THE SEMINAR WITH MORE IN '94

INDEX

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

ATSG

TRANSMISSION SEMINAR 1994

INTRODUCTION

This years seminar "More In '94" will cover the most asked questions from the ATSG "Hotline" on the 4L60 (700-R4), 4T60 (440-T4), which are no longer in production, but will be around for some time to come. We will also be covering common questions on the new 4L60-E (Electronic 700), the 4L80-E (400 Overdrive). The Chrysler A604 Transaxle and the Chrysler A500/518 Transmissions will also be covered. This information will help when the same type of questions arise on the vehicles coming into your shop.

The 1991 model year saw the introduction of the 4L80-E and the 4T60-E, and in 1993 model year the introduction of the 4L60-E and the 4T80-E, with a 4T40-E waiting in the wings. The only hydraulic transmission General Motors has left is the THM 125C and it will be replaced by the 4T40-E transaxle scheduled for sometimes in 1995.

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AUTOMATIC TRANSMISSION SERVICE GROUP
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SUITE 720
MIAMI, FL 33156
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OEM's use

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

shouldn't you?

SAAB

Parts & Service Information

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

Subject: Automatic Transmission Upshift Noise

Application: 9000 Models with ZF Automatic Transmission

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

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

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

Cars Affected:

9000 models with ZF automatic transmission.

Parts:

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

NOTE

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

Action:

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

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

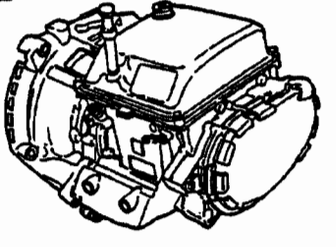
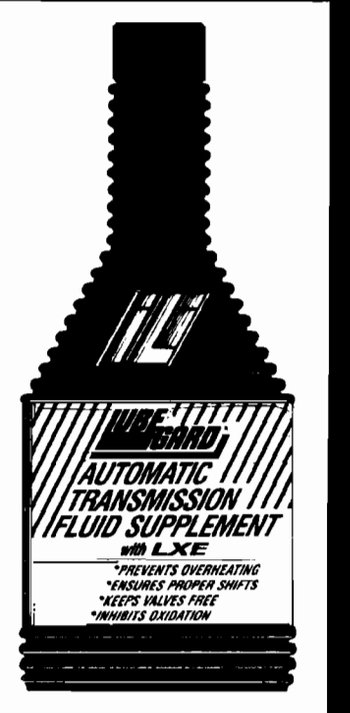


Figure 1. LUBEGARD ATF SUPPLEMENT



FILE	CIRCULATE			

INTERNATIONAL LUBRICANTS INC.
SEATTLE, WA 98108
(206) 762-5313
1-800-333-LUBE (5823)

THM 4L60-E

VALVE BODY EXPLODED VIEW

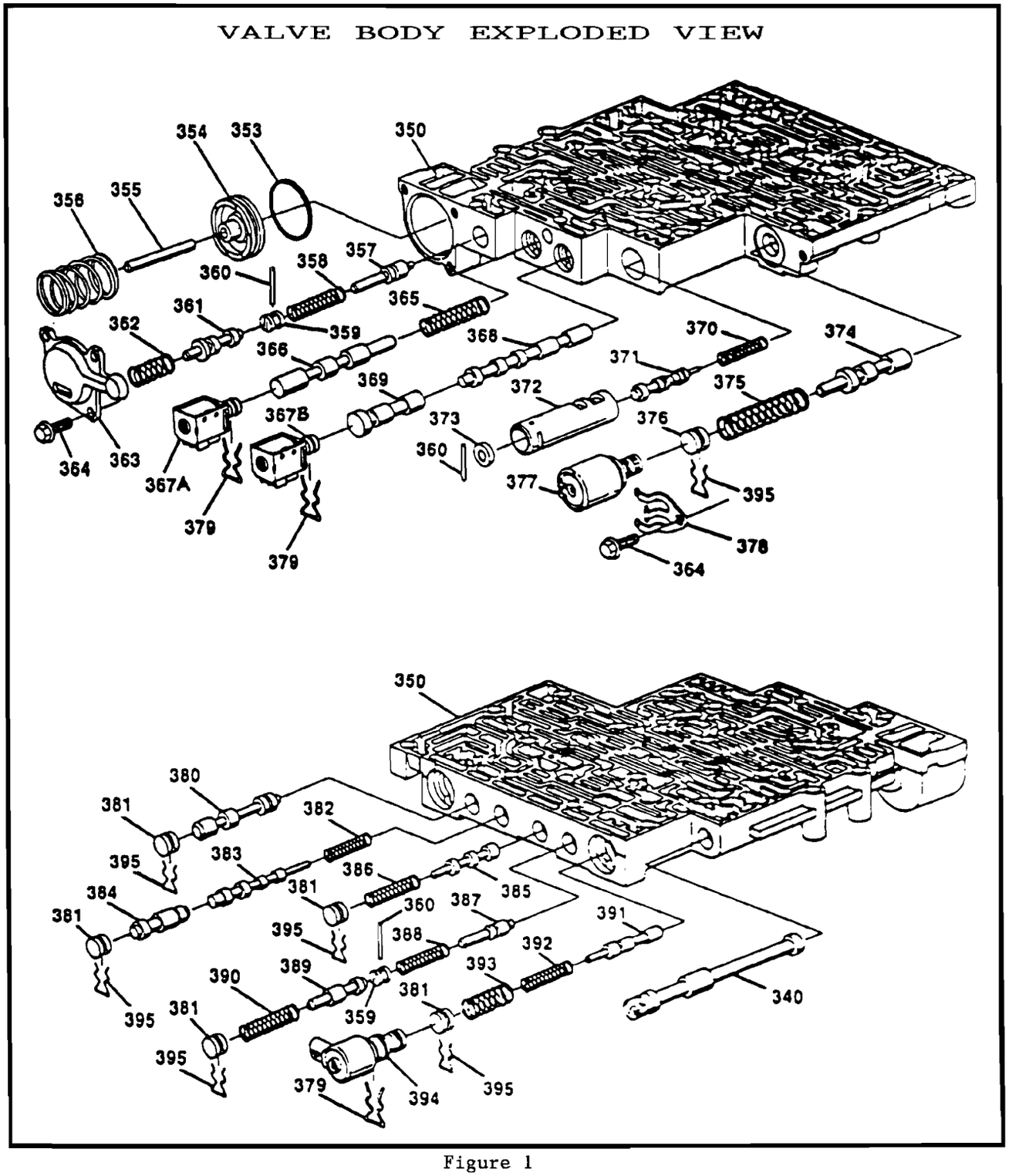
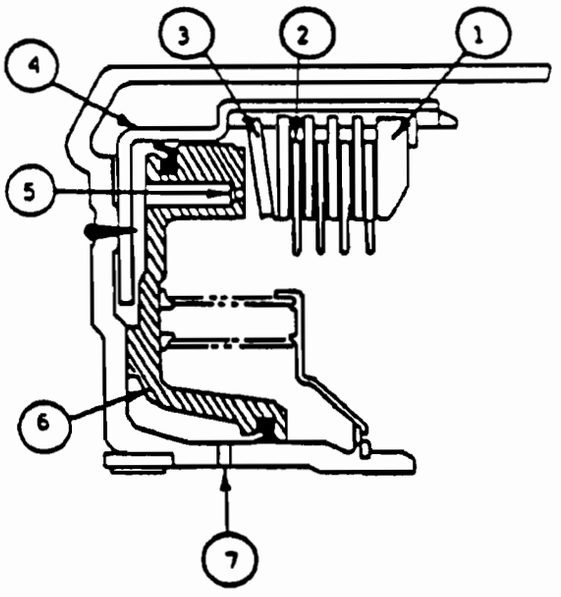


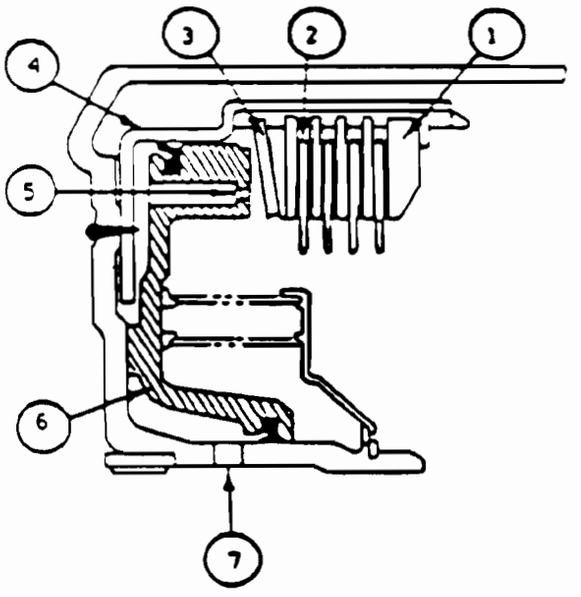
Figure 1

340 VALVE, MANUAL
350 VALVE ASSEMBLY, CONTROL BODY
353 SEAL, FORWARD ACCUMULATOR OIL
354 PISTON, FORWARD ACCUMULATOR
355 PIN, FORWARD ACCUMULATOR
356 SPRING, FORWARD ACCUMULATOR
357 VALVE, FORWARD ABUSE
358 SPRING, FORWARD ABUSE VALVE
359 PLUG, BORE
360 PIN, COILED SPRING
361 VALVE, LOW OVERRUN
362 SPRING, LOW OVERRUN VALVE
363 COVER, FORWARD ACCUMULATOR
364 BOLT, FORWARD ACCUMULATOR COVER
365 SPRING, 1-2 SHIFT VALVE
366 VALVE, 1-2 SHIFT
367A 1-2 SHIFT SOLENOID (A) ← RED AND GREEN WIRES
367B 2-3 SHIFT SOLENOID (B) ← RED AND YELLOW WIRES
368 VALVE, 2-3 SHIFT
369 VALVE, 2-3 SHUTTLE
370 SPRING, 1-2 ACCUMULATOR VALVE
371 VALVE, 1-2 ACCUMULATOR
372 SLEEVE, 1-2 ACCUMULATOR VALVE
373 PLUG, BORE
374 VALVE, ACTUATOR FEED LIMIT
375 SPRING, ACTUATOR FEED LIMIT VALVE
376 PLUG, BORE
377 PRESSURE CONTROL SOLENOID
378 RETAINER, PRESSURE CONTROL SOLENOID
379 RETAINER, SOLENOID
380 VALVE, CONVERTER CLUTCH SIGNAL
381 PLUG, BORE
382 SPRING, 4-3 SEQUENCE VALVE
383 VALVE, 4-3 SEQUENCE
384 VALVE, 3-4 RELAY
385 VALVE, 3-4 SHIFT
386 SPRING, 3-4 SHIFT VALVE
387 VALVE, REVERSE ABUSE
388 SPRING, REVERSE ABUSE VALVE
389 VALVE, 3-2 DOWNSHIFT
390 SPRING, 3-2 DOWNSHIFT VALVE
391 VALVE, 3-2 CONTROL
392 SPRING, 3-2 CONTROL VALVE
393 SPRING, BORE PLUG
394 3-2 CONTROL SOLENOID
395 RETAINER, BORE PLUG

Figure 2



1987-1992 MODELS



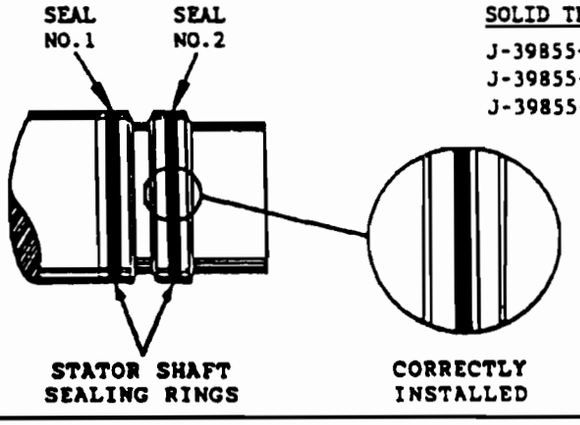
1993 MODELS

REVERSE INPUT HOUSING

1. Reverse Input Clutch Backing Plate.
2. Reverse Input Clutch Friction Plate.
3. Reverse Input Clutch Bellville Plate (Cone Shaped).
4. Reverse Input Clutch Housing.
5. Reverse Input Clutch Piston Orifice (.095").
6. Reverse Input Clutch Aluminum Piston.
7. FEED ORIFICE IN CLUTCH HOUSING ENLARGED FOR 1993.

Figure 3

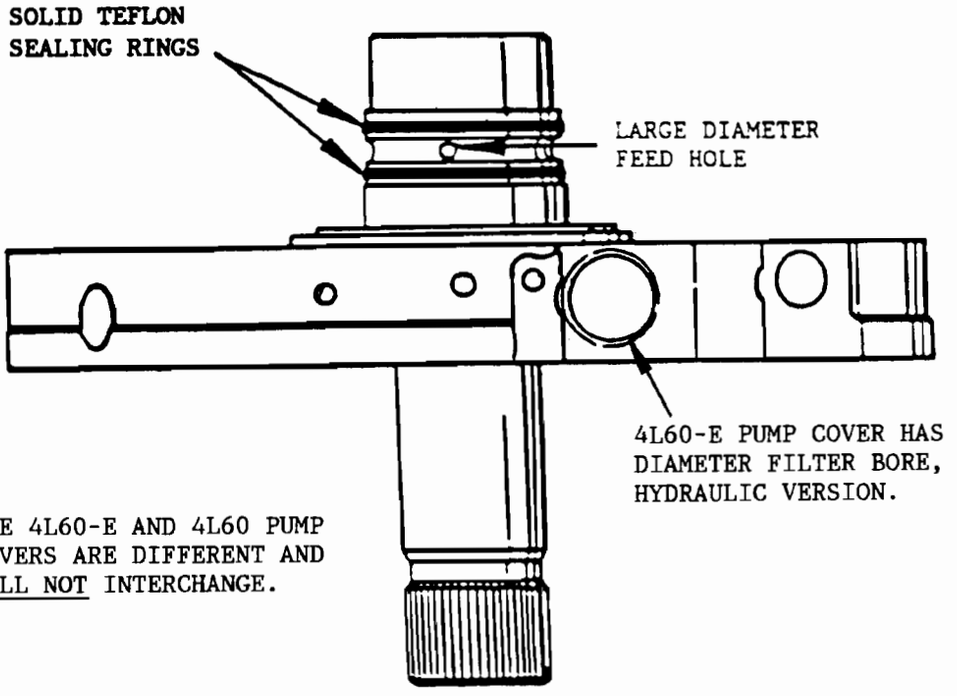
SOLID TEFLON STATOR SEALING RINGS



SOLID TEFLON RING TOOLS FOR STATOR

J-39855-1 = INSTALLER FOR RING NO.1
J-39855-2 = INSTALLER FOR RING NO.2
J-39855-3 = RESIZER FOR BOTH RINGS

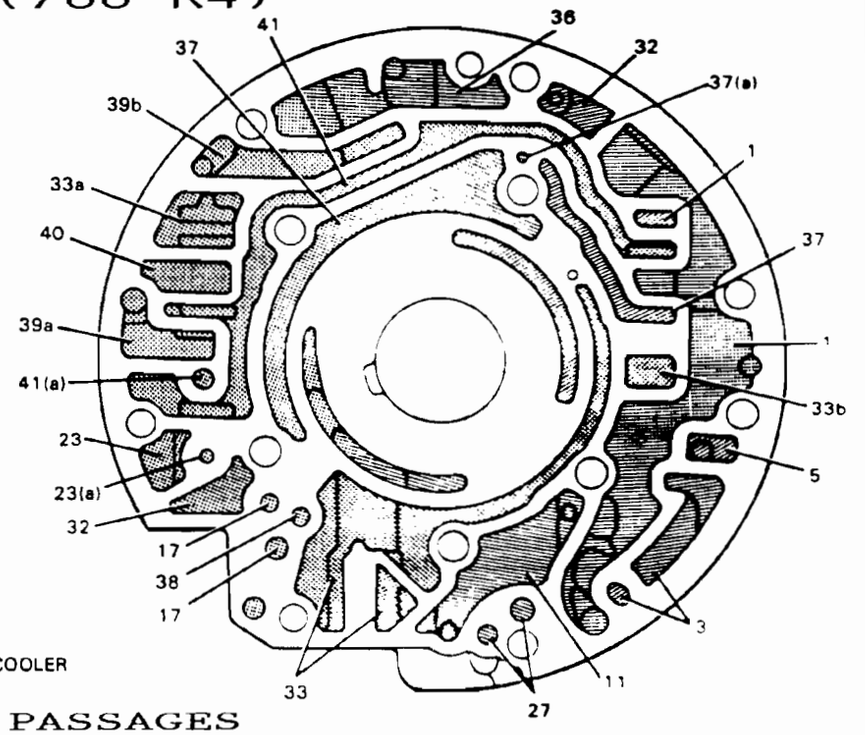
Figure 4



NOTE: THE 4L60-E AND 4L60 PUMP COVERS ARE DIFFERENT AND WILL NOT INTERCHANGE.

Figure 5

THM 4L60 (700-R4)

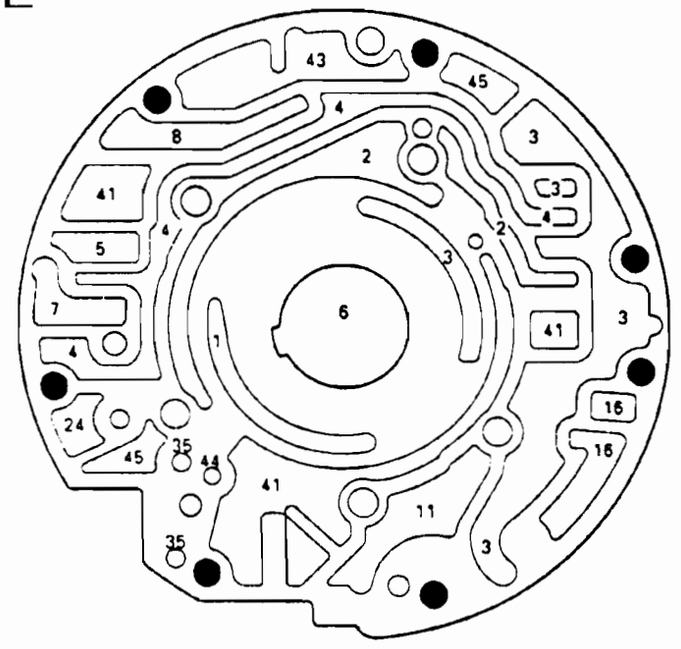


1 LINE
3 D2
5 REVERSE
11 MODULATED T.V.
17 OVERRUN CLUTCH
23 CONVERTER CLUTCH SIGNAL
23(a) CONVERTER CLUTCH SIGNAL (ORIFICE CUP PLUG)
27 3-4 CLUTCH
32 VOID
33 EXHAUST
33(a) EXHAUST (T.C.C. RELEASE)
33(b) EXHAUST (PRESS. REG.)
36 VENT
37 DECREASE
37(a) DECREASE AIR BLEED (ORIFICE CUP PLUG)
38 SEAL DRAIN
39 LUBE
39(a) LUBE TO COOLER
39(b) LUBE FROM COOLER
40 CONVERTER CLUTCH RELEASE
41 CONVERTER CLUTCH FEED
41(a) CONVERTER CLUTCH FEED TO COOLER (ORIFICE CUP PLUG)

PUMP COVER PASSAGES

Figure 6

THM 4L60-E



1 SUCTION (INTAKE)
2 DECREASE
3 LINE
4 CONVERTER FEED
5 RELEASE
6 APPLY (REG APPLY)
7 TO COOLER
8 LUBE FROM COOLER
11 TORQUE SIGNAL
16 REVERSE INPUT (REV. CL.)
24 C.C. SIGNAL
35 OVERRUN CLUTCH
41 EXHAUST
43 VENT
44 SEAL DRAIN
45 VOID

PUMP COVER PASSAGES

Figure 7

THM 4L60-E

NEW DESIGN FILTER SEAL

There is now in production a new design filter seal that should be used on every rebuild process. The new design seal is a metal clad filter seal made like the 440 filter seal but, different dimensions. Both the previous seal and new design seal are shown in Figure 8 below.

ALWAYS USE THE NEW DESIGN FILTER SEAL!

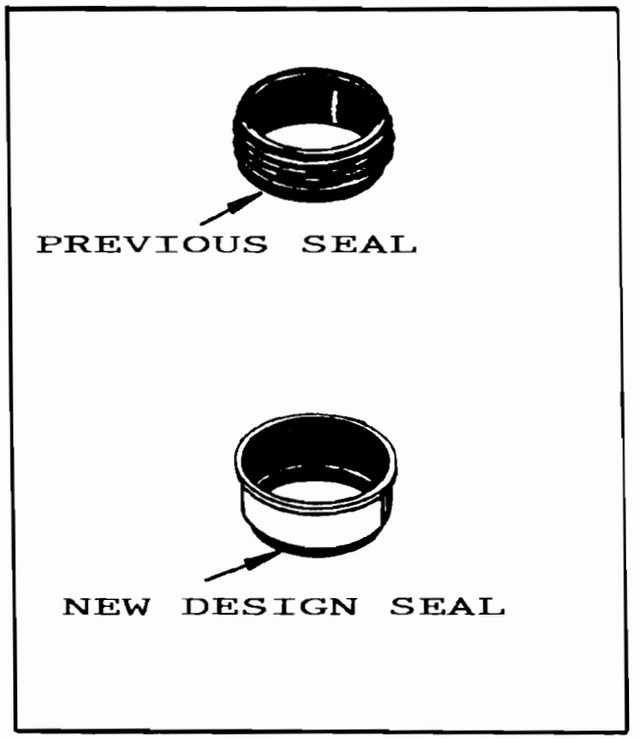


Figure 8

THM 4L60-E

PREMATURE 3-4 CLUTCH FAILURE

COMPLAINT: Premature failure of the 3-4 clutch pack and may happen in as little as 5000 miles. The vehicle may also exhibit a very soft 2-3 shift.

CAUSE: The cause may be, not enough clamping force for the 3-4 clutch pack due to the load release spring assemblies.

CORRECTION: STEP 1:
Remove and discard the five 3-4 load release spring assemblies in the input housing and located between the steel plates and input housing, as shown in Figure 9.

STEP 2:
Ensure that the hole in the spacer plate marked "A" is present, and at least .093" in diameter. If not, drill one in the spacer plate in that location .093" in diameter as shown in Figure 10.

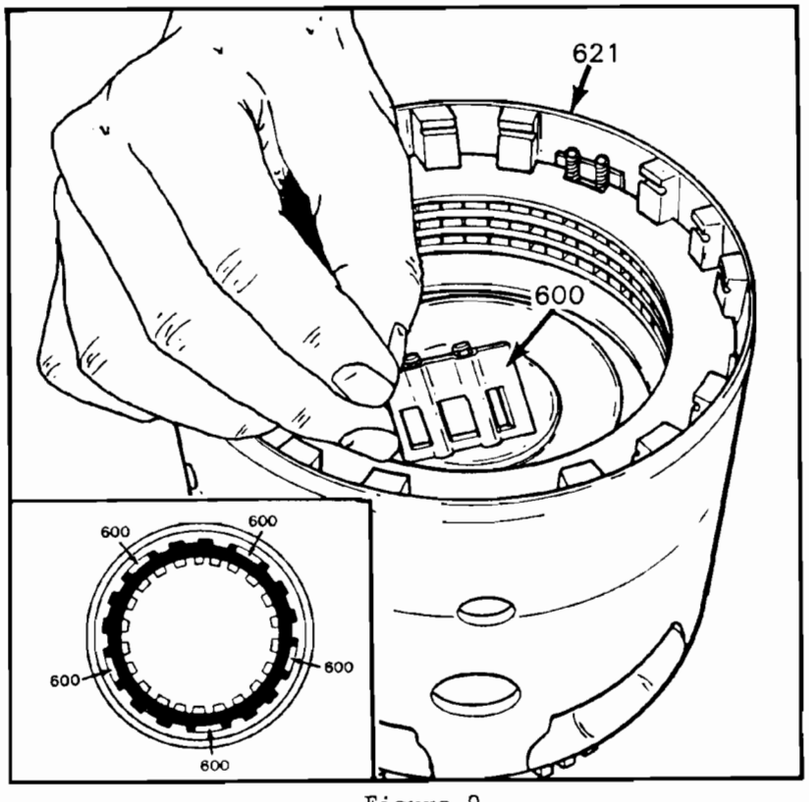
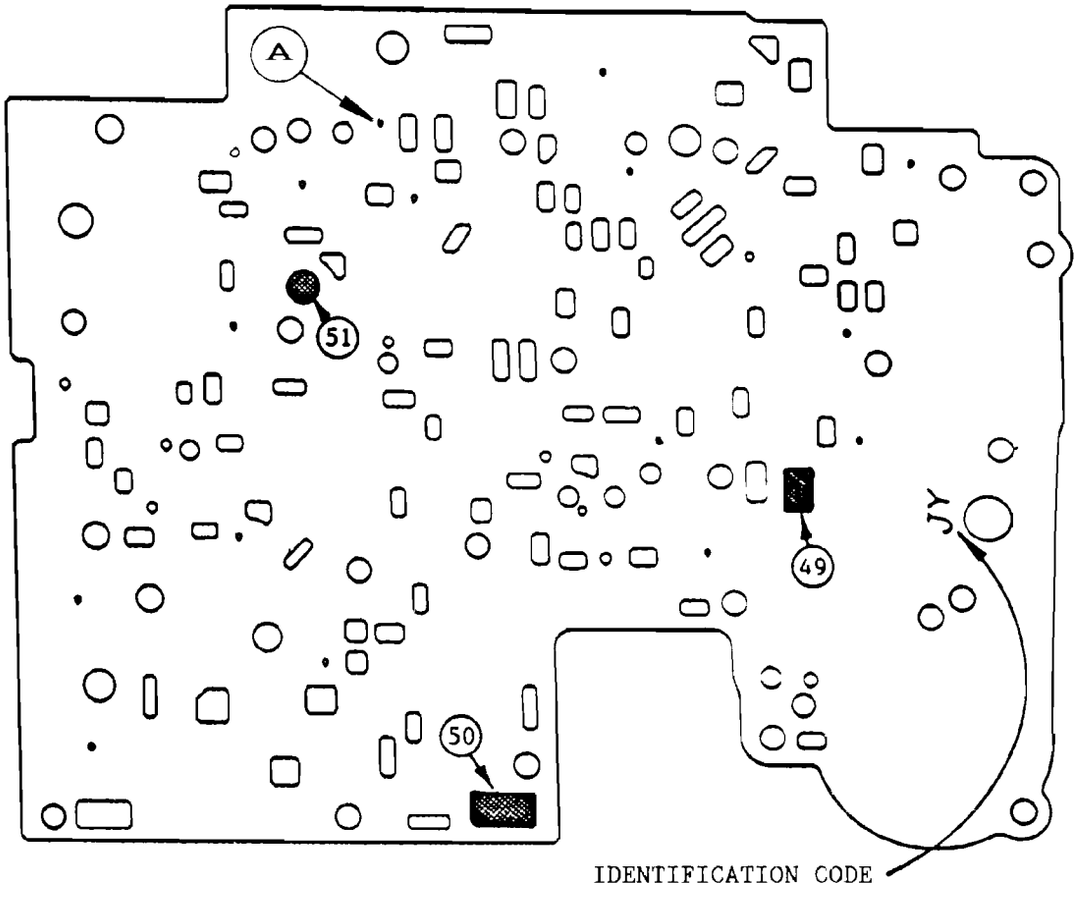


Figure 9

THM 4L60-E SPACER PLATE



49 SPACER PLATE SCREEN SNAPS INTO PLATE FROM CASE SIDE.
50 SPACER PLATE SCREEN SNAPS INTO PLATE FROM CASE SIDE.
51 SPACER PLATE SCREEN SNAPS INTO PLATE FROM V.B. SIDE (NOT USED ALL MODELS).

Figure 10

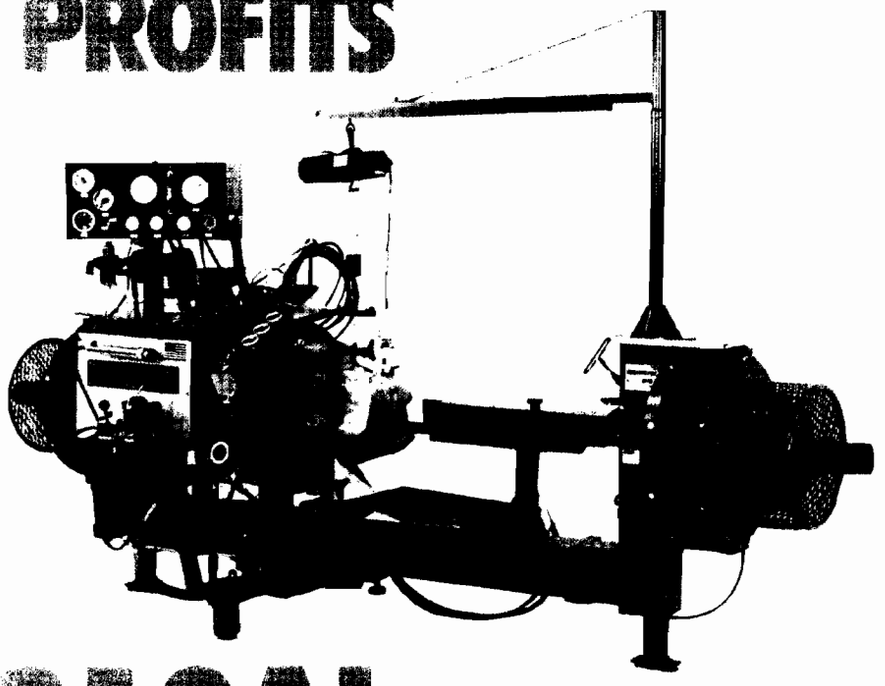
Serious Rebuilders

KEEP YOUR PROFITS

Comebacks eat up profits and damage your image. Axi-Line's NEW Dynadrome M310-AL with the variable loading device option adds more testing capabilities by simulating a greater range of road driving conditions, and helps prevent costly comebacks.

Your *Axi-Line* equipment:

- Lowers Initial equipment cost
- Reduces labor — more profit per job
- Needs less floor space
- Provides greater job confidence



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- Noise — mechanical, hydrosonic.
- Hot and cold testing.
- All AFT pressure patterns — line, boost.
- Shift points.
- Front pump — capacity, flow, pressure.
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- Stall speed — forward, reverse.
- TV pressure.
- Auto and manual upshifts, downshifts.
- Vacuum pressure modulator.
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- Converter — lockup, non-lockup types.
- Output loading and inertia loading.
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SAFETY FEATURES

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- Microswitch engine shutoffs in turret and guards, to prevent unsafe operation.
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THM 4L60 AND 4L60-E

REDESIGNED 3-4 CLUTCH PACK

CHANGE: Beginning on January 5, 1993 (Julian Date 005) all THM 4L60 and 4L60-E transmissions were built with a redesigned 3-4 clutch assembly. The 3-4 steel plates were made thicker to dissipate more heat out of the 3-4 clutch pack (See Figure 15).

REASON: Improved 3-4 clutch durability.

PARTS AFFECTED:

(1) 3-4 CLUTCH APPLY RING - The legs on the apply ring were made SHORTER to accomodate the thicker 3-4 clutch steel plates. The new design 3-4 clutch apply ring is identified with the number "7" stamped on one of the legs as shown in Figure 11.

(2) 3-4 CLUTCH RETAINER RING - Eliminated (See Figure 12).

(3) 3-4 CLUTCH STEPPED APPLY PLATE - Eliminated (See Figure 12).

(4) 3-4 CLUTCH APPLY PLATE - Eliminated (See Figure 12).

(5) 3-4 CLUTCH APPLY PLATE NEW - There is now a new design apply plate to replace the three pieces above that were eliminated (See Figure 12). This change was also to accomodate the thicker 3-4 steel plates.

(6) 3-4 CLUTCH STEEL PLATES - Now made .030" thicker as shown in Figure 13. The previous steel plates were .076" thick, and the new design steel plates are .106" thick (See Figure 13).

(7) 3-4 SELECTIVE BACKING PLATE - Made thinner to accomodate the thicker 3-4 clutch steel plates. Refer to the chart in Figure 14 for clutch pack travel and the new thickness and identification for each of the new selective backing plates.

INTERCHANGEABILITY:

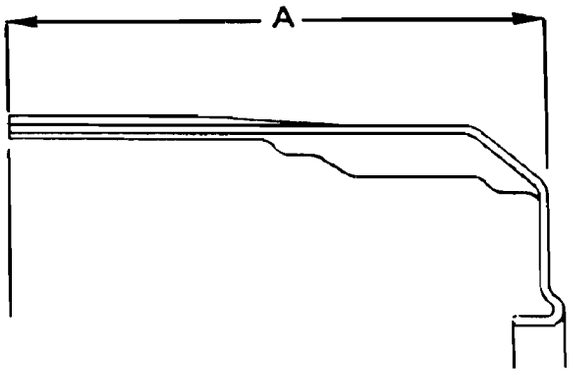
(1) None of the components listed above are compatable with the previous components in the 3-4 clutch pack (See Figure 15).

(2) The new 3-4 clutch pack will retro-fit back to all previous models but MUST be replaced as a package. Service package part numbers are listed below. There are two different part numbers because the "Lined" plates are included in the service packages and the lined plates are calibration sensitive on the different models.

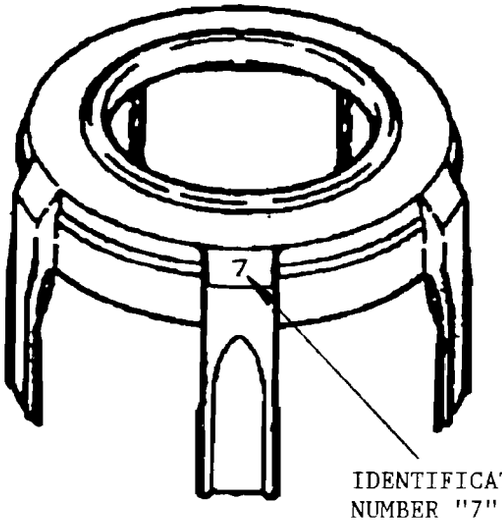
SERVICE INFORMATION:

3-4 Clutch Apply Ring (New Design)	8685043
3-4 Clutch Apply Plate (New Design)	8685044
3-4 Clutch Steel Plates (.106" Thick)	8685045
3-4 Clutch Backing Plate (Selective .227", Stamped "A")	8685046
3-4 Clutch Backing Plate (Selective .192", Stamped "B")	8685047
3-4 Clutch Backing Plate (Selective .157", Stamped "C")	8685048
3-4 Clutch Service Package (1987-1993) Includes parts listed above plus friction plates	8690923
3-4 Clutch Service Package (1982-1986) Includes parts listed above plus friction plates	8690924

3-4 CLUTCH APPLY RING



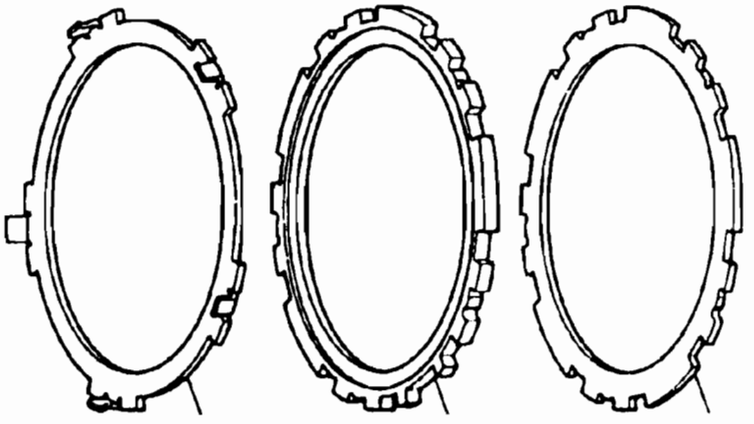
DIMENSION "A" ON NEW DESIGN IS 3.671"-3.682" (93.26mm-93.52mm).



IDENTIFICATION FOR NEW DESIGN IS NUMBER "7" STAMPED ON ONE LEG.

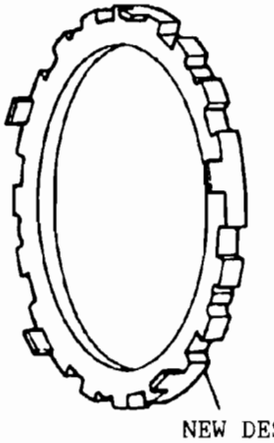
Figure 11

PREVIOUS APPLY PLATES



652 3-4 CLUTCH RETAINER RING
653 3-4 CLUTCH STEPPED APPLY PLATE
654C 3-4 CLUTCH FLAT APPLY PLATE

NEW DESIGN APPLY PLATE



NEW DESIGN 3-4 APPLY PLATE REPLACES ALL THREE OF THE PIECES ABOVE.

Figure 12

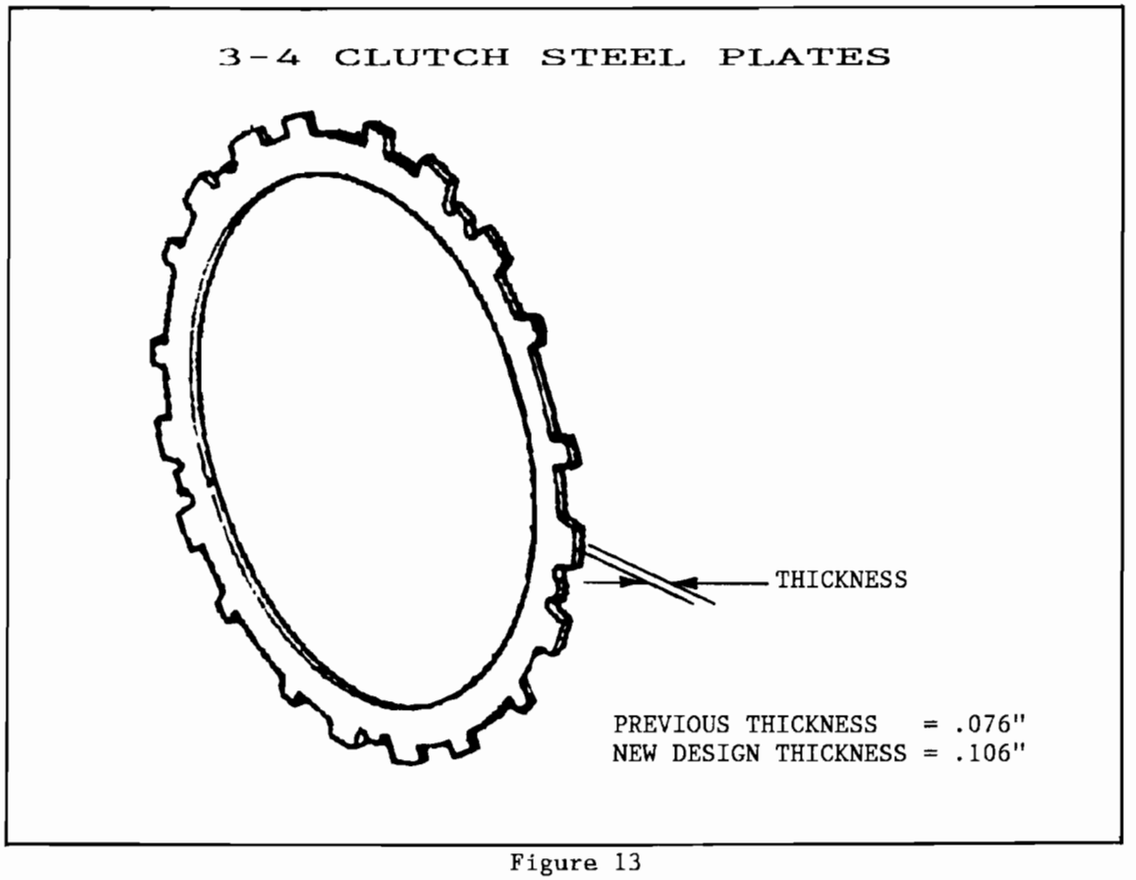
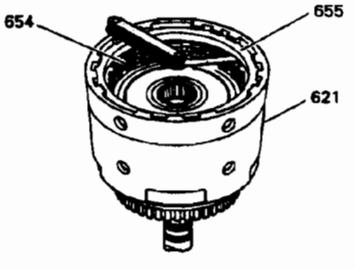


Figure 13

4L60

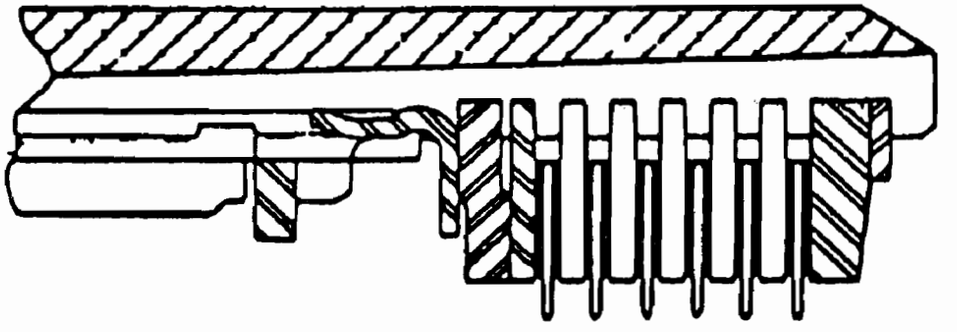
MODEL	BACKING PLATE TRAVEL	*BACKING PLATE	
		Use Backing Plate Which Gives Correct Travel	
		DIM.	I.D.
SAM, SFM	2.14mm - .99mm (.084" - 0.39")	5.88mm - 5.68mm (.231" - .224")	A
		4.99mm - 4.76mm (.196" - .187")	B
ALL OTHERS	2.10mm - .90mm (.083" - .035")	4.10mm - 3.90mm (.161" - .154")	C



621 HOUSING AND SHAFT ASSEMBLY, INPUT
654 PLATE ASSEMBLY, 3RD AND 4TH CLUTCH
655 PLATE, 3RD AND 4TH CLUTCH BACKING

Figure 14

PREVIOUS 3-4 CLUTCH STACK-UP



NEW DESIGN 3-4 CLUTCH STACK-UP

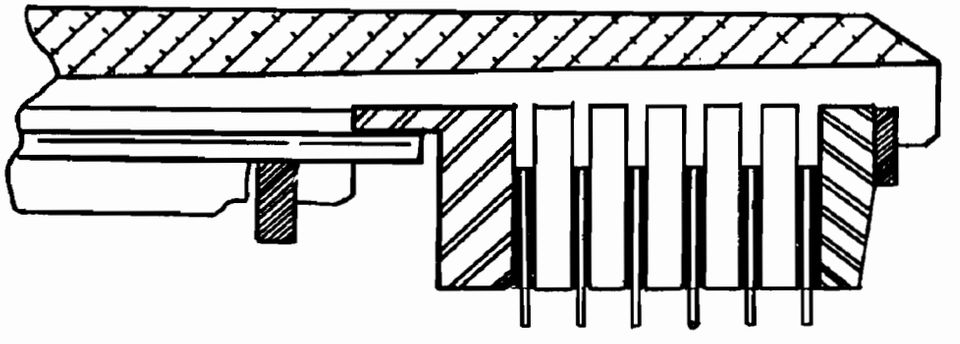


Figure 15

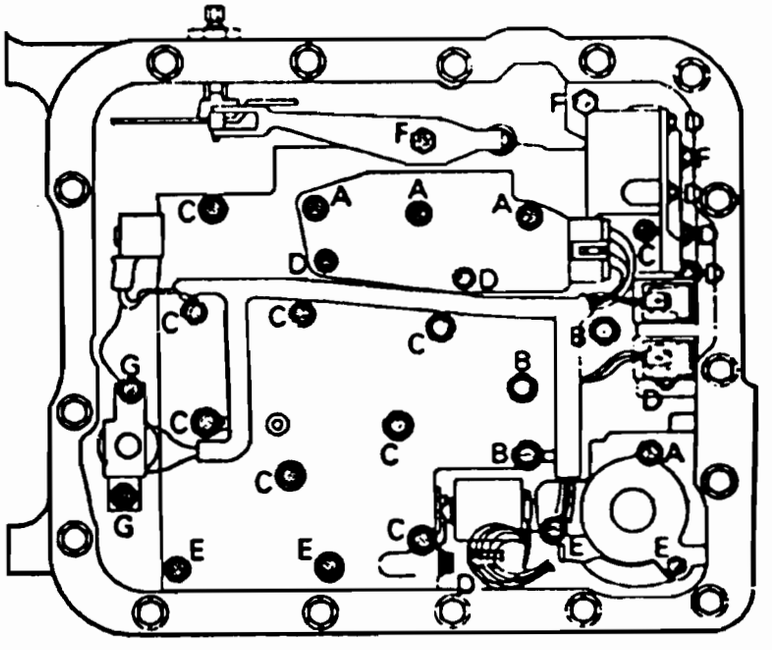
THM 4L60-E

NO MOVEMENT, AFTER OVERHAUL

COMPLAINT: Vehicle will not move. The transmission goes into gear both forward and reverse, but feels like the parking pawl is not released.

CAUSE: The cause may be valve body bolts installed in the wrong positions. Most common mix-up is bolt "B" (54.4mm long) installed in rearmost "C" position along the transmission centerline. The longer bolt in this location will now lock the sun gear shell from turning.

CORRECTION: Install the valve body bolts in their proper locations using the illustration and bolt chart below.

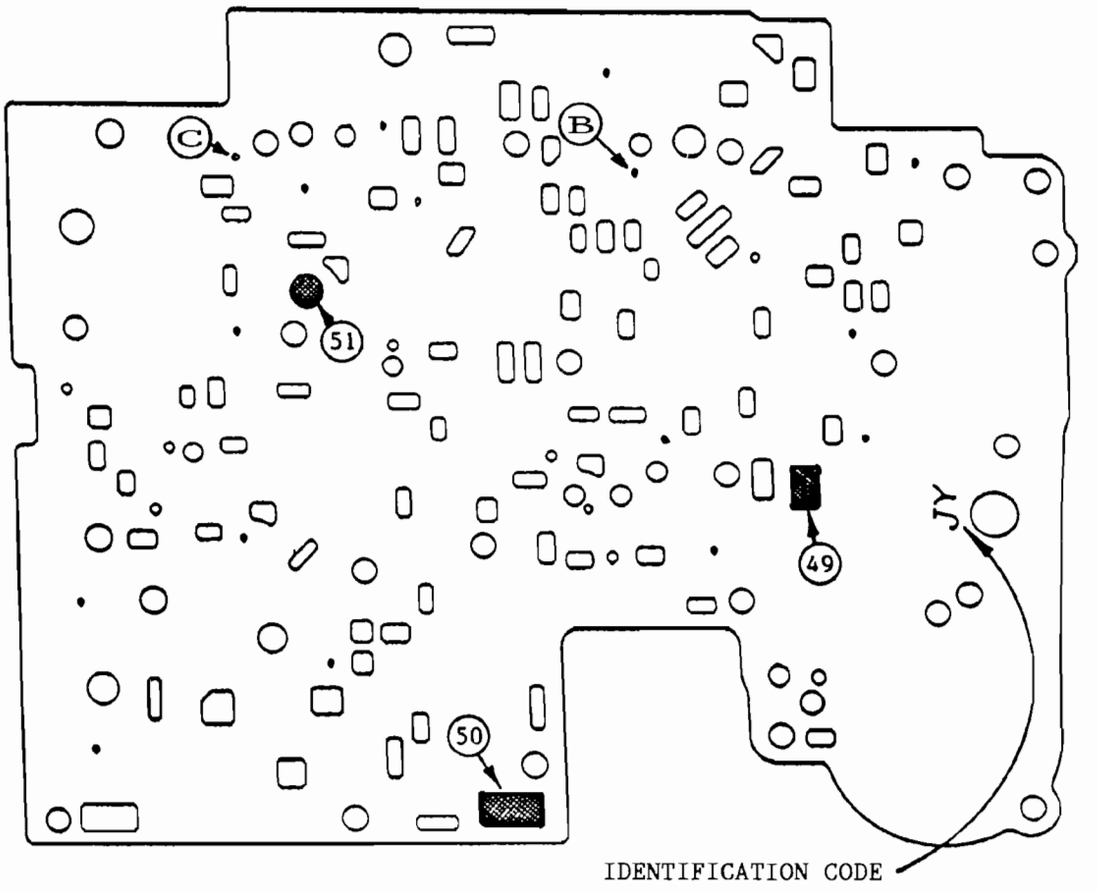


A = M6 X 1.0 X 65.0
B = M6 X 1.0 X 54.4
C = M6 X 1.0 X 47.5
D = M6 X 1.0 X 18.0
E = M6 X 1.0 X 35.0
F = M8 X 1.0 X 20.0
G = M6 X 1.0 X 12.0

Figure 16

THM 4L60-E

DELAYED ENGAGEMENT



49 SPACER PLATE SCREEN SNAPS INTO PLATE FROM CASE SIDE.
50 SPACER PLATE SCREEN SNAPS INTO PLATE FROM CASE SIDE.
51 SPACER PLATE SCREEN SNAPS INTO PLATE FROM V.B. SIDE (NOT USED ALL MODELS).

FOR DELAY TO DRIVE DRILL HOLE "B" OUT TO .125".

FOR DELAY TO REVERSE DRILL HOLE "C" OUT TO .125".

Figure 17

THM 4L60 AND 4L60-E

LONG LIP SEALS ARE BACK

Beginning at the start of production 1994, the manufacturer is once again using "Long Lip Seals" in the outer locations on all THM 4L60-E transmissions. This is being done as "Running Changes" through 1994, and apply to the following:

- REVERSE INPUT OUTER.
- 3-4 CLUTCH OUTER.
- FORWARD CLUTCH OUTER.
- OVERRUN CLUTCH OUTER.

Please specify "Long Lip Seals" when ordering gasket and seal kits from your supplier for all THM 4L60 and 4L60-E transmissions.

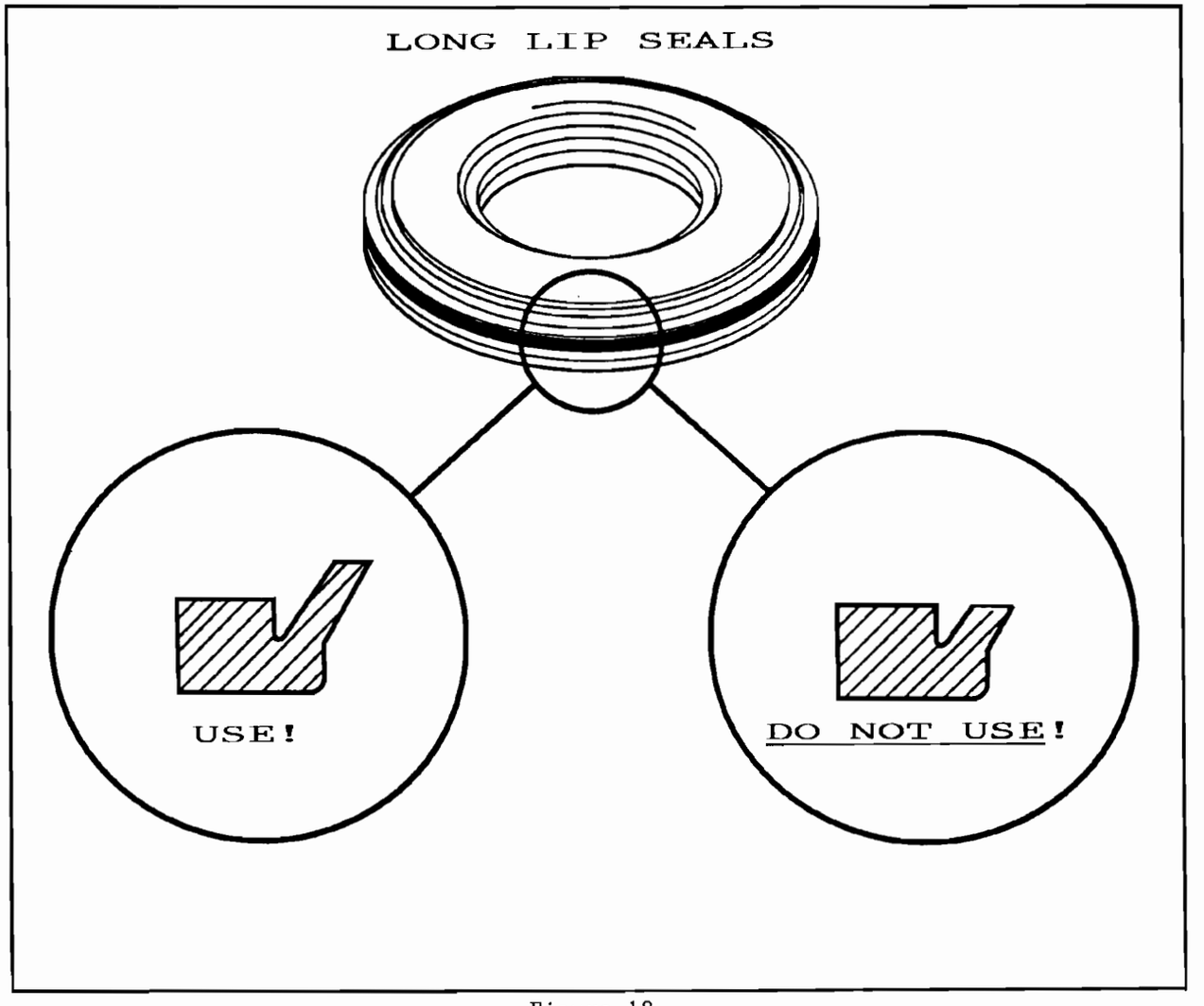


Figure 18

THM 4L60 AND 4L60-E

PREMATURE FAILURE OF INPUT SPRAG

COMPLAINT: Complaints will vary depending on the failure mode of the input sprag. If the sprag failure results in "Not Holding" the complaint will be; "No Movement in the D4 Range"!
If the sprag failure results "Not Freewheeling" the complaint will be; "Tie-up When Shifting Into 4th Gear"!

CAUSE: The cause may be the type of input sprag being used. The manufacturer is currently using an input sprag manufactured by SKF.

CORRECTION: Install an input sprag manufactured by BORG-WARNER. The sprags are easy to identify, as the SKF sprag Does Not use an inner cage and the BORG-WARNER sprag Does use an inner cage, as shown in Figure 19.

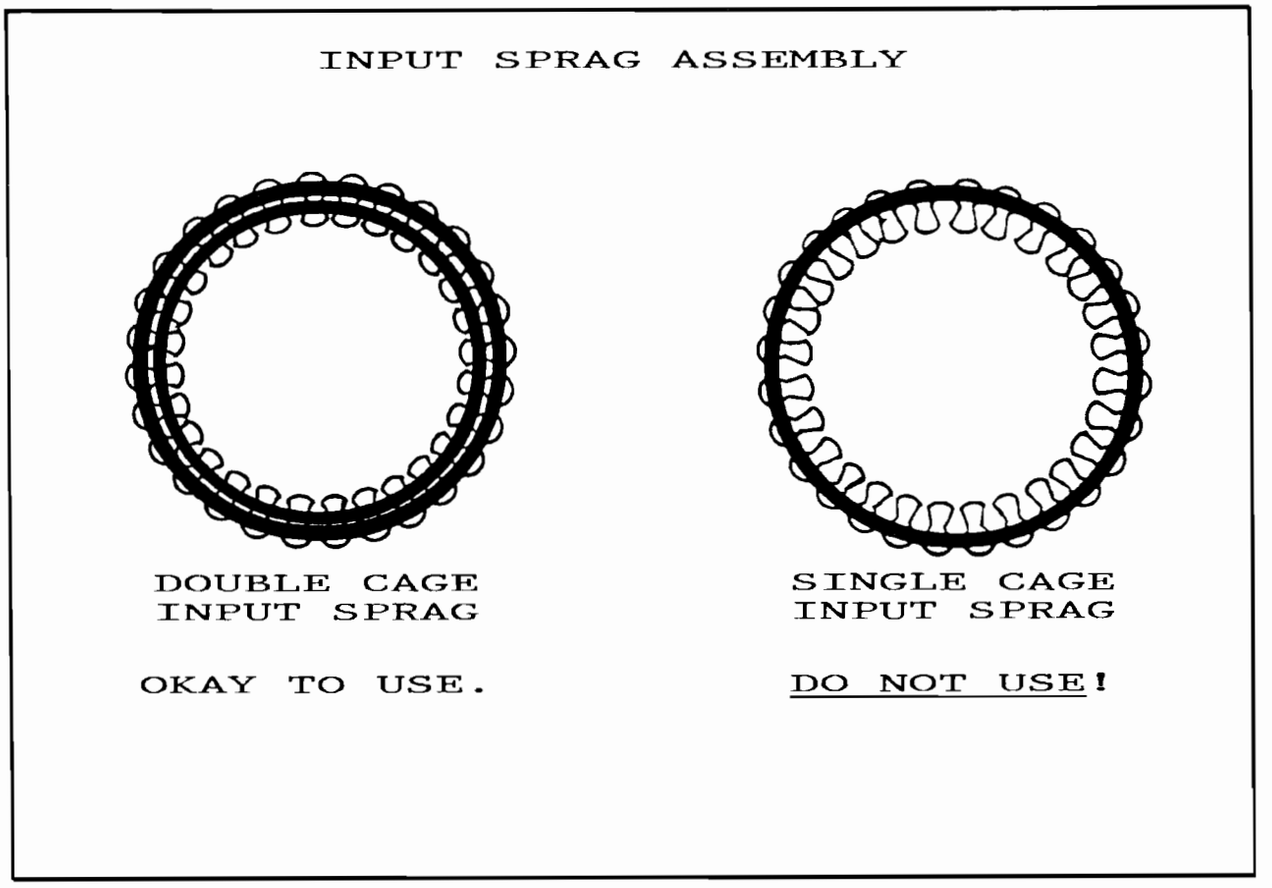


Figure 19

THM 4L60-E

DELAYED ENGAGEMENTS FORWARD AND/OR REVERSE

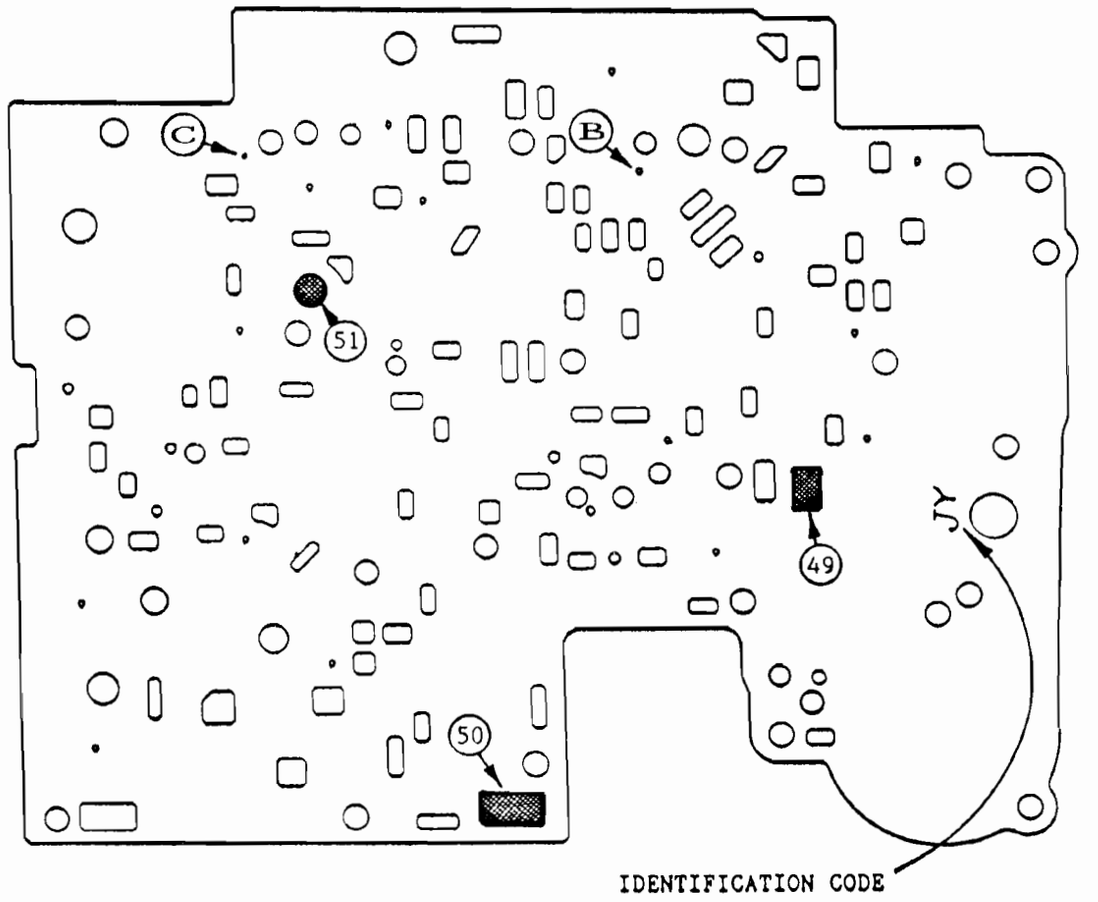
COMPLAINT: Delayed engagement when the selector lever is placed into a forward range and/or into reverse range.

CAUSE: The cause may be a lack of volume of oil to the forward clutch and/or to the reverse input clutch.

CORRECTION: For a delay into the forward ranges enlarge the hole marked "B" out to .125", as shown in Figure 20.

For a delay into reverse range enlarge the hole marked "C" out to .125", as shown in Figure 20.

THM 4L60-E SPACER PLATE



49 SPACER PLATE SCREEN SNAPS INTO PLATE FROM CASE SIDE.
50 SPACER PLATE SCREEN SNAPS INTO PLATE FROM CASE SIDE.
51 SPACER PLATE SCREEN SNAPS INTO PLATE FROM VALVE BODY SIDE (NOT USED ALL MODELS

PART NO.	8684122	8684123	8684124	8684125	8684126
I.D. CODE	JV	JW	JX	JY	JZ
FITS THESE MODELS	MJD MND MSD TAD TBD MDD	SHD TLD CAD CBD KAD TWD	CCD CFD KBD	CHD KCD CJD	CKD CLD KDD

1993 MODEL SPACER PLATE CHART

Figure 20

THM 4L60-E

NEW LO/REVERSE PISTON

NEVER RE-USE CASTING NUMBER 8681725!

ALWAYS REPLACE THE LO/REVERSE PISTON WITH CASTING NUMBER 8685550!

OEM PART NUMBER FOR THE NEW L/R PISTON IS 8685549.

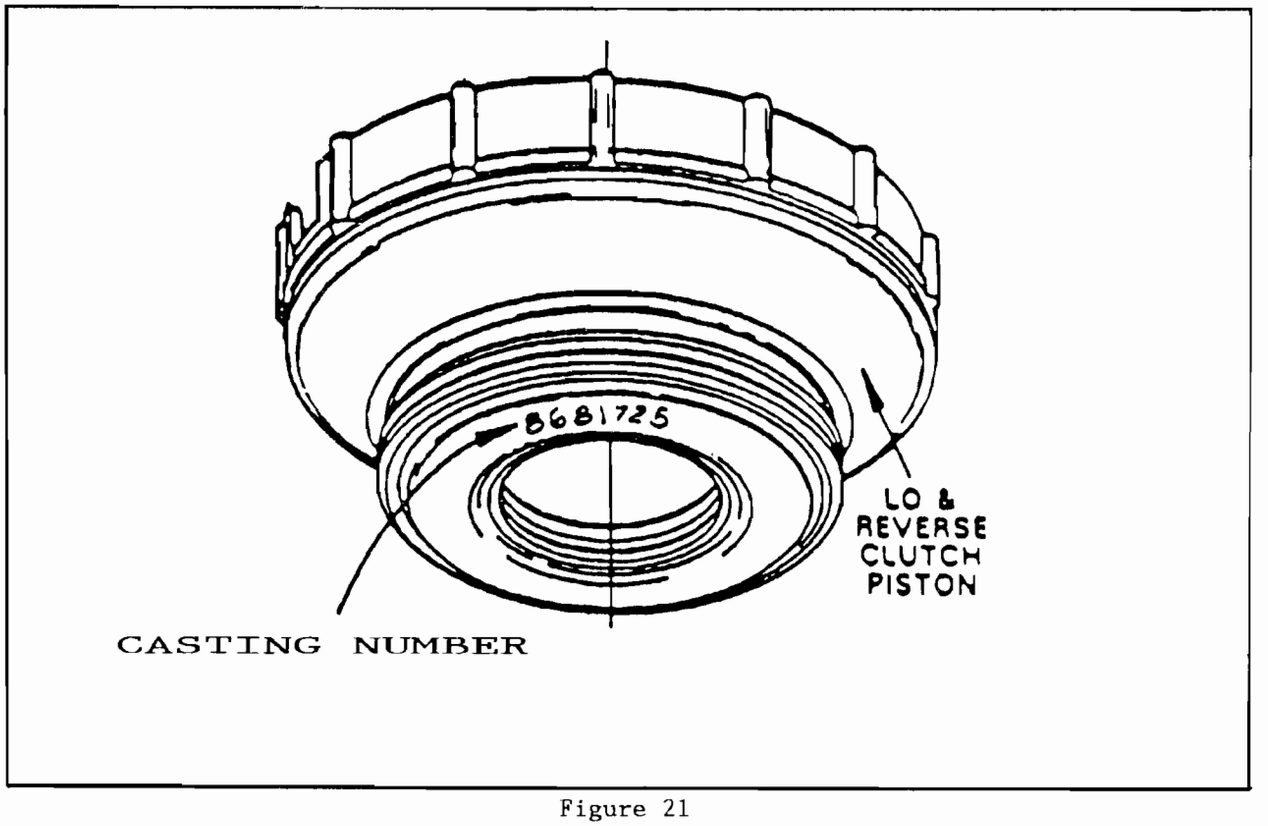


Figure 21

#5 in a series

TOLEDO TRANS-KIT LISTENS

and provides OEM lip seals in our kits.

We listen to rebuilders,evaluate their comments and, if they make sense, incorporate them in our kits. We want our kits to give rebuilders what they want and need. This is #5 in a series of examples of how we listen and respond.

REBUILDERS TOLD TOLEDO TRANS-KIT

We want OEM lip seals in your kits so we're assured of quality in these vital transmission parts.

TOLEDO TRANS-KIT LISTENED AND RESPONDED

Our kits feature either Acadia or ETI lip seals. These two suppliers, both now divisions of JM Clipper, are the preferred sources for the vast majority of domestic OEM lip seals as the chart below shows.

Acadia / ETI Domestic OEM Dominance

MAKE & MODEL	CHRYSLER				GENERAL MOTORS				FORD			
	A604 40TE 41TE 41AE	A404 30TH 31TH	A518 46RH 46RE	A500 40RH 40RE	TH125 3T40	TH700 4L60 4L60E	TH440 4T60 4T60E	4L80E	AXOD AXODE	ATX	AOD AODE	E4OD
ACADIA / ETI	100%	100%	100%	100%	100%	100%	70%	100%	100%	70%	100%	90%
ALL OTHERS	0%	0%	0%	0%	0%	0%	30%	0%	0%	30%	0%	10%

THE RESULT FOR REBUILDERS

Rebuilders have confidence that the lip seals in their kits are OEM selected and proven. They know the molded lip seals are Acadia with the famous FF identifying mark. And, their machined short lip seals will be ETI. They know that the lip seals in the transmissions they rebuild will work like new.

FF

For OEM lip seals in Gasket and Seal or Overhaul Kits, specify Toledo Trans-Kit.

TOLEDO TRANS-KIT ACADIA ETI

1235 Expressway Drive North • Toledo, OH 43608 • (419) 726-8200 • Fax: (419) 726-2560

For the distributor in your area or to suggest improvements Call (800) 345-8548. We'll Listen!

THM 4L80-E

3RD GEAR STARTS AND TIE-UP IN MANUAL LOW

COMPLAINT: The vehicle starts in 3rd gear with the selector lever in the D4 range, and has a tie-up when the selector lever is placed into Manual Low.

CAUSE: The cause may be a broken Direct Clutch "Dished" Cushion Plate in the direct clutch pack, and/or a broken Direct Clutch Piston.

CORRECTION: STEP 1:
If the Direct Clutch Piston is broken replace it with a new one, OEM part number 8675511 (See Figure 22).

STEP 2:
If the Direct Clutch "Dished" Cushion Plate is broken replace it with a redesigned version, OEM part number 8680816. The new design "Dished" Cushion Plate does not have any notches cut into the outside diameter, as shown in Figure 23.

NOTE: The Direct Clutch "Dished" Cushion Plate goes into the direct drum, in the direction shown in Figure 22, so that the inside diameter is closest to the Direct Clutch Piston.

SERVICE INFORMATION:

Direct Clutch "Dished" Cushion Plate (New Design) 8680816
Direct Clutch Piston 8675511

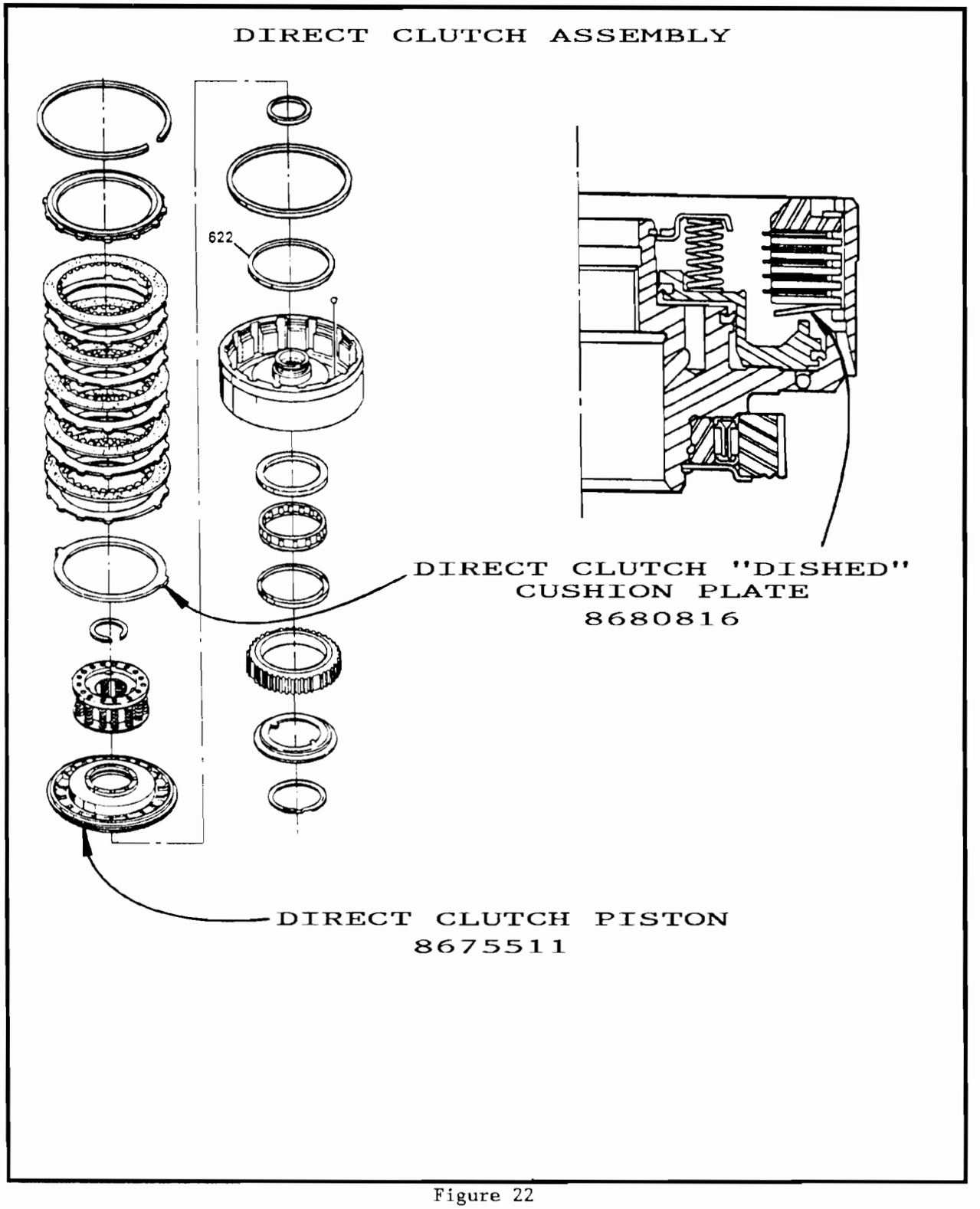

DIRECT CLUTCH ASSEMBLY
622
DIRECT CLUTCH "DISHED"
CUSHION PLATE
8680816
DIRECT CLUTCH PISTON
8675511

Figure 22

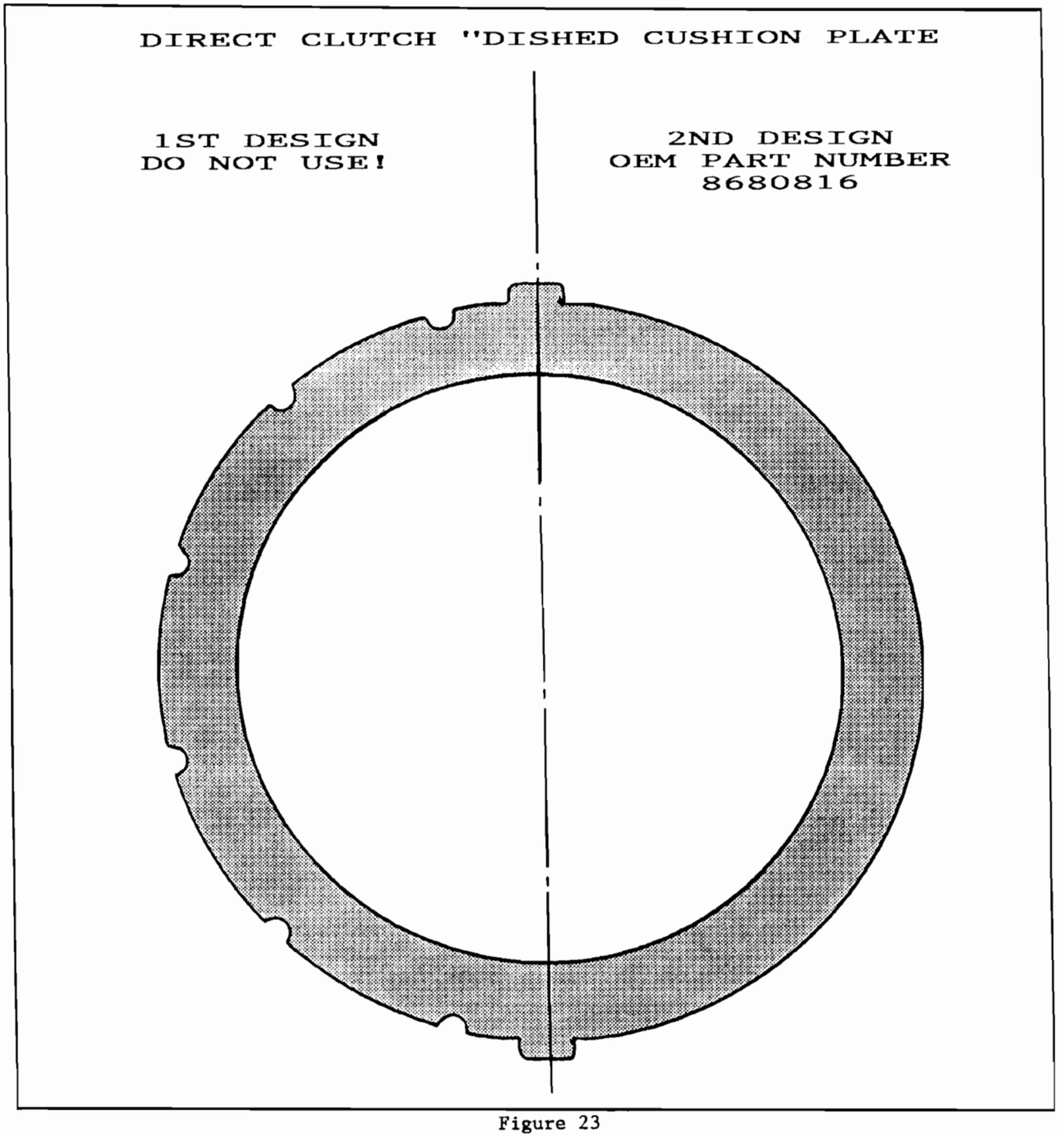

DIRECT CLUTCH "DISHED CUSHION PLATE
1ST DESIGN
DO NOT USE!
2ND DESIGN
OEM PART NUMBER
8680816

Figure 23

THM 4L80-E/4L80-EHD
HIGH LINE PRESSURE

COMPLAINT: Harsh 1-2 shift, harsh 2-3 shift, harsh 3-4 shift, harsh garage shift from park to drive and/or reverse. Repeat breakage of the direct clutch piston and/or direct clutch "dished" cushion plate.

CAUSE: The cause may be high line pressure created by mis-matching of valve body gaskets, spacer plates, and/or transmission case assembly.

CHANGE:
Beginning August 21, 1991 (Julian Date 233) all THM 4L80-E/4L80-EHD transmissions were built with revised spacer plates, revised spacer plate gaskets, and a revised transmission case assembly, in a effort to improve line pressure instability concerns.

PARTS AFFECTED:
(1) TRANSMISSION CASE - Oil dam added in the torque signal circuit in the location shown in Figure 24, to orifice torque signal oil thru the revised spacer plate to the boost valve in the pump.

(2) VALVE BODY SPACER PLATE - The "Banana Hole" in the previous spacer plate was eliminated, with a round feed hole and orifice hole added on each side of the new dam in the case to make orifice effective (See Figure 25).

(3) SPACER PLATE GASKETS - Revised hole configuration to accomodate the new spacer plate and case, as shown in Figure 26.

CORRECTION: Install compatable parts.

1. PREVIOUS ("Banana Hole") SPACER PLATE, PREVIOUS ("Banana Hole") VALVE BODY GASKETS, AND REVISED (With Dam) CASE.
   WILL NOT WORK, RESULTS IN HIGH LINE PRESSURE!
2. REVISED (Two Hole) SPACER PLATE, PREVIOUS ("Banana Hole") VALVE BODY GASKETS, AND REVISED (With Dam) CASE.
   WILL NOT WORK, RESULTS IN HIGH LINE PRESSURE!
3. PREVIOUS ("Banana Hole") SPACER PLATE, REVISED (Two Hole) VALVE BODY GASKETS, AND REVISED (With Dam) CASE.
   WILL NOT WORK, RESULTS IN HIGH LINE PRESSURE!
4. PREVIOUS ("Banana Hole") SPACER PLATE, REVISED (Two Hole) VALVE BODY GASKETS, AND PREVIOUS (Non-Dam) CASE.
   WILL FUNCTION, BUT WILL NOT IMPROVE LINE PRESSURE INSTABILITY CONCERNS!

NOTE: TO ELIMINATE LINE PRESSURE INSTABILITY CONCERNS ON THESE MODELS REFER TO PAGES 31 AND 32.

NO "BANANA PARTS" WITH A CASE THAT HAS A OIL DAM!

SERVICE INFORMATION:

Case Assembly (2WD)	91-92	ABP, ADP, BAP, BBP, BMP, BNP, CAP, CBP, CRP, DCP, DDP, DNP, DPP, DRP, DSP, HTP, LLP, JDP	8683974
Case Assembly (4WD)	91-92	ACP, BJP, CKP, DLP, LFP	8683975
Case Assembly (Lug Cut)	1992	AFP, AJP, MBP, MKP, MPP, TSP, TWP, MHP, LAP	8683976
Spacer Plate	1991	BAP, BBP, BJP, BMP, BNP, ...	8680654
Spacer Plate	1991	ADP, ...	8680584
Spacer Plate	1992	ABP, ACP, AFP, AJP, ...	8680584
Spacer Plate	91-92	BAP, BJP, BMP, BNP, CAP, CKP, CRP, ABP, JDP, LAP, LFP, LLP, MBP, MKP, MPP, ...	8685689
Spacer Plate	91-92	DNP, DPP, ...	8680586
Spacer Plate	91-92	DCP, DDP, DLP, DRP, TSP, TWP	8680587
Spacer Plate	91-92	DSP, HTP, ...	8680588
Gasket, V.B/S.P. (ALL MODELS)			8684733
Gasket, CASE/S.P. (ALL MODELS)			8684205

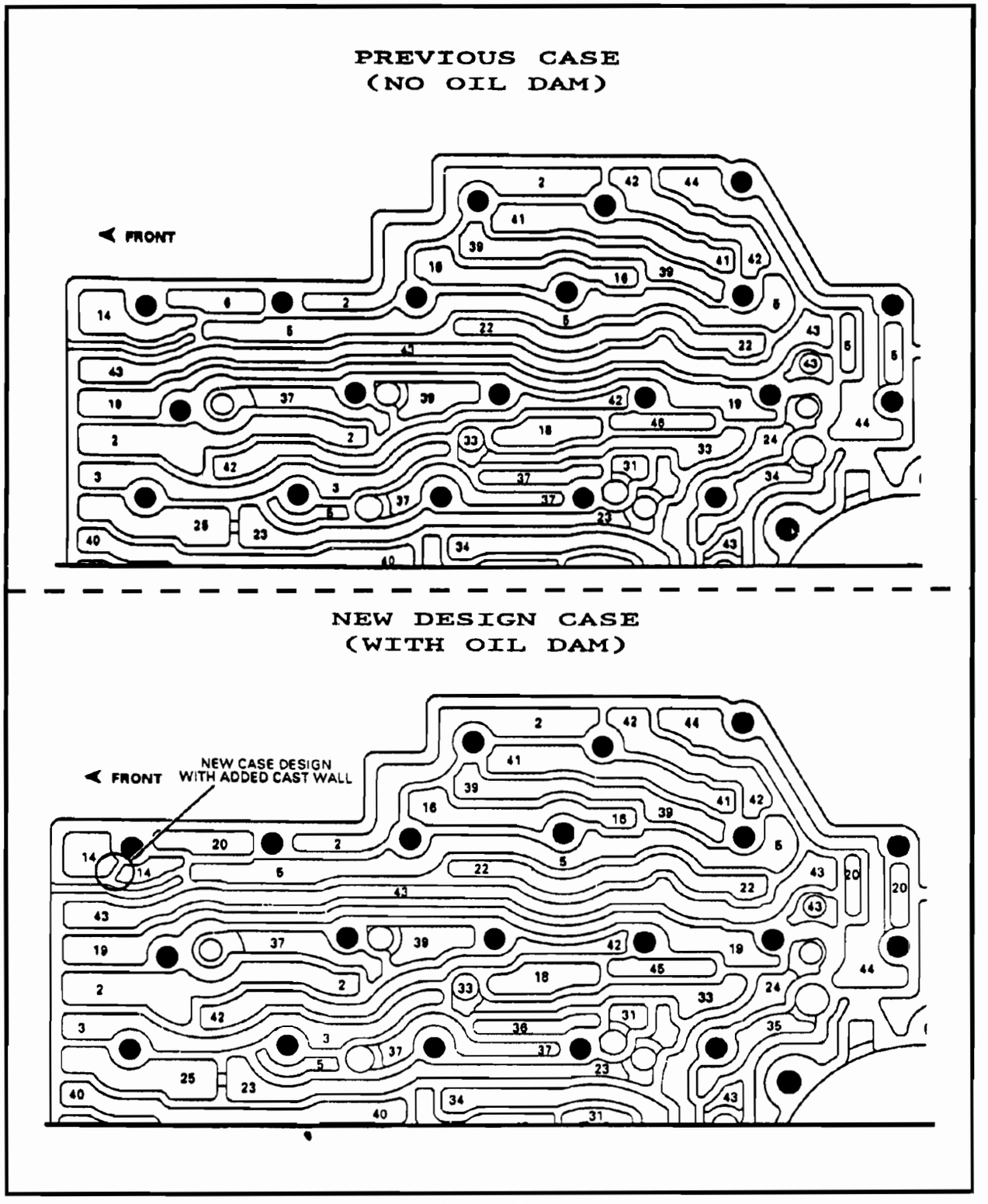

PREVIOUS CASE
(NO OIL DAM)
FRONT
NEW DESIGN CASE
(WITH OIL DAM)
FRONT
NEW CASE DESIGN
WITH ADDED CAST WALL

Figure 24

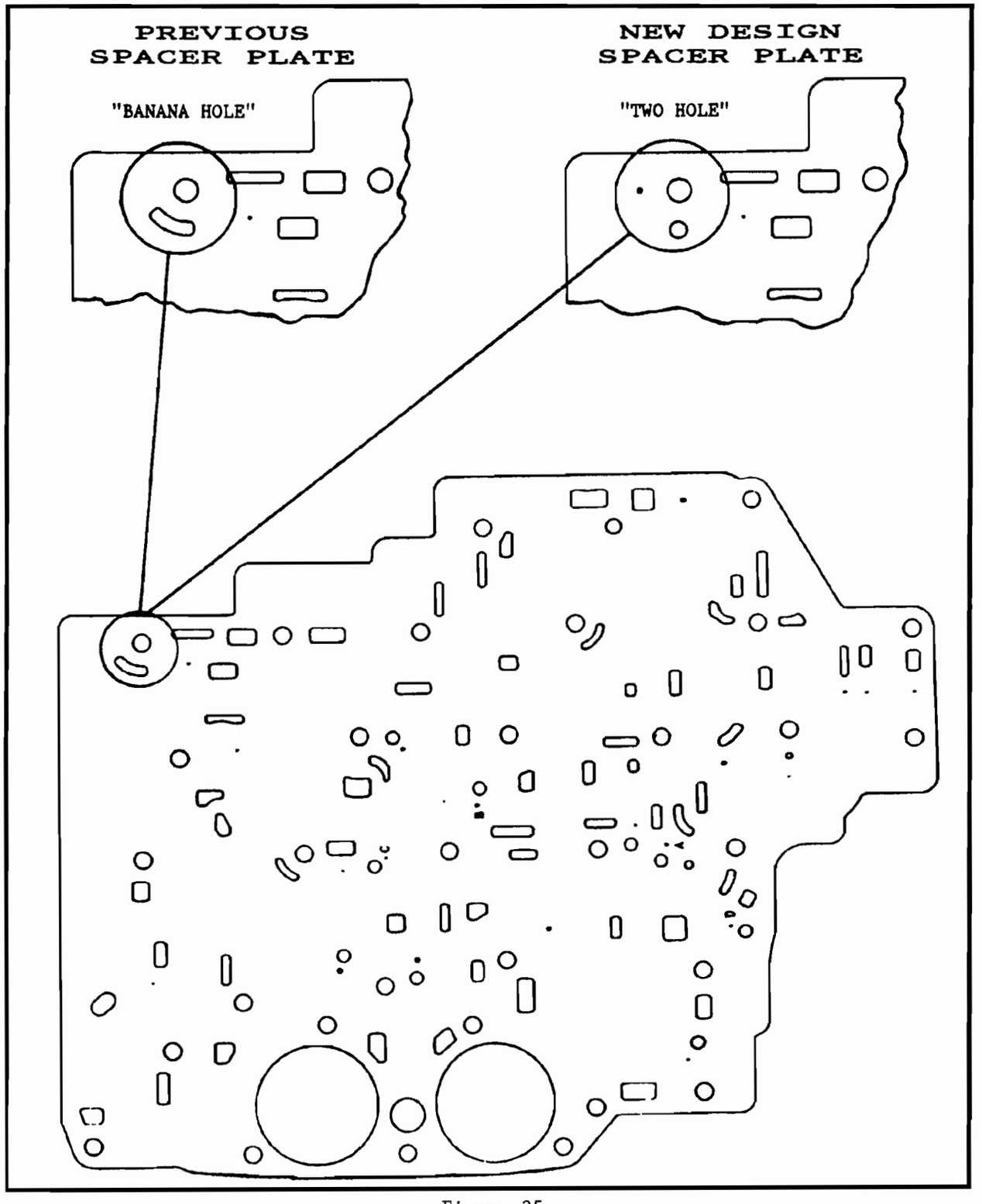

PREVIOUS
SPACER PLATE
"BANANA HOLE"
NEW DESIGN
SPACER PLATE
"TWO HOLE"

Figure 25

PREVIOUS SPACER PLATE GASKETS

"BANANA HOLE"

NEW DESIGN SPACER PLATE GASKETS

"TWO HOLE"

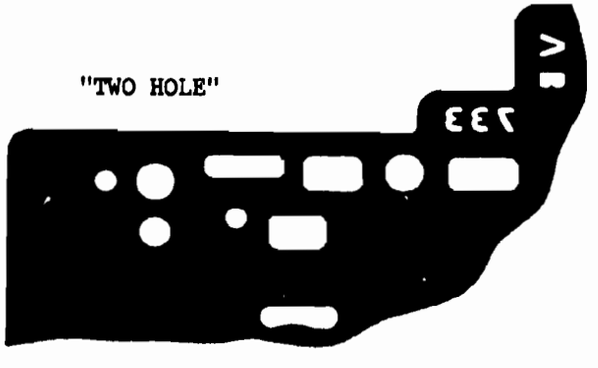


Figure 26

THM 4L80-E

BUZZING NOISE IN PARK AND/OR NEUTRAL

COMPLAINT: Some Hydra-matic 4L80-E/4L80-EHD transmissions may exhibit a buzzing or vibration noise while the selector lever is in the park or neutral position.

CAUSE: The cause may be line pressure instability in the pressure regulator valve line-up located in the pump cover.

CORRECTION: STEP 1:
There is now available from OEM, a new service package that includes an "Added" Isolater Spring, inside of the normal pressure regulator spring (See Figure 28). The new service package is available under OEM part number 8682998. Refer to Figure 28 for proper assembly.

NOTE: Ensure that the snap ring is installed with the flat side facing away from the boost sleeve.

STEP 2:
Install a 9/32" diameter cup plug, with a .075" orifice hole drilled into the center of the cup plug, into the torque signal oil passage of the pump cover as shown in Figure 27.

SERVICE INFORMATION:

Pressure Regulator Service Package 8682998
9/32" Cup Plug (Local Hardware Item)

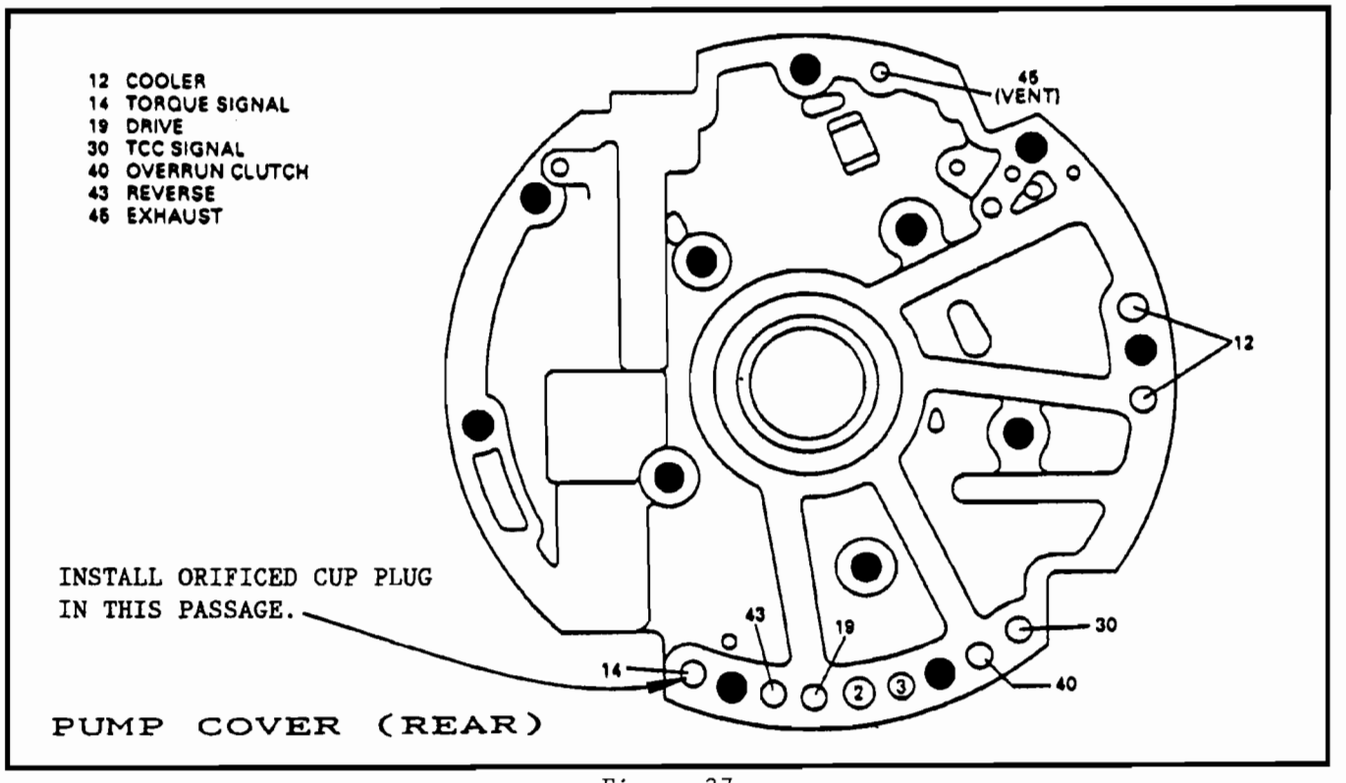
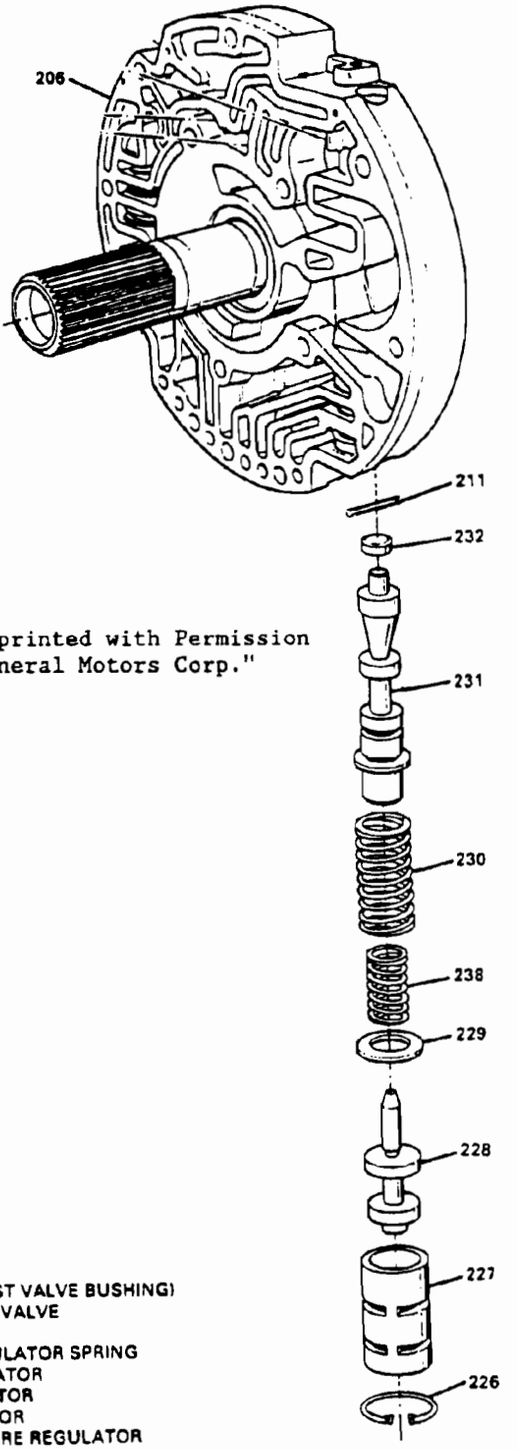


Figure 27



206 COVER, PUMP
211 PIN, COILED SPRING (3)
226 RING, RETAINER (REV. BOOST VALVE BUSHING)
227 BUSHING, REVERSE BOOST VALVE
228 VALVE, REVERSE BOOST
229 RETAINER, PRESSURE REGULATOR SPRING
230 SPRING, PRESSURE REGULATOR
231 VALVE, PRESSURE REGULATOR
232 PLUG, PRESSURE REGULATOR
238 SPRING, ISOLATOR PRESSURE REGULATOR

Figure 28

T.E.C.

TRANSMISSION ELECTRONIC CONTROLLER

With the T.E.C. you can operate any transmission without the automobile's computer! You can test drive the vehicle and control the transmission upshifts, downshifts, and the TCC. You can let the T.E.C computer control the shifts while you monitor the transmission. The T.E.C. allows you to determine if it is the transmission or is it the automobile's computer that is faulty and will scan the on-board computer for transmission trouble codes.

The T.E.C. is simple to program and simple to use. All you need to operate the T.E.C. is the correct adaptor cable to fit your transmission type and the correct program code found on the included laminated instruction sheet.

Follow these 5 easy steps:

1. *Attach the adaptor cable to the T.E.C. and the transmission.*

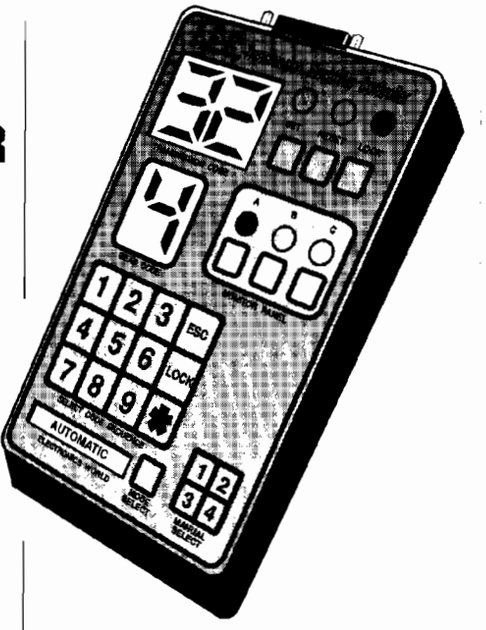
2. *Enter the program code found on the instruction sheet. You will be given a code on the LED display that will match your instruction sheet. This will tell you if you have the right transmission. Now you are ready for your test drive.*

3. *Place the T.E.C. in the automatic mode and the car's computer will control the transmission while you monitor the shifts on the T.E.C..*

4. *Now select the manual mode and the T.E.C. controls the transmission at your command. 1st gear, 2nd gear, 3rd gear, 4th gear, then lock-up.*

5. *Now a test drive with the T.E.C. allows you to control the shifts on a 10 minute test drive. Is the problem the computer or is it the transmission?*

As new transmissions are released from car manufacturers, all that is needed to upgrade or adapt your T.E.C. unit, is the appropriate cable and the program code on the instruction sheet. This is a very low cost way to add new transmissions to this tool. Only an inexpensive cable is required.



One Tool included with starter kit, evaluates these transmission models:

TH700R4 GM
TH3254L GM
TH2004R GM
TH440T4 GM
4T60E GM
4L80E GM

Other Transmission models available:

E40D Ford
AXODE Ford
A4LD Ford
All Toyota
Honda
Mi.subishi
ZF4HP22
ZF4HP18
Mazda 323/626 G4A-EL
Ford Probe 4EAT
AW7ILE
AW5040

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1-800-288-3668

THM 4L80-E/4L80-EHD

SELECTOR LEVER MOVES BY ITSELF LOW OR NO LINE PRESSURE RISE 2ND GEAR STARTS

COMPLAINT: NO. 1: Manual shift lever moves from the overdrive position to the reverse position, ALL BY ITSELF!

NO. 2: Very little or NO line pressure rise with throttle opening.

NO. 3: 2nd gear starts with no upshift.

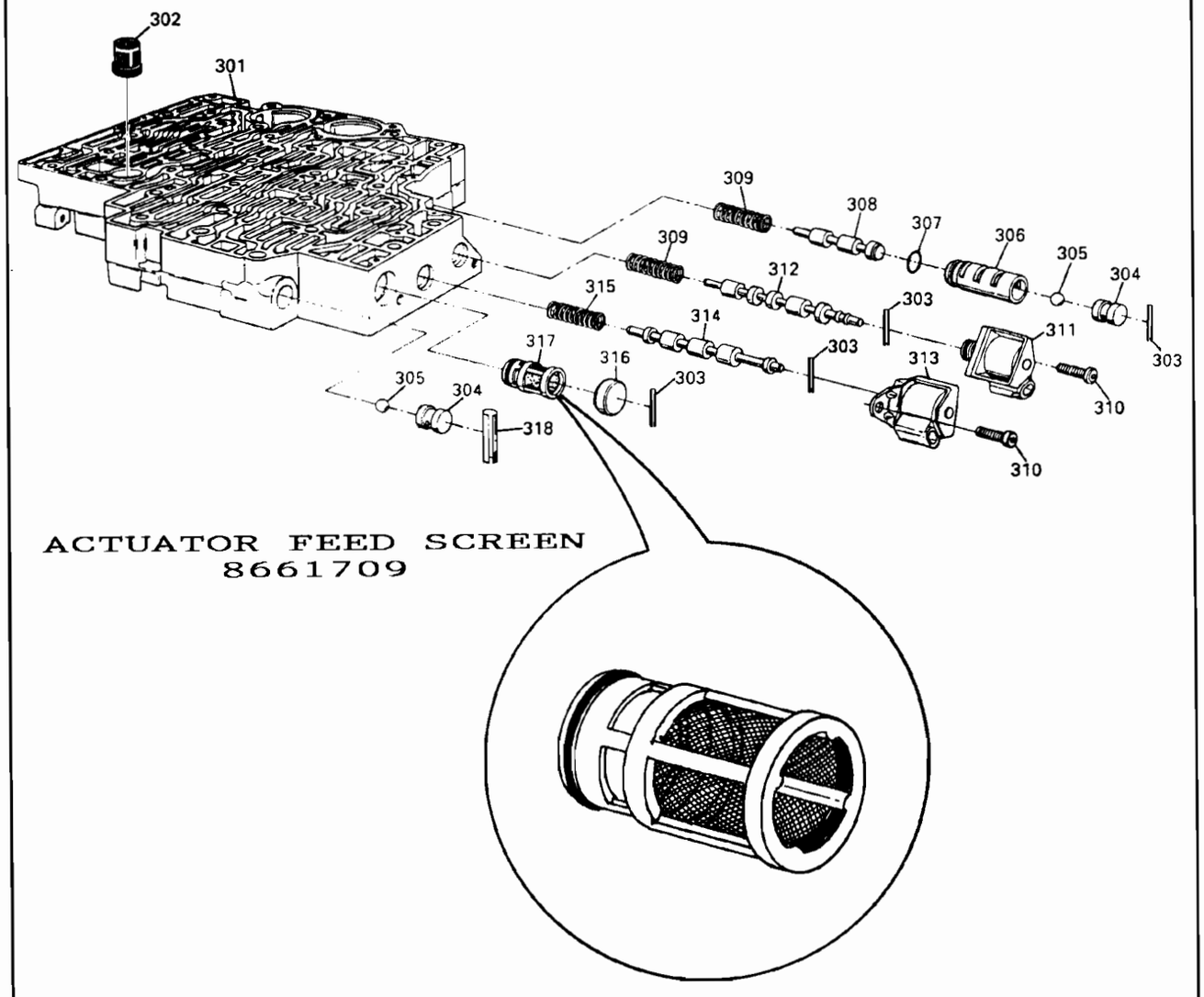
CAUSE: For ALL of the concerns listed above, the cause may be a broken Actuator (Solenoid) Feed Screen located INSIDE of the valve body, as shown in Figure 29.

NOTE: If the Actuator Feed Screen breaks and a portion of the screen blocks the exhaust passage, IT CAN FORCE THE MANUAL VALVE AND LINKAGE TO THE REVERSE POSITION!

CORRECTION: Replace the Actuator Feed Screen, located INSIDE the valve body with OEM part number 8661709. Refer to Figure 29 for location. We recommend that this screen be replaced on Every rebuild and some kit suppliers are now putting this screen in the gasket set.

SERVICE INFORMATION:

Actuator Feed Screen 8661709



ACTUATOR FEED SCREEN
8661709

301 BODY, CONTROL VALVE
302 SCREEN FILTER, PRESSURE CONTROL SOL. FEED
303 PIN, COILED SPRING
304 PLUG, CHECKBALL
305 BALL (.375 DIA.)
306 BUSHING, 3RD/REVERSE CHECKBALL
307 SEAL, 0-RING
308 VALVE, 3-4 SHIFT
309 SPRING, SHIFT VALVE RETURN (2-3 & 3-4)
310 BOLT, SOLENOID (1-2 & 2-3 SHIFT, PRESSURE CONTROL SOLENOID)
311 2-3 SHIFT SOLENOID & O-RING ASSEMBLY
312 VALVE, 2-3 SHIFT
313 1-2 SHIFT SOLENOID & O-RING ASSEMBLY
314 VALVE, 1-2 SHIFT
315 SPRING, 1-2 SHIFT VALVE RETURN
316 PLUG, SHIFT SOLENOID FEED FILTER
317 FILTER, SHIFT SOLENOID FEED
318 SLEEVE, LO/REVERSE CHECKBALL

Figure 29

THM 4L80-E/4L80-EHD

3RD DESIGN TURBINE AND OUTPUT SPEED SENSORS

OEM PART NUMBER 8685042.

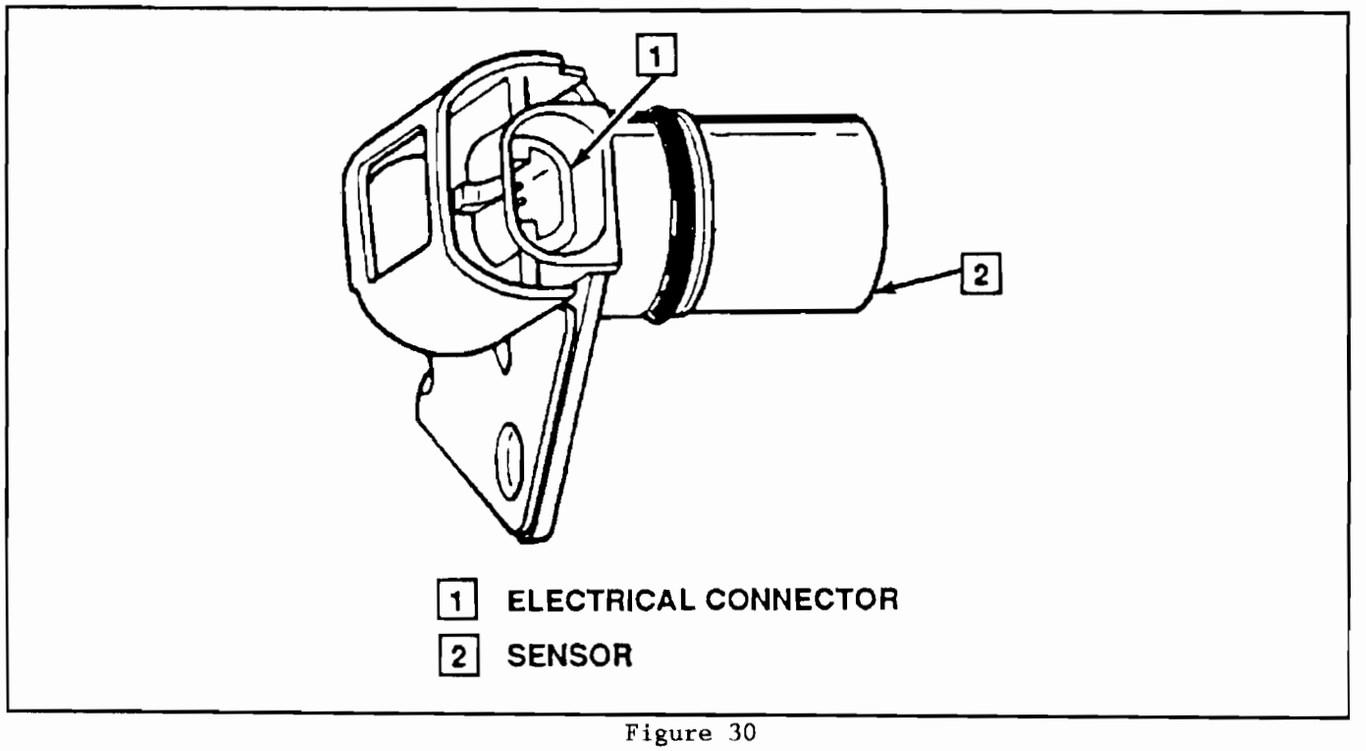


Figure 30

THM 4L80-E/4L80-EHD

NEW SHIFT SOLENOID ASSEMBLIES

CHANGE: Beginning on February 17, 1992 (Julian Date 048) all THM 4L80-E/4L80-EHD transmissions were built with revised shift solenoid assemblies.

REASON: Improved shift solenoid durability and manufacturing process.

PARTS AFFECTED:

(1) SHIFT SOLENOID "A" - Revised to incorporate reversible diaphragm, increased coil wire size, and inlet filter screen within the solenoid. Shift Solenoid "A" is now GRAY in color, instead of the previous Blue (See Figure 31).

(2) SHIFT SOLENOID "B" - Revised to incorporate reversible diaphragm, increased coil wire size, and inlet filter screen within the solenoid. Shift Solenoid "B" is now GREEN in color, instead of the previous Red (See Figure 31).

INTERCHANGEABILITY:

The new Shift Solenoids will retro-fit back to ALL previous models of the THM 4L80-E/4L80-EHD transmissions.

SERVICE INFORMATION:

Shift Solenoid "A" (GRAY) 8683081
Shift Solenoid "B" (GREEN) 8683082

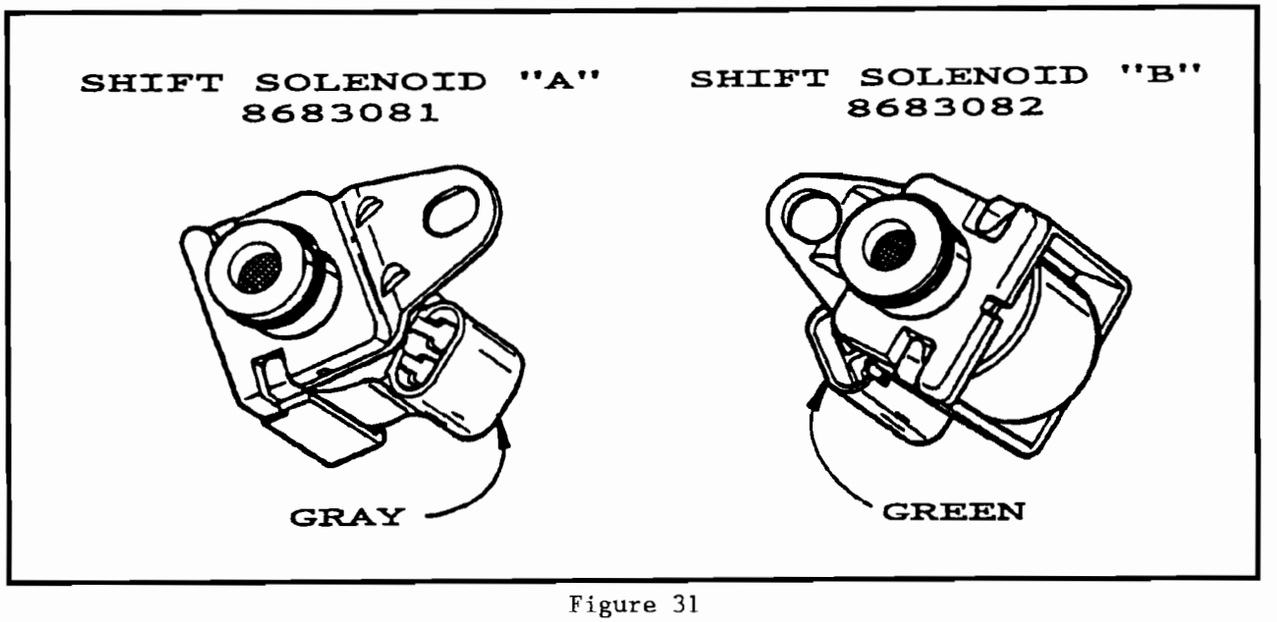


Figure 31

THM 4L80-E/4L80-EHD

NEW TEMPERATURE SENSOR

Some 1992 model THM 4L80-E/4L80-EHD transmissions are now equipped with a new Transmission Oil Temperature (TOT) sensor incorporated within the transmission wiring harness as shown in Figure 32, and replaces the TOT sensor that screwed into the valve body on previous models.

OEM part number for the revised wiring harness is 8686985, and will retro-fit back on all models. Leave the old TOT sensor in valve body as a plug.

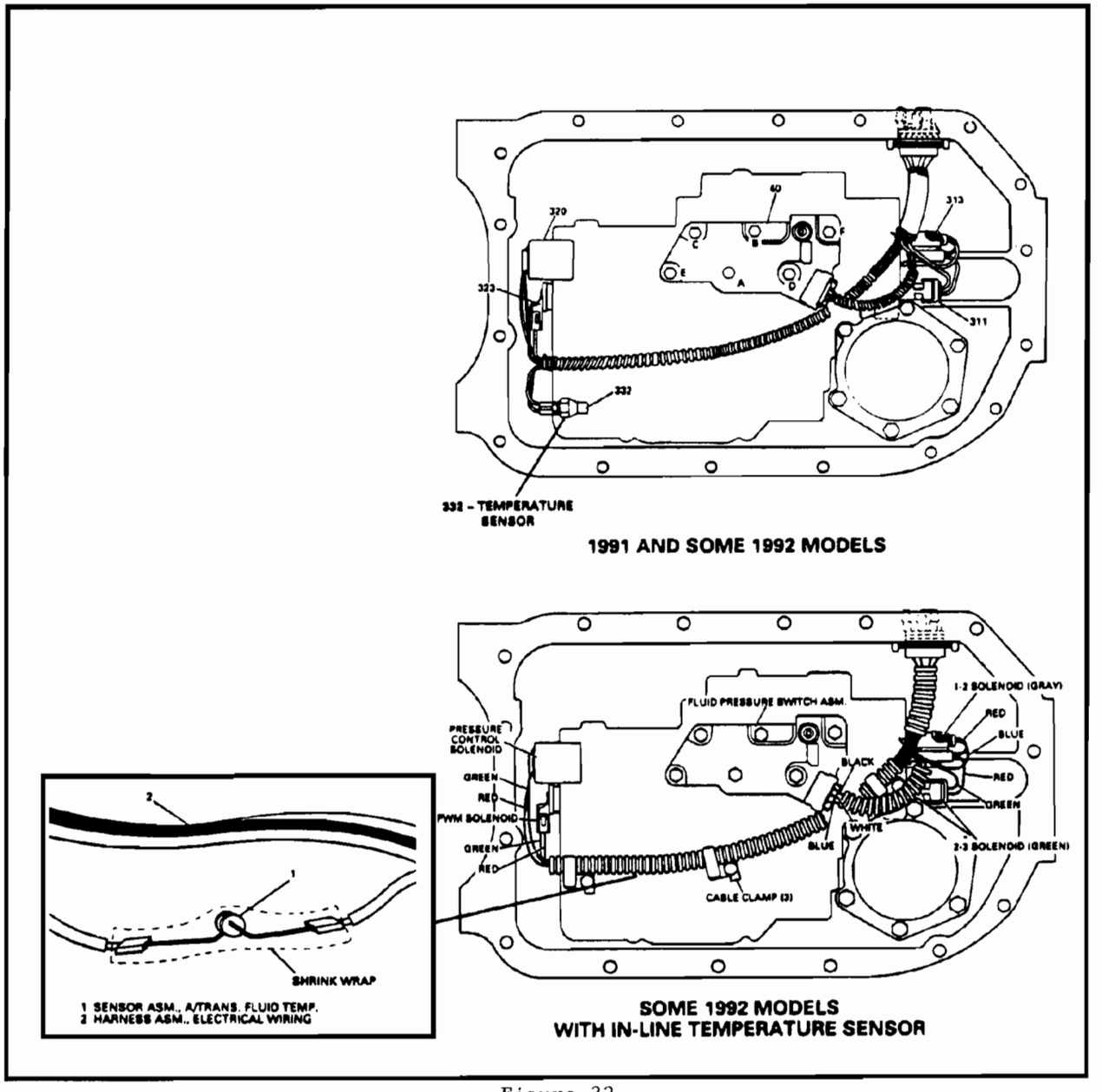


Figure 32

THM 4L80-E/4L80-EHD

NEW DESIGN CASE CONNECTOR FOR 1993

CHANGE: Beginning on May 25, 1993 (Julian Date 145) a new transmission case connector and wiring harness assembly went into production on all THM 4L80-E/4L80-EHD transmissions (See Figures 34 and 35).

REASON: Greatly decreased the possibility of bending the case connector terminals and ease of assembly.

PARTS AFFECTED:

(1) CASE CONNECTOR AND INTERNAL WIRING HARNESS - Now has a much more durable case connector and also REVISED pin locations.
REFER TO FIGURE 33 FOR PREVIOUS TRANSMISSION CASE CONNECTOR.
REFER TO FIGURE 34 FOR NEW DESIGN TRANSMISSION CASE CONNECTOR.

(2) EXTERNAL VEHICLE HARNESS CONNECTOR - Changed to accomodate the new design transmission case connector and also REVISED cavity locations.
REFER TO FIGURE 35 FOR NEW DESIGN VEHICLE HARNESS CONNECTOR.

INTERCHANGEABILITY:

There is now available a new service package, OEM part number 24200161, that will update ANY previous model THM 4L80-E/4L80-EHD transmission to the new design case connector, and includes the following:

1. New design transmission case connector and internal wiring harness.
2. New design external vehicle harness connector that requires cutting and splicing the new connector to the existing vehicle harness. USE THE CHART PROVIDED IN FIGURE 34 AS A GUIDE.

SERVICE INFORMATION:

UPDATE SERVICE PACKAGE, WIRING HARNESS 24200161
(Includes the following)

1. New Design Transmission Case Connector, and Internal Wiring Harness Assembly.
2. New Design External Vehicle Harness Connector.

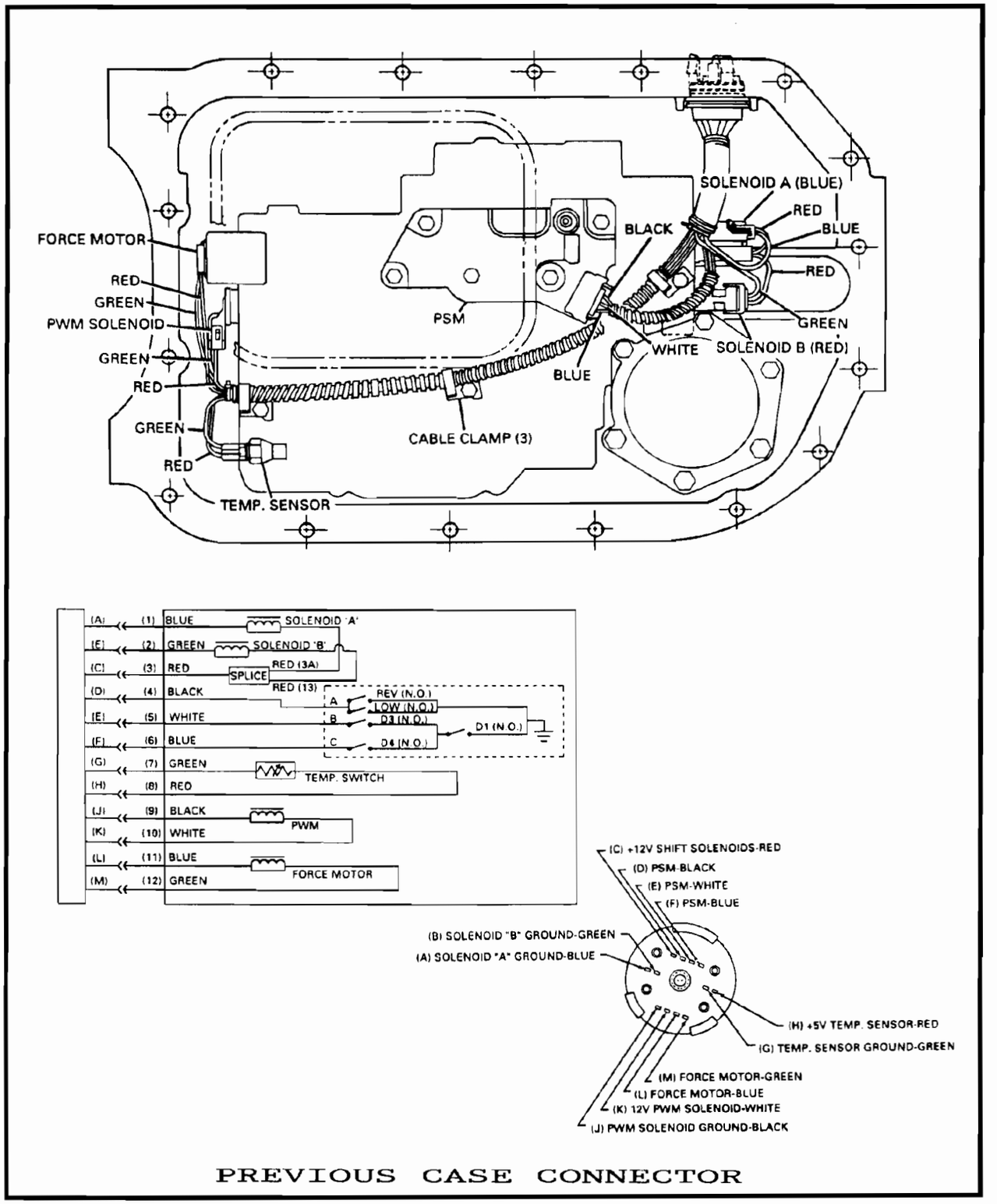
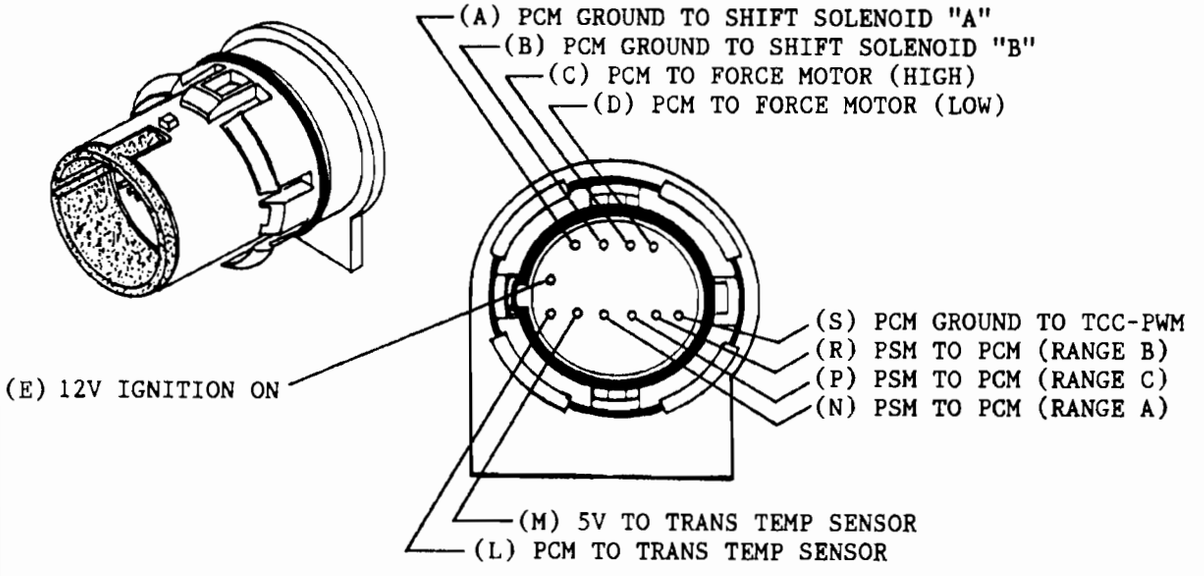


Figure 33

AUTOMATIC TRANSMISSION SERVICE GROUP

THM 4L80-E/4L80-EHD

NEW CASE CONNECTOR FOR 1993

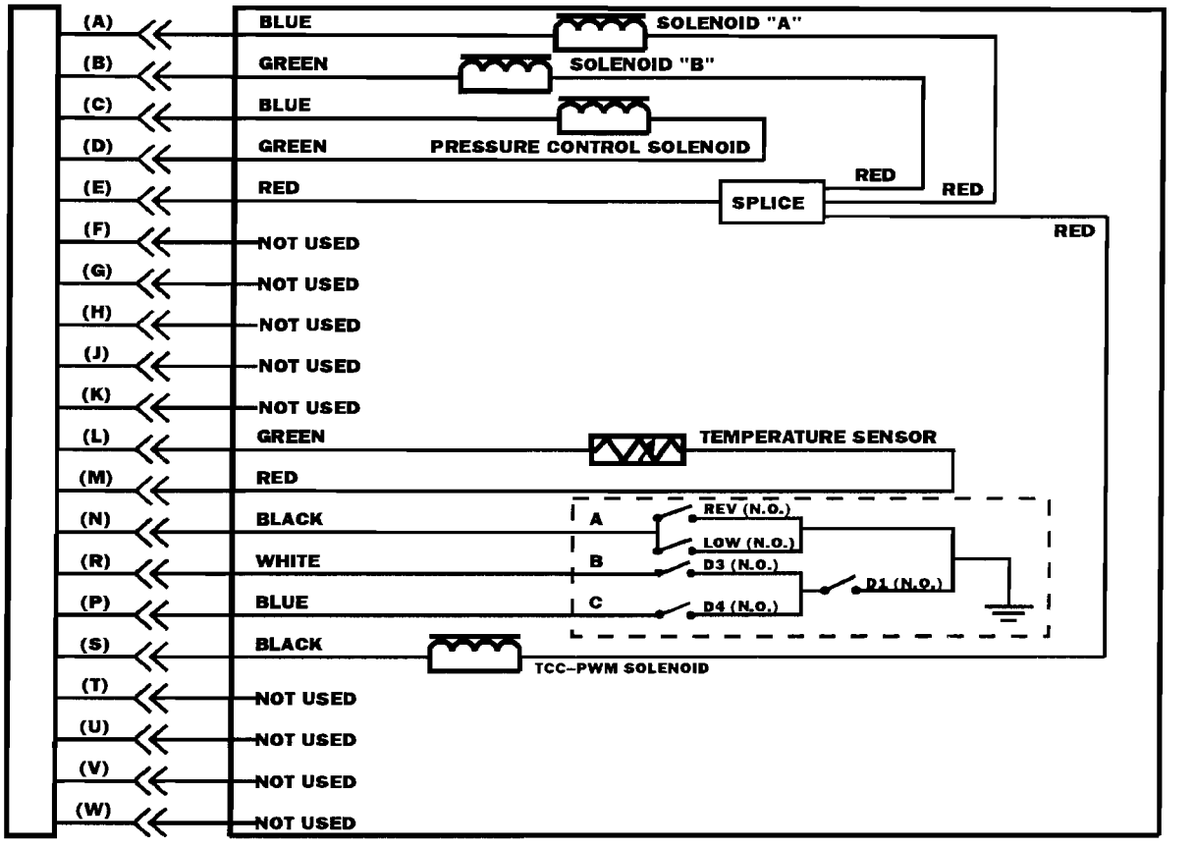


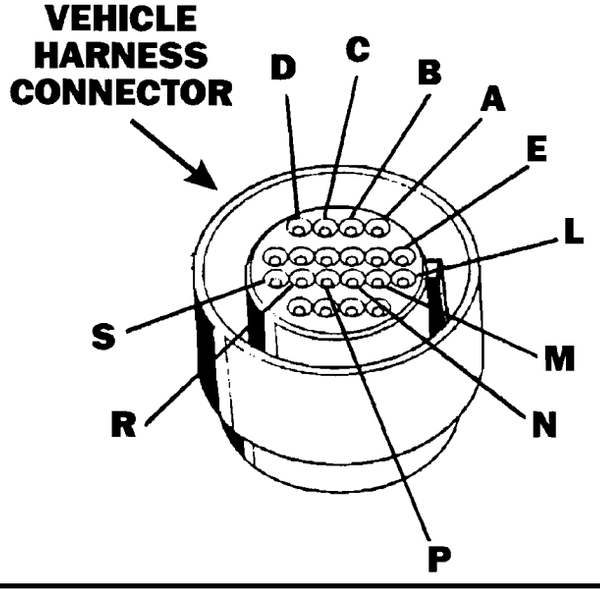
OLD CAVITY	NEW CAVITY	FUNCTION
A	A	PCM GROUND TO SHIFT SOLENOID "A"
B	B	PCM GROUND TO SHIFT SOLENOID "B"
L	C	PCM TO FORCE MOTOR (HIGH)
M	D	PCM TO FORCE MOTOR (LOW)
C	E	12V IGNITION ON, TO SOLENOIDS
G	L	PCM TO TRANS TEMP SENSOR
H	M	5V TO TRANS TEMP SENSOR
D	N	PSM TO PCM (RANGE A)
F	P	PSM TO PCM (RANGE C)
E	R	PSM TO PCM (RANGE B)
J	S	PCM GROUND TO TCC-PWM SOLENOID

NEW CASE CONNECTOR FOR 1993

Figure 34

1993 WIRING SCHEMATIC AND CONNECTOR





A PCM GROUND TO SHIFT SOLENOID "A"
B PCM GROUND TO SHIFT SOLENOID "B"
C PCM TO FORCE MOTOR (HIGH)
D PCM TO FORCE MOTOR (LOW)
E 12V IGNITION ON, TO SOLENOIDS
L PCM TO TRANS TEMP SENSOR
M 5V TO TRANS TEMP SENSOR
N PSM TO PCM (RANGE A)
P PSM TO PCM (RANGE C)
R PSM TO PCM (RANGE B)
S PCM GROUND TO TCC-PWM SOLENOID

Figure 35

THM 4L80-E/4L80-EHD

TURBINE SHAFT BREAKAGE AND/OR OVERDRIVE CARRIER BREAKAGE

COMPLAINT: Some THM 4L80-E/4L80-EHD transmissions may exhibit a twisting or breakage of the turbine shaft and/or breaking the overdrive carrier assembly, usually "P" series cube vans.

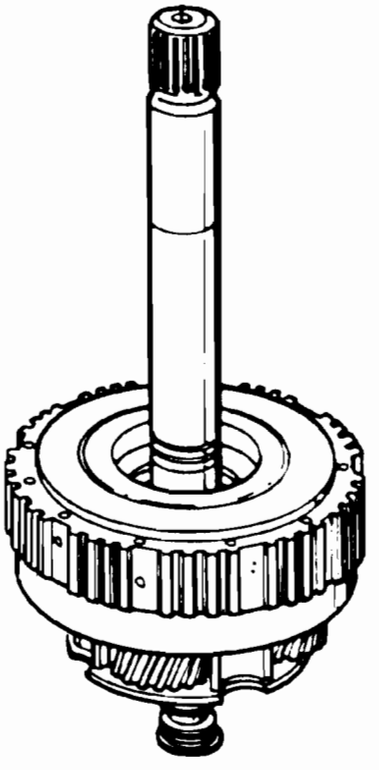
CAUSE: The cause may be more torque load than the parts are capable of carrying, usually vehicle weight in heavy throttle conditions.

CORRECTION: There is now available from OEM, a new service package that includes a heavy duty turbine shaft and overdrive carrier assembly. Refer to Figure 36. This service package, OEM part number 24200130, should be installed in "P" series cube vans, or any vehicle carrying a lot of extra weight.

SERVICE INFORMATION:

Turbine Shaft and O.D. Carrier Asm. (Heavy Duty) 24200130

HEAVY DUTY TURBINE SHAFT
AND OVERDRIVE CARRIER ASSEMBLY



OEM PART NUMBER
24200130

Figure 36

The Superior Ford Team

Corrects the Most Common Complaint on Ford AXOD Transmissions!

The AXOD Correction Spring and Clip Kit

The Superior Import Team

SUPERIOR
TRANSMISSON PARTS, INC.
THE SIMPLE SOLUTION

Valve Body Products With a Difference
Contact Your Local Distributor or call 800-451-3115

THM 4T60-E

COMPLETE HYDRAULICS CHANGE FOR 1993

CHANGE: A new design converter clutch regulator valve line-up, and a new design for the accumulator bushings in the valve body, changes the hydraulics beginning at the start of production for all 1993 model THM 4T60-E transaxles.

REASON: Improved shift feel and durability.

PARTS AFFECTED:

(1) VALVE BODY CASTING - The aluminum plug and retainer clip for the converter clutch regulator valve were eliminated and replaced with a new bushing and a new style retainer. This makes it much easier to remove this line-up out of its valve body bore (See Figure 37).
The 1-2 accumulator valve bushing (Both Primary and Secondary). The 2-3 accumulator valve bushing, and the 3-4 accumulator valve bushing were also re-designed for improved shift feel.
These changes required changes in the worm tracks in the valve body casting, and the easiest way to identify the 1993 valve body is the diameter of the TCC regulator valve bore, as shown in Figure 38.

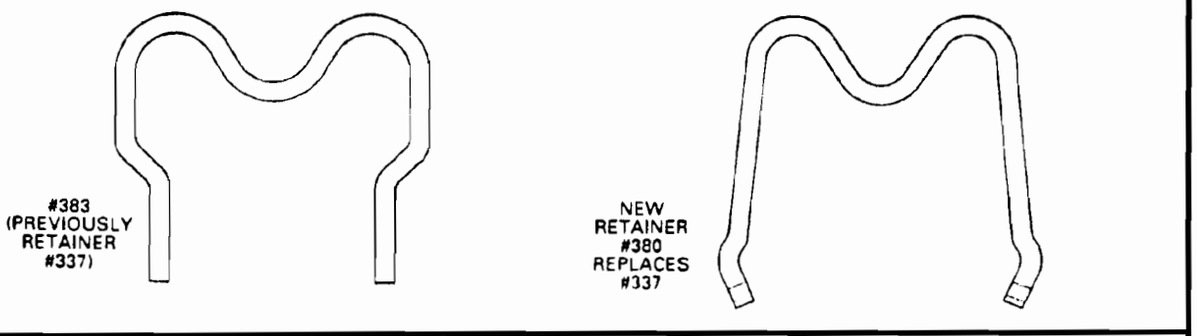
(2) VALVE BODY SPACER PLATE - Different hole spacing to accomodate the valve body and channel plate casting changes. Also the 91-92 hydraulics spacer plate has the TCC solenoid orifice in the spacer plate, and the 1993 hydraulics requires the screen and orifice assembly, with the "O" ring, that we seen in the THM 440-T4 transaxle (See Figures 39 and 40).

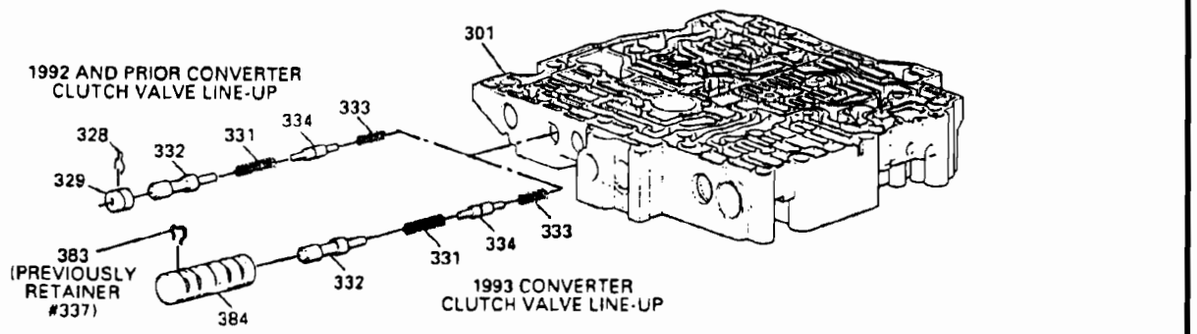
(3) VALVE BODY GASKETS - Both the valve body to spacer plate and spacer plate to channel plate gaskets change to accomodate the new hydraulics. They are easily identified by the part number ink stamped on each gasket. See the gasket chart in Figure 41 for proper identification.

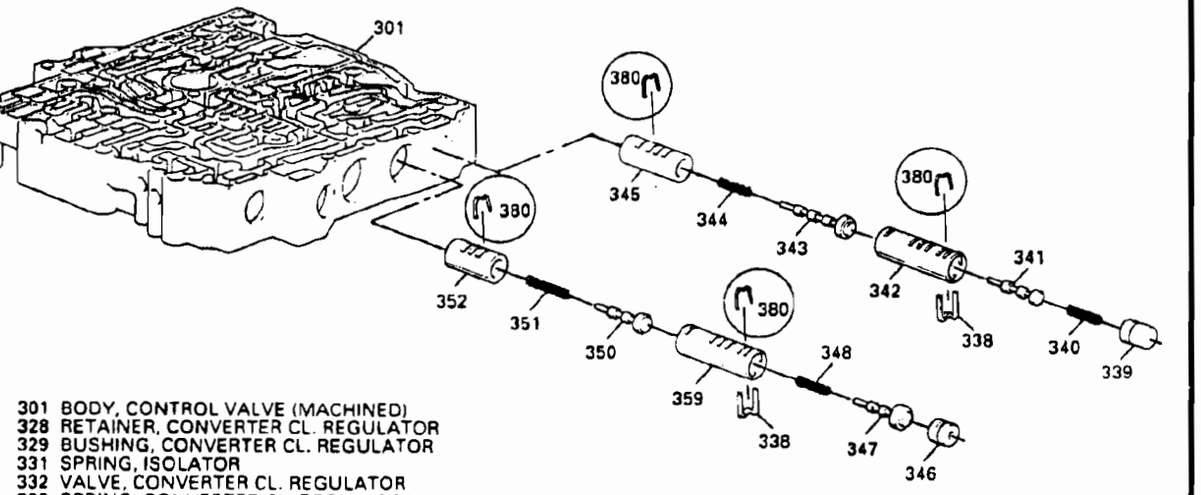
(4) CHANNEL PLATE CASTING - Casting changes in the worm track area to accomodate the valve body changes, and can be easily identified by the casting number. See Figure 42 for casting number location. The casting number on the 91-92 hydraulics is 8667284, and casting number on 1993 hydraulics is 8682217.

INTERCHANGEABILITY:

NONE of the parts listed above will interchange with one another. If you change one piece you must change them ALL.







301 BODY, CONTROL VALVE (MACHINED)
328 RETAINER, CONVERTER CL. REGULATOR
329 BUSHING, CONVERTER CL. REGULATOR
331 SPRING, ISOLATOR
332 VALVE, CONVERTER CL. REGULATOR
333 SPRING, CONVERTER CL. REGULATOR
334 VALVE, ISOLATOR
338 RETAINER, 1-2 ACCUMULATOR PLUG (PRIMARY AND SECONDARY)
339 PLUG, 1-2 ACCUMULATOR (PRIMARY)
340 SPRING, 1-2 ACCUMULATOR VALVE (PRIMARY)
341 VALVE, 1-2 ACCUMULATOR
342 BUSHING, 1-2 ACCUMULATOR VALVE (PRIMARY)
343 VALVE, 2-3 ACCUMULATOR
344 SPRING, 2-3 ACCUMULATOR VALVE
345 BUSHING, 2-3 ACCUMULATOR VALVE
346 PLUG, 1-2 ACCUMULATOR (SECONDARY)
347 VALVE, 1-2 ACCUMULATOR (SECONDARY)
348 SPRING, 1-2 ACCUMULATOR VALVE (SECONDARY
349 BUSHING, 1-2 ACCUMULATOR (SECONDARY)
350 VALVE, 3-4 ACCUMULATOR
351 SPRING, 3-4 ACCUMULATOR VALVE
352 BUSHING, 3-4 ACCUMULATOR VALVE
380 RETAINER, ACCUMULATOR BUSHING ASM. (2-3 AND 1-2 SECONDARY AND PRIMARY)
383 RETAINER, CONVERTER CL. REGULATOR
384 BUSHING, CONVERTER CL. REGULATOR

Figure 37

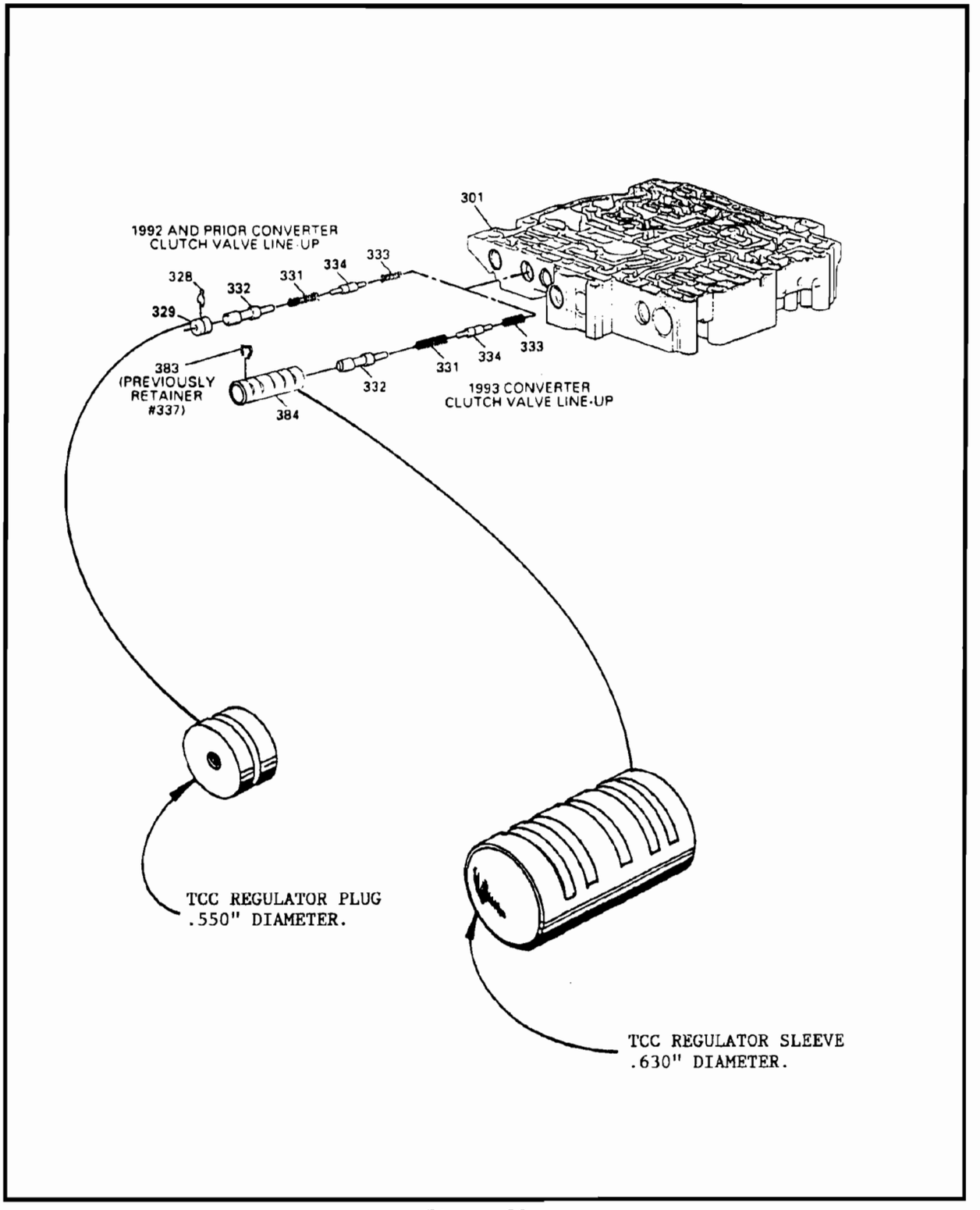

301
1992 AND PRIOR CONVERTER
CLUTCH VALVE LINE-UP
328
329
332
331
334
333
383
(PREVIOUSLY
RETAINER
#337)
384
332
331
334
333
1993 CONVERTER
CLUTCH VALVE LINE-UP
TCC REGULATOR PLUG
.550" DIAMETER.
TCC REGULATOR SLEEVE
.630" DIAMETER.

Figure 38

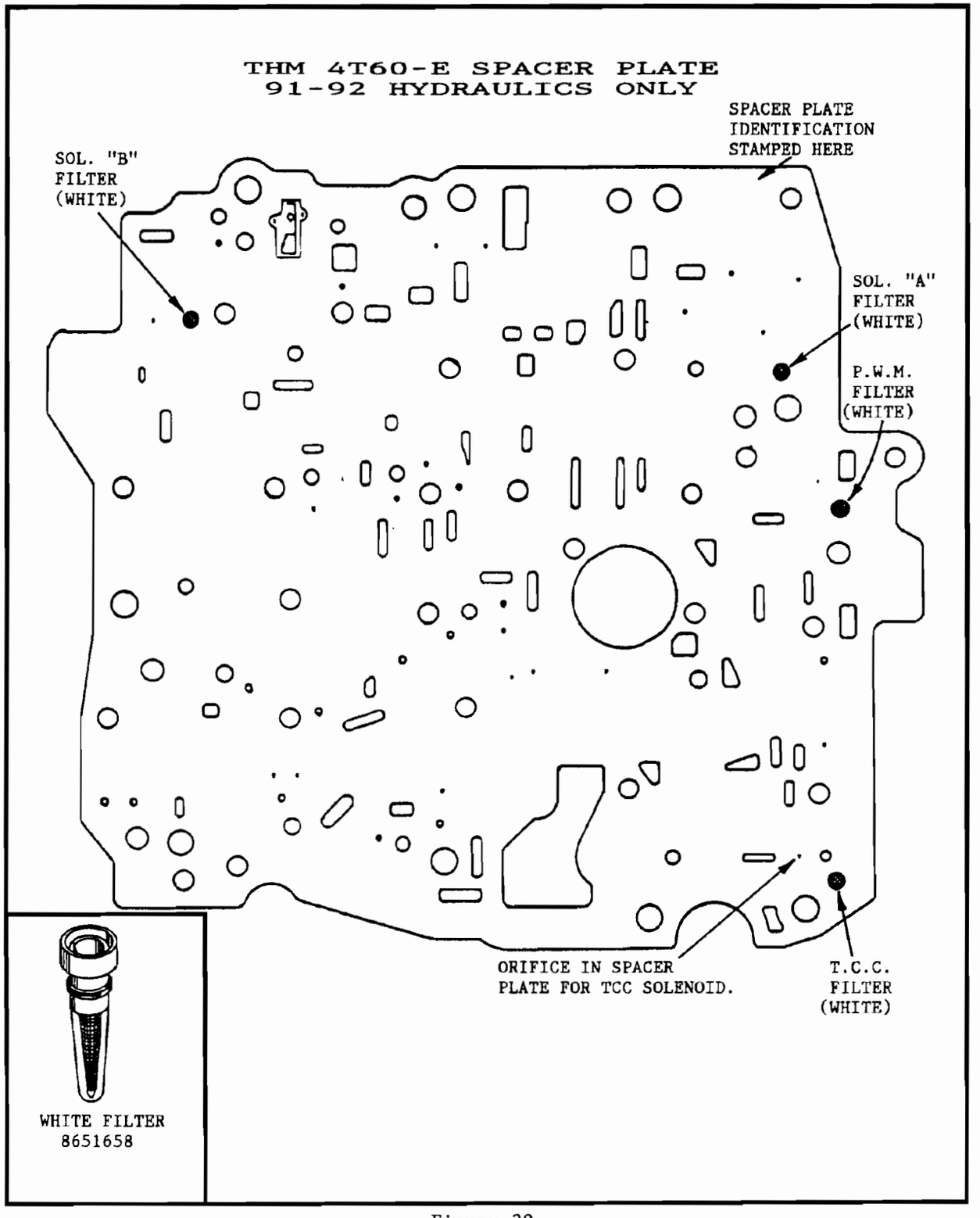

THM 4T60-E SPACER PLATE
91-92 HYDRAULICS ONLY
SPACER PLATE IDENTIFICATION STAMPED HERE
SOL. "B" FILTER (WHITE)
SOL. "A" FILTER (WHITE)
P.W.M. FILTER (WHITE)
ORIFICE IN SPACER PLATE FOR TCC SOLENOID.
T.C.C. FILTER (WHITE)
WHITE FILTER
8651658

Figure 39

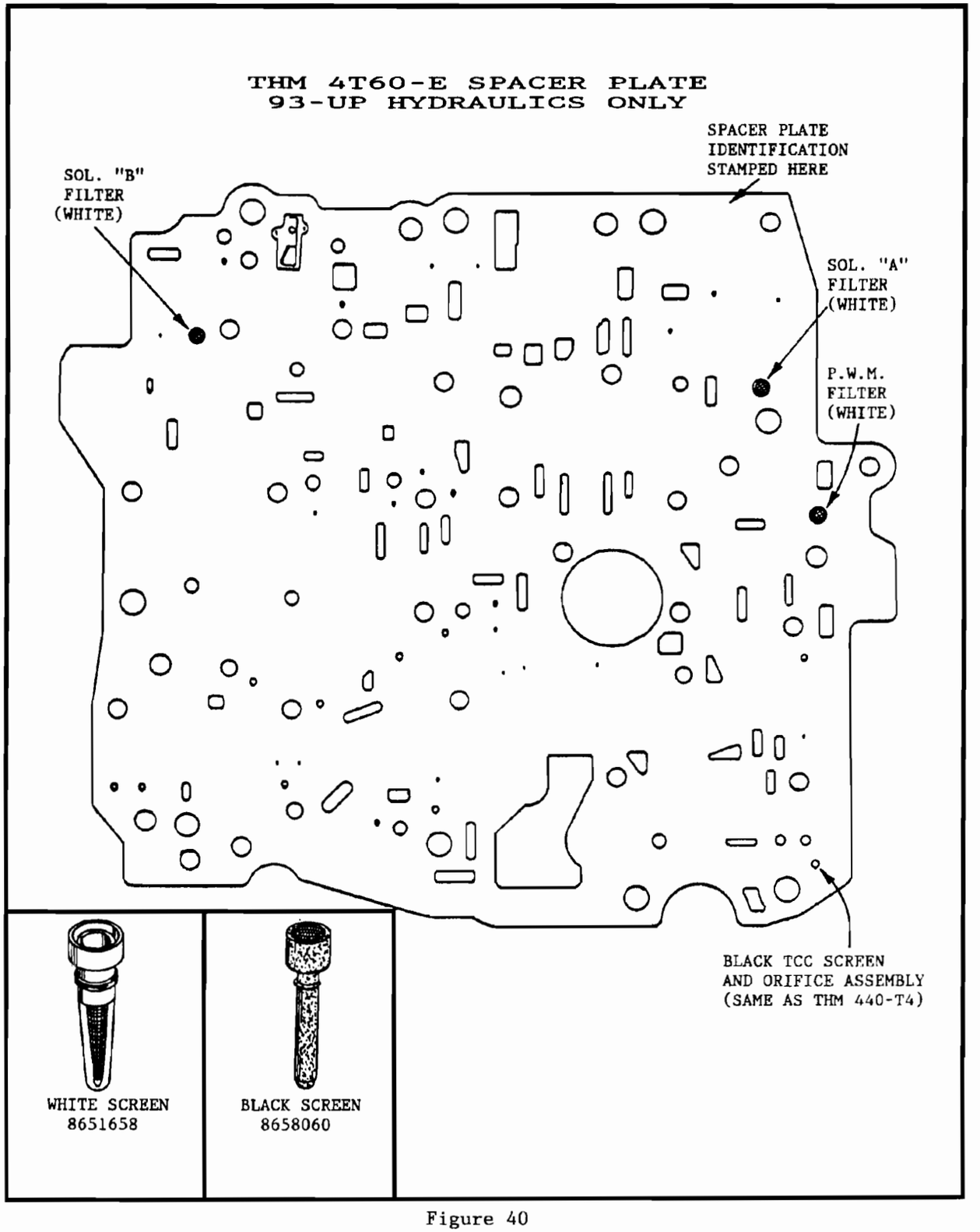

THM 4T60-E SPACER PLATE
93-UP HYDRAULICS ONLY
SPACER PLATE IDENTIFICATION STAMPED HERE
SOL. "B" FILTER (WHITE)
SOL. "A" FILTER (WHITE)
P.W.M. FILTER (WHITE)
BLACK TCC SCREEN AND ORIFICE ASSEMBLY (SAME AS THM 440-T4)
WHITE SCREEN 8651658
BLACK SCREEN 8658060

Figure 40

VALVE BODY GASKET CHART

	91-92 HYDRAULICS	1993 HYDRAULICS
VALVE BODY TO SPACER PLATE GASKET (GVB)	8678762	8682281
SPACER PLATE TO CHANNEL PLATE GASKET (GCP)	8678761	8682280

Figure 41

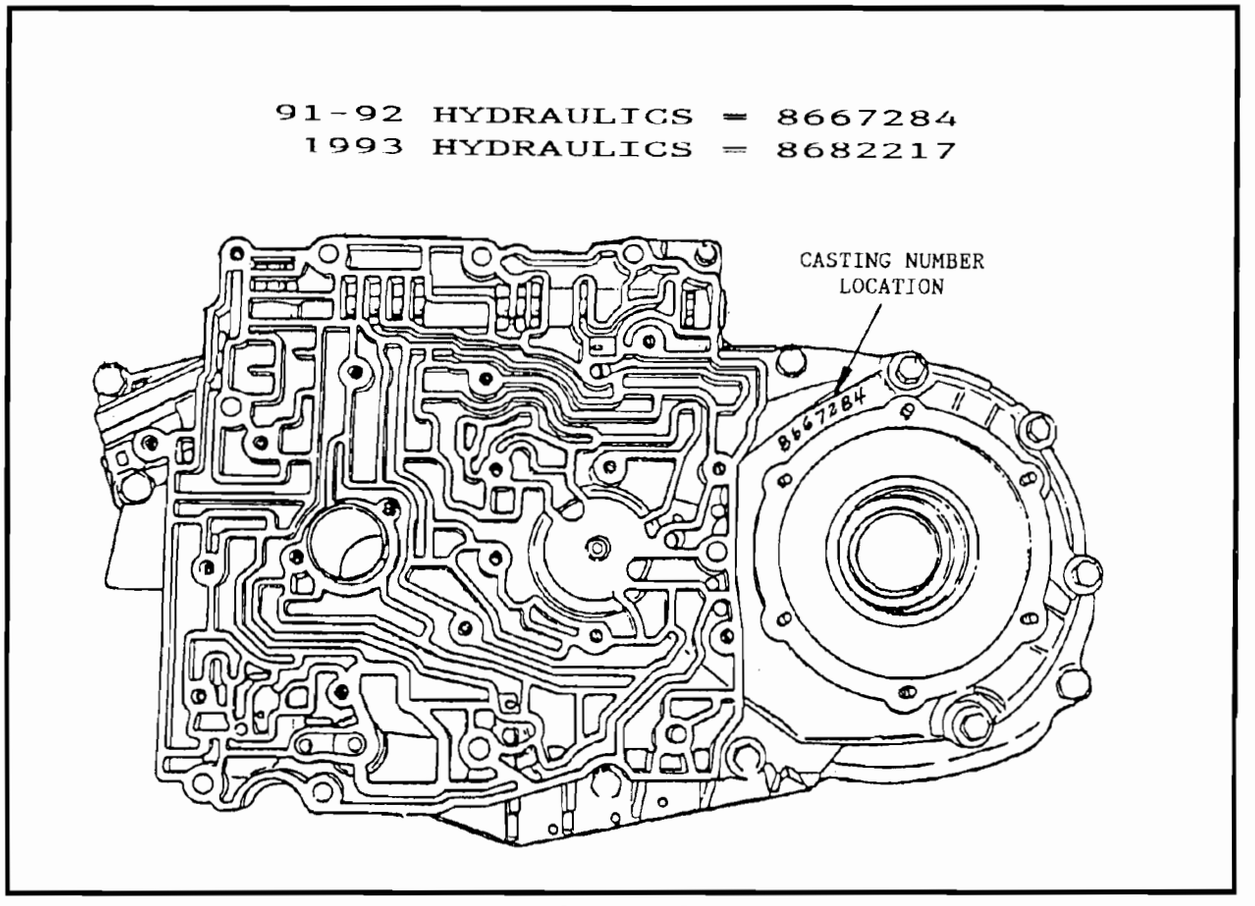


Figure 42

NOTES

Transmission Troubleshooting Breakthrough

Snap-on Tools Adds Automatic Transmission Troubleshooting Capability to Hand-held Scan Tool

Kenosha WI—Snap-on Tools Corporation has introduced a unique solution to diagnosing and repairing automatic transmission problems with a hand-held scan tool, the *Fast-Track Transmission Troubleshooter.*

The *Fast-Track Transmission Troubleshooter* system consists of a single cartridge for the Snap-on MT2500 Scanner, and the accompanying *Fast-Track User's Manual.*

Proven Methods

The *Transmission Troubleshooter* is the first vehicle diagnostic system that specifically addresses automatic transmission diagnosis and repair needs.

The first in the next generation of *Fast-Track Troubleshooter* products, the *Transmission Troubleshooter* follows the proven methods of previous *Fast-Track Troubleshooters.* Experienced and first-time users, alike, will find using the *Transmission Troubleshooter* to be easy, fast, and effective.

Offers New Capability To General Repair Shops

"Is this an engine problem or a transmission problem?" No longer does the general repair shop need to send a possible transmission problem down the street for further diagnosis.

The *Transmission Troubleshooter* is based on the real-world experience of master transmission technicians. The *Troubleshooter* helps determine if the symptoms are engine or transmission-related. On-line maintenance tips also include recommended service intervals.

A Must For The Transmission Specialty Shops

Electronically-controlled transmissions are now common production technology for all carmakers, and the Snap-on Scanner is already the tool of choice for many transmission shops. The GM, Ford, and Chrysler primary cartridges for the MT2500 Scanner already offer automatic code gathering, data parameter monitoring, and many functional tests necessary for diagnosing problems in electronically-controlled transmissions.

The *Transmission Troubleshooter* takes using a scan tool beyond problem diagnosis; the *Troubleshooter* also offers repair and rebuild information.

Most other sources of information are based on factory service manuals, and typically don't include field experience. The *Troubleshooter* is based on field experience, and offers the insight of specialists working on transmissions every day. Not only does the Troubleshooter offer the most efficient and effective way to repair and rebuild transmissions, but it also offers insight into the techniques used to prevent those unwanted (and now unnecessary!) comebacks.

A Single Cartridge For GM, Ford, and Chrysler Vehicles

The *Transmission Troubleshooter* cartridge contains an on-line checklist of troubleshooting tips for common transmission problems on GM, Ford, and Chrysler vehicles. The 3-in-1 cartridge is used in tandem with any of the Snap-on domestic primary cartridges (GM, Ford, or Chrysler).

The User's Manual

The reference bulletins in the 128-page *User's Manual* contain additional information to support many *Troubleshooter* tips when special instructions, specifications, or other information is required. The reference bulletins are compiled primarily from the experience of master transmission technicians, as well as from information in carmakers' service manuals, technical service bulletins, and independent sources of service data (including telephone helplines).

"User-Friendly" Organization

The *Transmission Troubleshooter* gives you specific tips for specific problems, on specific transmissions. Each transmission menu in the *Transmission Troubleshooter* is organized with a "Read First" introduction followed by four major sections that group the tips and other information into basic categories:

- Section 1 contains tips for frequently seen symptoms and codes, as well as road testing tips.
- Section 2 contains factory-recommended service information, leak tips, and adjustments that you can make while the transmission is in the vehicle.
- Section 3 contains tips for transmission removal and repair, including subassembly inspection and repair tips. Also included in this section are case and valve body tips.
- Section 4 contains technical information such as, adjustment and test procedures, specifications, listings of related service bulletins, and commonly used abbreviations.

The checks in each *Transmission Troubleshooter* tip begin with the most likely cause of a problem or with the tests that should be made first. The checks then progress through other possible causes and tests. All checks in a tip are common causes of a problem or important basic tests, and the most important are listed first.

Order Today

To order the MT2500-6992 *Transmission Troubleshooter*, or to get more information on the MT2500 Scanner and *Fast-Track Troubleshooter* systems, contact your local Snap-on Dealer, or contact Snap-on Tools Corporation at (800) 424-7226.

Phone: (800) 424-7226 for more information today.

Snap-on®

Is It An Engine Problem or a Transmission Problem?

Snap-on Has the Answer!

MT2500-6992 Fast-Track Transmission Troubleshooter cartridge.

New!

New Fast-Track™ Transmission Troubleshooter Cartridge expands the MT2500 Scanner's capability with added field-proven diagnostic insight and overhaul direction.

That all too common question with today's electronically-controlled automatic transmissions, "Where's the problem--engine or transmission?" can now be answered right in your shop! The new Snap-on *Fast-Track* MT2500-6992 Transmission Troubleshooter cartridge enables you to diagnose the problem and, in many cases, fix it yourself.

Nothing Else Like It On The Market Today.

This is the only Transmission Troubleshooter cartridge you can buy with real-world fixes built-in! Now, accurate diagnosis can be done before removing the transmission. You also get field-proven tips and insight throughout the removal and rebuild process, including subassembly inspection. All at your fingertips!

Specific Help for Specific Problems on Specific Transmissions.

The *Scanner* and Transmission Troubleshooter cartridge instantly tell you what to look for on most 1981 and later domestic-built GM, Ford and Chrysler automatic transmissions. Plus, it comes with a 128-page User's Manual packed with detail from field experience, carmakers'service manuals, technical service bulletins and telephone helplines.

An Essential Tool for Diagnosing Today's Transmissions.

For further information, talk to your Snap-on dealer or call 1-800-424-7226 today. Ask about the *MT2593-2991 Super Deluxe Scanner* and *NEW* MT2500-6992 *Fast-Track* Transmission Troubleshooter cartridge.

Snap-on®

For further information, call 1-800-424-7226 today.

THM 4T60-E

SLIPPING AND/OR NO CONVERTER CLUTCH

COMPLAINT: Some vehicles equipped with the THM 4T60-E transaxle built on or before January 26, 1993 (Julian Date 026) may exhibit no converter clutch apply, or a converter clutch apply shudder condition. Either one of these conditions will usually store diagnostic code 039 in the PCM memory. Vehicles built after the above Julian Date have a new design Pulse Width Modulated (PWM) Solenoid with added screens. Refer to Figure 43 for Julian Date identification.

Excessive heat on torque converter may be visible when this condition exists.

CAUSE: The cause may be due to sediment trapped in the PWM Solenoid, and may enter the solenoid from either the control and/or feed passages and lodge in the flow path around the metering ball causing an undesired leak (See Figure 44).

NOTE: CAREFUL DIAGNOSIS IS HIGHLY RECOMMENDED. DO NOT ASSUME THAT THE CONDITION IS CAUSED BY THE ABOVE CONCERN.

Following is a list of other items that may affect converter clutch engagement concerns:

- Engine performance related.
- Improper operation of the PCM.
- Poor connection between PCM and transaxle case connector.
- Converter clutch apply valve stuck.
- Converter clutch regulator valve stuck.
- Turbine shaft sealing ring damage.
- Drive sprocket support bushing worn.
- Oil pump drive shaft seal damaged.
- Number 1 checkball missing or off location.
- PWM Solenoid "O" ring leaking or missing.
- PWM Solenoid inoperative.

CORRECTION: Replace the Pulse Width Modulated (PWM) Solenoid with OEM part number 8683535. This is the new design solenoid, in which screens were added to the solenoid control and feed passages (See Figure 45). The PWM spacer plate filter has also been eliminated on the later models that use the new design PWM Solenoid (See Figure 46). The new design PWM Solenoid with screens added should be installed on all rebuilds to prevent contamination. It is not necessary to remove spacer plate filter when installing the new design PWM Solenoid.

SERVICE INFORMATION:

Pulse Width Modulated (PWM) Solenoid Assembly 8683535
(New Design With Added Screens)

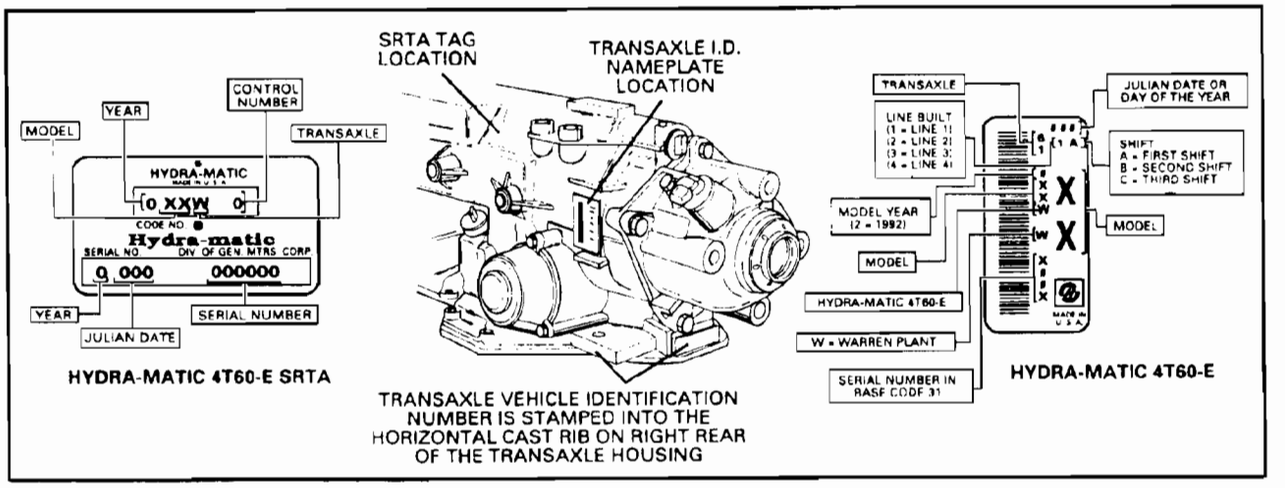


Figure 43

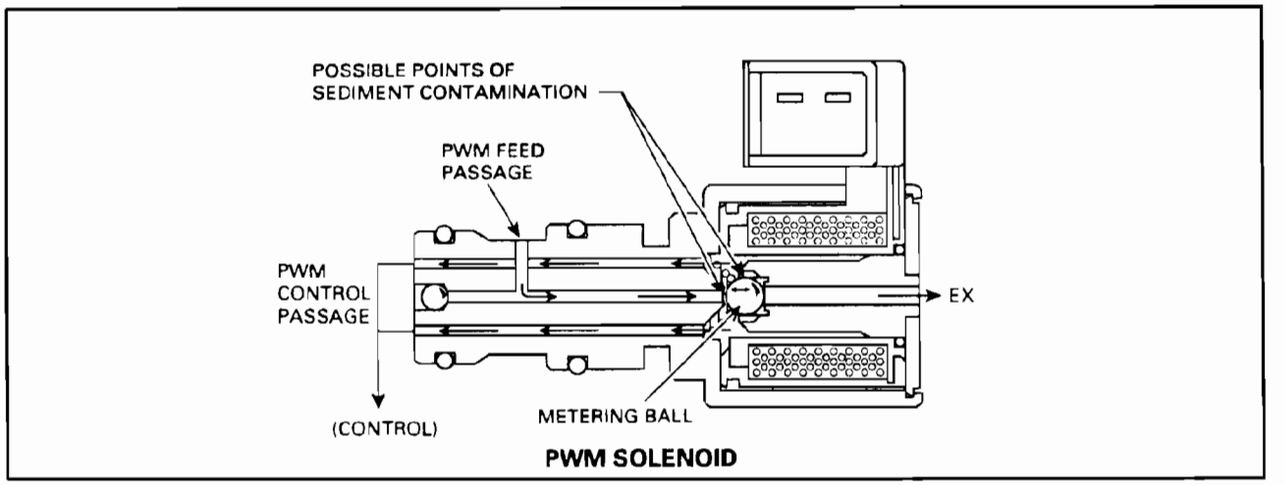


Figure 44

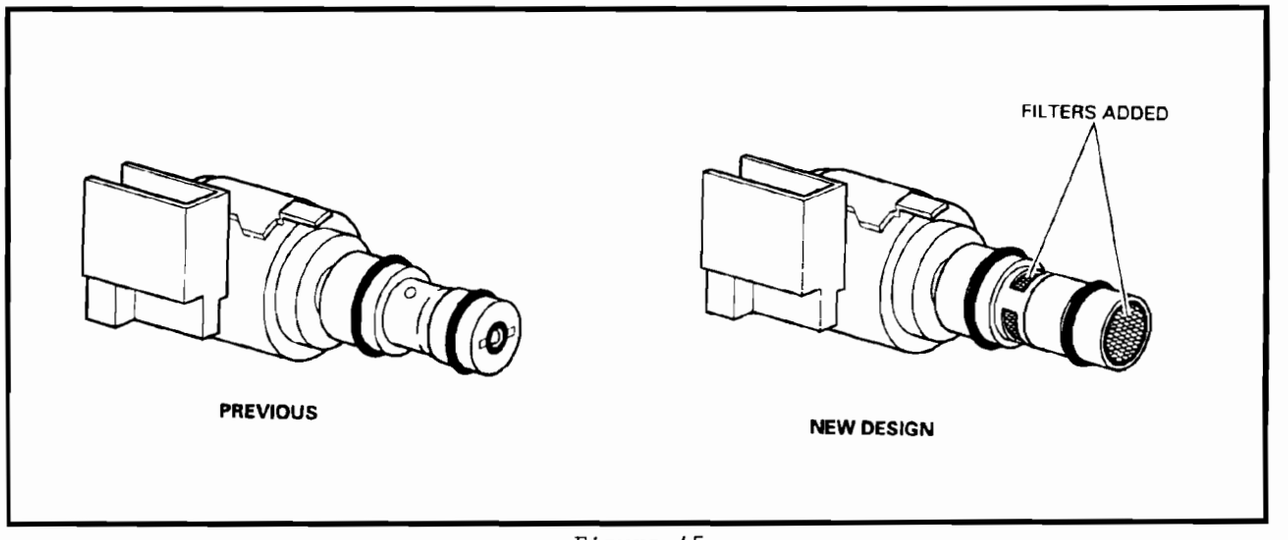


Figure 45

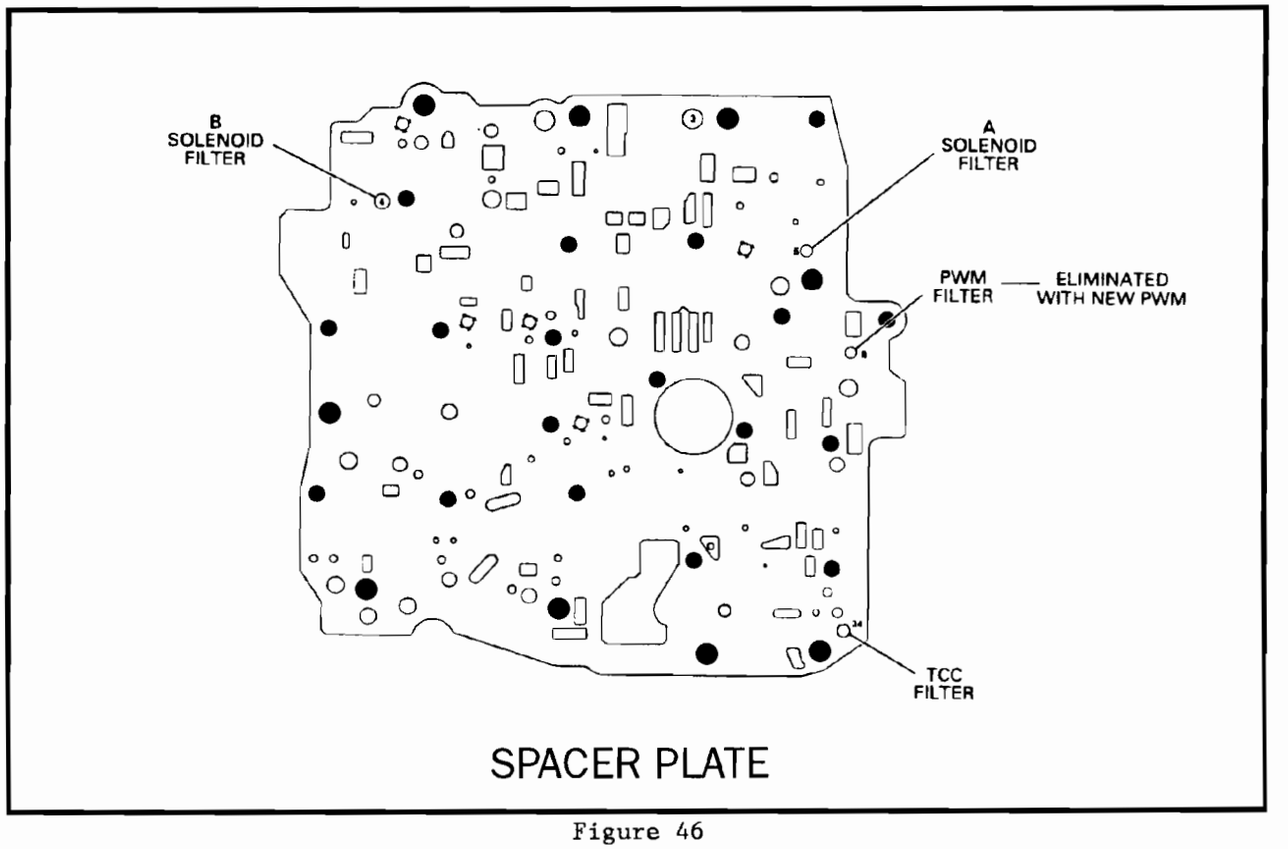


Figure 46

THM 4T60-E

NEW DESIGN DOUBLE SPRAG ASSEMBLY

CHANGE: Beginning on February 1, 1993 (Julian Date 032) all THM 4T60-E transaxles were built with a new "Double Sprag" assembly, in place of the previous 3rd roller clutch and input sprag assembly (See Figure 47).

REASON: Greatly increased durability of center gearbox concerns.

PARTS AFFECTED:

(1) INPUT/3RD SPRAG ASSEMBLY - Completely changed in design and dimensions on ALL components of the assembly. Refer to Figure 47.

(2) INPUT SUN GEAR - Now has two "Blind Splines" 180° from one another, to accomodate the new sprag inner race, and insure that the lube holes are aligned (See Figure 48).

(3) INPUT SUN GEAR SPACER - Revised thickness to accomodate the dimensional changes on the double sprag assembly, and no longer has any lube holes. (See Figure 48).

	PREVIOUS	NEW DESIGN
THICKNESS	.353"	.339"
DIAMETER	1.825"	1.835"

(4) INPUT CARRIER - Lip on top of input carrier completely removed, and the bushing completely removed, to accomodate double sprag assembly. There have also been some internal changes to improve lube and durability. (See Figure 49).

INTERCHANGEABILITY:

(1) NONE of the new components listed above, which are used in the improved "Double Sprag" assembly, are interchangeable with the previous 3rd roller clutch and input sprag components.

(2) The new "Double Sprag" Assembly CAN be used to back service ALL 4T60-E transaxles as long as ALL of the components listed above are used.

(3) The new "Double Sprag" Assembly CAN be used to back service the 4T60 (440-T4) transaxles from 1989 to 1993, as long as ALL of the components listed above are used.

(4) Units built prior to 1989 MUST be upgraded with the input housing that uses the Torrington Bearing, instead of the "Top Hat" thrust washer, before it will be compatable with the "Double Sprag" components.

SERVICE INFORMATION:

Input Sun Gear (New Design)	8682441
Input Sun Gear Spacer (New Design)	8682442
New "Double Sprag" Assembly Complete	8682443
Input Carrier Assembly (New Design)	8682461
Double Sprag Conversion Package	8651935

(Conversion Package Includes all 4 Parts Listed Above)

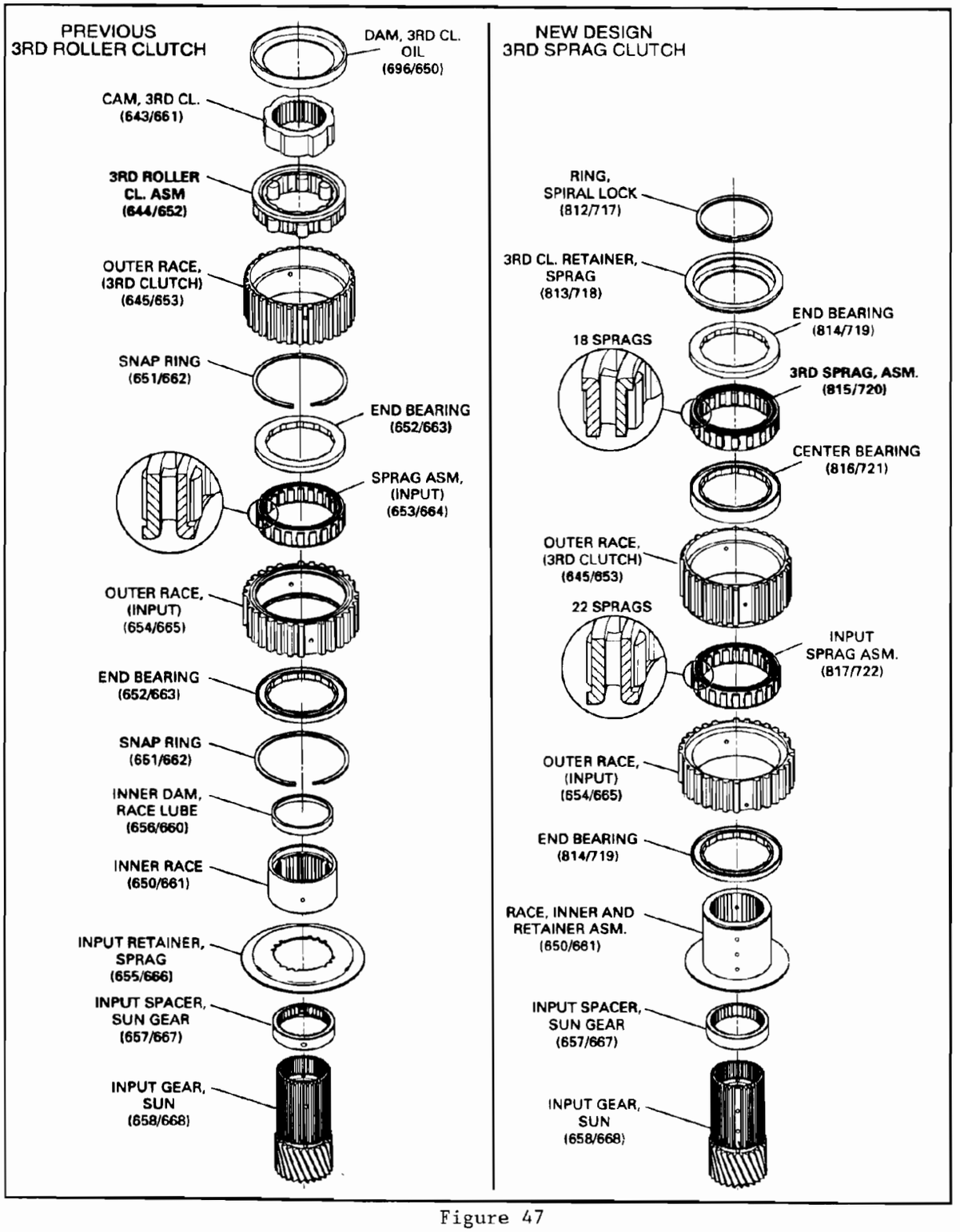

PREVIOUS
3RD ROLLER CLUTCH
DAM, 3RD CL. OIL (696/650)
CAM, 3RD CL. (643/661)
3RD ROLLER CL. ASM (644/652)
OUTER RACE, (3RD CLUTCH) (645/653)
SNAP RING (651/662)
END BEARING (652/663)
SPRAG ASM, (INPUT) (653/664)
OUTER RACE, (INPUT) (654/665)
END BEARING (652/663)
SNAP RING (651/662)
INNER DAM, RACE LUBE (656/660)
INNER RACE (650/661)
INPUT RETAINER, SPRAG (655/666)
INPUT SPACER, SUN GEAR (657/667)
INPUT GEAR, SUN (658/668)
NEW DESIGN
3RD SPRAG CLUTCH
RING, SPIRAL LOCK (812/717)
3RD CL. RETAINER, SPRAG (813/718)
END BEARING (814/719)
18 SPRAGS
3RD SPRAG, ASM. (815/720)
CENTER BEARING (816/721)
OUTER RACE, (3RD CLUTCH) (645/653)
22 SPRAGS
INPUT SPRAG ASM. (817/722)
OUTER RACE, (INPUT) (654/665)
END BEARING (814/719)
RACE, INNER AND RETAINER ASM. (650/661)
INPUT SPACER, SUN GEAR (657/667)
INPUT GEAR, SUN (658/668)

Figure 47

INPUT SUN GEAR AND SPACER

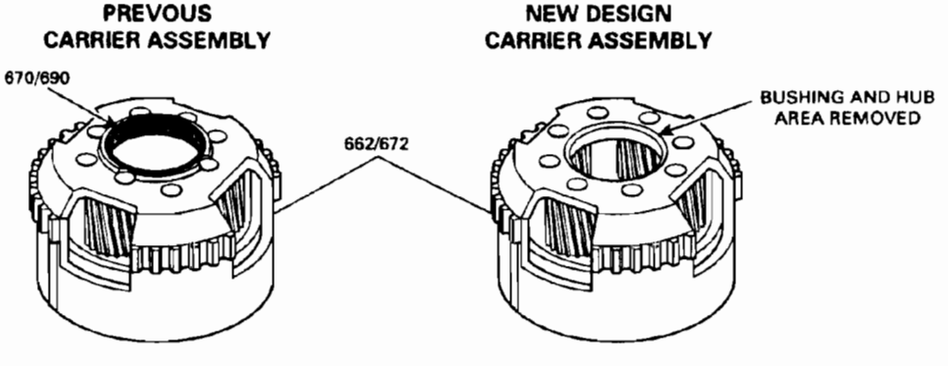
PREVIOUS DESIGN

SPACER THICKNESS = .353"
SPACER DIAMETER = 1.825"

NEW DESIGN

SPACER THICKNESS = .339"
SPACER DIAMETER = 1.835"

Figure 48



670/690 BUSHING, REACTION INTERNAL GEAR
662/672 CARRIER ASM., INPUT COMPLETE

Figure 49

THM 4T60-E AND THM 4T60 (440-T4)

NEW DRIVE CHAIN AND SPROCKETS

CHANGE: A new "Rocker-Joint" design drive chain assembly has been released for all 1993 THM 4T60 (440-T4) and selected 1993 THM 4T60-E transaxles on the dates listed below. Due to the unique "Rocker-Joint" configuration of the chain links, it was also necessary to change the tooth geometry on both the drive and driven sprockets. The new "Rocker-Joint" design was implemented into production as follows:

37-33 Ratio -- December 21, 1992 (Julian Date 356).
33-37 Ratio -- December 21, 1992 (Julian Date 356).
35-35 Ratio -- MAY BE IMPLEMENTED MID_YEAR 1994

Refer to Figure 52 for model identification and Julian Date information.

REASON: Lower friction of new design permits reduced chain wear, and higher efficiency at continuous speeds.

PARTS AFFECTED:

(1) DRIVE CHAIN ASSEMBLY - New "Rocker-Joint" Drive Chain is easily identified by the link pins that are flat on one side. The existing drive chain link pins are round, as shown in Figure 50. Another identification is the color of the master link. The "Rocker-Joint" design are supposed to be copper in color, BUT, we have seen some of them with black links which is the identification for the existing chain.

USE THE LINK PINS FOR POSITIVE IDENTIFICATION!

(2) DRIVE SPROCKET ASSEMBLY - It was necessary to change the tooth geometry to accomodate the new "Rocker-Joint" chain and can be identified by the part number stamped on the washer surface area in Magenta (Red) ink. (See Figure 51).

NOTE: MAGENTA INK MAY WEAR OFF SO USE DIMENSIONS BELOW FOR POSITIVE I.D.

	PREVIOUS O.D.	NEW O.D.	
37 TOOTH	4.233"	4.181"	APPROX .052" DIFFERENCE
33 TOOTH	3.756"	3.700	APPROX .056" DIFFERENCE

(3) DRIVEN SPROCKET ASSEMBLY - It was necessary to change the tooth geometry to accomodate the new "Rocker-Joint" chain and can be identified by the part number stamped on the washer surface area in Magenta (Red) ink. (See Figure 51).

NOTE: MAGENTA INK MAY WEAR OFF SO USE DIMENSIONS BELOW FOR POSITIVE I.D.

	PREVIOUS O.D.	NEW O.D.	
37 TOOTH	4.233"	4.181"	APPROX .052" DIFFERENCE
33 TOOTH	3.756"	3.700"	APPROX .056" DIFFERENCE

CONTINUED ON NEXT PAGE.

INTERCHANGEABILITY:

(1) The new "Rocker-Joint" Drive Chain IS NOT compatable with the existing sprockets, nor is the existing drive chain compatable with the new sprockets. Compatable parts MUST be used together. The "Rocker-Joint" Drive Chain will back service all previous units, when used with the new sprockets.

(2) If the new "Rocker-Joint" Drive Chain is installed on existing sprockets the assembly physically will not fit into the transaxle.

(3) If the existing drive chain is installed on the new sprockets, the entire assembly WILL go into the transaxle, but the chain will be noticeably loose.

SERVICE INFORMATION:

Drive Sprocket 37 Tooth (New Design)	8682597
Driven Sprocket 33 Tooth (New Design)	8682600
Rocker-Joint Drive Chain (New Design)	8682603
Drive Sprocket 33 Tooth (New Design)	8682599
Driven Sprocket 37 Tooth (New Design)	8682602

MODEL USEAGE

37-33 Ratio fits 440-T4 Models	3WFH
37-33 Ratio fits 4T60-E Models	3AVW, 3AWW, 3AZW, 3AMW, 3APW, 3ABW, 3BTW, 3CXW, 3CZW, 3PHW.
33-37 Ratio fits 4T60-E Models	3CWW,

Refer to Figure 52 for model identification and Julian Dates.

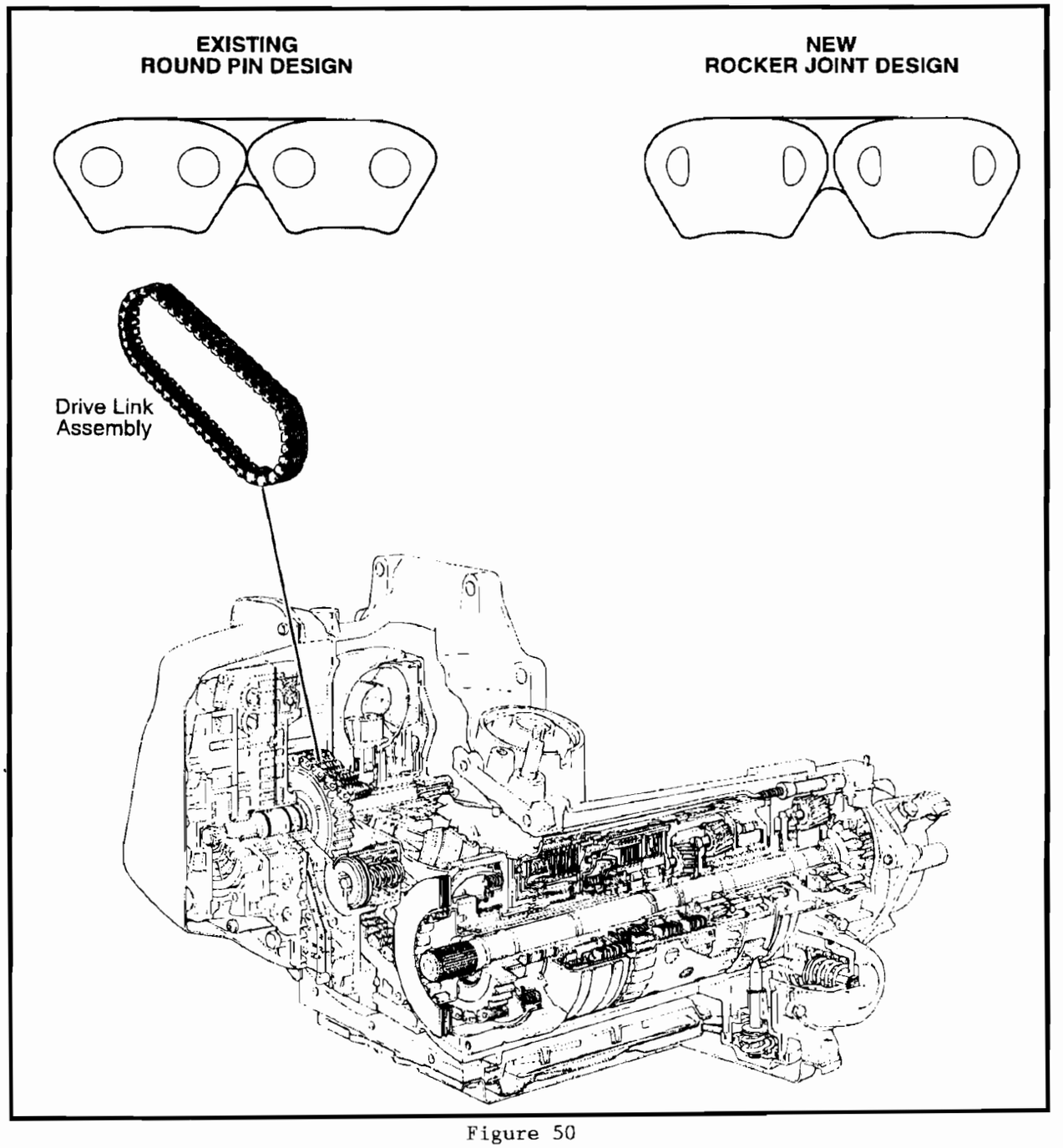

EXISTING
ROUND PIN DESIGN
NEW
ROCKER JOINT DESIGN
Drive Link
Assembly

Figure 50

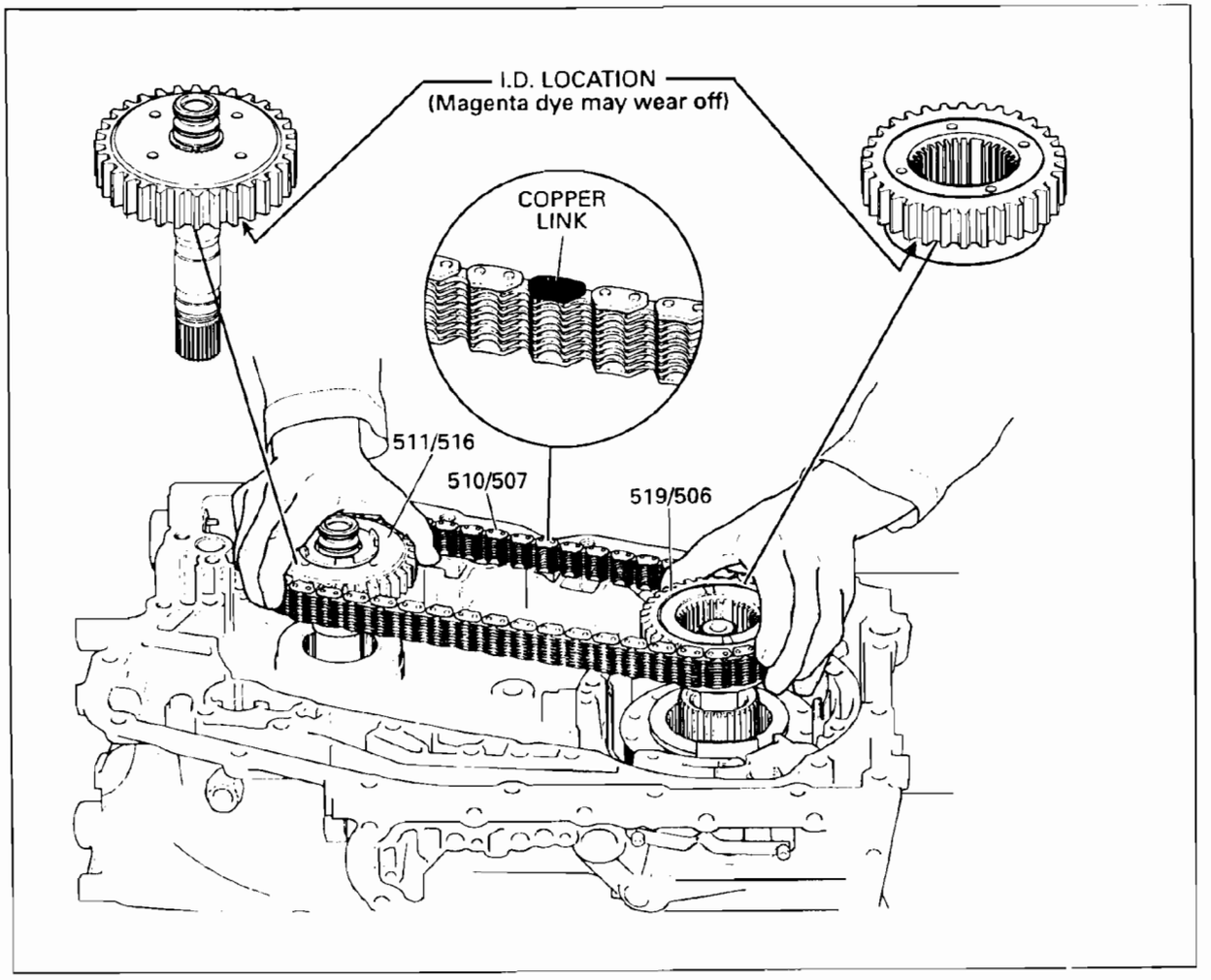

I.D. LOCATION
(Magenta dye may wear off)
COPPER
LINK
511/516
510/507
519/506

Figure 51

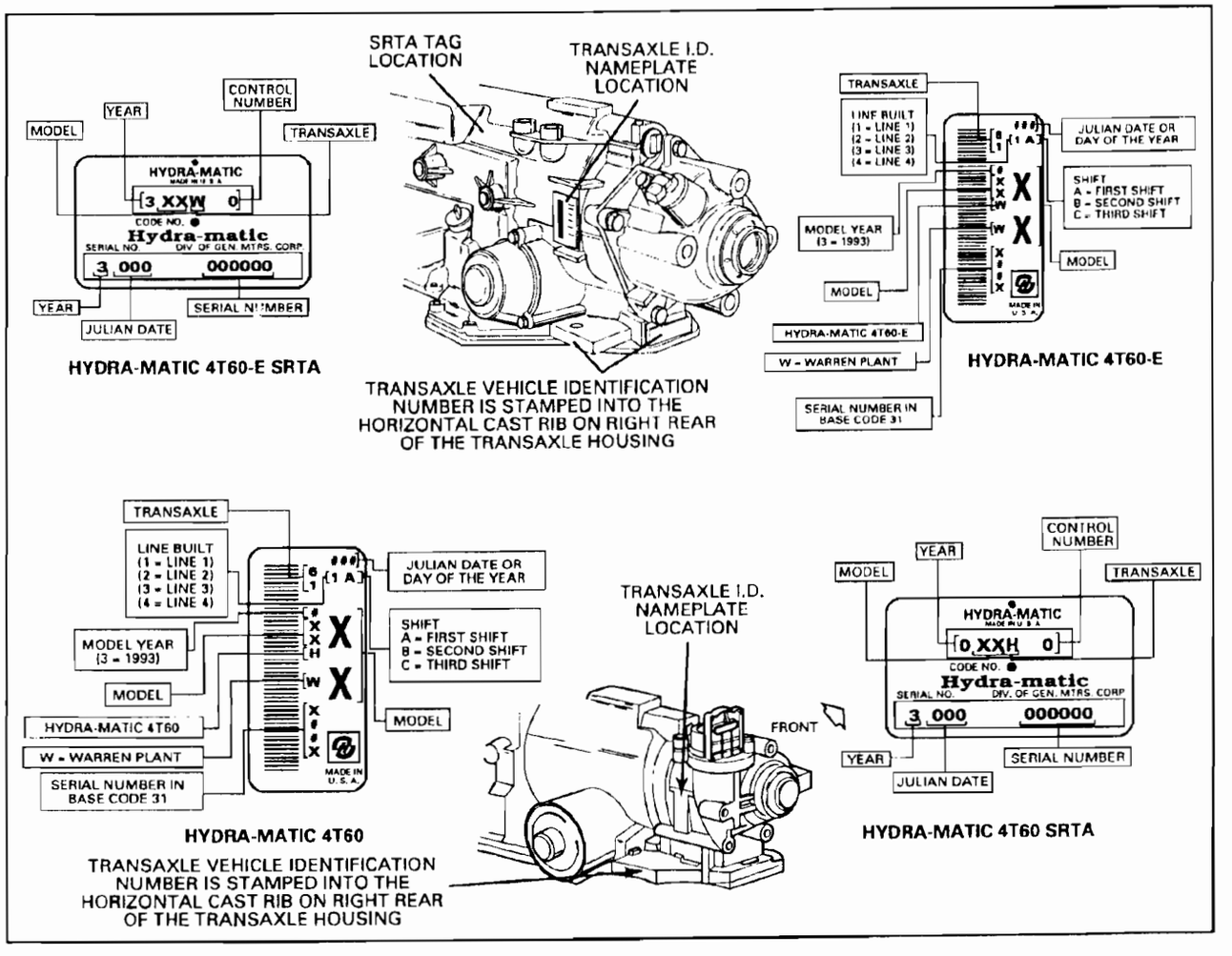

SRTA TAG LOCATION
TRANSAXLE I.D. NAMEPLATE LOCATION
MODEL
YEAR
CONTROL NUMBER
TRANSAXLE
HYDRA-MATIC
3 XXW 0
CODE NO.
Hydra-matic
SERIAL NO.
DIV. OF GEN. MTRS. CORP.
3 000 000000
YEAR
SERIAL NUMBER
JULIAN DATE
HYDRA-MATIC 4T60-E SRTA
TRANSAXLE VEHICLE IDENTIFICATION NUMBER IS STAMPED INTO THE HORIZONTAL CAST RIB ON RIGHT REAR OF THE TRANSAXLE HOUSING
TRANSAXLE
LINE BUILT
(1 = LINE 1)
(2 = LINE 2)
(3 = LINE 3)
(4 = LINE 4)
JULIAN DATE OR DAY OF THE YEAR
SHIFT
A = FIRST SHIFT
B = SECOND SHIFT
C = THIRD SHIFT
MODEL YEAR
(3 = 1993)
MODEL
HYDRA-MATIC 4T60-E
W = WARREN PLANT
SERIAL NUMBER IN BASE CODE 31
HYDRA-MATIC 4T60-E
TRANSAXLE
LINE BUILT
(1 = LINE 1)
(2 = LINE 2)
(3 = LINE 3)
(4 = LINE 4)
JULIAN DATE OR DAY OF THE YEAR
SHIFT
A = FIRST SHIFT
B = SECOND SHIFT
C = THIRD SHIFT
MODEL YEAR
(3 = 1993)
MODEL
HYDRA-MATIC 4T60
W = WARREN PLANT
SERIAL NUMBER IN BASE CODE 31
HYDRA-MATIC 4T60
TRANSAXLE I.D. NAMEPLATE LOCATION
FRONT
CONTROL NUMBER
YEAR
MODEL
TRANSAXLE
HYDRA-MATIC
0 XXH 0
CODE NO.
Hydra-matic
SERIAL NO.
DIV. OF GEN. MTRS. CORP.
3 000 000000
YEAR
SERIAL NUMBER
JULIAN DATE
HYDRA-MATIC 4T60 SRTA
TRANSAXLE VEHICLE IDENTIFICATION NUMBER IS STAMPED INTO THE HORIZONTAL CAST RIB ON RIGHT REAR OF THE TRANSAXLE HOUSING

Figure 52

THE ALTO ALTERNATIVE

Complaint	*Solution*
TH 700R4 3-4 CLUTCH DISTRESS / BURN UP	ALTO 3-4 CLUTCH COMMERCIAL KIT
AOD DIRECT CLUTCH DISTRESS / BURN UP	ALTO AOD DIRECT CLUTCH COMMERCIAL KIT
TH 440-T4 2ND CLUTCH DISTRESS / BURN UP	ALTO TH 440-T4 2ND CLUTCH COMMERCIAL KIT
TH 440-T4 ACCELERATED WEAR OF 4TH SHAFT	ALTO TH 440-T4 "BENT TOOTH" REPAIR KITS
TH 700R4 PUMP SEAL WALKOUT	ALTO SEAL RETAINER
E4OD DELAYED REVERSE ENGAGEMENT CAUSED BY EXCESSIVE CLUTCH FILL VOLUME	ALTO CLUTCH CLEARANCE KIT

ALTO® ***... THE FIRST AND LAST NAME IN CLUTCHES***

ALTO PRODUCTS CORP. • PHONE: (908) 249-3633 • FAX: (908) 745-7774

THM 4T60-E

1-2 ROLLER CLUTCH FAILURE

COMPLAINT: NO. 1:
Some 1991-1993 models equipped with the THM 4T60-E transaxle may exhibit a no movement condition, with the selector lever in the D4 or D3 ranges, but will move when the selector lever is placed into D2 or Lo range.

NO. 2:
When the engine RPM is increased with the selector lever in the Park and/or Neutral position, you may hear a noise that sounds like "Marbles in a Can", but still moves and shifts properly.

CAUSE: The cause for both complaints listed above is a 1-2 roller clutch failure. (See Figure 53)

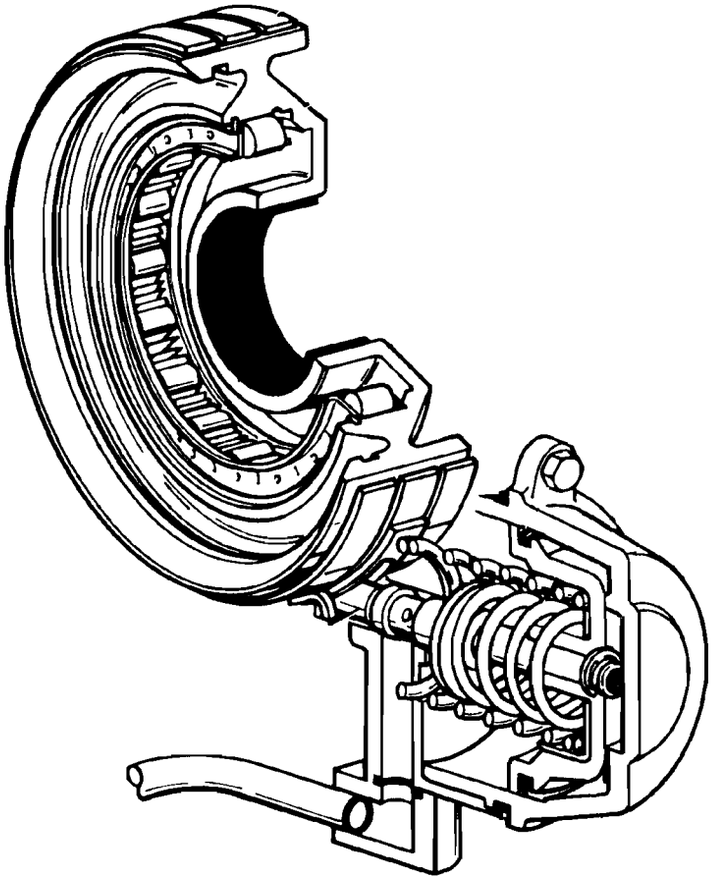
CORRECTION: Replace the 1-2 Roller Clutch Assembly and any related parts that may be damaged or broken.

WARNING: DO NOT EXCEED 3000 RPM WITH THE SELECTOR LEVER IN REVERSE AND THE WHEELS OFF OF THE GROUND.

IF YOU DO THIS, YOU CAN FAIL THE 1-2 ROLLER CLUTCH BEFORE IT EVER LEAVES THE SHOP!

THM 4T60-E

1-2 ROLLER CLUTCH ASSEMBLY



WARNING: DO NOT EXCEED 3000 RPM WITH THE SELECTOR LEVER IN REVERSE AND THE WHEELS OFF OF THE GROUND.

IF YOU DO THIS, YOU CAN FAIL THE 1-2 ROLLER CLUTCH BEFORE IT EVER LEAVES THE SHOP!

Figure 53

SNAP-ON MT 2500 SCANNER

MAIN MENU
I - FUNCTION TEST
II - CUSTOM SETUP
III - OTHER MODULES
IV - CODES & DATA

I - FUNCTION TEST
1. ATM
2. RPM
3. CVI

1 - ATM - SCROLL TO SELECT TEST
A - CYCLE L/R SOLENOID
B - CYCLR 2/4 SOLENOID
C - CYCLE UD SOLENOID
D - CYCLE OD SOLENOID

2 - RPM

ENGINE RPM	XXX	TPS ANGLE	XX
OUTPUT RPM	XXX	GEAR	XX
TURBINE RPM	XXX	PRNODDL	X

3 - CVI

L/R CLUTCH	49	OD CLUTCH	85'
2/4 CLUTCH	43	UD CLUTCH	45

II - CUSTOM SET-UP
1. ENGLISH/METRIC
2. COMMUNICATION SET-UP
A - SNAP ON MT 1670 PRINTER BAUD
B - 4800 BAUD
C - 1200 BAUD
D - 300 BAUD

III - OTHER MODULES
A - SCANNING
1 - TRANSAXLE
2 - BODY COMPUTER
3 - MECHNICAL CLUSTER

IV - CODES & DATA

ENGINE RPM	XXX	GEAR	XX
CODES & DATA		OK TO DRIVE	
36 EXPLANATION			
51 EXPLINATION			
OUTPUT RPM	XXX	IGNITION	XXX
TURBINE RPM	XXX	PRNODDL	XXX
TPS (V)	XXX	TPS ANGLE	XXX
TCC LOCKED	XXX	PT # 04682068	
LIMP-IN	XXX	OD PRESSURE SWITCH	XXX
L/R PRESSURE SWITCH	XXX	2/4 PRESSURE SWITCH	XXX
NEUTRAL SWITCH 1	XXX	NS 2	XXX
REVERSE LIGHT 1	XXX	RL 2	XXX
J2 CIRCUIT	XXX	SWITCHED BATTERY	XXX
VERSION 0.9			

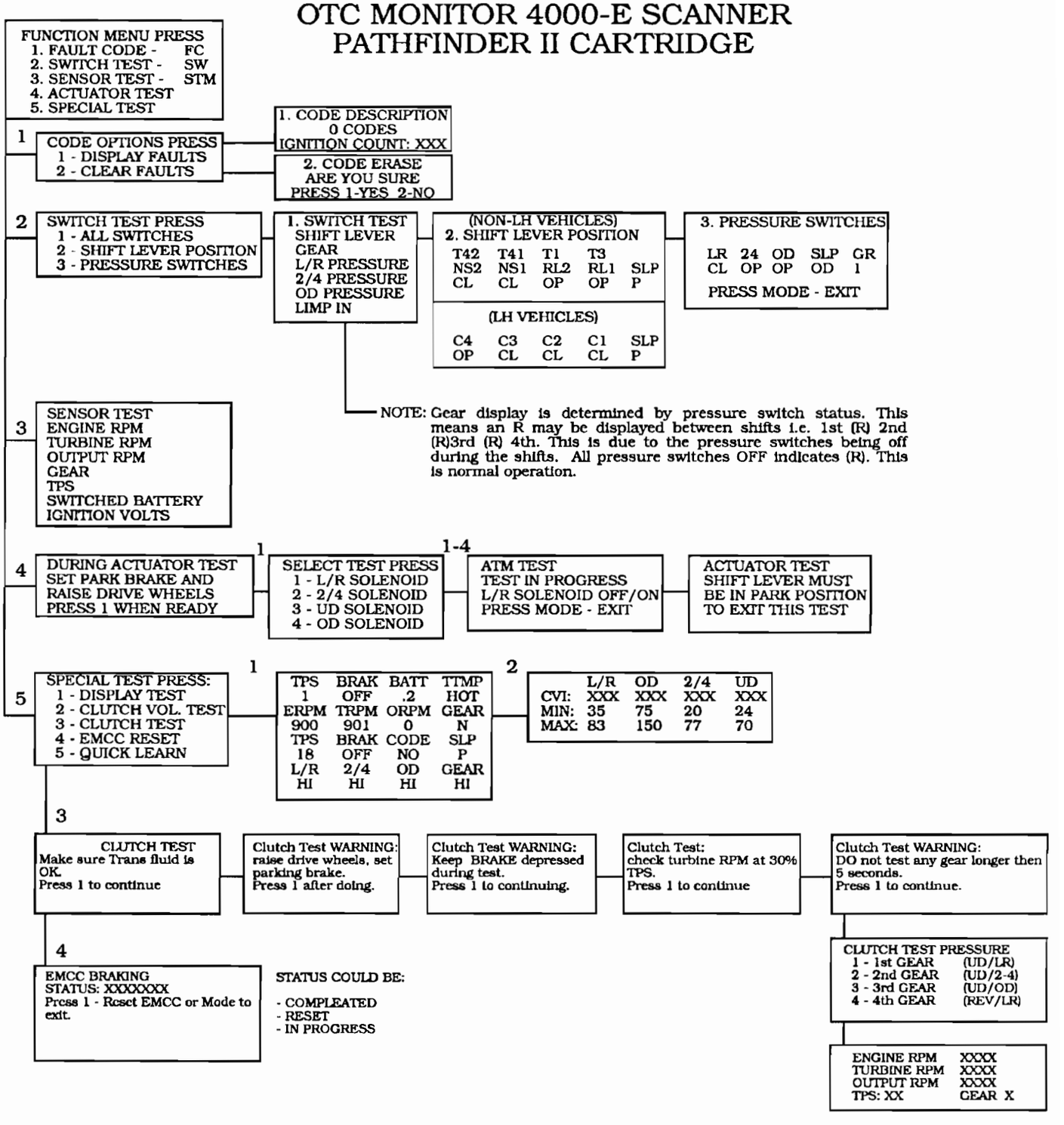
PRESS "Y" AND ENGINE RPM HOLDS

PRESS "N" AND

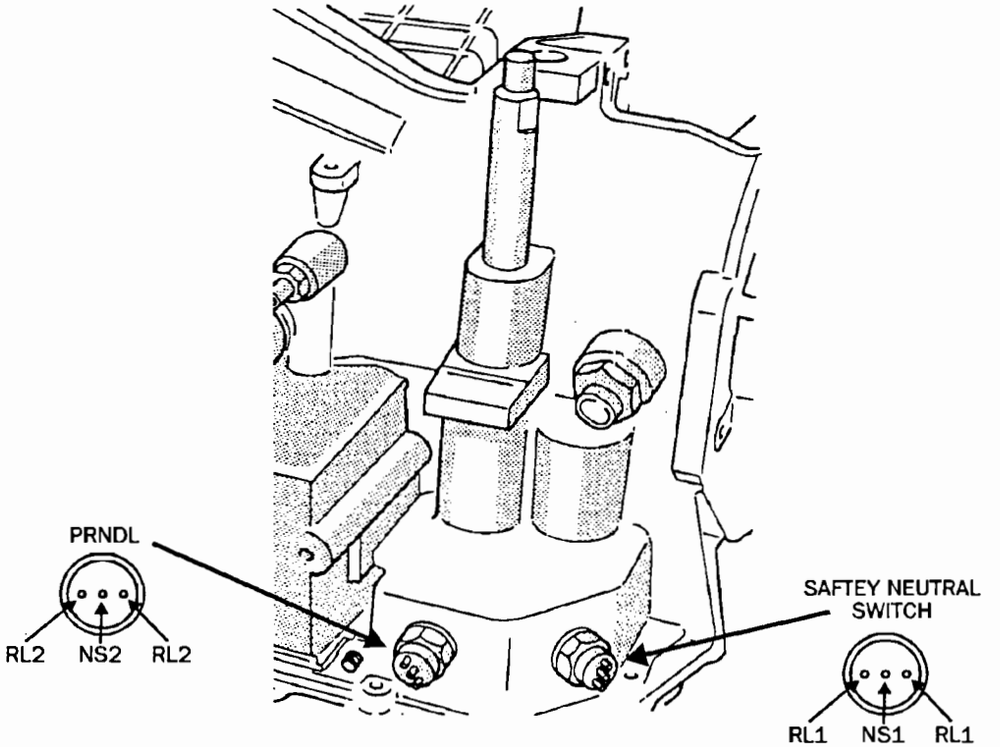
1. PRINT SCREEN
2. PRINT FRAME
3. ARM MOVIE
4. CLEAR CODE
5. FIX LINE 2

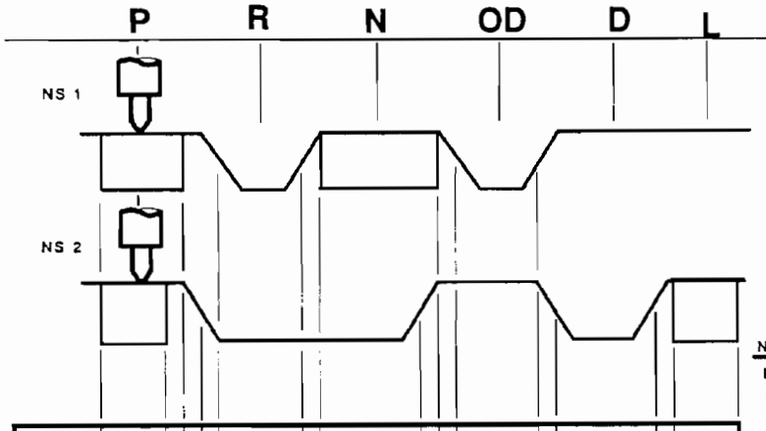
[PRESS "N" FOR MAIN MENU]

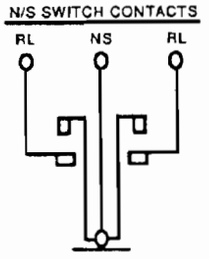
OTC MONITOR 4000-E SCANNER
PATHFINDER II CARTRIDGE



PRNDL AND SAFETY NEUTRAL SWITCH TEST SCANNERS







NS 1	CLOSED	C	O	O	OPEN	O	CLOSED	C	O	OPEN	O	OPEN	O	OPEN
RL 1	OPEN	O	O	O	CLOSED	O	OPEN	O	O	CLOSED	O	OPEN	O	OPEN
NS 2	CLOSED	O	O	O	OPEN	O	OPEN	O	O	OPEN	O	OPEN	O	CLOSED
RL 2	OPEN	O	O	C	CLOSED	C	CLOSED	O	O	OPEN	O	CLOSED	O	OPEN
CODE	P	T1	T2	D	R	D	N	T1	T2	OD	T2	D	T2	L

T1, T2 TRANSITION CODES.
AN "I" OR "?" WILL APPEAR ON SCANNERS IF INVALID COMBINATION OCCURS.

Figure 55

PRNDL AND SAFETY NEUTRAL SWITCH TEST (METER CHECK)

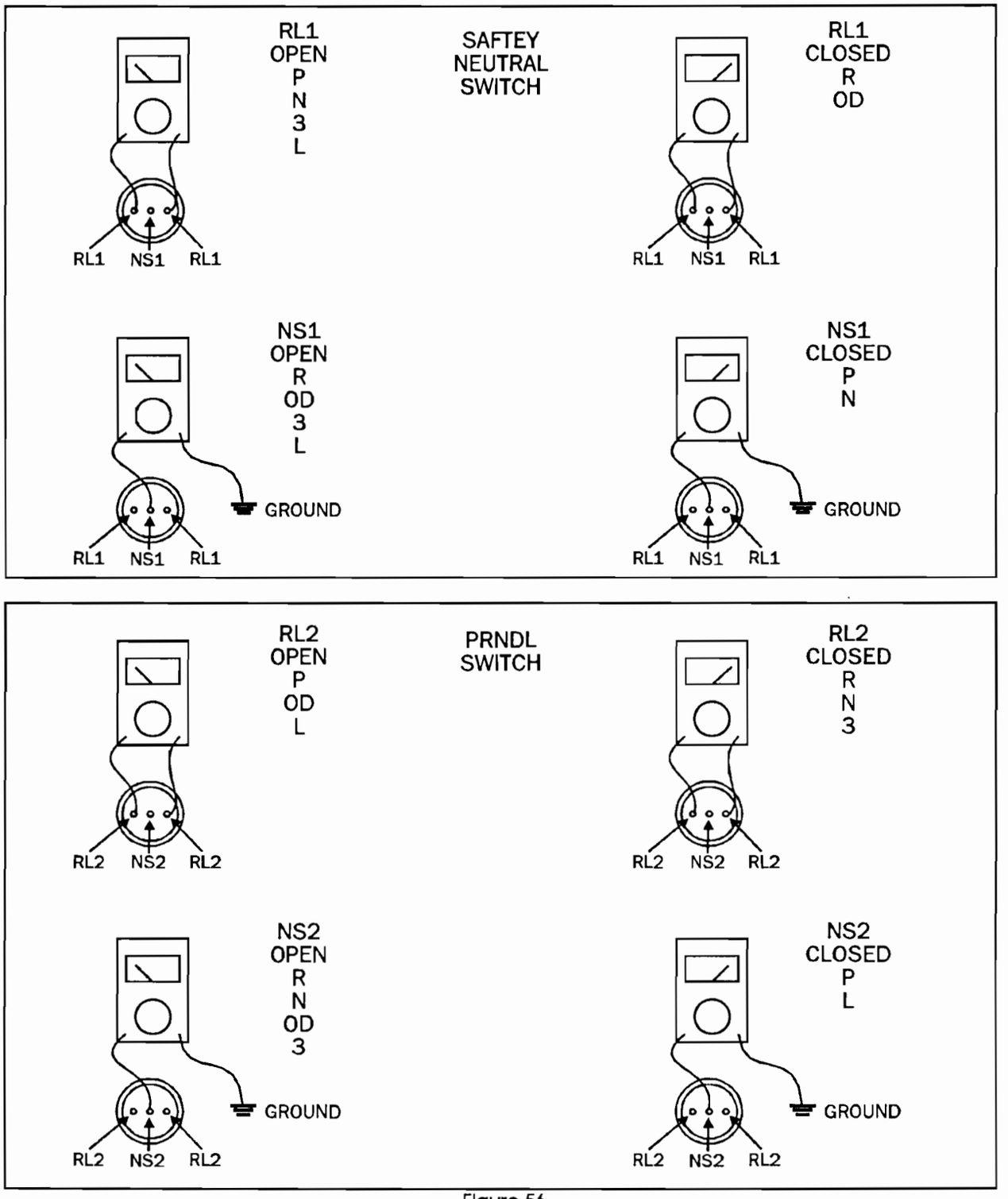


Figure 56

A604

Final Drive Changes

Change: In 1991, Chrysler changed the pitch on the transfer gears from 27.5 degrees to 32 degrees in order to reduce a whining concern. See figure 57. An easy way to identify the two different gear sets is that the previous 27.5 degree gear has a step machined into the face of the gear. The 32 degree gear has a flat face instead of a stepped face, see figure 58. These gears will not interchange individually as an improper mesh will occur. With the 32 degree gear now having a flat face, the length of the splines on the output shaft on the rear carrier changed from 1" in length to 1 1/8" in length as shown in figure 59.

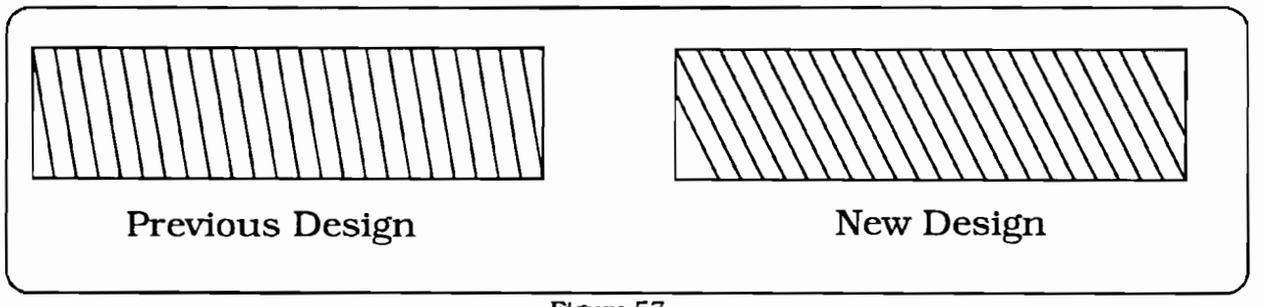


Figure 57

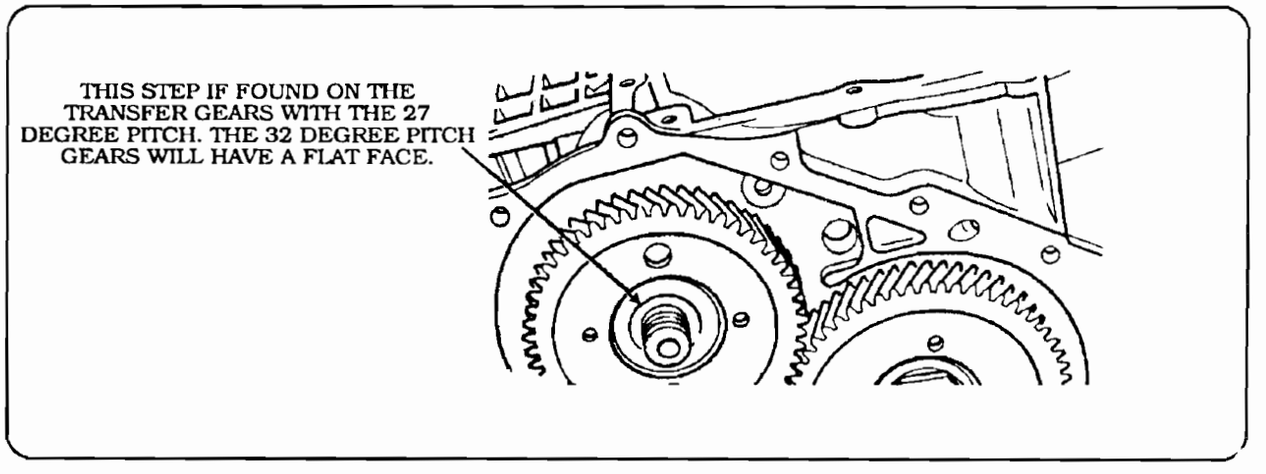


Figure 58

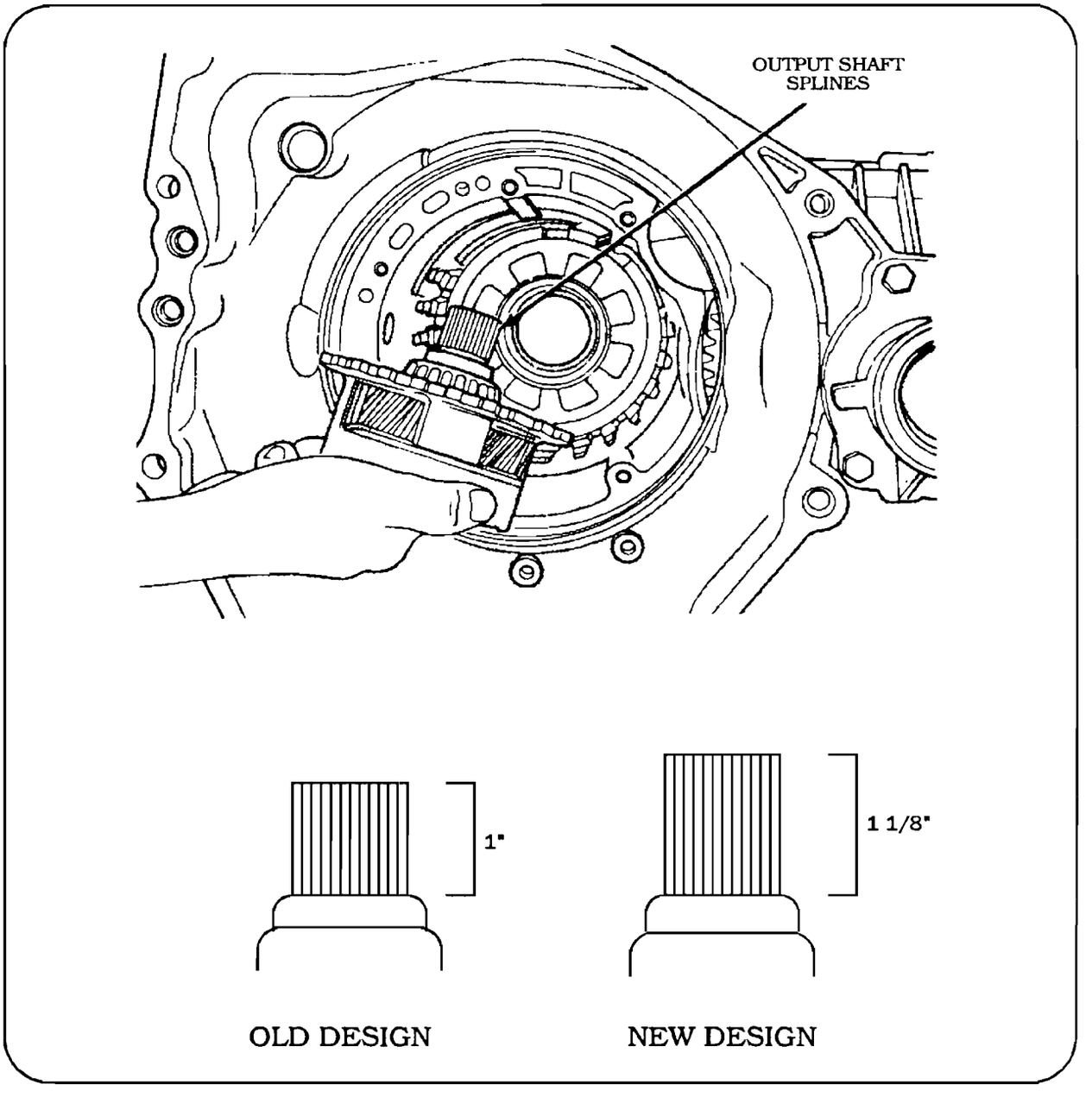


Figure 59

Transfer Shaft Change

Change: Starting in July of 1990 and all 1991 and up production, the transfer shaft was re-designed and made thicker. This was done because some of the earlier transfer shafts were showing signs of torsional deflection under load in lab tests. There were no field failures for this condition. See figure 60.

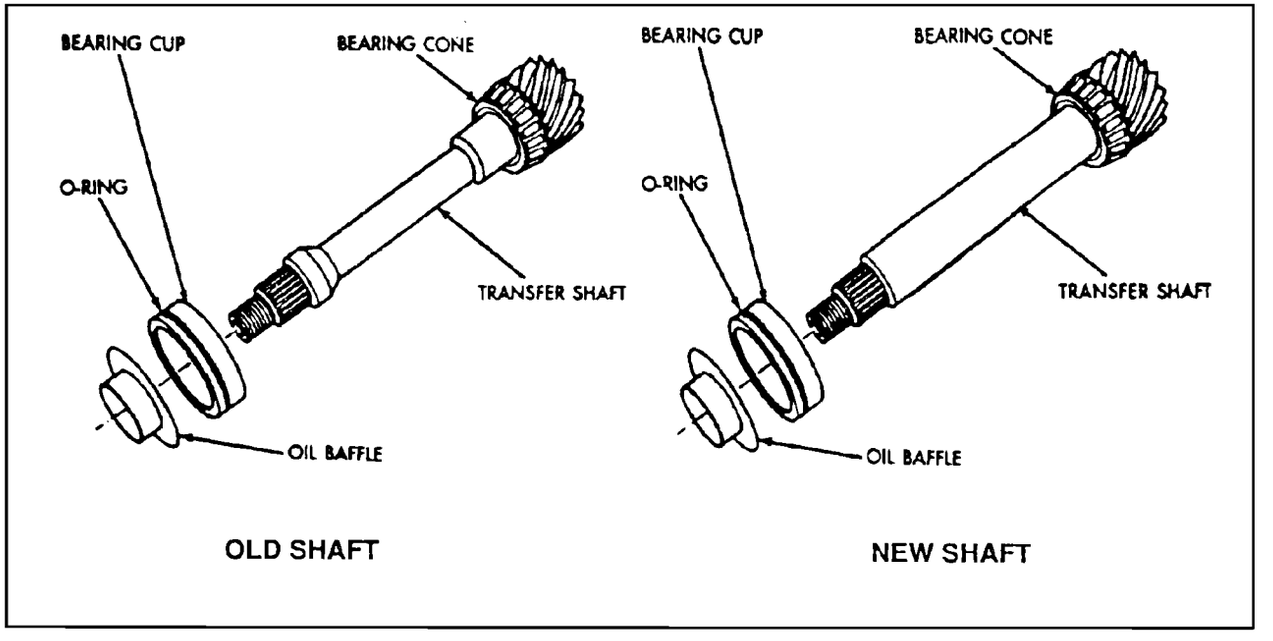


Figure 60

Chrysler increased the thickness of the output shaft bolt head from approximately .250 to .3125 (Figure 61). This necessitated an extended transfer gear cover to accomodate the thicker head bolt (Figure 62).

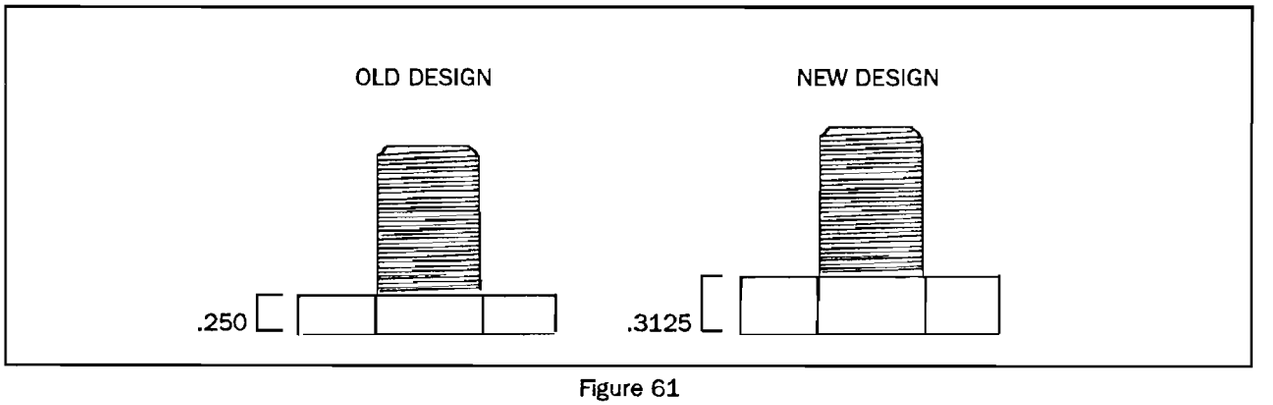
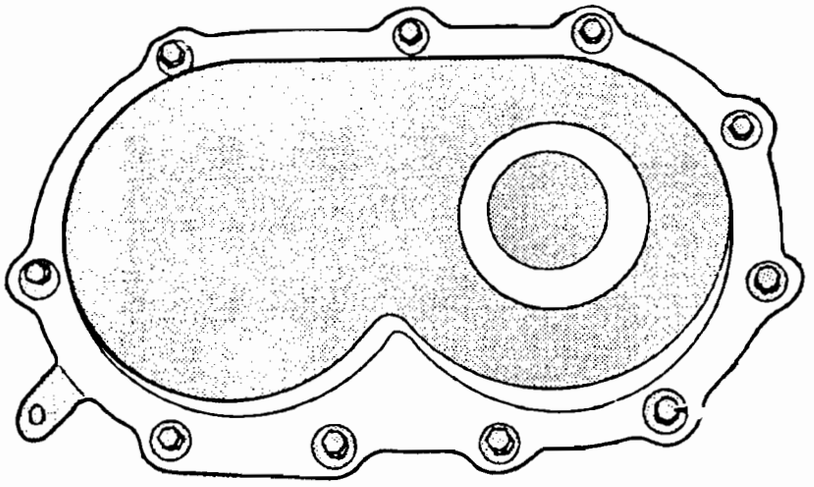
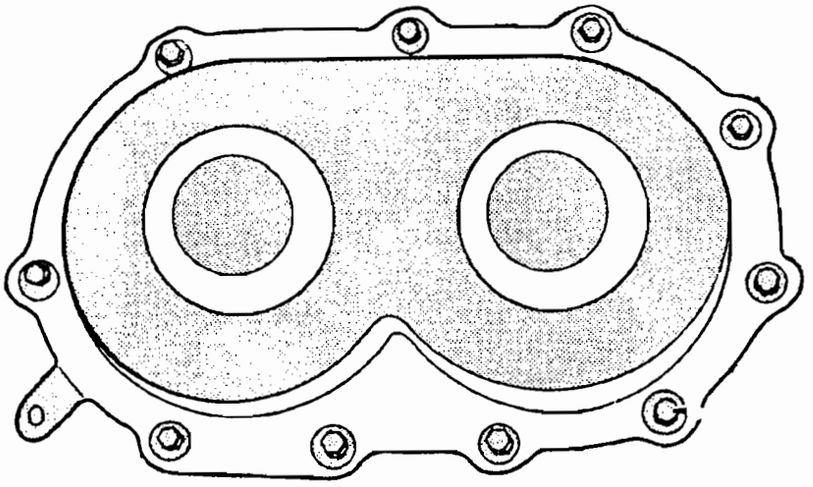


Figure 61

OLD DESIGN



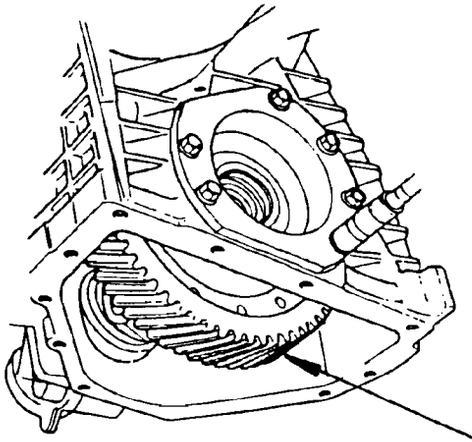
NEW DESIGN

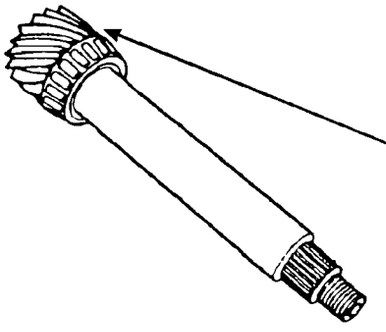


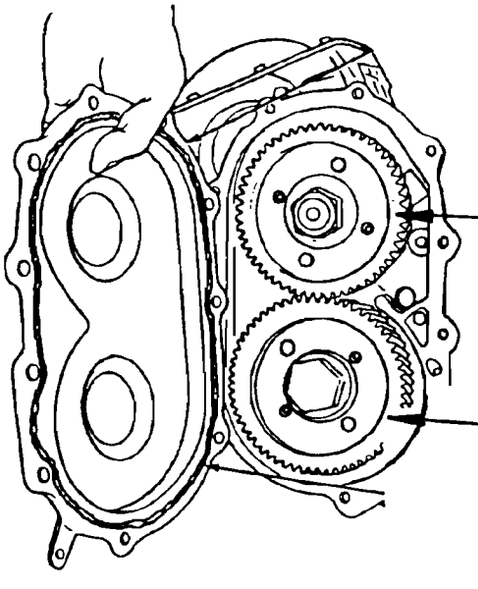
NOTE: THE NEW DESIGN EXTENDED COVER WILL RETRO-FIT BACK TO EARLY MODELS.

Figure 62

32° TRANSFER GEARS







OUTPUT SHAFT GEAR	TRANSFER SHAFT GEAR	TRANSFER SHAFT	RING GEAR	OVERALL GEAR RATIO
47T 4567380	49T 4567377	17T 4377126	59T 4431655	2.49
50T 4567374	46T 4567371	16T 4377128	60T 4431660	2.38
50T 4567374	46T 4567371	17T 4377126	59T 4431655	2.29

DIFFERENTIAL ASSY'S - MATCHED SETS	
4431657	17/59
4431658	16/60
4531999	16-60 4WD

Figure 63

CHRYSLER A604

UNDERDRIVE/OVERDRIVE REACTION PLATE TAPERD SNAP RING BREAKING

COMPLAINT: The color coded taperd snap ring that goes on top of the Underdrive/ Overdrive reaction plate, in the input housing, is found broken and usually in many pieces (see figure 64).

CAUSE: Snap ring not thick enough.

CORRECTION: Install "Updated" (Thicker) taperd snap ring, and the "Updated" Underdrive/Overdrive reaction plate. THESE TWO PIECES MUST BE INSTALLED TOGETHER. Neither part is compatable with the previous parts. These parts will retro fit back on previous model vehicles WITH THE 4 OVERDRIVE PACK ONLY.

SERVICE INFORMATION:

Underdrive/Overdrive Reaction Plate (Updated Selective)

.215"-.219" Thickness	4723684
.234"-.238" Thickness	4723683
.253"-.257" Thickness	4723682
.273"-.277" Thickness	4723681

Note: The part numbers listed above INCLUDES THE UPDATED TAPERED SNAP RING. If you need just the updated snap ring, the part number is 4567602. This change was implemented at the start for all 1993 model A604 transaxle.

FOR IDENTIFICATION OF THE INDIVIDUAL PARTS THAT YOU MAY HAVE ON YOUR SHELF, SEE FIGURE 65.

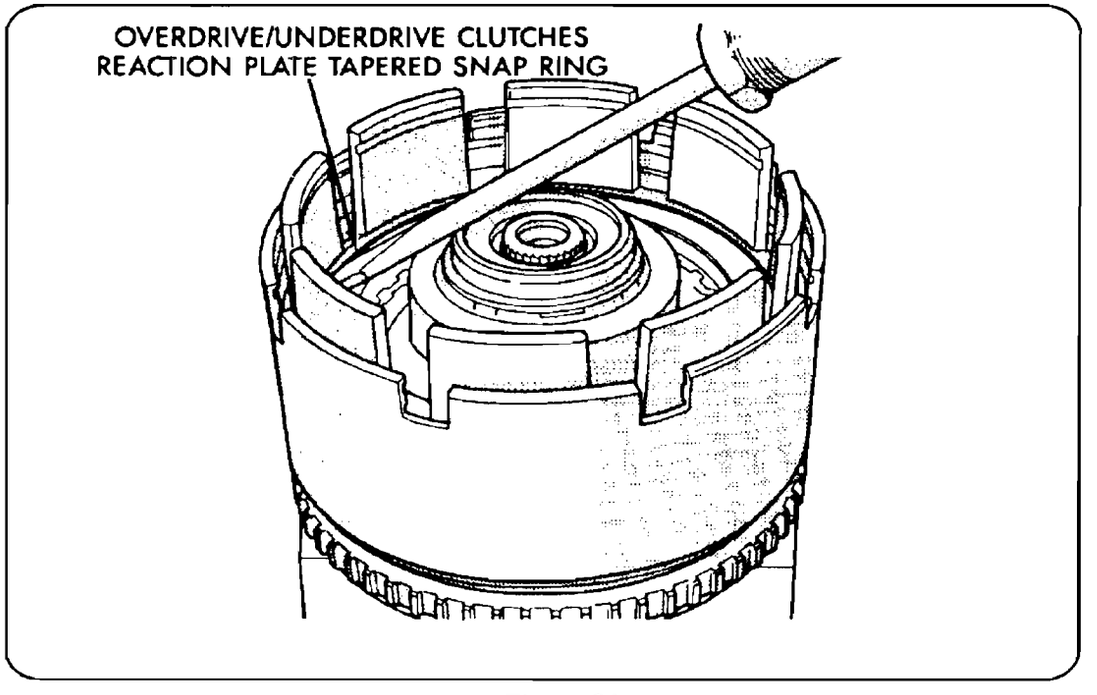
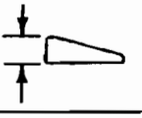


Figure 64

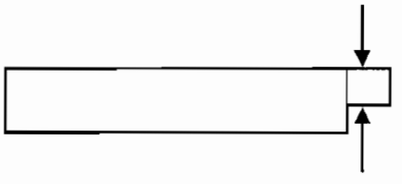
UNDERDRIVE/OVERDRIVE TAPERED SNAP RING IDENTIFICATION

THICKNESS	COLOR CODE	APPLICATION	PART NO.
.060"	BLUE	3 O.D. PLATE ONLY	4377189
.070"	GREEN/WHITE	4 O.D. PLATE ONLY	4531411
.075"	BLACK	4 O.D. PLATE ONLY	4567640

MEASURE SNAP RING ACROSS THE THICKEST DIMENSION AS SHOWN AT RIGHT.

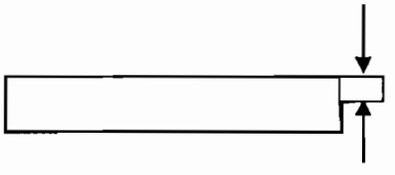


UNDERDRIVE/OVERDRIVE REACTION PLATE MEASURE THICKNESS OF LONGEST TANGS FOR IDENTIFICATION



.196" THICK = 3 OD PLATE ONLY

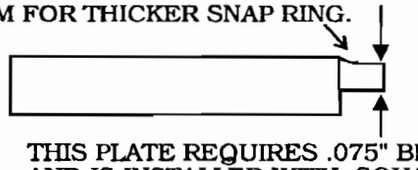
THIS PLATE REQUIRES .070" TAPERED SNAP RING, AND IS INSTALLED WITH STEP FACING DOWN.



.156" THICK = 4 OD PLATE ONLY

THIS PLATE REQUIRES .060" GREEN/WHITE TAPERED SNAP RING, AND IS INSTALLED WITH STEP FACING DOWN.

RADIUSED UNDERCUT TO MAKE ROOM FOR THICKER SNAP RING.



.141" THICK = 4 OD PLATE ONLY

THIS PLATE REQUIRES .075" BLACK TAPERED SNAP RING, AND IS INSTALLED WITH SQUARE STEP FACING DOWN.

THE "UPDATED" BLACK SNAP RING AND THE "UPDATED" UNDERCUT REACTION PLATE WILL RETRO FIR BACK ON 4 O.D. PLATES ONLY.

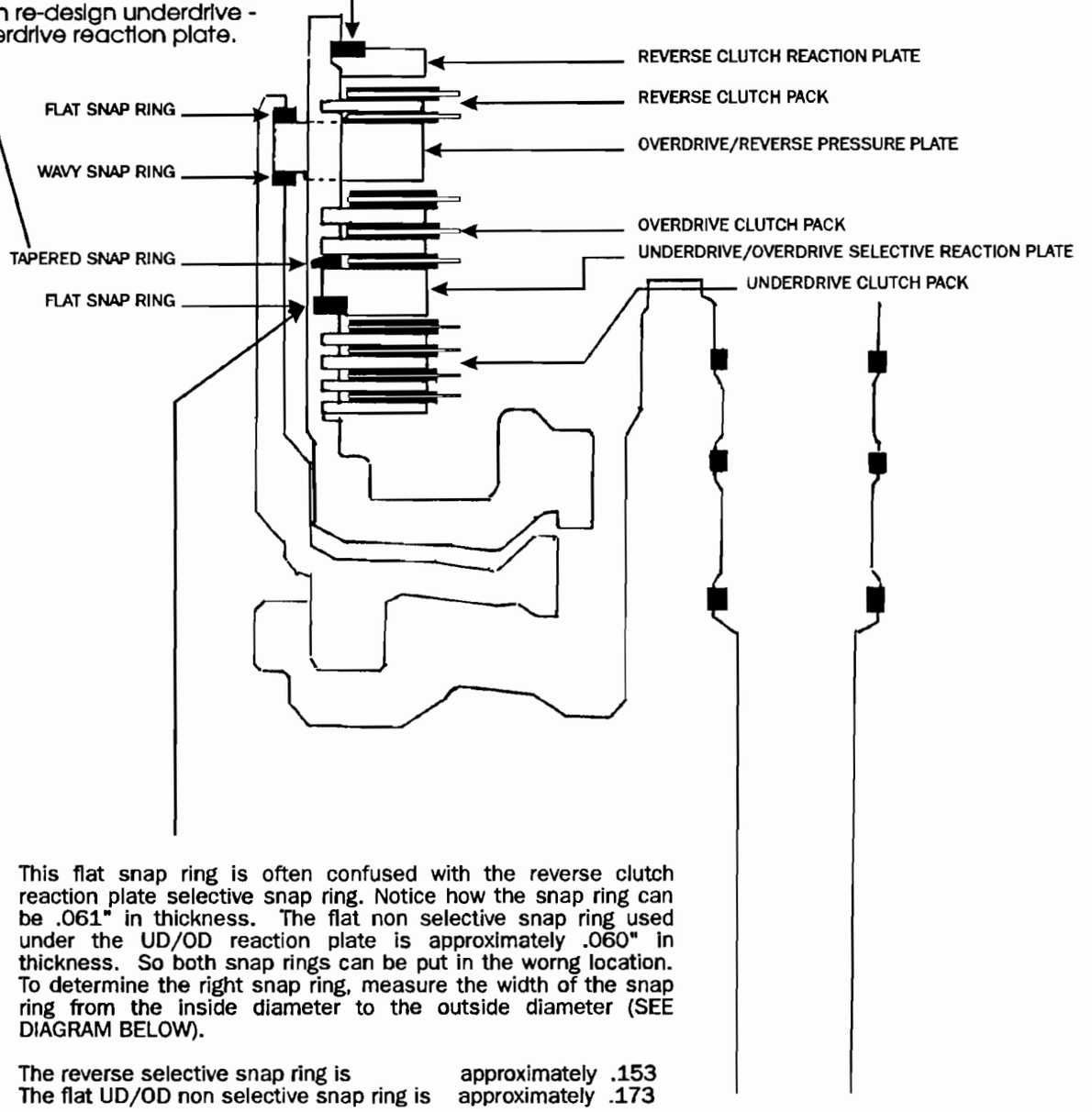
Figure 65

INPUT CLUTCH DRUM SNAP RING LOCATION

.070" Blue for 3 friction OD drum.
.060" Green or white for 4 friction OD drum.
.075" Black for 4 friction OD drum with re-design underdrive - overdrive reaction plate.

Reverse Clutch Reaction plate snap ring (flat selective). There are 4 selective snap rings to adjust the reverse clutch pack. The reverse clutch pack should be .030" to .039". These are your selective snap rings.

PART NUMBER	THICKNESS
4377195	.061
4412871	.071
4412872	.081
4412873	.090



This flat snap ring is often confused with the reverse clutch reaction plate selective snap ring. Notice how the snap ring can be .061" in thickness. The flat non selective snap ring used under the UD/OD reaction plate is approximately .060" in thickness. So both snap rings can be put in the worng location. To determine the right snap ring, measure the width of the snap ring from the inside diameter to the outside diameter (SEE DIAGRAM BELOW).

The reverse selective snap ring is approximately .153
The flat UD/OD non selective snap ring is approximately .173

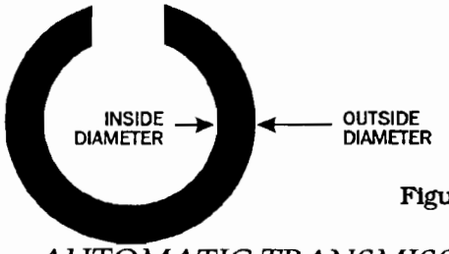


Figure 66

OVERDRIVE / REVERSE PISTON

A running change on the Overdrive/Reverse piston took place in 1991 where the two top snap ring grooves are located (See Figure 67). The removal of the drum material between the two snap rings prevents the overdrive/reverse pressure plate from binding up in the drum (See Figure 68). The assembly of the pressure plate and snap rings has not changed. The wavy snap ring goes down first, then the overdrive/reverse pressure plate is installed (lip down) with the flat snap ring on top.

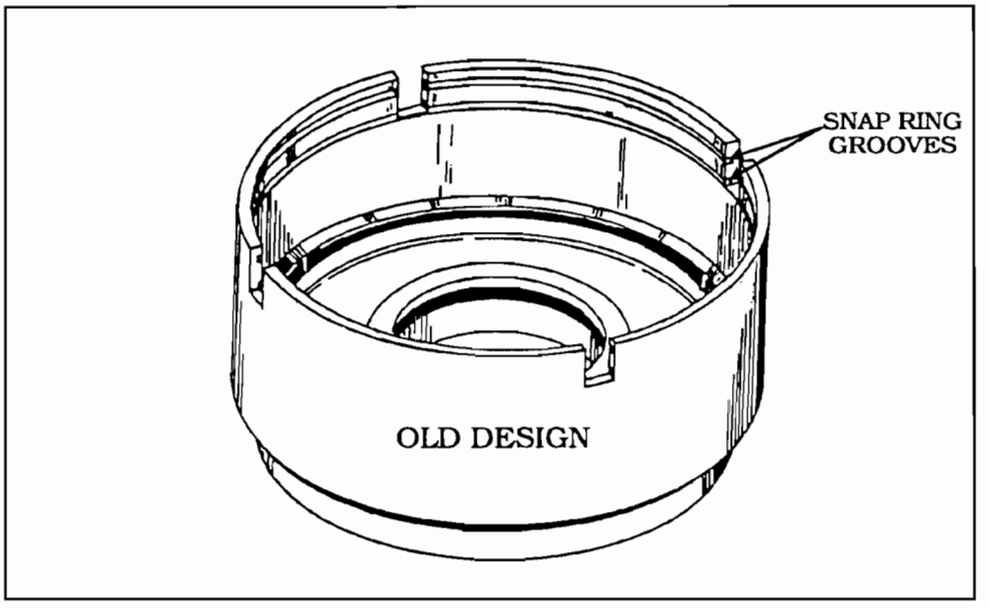


Figure 67

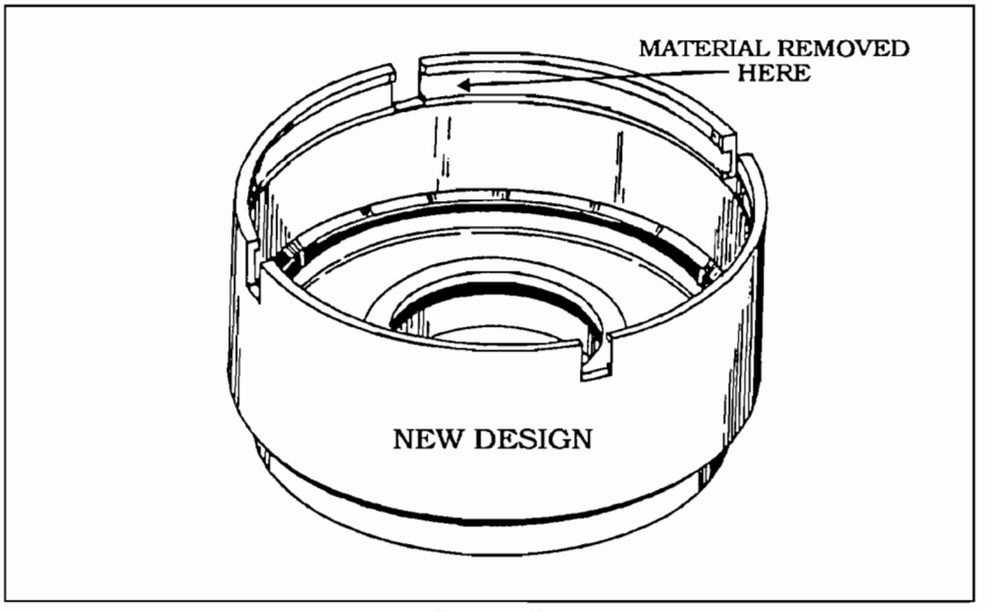


Figure 68

CHRYSLER A604

VALVE BODY CHANGES

CHANGE NO. 1:
Beginning at the start of production 1992 on all A604 transaxles, there is a completely different (2nd Design) valve body assembly.

CHANGE NO. 2:
Beginning at the start of production 1993 on all A604 transaxels, there is another completely different (3rd Design) valve body assembly.

REASON FOR CHANGE NO. 1:
The 1992 (2nd Design) valve body assembly, along with the appropriate software, allows "Partial Lock-up" of the torque converter clutch in 3rd or 4th gear depending on conditions. This change is for improved driveability and fuel economy.

REASON FOR CHANGE NO. 2:
The 1993 (3rd Design) valve body assembly reduces a reverse "Buzz" complaint.

PARTS AFFECTED BY CHANGE NO. 1:

(1) VALVE BODY CASTING - 2nd design required machining and casting changes to accommodate new lock-up valve and torque converter control valve components. For positive identification, 2nd design valve body casting number is 4511644, and the previous (1st Design) valve body casting number is 4446639. (See Figures 74 and 75).

(2) TRANSFER PLATE - 2nd design required machining and casting changes to accommodate new lock-up valve and torque converter control valve components. For positive identification, 2nd design transfer plate casting number is 4511645, and the previous (1st Design) transfer plate casting number is 4446640 (See Figures 76 and 77).

(3) TORQUE CONVERTER CONTROL VALVE - 2nd design valve is made of aluminum instead of steel, and the land configuration is different than 1st design (See Figures 69 and 70).

(4) TORQUE CONVERTER CONTROL VALVE SPRING - 2nd design is calibrated different than 1st design.

(5) VALVE BODY SPACER PLATE - 2nd design is identified with "46" stamped in the plate and 1st design being identified with "33" stamped in the plate. 2nd design "46" plate is TOTALLY different to accommodate new TCC control valve and casting changes (See Figures 71 and 72).

(6) VALVES, PLUGS AND SLEEVES - Made of aluminum replacing most of the current steel components. The P.R. Valve is still made of steel.

(Continued on following page).

PARTS AFFECTED BY CHANGE NO. 2:

(1) TORQUE CONVERTER CONTROL VALVE - 3rd design valve has two lands machined .020" thicker than the previous, and has a "Groove" cut into the stem for I.D. (See Figure 70).

(2) TORQUE CONVERTER CONTROL VALVE SPRING - Calibration changes to accommodate the new design TCC valve.

(3) VALVE BODY SPACER PLATE - 3rd design is identified with "96" stamped into the plate and the 2nd design is identified with "46" stamped in plate. The 3rd design "96" spacer plate has calibration changes to accommodate the new TCC control valve. (See Figure 73).

INTERCHANGEABILITY:

1st design parts and 2nd design parts ARE NOT INTERCHANGEABLE AND WILL CAUSE FUNCTIONAL PROBLEMS.

2nd design parts and 3rd design parts will fit, but WILL cause calibration and/or noise problems.

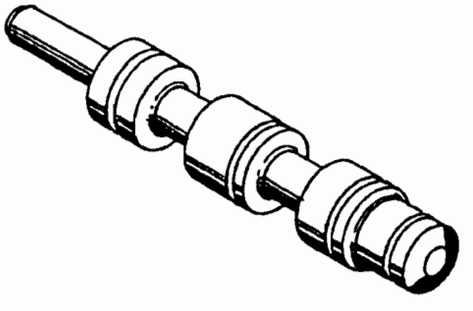
3rd design complete valve body assembly will fit all previous model transaxels regardless of whether the software (Computer) changes was made or not. If the software (Computer) update was not made then the valve body will perform just like the previous version.

SERVICE INFORMATION:

Valve Body Assembly (3rd Design).....4659044

NOTE: This valve body assembly will reduce reverse "Buzz".

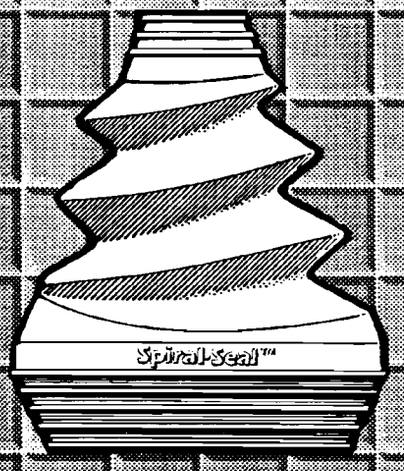
TORQUE CONVERTER CONTROL VALVE



1ST DESIGN

Figure 69

THE NEXT GENERATION C.V. BOOT



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  - Circulates Grease
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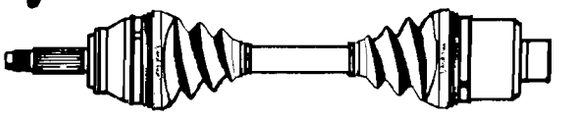

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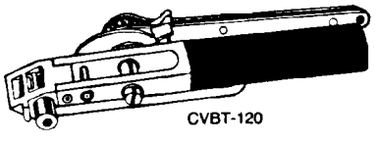
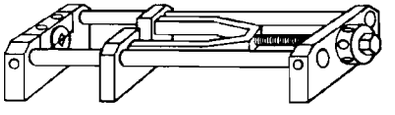
BAND STRAP DELUXE TOOL
(w/RACHET and CUTTER)



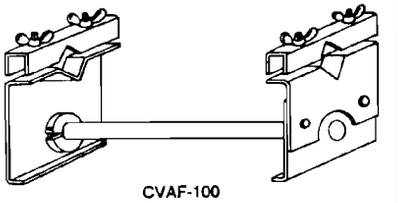
CVBT-120

C.V JOINT PULLER



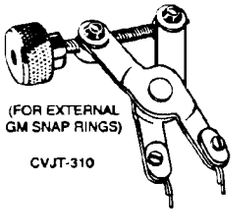
CVJP-200

C.V ASSEMBLY FIXTURE



CVAF-100

GM C-CLIP EXPANDER

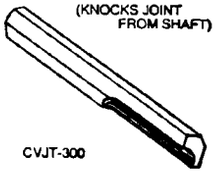


(FOR EXTERNAL GM SNAP RINGS)

CVJT-310

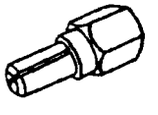
"RACE" IMPACT DRIVER TOOL

(KNOCKS JOINT FROM SHAFT)



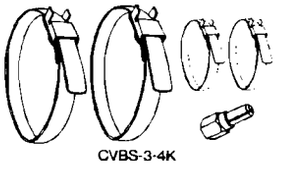
CVJT-300

BAND STRAP THROW-AWAY TOOL™



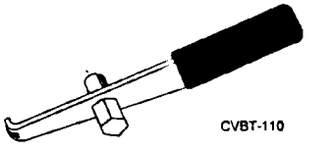
CVBT-100

BAND STRAP CLAMP KIT
INCLUDES: 2 STAINLESS STEEL (19") & 2 (10") CLAMPS AND THROW-AWAY-TOOL™



CVBS-3-4K

BAND STRAP STANDARD TOOL



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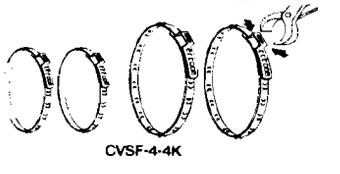
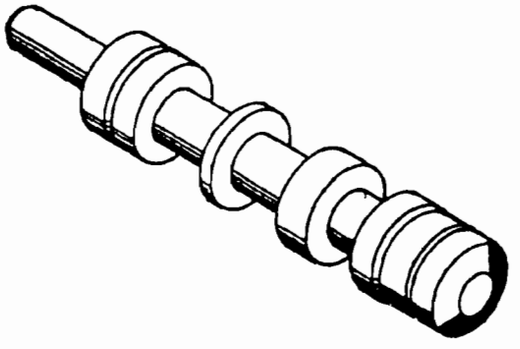


CVSF-4-4K

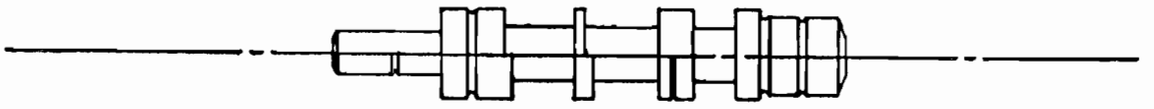
SPIRAL TECH, INC. 2031 SW 70 Avenue, #C4 Davie, FL 33317 U.S.A.

CHRYSLER A604

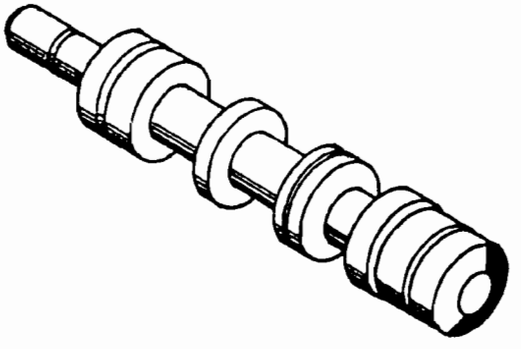
T/C CONTROL VALVE CHANGES (TO REDUCE REVERSE BUZZ)



2ND DESIGN



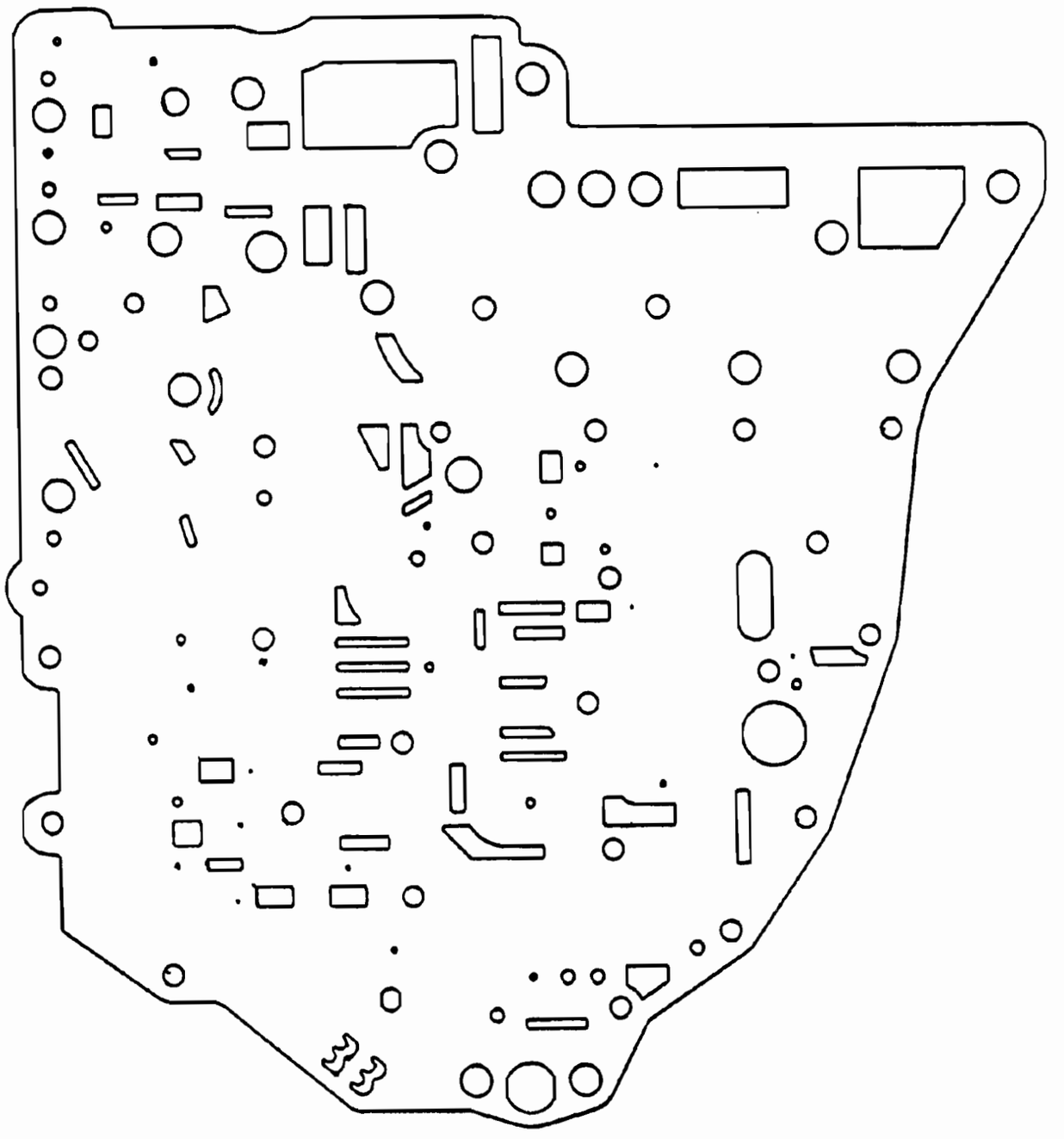
3RD DESIGN



1ST DESIGN USES "33" SPACER PLATE
2ND DESIGN USES "46" SPACER PLATE
3RD DESIGN USES "96" SPACER PLATE

Figure 70

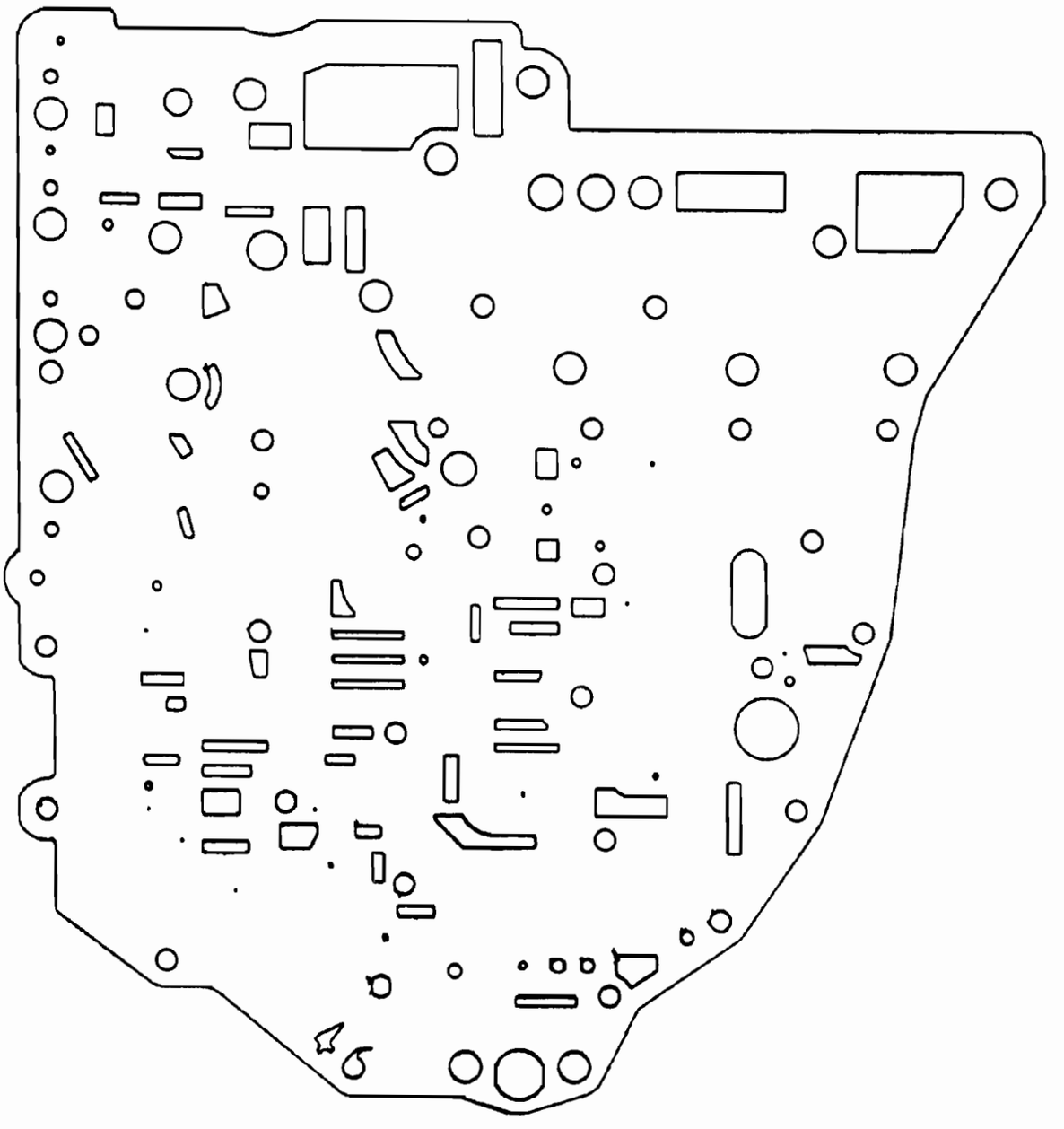
CHRYSLER A604
1ST DESIGN "33" SPACER PLATE



Fits ONLY Valve Body Casting Number 4446639
Fits ONLY Transfer Plate Casting Number 4446640

Figure 71

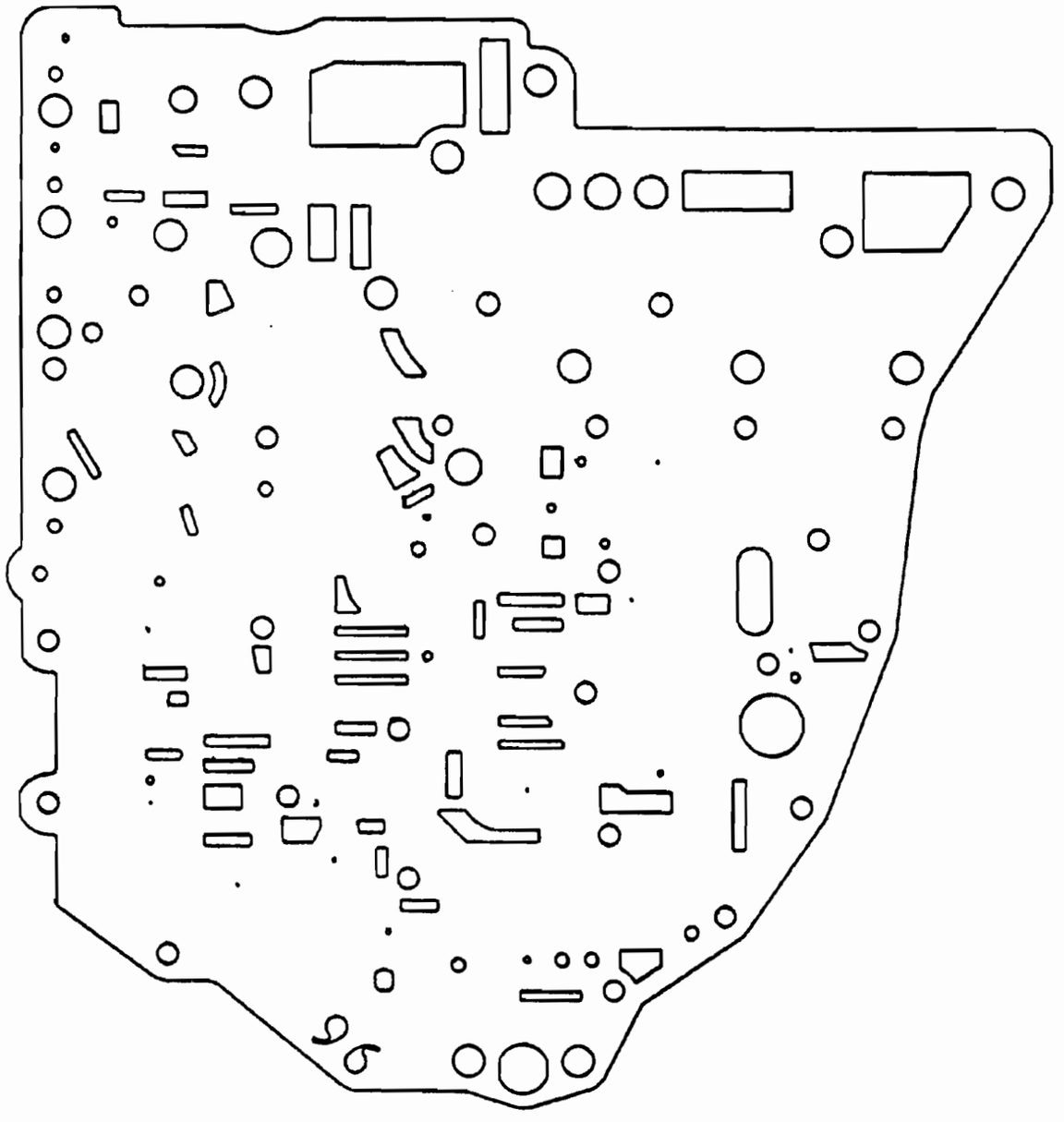
CHRYSLER A604
2ND DESIGN "46" SPACER PLATE



Fits ONLY Valve Body Casting Number 4511644
Fits ONLY Transfer Plate Casting Number 4511645
(Implemented in model year 1992)

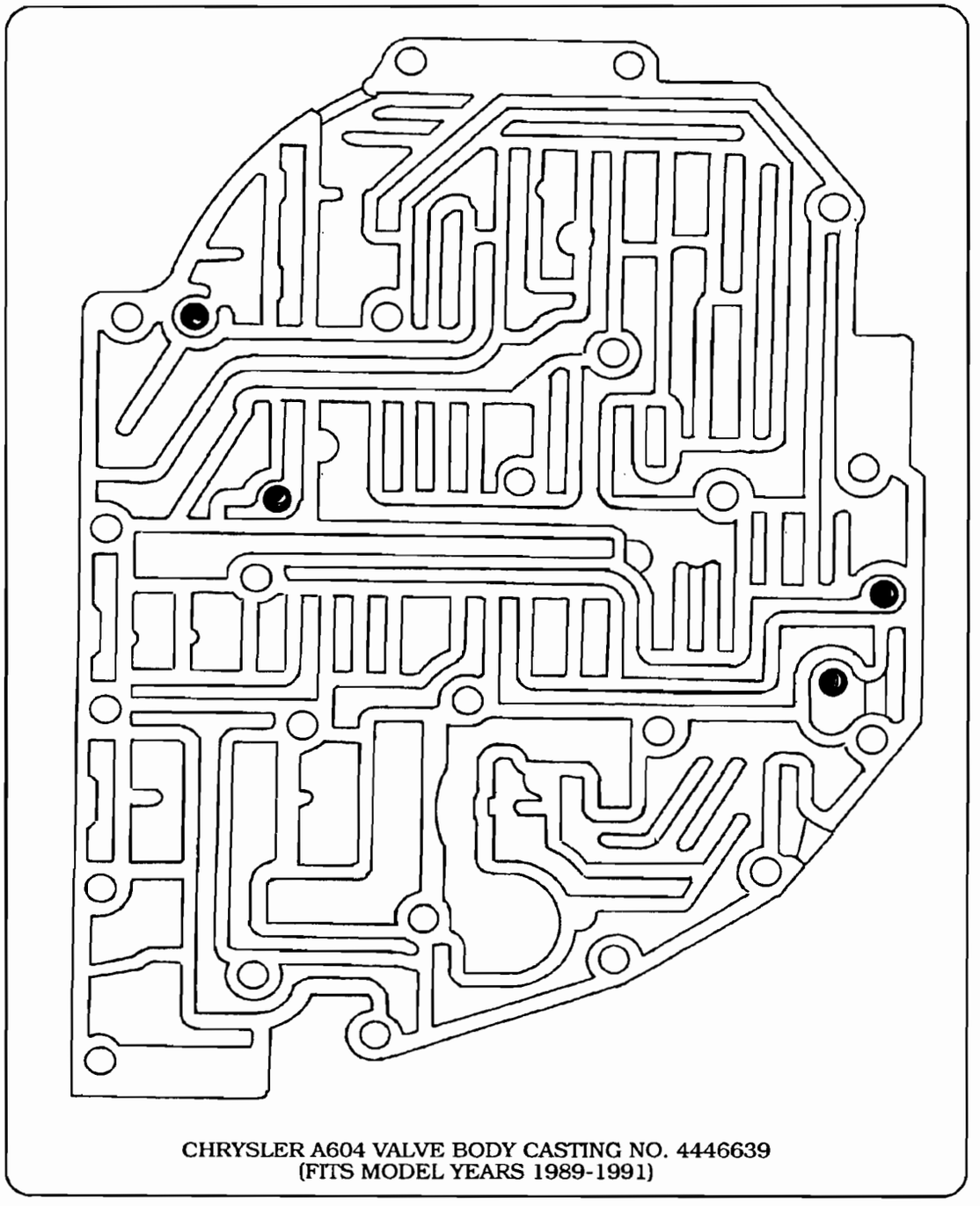
Figure 72

CHRYSLER A604
3RD DESIGN "96" SPACER PLATE



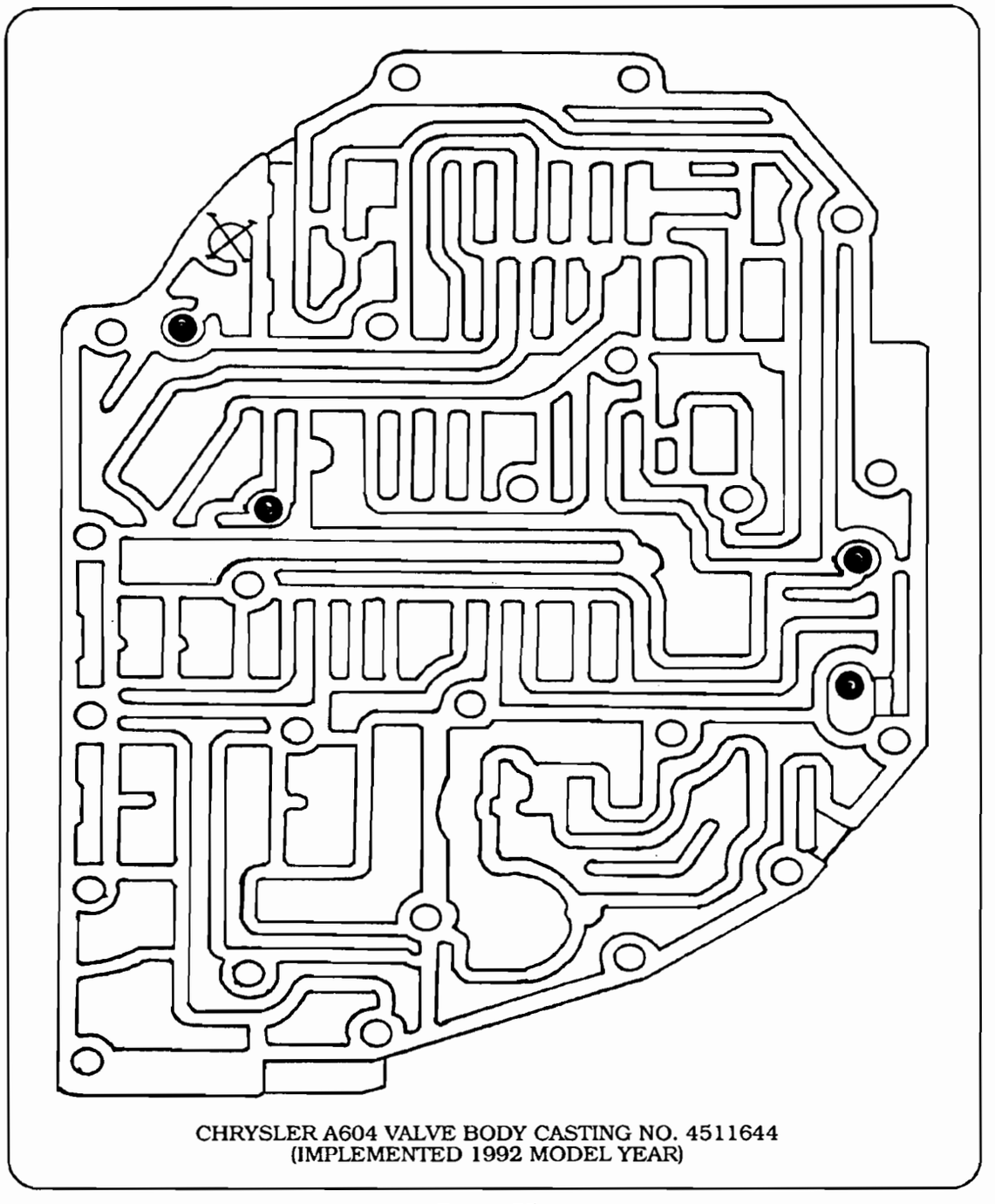
Fits ONLY Valve Body Casting Number 4511644
Fits ONLY Transfer Plate Casting Number 4511645
(Implemented in model year 1993, and will interchange with "46" plate)

Figure 73



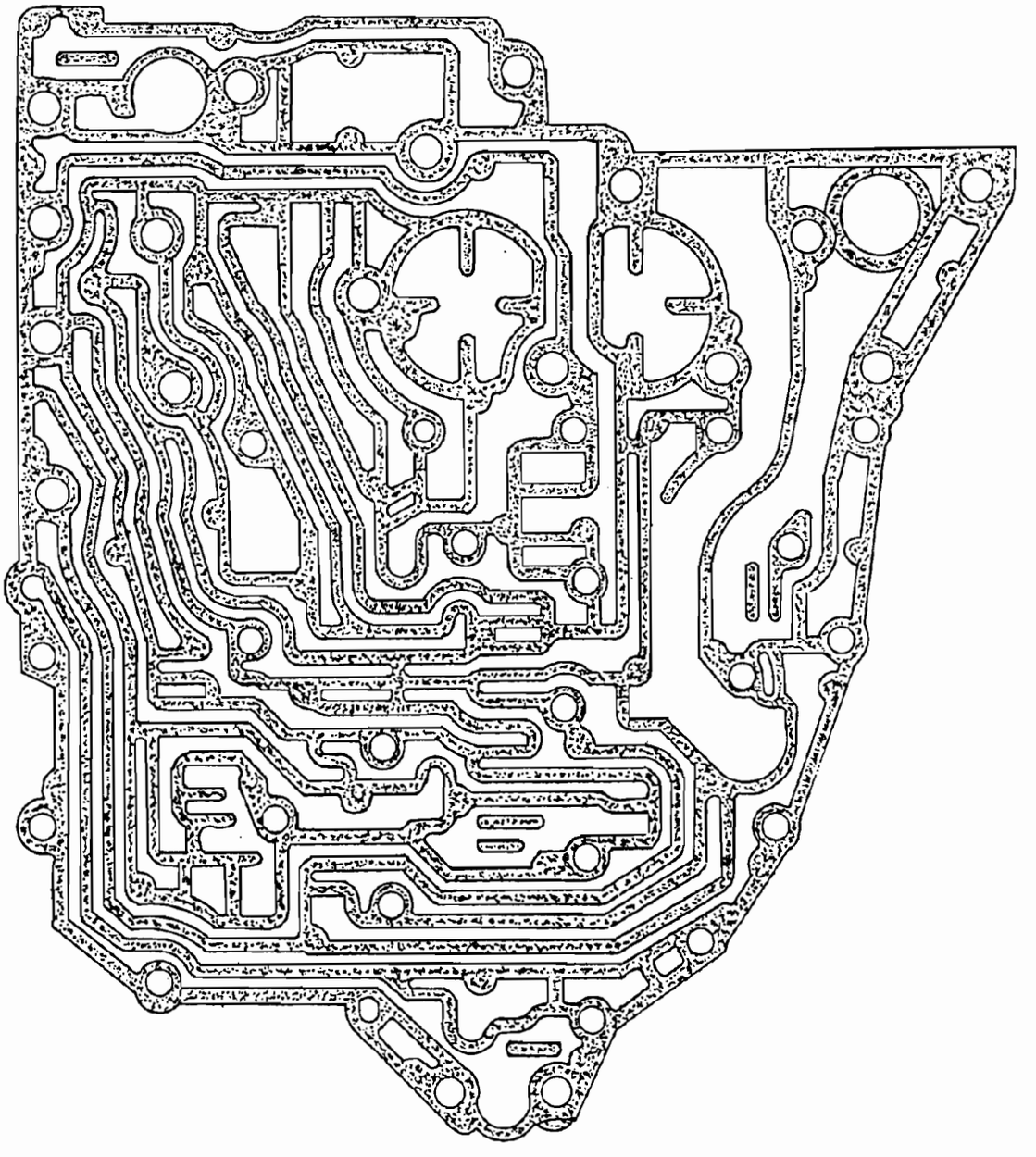
CHRYSLER A604 VALVE BODY CASTING NO. 4446639
(FITS MODEL YEARS 1989-1991)

Figure 74



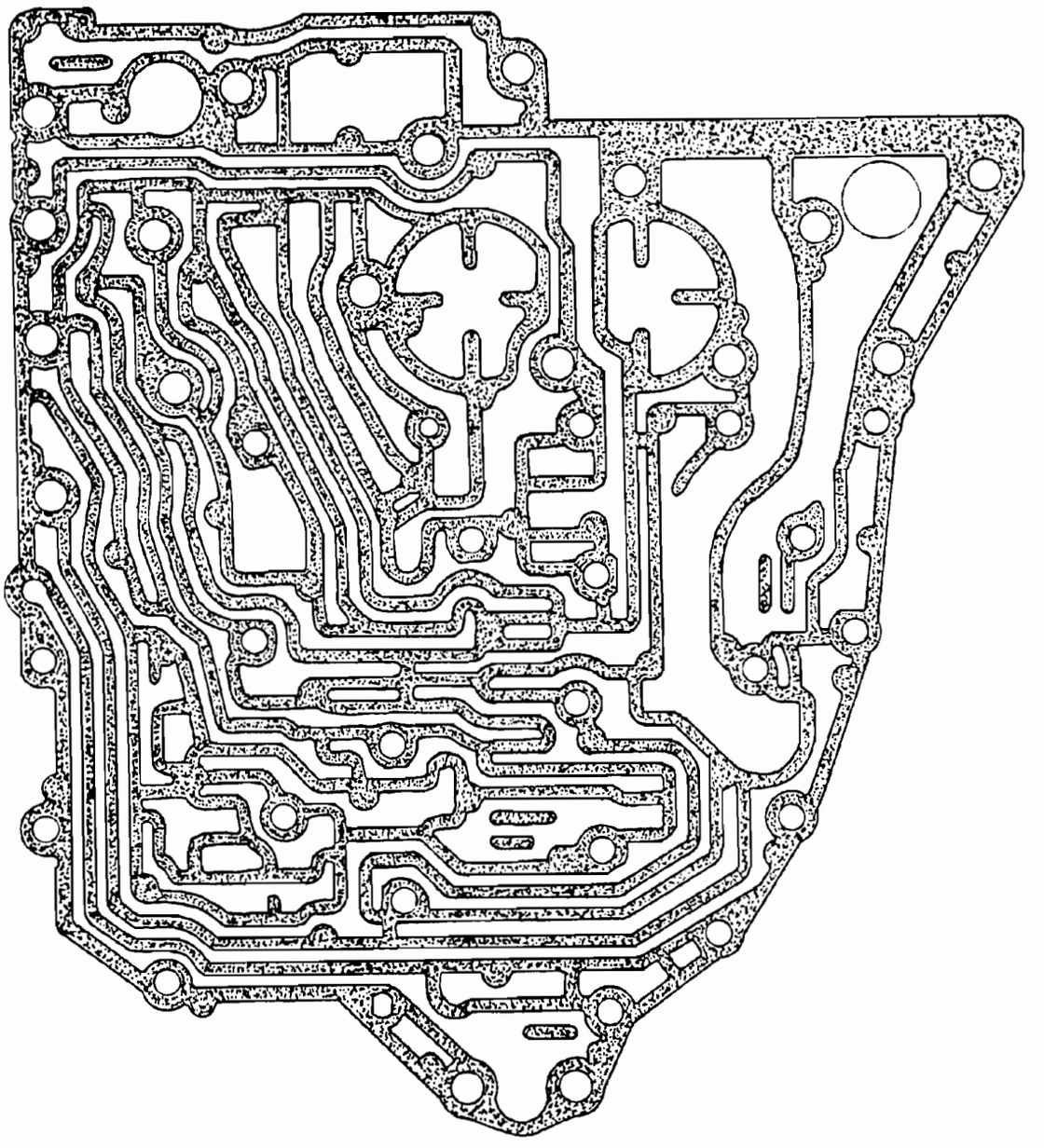
CHRYSLER A604 VALVE BODY CASTING NO. 4511644
(IMPLEMENTED 1992 MODEL YEAR)

Figure 75



CHRYSLER A604 TRANSFER PLATE
CASTING NUMBER 4446640
(FITS MODEL YEARS 1989-1991)

Figure 76



CHRYSLER A604 TRANSFER PLATE
CASTING NUMBER 4511645
(IMPLEMENTED 1992 MODEL YEAR)

Figure 77

A604

2ND GEAR STARTS AND NO UPSHIFT, EVEN AFTER IGNITION CYCLE

COMPLAINT: 2nd gear starts and no upshifts occur even after an ignition cycle. A code 15 may be accompanied with this complaint.

CAUSE: The cause may be a loss of voltage supply to pin number 4 at the solenoid body which is controlled by the EATX relay. The EATX relay (Electronic Automatic Transaxle) is operated by the controller. Its purpose is to provide battery voltage to the solenoids and switches. When the controller receives an ignition run signal from the ignition switch, it will first perform a number of circuit checks and a EATX relay check. The controller will initialize and activate the EATX relay if no circuit problems are found. One side of the EATX relay coil is grounded and the controller applies battery voltage to the opposite side. This power comes from the controllers direct battery supply circuit. When the EATX relay contacts close, battery voltage is supplied to pin number 4 at the solenoid body and pins 16 & 17 on the controller. This is referred to as switched battery voltage (See Figure 78). The controller uses pins 16 & 17 to monitor the relay function and applied voltage. If the contacts in the EATX relay cannot close, switched battery voltage cannot be supplied to pin number 4 at the solenoid body or pins 16 & 17 at the controller causing the 2nd gear starts and no upshifts even after an ignition cycle. Fault code 15 may be accompanied with this fault which means EATX relay off.

CORRECTION: NEW YORKER, DYNASTY, IMPERIAL and FIFTH AVENUE ONLY.

(1) Locate the EATX relay in the Power Distribution Center as shown in Figure 79.

(2) With the ignition OFF, remove the relay and refer to figure 80 for cavity identification.

(3) Re-install the EATX relay into the cavity so that pins make contact with the cavity terminals, leaving room to back probe relay pin.
NOTE: FOLLOWING TEST CANNOT BE MADE WITH RELAY REMOVED.

(4) Using a Volt Meter set to DC volts, place the positive lead onto terminal B and the negative lead on the ground post of the battery. Battery voltage should be seen here with the ignition switch either on or off. If no voltage appears, inspect and repair the wiring for an open or a blown fusible link. If there is battery voltage, go to step 5.

(5) Using an OHM meter, place the positive lead onto terminal C and the negative lead to a good ground and check for continuity. If there is continuity, go to step 6. If there is no continuity, the wire coming out of cavity C has a bad ground. Repair the ground wire coming out of cavity C and repeat this check to insure that you have good continuity.

(6) Using a volt meter set to DC volts, place the positive lead onto terminal A and the negative lead onto the ground post of the battery. Battery voltage should be seen here when the ignition switch is turned on. If no battery voltage is seen, check continuity between cavity A at the relay and terminal 15 at the controller (See figure 81 for terminal location at the controller). If there is continuity, go to step 7. If there is no continuity, the wire from terminal 15 at the controller to cavity A at the relay has an open. Repair the wire and repeat this step to insure that you have continuity across this wire.

CONTINUED ON NEXT PAGE

A604 Continued

(7) Using a volt meter set to DC volts, place the positive lead onto terminal A and the negative onto terminal C. Battery voltage should be seen here with ignition switch on. If battery voltage is not seen, replace the controller. If battery voltage is seen, go to step 8.

(8) Using a volt meter set to DC volts, place the positive lead onto terminal D and the negative lead on the ground post of the battery. Battery voltage should be seen here with ignition switch on. If battery voltage is not seen, replace the EATX relay. If battery voltage is seen, go to step 9.

(9) Using an OHM meter, check for continuity between cavity D at the relay and terminal 4 at the solenoid body connector. See figure 82 for solenoid connector terminal identification. If there is no continuity, the wire from cavity D at the relay to terminal 4 in the solenoid connector has an open. Repair the wire and repeat this check to insure that you have continuity across this wire.

CORRECTION: SPIRIT, ACCLAIM, LEBARON, DAYTONA, SHADOW, SUNDANCE, CARAVAN, and VOYAGER ONLY.

(1) Locate the EATX relay location by using figure 83 and refer to figure 84 for cavity identification.

(2) Carefully bend the EATX relay bracket to gain access to back probe the connector. NOTE: FOLLOWING TEST CANNOT BE MADE WITH CONNECTOR REMOVED.

(3) Using a volt meter set to DC volts, take the positive lead and carefully back probe the D terminal (Red with white strip wire). Place the negative lead onto the ground post of the battery. Battery voltage should be seen here with ignition switch either on or off. If no voltage appears, inspect and repair the wiring for an open or a blown fusible link. If there is battery voltage, go to step 4.

(4) Using an OHM meter, take the positive lead and carefully back probe the A terminal (Black with red strip wire) and put the negative lead to a good ground. If you have good continuity, go to step 5. If there is no continuity, the wire coming out of terminal A has a bad ground. Repair the ground wire coming out of terminal A and repeat this check to insure that you have good continuity.

(5) Using a volt meter set to DC volts, take the positive lead and carefully back probe the C terminal (Light green wire) and place the negative lead onto the ground post of the battery. Battery voltage should be seen here when the ignition switch is turned on. If no battery voltage is seen, check continuity between terminal C (Light green wire) at the relay and terminal 15 at the controller (See Figure 81 for terminal location at the controller). If there is continuity, go to step 6. If there is no continuity, the wire from terminal 15 at the controller to terminal C at the relay has an open. Repair the wire and repeat this step to insure that you have continuity.

(6) Using a volt meter set to DC volts, take the positive lead and carefully back probe terminal C (Light green wire). Take the negative lead and carefully back probe terminal A (Black with red strip wire). Battery voltage should be seen here with ignition switch on. If battery voltage is not seen, replace the controller. If battery voltage is seen, go to step 7.

Voltage will only be seen here for 3 seconds after ignition switch is turned on if there is A problem with relay or circuit

CONTINUED ON NEXT PAGE

A604 Continued

(7) Using a volt meter set to DC volts, take the positive lead and carefully back probe terminal B (Red wire). Place the negative lead onto the ground post of the battery. Battery voltage should be seen here with the ignition switch on. If battery voltage is not seen, replace the EATX relay. If battery voltage is seen, go to step 8.

(8) Using an OHM meter, check for continuity between terminal B (Red) at the relay and terminal 4 at the solenoid body connector. See figure 82 for solenoid connector terminal identification. If there is no continuity, the wire from terminal B (Red wire) at the relay to terminal 4 at the solenoid connector has an open. Repair the wire and repeat this check to insure that you have continuity across this wire.

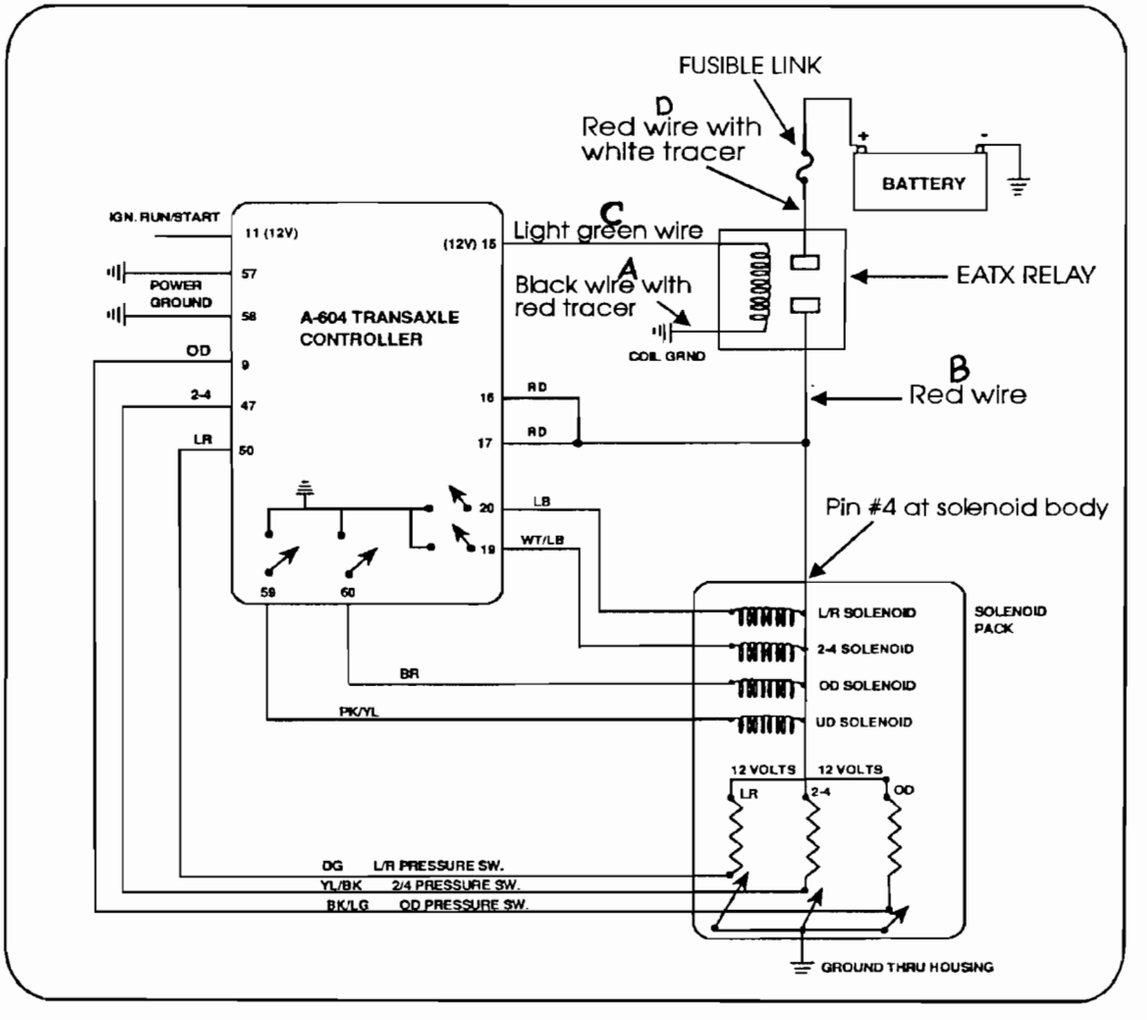


Figure 78

EATX RELAY LOCATION FOR NEW YORKER, DYNASTY, IMPERIAL AND FIFTH AVENUE.

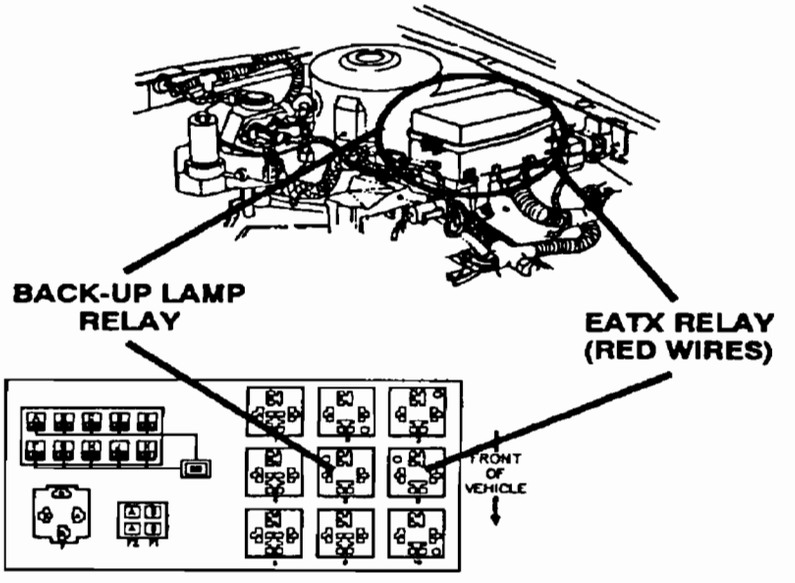


Figure 79

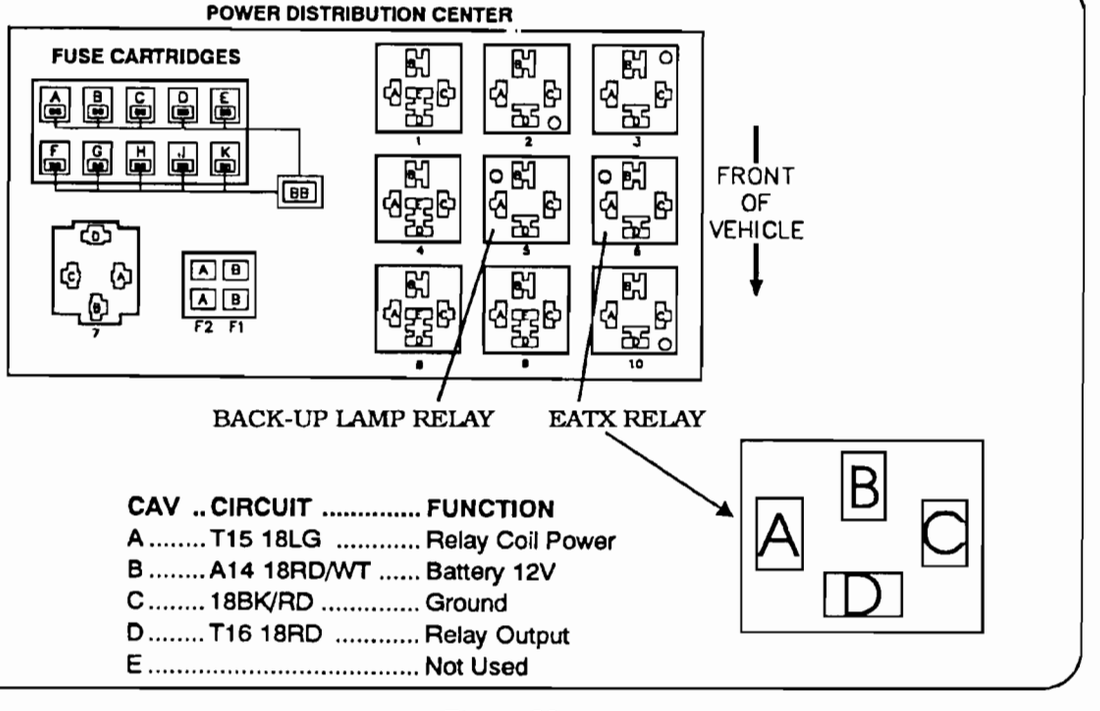
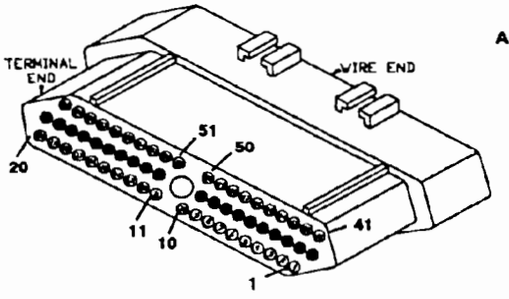


Figure 80

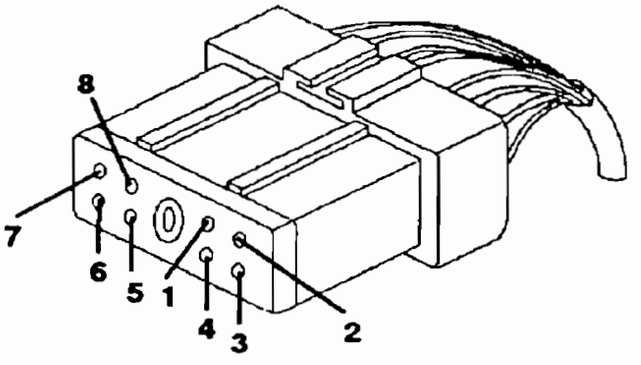


A-604 CONTROLLER CONNECTOR

CAV..	CIRCUIT.....	FUNCTION
1	T01 18LG/*	PRNDL (RL2)
2	T02 18TN/BK	Back-up Lamp Relay, Coil Driver (RL3)
3	T03 14VT	Neutral Start Switch (RL1)
4	D02 20PK/BK	Bus (-)
5	D01 20WT/BK	Bus Bias (A Body Only)
6	T44 18TN/YL	(2.5L Turbo Only)
7		Not Used
8	A41 14YL	Crank Signal
9	T09 18OR/BK	OD Pressure Switch
10		Not Used
11	A21 14DB	Ignition (+)
12	K22 18OR/DB	Throttle Position Sensor
13	T13 18DB/BK	Speed Sensor Ground
14	T14 18LG/WT	Output Speed Sensor
15	T15 18LG	EATX Relay Coil (Power)
16	T16 16RD	EATX Relay Output
17	T16 16RD	EATX Relay Output
18		Not Used
19	T19 18WT	2-4 Solenoid Driver
20	T20 18LB	L/R Solenoid Driver
21-40		Not Used
41	T41 20BR/YL	Neutral Start (NS1)
42	T42 18VT/*	PRNDL (NS2)
43	D01 20VT/BR	Bus (+)
44	D02 20WT/BK	Bus Bias (A Body Only)
45	K24 18GY/BK	Engine Speed Signal
46		Not Used
47	T47 18YL/BK	2-4 Pressure Switch
48		Not Used
49		Not Used
50	T50 18DG	LR Pressure Switch
51	K04 18BK/LB	T.P.S. Ground
52	T52 18RD/BK	Turbine Speed Sensor
53	Z14 18BK/YL	Signal Ground
54	Z14 18BK/YL	Signal Ground
55		Not Used
56	A14 16RD/*	Battery Feed
57	Z13 18BK/RD	Power Ground
58	Z13 18BK/RD	Power Ground
59	T59 18PK	UD Solenoid Driver
60	T60 18BR	OD Solenoid Driver

Figure 81

SOLENOID CONNECTOR TERMINAL IDENTIFICATION

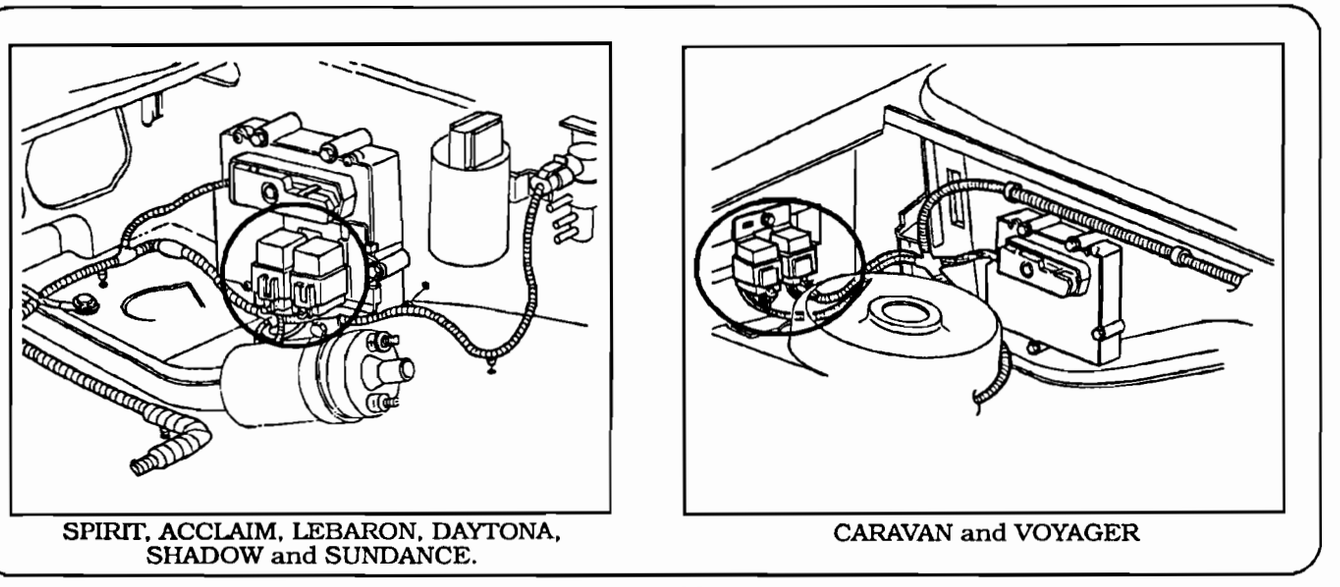


TRANSMISSION SOLENOID PACK CONNECTOR

CAV	CIRCUIT	FUNCTION
1	T47 18YL/BK	2-4 Pressure Switch
2	T50 18DG	L/R Pressure Switch
3	T9 18OR/BK	OD Pressure Switch
4	T16 18RD	Relay Output
5	T59 18PK.....	UD Solenoid Driver
6	T60 18BR	OD Solenoid Driver
7	T20 18LB	L/R Solenoid Driver
8	T19 18WT	2-4 Solenoid Driver

Figure 82

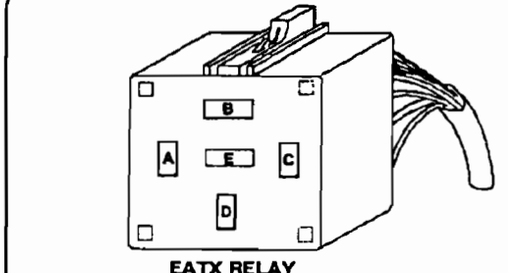
EATX RELAY LOCATION FOR SPIRIT, ACCLAIM, LEBARON, DAYTONA, SHADOW, SUNDANCE, CARAVAN and VOYAGER.



SPIRIT, ACCLAIM, LEBARON, DAYTONA, SHADOW and SUNDANCE.

CARAVAN and VOYAGER

Figure 83



EATX RELAY

CAV	CIRCUIT	FUNCTION
A	Z13 18BK/RD	Ground
B	T16 18RD	Relay Output
C	T15 18LG	Relay Coil Power
D	A14 18RD/WT	Battery 12V
E		Not Used

Figure 84

Each time you disconnect a connector, inspect it thoroughly to determine that it is in good condition. Focus on the circuit being checked.

Dirt and corrosion are the biggest problems in connectors, causing voltage drop, open circuits, or other improper operation. Water and dirt in a connector can allow voltage to "leak" into other circuits, leading to problems during damp/wet weather.

All wiring connectors in the A-604 ultradrive transaxle can be disassembled for repair.

>> Inspect both sides of the connector for water, dirt or physical damage such as corrosion and pin push-outs. Pay attention to female connectors for spread cavities. **NOTE:** Use caution when testing wires to avoid damage to connectors.

>> Ensure that the connector is properly wired by verifying the wire color in each cavity against the appropriate pinout illustration below. Correct any miswired connectors.

Clean, repair, or replace the connector as necessary for proper vehicle operation.

BUS DIAGNOSTIC CONNECTOR

CAV	CIRCUIT	FUNCTION
1	D11 20WT/VT	Data In (Vehicle with ABS)
2	F30 18RD	Battery 12V
3	D02 20WT/BK	Serial Data Bus (-)
4	D01 20VT/BR	Serial Data Bus (+)
5	D12 20OR	Data Out (Vehicle with ABS)
6	Z03 18BK/LG	Ground

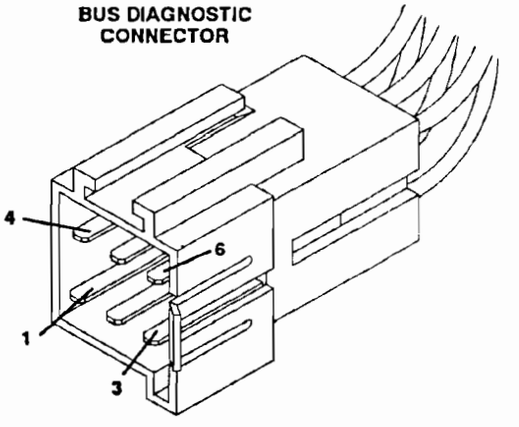


Figure 85

TO TEST THE DIAGOSTIC CONNECTOR

1.) Do a voltage drop test by connecting your positive lead to terminal 6 and your negative lead to the negative post on the battery. You should see .01 to .00 DC volts.

2.) Connect your negative lead of your meter to terminal 6 and the positive lead to terminal 3. You should see approximately 2.52 DC volts.

3.) Connect your negative lead of your meter to terminal 6 and the positive lead to terminal 4. You should see approximately 2.52 DC volts.

4.) Connect your negative lead of your meter to terminal 6 and the positive lead to terminal 2. You should see approximately 12.52 DC volts.

A604
HARSH COAST DOWNSHIFT

Complaint: Delayed engagement both in forward and reverse, harsh 2-1 downshift, slips and bangs after stopping quickly, 3-1 kickdown runaway with a bang, defaults to limp-in when hot.

Cause: A leaking gasket between the low/reverse piston retainer and case.

Qualification:

1. Scan the transaxle's controller for any fault codes. Record the codes and then clear the memory.

2. Attach a 0-300 pound pressure gauge on the low/reverse pressure tap. Record the pressures seen at idle in Park, Reverse, Neutral and Drive while the vehicle is standing still.

3. Road test the vehicle with the pressure gauge still attached to the low/reverse pressure tap. While you are driving the vehicle in 2nd, 3rd, or 4th gear, zero pressure should be seen on the pressure gauge. Coast down to a gentle stop and "OBSERVE" the pressure gauge carefully. Usually the pressure will begin to rise just before the transaxle downshifts to first gear. The pressure will be low and will usually boost up when the bang occurs. During a 3-1kickdown, the pressure will often respond in the same manner.

Correction:

Replace the low/reverse clutch piston gasket as shown in figure 86. Also replace the low/reverse retainer plate to ensure that you have an even compression on the gasket (See figure 87). The part number for this retainer plate is 4431648. Also, in 1993 the low/reverse piston was redesigned so that the outer diameter above the lip seal is now .002" smaller. This was done to prevent the possibility of the piston having a thermal bind up in the piston retainer which can cause a similar complaint. The part number for the low/reverse piston did not change with the redesign. If you order this piston, be sure to ask for a 1993 or later piston or you will get the same style piston that you are trying to change. The part number for the low/reverse piston is 4431672. You could cut your original piston down by .002" on your own in the area shown in figure 88. When you place the piston in the lathe, cut in only .001", this will reduce the outer diameter .002 of an inch as you cut all the way around.

Compliments of Steve Lavallee

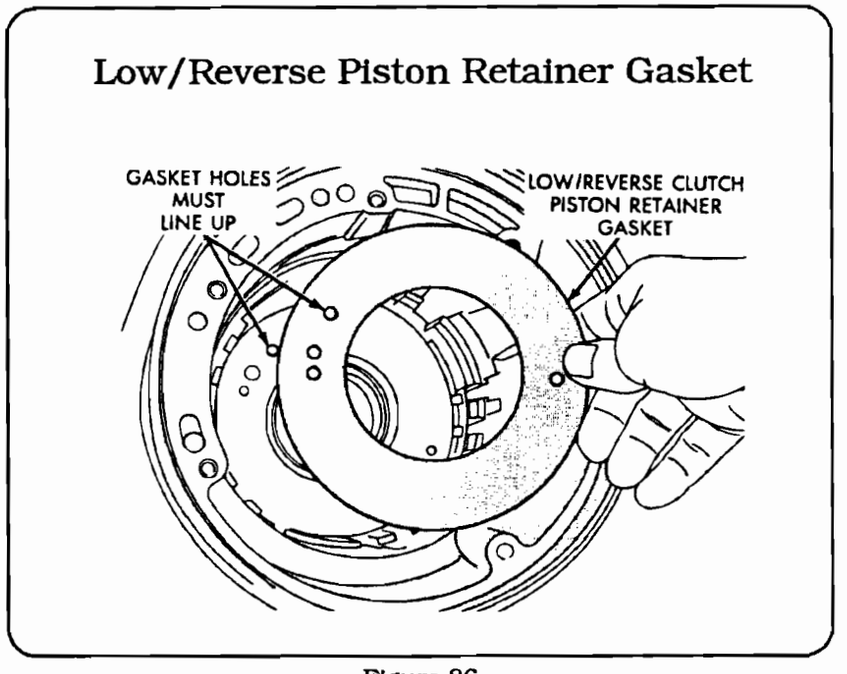


Figure 86

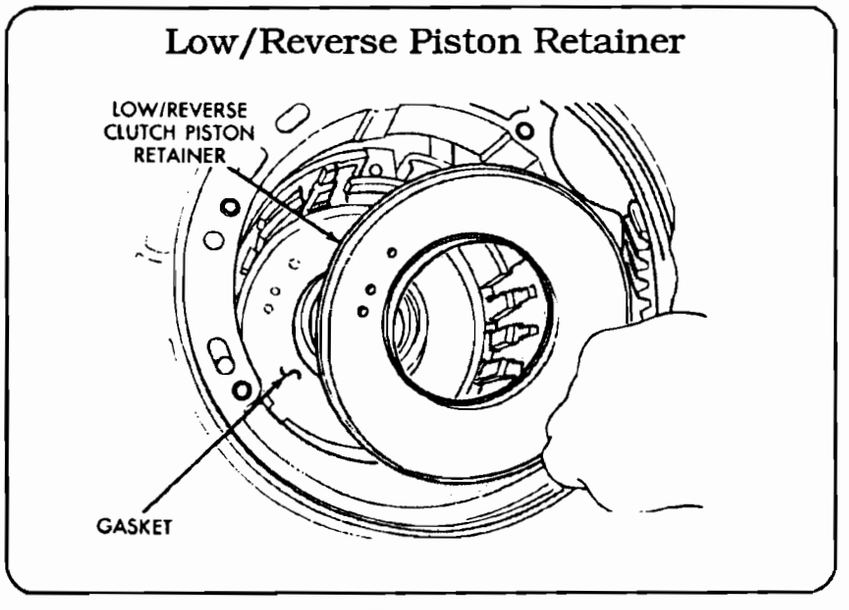


Figure 87

Reduce the outer diameter of the low/reverse piston .002 of an inch by cutting .001" all the way around the piston in between the area indicated by the arrows.

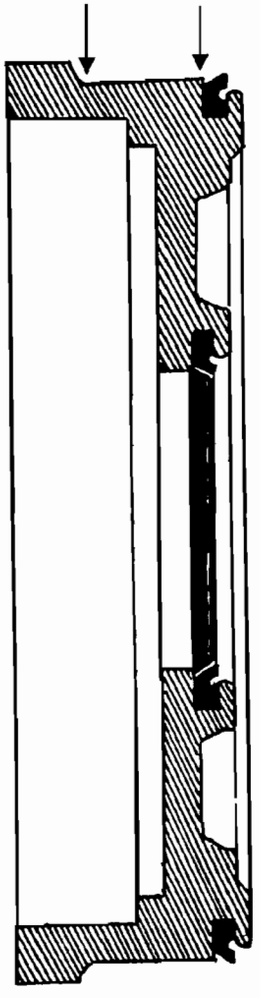
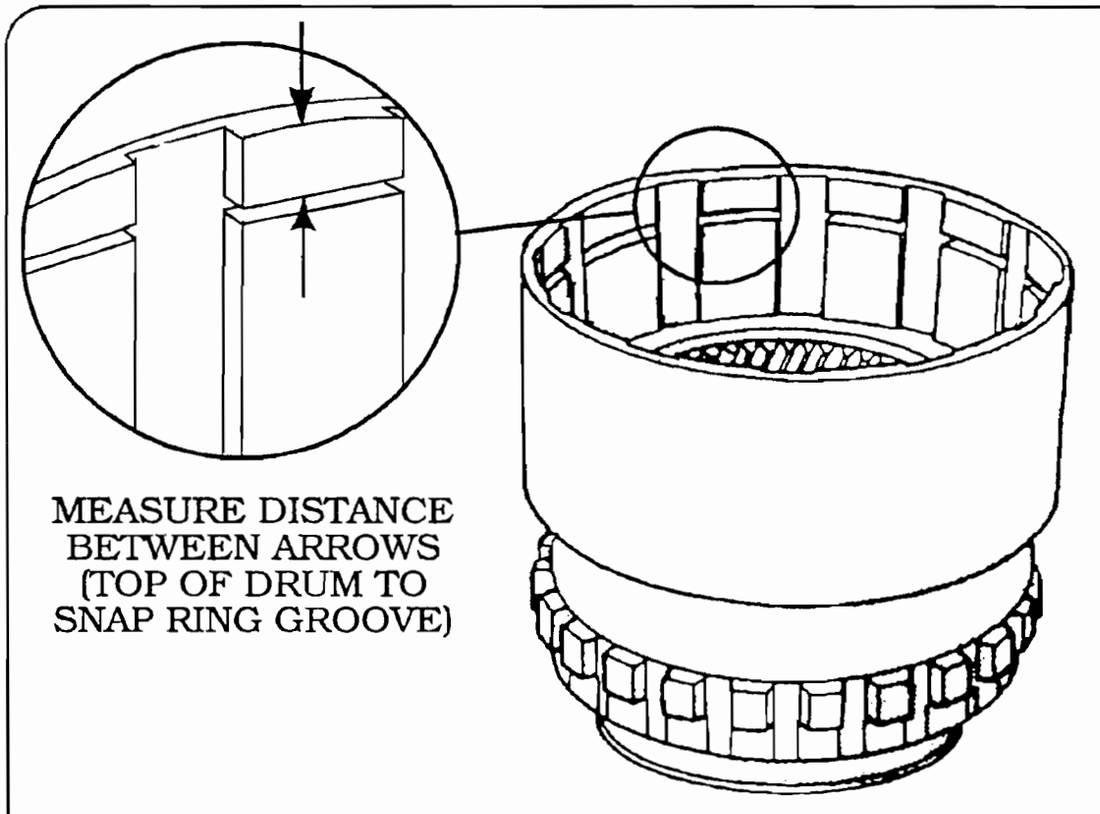


Figure 88

A500/518 OVERDRIVE DIRECT CLUTCH DRUM IDENTIFICATION

There are presently three Overdrive/Direct clutch drums depending on the engine size and transmission. If your overdive section has been destroyed due to lack of lubrication to the thrust plate bearing, the drum may need replacement. When a new drum is bought, it may not be the same as the original drum and the wrong amount of frictions and steel plates can be installed. This could lead to a bind up on the 3-4 shift or a no reverse condition depending on if the drum received too many friction, or not enough. To determine the amount of frictions and steels that belong in the drum that you have, measure the distance between the snap ring groove to the top of the drum as shown in figure 89. If the distance is approximately .485", then 5 lined plates and 4 steel plates belong in this drum. If the distance is approximately .350", then 6 lined plates and 5 steel plates belong in this drum. If the distance is approximately .100", then 8 lined plates and 7 steel plates belong in this drum.



TRANSMISSION	LINED	STEEL	MEASUREMENT
A500 (40RH) 3.9L	5	4	.485"
A500 (42RH) 5.2L	6	5	.350"
A518 (46RH)	8	7	.100"

Figure 89

A500/518

BIND ON 3-4 SHIFT

Complaint: Binds up on a 3-4 shift after overhaul.

Cause: One cause can be that the Overdrive/Direct clutch reaction plate has been installed upside down.

Correction: Install the Overdrive/Direct clutch reaction plate with the inside step facing down so that it will fit over the lugs on the direct clutch sliding hub. The reaction plate when installed correctly, should be flush with the end of the hub (See Figure 90).

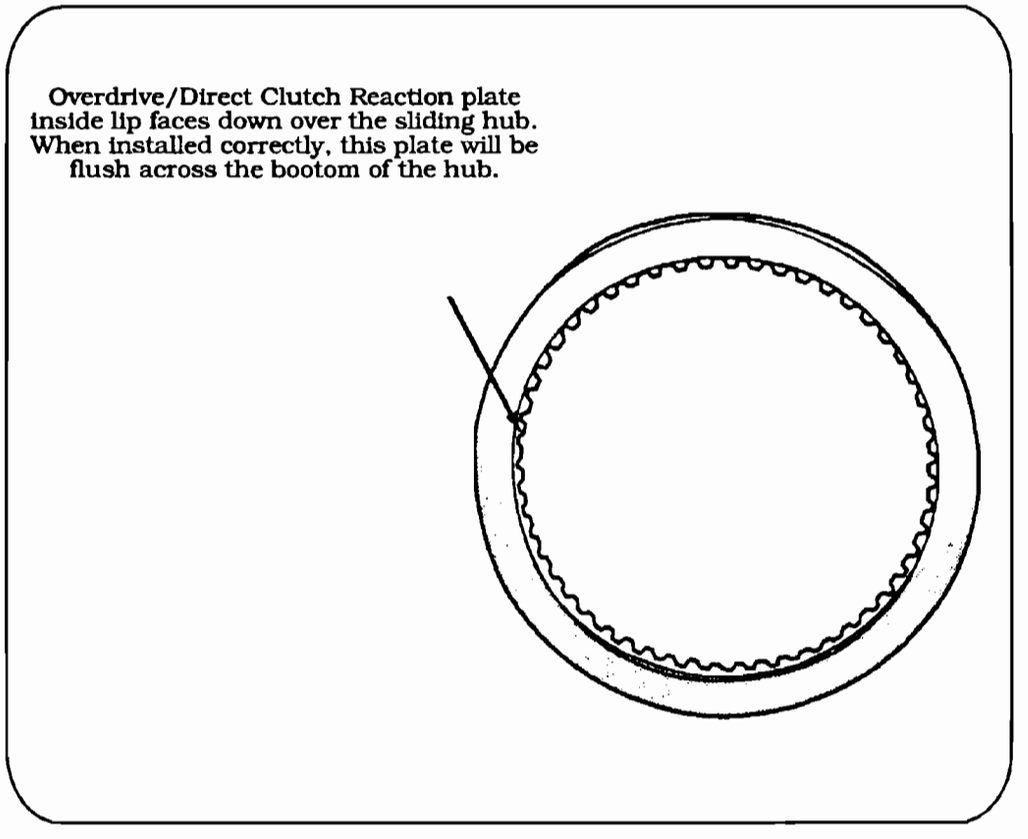


Figure 90

A500/518

Low/Reverse Drum Change

Change: A running change was made to the low/reverse drum where the snap ring reatins the drum to the OD Piston retainer. Previous models had a washer located between the snap ring and drum. The new design eliminates the washer (See figure 91). To determine if your drum takes the washer, there will be an inside step machined into the drum to accomodate the washer. If the drum has a flat face, no washer is required.

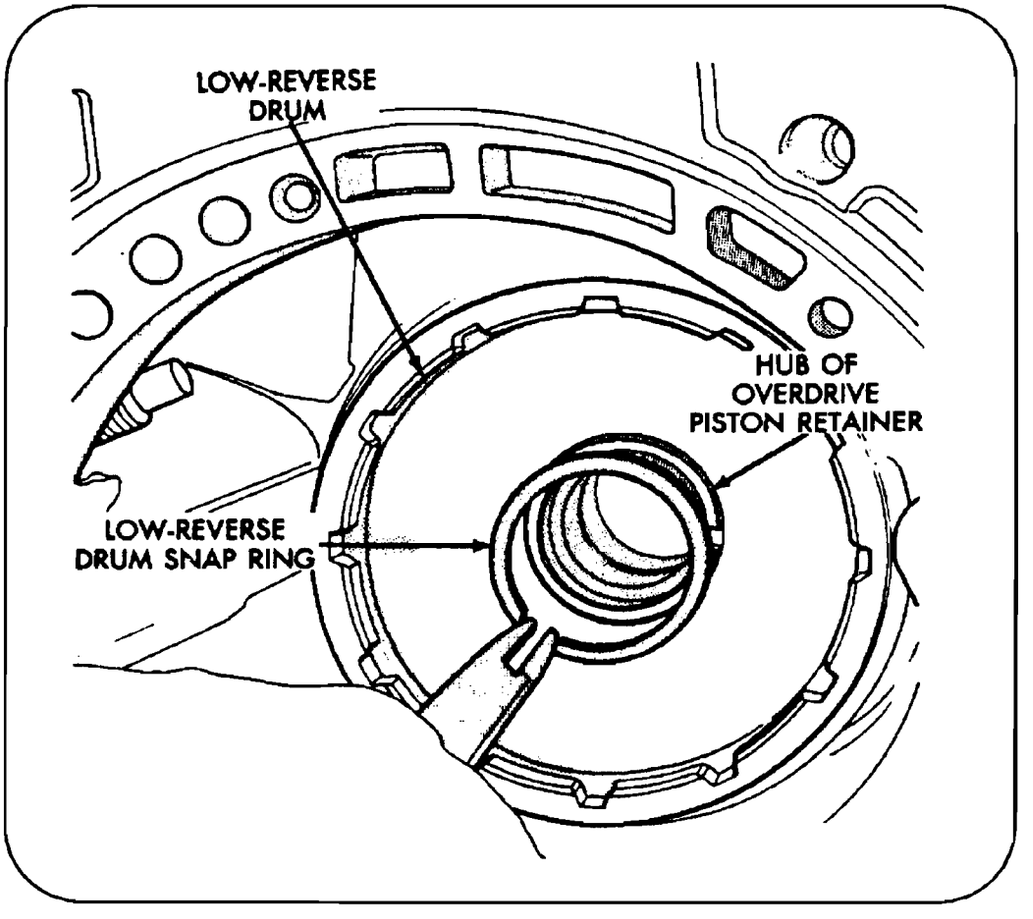


Figure 91

A500/518

OVERDRIVE SUN GEAR

Complaint: The retaining ring snap ring groove in a newly purchased sun gear does not seem to retain the retaining ring properly.

Cause: The retaining ring snap ring groove is not machined deep enough to accommodate the snap ring.

Correction: The snap ring groove should be machined the same depth as the splines. You can machine the groove down all the way yourself or reorder a new sungear.

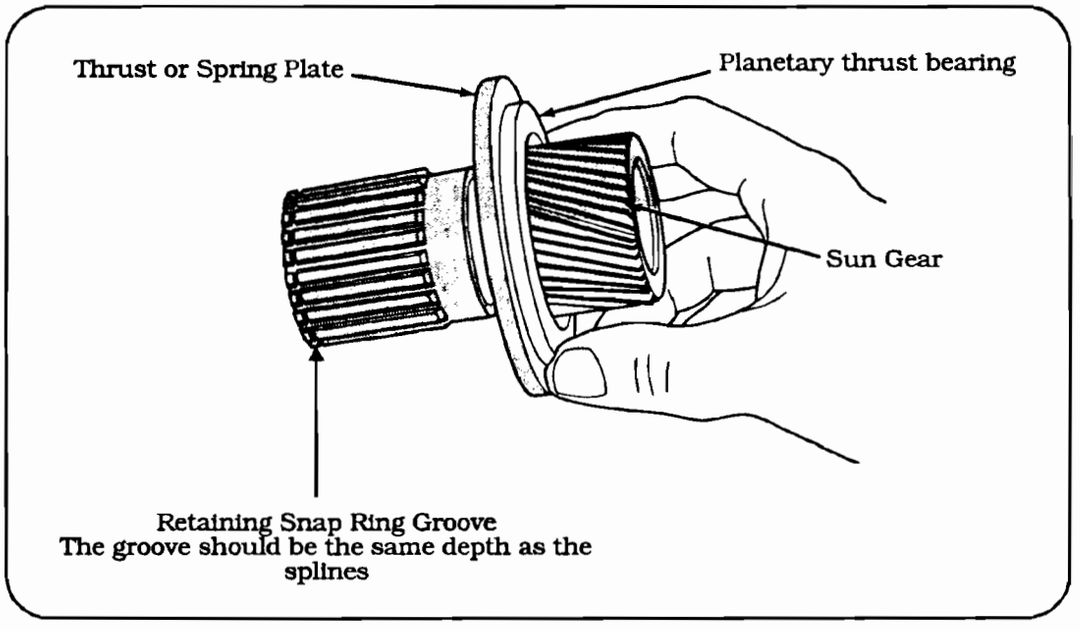


Figure 92