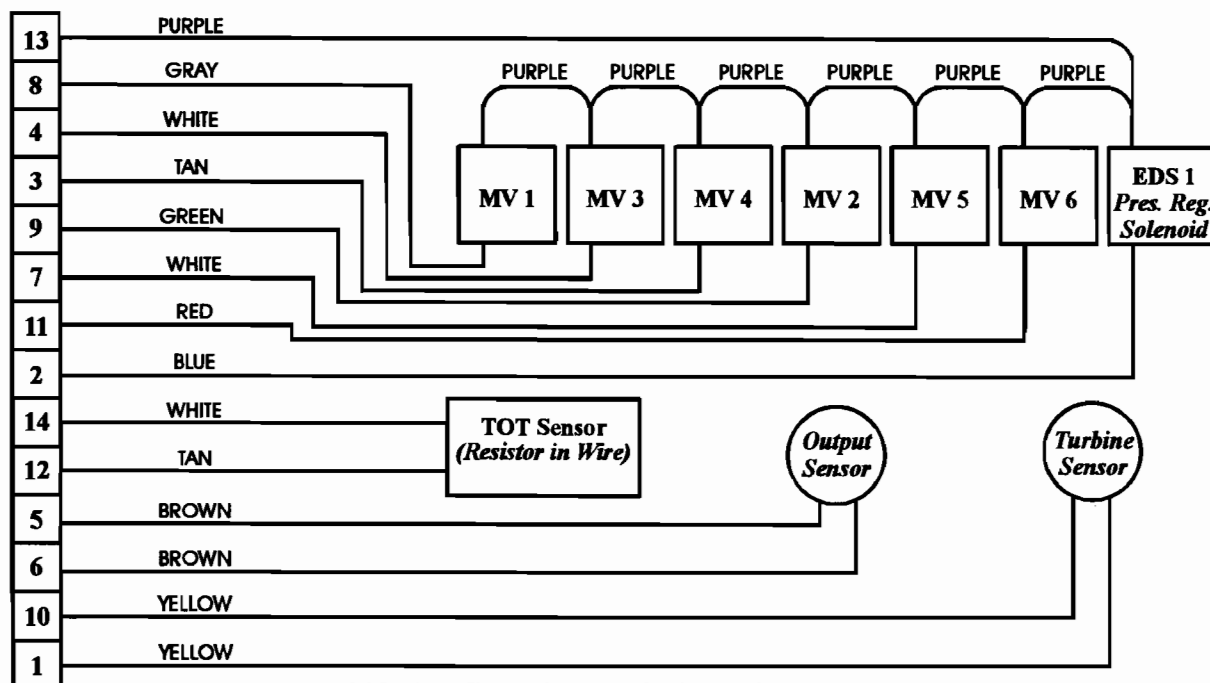
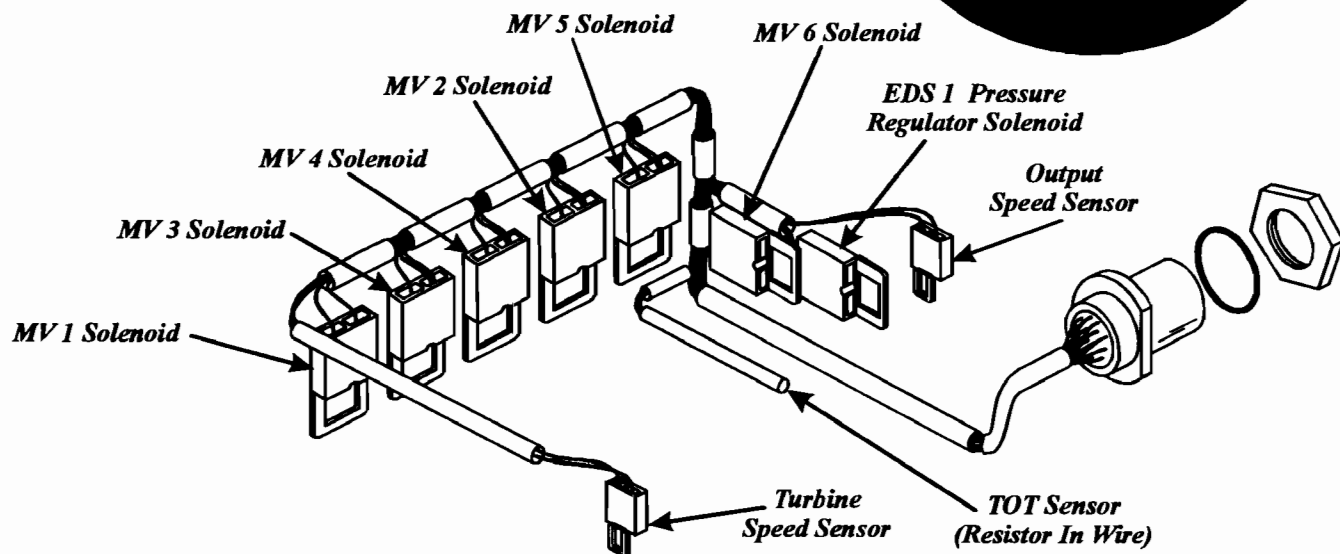
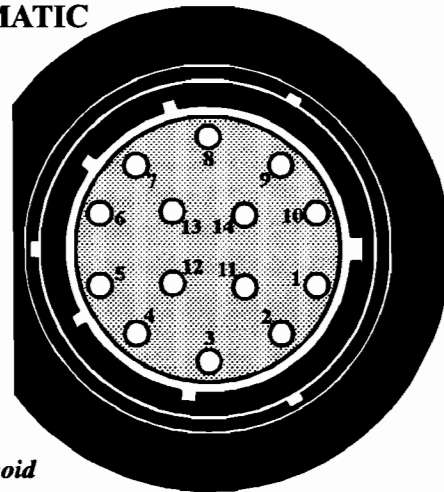
Note: MV 4 and MV 5 are used only on downshifts.

Copyright © 1999 ATSG

Figure 5

ZF-5HP-18 INTERNAL WIRE SCHEMATIC

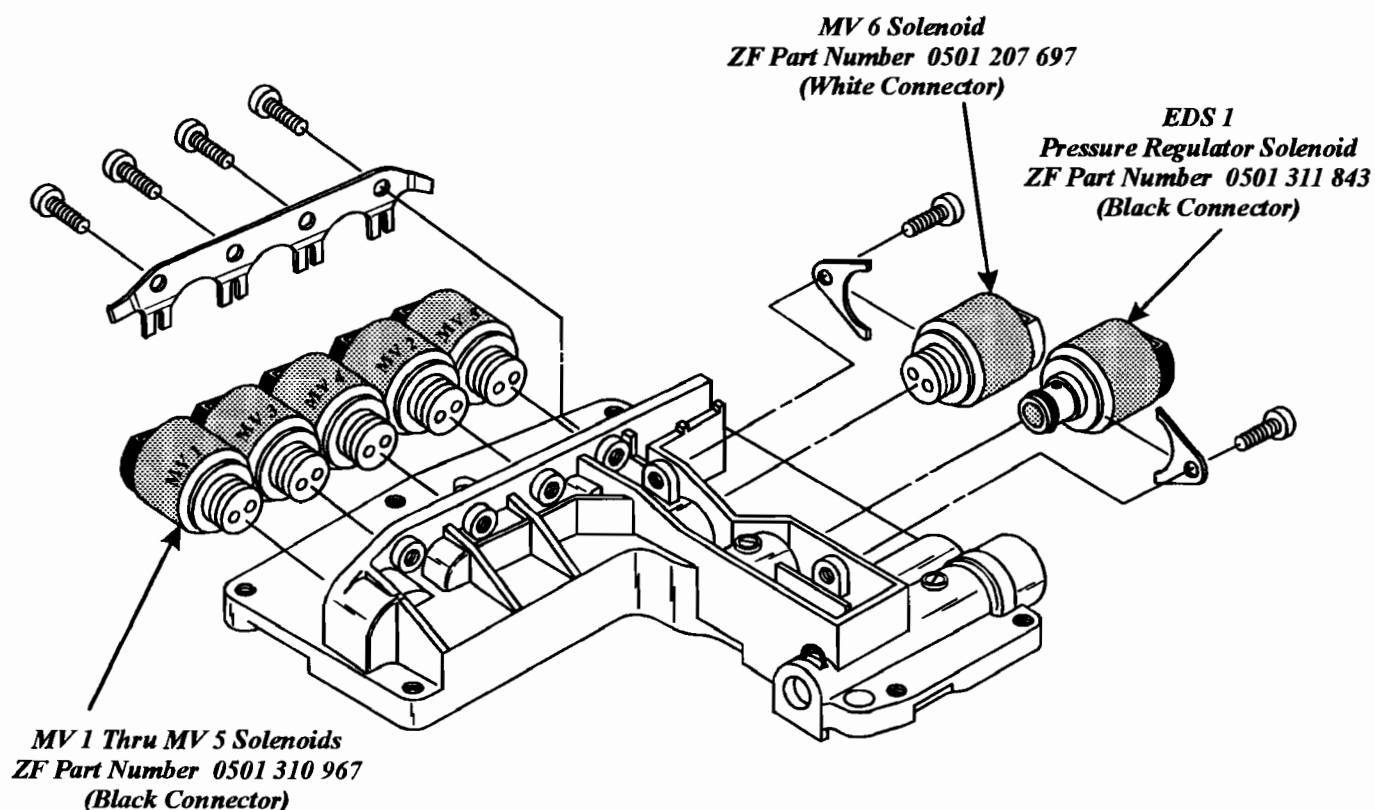
*View Looking Into Case
Connector Setting In The vehicle*



NOTE: Some internal wire colors may vary.

Copyright © 1999 ATSG

Figure 6



COMPONENT	RESISTANCE	PART NUMBER
<i>MV 1 Solenoid</i>	30 - 34 Ohms	0501 310 967
<i>MV 2 Solenoid</i>	30 - 34 Ohms	0501 310 967
<i>MV 3 Solenoid</i>	30 - 34 Ohms	0501 310 967
<i>MV 4 Solenoid</i>	30 - 34 Ohms	0501 310 967
<i>MV 5 Solenoid</i>	30 - 34 Ohms	0501 310 967
<i>MV 6 Solenoid</i>	30 - 34 Ohms	0501 207 697
<i>EDS 1 Pres Reg Solenoid</i>	5.2 - 6.8 Ohms	0501 311 843
<i>Input Speed Sensor</i>	265 Ohms (72° F)	0501 311 086
<i>Output Speed Sensor</i>	265 Ohms (72° F)	0501 311 086
<i>Trans Temp Sensor</i>	970 Ohms (72° F)	N/A

Figure 7



"2000" SEMINAR INFORMATION

SLIDE

35

RETRIEVING FAULT CODES

The BMW Diagnostic Tool is **required** to retrieve the fault codes that are stored in the control unit. The diagnostic tool has the ability to retrieve codes, clear codes and activate individual components, and is adaptable to 3 Series, 5 Series, 7 Series and 8 Series vehicles equipped with 4HP-22/24, 4L30-E, 5HP-18, 5HP-19, and 5HP-30. The BMW Diagnostic Tool can be purchased from:

Mario Aristides Phone - (305) 666-3544, Fax - (305) 666-8238

BMW ZF-5HP-18 FAULT CODE CHART

Code	Description (Pin No's Refer To TCM)	Possible Causes
02	Park-Neutral Lock Solenoid - Pin 2	Break or short in wiring, or defective solenoid
03	MV 5 Solenoid - Pin 3	Break or short in wiring, or defective solenoid
04	MV 6 Solenoid (Lock-Up) - Pin 4	Break or short in wiring, or defective solenoid
05	EDS 1 Solenoid (Pres. Reg.) - Pin 5	Break or short in wiring, or defective solenoid
08	Selector Lever Position L2 - Pin 8	Vehicle acceleration detected while selector lever in P or N position, or engine has been started even though trans control unit has not detected a selector lever position of P or N
09	Selector Lever Position L3/L4 - Pins 37 and 9	Engine has been started even though trans control unit has not detected a selector lever position of P or N
0C	Program Selector Switch - Pins 12, 13 and 45	Short in wiring, or more than one program selector switch input is applied to ground
10	Turbine Shaft Speed Sensor, Pins 16 and 44	No input, or incorrect engine speed information
12	Kickdown Switch - Pin 18	Shorted to Ground
13	ASC Monitoring - Pin 19	ASC operation has been detected while selector lever was in Park or Neutral position
16	TOT Sensor - Pins 21 and 22	Resistance of TOT Sensor not within permissible range
1A	Battery Voltage Supply - Pin 26	Break in wiring
1E	MV 1 Solenoid - Pin 30	Break or short in wiring, or defective winding in solenoid
1F	MV 4 Solenoid - Pin 31	Break or short in wiring, or defective winding in solenoid
20	MV 3 Solenoid - Pin 32	Break or short in wiring, or defective winding in solenoid
21	MV 2 Solenoid - Pin 33	Break or short in wiring, or defective winding in solenoid
23	Throttle Position Sensor - Pin 35	Break or short in wiring, or defective sensor
24	Selector Lever Position L1 - Pin 36	Break or short in wiring, or defective sensor
2A	Output Speed Sensor signal - Pins 13 and 42	No input, or incorrect engine speed information
2b	Engine Speed Signal - Pin 43	Questionable signal, or break or short in wiring
35	Power Supply to transmission - Pin 52	Break or short in wiring, or defective TCU

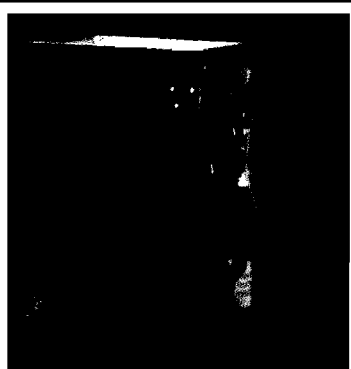
Copyright © 1999 ATSG

Figure 8

TRANSMISSION TESTING

A TO Z

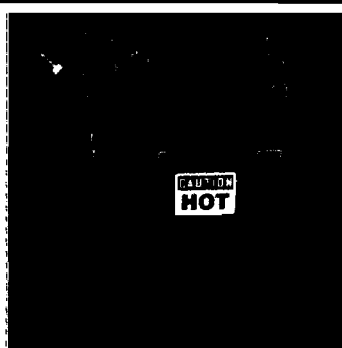
Industry leaders . . . combined technology . . . leading products



ANSWERMATIC

A_{MI}

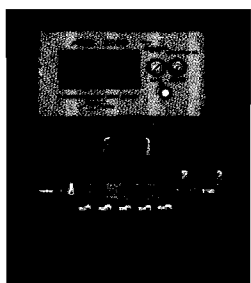
Delivers ATF under pressure enabling builder to completely test transmissions with the valve body removed in or out of the vehicle! Test plates available for 85 different transmissions.



ANSWERMATIC

VBT 4000

Allows thorough flushing, exercising, testing and calibration of valve bodies on the bench before they are installed! Transmissions can also be unit checked with valve bodies removed, either in or out of the vehicle. Adapters available for over 85 transmission types!



ANSWERMATIC

Sol-X™ 2000

A complete and thorough solenoid flushing and test system. Why waste your money? The Sol-X will save you big dollars on Solenoids!

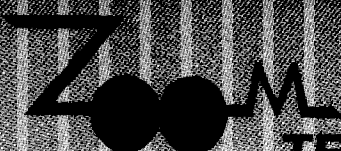


ZOOM

TranX

The TranX provides a fast and thorough method for electrical testing. It will help you find opens and shorts, it will separate ECU problems from transmission problems. You can use it on the bench or in the vehicle! Adapters are available for more than 50 types of transmissions!

“Equipment for Rebuilding Profits!”



TECHNOLOGY INC.

1003 Industrial Drive • West Berlin, NJ 08091

1.856.767.8840 • Toll Free: 1.800.322.0806

Fax: 1.856.767.8839 • www.zoom-tech.com

Patents #4809544, #4998437. Other US & Foreign Patents Pending.



SLIDE BMW ZF-5HP-18 FAULT CODE CHART

Code	Description (Pin No's Refer To TCM)	Possible Causes
36	Power Supply - Pin 54	Power Supply less than 9 volts at engine speeds greater than 1600 RPM
64	Speed Monitoring	Faulty Speed Sensor signal, or slip in Transmission
65	EPROM - Checksum	Program memory in Transmission Control Unit faulty
66	Incorrect Program Checksum	Program memory in Transmission Control Unit faulty
67	Transmission Relay - Pin 52	Pickup and dropout times too long
68	Engine Temp Sensor - Pin 35	Break or Short in wiring, or defective CTS
69	Throttle Position Sensor - Pin 35	TCU detected questionable TPS signal
6E	Basic Data Record	TCU has not programmed
96	CAN Timeout 1	CAN signal not sent during initialization (Ignition On)
97	CAN Timeout 2	CAN signal not sent during operation
98	CAN Bus monitoring	Values in CAN RAM are not updated
99	CAN status fault	Control units with different CAN statuses are installed on CAN bus
9A	CAN throttle valve information	DME detects faulty throttle valve signal
9B	CAN load signal information	DME detects faulty load signal
9C	CAN engine intervention	DME cannot carry out reduction in engine torque desire by the EGS, or DME has different requirements compared to other CAN users
9D	CAN engine temperature info	DME detects faulty engine temperature signal
9E	CAN engine speed information	DME detects faulty engine speed signal

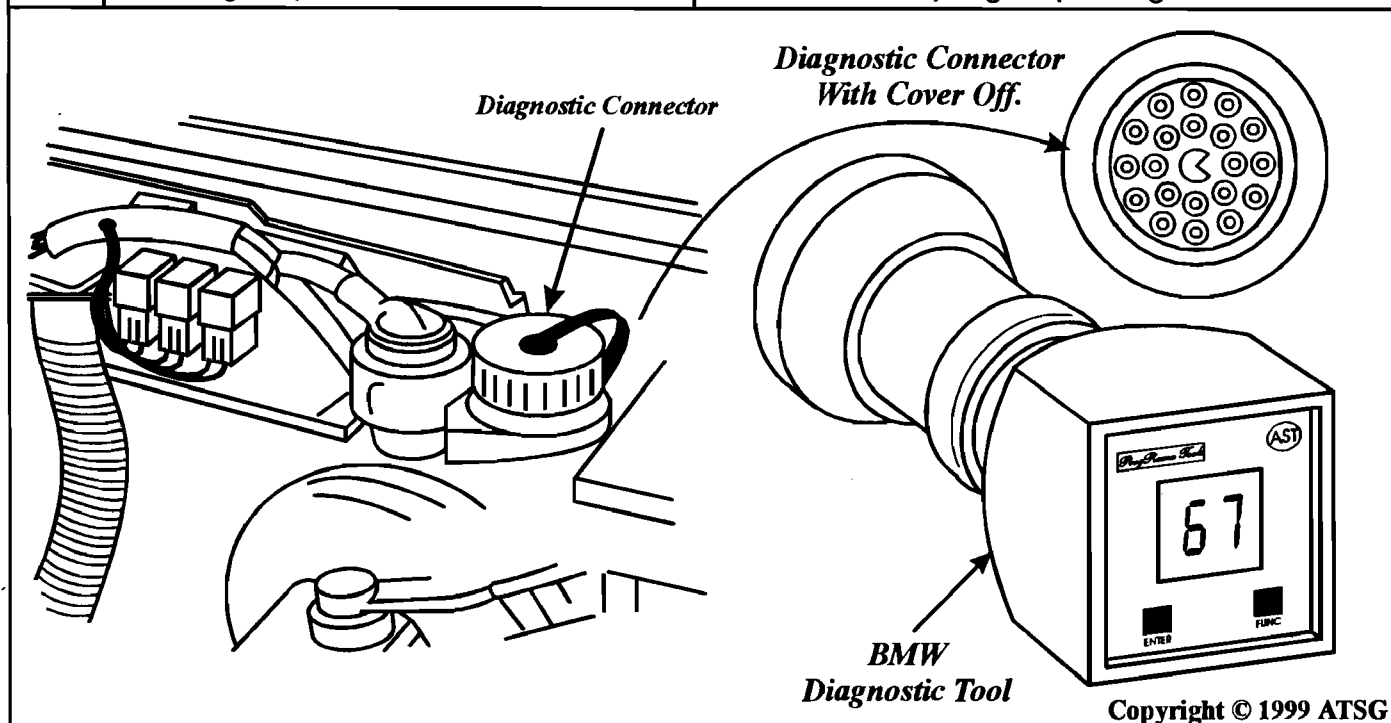


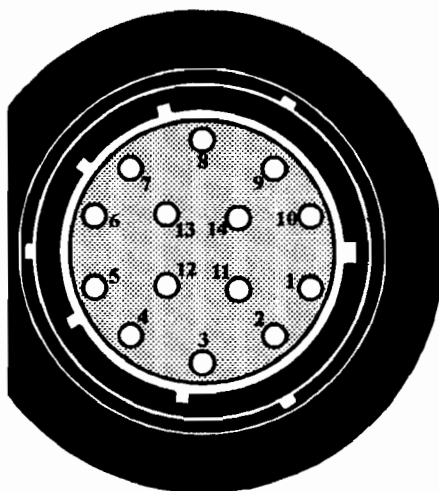
Figure 9

SLIDE

SOLENOID AND SENSOR RESISTANCE CHART

<i>Solenoid</i>	<i>Case Connector Pin Numbers - +</i>	<i>Control Unit Connector Pin Numbers - +</i>	<i>Resistance In Ohms</i>
MV 1	8 and 13	30 and 52	30 - 34 W
MV 2	9 and 13	33 and 52	30 - 34 W
MV 3	4 and 13	32 and 52	30 - 34 W
MV 4	3 and 13	31 and 52	30 - 34 W
MV 5	7 and 13	3 and 52	30 - 34 W
MV 6	11 and 13	4 and 52	30 - 34 W
EDS 1	2 and 13	5 and 52	5.2 - 6.8 W
TOT	12 and 14	21 and 22	970 W at 72°F
TSS	1 and 10	44 and 16	265 W (72°F)
OSS	5 and 6	14 and 42	265 W (72°F)

*View Looking Into Case
Connector Setting In The vehicle*



Electronic Control Unit Connector Pin Identification

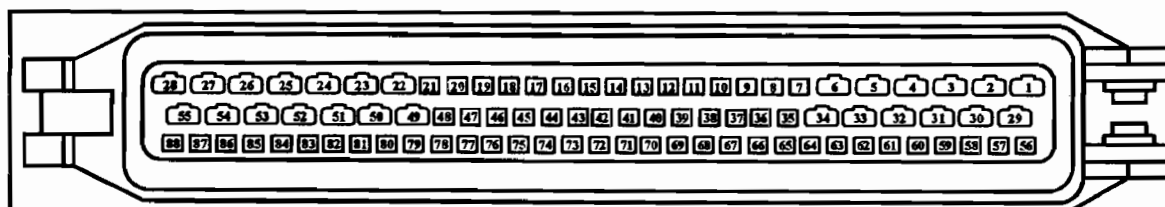


Figure 10

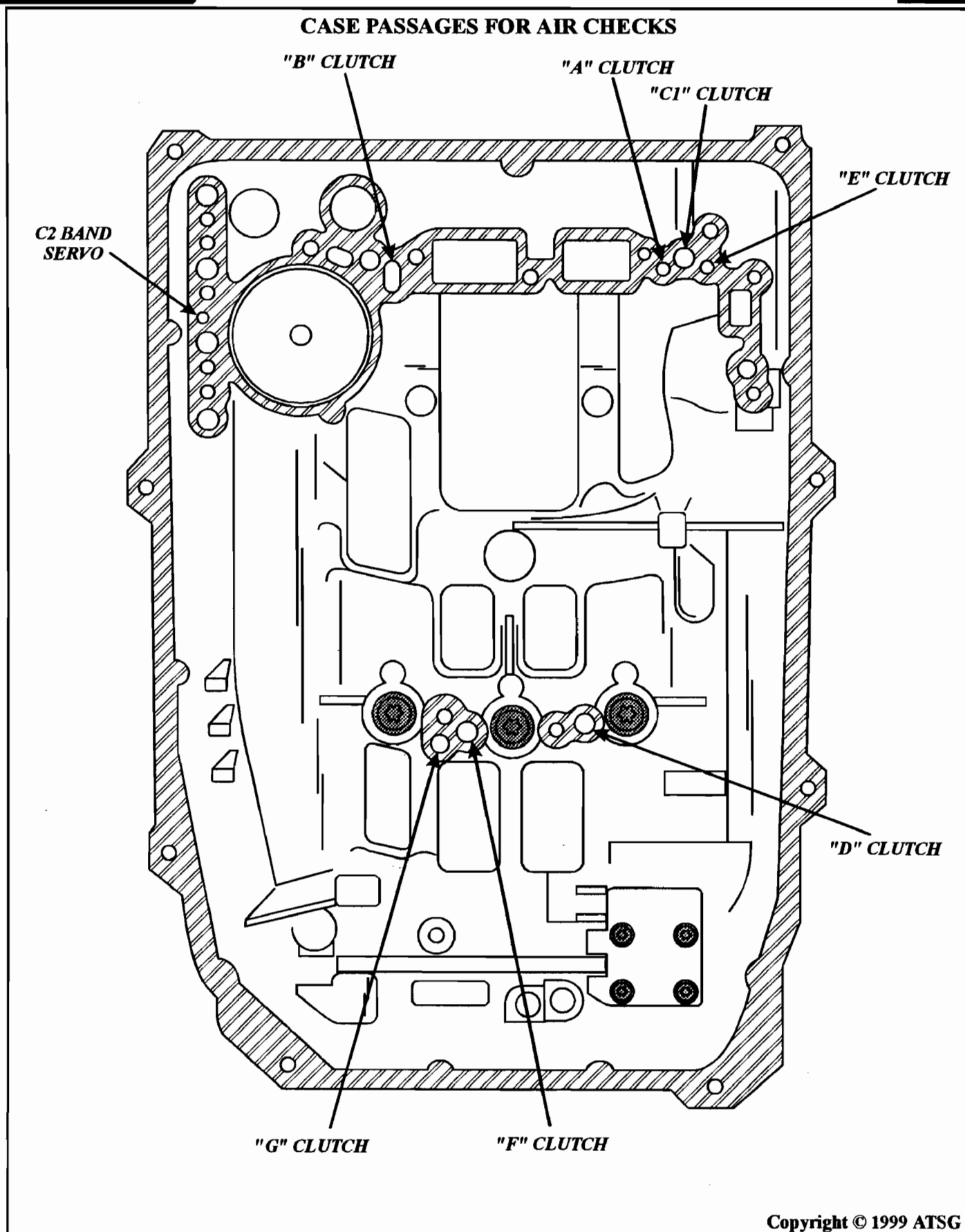
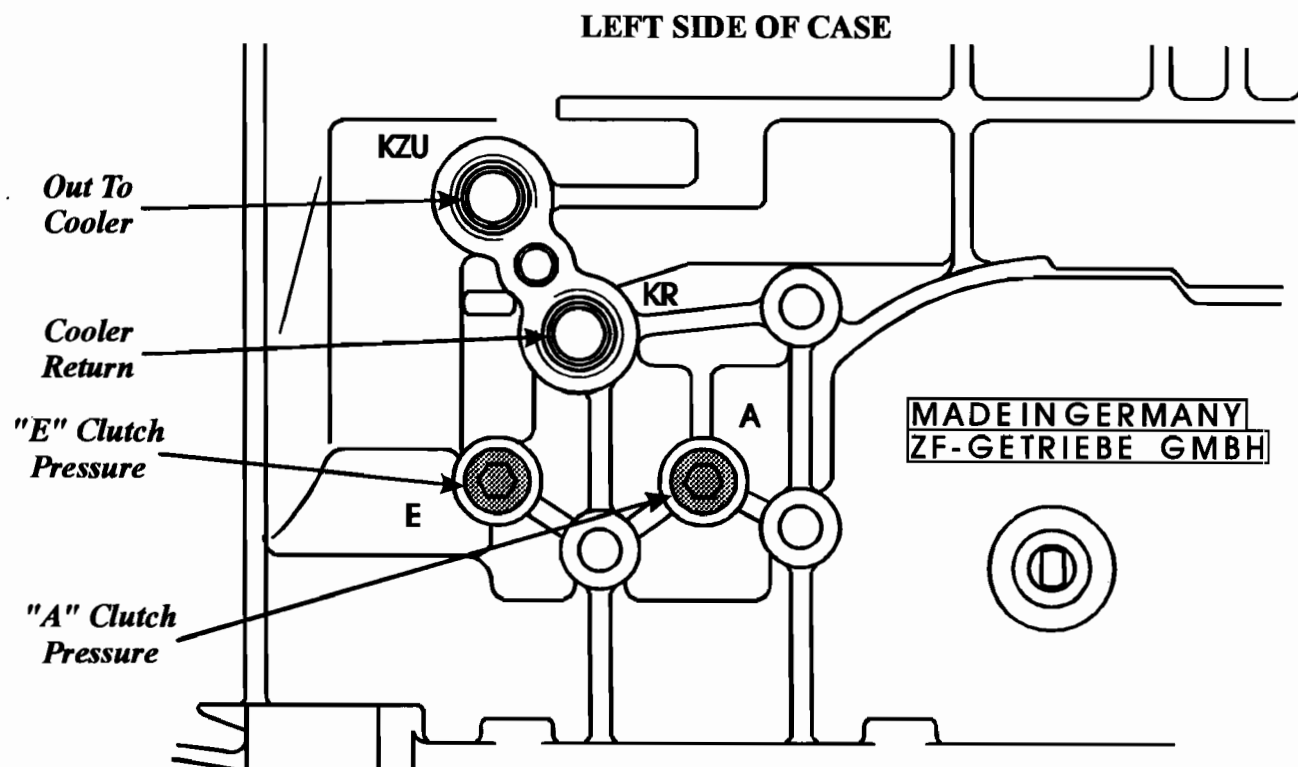
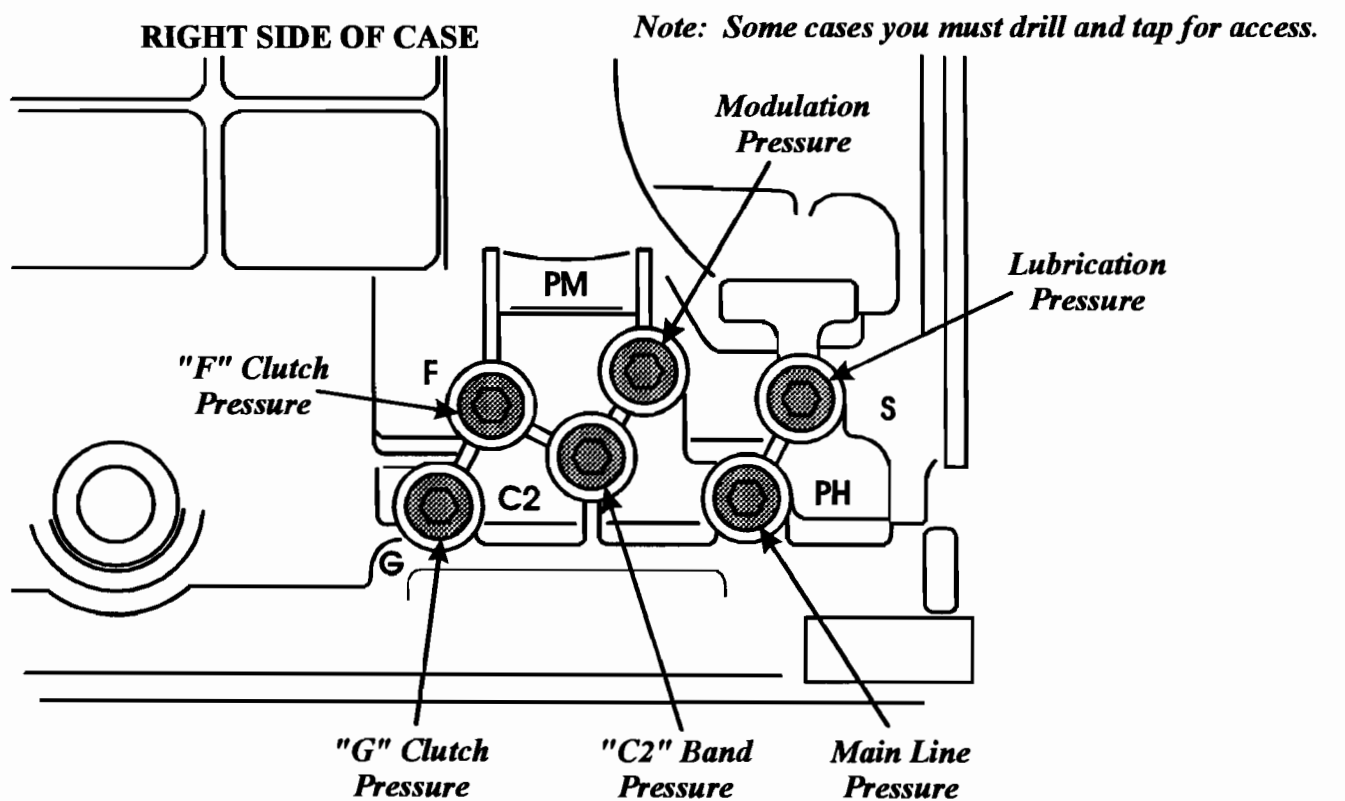


Figure 11

SLIDE

PRESSURE TAP LOCATIONS

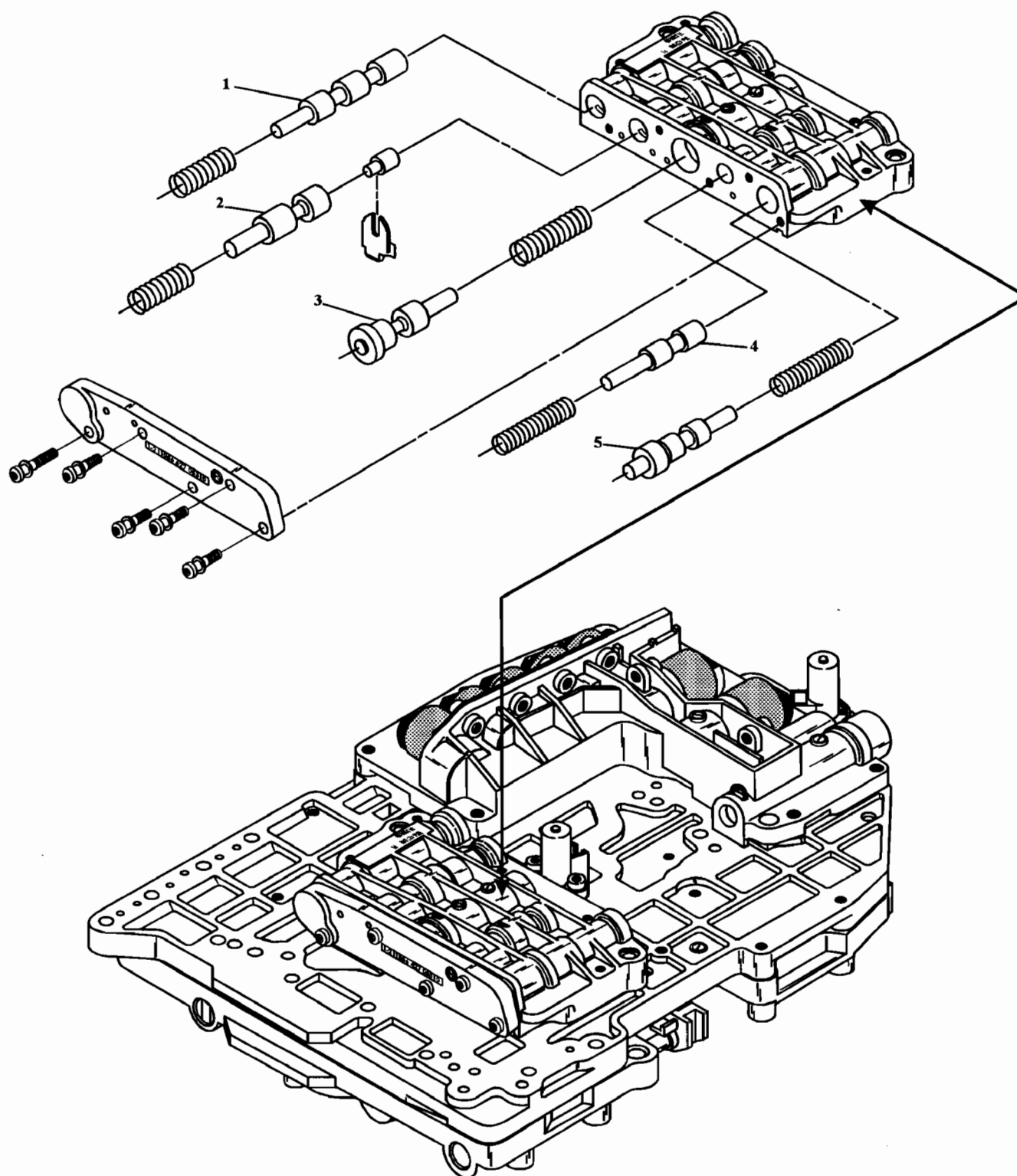


Note: Some cases you must drill and tap for access.

Copyright © 1999 ATSG

Figure 12

UPPER FRONT VALVE BODY



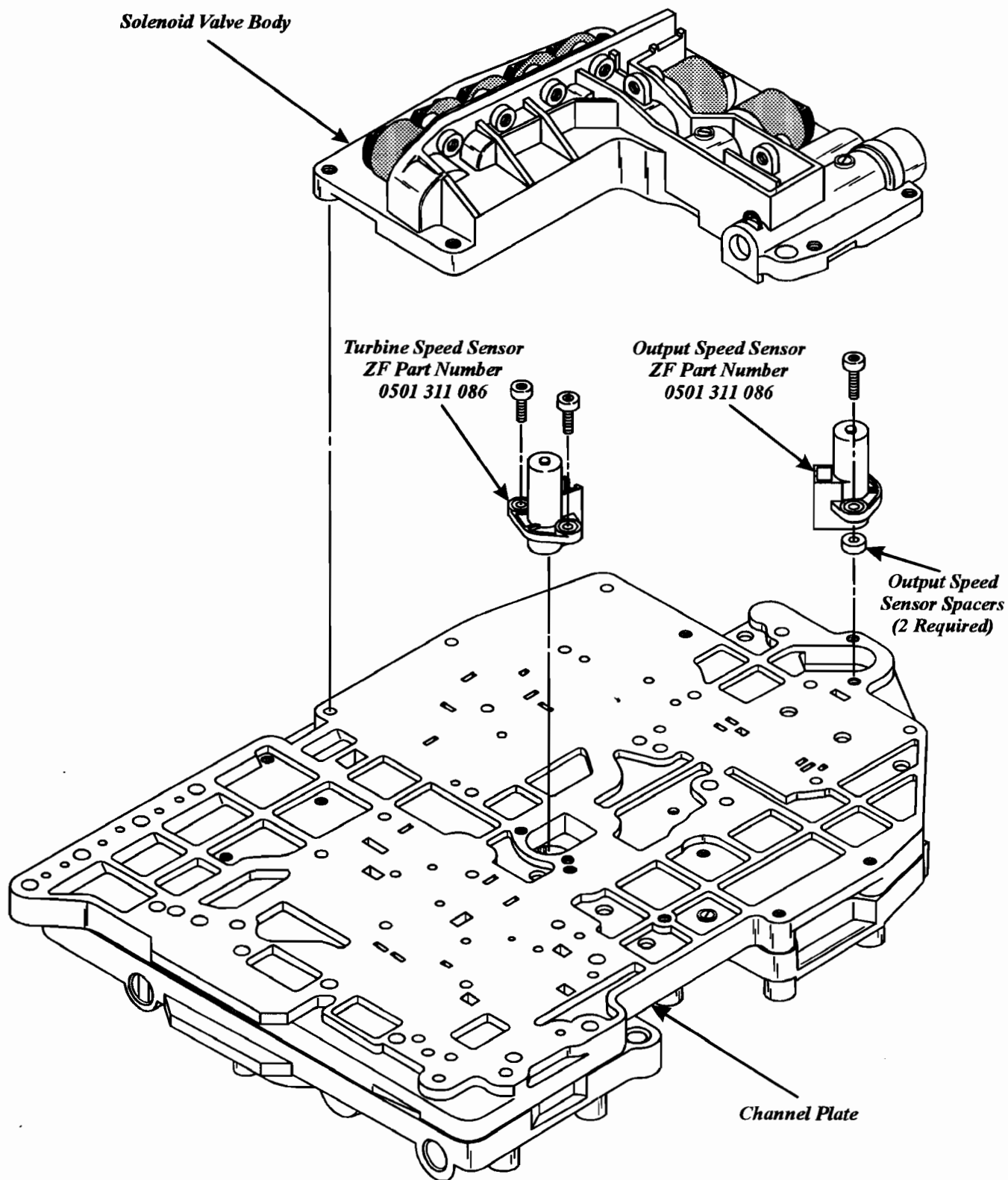
1. Torque Converter Valve
2. Lubrication Valve Train
3. Lock-Up Control Valve
4. 5-4 Traction Valve
5. 4-5 Traction Valve

Copyright © 1999 ATSG

Figure 13

SLIDE

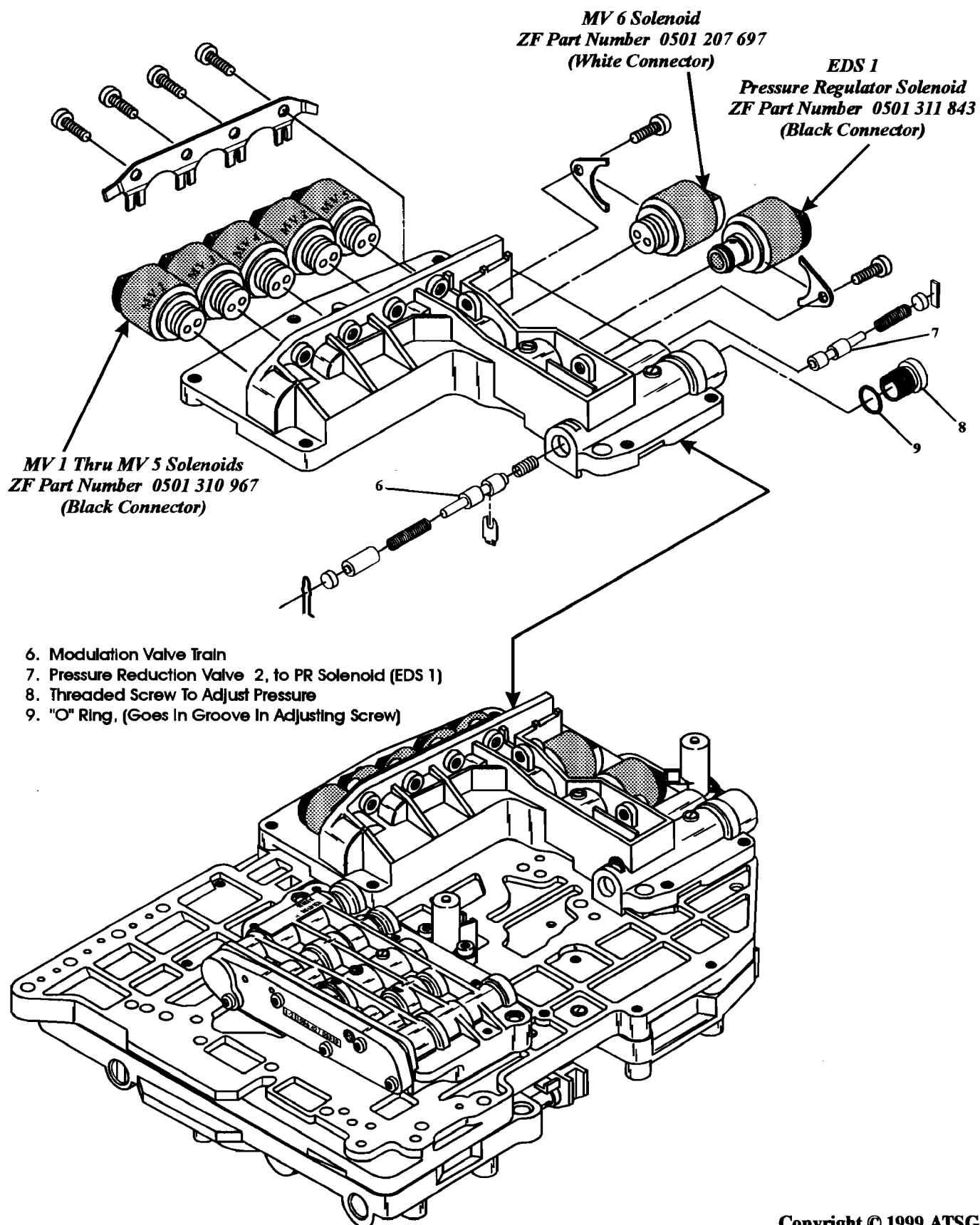
SOLENOID BODY, SPEED SENSORS AND CHANNEL PLATE



Copyright © 1999 ATSG

Figure 14

SOLENOID VALVE BODY



Copyright © 1999 ATSG

Figure 15

Transtar. One company. One philosophy.

Serving your parts needs is our only business.

We're the guys you can count on. The ones who always come through with the parts you need, when you need them. We think of our business as helping you stay in business. And we take that role seriously.

Transtar stocks the world's largest and most comprehensive inventory of parts and kits. We have the quality and



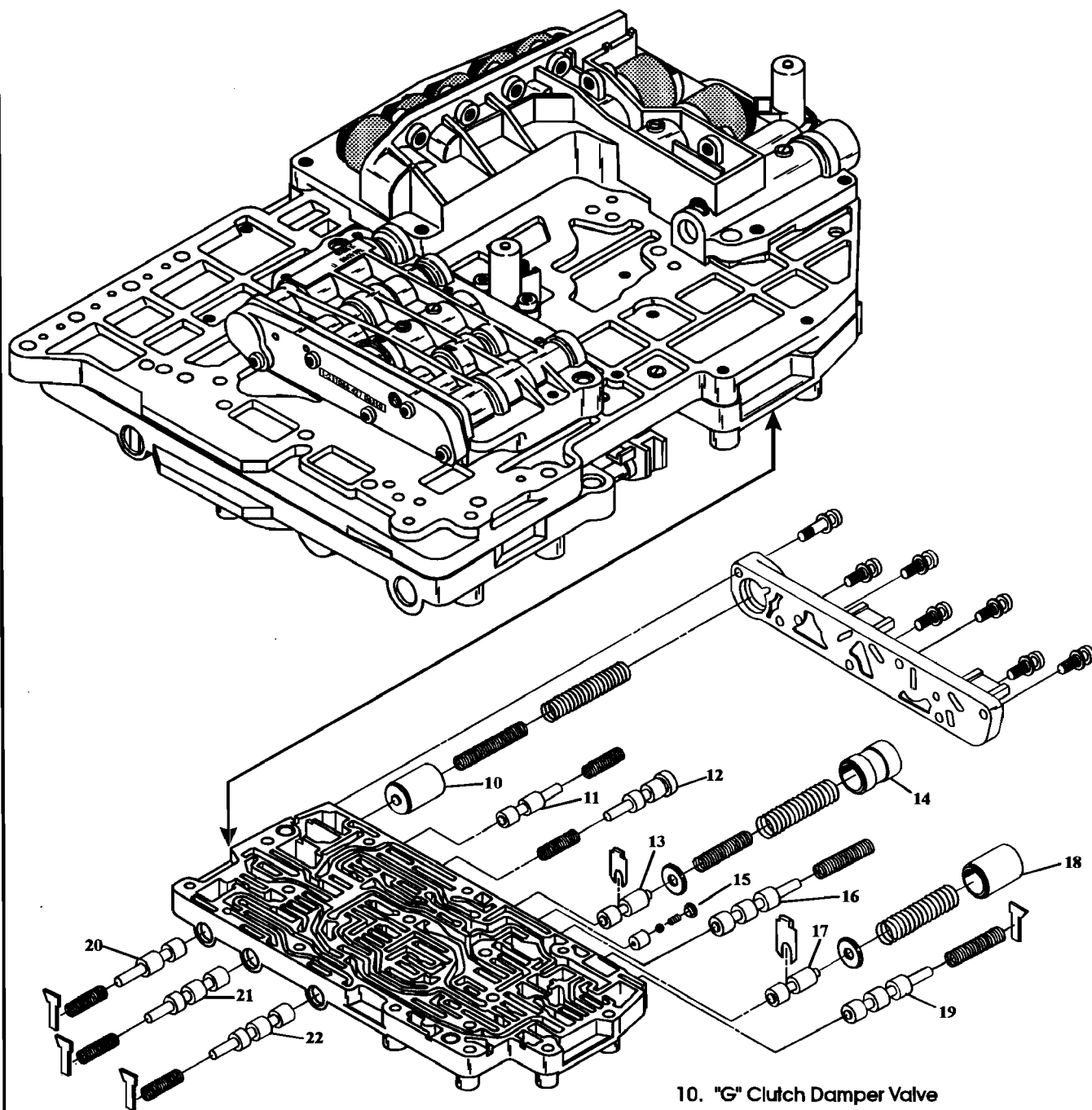
selection you demand, available from our network of 22 locations nationwide. And we back it with service and expertise developed over nearly a quarter century in business.

So call us for your parts needs. Timely delivery. And expert customer service. We do it best because it's all we do.

TRANSTAR®
TRANSTAR INDUSTRIES, INC

SLIDE

LOWER REAR VALVE BODY

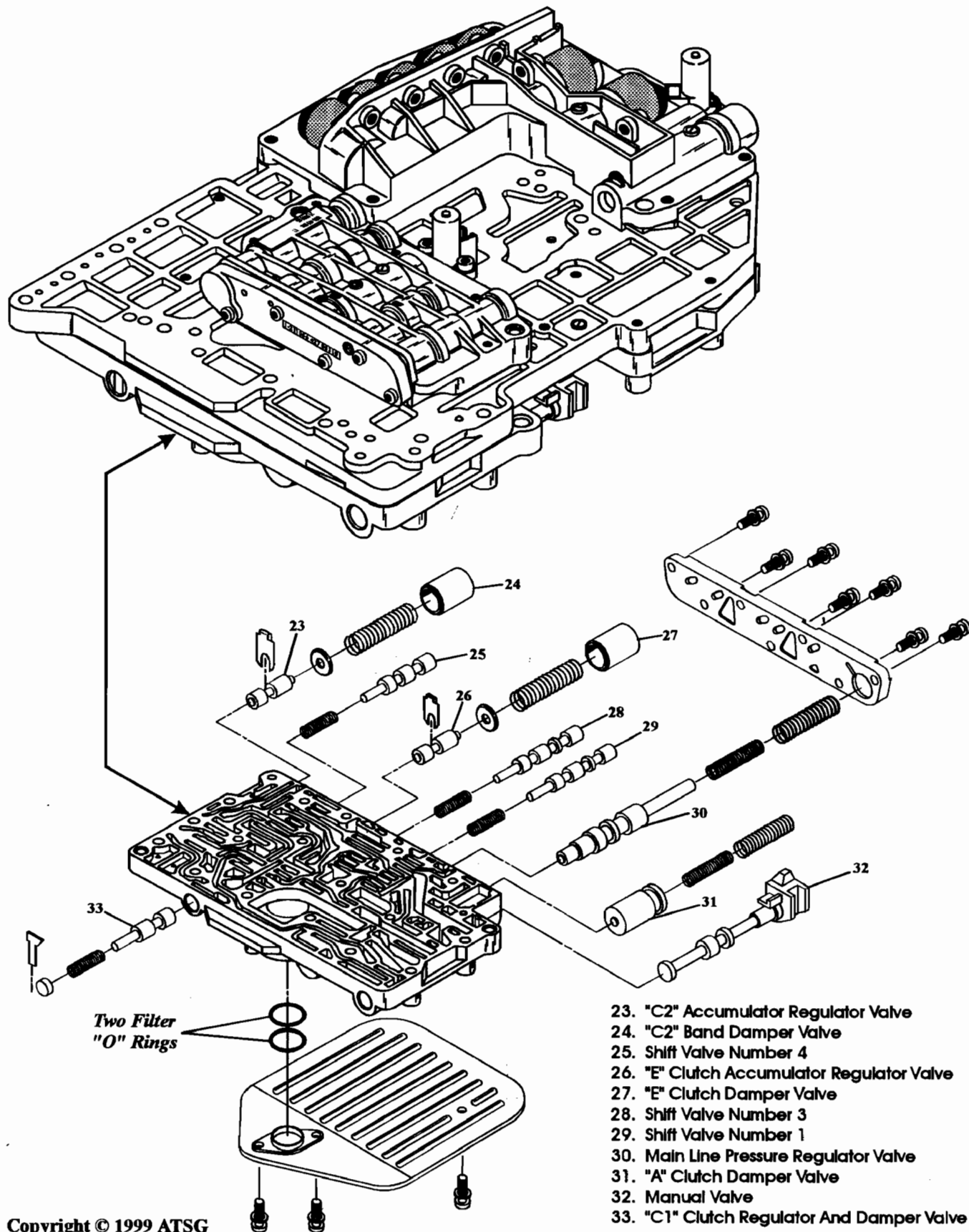


- 10. "G" Clutch Damper Valve
- 11. 3-2 Traction Valve
- 12. 2-3 Traction Valve
- 13. "D" Clutch Accumulator Regulator Valve
- 14. "D" Clutch Damper Valve
- 15. "D" Clutch One-Way Check Valve Assembly
- 16. Reverse Lock-Out Valve
- 17. "F" Clutch Accumulator Regulator Valve
- 18. "F" Clutch Damper Valve
- 19. Shift Valve Number 2
- 20. Pressure Reduction Valve For MV 1 thru MV 6
- 21. Traction Coast Valve Number 2
- 22. Traction Coast Valve Number 1

Copyright © 1999 ATSG

Figure 16

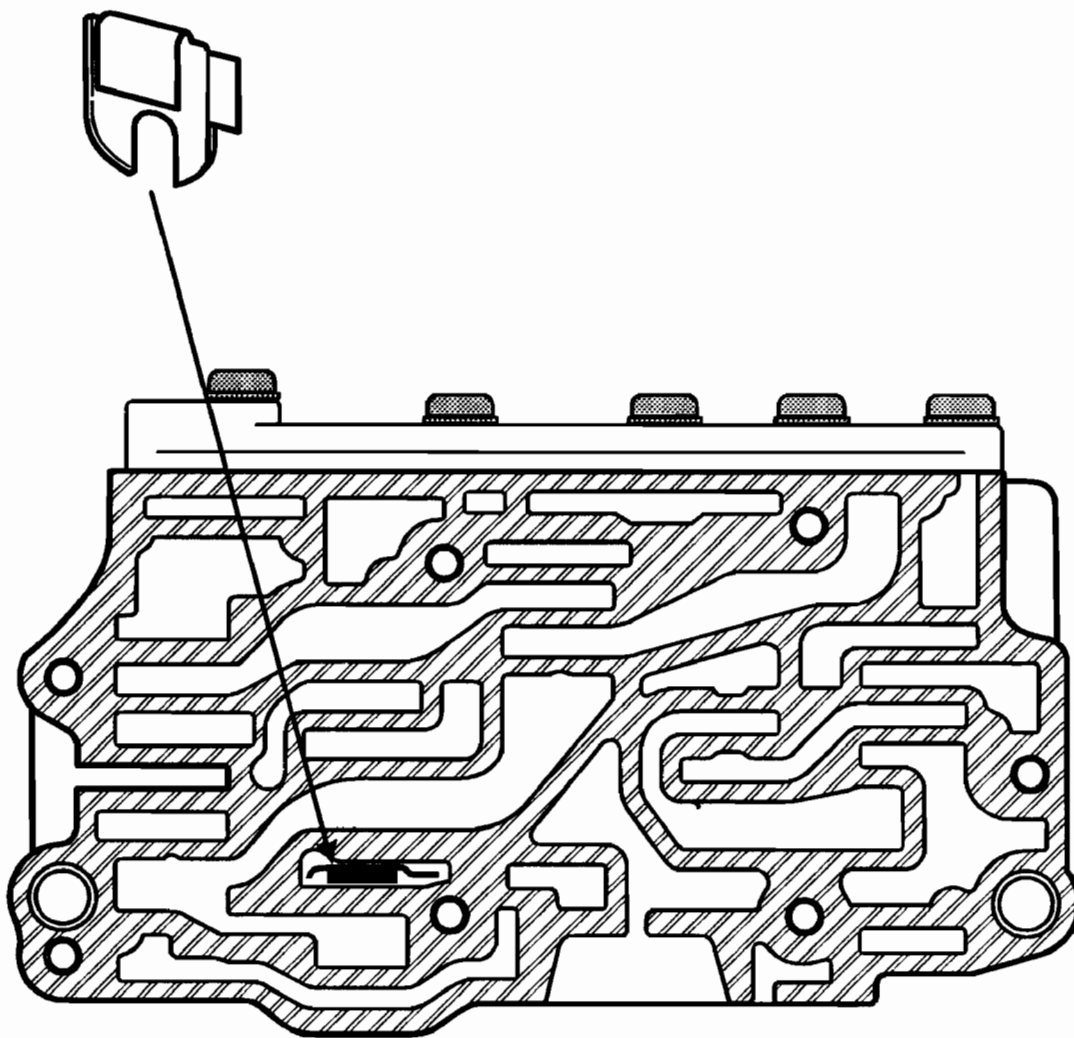
LOWER FRONT VALVE BODY



Copyright © 1999 ATSG

Figure 17

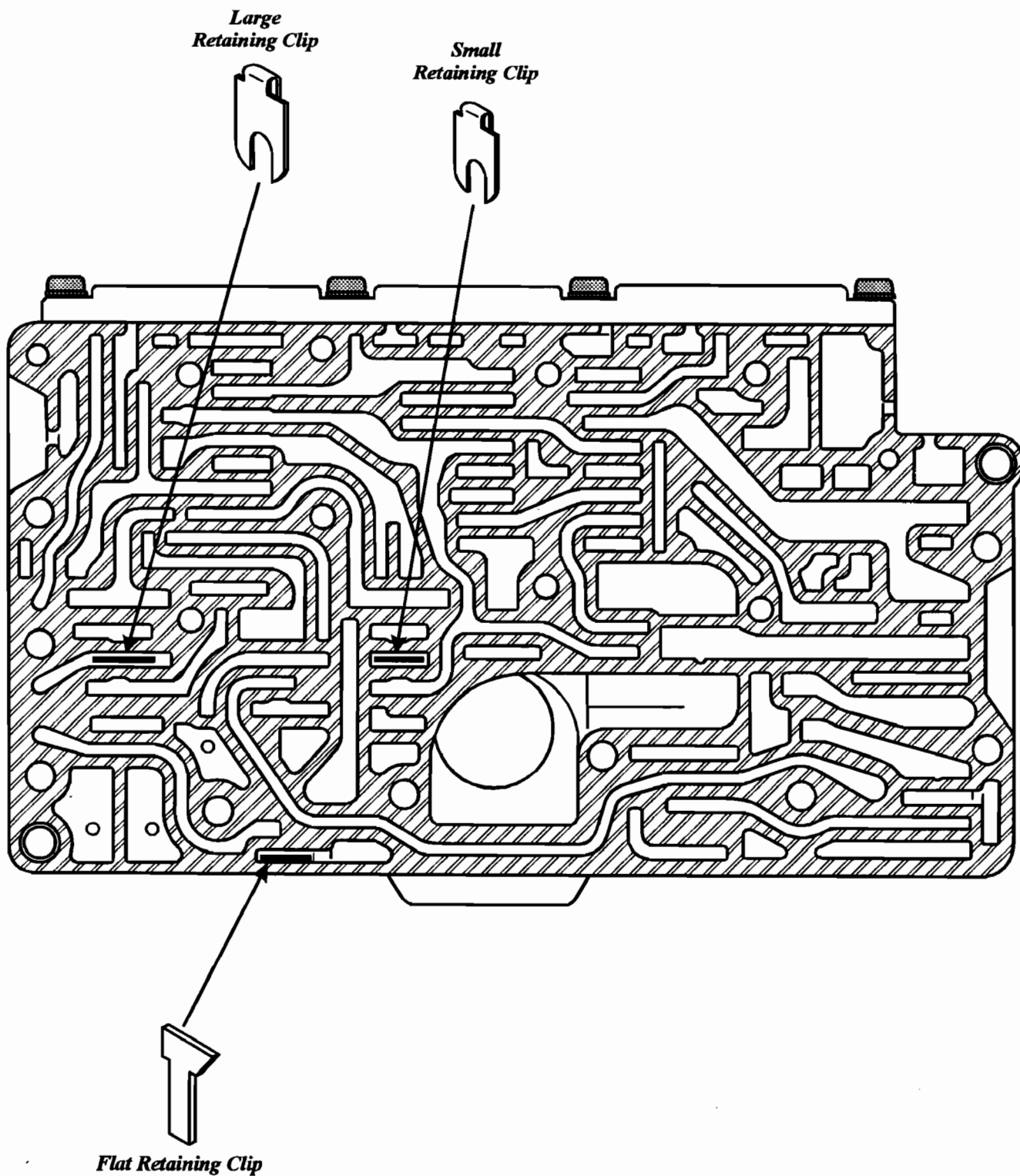
UPPER FRONT VALVE BODY CLIP LOCATIONS



Copyright © 1999 ATSG

Figure 18

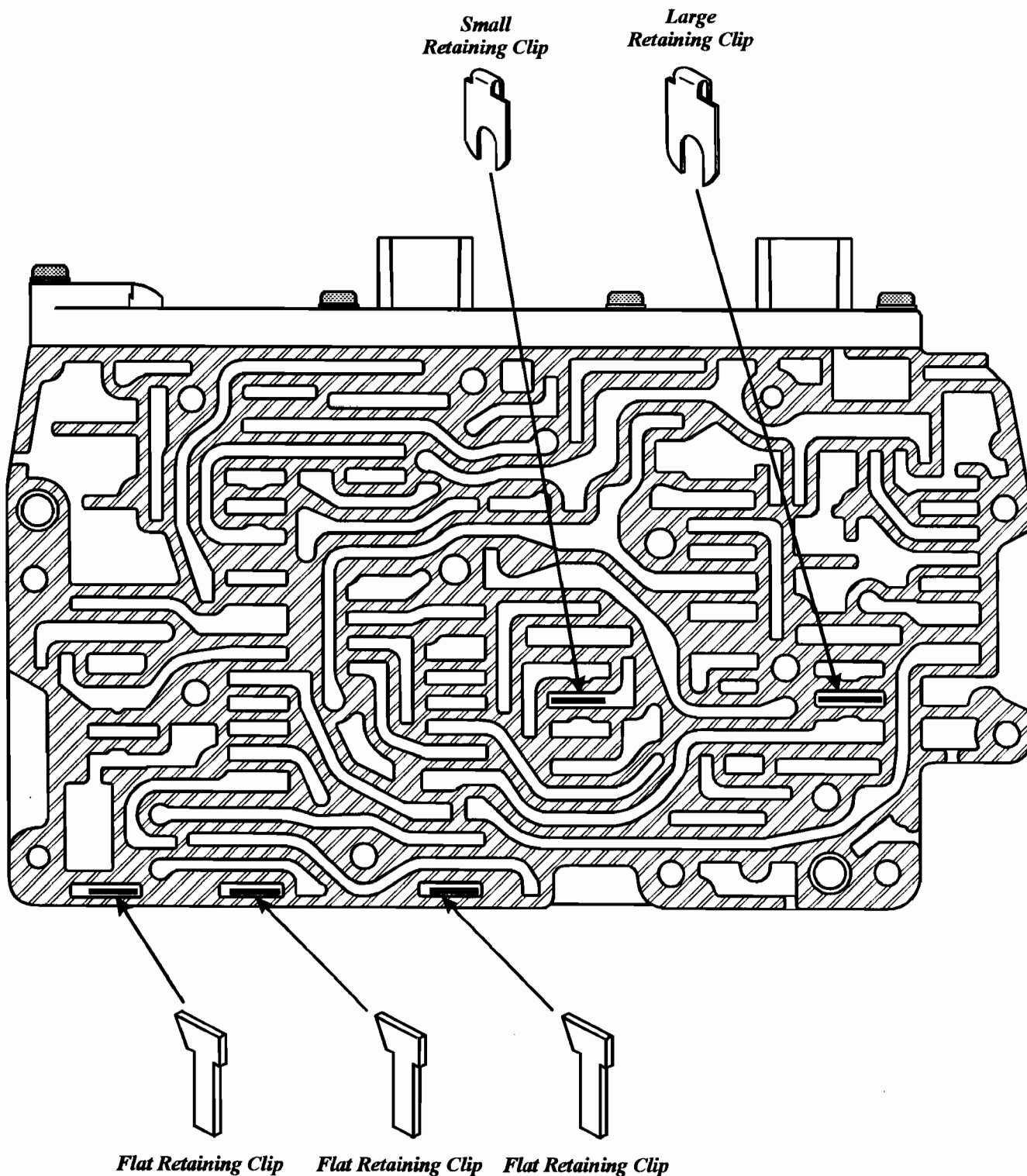
LOWER FRONT VALVE BODY CLIP LOCATIONS



Copyright © 1999 ATSG

Figure 19

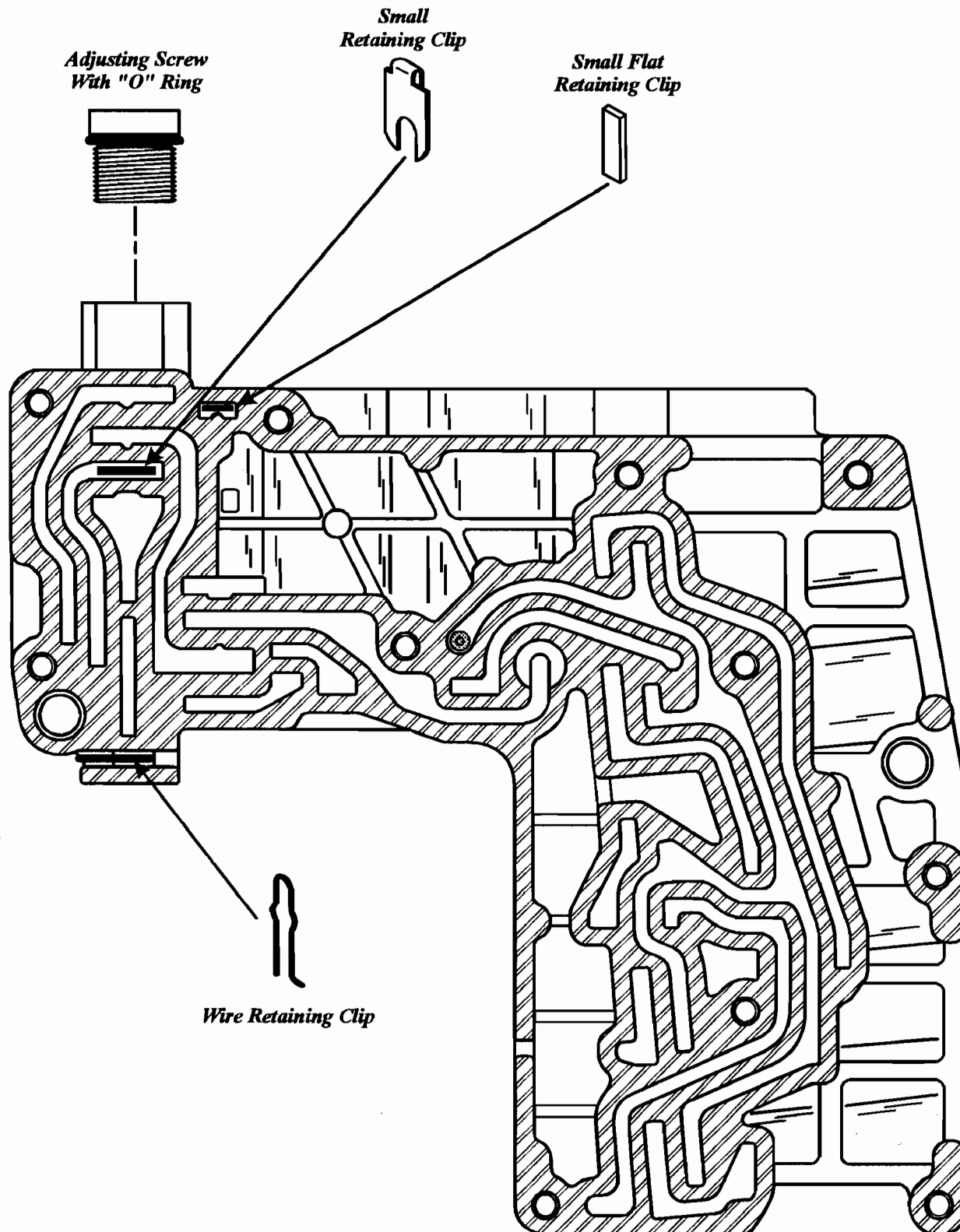
LOWER REAR VALVE BODY CLIP LOCATIONS



Copyright © 1999 ATSG

Figure 20

SOLENOID VALVE BODY CLIP LOCATIONS



Copyright © 1999 ATSG

Figure 21

SLIDE

CHANNEL PLATE BALL AND ORIFICE LOCATIONS

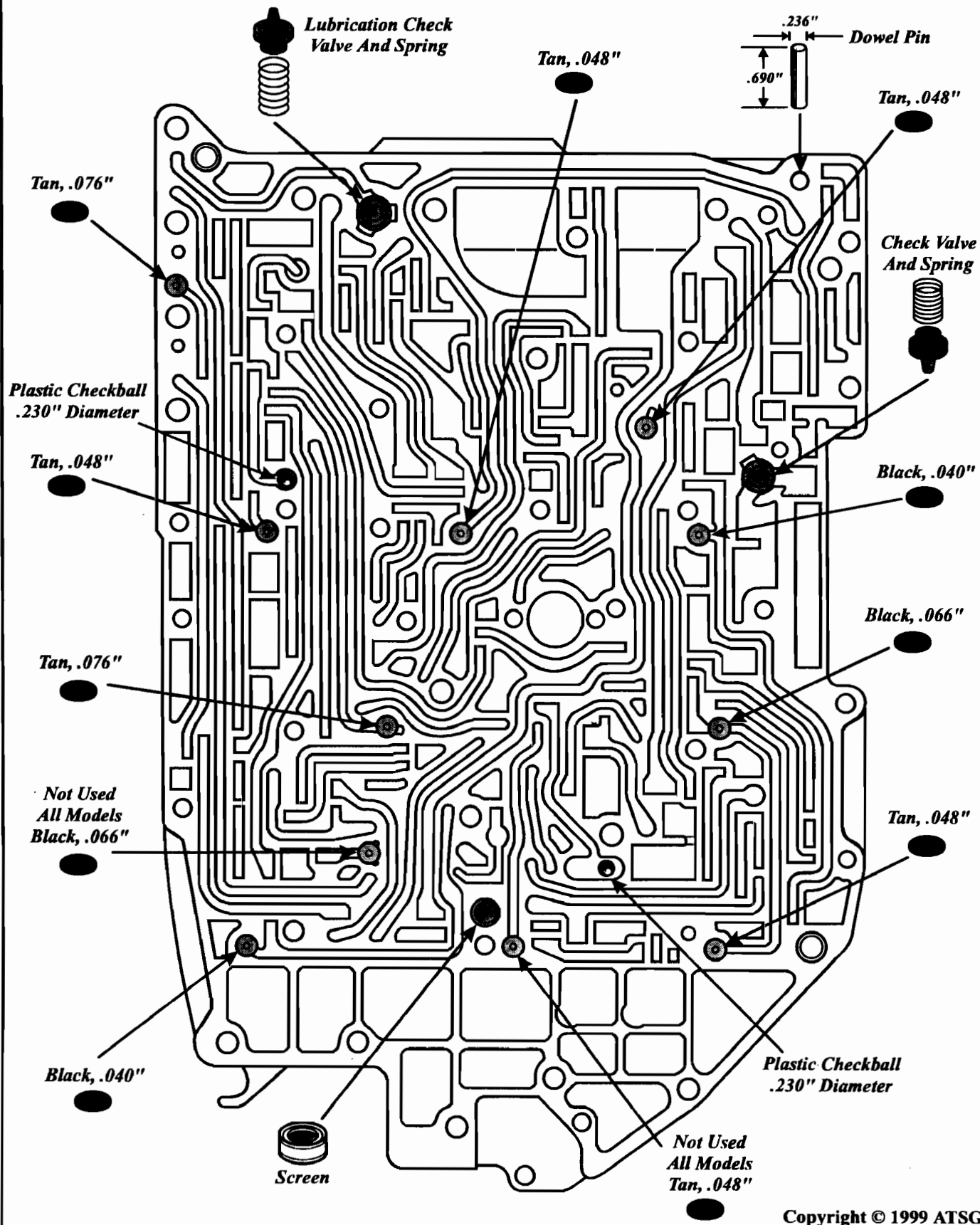


Figure 22

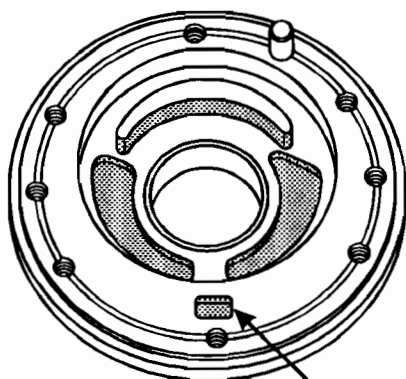


ZF-4HP-22/24

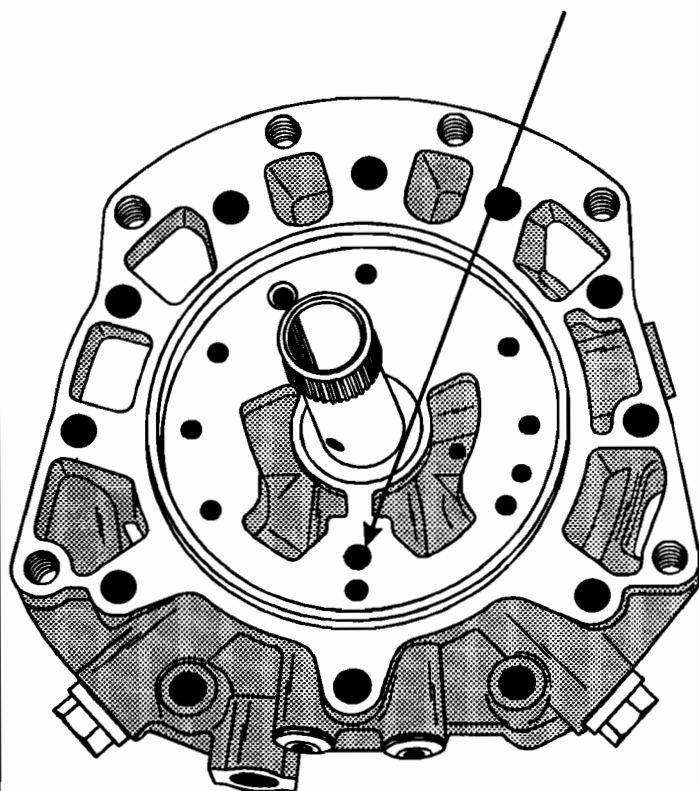
REPEATED LEAK FROM BELL HOUSING AREA

- COMPLAINT:** Repeated leakage of transmission fluid, coming from the bell housing area on any vehicle equipped with the ZF-4HP-22 or 4HP-24 transmission. This usually occurs after rebuild coupled with pump parts replacement that was necessary.
- CAUSE:** Beginning in the 1989 model year, ZF implemented a running change to the pump body and pump cover on both the 4HP-22 and the 4HP-24 transmissions. This change was made to increase the durability of the converter bushing with increased lubrication to this area. This change however, created the possibility of mis-matching parts that are not compatible. The 1st design pump body and cover has the drain back hole located at the 6 O'clock position and the drain back passage was moved to the 3 O'clock position in the 2nd design pump body and cover, as shown in Figure 1. Installing 2nd design pump body with 1st design pump cover will completely block the drain back passage and the repeated leakage will occur. Installing the 1st design pump body with 2nd design pump cover will function, but you will now be faced with the possibility of premature converter bushing failure.
- CORRECTION:** To eliminate both conditions, always install the 2nd design pump body, matched with the 2nd design pump cover, as shown in Figure 1.

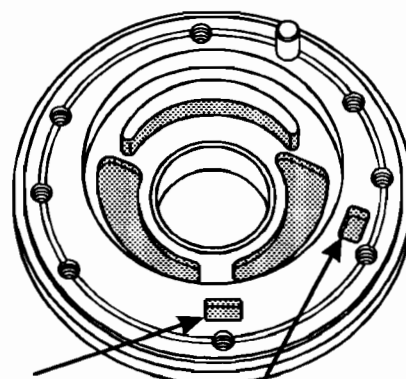
1ST DESIGN PUMP BODY
AND PUMP COVER



Drain Back Passage

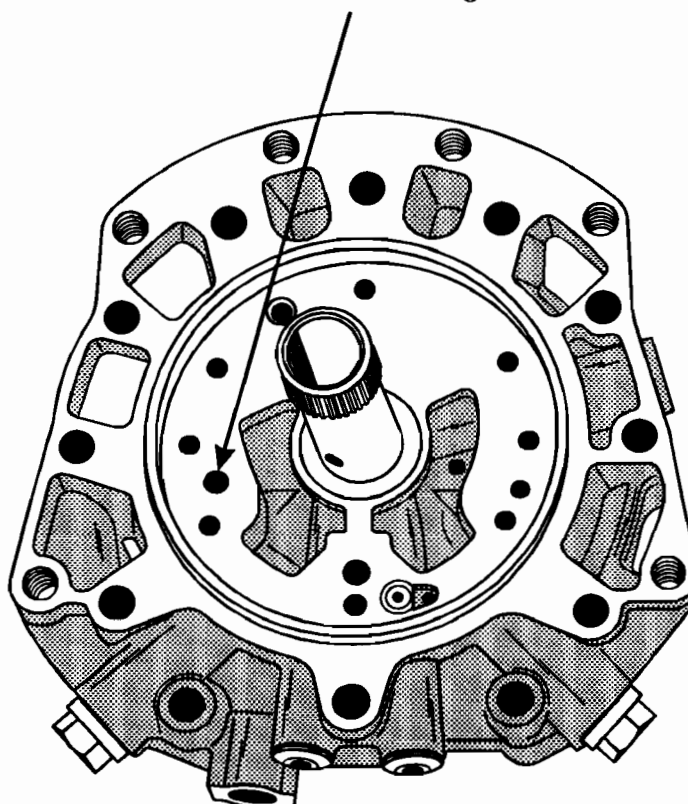


2ND DESIGN PUMP BODY
AND PUMP COVER



Blind Hole

Drain Back Passage



Copyright © 1999 ATSG

Figure 1

DACCO[®]

converters

DACCO/DETROIT

PERFORMANCE^{PLUS}
ENGAGE THE POWER!

Tru - Test
engineered perfection

For more than 30 years
Dacco Inc. has served the
Automatic Transmission
rebuilding industry.

Today we offer a full line of

- Remanufactured Foreign
and Domestic Torque Converters
- Soft Parts
- Remanufactured Hard Parts
- Used Hard Parts
- Racing , Heavy-Duty , and
Stall Converters
- Remanufactured Industrial
Torque Converters and
Fluid-Couplings

Your nearest Dacco Distributor
is only a phone call away

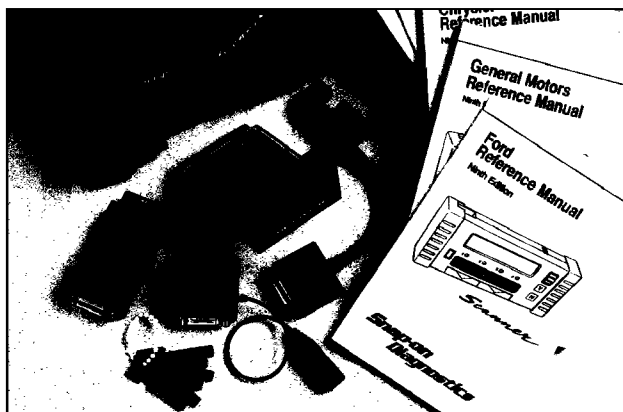
- 35 Dacco/Detroit Stores
- 50 Route Salesmen
- 200 + Independent Warehouse
Distributors

DACCO[®]

INC.

1-800-443-2226

Fax 931-528-9777



Domestic Combination Primary

The most comprehensive scantool software available:

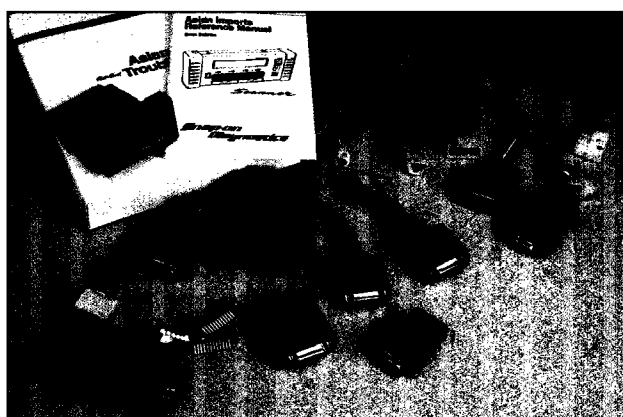
- 1980½-later GM Coverage (Engine, Transmission, Airbag, and ABS)
- 1981-later Ford Coverage (Engine, Transmission, Body, and ABS)
- 1983-later Chrysler Coverage (Engine, Body, Transmission, and ABS)
- 1984-later Jeep Coverage (Engine, Transmission, and ABS)

Plus 100's of GM bi-directional controls, enhanced OBD-II, Chrysler pinion factor reprogramming, and Generic OBD-II. Also available in a PROM update kit..



Fast-Track® Domestic Troubleshooter

Offers VIN-specific troubleshooting and repair information, based on the working experience of hundreds of Master Technicians. Includes tips for trouble codes, no-start problems, driveability symptoms, and frequently suspected components, as well as symptom-related functional tests, part location help, quick repair strategies, references to service procedures and specifications, and GM PROM ID and symptom-related PROM updates. Also includes OBD-II repair strategies and code-set information. Plus the User's Manual provides an exhaustive compilation of component/circuit wiring diagrams for OBD-II codes.



Asian Import Combination Kit

The Asian Imports Primary cartridge covers 15 Asian Import manufacturers, giving you enhanced OBD-II, Nissan & Infiniti datastream, Toyota, Lexus, Geo, Nissan & Infiniti bi-directional controls, and extensive airbag coverage. Combine that with the OBD-II insight found in the Asian Imports Fast-Track® Troubleshooter, and you've got everything you need to diagnose and repair today's Asian Import vehicles. Plus, the User's Manual gives you an exhaustive compilation of component/circuit wiring diagrams for OBD-II codes!



Fast-Track® ABS Troubleshooter

The only vehicle diagnostic system offered for a handheld scantool that specifically addresses ABS diagnosis and repair needs. Covers 13 of the most popular Asian Import manufacturers, plus Domestics. Gives you symptom tips for no-code diagnosis and repair, pre-roadtest checks, code definitions, code-set information and code repair insight, component and sensor tests, specialized hydraulic bleed sequences, and OEM TSB info. Plus the User's Manuals are packed with component location drawings and hundreds of ABS wiring diagrams.

SLIDE

BMW ELECTRONIC ZF4HP-22 (4 SOLENOID ONLY)

"LOWER REAR" VALVE BODY

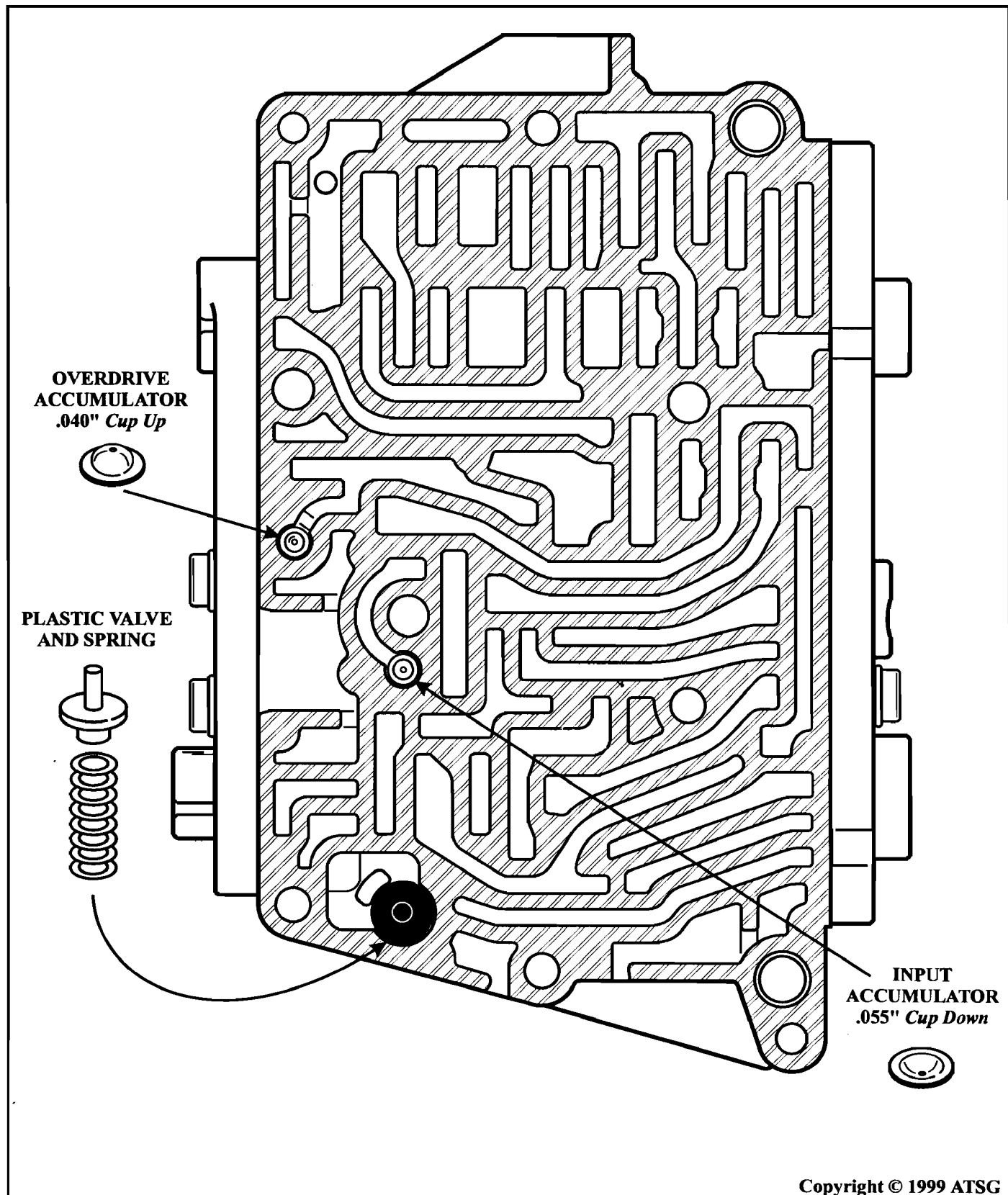


Figure 2

SLIDE

BMW ELECTRONIC ZF4HP-22 (4 SOLENOID ONLY)
CHANNEL PLATE

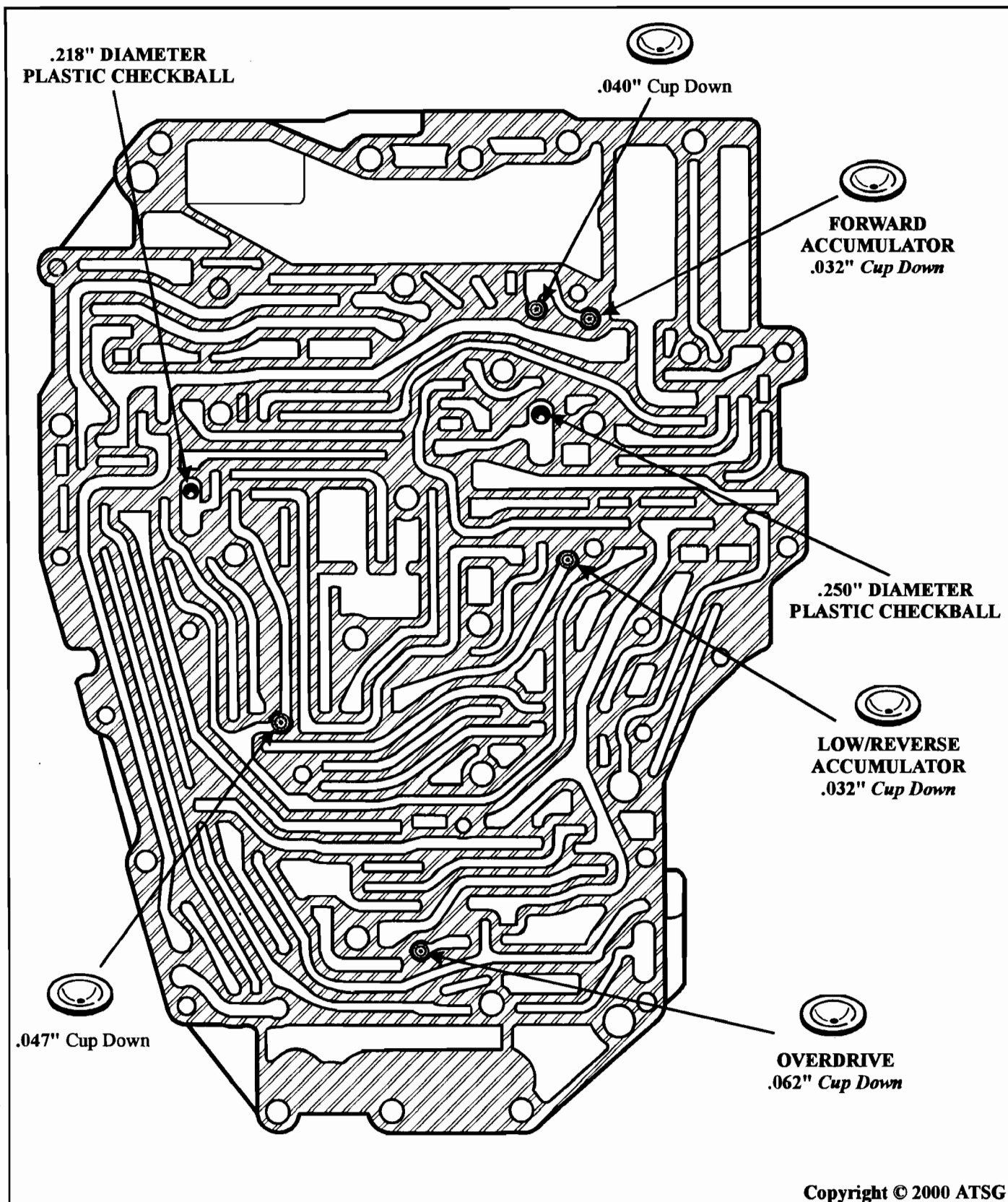
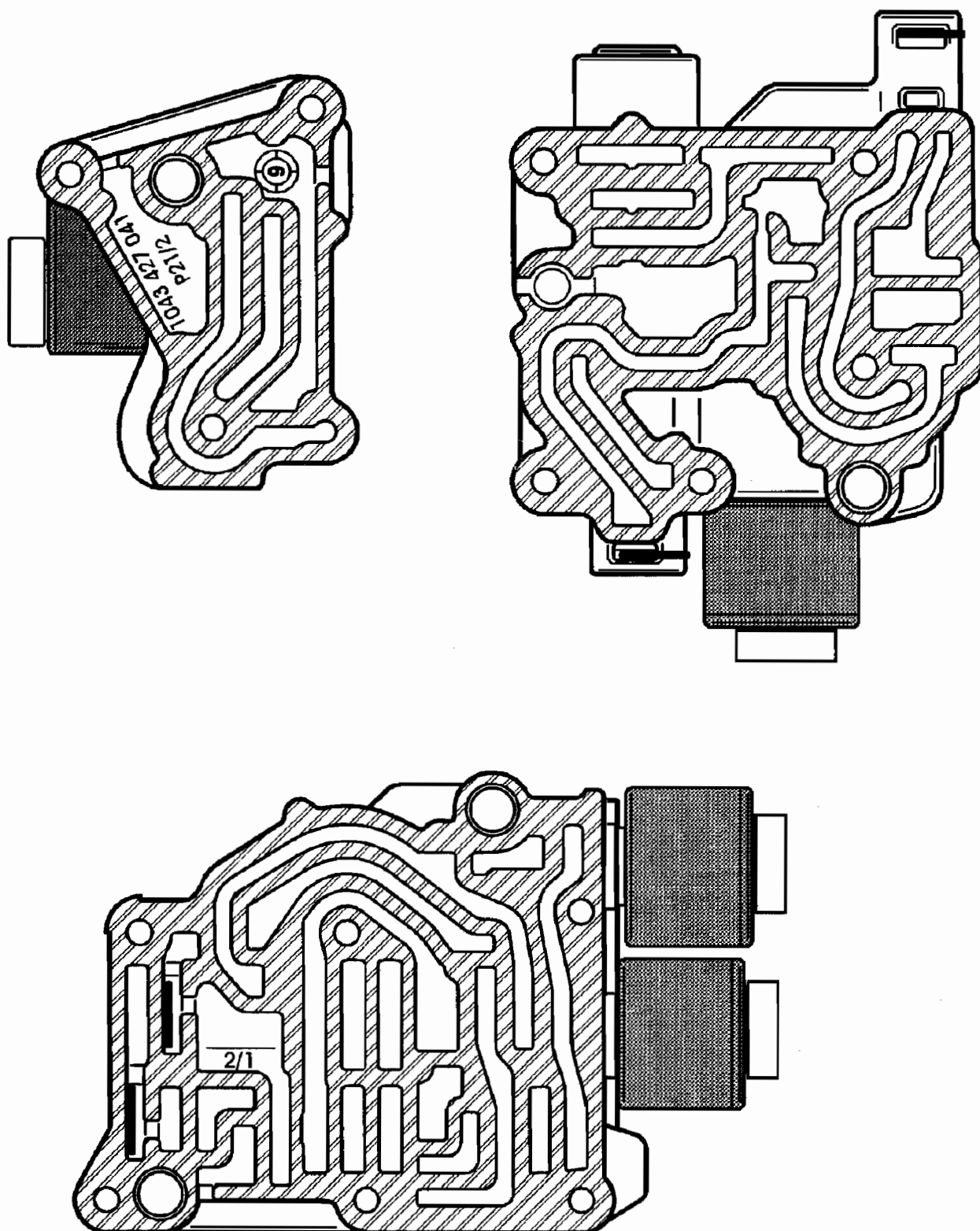


Figure 3

SLIDE

**BMW ELECTRONIC ZF4HP-22 (4 SOLENOID ONLY)
"UPPER RIGHT" AND "UPPER LEFT" VALVE BODY**



Copyright © 2000 ATSG

Figure 4

SLIDE

BMW ELECTRONIC ZF4HP-22 (5 SOLENOID ONLY) "LOWER FRONT" VALVE BODY

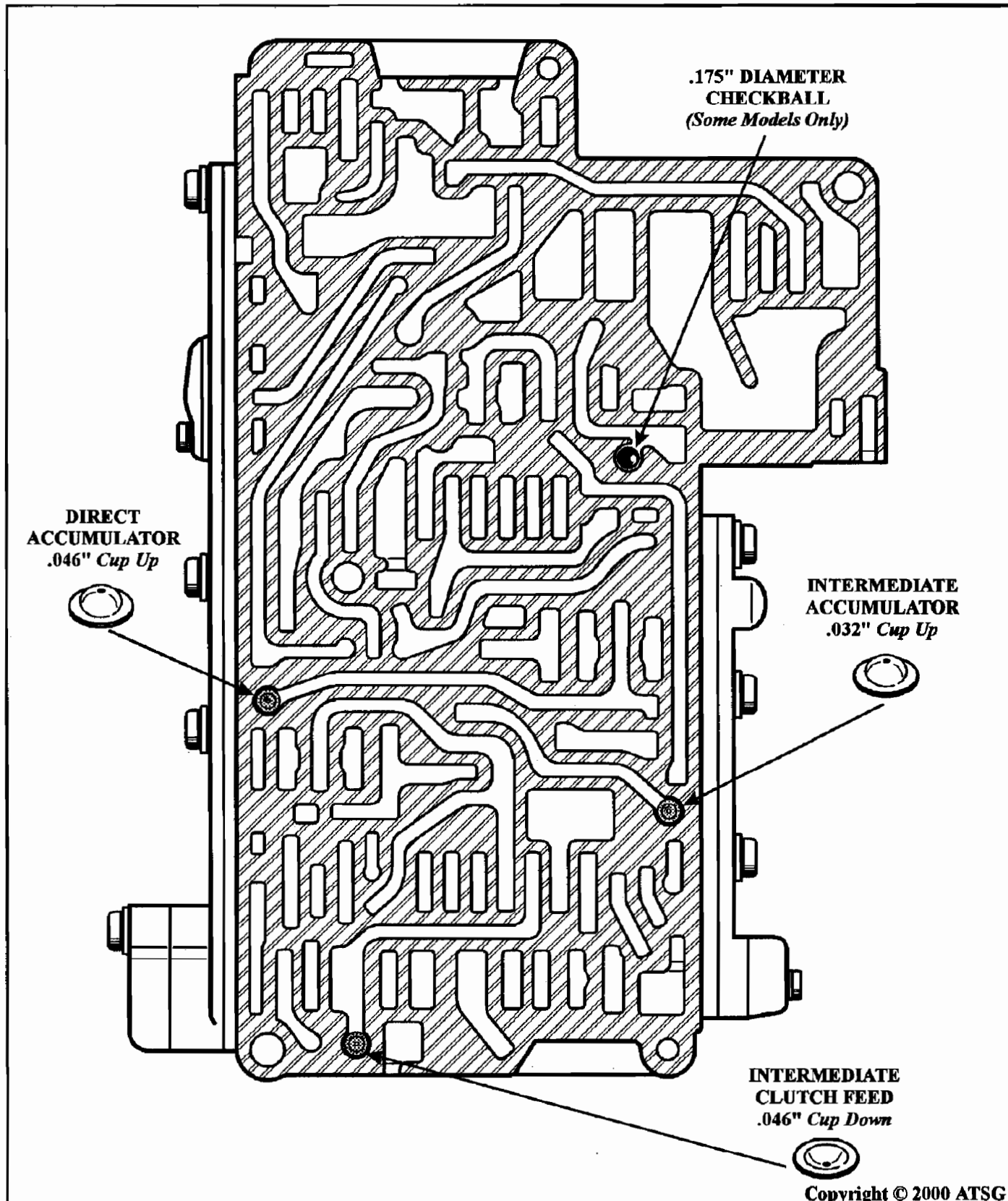


Figure 1

SLIDE

BMW ELECTRONIC ZF4HP-22 (5 SOLENOID ONLY)

"LOWER REAR" VALVE BODY

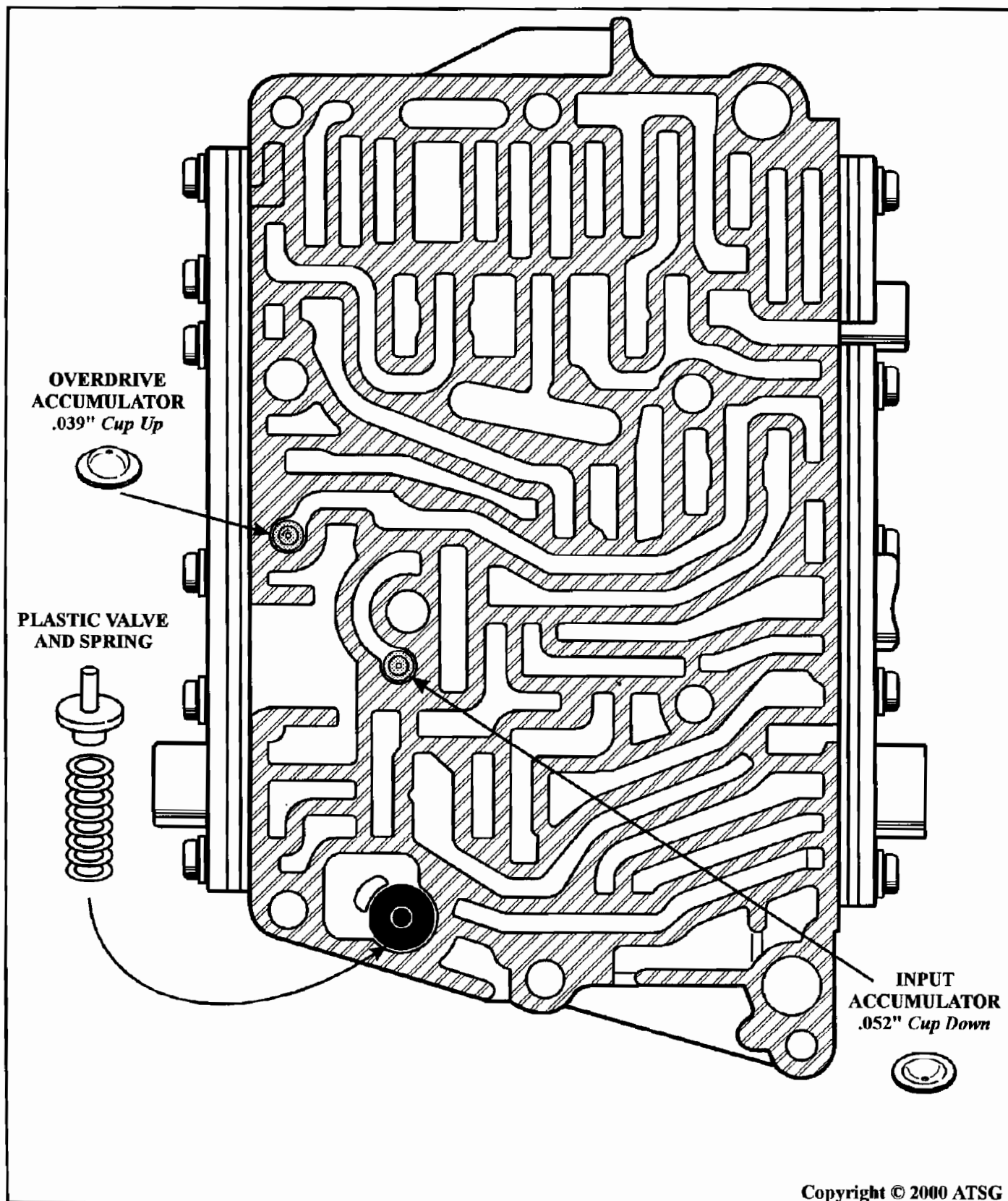
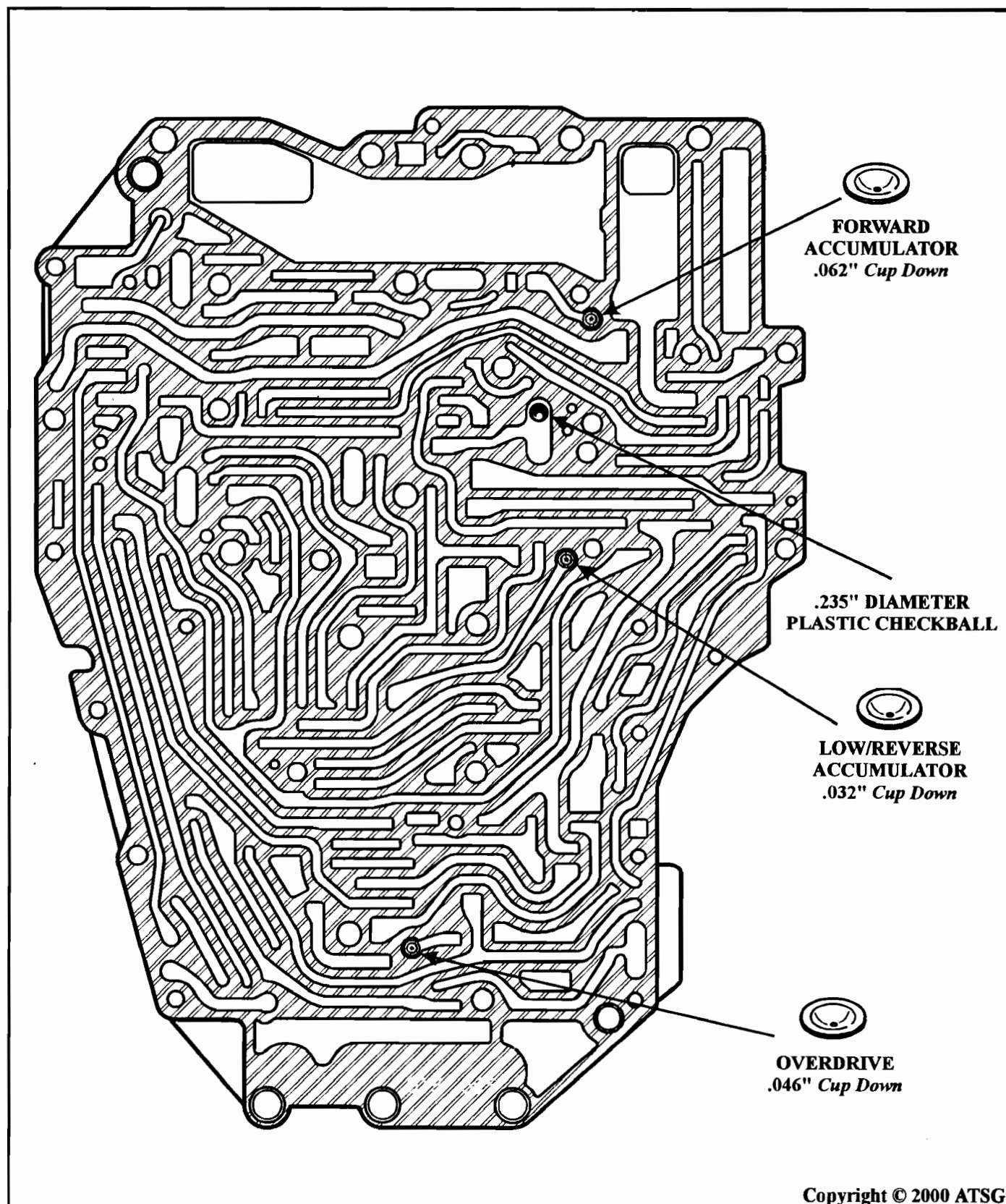
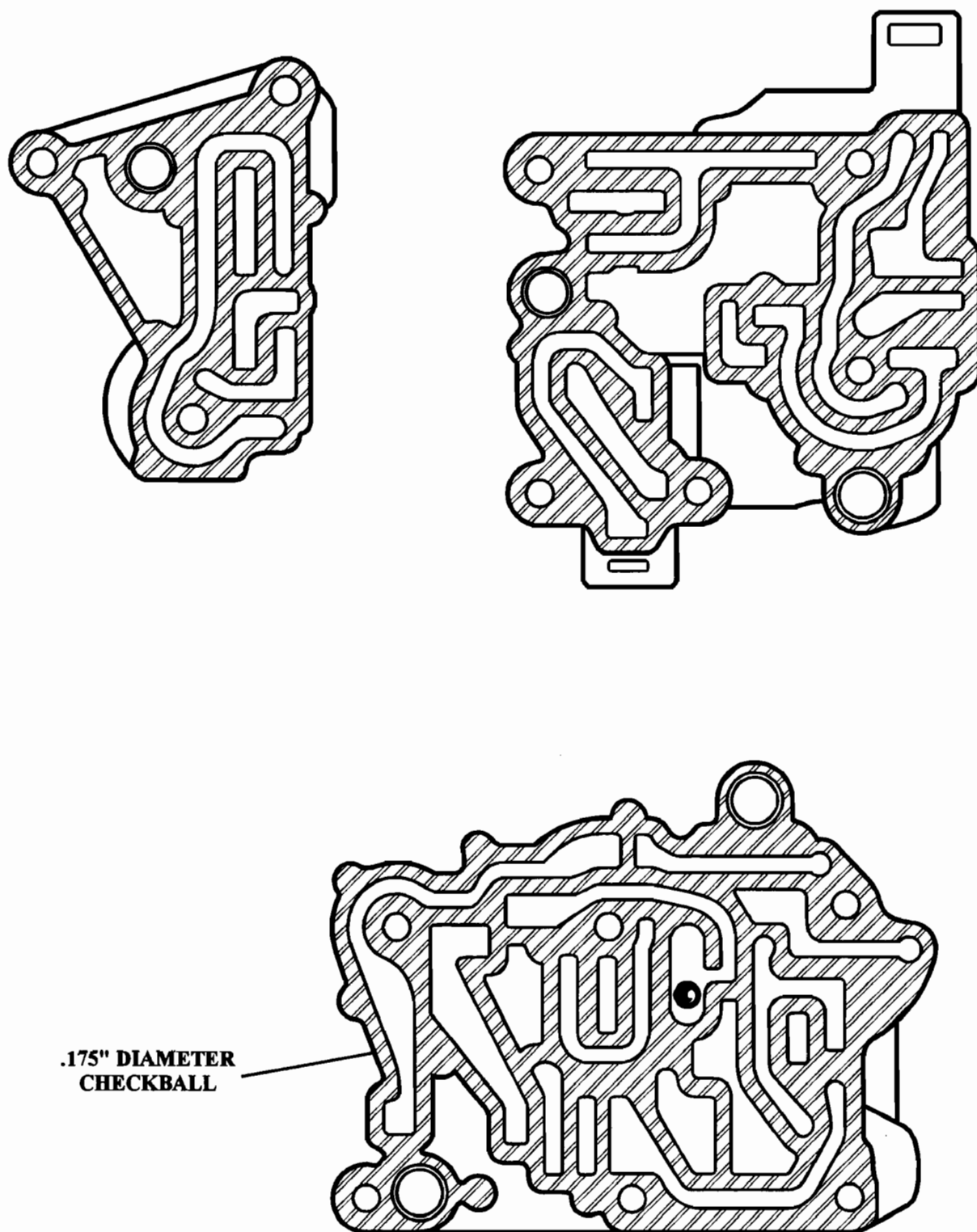


Figure 2

SLIDE**BMW ELECTRONIC ZF4HP-22 (5 SOLENOID ONLY)
CHANNEL PLATE****Figure 3**

SLIDE**BMW ELECTRONIC ZF4HP-22 (5 SOLENOID ONLY)
"UPPER RIGHT" AND "UPPER LEFT" VALVE BODY**

Copyright © 2000 ATSG

Figure 4



“We road test our transmission parts at 160 mph.”

-Mike Weinberg, President of Rockland Standard Gear

We not only have the largest inventory of OEM standard transmission parts, we race these parts. Mike, our President, races an IMSA car with one of our transmissions in it. So, if you need technical advice backed-up from a company that knows standard transmissions, we're your company. We stock standard transmission parts for practically every model of car and truck. We offer technical support to any customer who buys our parts. Rockland Standard Gear, the answer to all of your standard transmission problems.



**Rockland
Standard Gear**

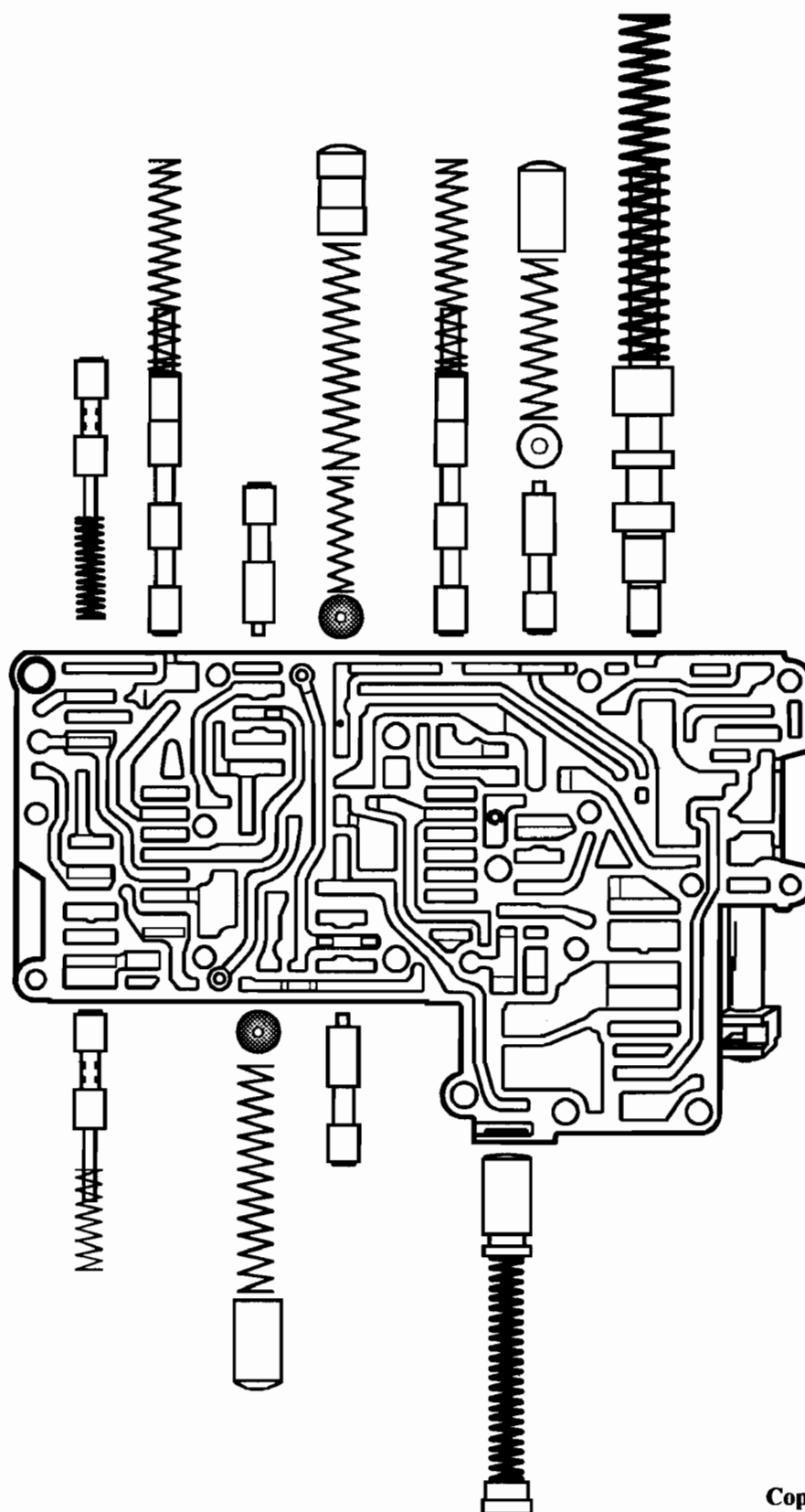
We road test our transmission parts at 160 mph

WE SHIP FROM 8:30 A.M. TO 6:30 P.M. EASTERN STANDARD TIME MONDAY - FRIDAY

Call 1-800-227-1523

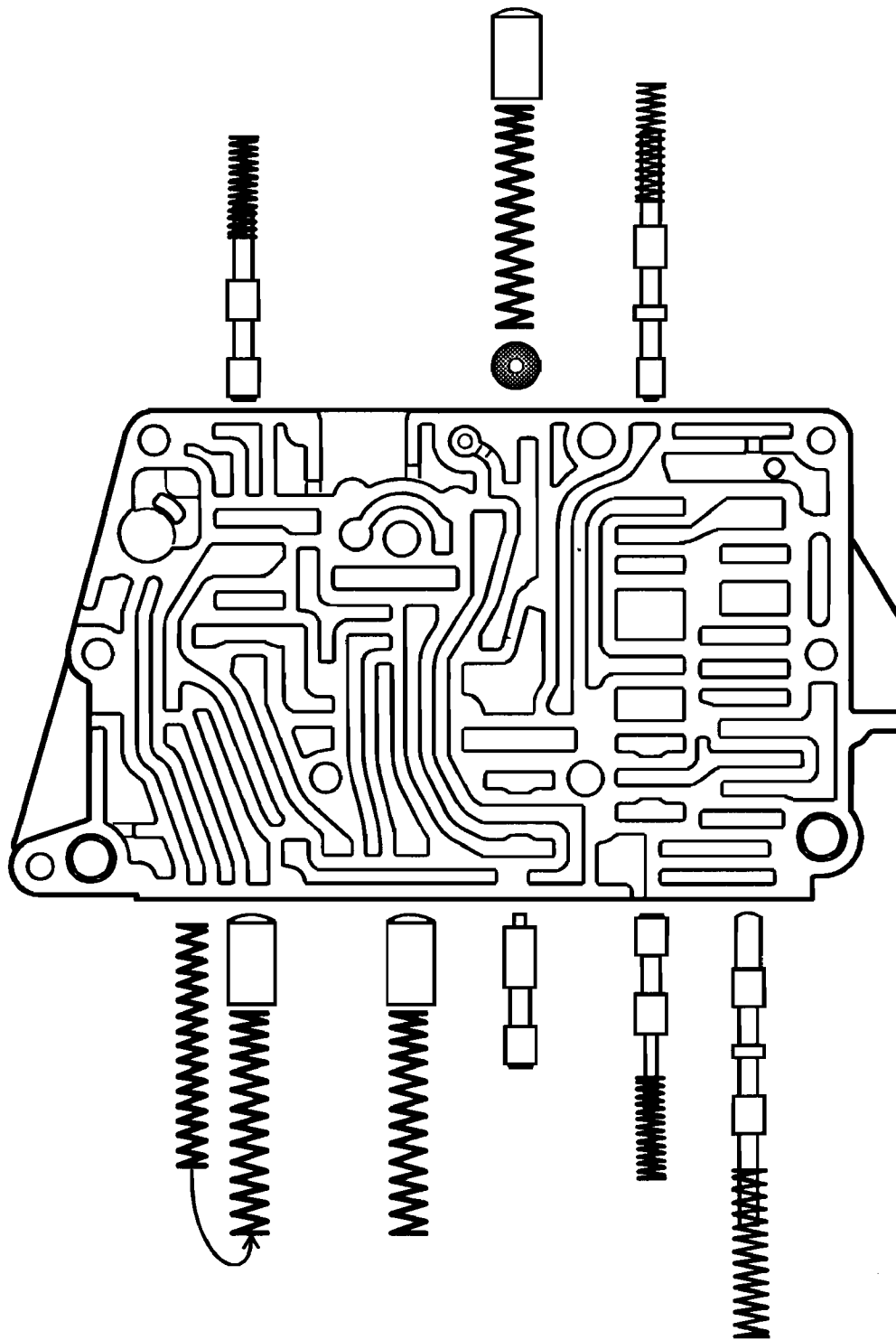
Fax 1-877-774-3294 (toll free)

- Manual Transmission parts and assemblies • Transfer Case parts and assemblies
- Full line of LuK Clutches • Differential Ring and Pinions • Overnight Delivery
- Guaranteed 3-day FedEx delivery anywhere in the Continental U.S. for the price of ground

SLIDE**BMW ELECTRONIC ZF4HP-22/24 (4 SOLENOID ONLY)****"LOWER FRONT" VALVE BODY**

Copyright © 2000 ATSG

Figure 5

SLIDE**BMW ELECTRONIC ZF4HP-22/24 (4 SOLENOID ONLY)****"LOWER REAR" VALVE BODY**

Copyright © 2000 ATSG

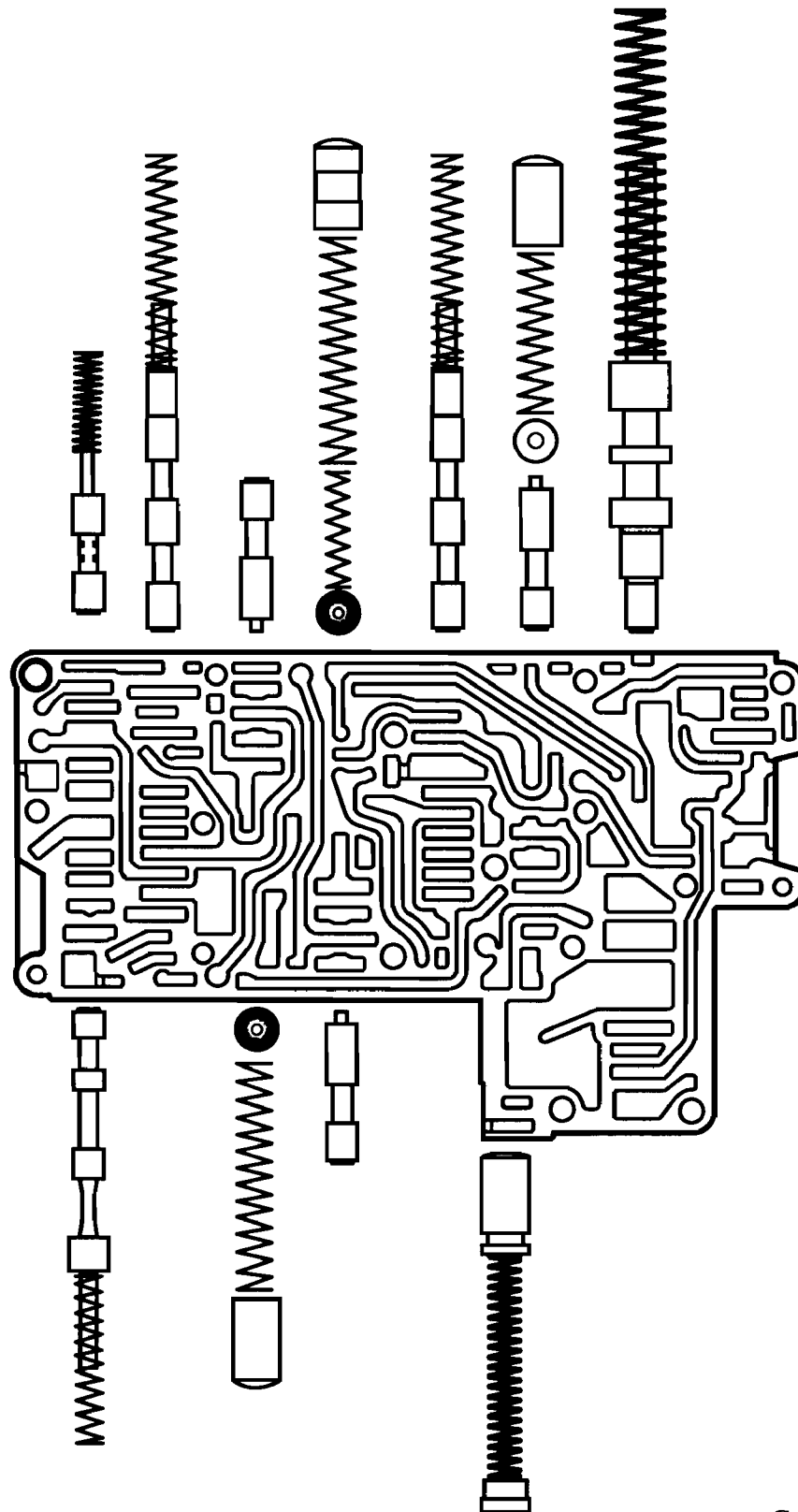
Figure 6

Automatic Transmission Service Group

SLIDE

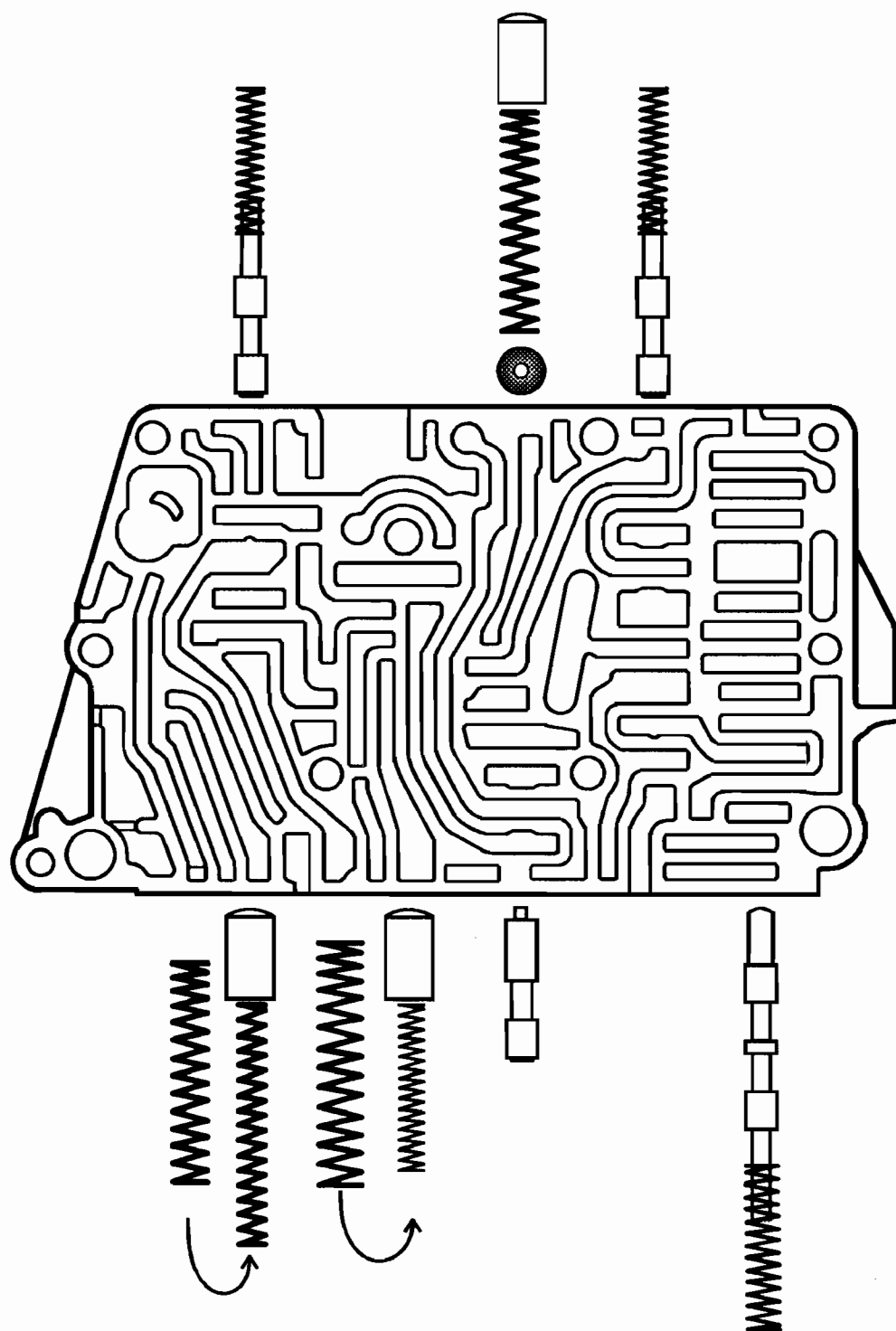
BMW ELECTRONIC ZF4HP-22 (5 SOLENOID ONLY)

"LOWER FRONT" VALVE BODY



Copyright © 2000 ATSG

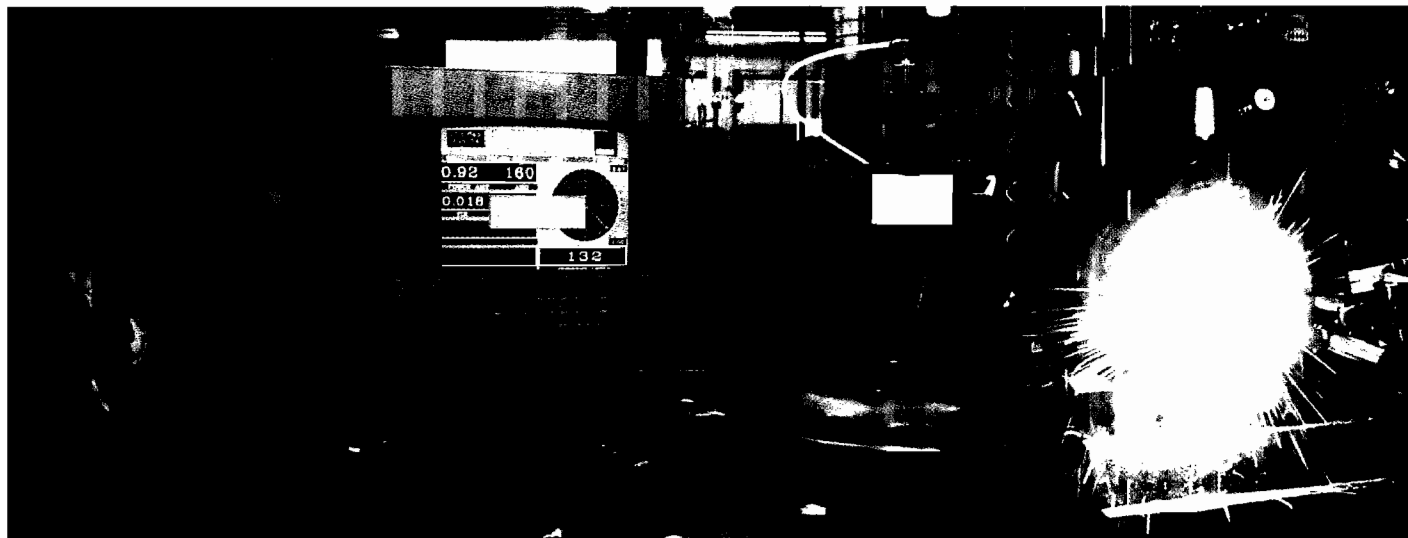
Figure 7

SLIDE**BMW ELECTRONIC ZF4HP-22 (5 SOLENOID ONLY)****"LOWER REAR" VALVE BODY**

Copyright © 2000 ATSG

Figure 8

Automatic Transmission Service Group



Committed to Quality

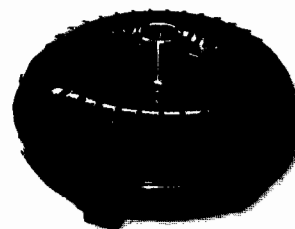
You told us what you want. Converters that work when you install them.
You want quality.

That's why we're investing in better tooling in our plants,
and training our employees to build the best converter in
the industry.

To meet our commitment, we:

- Balance every torque converter to eliminate vibration
- Check end-play and run-out to insure the tightest tolerances in the industry
- Manufacture hubs using state-of-the-art CNC machines that allow us tolerances within .000005 of ATC specs
- Burnish all hubs to extend bushing and hub life.

You work hard to satisfy your customers. We're listening and
we're working hard to satisfy you. ATC delivers.



Converter Spec Tag



*Maneco
Converters*

TRANS MART

ELING-MATC

TRANZPARTS

ALL PARTS

REPCO Industries

METRAN

DIVERCO

ETC

ATC

Working together to keep you moving.



"2000" SEMINAR INFORMATION
SLIDE

69

ZF5HP30

PRESSURE REGULATOR VALVE CHANGE

CHANGE: The main pressure regulator valve has been redesigned in the area of the valve spools.
The main pressure regulator valve is located in the lower front valve body section and is illustrated in figure 1.
The 1st design pressure regulator valve and it's dimensions are shown in figure 2.
The 2nd design pressure regulator valve and it's dimensions are shown in figure 3.

REASON: The 1st design pressure regulator valve was responsible for causing pressure spikes which would create intermittent undesirable shift feel.
The 2nd design pressure regulator valve prevents these pressure spikes from occurring.

PARTS AFFECTED:
The main pressure regulator valve.

INTERCHANGEABILITY:
The 2nd design pressure regulator valve will back service all 5HP30 transmissions.

SERVICE INFORMATION:
2nd design pressure regulator valve.....1058-327-030

NOTE: *The number listed above is a ZF part number, which can be obtained from a ZF parts distributor.*
DO NOT TRY TO GET THIS FROM A BMW DEALER!

ZF5HP30

PRESSURE REGULATOR VALVE CHANGE

**ZF-5HP-30
LOWER FRONT VALVE BODY**

9. Manual Shift Valve (W-S).
10. Converter Clutch Apply Oil Control Valve (WK-V).
11. Converter Clutch Release Oil Control Valve (WD-V).
12. **Main Pressure Regulator Valve Line-Up (HD).**
13. Lubrication Valve (SCHM-V).
14. Modulating Valve Line-Up (MOD-V).
15. Main Regulator Valve For "B" Clutch (HV-B).
16. Accumulator Valve For EDS 2 Solenoid (D-2).
17. Main Regulator Valve For "D" Clutch (HV-D).
18. Accumulator Valve For EDS 4 Solenoid (D-4).
19. Accumulator Valve For EDS 5 Solenoid (D-5).
20. Accumulator Valve For EDS 3 Solenoid (D-3).

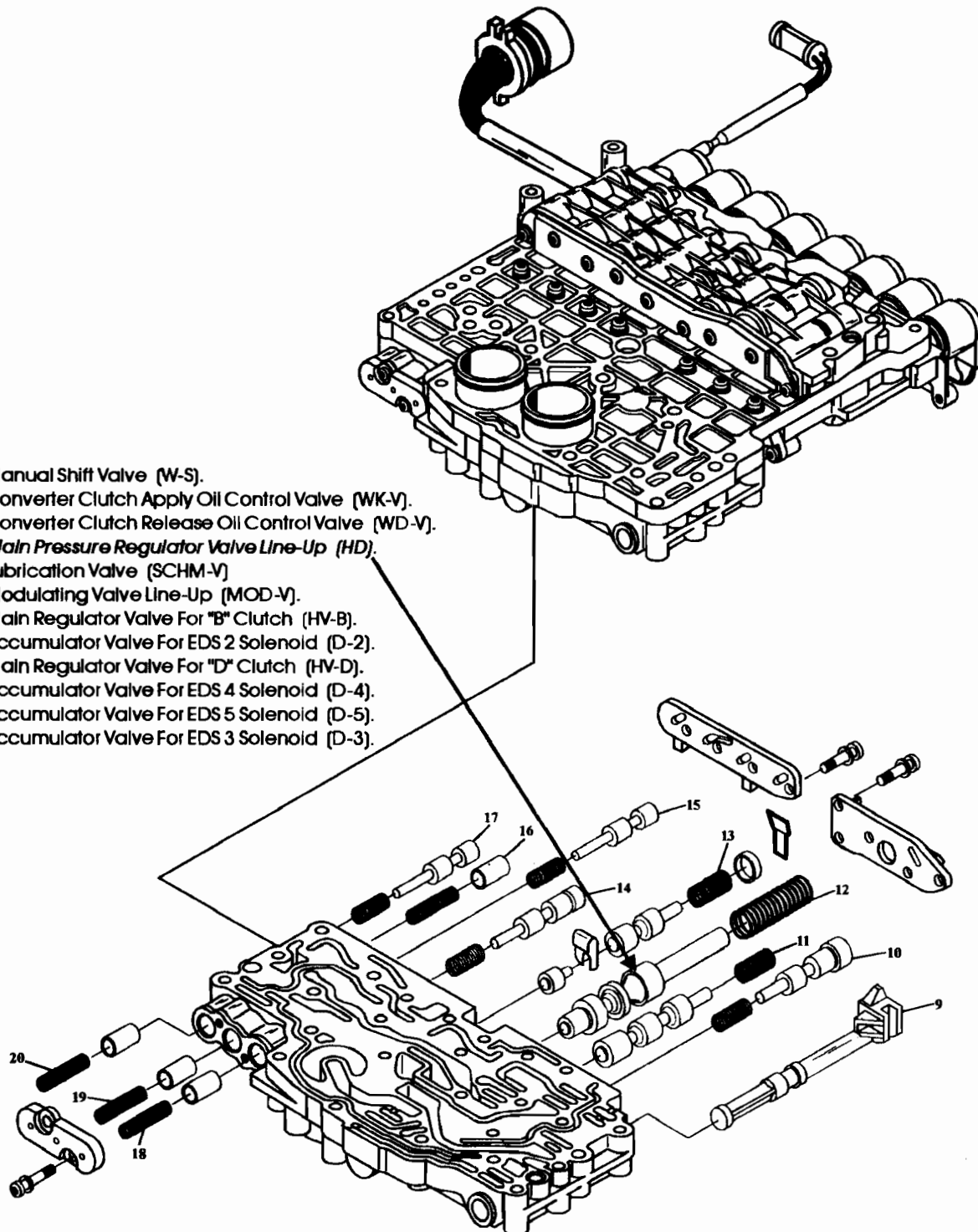


Figure 1

ZF5HP30

PRESSURE REGULATOR VALVE CHANGE

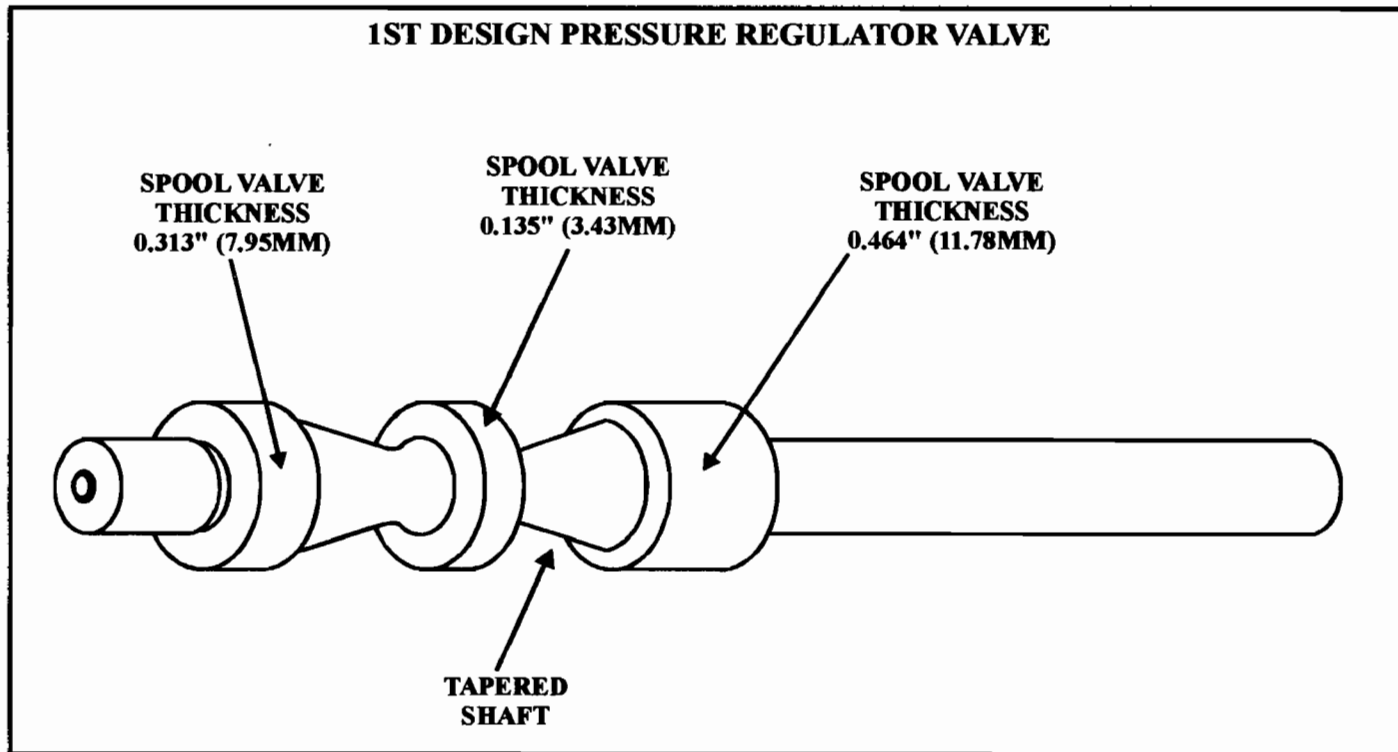


Figure 2

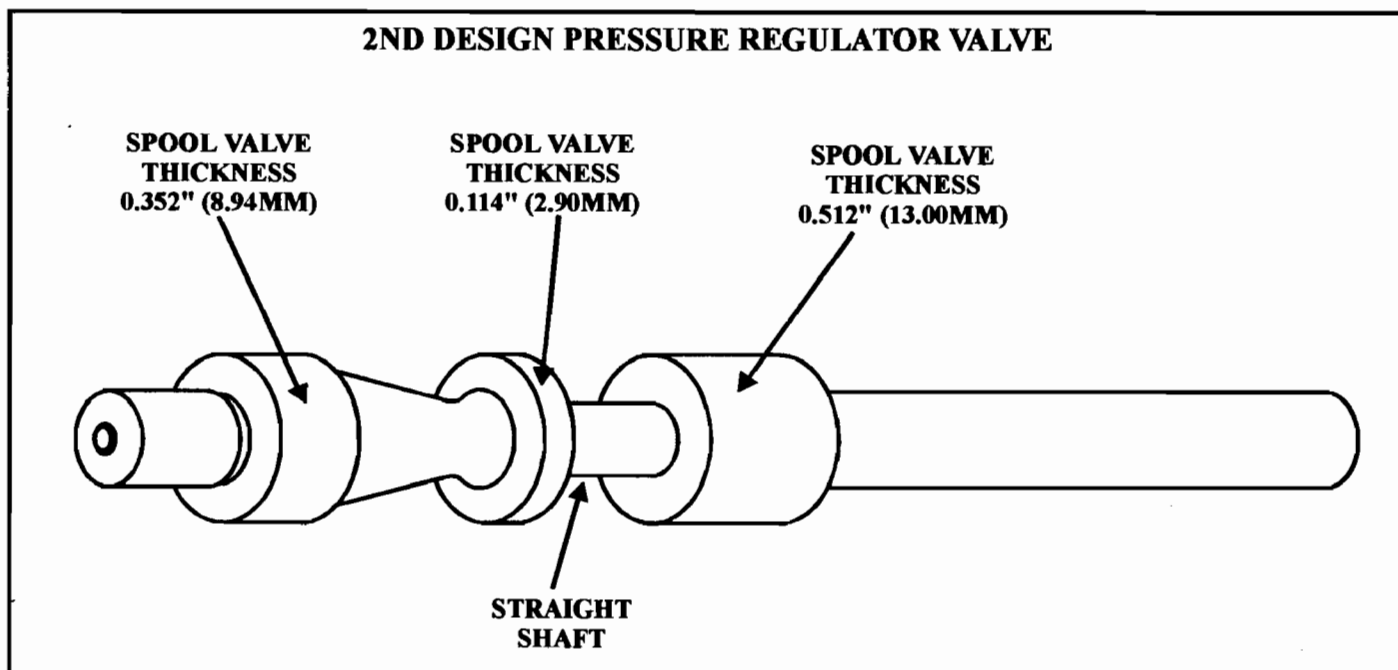


Figure 3

ZF-5HP-30
LOW GROWLING NOISE

COMPLAINT: During a road test, it is noticed that a low groaning or growling noise is heard and changes pitch with speed.

CAUSE: One cause may be the Ball Bearing for the output flange in the extension housing has rusted. The one way baffled vent restricts moisture from escaping allowing condensation to form on the bearing which eventually leads to rust.

CORRECTION: Disassemble and replace the nut and bearing. As an update on models past specification number ending with 029, ZF has now placed a hole drilled through the output shaft to allow increased flow of transmission fluid to the bearing. This keeps the bearing flushed with fluid preventing condensation from forming on the bearing (See Figure 1). The output carrier and flange must be replaced on previous models allowing this additional fluid to reach the bearing.

SERVICE INFORMATION:

Flange with additional oil passages.....	1058314011
Nut.....	0737502175
Bearing.....	0735340153
Output Carrier with additional oil passages and orifice installed.....	1055232090

These are ZF part numbers available through ZF Authorized Distributors.

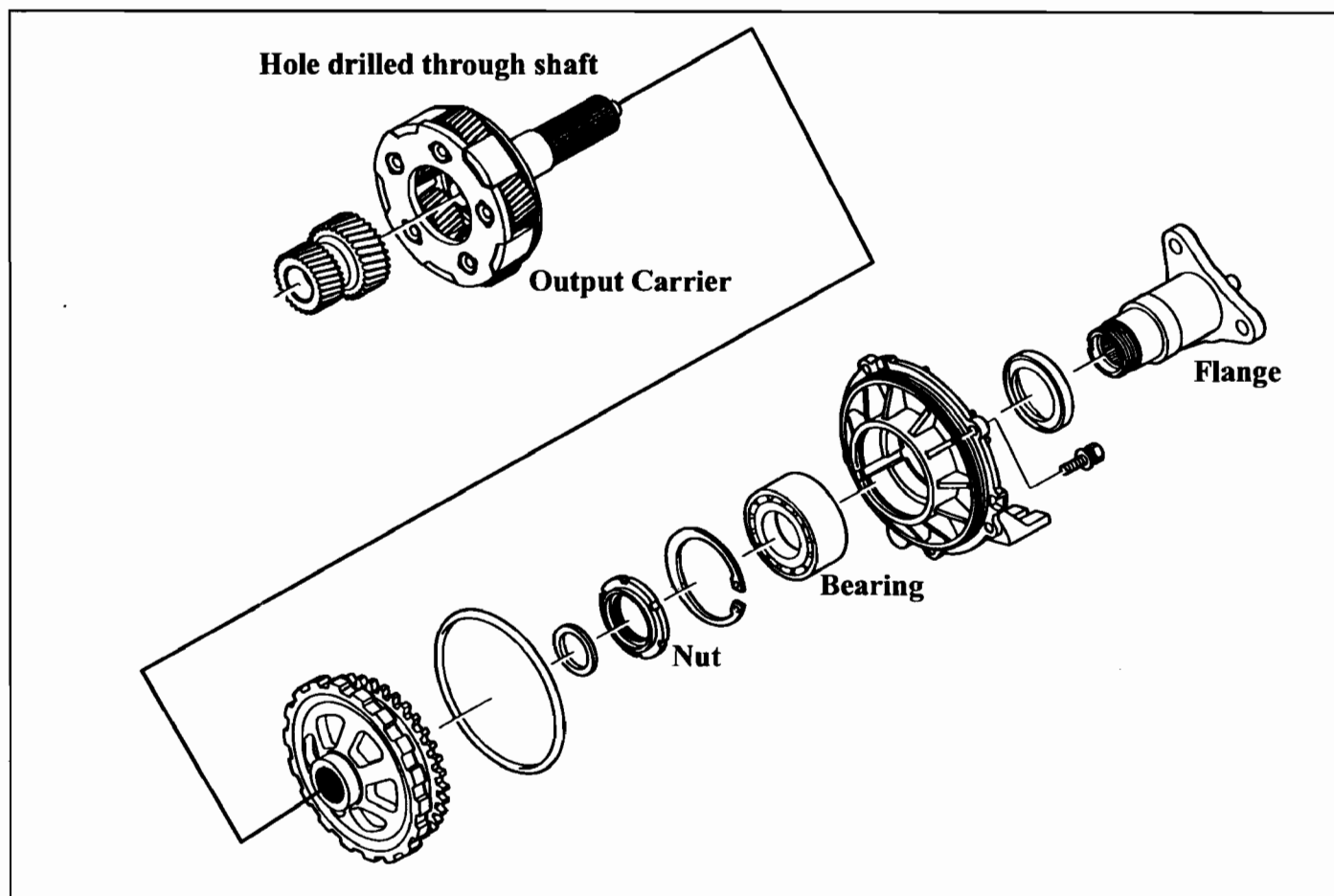
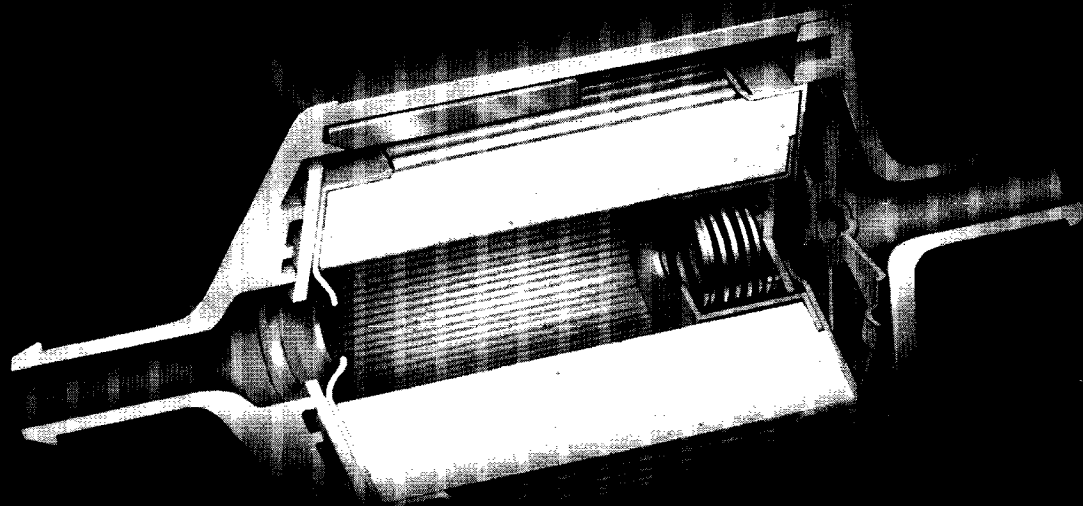


Figure 1

PERFORMANCE STANDARD



XL30 MAGNETIC IN-LINE **FILTERS**

***REBUILT TRANSMISSIONS SHOULD BE
BROKEN IN, NOT BROKEN DOWN.***

The new and improved Filtran XL30 filter is the best protection against contamination during the break-in stage. Typically, new parts produce tiny wear particles that damage the transmission's electronic solenoids and valve bodies. To prevent that from happening, just take a few minutes to install our XL30 in the return cooler line of any

automatic transmission, especially electronic transmissions. The filter is redesigned with a Zero Leak bypass valve that prevents transmission fluid from escaping unfiltered, and a recyclable magnet that harnesses magnetic lines of force, preventing them from radiating outward. By protecting your work, you're protecting yourself from customer returns and warranty claims.

SPX FILTRAN



"2000" SEMINAR INFORMATION INFORMATION ONLY

74

HONDA/ACURA

ALL VEHICLES EQUIPPED WITH GRADE LOGIC CONTROL SYSTEM

COMPLAINT: When road testing the vehicle on the lift the transmission will exhibit wrong gear starts and the transmission shuttle shifts 2-3-2 or 3-4-3.

When the solenoid command is checked, the commands match the above operation of the transmission.

CAUSE: Honda/Acura vehicles that are equipped with **Grade Logic Control System** uses the PCM to control shifting while the vehicle is ascending or descending a hill or reducing vehicle speed.

The PCM uses what is called a Fuzzy Logic System which compares actual driving conditions with memorized driving conditions based on inputs from several sensors which is illustrated in figure 1.

NOTE: 1997 and earlier vehicles with grade logic use the *Vehicle Speed Sensor* for speed signal input.

1998 and later vehicles with grade logic use the *Countershaft Speed Sensor* for speed signal input.

CORRECTION: The Grade Logic Control System commands three modes of strategy as follows:

ASCENDING CONTROL

When the PCM determines that the vehicle is climbing a hill in the D4 or D3 gearshift positions, the system extends the 2-3 and 3-4 shifts to prevent the transmission from frequent shifts between 2nd and 3rd gear and 3rd and 4th gear, in order to provide more power when needed.

Shift schedules stored in the PCM, enable the PCM Fuzzy Logic to automatically select the most suitable gear according to the steepness of the hill which is illustrated in the graph shown in figure 2.

DESCENDING CONTROL

When the PCM determines that the vehicle is going down a hill in the D4 or D3 gearshift positions, the upshift speed from 2nd to 3rd gears or 3rd to 4th gears, when the throttle is closed, becomes faster than the set speed for flat road driving to prolong 3rd and 2nd gears.

This, in combination with engine braking achieves smooth driving when the vehicle is descending a hill. There are two descending phases with different 3rd gear and 2nd gear operating ranges according to gradient angle stored in the PCM.

When the vehicle is in 4th gear, and you are decelerating when you are applying the brakes on a steep hill, the transmission will downshift to 3rd gear.

When you accelerate, the transmission will then return to a higher gear as illustrated in the graph in figure 3.

DECELERATION CONTROL

When the vehicle goes around a corner, and needs to decelerate first and then accelerate, the PCM sets the data for deceleration control to reduce the number of times the transmission will shift.

When the vehicle is decelerating from speeds above 27mph (43km/h), the PCM shifts the transmission from 4th to 2nd earlier than normal to cope with upcoming acceleration.

WARNING: ***DO NOT PERFORM THE FINAL ROAD TEST ON A LIFT, DO IT ON THE ROAD!***

HONDA/ACURA

ALL VEHICLES EQUIPPED WITH GRADE LOGIC CONTROL SYSTEM

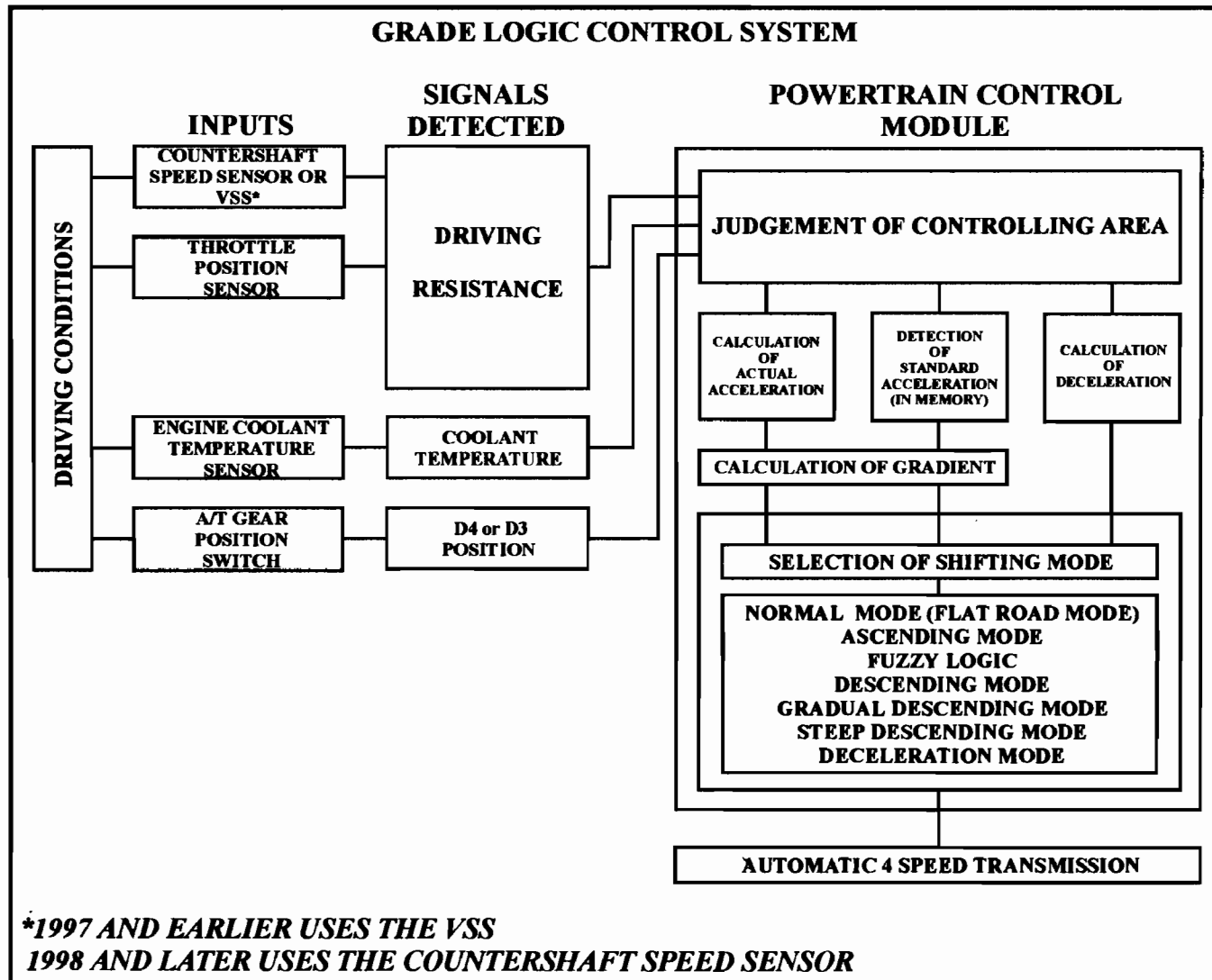


Figure 1

HONDA/ACURA

ALL VEHICLES EQUIPPED WITH GRADE LOGIC CONTROL SYSTEM

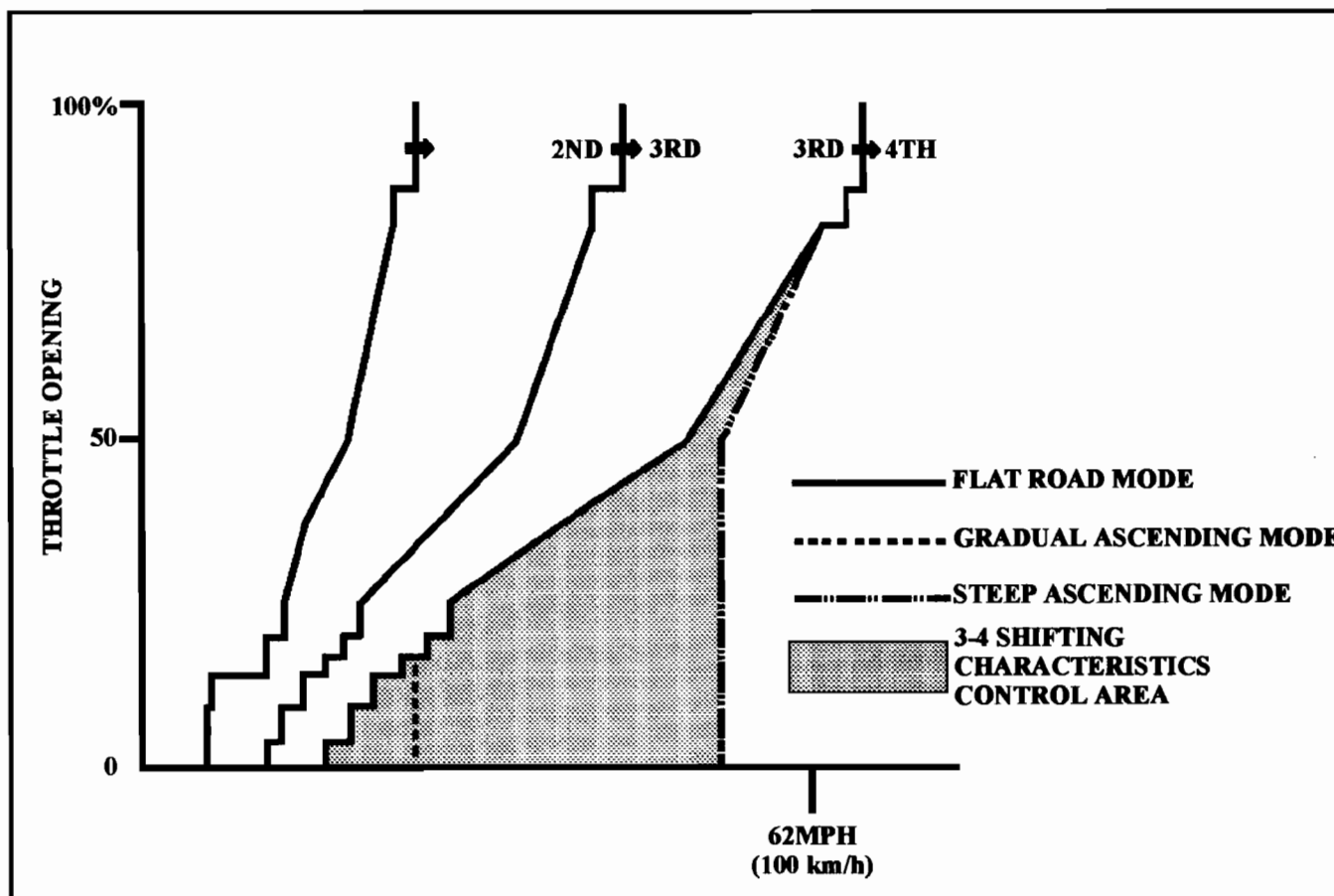


Figure 2

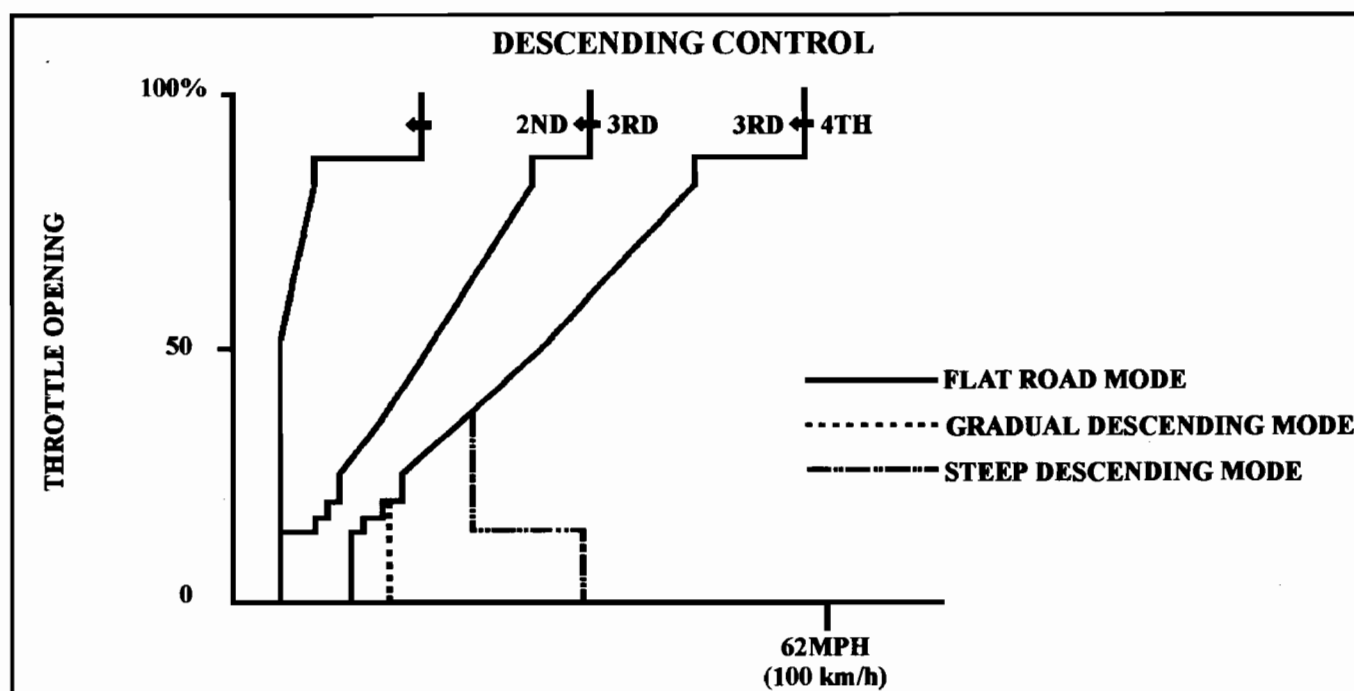


Figure 3



"2000" SEMINAR INFORMATION

SLIDE



HONDA CIVIC AND ACCORD

NO TCC APPLICATION

COMPLAINT: A complaint of no converter clutch application on *1996-97 Honda Civics (Except HX Models) and 1996-97 Honda Accords (Except V6 Models)*, when the weather is cold.

CAUSE: The above mentioned vehicles received marginally defective thermostats from the factory which will keep the engine from reaching normal operating temperature in cold weather which in turn will inhibit converter clutch application.

CORRECTION: Perform the following test procedure according to *Honda factory bulletin 97-025*:

(1) Wait until engine has cooled, then connect scan tool to the OBDII Data Link Connector located under the driver's side of the dashboard next to the kick panel on Civic Models as seen in figure 1, and in the center console on Accord Models as seen in figure 2, then follow scan tool menu instructions until data is displayed on the scan tool.

(2) Start engine and drive vehicle while observing engine coolant temperature on the scan tool.

(3) Engine temperature should reach 176°F (80°C) within ten (10) minutes of driving.

NOTE: *The values in step 3 are calculated when outside temperature is below 30°F (-1°C).*

(4) Continue driving to insure engine reaches normal operating temperature.

(5) If steps 3 and 4 have failed to reach the desired values, replace the thermostat, (Refer to Figures 3 and 4), and refill radiator with a 50/50 mix of antifreeze and water.

(6) Drive vehicle again and check the scan tool data to see if engine coolant temperature has reached normal operating temperature and that the TCC solenoids have turned on.

SERVICE INFORMATION:

Honda Thermostat and Gasket Kit.....19301-P08-316

HONDA CIVIC AND ACCORD

NO TCC APPLICATION

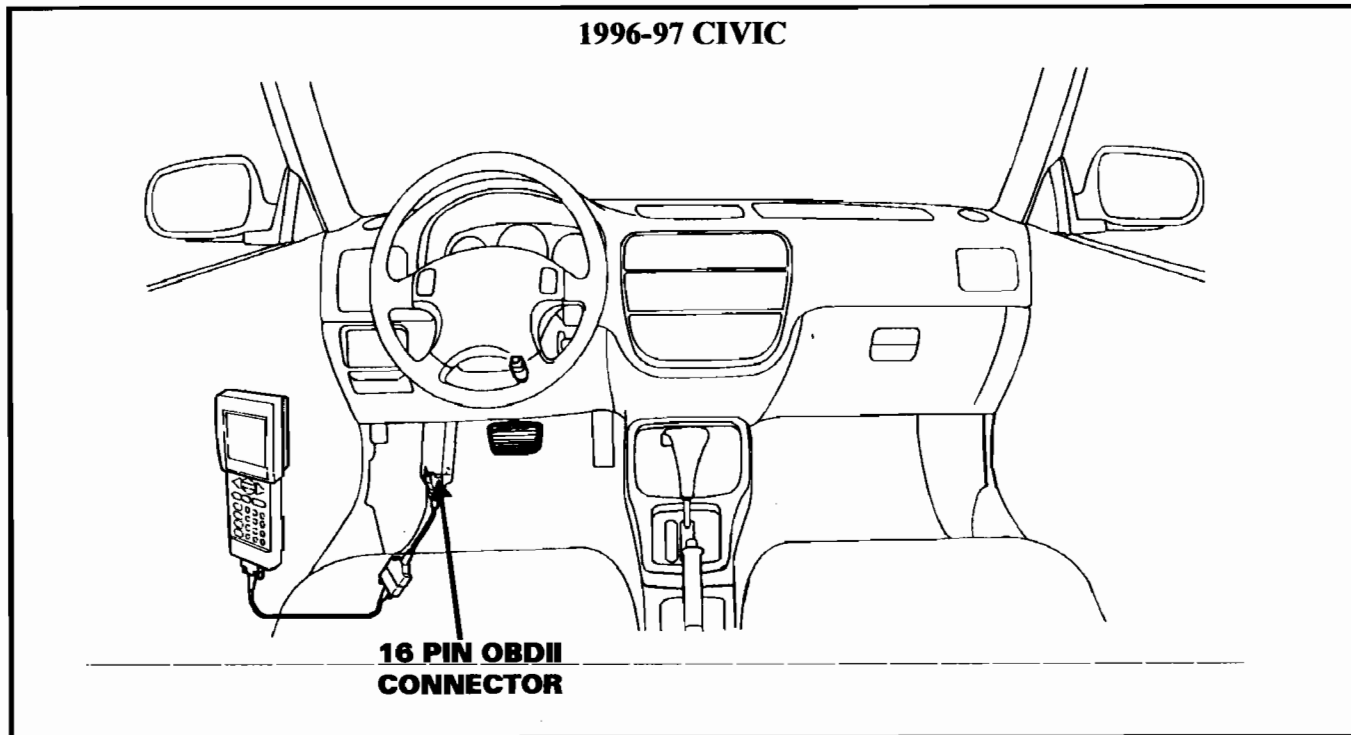


Figure 1

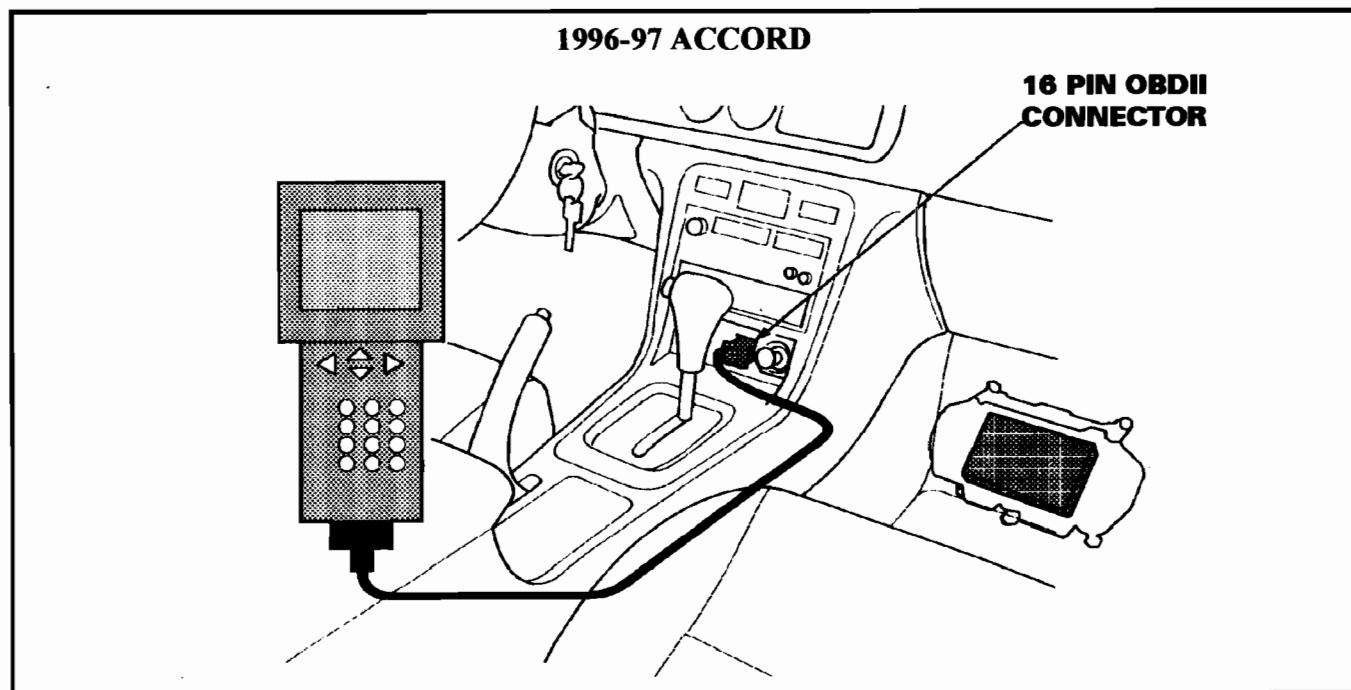


Figure 2

HONDA CIVIC AND ACCORD

NO TCC APPLICATION

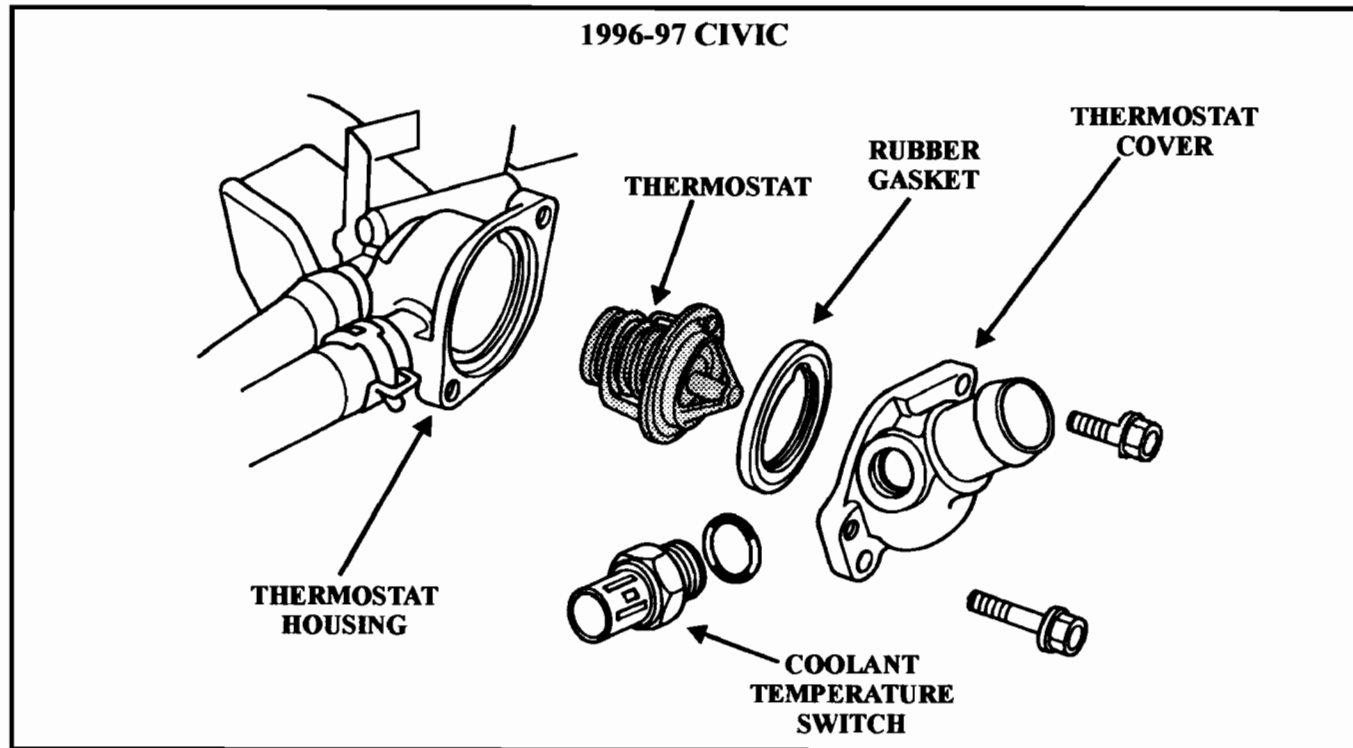


Figure 3

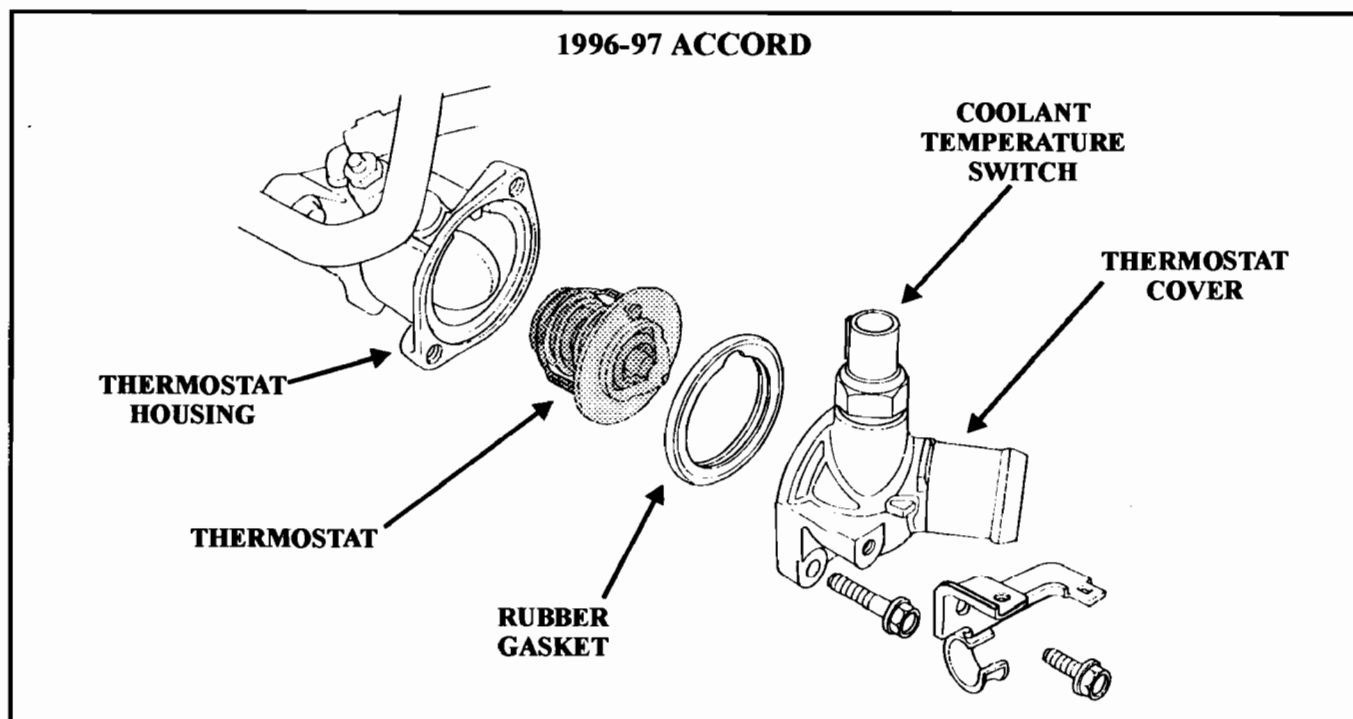


Figure 4

SLIDE**GF4A-EL
CODES 6, 25 and 55**

COMPLAINT: Vehicles having a 2.0L engine with a GF4A-EL transaxle may produce a code 6 for the VSS (Vehicle Speed Sensor), a code 25 for the FPCS (fuel pressure control solenoid) and a 55 for the PSG (Pulse Signal Generator) all at the same time placing the unit in failsafe.

CAUSE: It has been ATSG's experience that when these three codes have been stored together, the replacement of the Powertrain Control Module has corrected this complaint. It must be noted that each circuit has been checked and verified for proper operation before taking the action of computer replacement.

CORRECTION: The PCM can be located below the front center of the console (See Figure 1). From here all three circuits can be verified for proper operation before changing the computer (See Figure 2). If the following checks are observed, change the PCM.

Code 6 VSS - An approximate 5 DC volt pulse should be seen on the green wire with a red tracer going to terminal 1M as the wheels rotate slowly. An averages of 2.5 volts will be observed during driving conditions.

Code 25 FPCS - Unplug connector 3. With the key on and engine of, system voltage should be observed on the green wire going to terminal 3M.

Code 55 PSG - Plug connector three back into the PCM. Set meter to AC volts and probe the white wire at terminal 3F with the positive meter lead. Probe the red wire at terminal 3H with the negative lead. AC volts should be observed as soon as the vehicle is started and should increase proportionally with turbine shaft rotation.

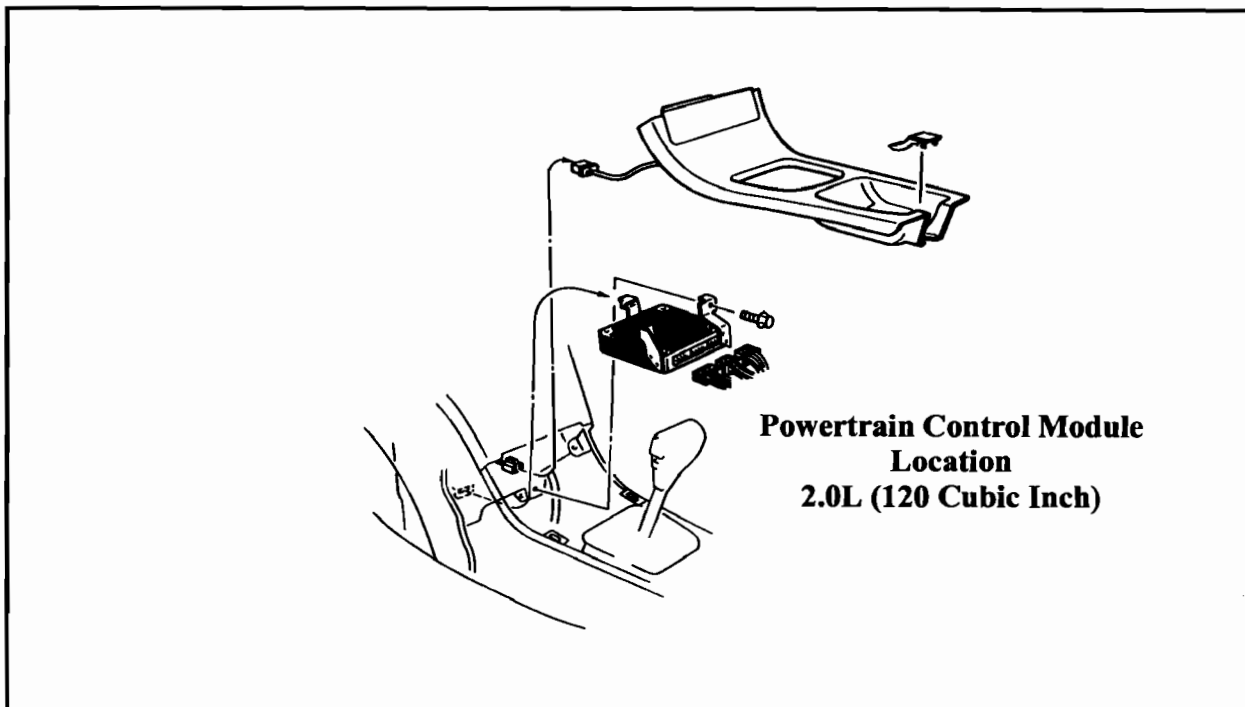


Figure 1

VSS: Approximate
5 volt pulse should be
seen as the wheels are
rotated slowly.

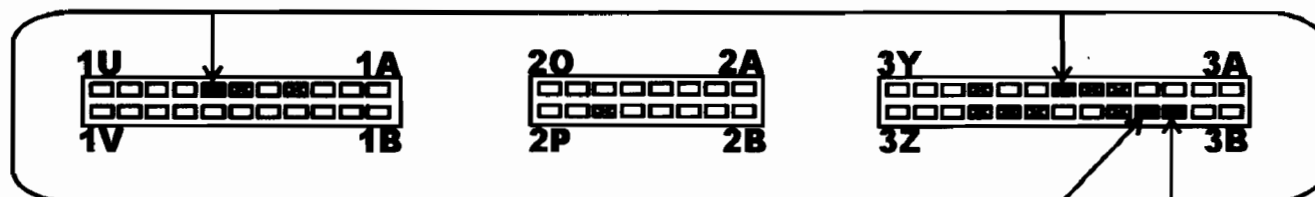
1M

Green/Red

FPRC: System Voltage
should be seen on this
wire unplugged from
the computer.

3M

Green



WIRE SIDE VIEW OF CONNECTORS

3H

Red
PSG-

3F

White
PSG+

PSG: AC voltage should
increase proportionally
with turbine shaft
speed rotation

*Powertrain Control Module
2.0L (KL System)*

Figure 2

626 G4A-EL

CODE 6 - SPEED SENSOR or PULSE GENERATOR

COMPLAINT: The transaxle goes to failsafe with a code 6. Code 6 means a faulty speed sensor circuit. This speed sensor is located in the speedometer cluster. Upon disassembly of the dash a speed sensor is not found.

CAUSE: Some Mazda 626's and Ford Probe GL's *1990-1992 2.2L Non-Turbo* vehicles may not have a speed sensor at all. In these instances, the pulse generator has been assigned code 6 rather than code 55. To determine if the 2.2L Non-Turbo vehicle you are working on has a speed sensor or not, it is easier to locate the computer and look for a speed sensor wire at terminal 1M (See Figure 1).

CORRECTION: If a wire does not exist at terminal 1M, inspect the pulse generator circuit. If terminal 1M contains a wire, there is a speed sensor in the dash. A quick check of the speed sensor can be made at this wire with a volt meter set to DC volts. Carefully probe into the wire with the positive lead and place the negative lead to ground. An approximate 1.5 to 4.5 volt pulse should be seen when turning the speedometer cable. If a pulse is not seen, the speed sensor in the dash is defective. If 0 volts is seen, snip the wire downstream the harness away from the computer leaving yourself enough room to repair the wire. With the wire snipped, check for voltage coming from the computer. Approximately 5 volts should be seen. If no voltage is seen on the snipped wire coming from the computer, the computer is defective. If approximately 5 volts is seen, the wire going to the speed sensor may be shorted to ground or the speed sensor is defective.

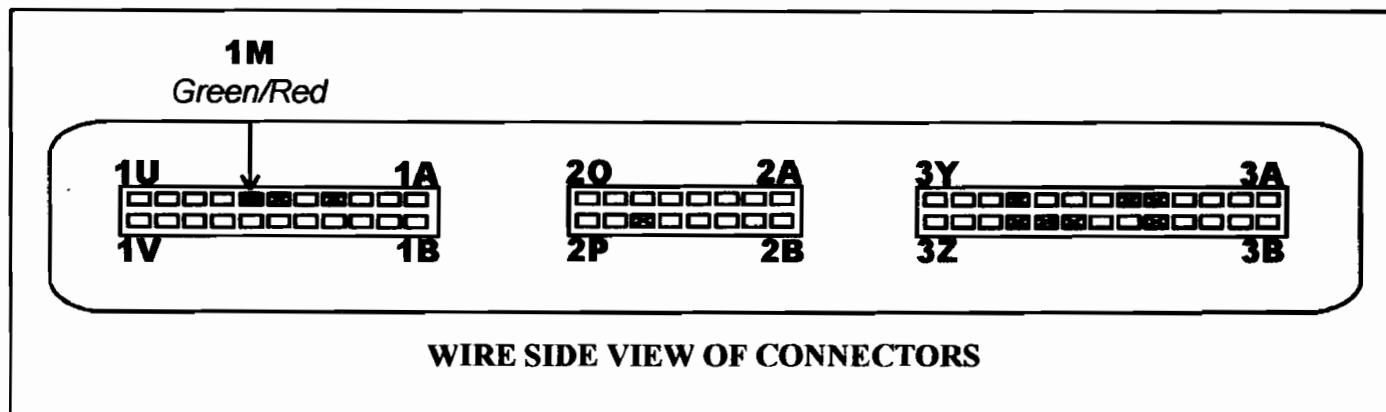


Figure 1

**MAZDA/FORD GF4A-EL
PREMATURE COAST CLUTCH FAILURE**

COMPLAINT: Vehicles equipped with GF4A-EL transaxles may exhibit premature and repeated Coast Clutch failure before or after overhaul.

CAUSE: The cause may be, a cracked Forward piston or a cracked Reverse Forward and Coast clutch drum allowing Forward Clutch pressure to partially apply the Coast Clutch while in 4th gear causing a partial bind-up. **NOTE:** This problem can *not* be easily detected when air checking the clutch packs.

CORRECTION: Replace the Reverse Forward and Coast Clutch drum and or Forward Clutch piston as shown in Figure 1.

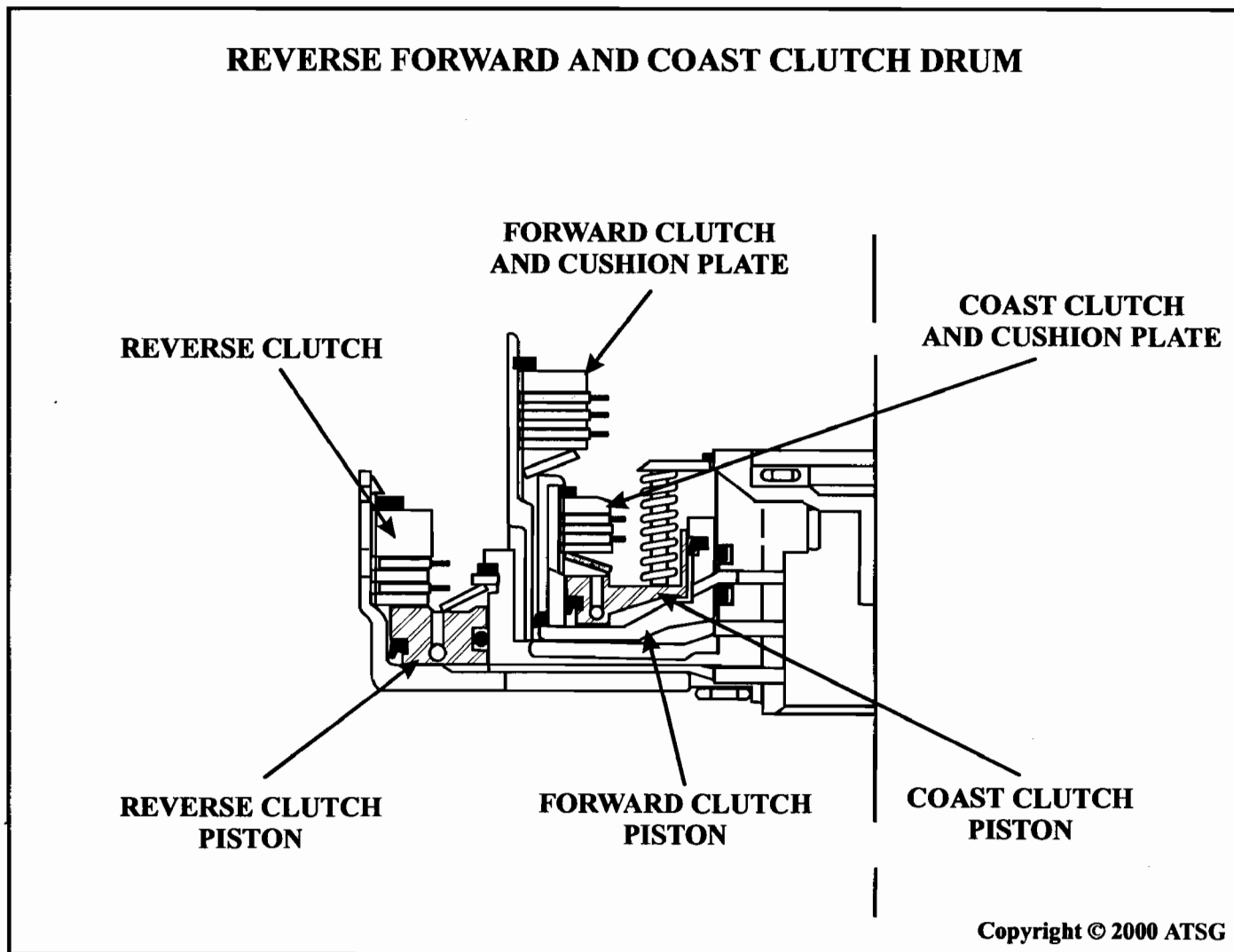


Figure 1



MAZDA/FORD GF4A-EL
LOSES REVERSE WHILE BACKING UP

COMPLAINT: Vehicles equipped with GF4A-EL transmissions may exhibit a no Reverse condition while backing up.

CAUSE: The cause may be a failed aftermarket theft deterrent system constantly grounding the P/N position signal wire. Under normal conditions, the P/N signal wire is only grounded in Park and Neutral and indicates 12 volts in all other selector ranges. When the P/N signal wire is grounded constantly by the theft deterrent system, a constant Park or Neutral selector position is indicated to the Transmission Control Module. When the selector is placed in Reverse, the Control module looks at the inhibitor switch for the Reverse range signal. The Control Module also looks at P/N position as a load/no load signal which indicates whether the transaxle is in gear or not. If the Reverse range signal is present, when in Reverse, and the P/N position signal is present at the same time, as if the selector was also in Park or Neutral, the Transmission Control Module may select the Neutral selector position shift solenoid strategy. When the selector is in the Neutral position, computer strategy is to turn the 1-2 shift solenoid ON, which blocks the passage to the low/reverse clutch, at approximately 3 mph which inhibits Reverse should the driver select Reverse. When the vehicle slows down below 3 mph, reverse is restored and the cycle repeats itself.

QUALIFICATION:

This complaint only pertains to vehicles with aftermarket anti-theft deterrent systems. Original manufacturers anti theft system uses a starter cut relay to disable the system. If a problem occurs with the OEM design, the vehicle will not start. A quick method in which to identify an OE or an aftermarket theft deterrent system is to locate the *Underhood Fuse Panel* (See Figure 1). If a starter cut relay (or starter interrupt relay) is in the panel, the vehicle has an OEM theft deterrent system. If a jumper wire has been installed in the panel rather than a relay, the vehicle is equipped with an aftermarket anti theft system.

CORRECTION: Verification of a shorted to ground P/N signal wire can be conducted at the computer. Both the 1993 2.0L and 1993 and later 2.5L version computer connector views are provided in figure 2. On early vehicles with 2.0 litre engines, probe terminal 1V. Near 0 volts should be observed in P and N while battery voltage should be seen in all other ranges. If battery voltage is not seen in other ranges than P and N, the wire is shorted to ground. The same procedure should be followed on 2.5 litre engines by probing into wire 2B. Once it is determined that a shorted P/N wire exists, the anti theft system will need to be located and disconnected to repair the condition. In some cases the splice going into the P/N signal wire from the theft deterrent system will need to be removed.

MAZDA/FORD GF4A-EL
LOSES REVERSE WHILE BACKING UP

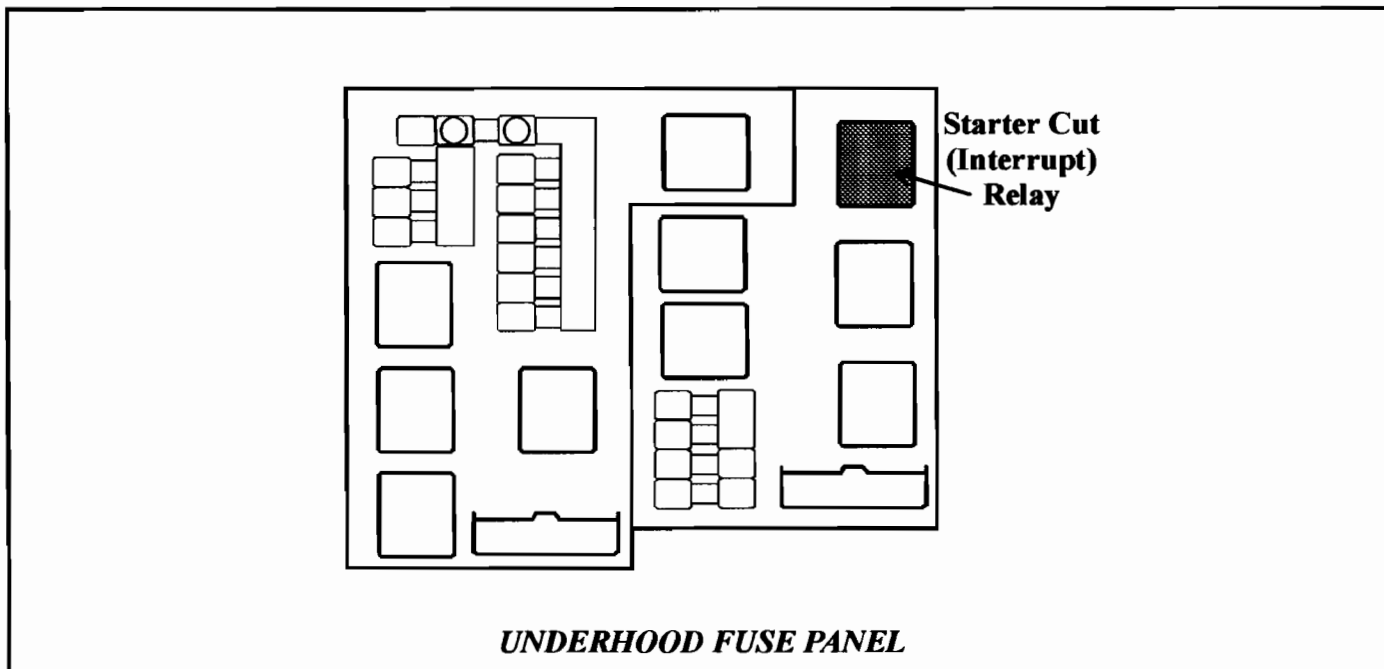


Figure 1

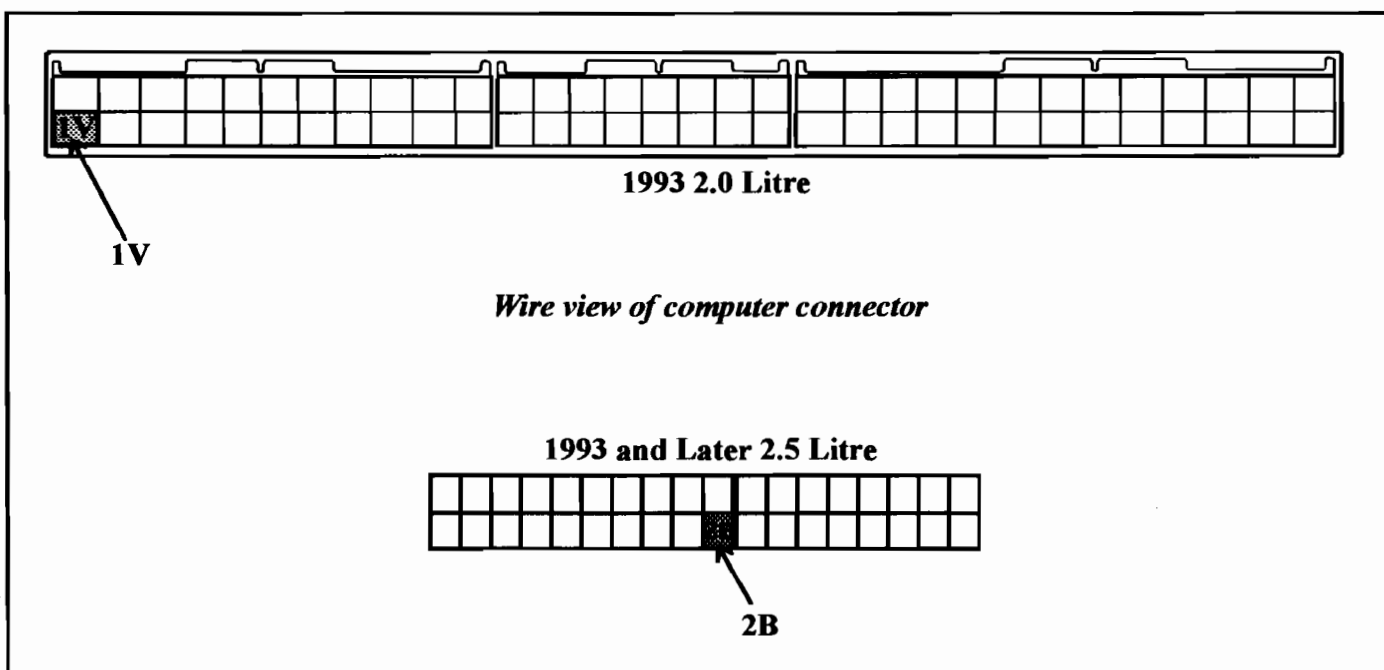


Figure 2

MAZDA 929

NO FOURTH OR CYCLES 3-4-3

COMPLAINT: Vehicle exhibits a **NO FOURTH** gear shift or it Cycles from 4th to 3rd to 4th gear. This condition may appear before and/or after rebuild.

CAUSE: The cause may be, a loose or broken "D" Range signal wire to the inhibitor switch, bent or corroded pin in the harness connector, or a defective inhibitor switch. The switch may be determined to be defective and is replaced only to go bad again. *A bad starter solenoid can draw excessive amps causing damage to the inhibitor switch (See Figure 2 and 3).* If the battery voltage is acceptable yet cranking is slow or lazy, this may indicate a bad starter solenoid.

CORRECTION: Check the Inhibitor Switch and the connectors for any bent and/or corroded pins. If the connectors and pins are good, inspect the wires in the harness, from the computer to the inhibitor switch, for any opens or shorts to ground using your DVOM. Refer to Figure 1 for the inhibitor switch view of the connector which identifies the "D" Range signal terminal. If the inhibitor switch has been replaced and has been damaged after starting the vehicle, the starter solenoid may need to be replaced.

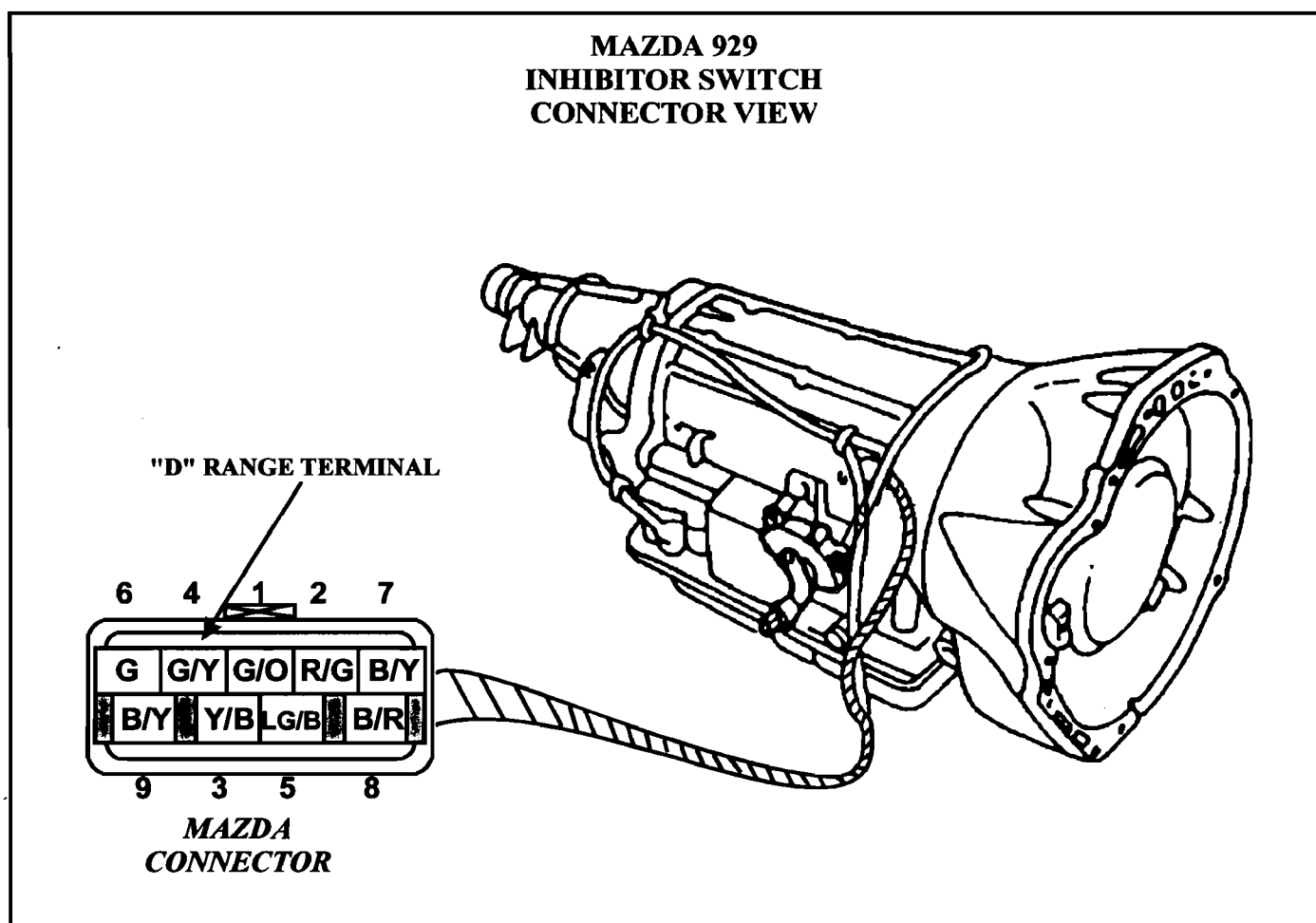


Figure 1

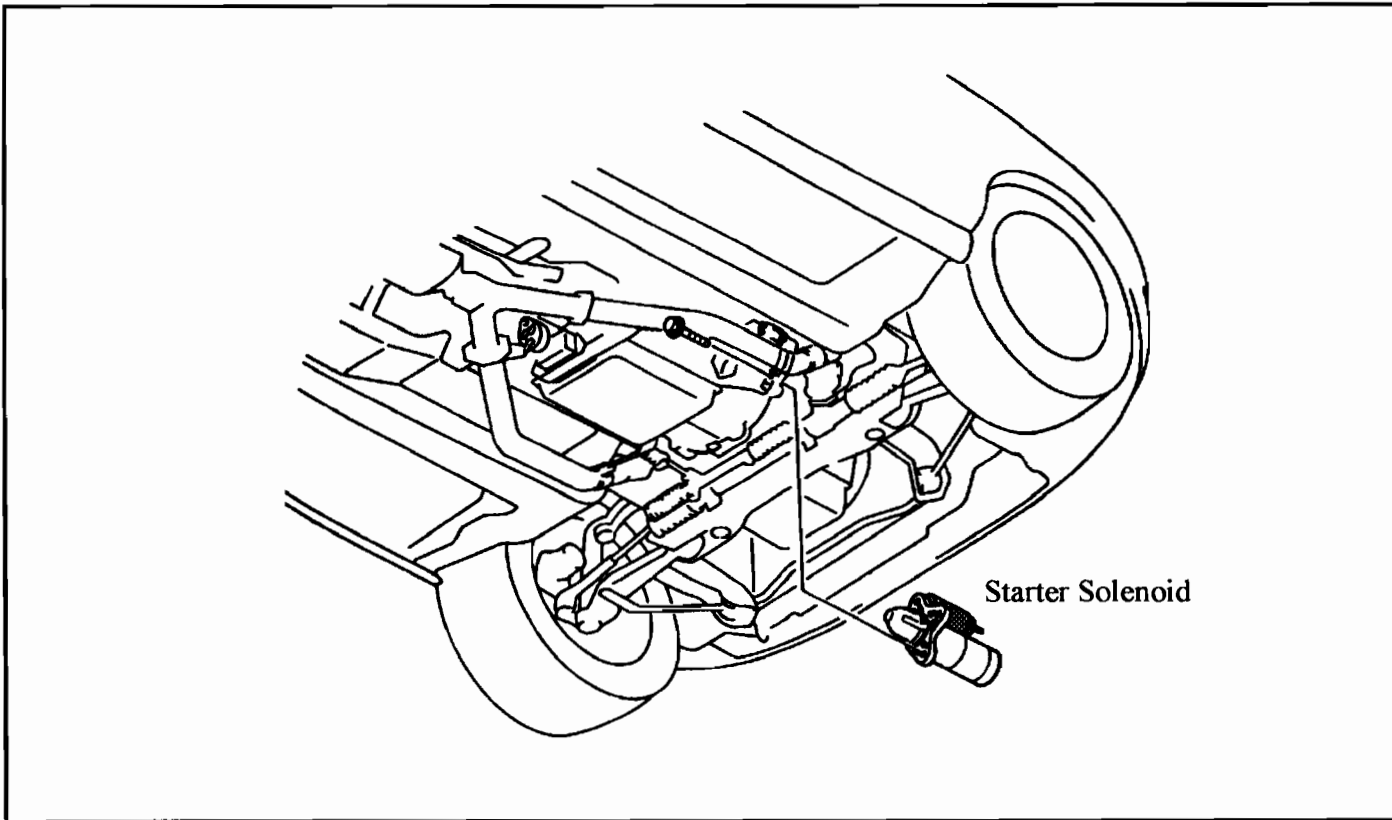


Figure 2

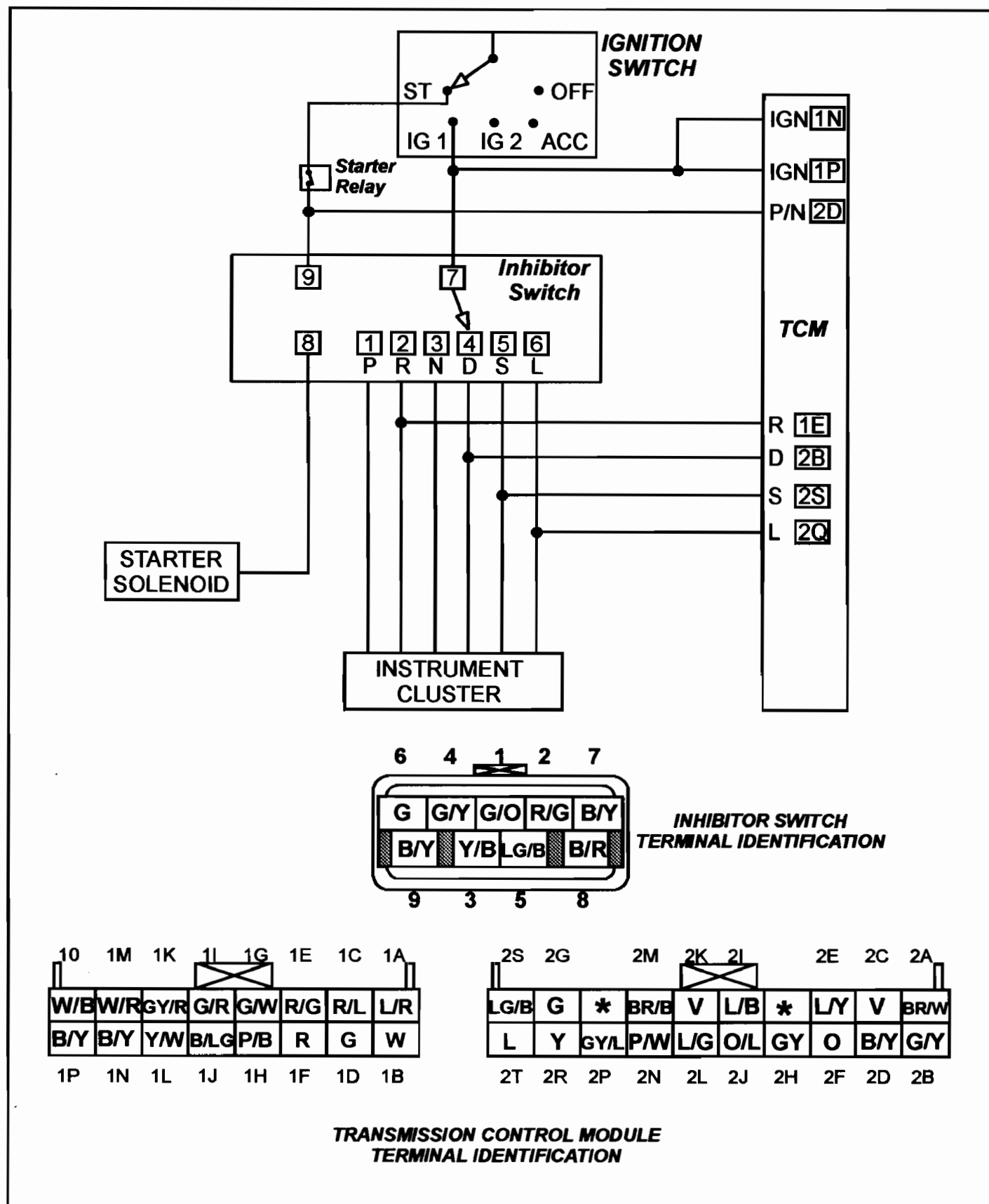


Figure 3

MAZDA N4AEL
SOFT OR FLARED SHIFTS

COMPLAINT: After a transmission exchange, the vehicle exhibits soft, flared or drawn out shifts.

CAUSE: One cause may be that the wrong transmission was installed into the vehicle. DOHC vehicles must use an N4AEL transmission with a push in modulator while SOHC vehicles uses a transmission with a screw in modulator (See Figure 1). If a screw in modulator style unit was placed into a vehicle with a DOHC engine, soft, flared or drawn out shifts may be observed.

CORRECTION: Install the correct transmission.

INFORMATION: SOHC Modulator (Screw in type) part number is BV04-19-823A
DOHC Modulator (Push in type) part number is BT07-19-823

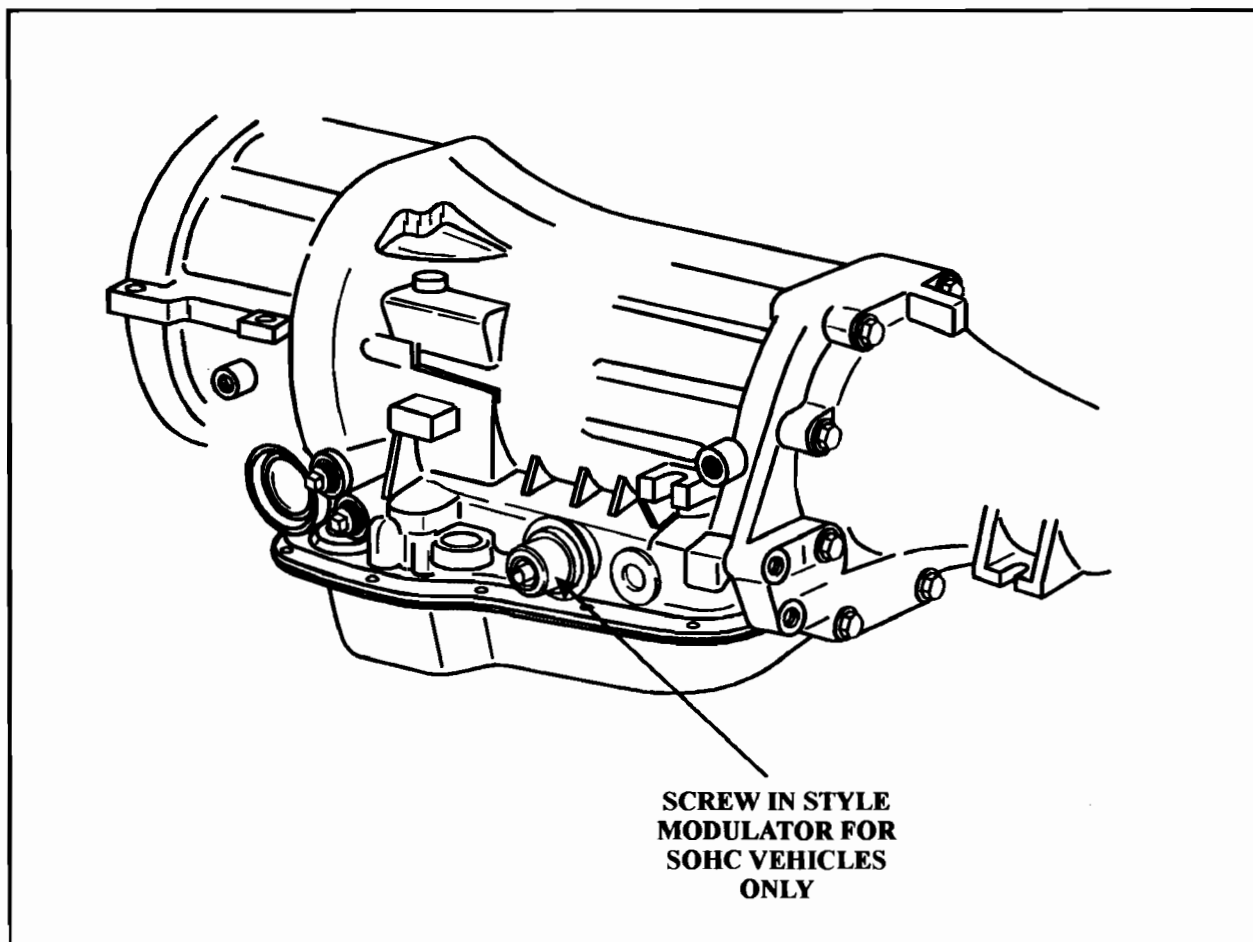


Figure 1

MISTUBISHI / HYUNDAI
KM 4 SPEED
BIND UP ON 1-2 UPSHIFT

COMPLAINT: After overhaul, vehicles equipped with KM 4 speed automatic transaxles may exhibit a binding condition on the 1-2 upshift.

CAUSE: The cause may be, shift control valve plug "B" was installed backwards. When plug "B" is installed backwards, solenoid "A" pressure is not able to move plug "B" and the shift control valve far enough to completely stroke the 1-2 shift valve. This allows the Low-Reverse clutch to come on while the 1-2 upshift is taking place. Refer to Figures 2 and 3.

CORRECTION: Install shift control valve plug "B" with the hole facing the retaining plate as shown in Figure 1.

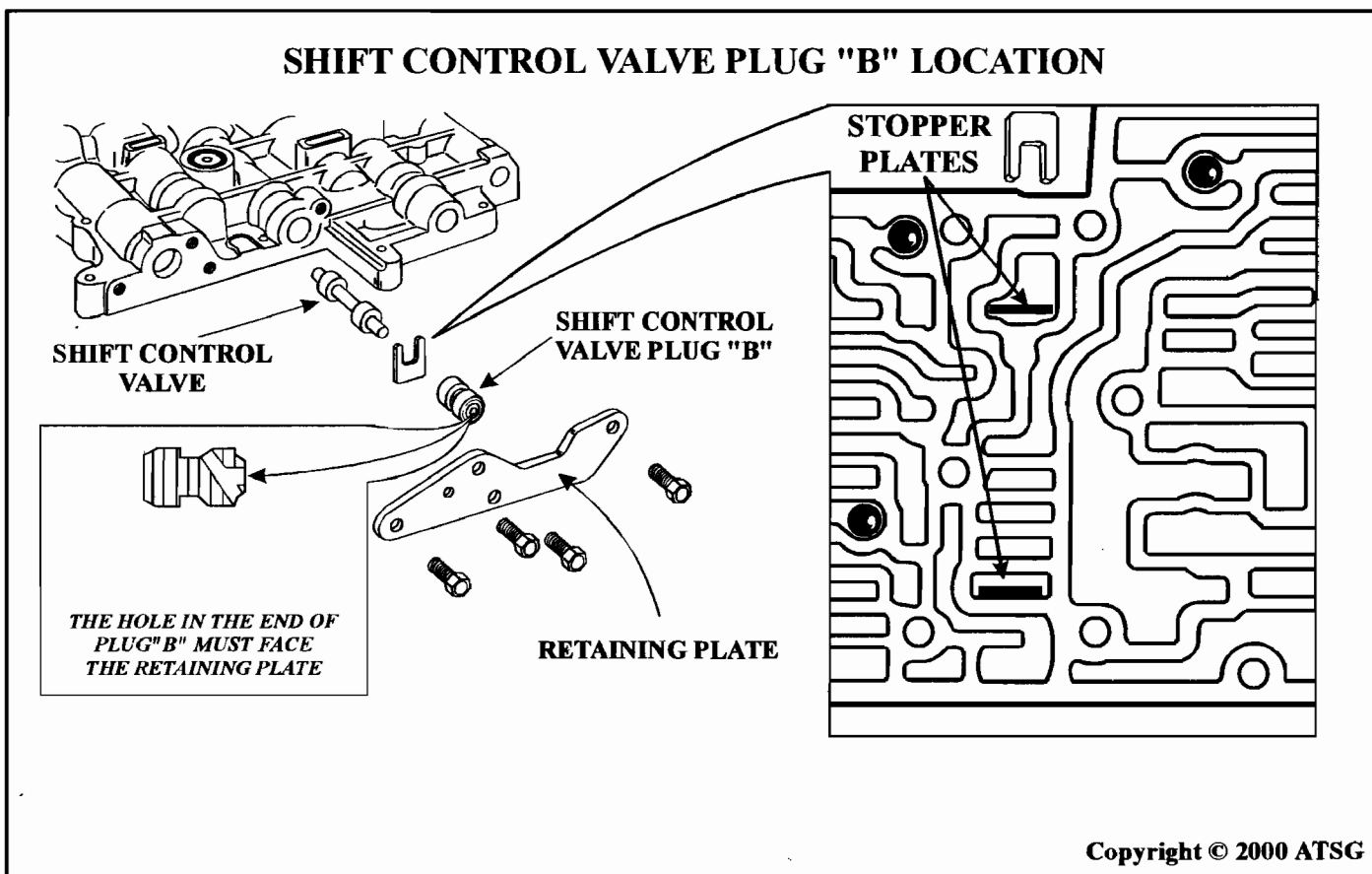


Figure 1

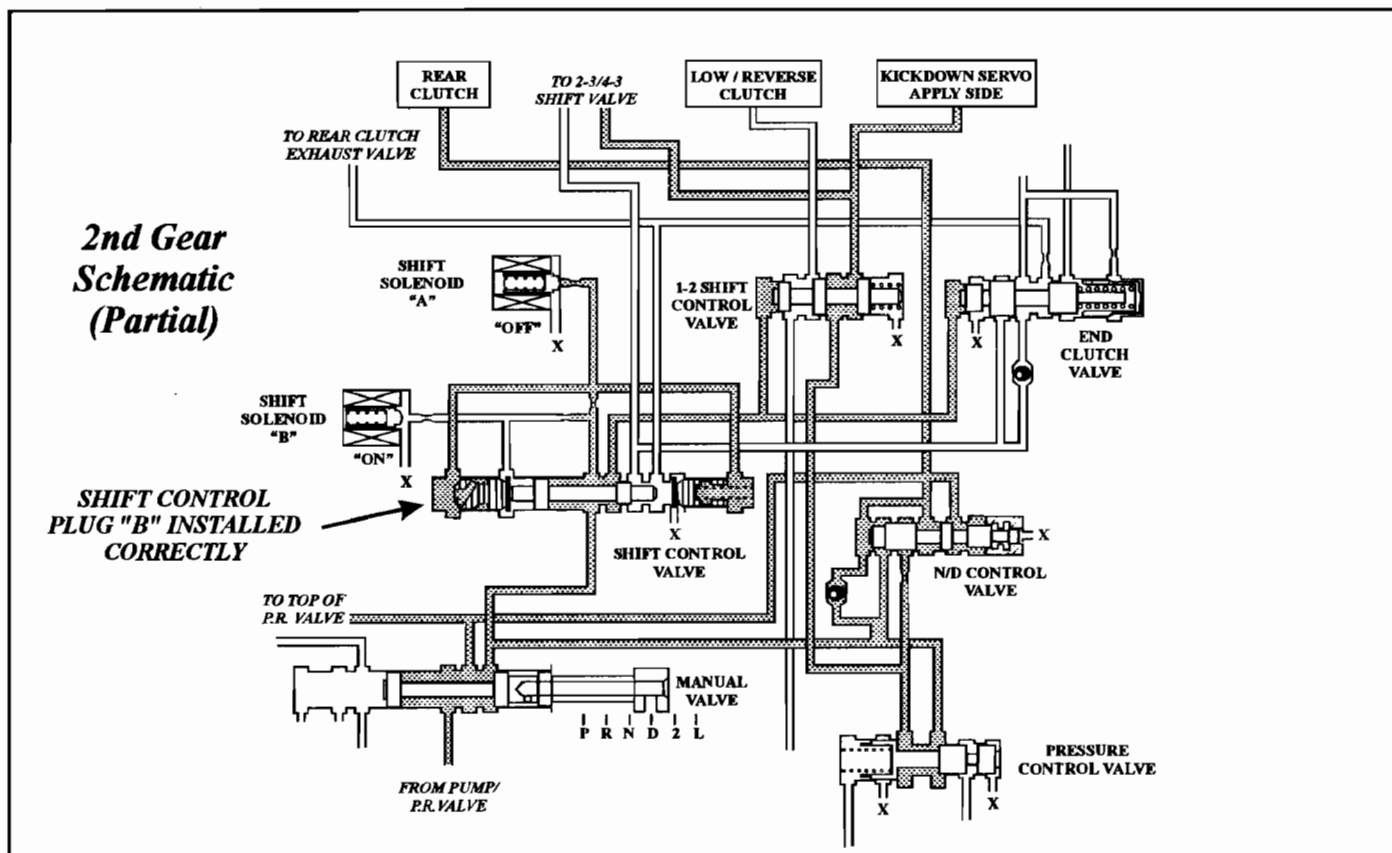


Figure 2

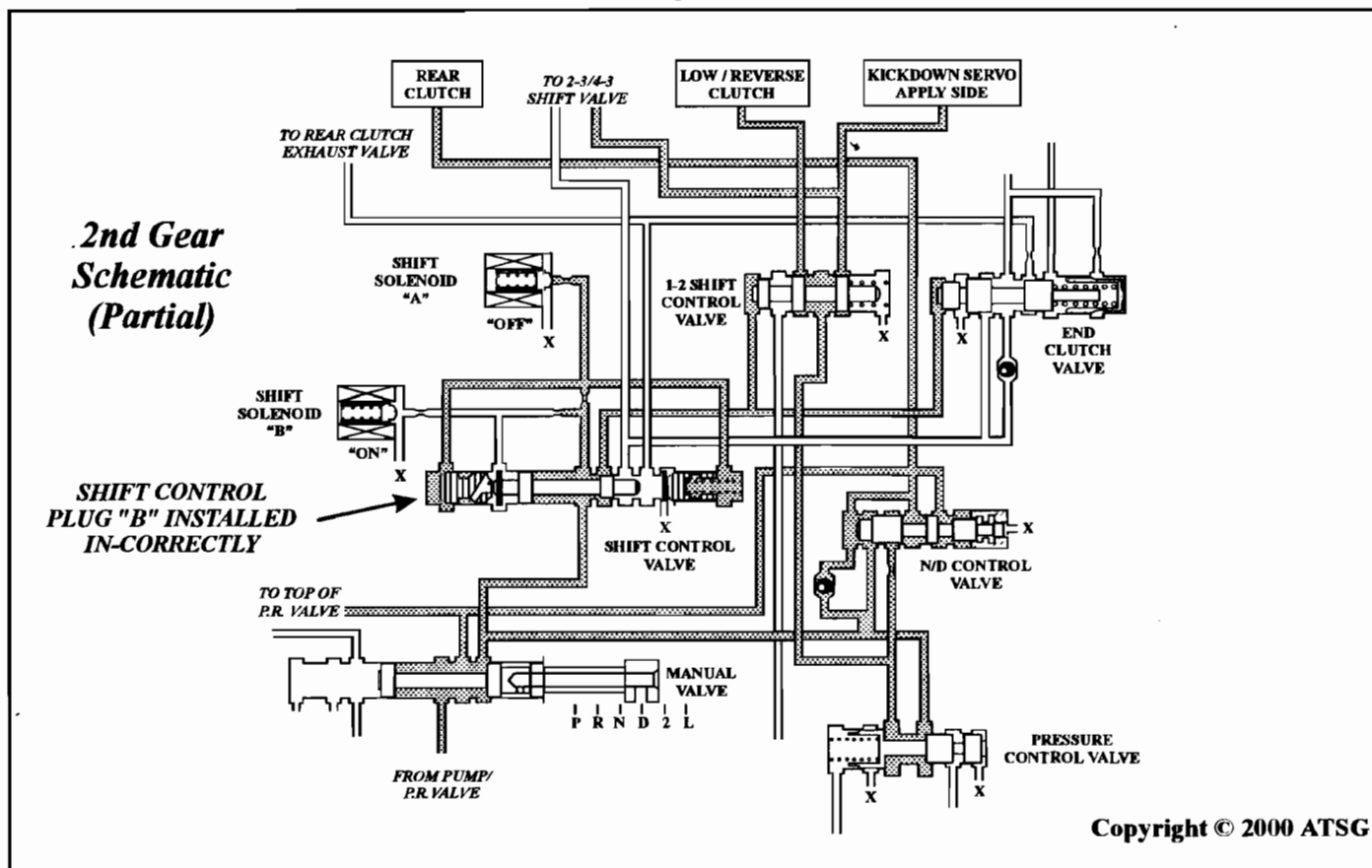


Figure 3

KM UNITS
NO TCC/ PLANET FAILURE

COMPLAINT: Premature planetary failure after overhaul.

CAUSE: One reason may be that the Damper Clutch Control Valve may be sticking in a partially stroked position preventing or restricting the converter clutch fill and lube circuit (See Figure 1).

CORRECTION: The desired corrective measure would be to ensure free movement of the Damper Clutch Control Valve after the filter bolts have been tightened. However, there are times that as hard as one tries, the valve may continue to stick. As a preventive measure, cross drill the area shown in Figure 2. This will allow the planetary system to continue to receive lubrication fluid should the valve stick. This drilling will not cure the loss or restricted converter clutch fill fluid should this valve stick. Cross drilling will only lessen the damage to the unit when and if the Damper Clutch Control Valve sticks.

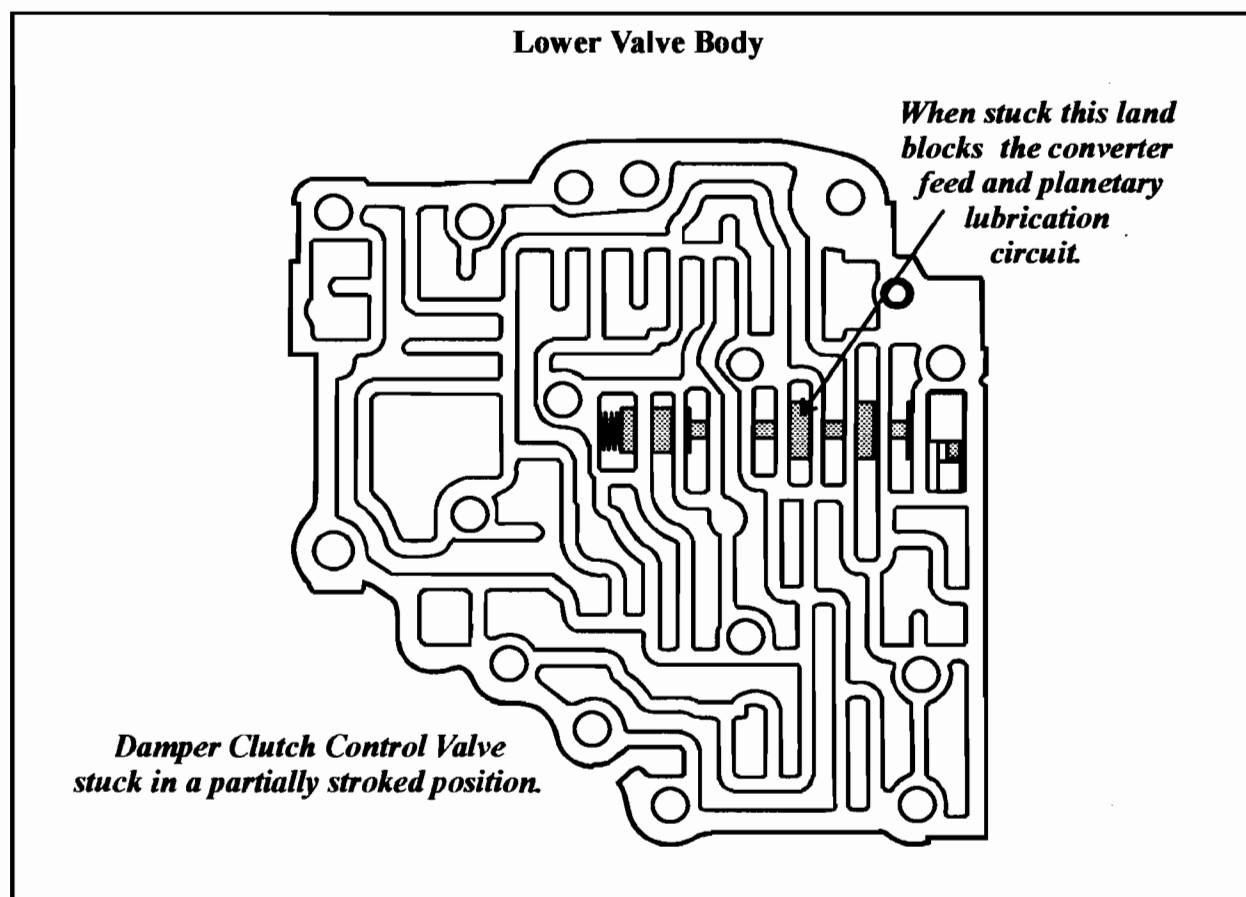


Figure 1

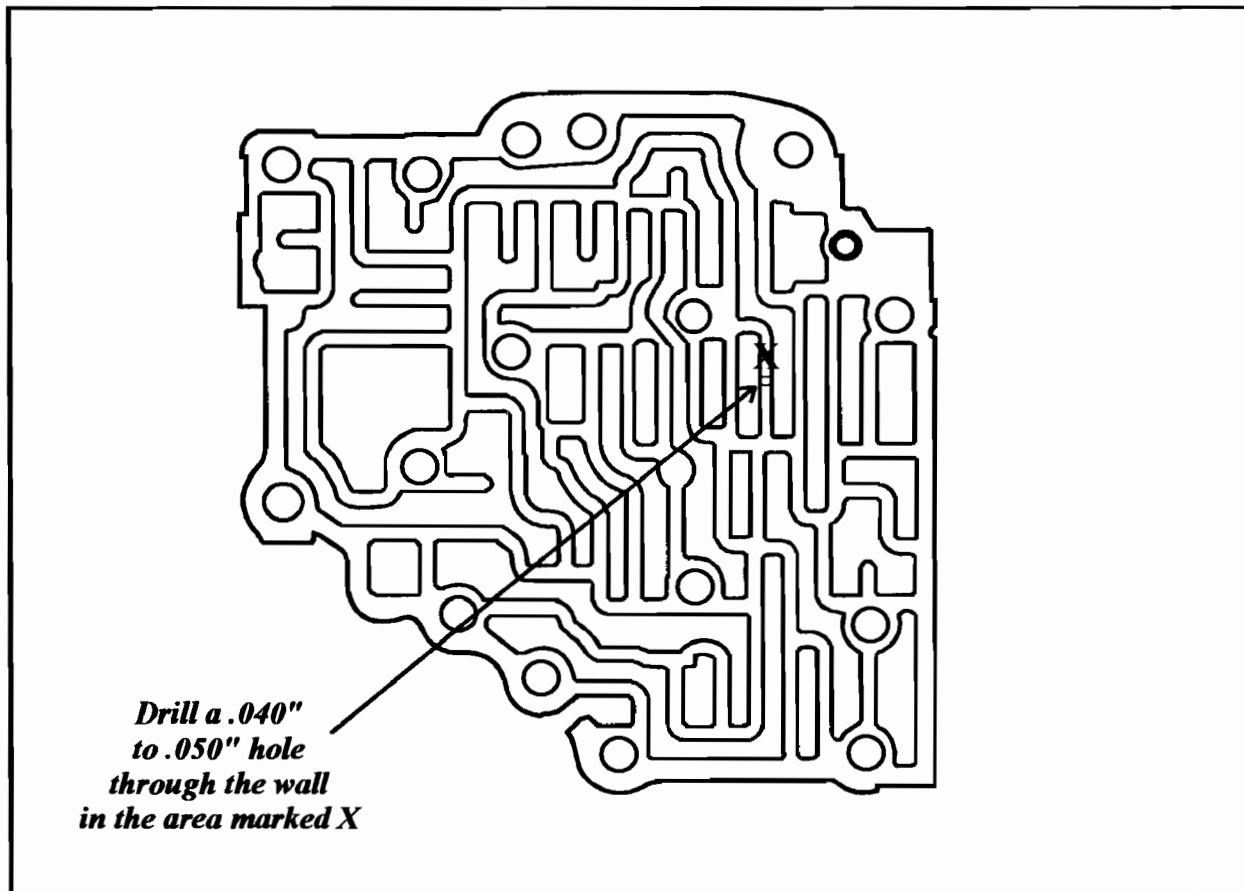


Figure 2

KM 20 AND 30 SERIES TRANSAXLES

BAND ADJUSTMENT TOOL

COMPLAINT: The transmission exhibits a soft or flared 1-2 and/or 3-4 shift, or a cut loose 4-3 or 3-2 kickdown. A new band may have been installed during overhaul but, in many cases, the band adjustment is not done, which could leave the band with too loose an adjustment causing the above complaints and possibly premature failure of the band.

CAUSE: Adjusting the band in a KM transmission, at best, is a difficult procedure without the proper tool. It is almost impossible to keep the servo assembly from turning while attempting to loosen or tighten the adjustment rod lock nut or the adjustment rod itself without the use of the OE adjustment tool.

CORRECTION: A easy to use band adjustment tool has been produced by Zoom Technology Inc. which simplifies the band adjustment procedure with the transmission in or out of the vehicle.

The Zoom KM band adjusting tool components are shown in figure 1 and in figure 2 the tool is shown installed on the servo assembly. Figures 3 and 4 show the band adjustment being made.

For further information contact Zoom Technology at 1-800-322-0806 or E-mail: answermatic@Info80e.net

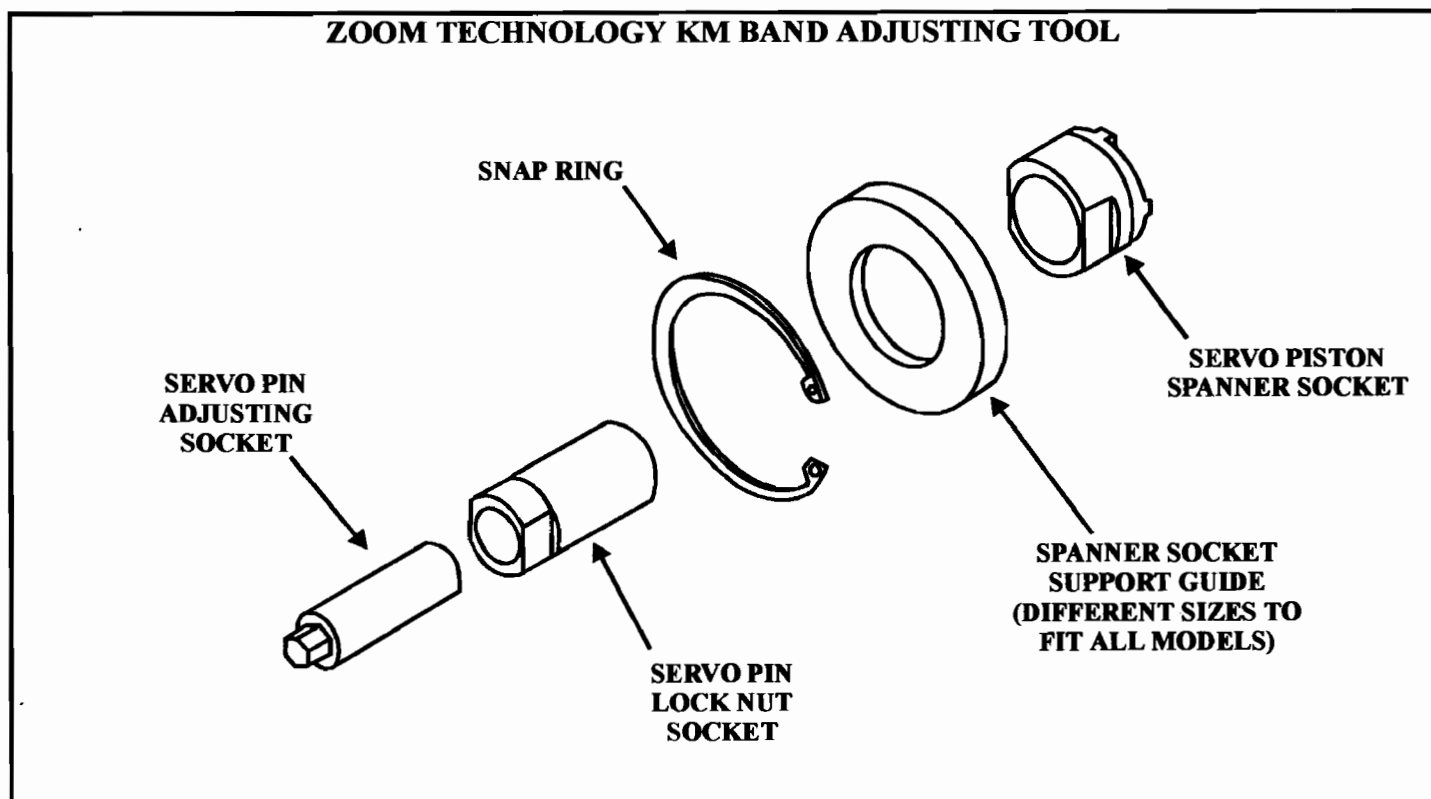


Figure 1

KM 20 AND 30 SERIES TRANSAXLES
BAND ADJUSTMENT TOOL

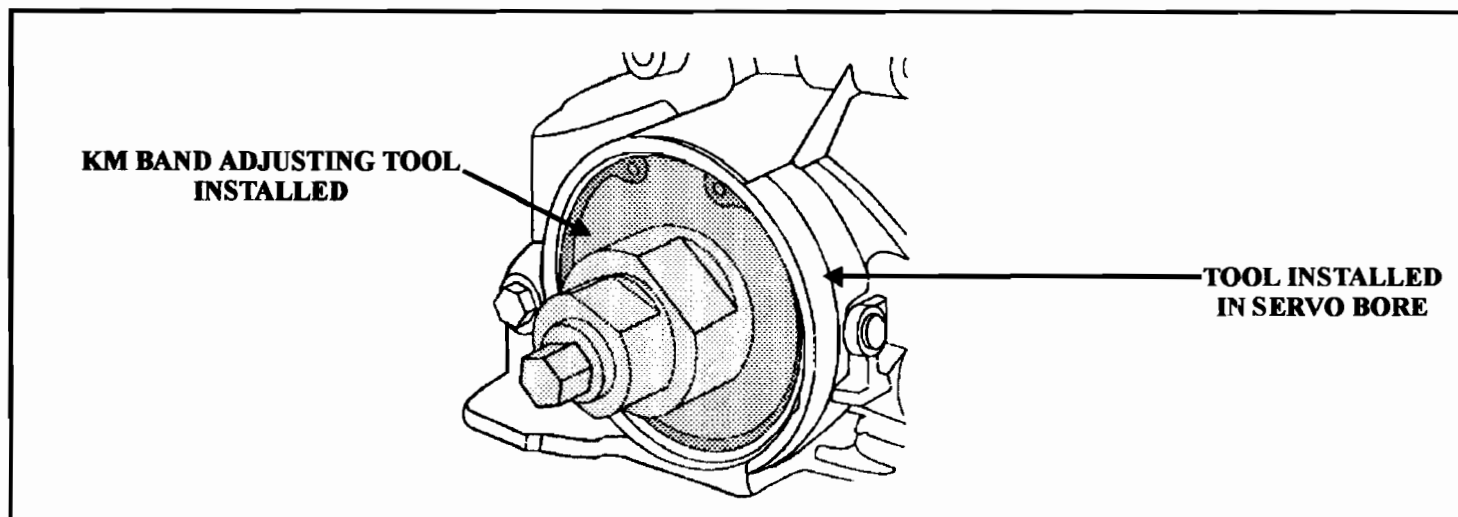


Figure 2

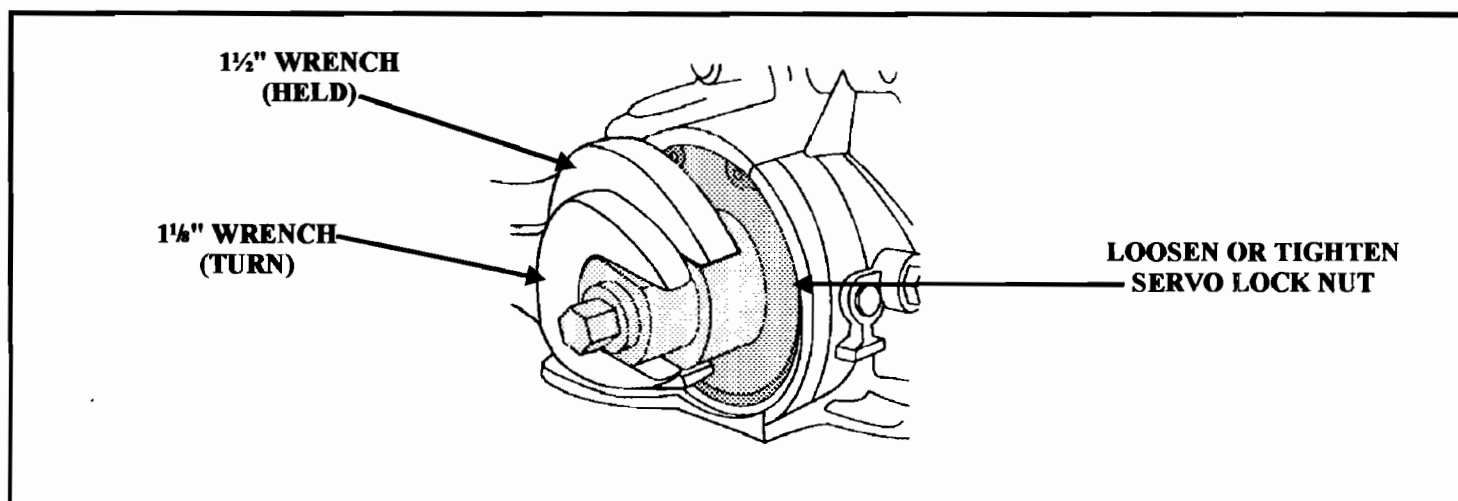


Figure 3

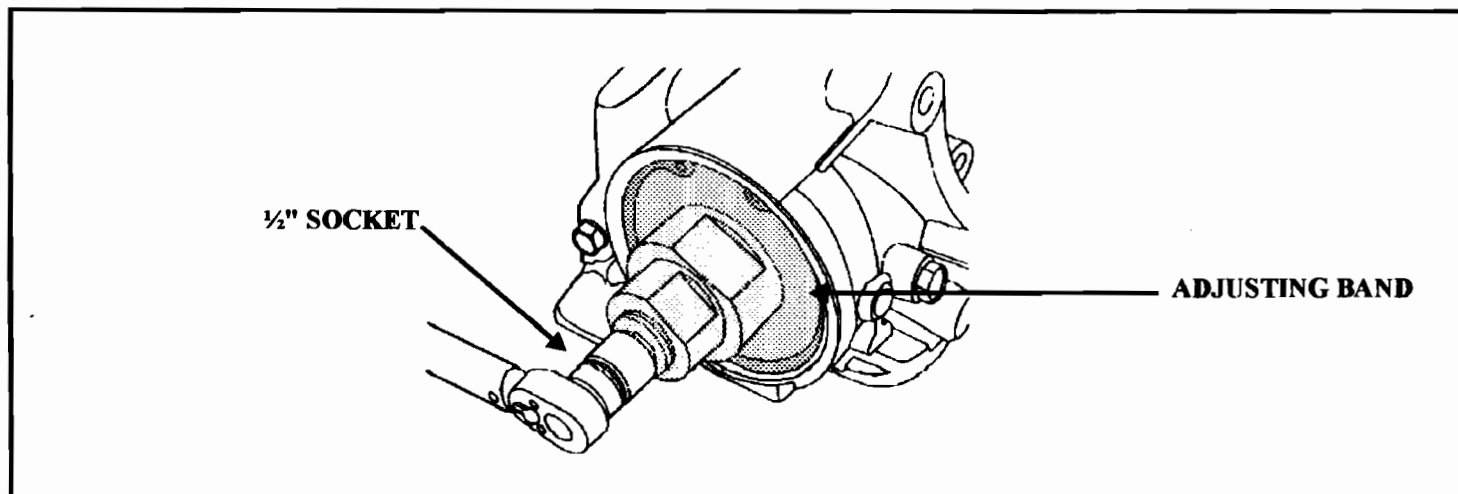


Figure 4

NISSAN RL4FO2A AND RE4FO2A SOFT 1-2 UPSHIFT

COMPLAINT: Soft and/or a Slide-Bump 1-2 upshift on Nissan vehicles equipped with the RL4FO2A or the RE4FO2A transaxles.

CAUSE: The cause may be, too much accumulator piston movement.

CORRECTION: Remove and discard the large diameter accumulator spring as shown in Figure 2. Use the illustrations in Figure 1 and 2, to ensure proper reassembly.

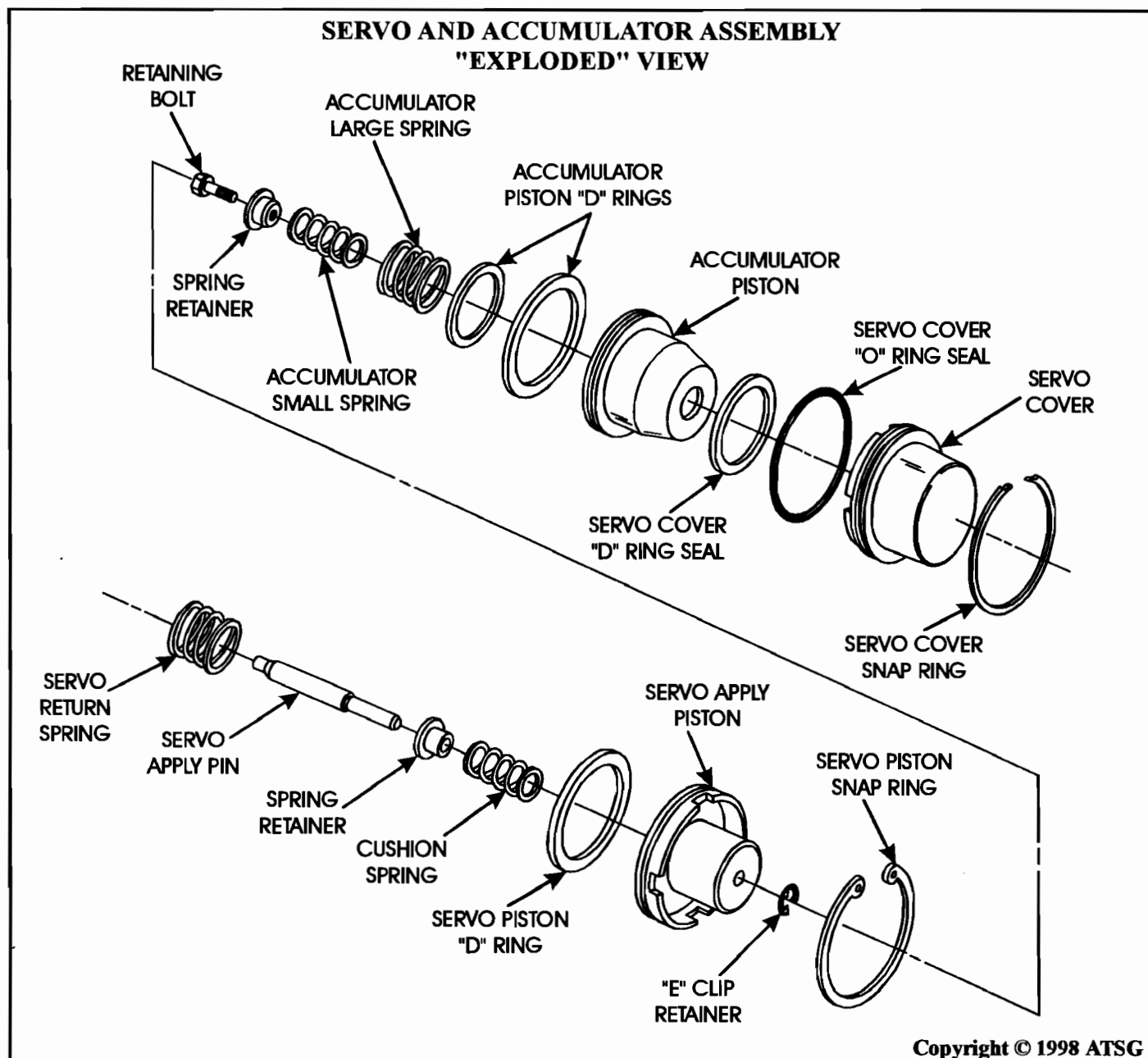


Figure 1

SERVO AND ACCUMULATOR ASSEMBLY
"CUT-AWAY" VIEW

*For a much improved 1-2 upshift,
remove and discard the large
accumulator spring.*

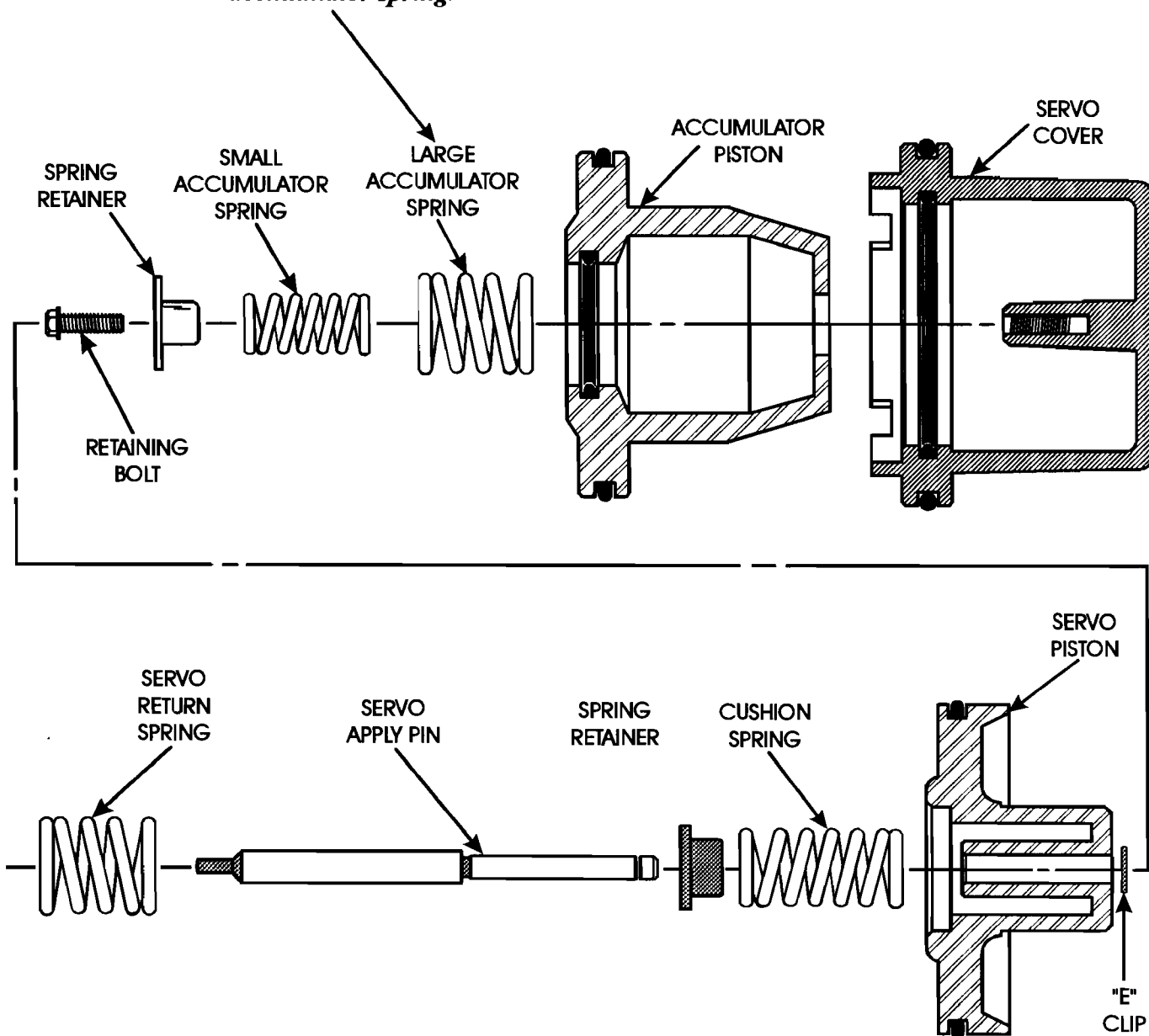


Figure 2

Good press coverage for us.

atthepartscounter

G4A-EL Front Seal Modification

Reprinted from GEARS
magazine November, 1998



One of the more frustrating comeback problems with the G4A-EL is a front seal leak. The usual causes of this are either insufficient contact between the seal lip and the torque converter hub, or the seal moving out of position in the stator support. There is now an aftermarket seal available that solves both of these problems (figure 1, left). The solution is in the overall height of the seal.

The additional wall height of the seal provides greater wall contact with the stator support bore, making the seal much less likely to move after installation. That, coupled with using high quality hardening Sealer, should assure positive bore position of the seal.

Our test converter hub shows the contact point between the converter hub and an OE seal lip installed in typical fashion (figure 2). This contact point is very near the end of the hub, and in operation the hub may pull partially out of the seal, causing a substantial front leak.

The height of the taller replacement seal doesn't permit installing the seal too deep into the stator support, assuring proper positioning of the seal lip on the converter hub.

Since seal installation depth is a critical issue on this unit, there is a special factory tool used for

installing the seal. However, there is an acceptable method for installing this seal without the use of special tools. All you need is a 4T60 (44OT4) second clutch drum and a hydraulic or arbor press. Here's how:

Step 1: Place the drum upside-down on the bed of the press.

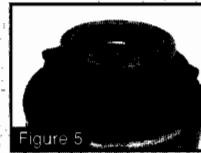
Step 2: Coat the outside diameter of the seal with a quality hardening sealer and place it upside-down on the center of the clutch drum (figure 3).

Step 3: Holding the stator support upside-down, place it on top of the seal (figure 4).

Step 4: Press the support squarely down over the seal until the support contacts the clutch drum (figure 5).

This procedure will locate the seal properly within the stator support, where it will line up as it should with the torque converter hub. It will also remain locked into the support without moving out of position in operation. This installation procedure also avoids accidentally deforming the seal by misplaced hammer blows, which can also cause leaks (figure 6).

Consult your parts supplier to determine if this taller replacement seal is available to you and avoid the headaches of front seal leaks on this unit.



Good news for you.

The seals recommended in the above Gears article are available exclusively from Precision International.

When our customers told us about the front seal leak problems they were having with the G4A-EL, we came up with an innovative solution - a seal with a tall lip for better contact and stability. Then we made these seals available in a number of our most popular kits: Another problem solved. At Precision, we know the most important problem to solve is yours. To order, contact your parts distributor, or call Precision International.

	Overhaul Kit	Banner Kit	Master Kit
G4A-EL Mazda 628 FWD, Non-Turbo 1986-4/87 With aftermarket accumulator O-rings (Two pan)	ØK71900 / M*	K7100 W/O / M*	K7100 / M*
G4A-EL/HL (4EAT) 626 & MX6 5/87-92, Mercury Capri 91-94, 323 & Protege 4WD 90-91, Turbo & Non-turbo With aftermarket accumulator. O-rings & D-rings (Two pan)	ØK71900C / M*	K7100C W/O / M*	K7100C / M*
GF4A-EL (4EAT) Mazda 626 & MX6 1993 (ALL), 94-97 W/2.6L (V-6) ENG. Millenia (2.5L)12/93-97, Ford Probe 1993 (ALL),94-97 W/2.5L, 2.0L ENG. (SOME) With aftermarket accumulator D-rings (Two pan) (No T.V. Cable)	K71900E / M*	K7100E W/O / M*	K7100E / M*
4EAT-F (F4A-EL) Mazda 323,Protege (2WD) 90-91, Mazda 323, Protege (ALL) 92-96, Ford Escort 91-96, Mercury Tracer 90-96, Mazda MXS 91-96 (One pan)	K71900F / M*	K7100F W/O / M	K7100F / M*
4EAT-F (F4A-EL) Mazda Protege Mazda Protege 97-98 (One pan)	K71900P / M*	K7100P W/O / M*	K7100P / M*

Ø Add "T" suffix if aftermarket F.P. pressure port seals are required.

* Add "M" suffix for SPX pump stator and output gear.

Contact your parts distributor and order by part number listed, or call Precision International at (1-800-872-6649) and we'll connect you with a distributor.



PRECISION
INTERNATIONAL

210 Kelckerbecker Ave., Bohemia, NY 11716 (516) 567-2000 • Fax (516) 567-2840
Florida Office (854) 341-4333 • Fax (854) 341-4334 • E-mail: sales@problemsolvers.net

ISUZU TROOPER AND RODEO

SYSTEM VOLTAGE PROBLEMS ON 1990-93 ISUZU VEHICLES EQUIPPED WITH 4L30E TRANSMISSIONS

COMPLAINT: Vehicle is in "Limp Mode" and code retrieval indicates a code 43 (Ground Control Relay circuit), or a *false* code 33 (Force Motor circuit shorted to ground) has been stored.

NOTE: *Shift or band apply solenoid codes can be stored when a Code 43 (Ground Control Relay Circuit) is stored. In addition to that, a Shift or Band Apply Solenoid fault may cause a Code 43 to be stored.*

After extensive wiring checks and solenoid circuits have been checked at the Transmission Control Module (TCM) connector, it is determined that the TCM will have to be replaced, because the Ground Control Relay is an internal component of the TCM.

Unfortunately in many cases when the replacement TCM is installed, upon start up of the vehicle, the vehicle is once again in "Limp Mode" with the same code(s) stored.

This means the newly replaced TCM was also destroyed from the same cause.

CAUSE: There are two main causes for TCM failure to occur:

- (1) **Charging System Voltage Irregularities:** These Isuzu vehicles are extremely susceptible to system voltage irregularities. The area of concern is charging system voltage. The Ground Control Relay circuit can be easily destroyed by charging system voltage that is too high.

This means that an electrical system check procedure should be established when this problem exists.

This begins with checking open post battery voltage, preferably after a load has been induced on the battery, which should be approximately 12.6 volts. (Refer to Figure 1)

Next check the charging system voltage, on these vehicles it should not exceed 14.3 to 14.5 volts.

This can be caused by an overcharging alternator or, the incorrect alternator has been installed. Due to the heavy GM influence in Isuzu vehicles, an alternator made for a GM vehicle resembles the alternator found in Isuzu vehicles.

There is however, a major difference being, the average GM alternator usually puts out a charging system voltage of approximately 14.9 to 15.3 volts. This is too much voltage output for an Isuzu system, which is designed to operate within the 14.3 to 14.5 volt range.

If the above checks are good, the shift and band apply solenoid circuits will have to be checked for resistance to insure circuit integrity.

In some cases the main case connector is at fault and can be replaced using the 4T60 square case connector.

- (2) **A Loss of Ground:** The second cause indicates, that somewhere in the vehicle the TCM main ground has been lost. This can also be caused by a faulty negative battery cable.

The main TCM grounds in these vehicles are usually located in the most obscure places which is what makes them so easy to overlook.

ISUZU TROOPER AND RODEO

SYSTEM VOLTAGE PROBLEMS ON 1990-93 ISUZU VEHICLES EQUIPPED WITH 4L30E TRANSMISSIONS

CORRECTION: Make the following corrections as follows:

- (1) Make certain the battery is in good condition. When alternator replacement becomes necessary, make certain that the replacement alternator indicates somewhere on the alternator or its package "**MADE FOR AMERICAN ISUZU MOTORS**" as shown in figure 2 in order to avoid an over voltage problem for the TCM. Utilizing the chart shown in figure 3, insure shift and band apply circuit integrity by checking solenoid resistance which will also check the integrity of the case connector.
- (2) Check the main TCM ground circuits as illustrated in figures 4,5,6, and 7, using the voltage drop method, including the negative battery cable condition at both ends and repair any ground circuit that contains 300 millivolts or higher. (Refer to figure 8)

OPEN POST BATTERY VOLTAGE

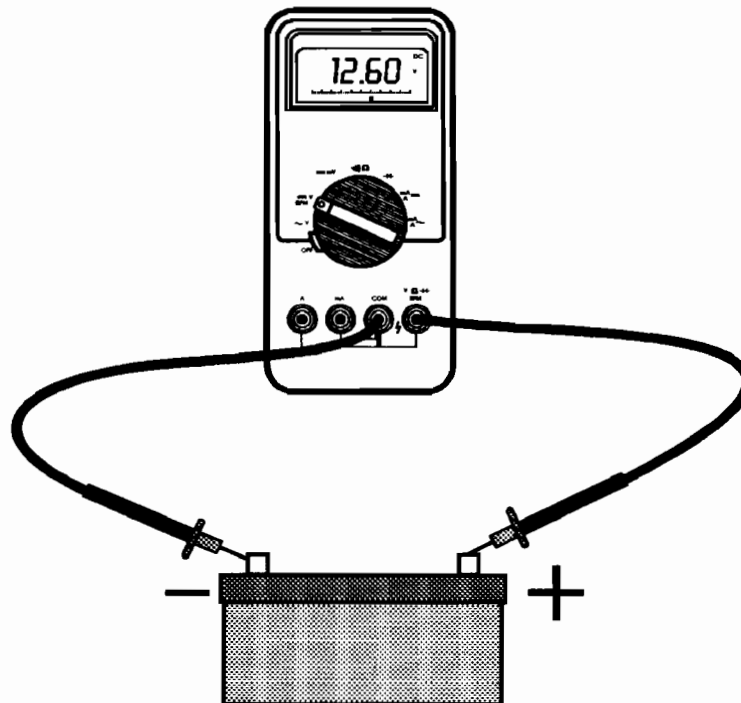


Figure 1

ISUZU TROOPER AND RODEO

SYSTEM VOLTAGE PROBLEMS ON 1990-93 ISUZU VEHICLES EQUIPPED WITH 4L30E TRANSMISSIONS

ALTERNATOR MADE FOR ISUZU VEHICLES

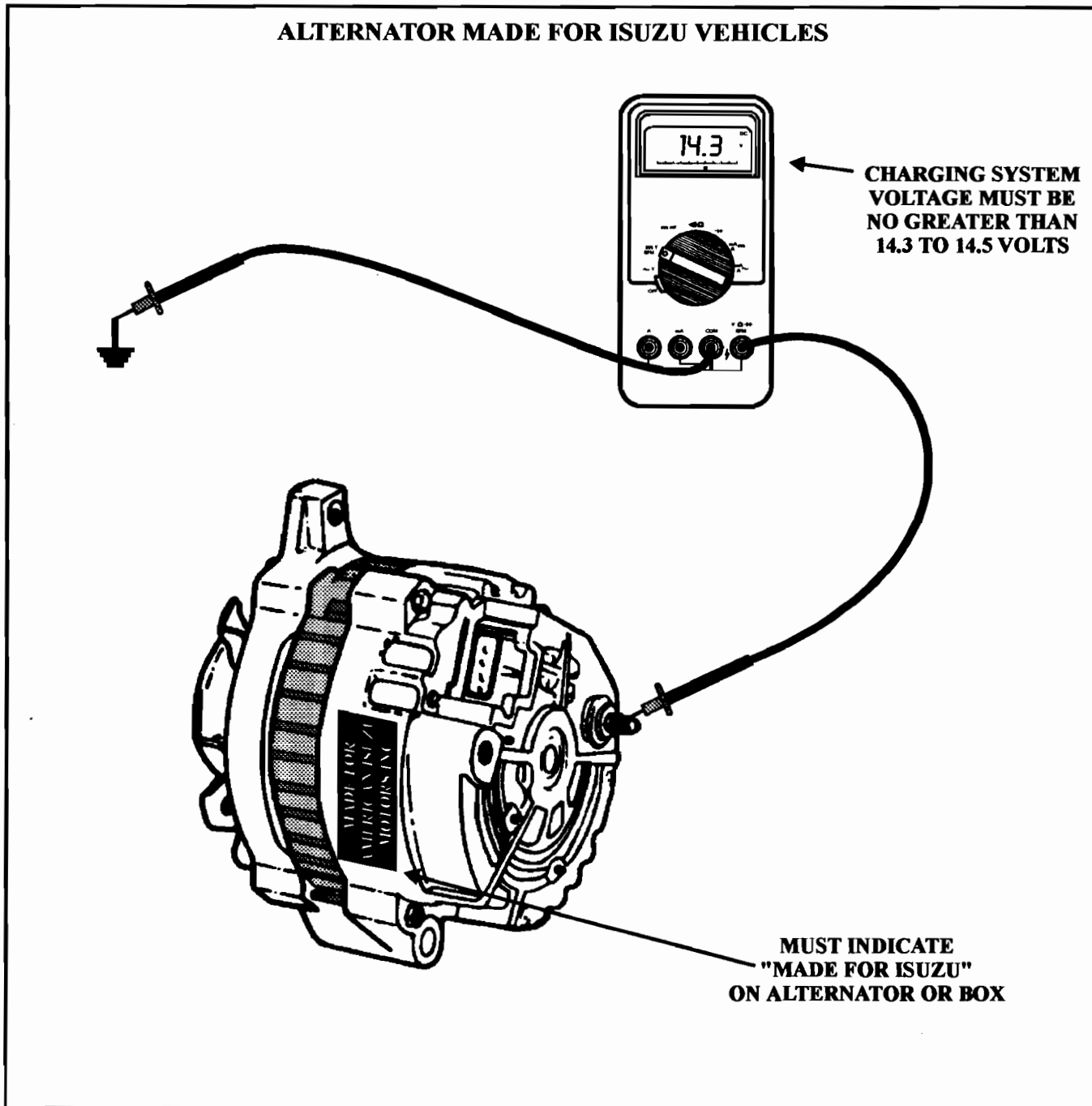
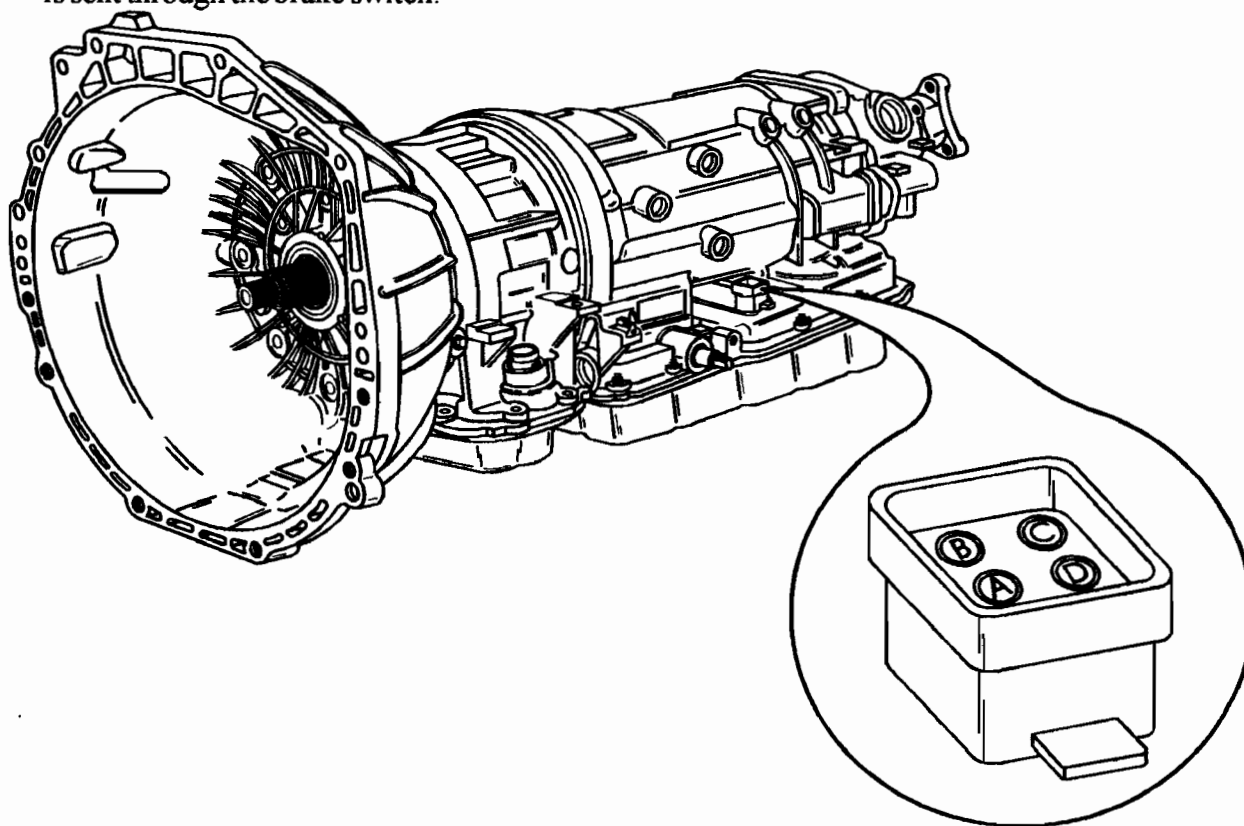


Figure 2

ISUZU TROOPER AND RODEO
SYSTEM VOLTAGE PROBLEMS ON 1990-93 ISUZU
VEHICLES EQUIPPED WITH 4L30E TRANSMISSIONS

CONNECTOR AND TERMINAL IDENTIFICATION

As seen looking into the Main Case Connector, terminal "A" is toward the front outside of the case. Unlike most General Motors style case connectors, terminal "A" *is not* the 12 volt signal that is sent through the brake switch.



FUNCTION	TERMINAL	WIRE COLOR INSIDE	WIRE COLOR OUTSIDE	RESISTANCE IN OHMS
2-3 SOLENOID 12 VOLT POWER	"A"	White	Brown & Black	Between "A" and "C" 17.5Ω - 18.5Ω
1-2/3-4 SOLENOID 12 VOLT POWER	"D"	Black	Brown & Red	
SOLENOID GROUND CONTROL	"C"	Brown	Brown & White	
BAND APPLY SOLENOID 12 VOLT POWER	"B"	Blue	Brown & Yellow	Between "B" and "C" 9.5Ω - 10.5Ω

Copyright © 2000 ATSG

Figure 3
Automatic Transmission Service Group

ISUZU TROOPER AND RODEO

SYSTEM VOLTAGE PROBLEMS ON 1990-93 ISUZU VEHICLES EQUIPPED WITH 4L30E TRANSMISSIONS

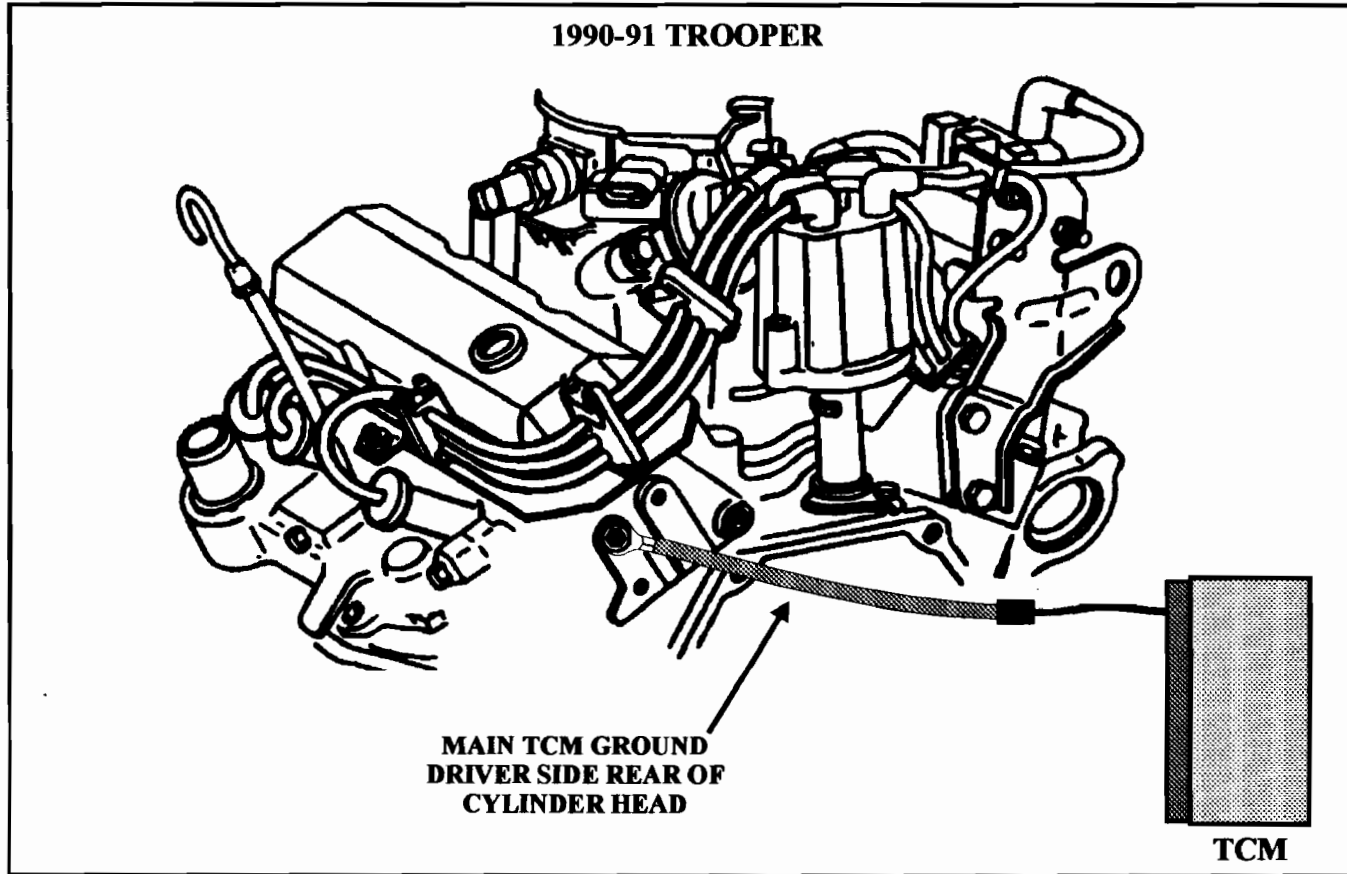


Figure 4

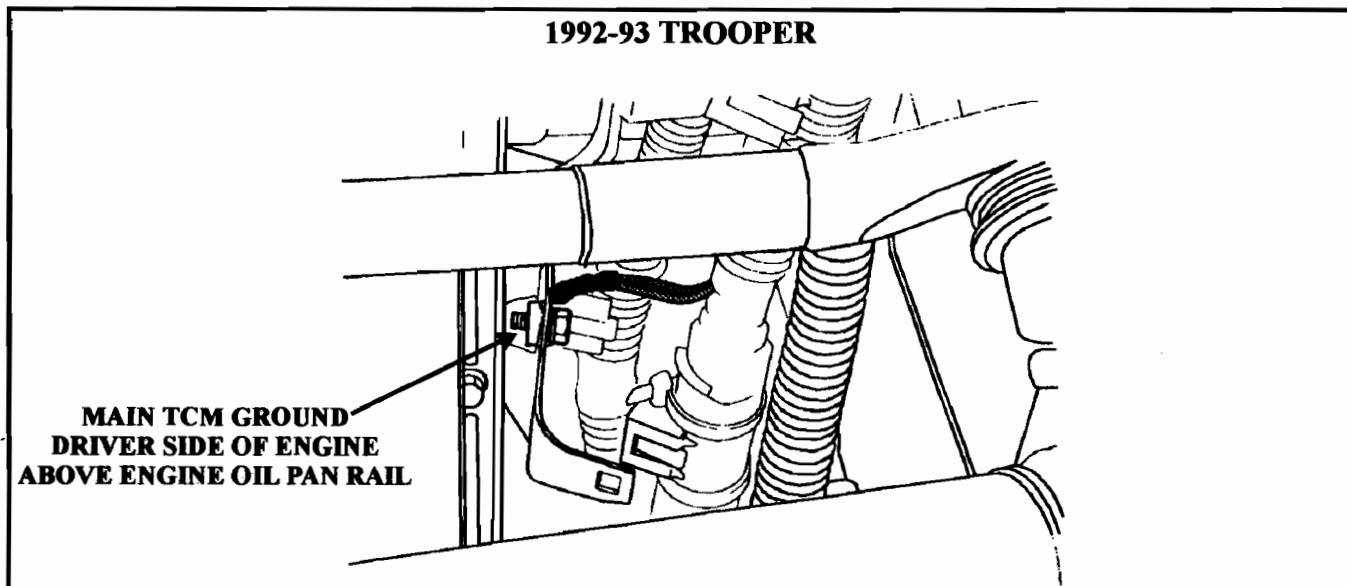


Figure 5

ISUZU TROOPER AND RODEO
SYSTEM VOLTAGE PROBLEMS ON 1990-93 ISUZU
VEHICLES EQUIPPED WITH 4L30E TRANSMISSIONS

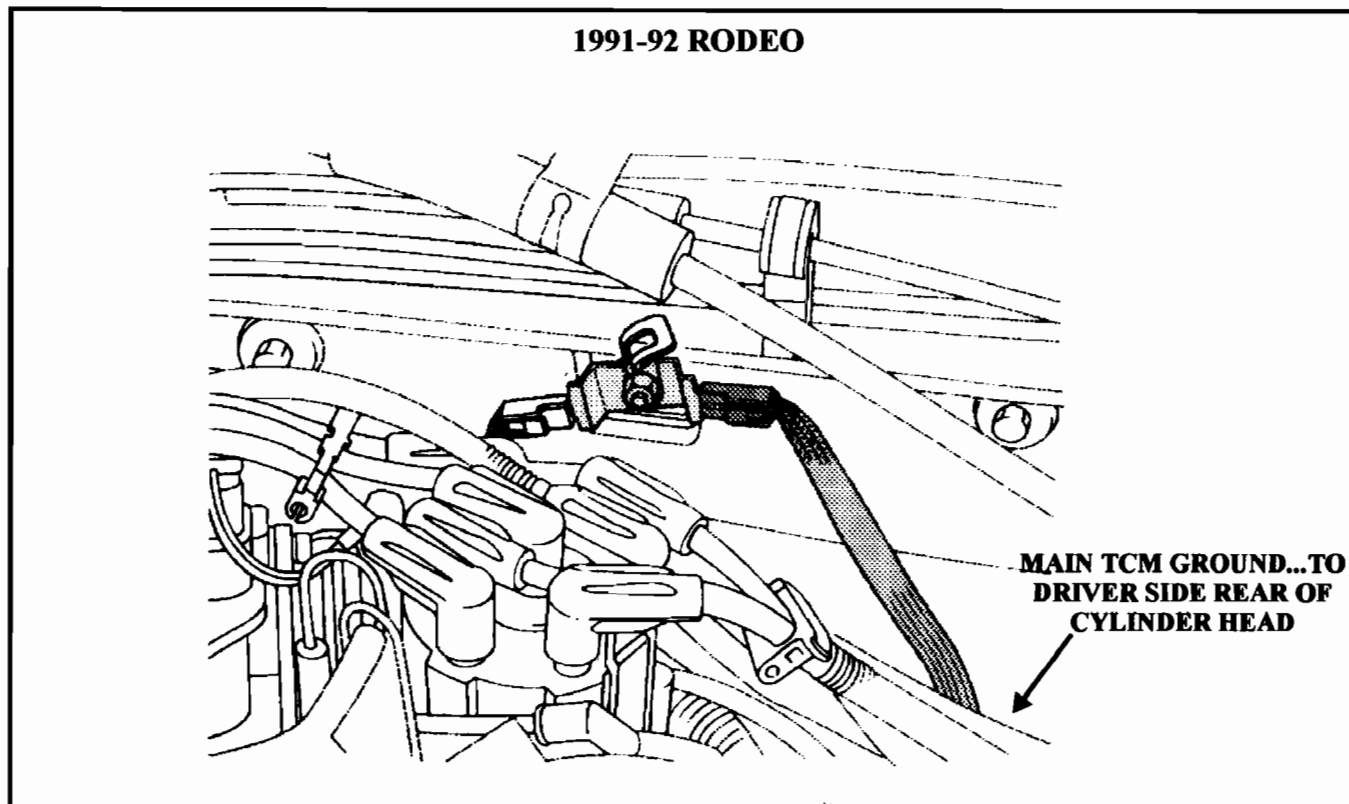


Figure 6

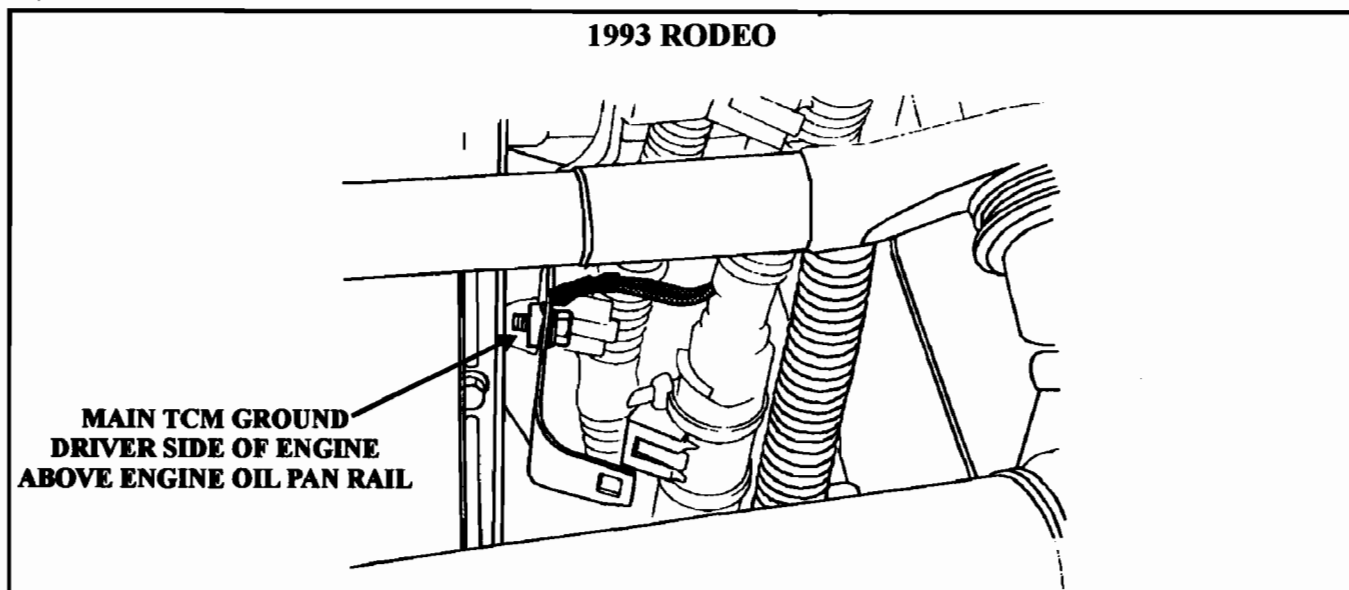


Figure 7

ISUZU TROOPER AND RODEO

SYSTEM VOLTAGE PROBLEMS ON 1990-93 ISUZU VEHICLES EQUIPPED WITH 4L30E TRANSMISSIONS

CHECKING GROUND CIRCUIT INTEGRITY

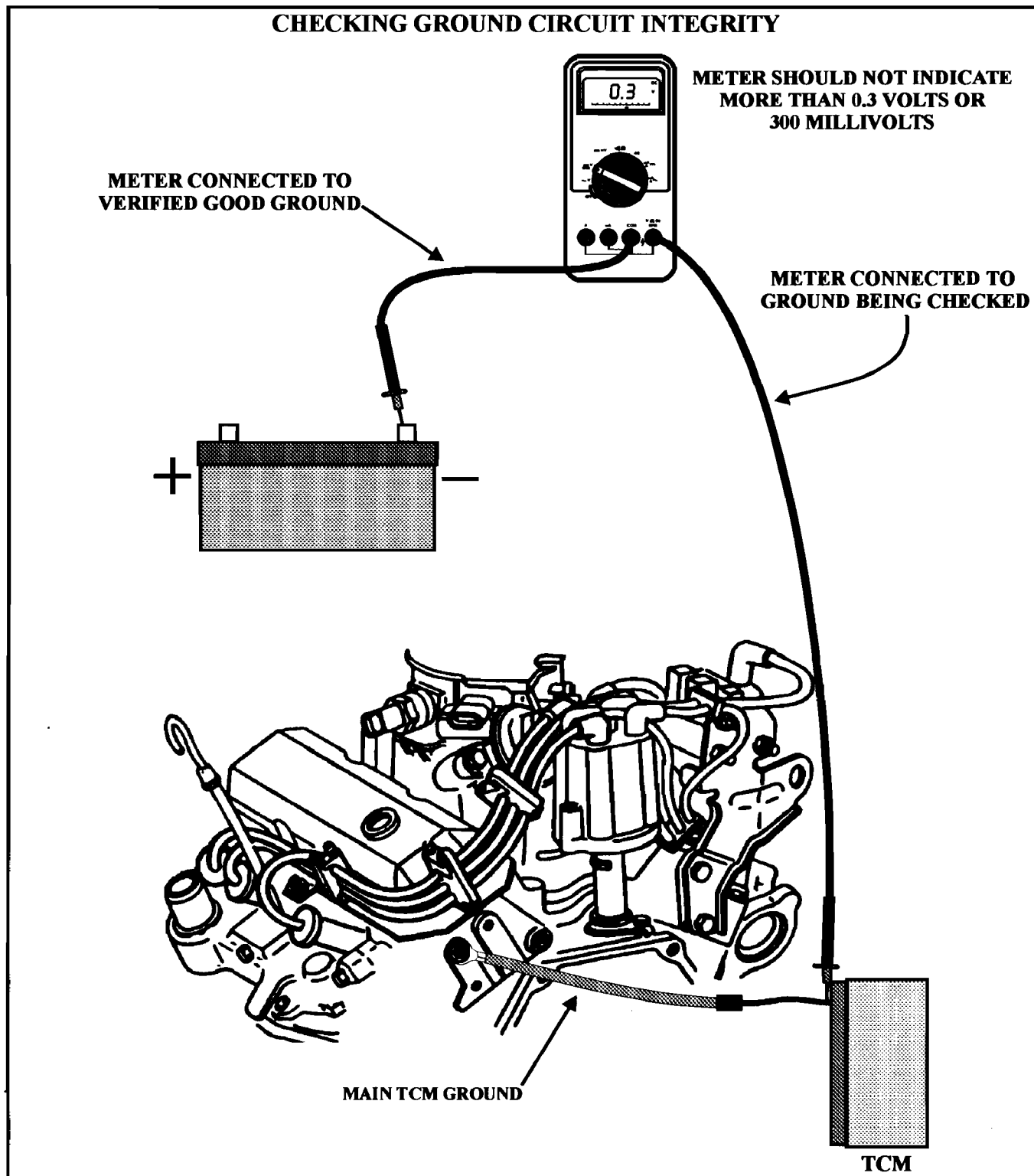


Figure 8



ISUZU TROOPER/RODEO

REPEATED OVERHEATING OF THE TRANSMISSION (4L30E)

- COMPLAINT:** The vehicle comes in with a complaint of a lack of power and the transmission may be slipping. Further examination reveals that the transmission fluid is burnt.
When the transmission is disassembled, it is then obvious that it has been severely overheated.
After overhaul the transmission seems to shift all the gears, but the vehicle still seems to lack power. This condition may be explained to the owner of the vehicle, but inevitably the vehicle returns, once again, with the transmission severely overheated.
- WARNING:** *Another complaint associated with this is transmission fluid out of the filler tube because the oil gets so hot it can actually boil, this could be a fire hazard!*
- CAUSE:** What makes this complaint so difficult to solve is the fact that it is **NOT** caused directly by a transmission failure.
The cause is a faulty ignition coil pack!
Over a period of time the coil pack begins to leak a white milky substance which is used to insulate the coil pack against heat that can damage it. (Refer to Figures 1 and 2)
Once this insulating fluid leaks out, the coil pack overheats and begins to break down internally which causes poor engine performance.
The poor engine performance creates a lack of power which causes the vehicle's operator to have the throttle at an almost wide open position most of the time.

This throttle position keeps the converter clutch unlocked when the transmission is in fourth gear which causes the converter to generate a great deal of heat thereby severely overheating the transmission.
- CORRECTION:** If the engine seems to exhibit a lack of power, check the coil pack for leakage of the white insulating fluid and replace it if this condition exists and also insure that the converter clutch solenoid signal is present at the proper times.
- NOTE:** A number of these vehicles tow boat trailers, etc., this would create an even more serious overheating condition.

ISUZU TROOPER/RODEO

REPEATED OVERHEATING OF THE TRANSMISSION (4L30E)

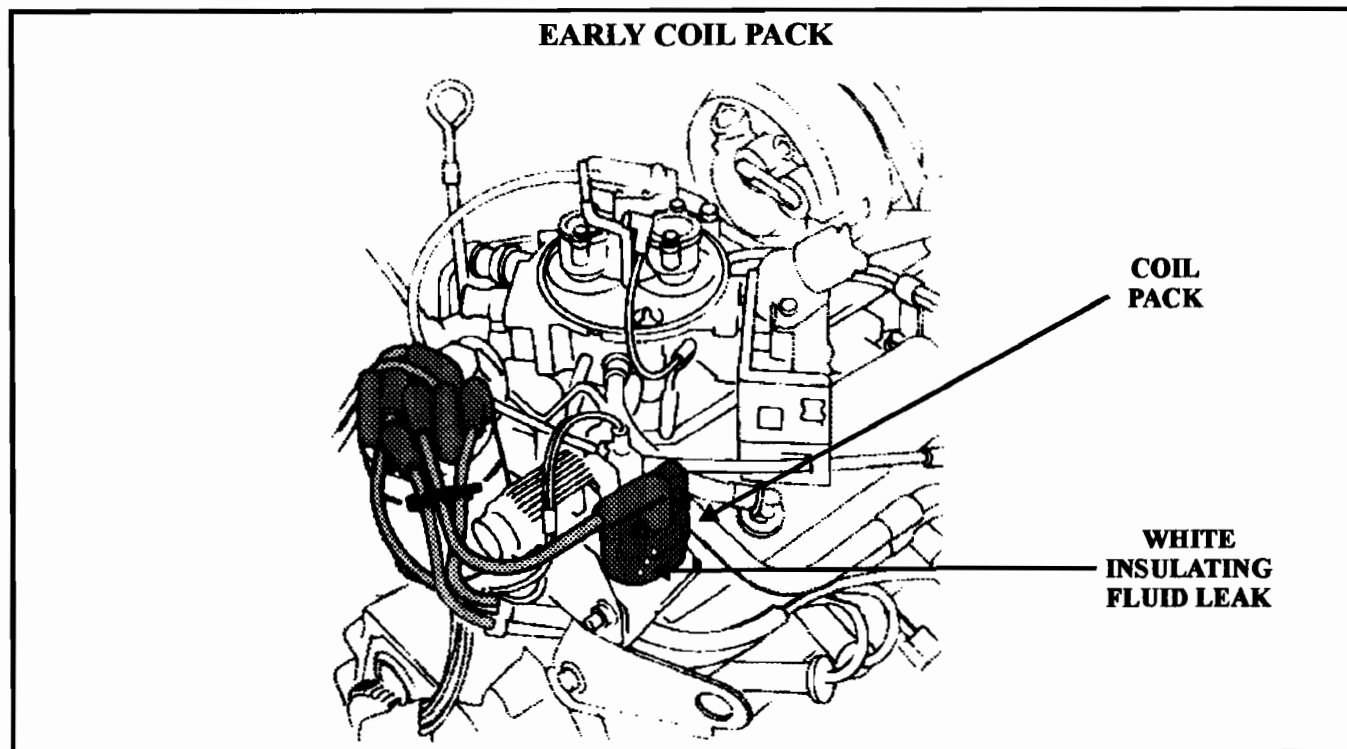


Figure 1

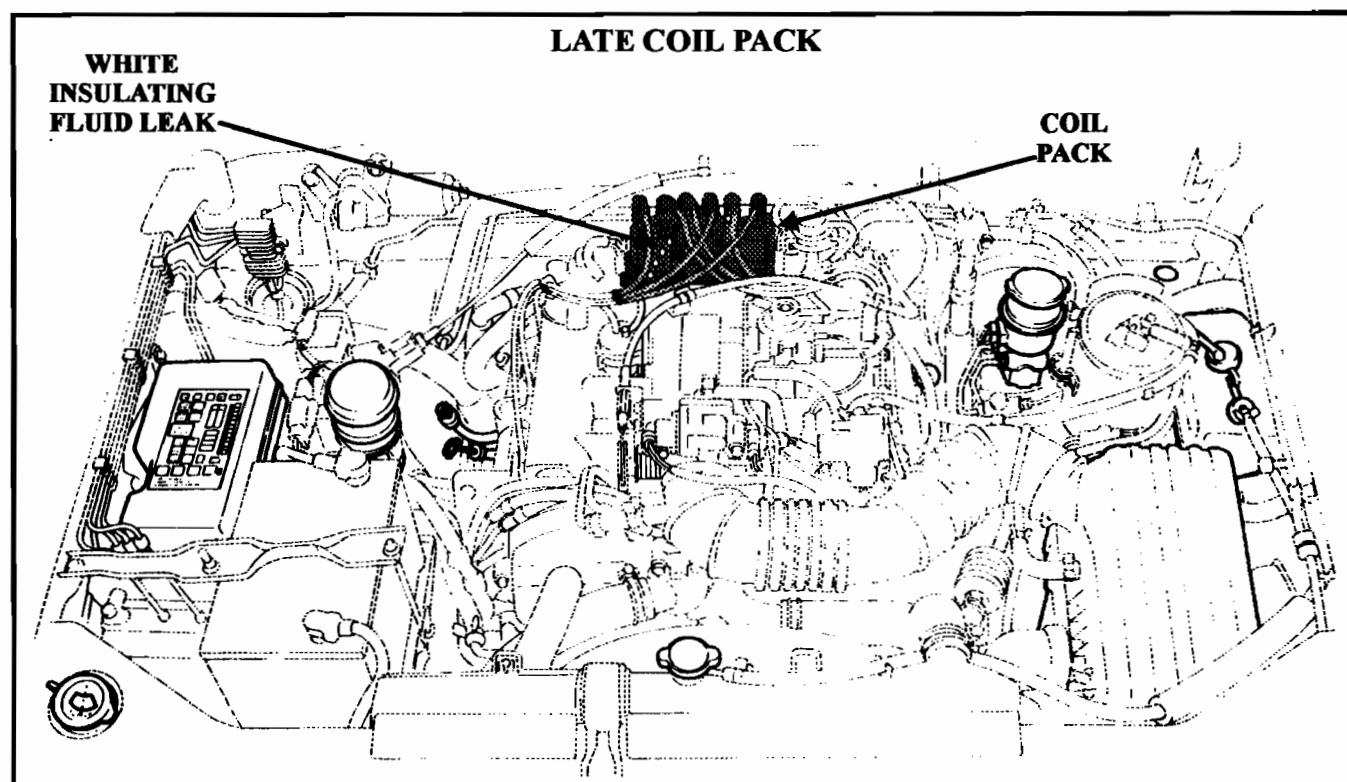


Figure 2



"2000" SEMINAR INFORMATION

SLIDE

108

4L30-E SELECTIVE WASHERS

COMPLAINT: On tear down of the transmission, one or both of the selective washers is found to be in pieces causing damage to the internal components (See Figure 2).

CAUSE: One cause may be excessive end play clearance from the factory allowing the gear train to pound into the washer causing it to break. On units which were torn down not having these washers broken, an end play check was made. More than .050" clearance was observed. If left this way during the rebuild process, the unit may come back later with these washers broken.

CORRECTION: Adjust both the main and overdrive gear box with new selective washers bringing the end play tolerance to the minimum specifications.

Second clutch end play should be between 0.014" to 0.031" (See Figure 3).

Overdrive clutch end play should be between 0.004" to 0.03" (See Figure 4).

INFORMATION: There is a bag of selective washers that can be purchased from BMW under part number:

24-20-1-422-850

The washers contained are color coded for easier ID. The bag contains the following:

Washer Color	Washer Thickness
Yellow	0.060" - 0.064"
Red	0.068" - 0.072"
Black	0.075" - 0.079"
Natural	0.083" - 0.087"
Green	0.090" - 0.094"
Blue	0.098" - 0.102"

Figure 1

This kit may also be purchased from Mario Aristides (305) 666-3544.

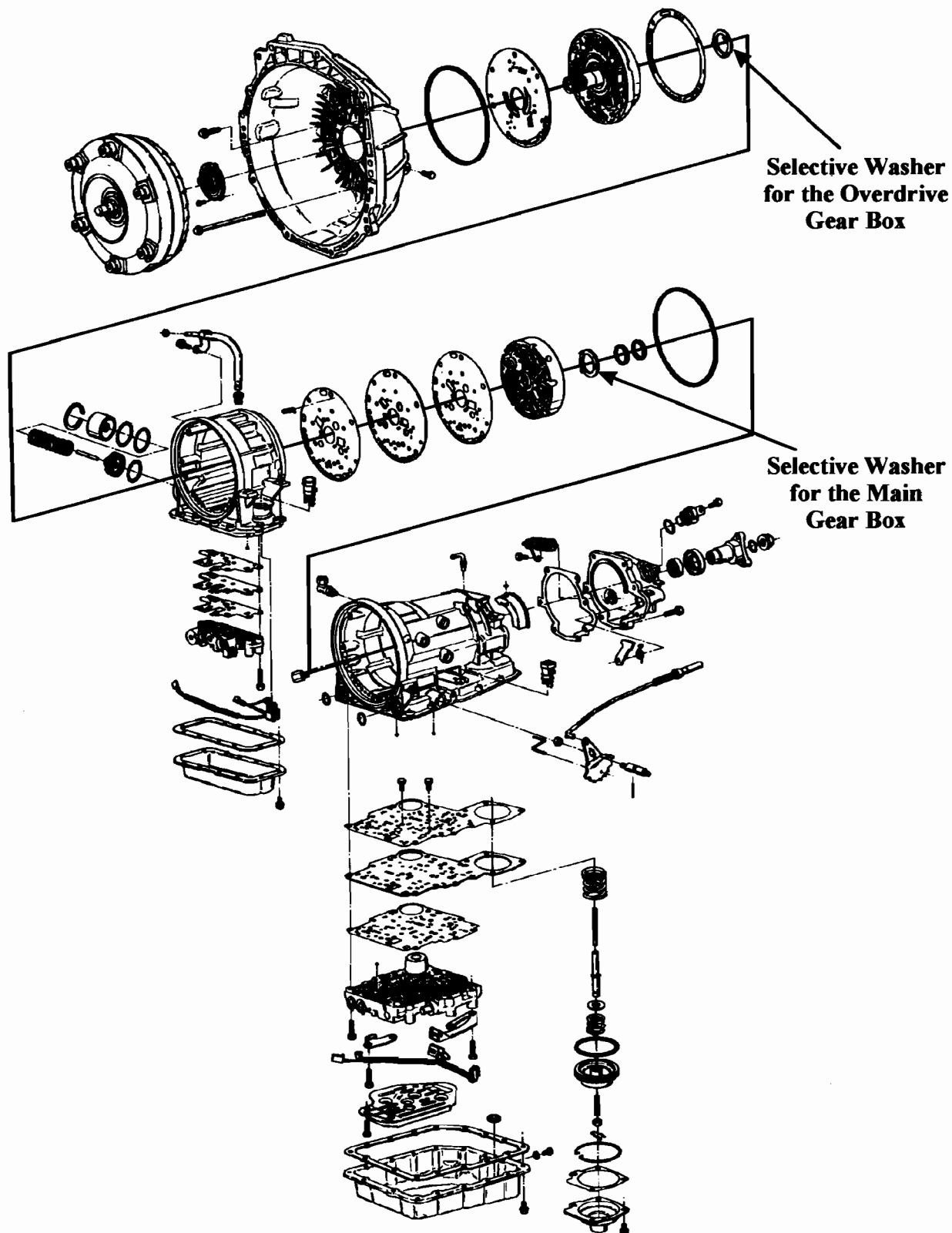
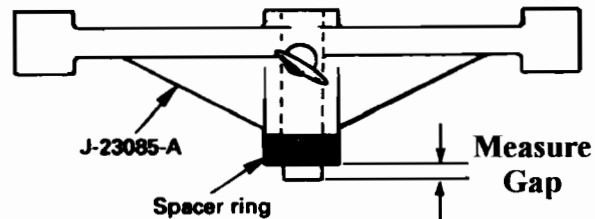
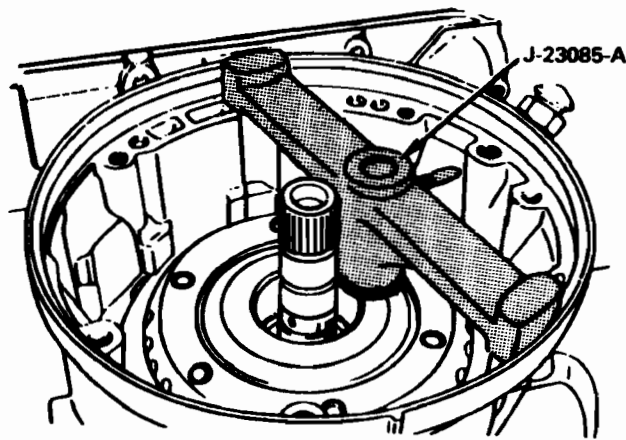
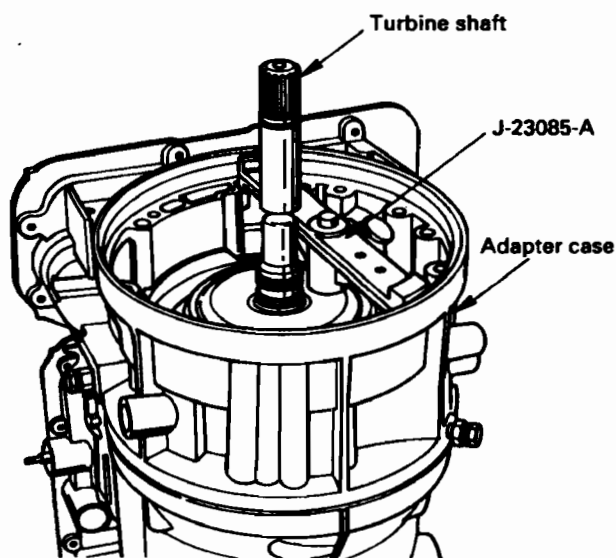


Figure 2



Using Kent Moore tool J-23085-A or equivalent, install the gauging tool on the case flange and against the intermediate shaft. Position the inner shaft of the gauging tool against the thrust surface of the second clutch hub. Tighten thumbscrew and remove the tool. Fit the spacer ring on the inner shaft of the tool and measure the thickness of the remaining gap and select the appropriate washer from the chart in Figure 1.

Figure 3

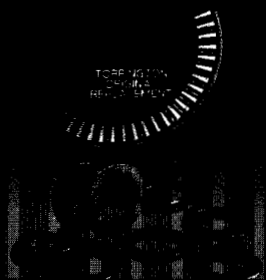


Using Kent Moore tool J-23085-A or equivalent, install the gauging tool on the adapter case flange and against the input shaft. Position the inner shaft of the gauging tool against the thrust surface of the overrun clutch housing. Tighten thumbscrew and remove the tool. Fit the spacer ring on the inner shaft of the tool and measure the thickness of the remaining gap and select the appropriate washer from the chart in Figure 1.

Figure 4



Winners Know How To Make Every Second Count.



Torrington Transmission Bearings Kits get you to the finish line faster.

Whether you're tearing down a drag strip or tearing down a transmission, you know that every second counts.

For you, the winning edge comes from doing a transmission job quickly and efficiently. And making sure it doesn't come back to haunt you.

Ask your parts supplier for Torrington Transmission Bearings Kits. Or ask yourself this question. "Do I have time to waste

looking for old, worn out transmission bearings and reducing my profit margin when I can replace them for a fraction of the total cost of the job?"

Torrington Kits make it easy. You get the entire set of quality replacement bearings in one neat package.

If your goal is smooth running transmission repair work, let Torrington put you in the driver's seat.

**TORRINGTON
INGERSOLL-RAND**

Progress Through Performance

www.torrington.com

TESTING HALL EFFECT SENSORS

PROBLEM: Due to their solid state nature Hall Effect sensors, such as VSS sensors, are difficult to troubleshoot.

PROCEDURE: By far the best way to test a Hall effect sensor is with an Oscilloscope or graphing multimeter. If this equipment is not available, there are three stages to completely test a Hall Effect switch with a DMM: Resistance/Diode test, Static test, and Dynamic test.

O-Scope test:

Connect the sensor to the vehicle or a 12VDC power supply. Connect the common lead (ground pigtail) of the scope to the signal wire of the sensor. Connect the signal lead of the scope to +12 VOLTS (See Figure 1). Now make the sensor move by making the vehicle move or twirling the gear with your fingers.

If you have a nice square wave (Figure 1) the sensor is good.

If you see no changes on the scope at all either the sensor is bad, or it is not getting power, or the magnet on the shaft is missing or not moving.

If you have an inverted saw tooth (Figure 1), then there is no pull up resistance. The pull up resistor may either be in the computer OR in the sensor. If you are bench testing, move to in vehicle testing. If you get the same waveform in the vehicle the only thing left to test is the wiring between the sensor and the computer. If the wiring tests OK it is either a bad sensor or a bad computer.

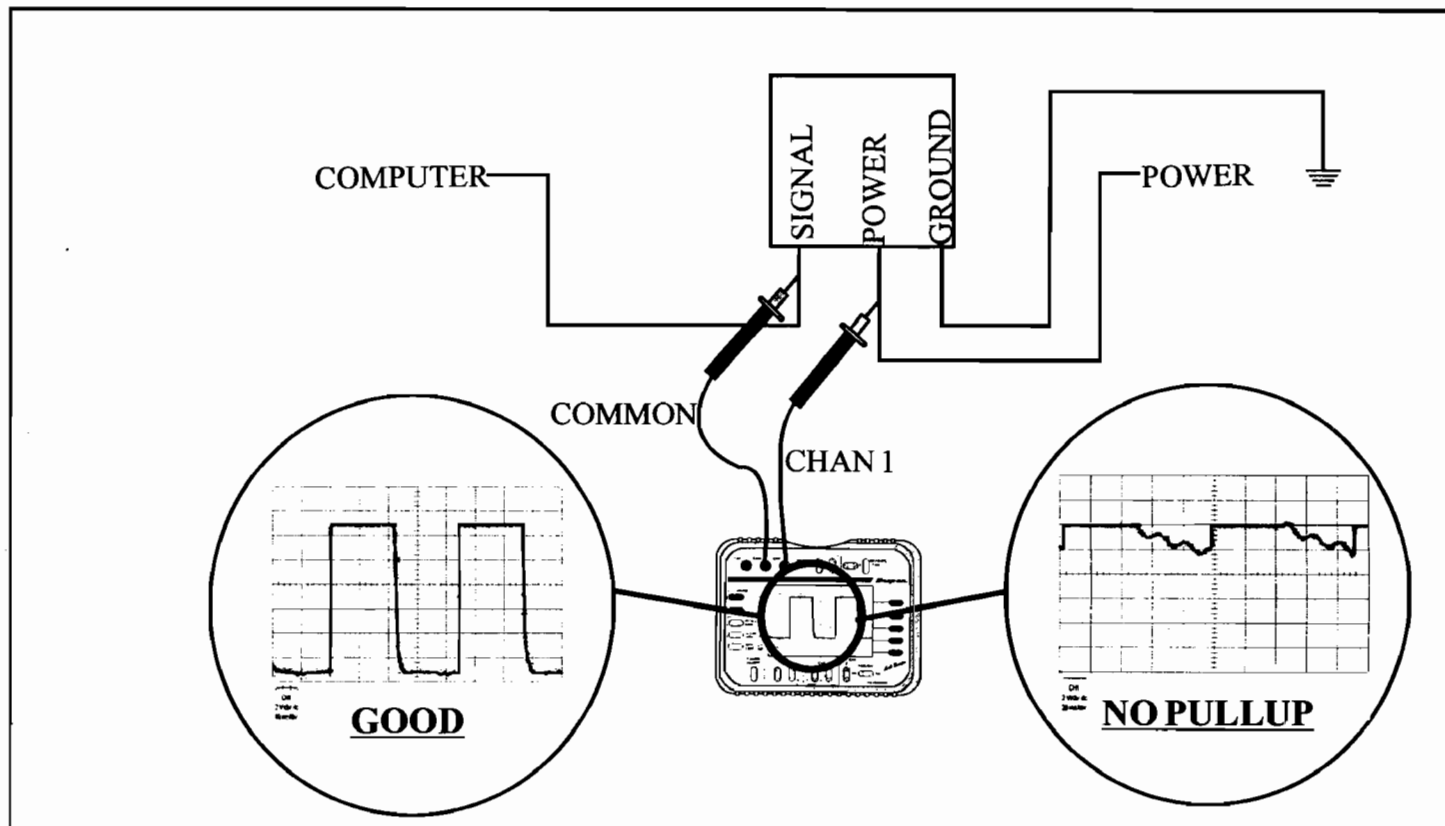


Figure 1

TESTING HALL EFFECT SENSORS

Static testing:

Either connect the sensor to the vehicle, or connect it to a 12VDC power supply

- 1) Connect a DC Voltmeter with the Common (Negative) lead to the SIGNAL wire, and the Positive lead to +12 volts.
- 2) Read the meter, it should be either 12VDC (1) or 0 (2).
- 3) Slowly rotate the VSS 1/8 to 1/4 turn. The meter should toggle between 12VDC (1) and 0 (2) as the shaft is **SLOWLY** turned. If it does, you should proceed to dynamic testing. If it does not, the sensor is bad, or it is not receiving power or the exciter magnet is missing or not moving.

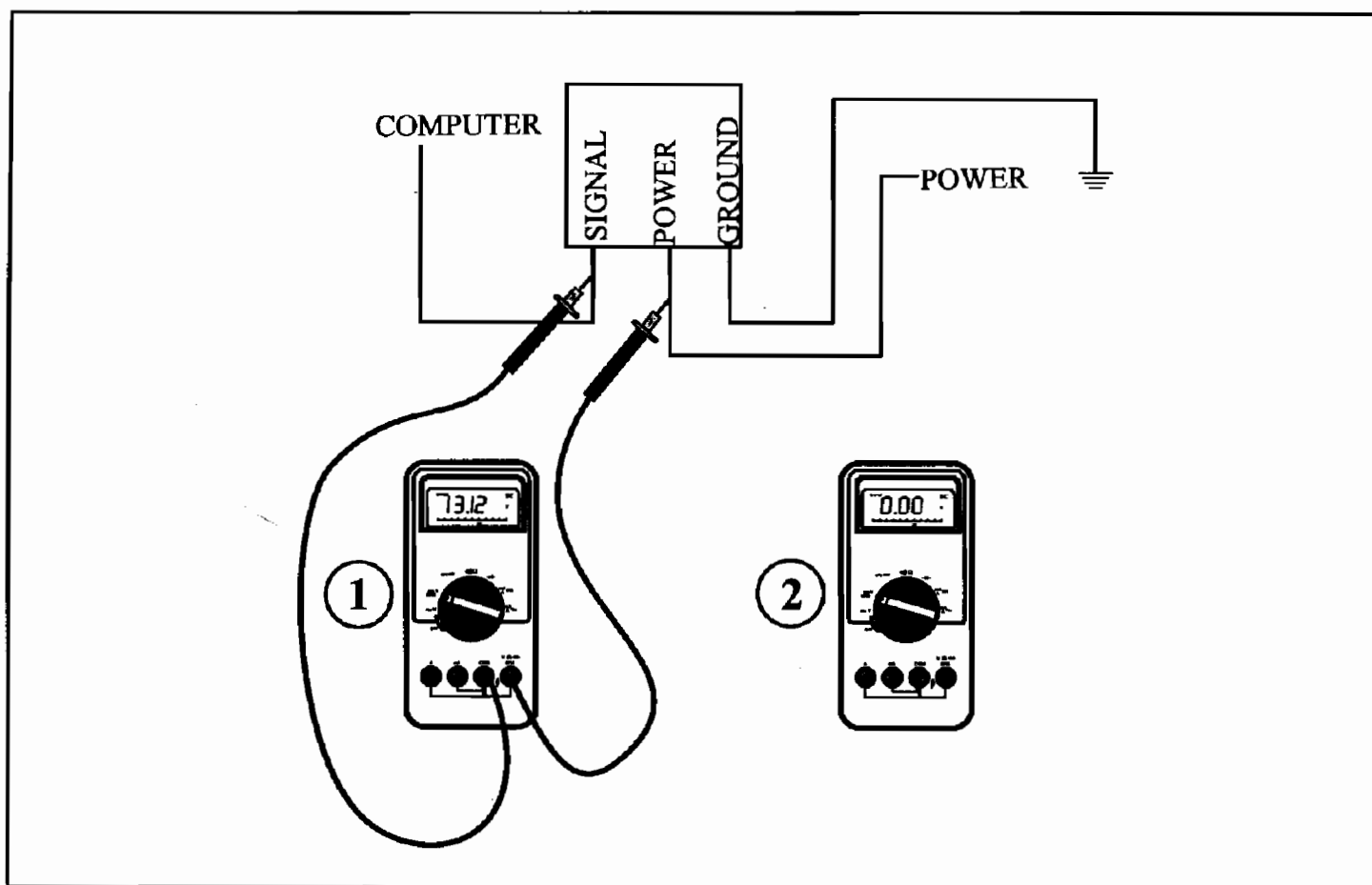


Figure 2

TESTING HALL EFFECT SENSORS

Dynamic testing:

- 1) Leave the meter and sensor connected as in static testing
- 2) Run vehicle to a constant speed (if not in the vehicle you will need to attach a drill or something). Remember the DC reading you get here.
- 3) With the sensor still at the same constant speed, switch the meter to AC volts leaving the leads connected the same way. Remember your AC volts reading here.
- 4) If both readings are 5 to 7 V (2A and 2B), the unit is operating correctly. If the AC reading is less than 2 VAC (1B) and the DC reading is greater than 10 volts (1A), the pull up resistor is not in the circuit. The only thing left to test is the wiring between the sensor and the computer. If the wiring tests OK it is either a bad sensor or a bad computer.

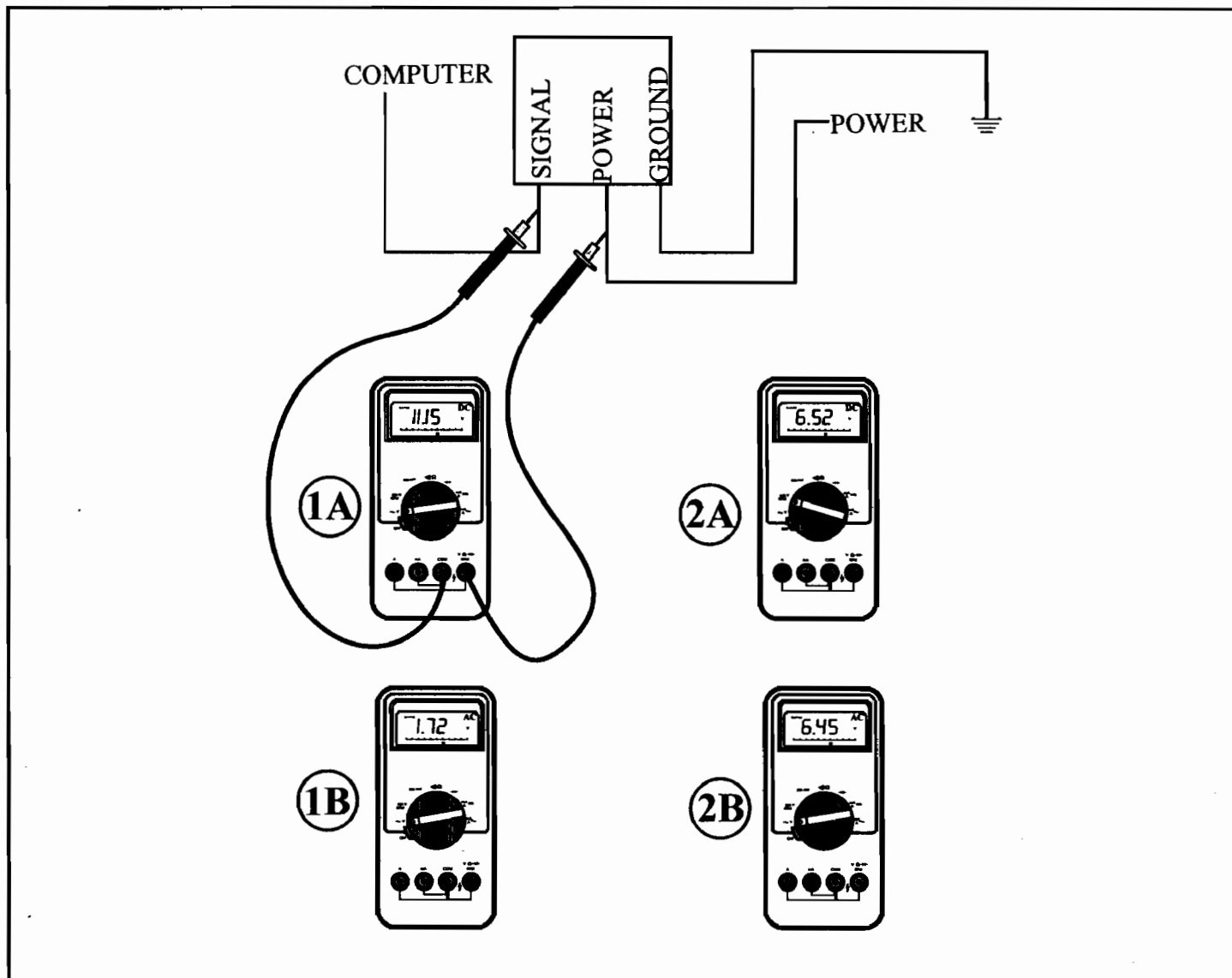


Figure 3

TESTING HALL EFFECT SENSORS

If you are bench testing and none of the previous tests were conclusive, you may want to try the Resistance/Diode test

Resistance/Diode test:

- 1) With the unit disconnected, connect an Ohmmeter from the Positive power lead to the signal lead. If the reading is lower than 1 MEGOhm, but still higher than 5 or 10 Ohms, the pull up resistor is in the sensor unit, and it is good (1). If the reading is very low (less than 5 ohms) the unit is shorted.
 - 2) If step 1 indicated that the pull up resistor was NOT in the unit, switch your meter to the Diode Test function and remember the reading (2)
 - 3) Now reverse you meter leads, the reading should change (3). If the reading does not change the sensor is open.
- (The reading in steps 2 or 3 MAY be out of range for your meter, this is OK, you are looking for the CHANGE)
- 4) Repeat steps 2 and 3 with your meter connected between the Ground terminal and the signal terminal (4 and 5).

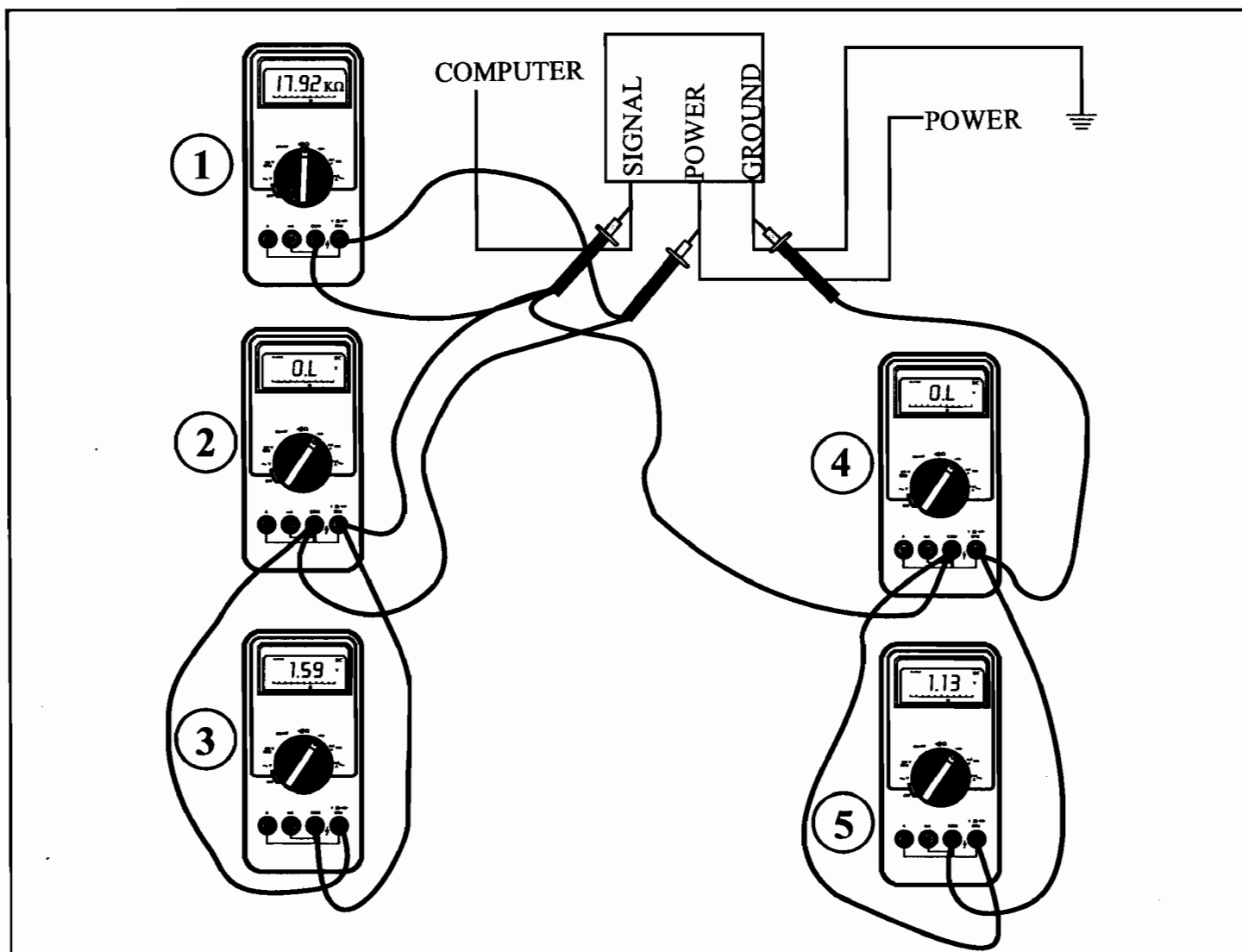
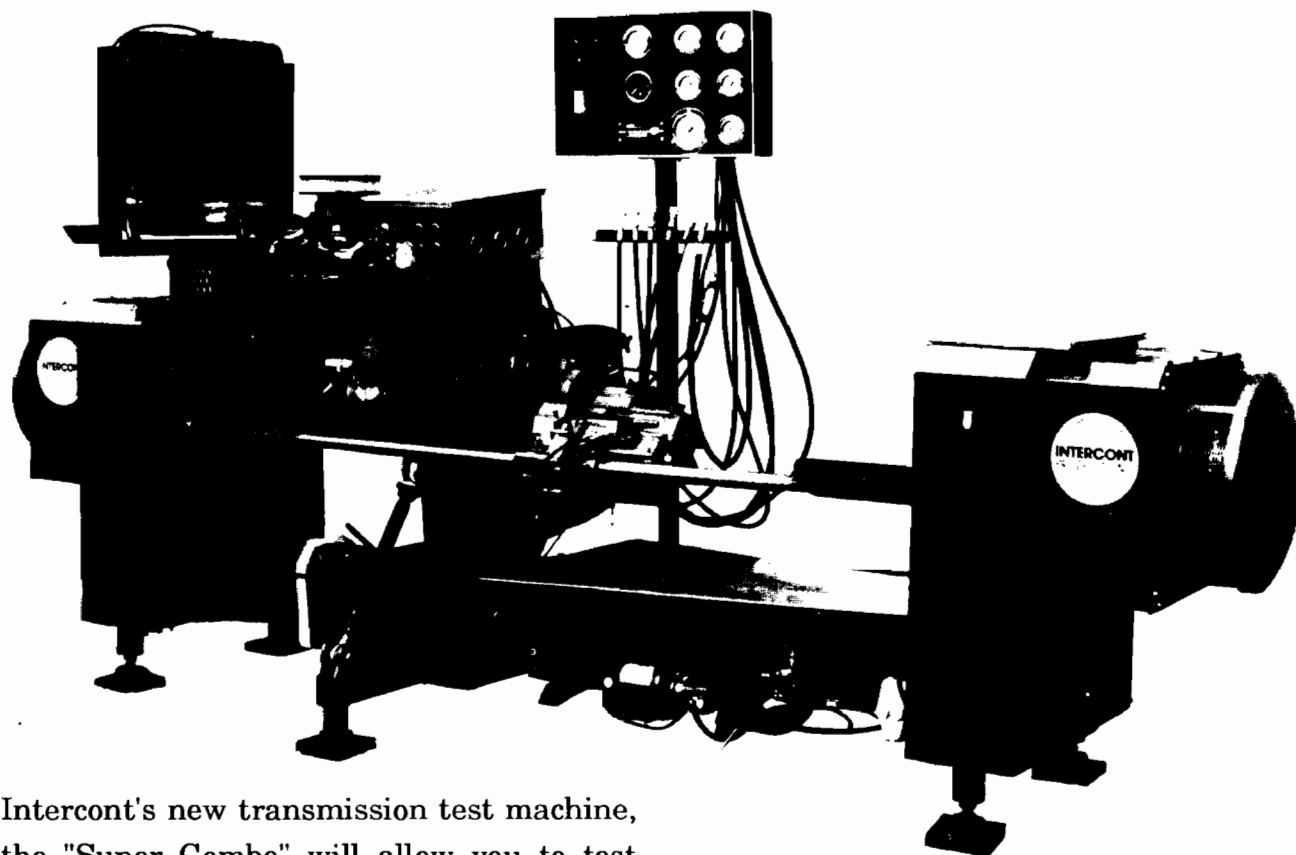


Figure 4

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.



RFI / EMI and POWER SUPPLY NOISE PROBLEMS

COMPLAINT: Erratic shifting, intermittent codes, and other behavior due to electrical interference.

CAUSE: Electromagnetic Interference, Radio Frequency Interference, and Noise in the electrical system can all cause erroneous readings from electronic sensors, especially coil type pulse generators.

CORRECTION: Noise must be eliminated from entering the circuit, or filtered from the circuit. Eliminating noise from entering is accomplished with proper grounding and shielding. Filtering is accomplished by adding appropriate filters to proper points in the circuit.

Shielding: A shield is a covering over a device or wire which "absorbs" any external spurious signals. It is always an electrical conductor, and it is always grounded. This causes any interference to be conducted to ground. Always avoid any kind of current flow in the shield itself as this could create its own spurious signal. To this end, always use enough conductors inside a shielded cable to support both the signal AND RETURN wires. Further, only ground the shield at ONE POINT as multiple grounding points could cause a ground loop. For example, to replace the cabling to one of the pulse generators on a KM unit, use a two conductor with shield (Beldin cat#8719 (16 gauge) or Beldin cat#8720(14 gauge)) cable. Make sure to ground the shield on ONLY ONE END, preferably where the old one is grounded.

Grounding: Proper grounding is essential in all electrical circuits, and especially important in electronics. Improper grounds can render shields and filters useless since there is no place to route the spurious signals. Bad grounds can also cause incorrect biasing within electronic circuits themselves causing them to produce their own noise which can affect the noisy circuit, or other connected or nearby circuits. A "bad" ground can also be in the form of a "noisy" ground in that the connections resistance constantly and rapidly changes causing the noise in the first place.

Filtering: Filtering is really only practical in the power supply. Any filtering to be done in the signal lines is done internally and takes the signals characteristics into consideration. Filtering of signal lines is NOT recommended in the field. The best way to get rid of noise in the power supply is to fix the problem causing the noise. Aftermarket electronic components (stereos, alarms, car computers, etc) should either have their own FUSED wire directly to the battery (or "on with ignition" bus), or should at least be on separate circuits from control computers and modules. If noise in the power supply is still a problem, try to filter the noise from the vehicles overall electrical system. Failing that, place a noise filter in the line feeding the unit that is having the problem. There is a huge variety of automotive noise filtering devices available from most automotive parts suppliers and electronics stores. (Radio Shack cat#27-051 for example.)

TESTING HALL EFFECT SENSORS

DISCUSSION: Simply put, A Hall Effect device is simply a transistor which uses magnetism for it's input. More than simply the presence of magnetism, the magnetic lines must be in the correct orientation (North and South), and at the correct angle.

Some facts from "The Book:"

The "Hall Effect" is named after Edwin Hall who discovered the effect in 1879. The basic "Hall Effect" sensing element is a semiconductor device which, when biased by an electrical current through it, will generate an electrical voltage proportional to the magnitude of a magnetic field flowing perpendicular to the surface of the semiconductor.

Klaus von Klitzing demonstrated (1980) that, under the special conditions of low temperature, high magnetic field, and two dimensional electronic systems (in which the electrons are confined to moving in planes), the voltage difference increases in a series of steps as magnetic field is increased. This is known as the quantized Hall effect.

Here is what happens inside a Hall Effect device. On a flat surface of a semiconductor material you pass a current through. You then sense any current flowing ACROSS that same surface (perpendicular to the original current flow). If there is any, it is being caused by a magnetic field which has lines of force perpendicular to the magnetic field created by the original current flow. Since all this is happening right on the surface of the semiconductor, it is amplified to useable levels before it ever leaves the device.

Because of the limited area where the signal is at low levels, it is much less susceptible to interference. When the semiconductors' output is properly biased by an output pull up resistor the signal may be used by digital logic circuitry without any further conditioning.

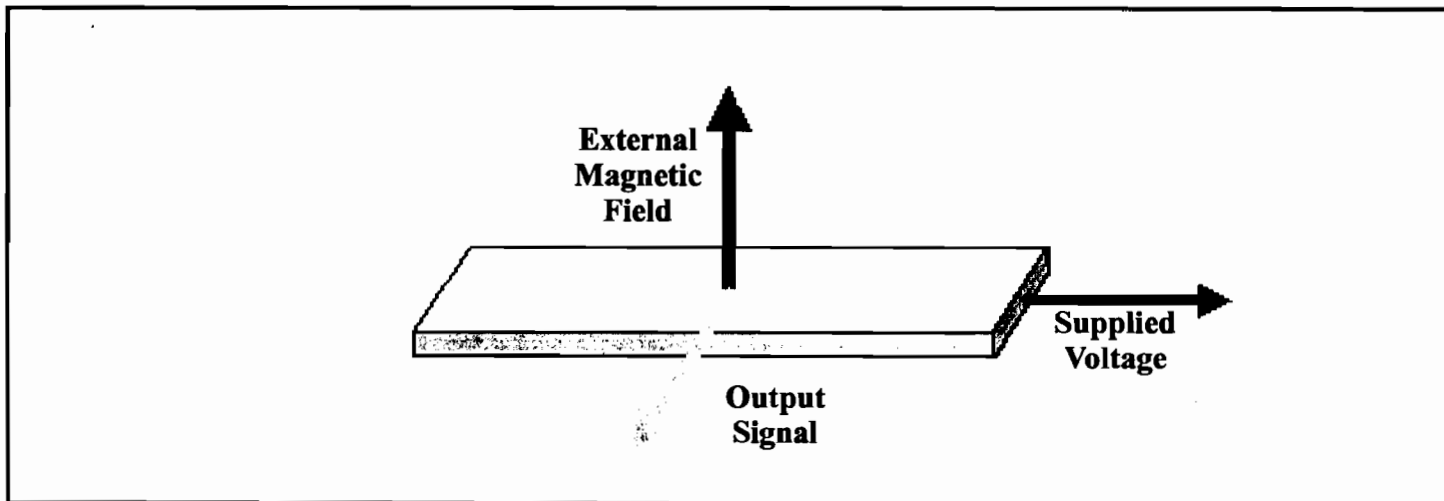


Figure 5

COMPUTERS LOOSE MEMORY

COMPLAINT: Computers loose all learned memory when battery is disconnected.

CAUSE: There is no power available from any source to retain the memory when the battery is disconnected.

CORRECTION: Keep minimal power to all devices that have memory. A simple inexpensive way to do this is to wire a 9 volt battery (Battery Clip for 9 volt battery is Radio Shack cat#27-324) to a cigarette lighter plug (Radio Shack cat# 980-0300). JUST before disconnecting the battery, plug the device into the cigarette lighter. This will not only retain your learned memory in the transmission computer, it will even keep the programmed radio stations!

Using this device has the vehicle running on a little 9-volt battery. Any heavy electrical load (headlights, brakelights, starter, etc) will drop the output voltage of this device to zero. Further, this small battery does not have the storage capacity of a car battery and will run down in less than a day. If longer "keep alive" power is required, use a 110VAC to 9-volt power supply (Radio Shack "battery eliminator" cat#273-1552).

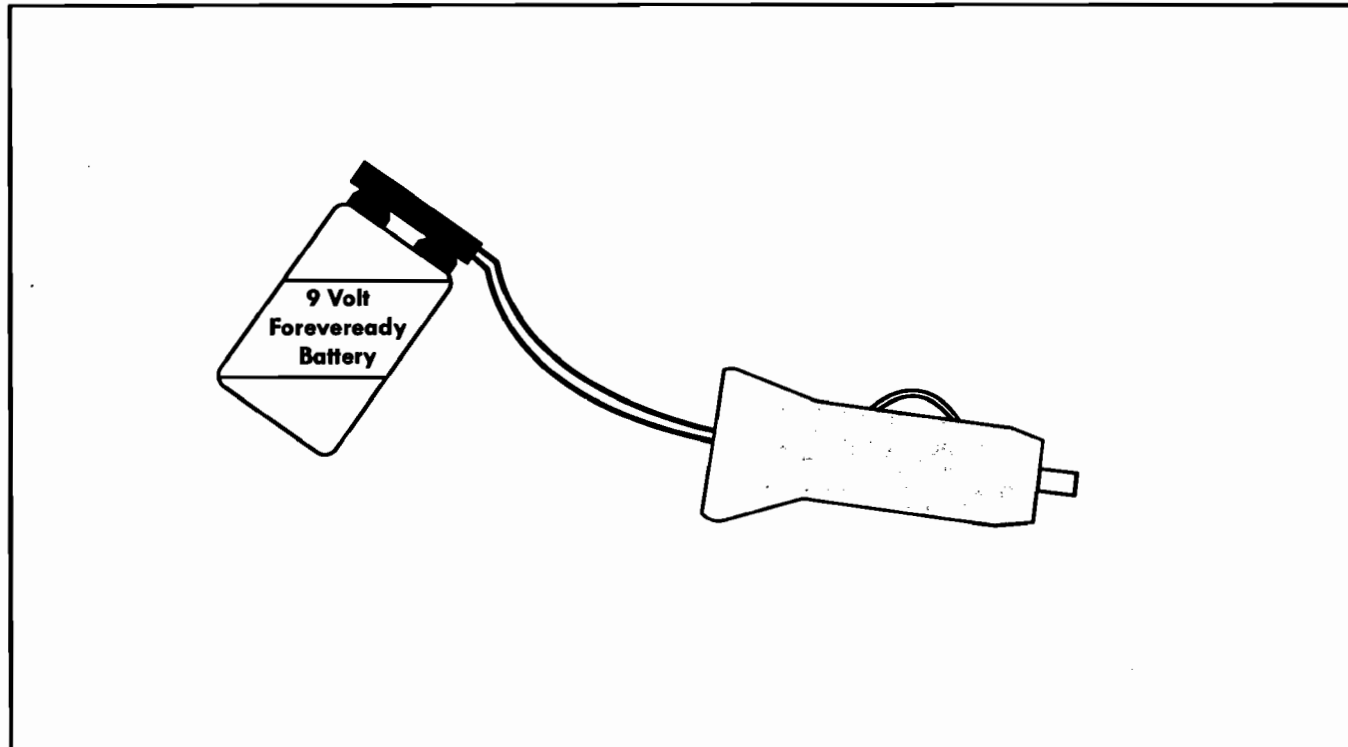


Figure 1

AUDIO TACH

SHIFT AND TCC APPLY RECOGNITION

There have been times when the technician road testing a vehicle has wondered whether or not the transmission shifted or not or whether or not TCC applied.

This is especially true on vehicles that do not support data stream on a scan tool which means shift solenoid and TCC solenoid command cannot be seen.

The Shift-a-lizer, a new product from *Schaffer Test Products*, makes knowing when a shift or TCC application took place because the Shift-a-lizer enables the technician to **HEAR** when a shift or TCC application took place.

With the Shift-a-lizer plugged into the vehicles cigarette lighter socket, and with all accessories turned off, the Shift-a-lizer will send out an audible buzz which allows the slightest change in engine rpm to be heard such as when a shift or TCC apply takes place.

In situations where the shift is long and drawn out, this can also be heard through the Shift-a-lizer.

The Shift-a-lizer also has a convenient accessory socket to allow the use of other equipment while the Shift-a-lizer is also in use as seen in figure 1.

For further information on the Shift-a-lizer, contact:

Schaffer Test Products
1-877-744-3837

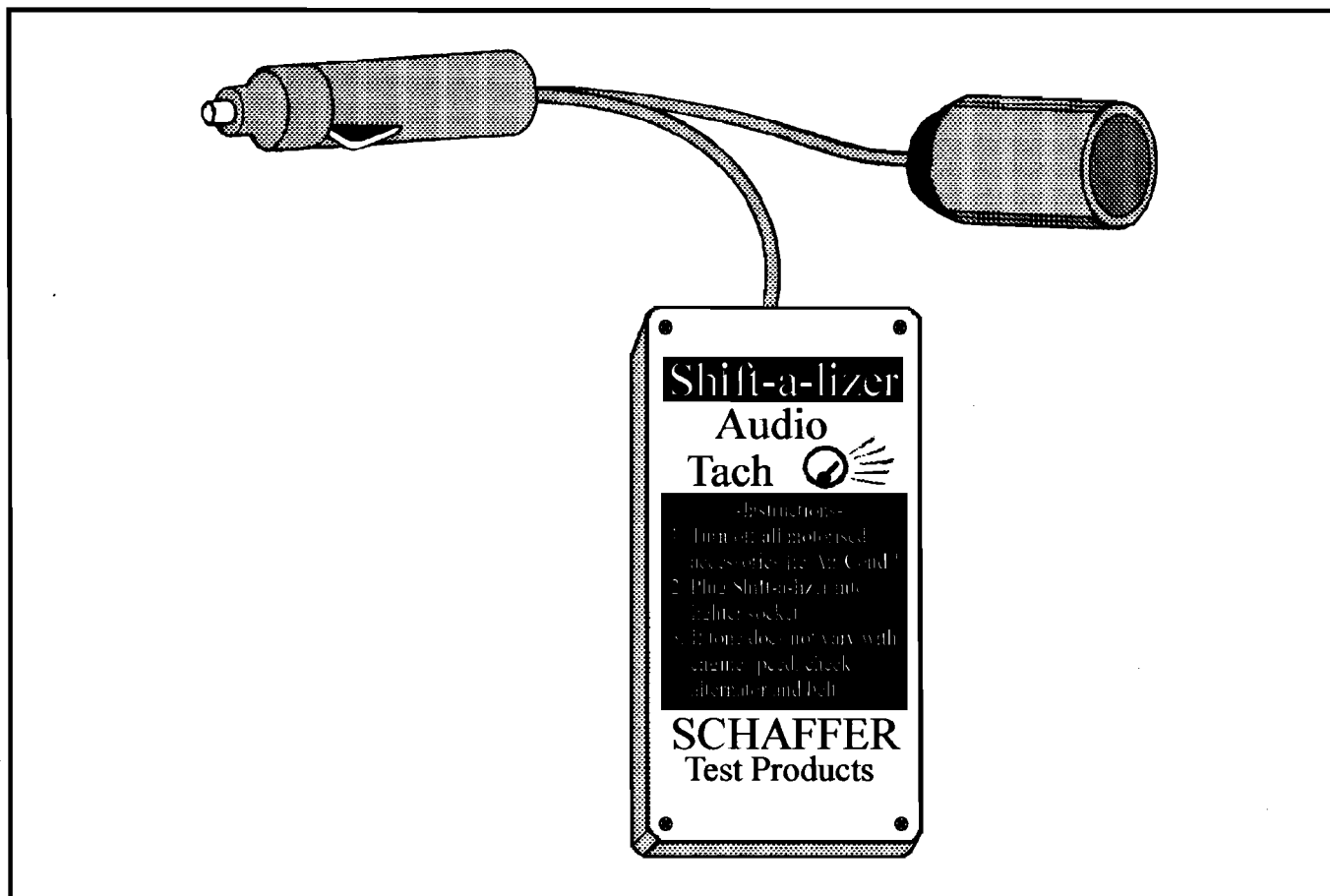


Figure 1