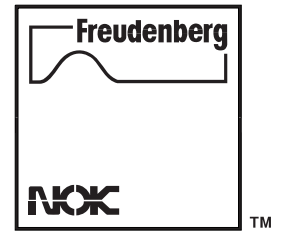


# REBUILDER NEWS



Volume 3, Issue 2 / Second Quarter, 1995

from **TransTec**

## Adaptor Housing Seal for the Jeep AW4 Now Available

TransTec now offers the adaptor housing seal for the AW4 transmission found in 4WD Jeeps. The seal installs in the housing between the transmission and the transfer case. This is the

*Continued on page 2...*

### In this issue...

- Our *Troubleshooter* feature article provides insight into rebuilding GM's 4L30-E transmission.
- The adaptor housing seal for Toyota's A340 Overdrive is now available from TransTec. *See cover article.*
- Chrysler changes 604/606 low/reverse clutch piston seals. *See cover article.*
- TransTec now offers the overhaul kit for Ford's new CD4E transmission. *See cover article.*
- Mazda valve body screens for G4A-EL and F4A-EL now included in TransTec kits. *See page 2.*
- RE4R01A/R4A-EL kit update. *See page 2.*

### In our next issue...

- Teflon® sealing rings used in Japanese transmissions have always been a problem. TransTec solves this in the next issue of *Rebuilder News!*

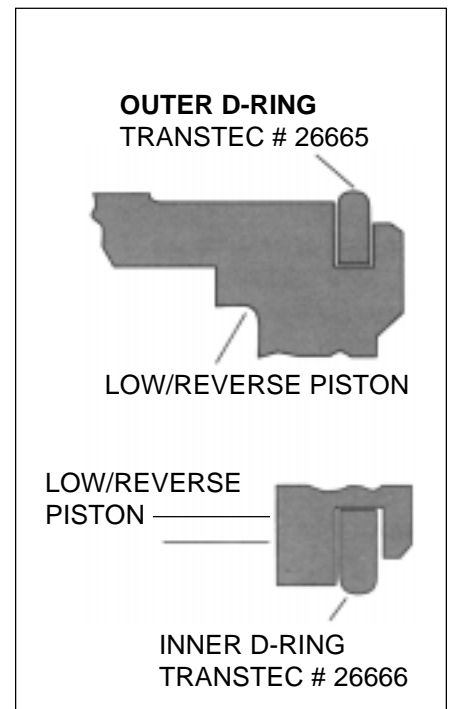
## Chrysler Changes 604/606 Low/Reverse Clutch Piston Seals

Chrysler has made a change in 1995 on the low/reverse clutch piston seals in the 604 (41TE) and 606 (42LE) transaxles.

Until now, the inner and outer seals on the low/reverse piston were lip seals. Both of these seals have been changed to D-ring seals.

The lip seals are no longer available, they are replaced by the D-rings, which retrofit all 604 and 606 transaxles. The outer D-ring is TransTec #26665 (OEM ref. #4659184) and the inner is #26666 (OEM ref. #4659185). All kits with a date code of C95 or later will contain these seals and they are also available separately.

Kits that were built prior to the change contain lip seals and they can still be used. Since the low/reverse piston and piston retainer did not



change, the lip seals can be used on units that originally came with D-rings.

## Ford CD4E Overhaul Kit Now Available

TransTec now offers an overhaul kit for the CD4E, Ford's new light-duty, 4-speed overdrive transaxle. Ford began using the CD4E in the 1993 Mondeo (available only in Europe). Starting in 1994, Ford put it in Probes with a 4-cylinder (2.0 liter) engine. It was also put into the Mazda 626.

More recently, the CD4E is being used in the 1995 Ford Contour and

Mercury Mystique. These are the American versions of the European Mondeo. Since the Contour and Mystique will replace the ever-popular Tempo and Topaz, shops may see quite a few of these in the years to come. To order this overhaul kit, specify TransTec #2295. (*Note: Ford Probes and Mazda 626's with a V-6 engine still use Mazda's G4A-EL (4EAT-G).*)

## Mazda G4A-EL and F4A-EL Valve Body Screens Now Included In TransTec Kits

The Mazda G4A-EL and F4A-EL transaxles both use small, flat screens in the valve bodies to filter fluid in various circuits. Due to their small size, these screens are very easily lost.

Until now, these screens were only available from Mazda and had to be ordered, which could take several weeks. TransTec is now including them in all G4A-EL and F4A-EL Gasket & Seal kits and Overhaul Kits.

There are two different sizes for these screens. All F4A-EL transmis-

sions and 1986-92 G4A-EL transmissions use the smaller screen, TransTec part # 87085 (OEM # FU01-21-296A). There are 9 of these in the F4A-EL valve body and 4 in the G4A-EL.

The screen used in 1993-On G4A-EL transmissions is slightly larger in diameter and is part # 87086 (OEM # FU9A-21-296). There are 9 of these in the valve body.

All kits with a date code of A95 and later will contain the screens and they are also available in bulk.

Gasket & Seal Kits				
Application	Year	Kit #	Screen #	Quantity
G4A-EL	1986-92	1194	87085	4
G4A-EL	1993-On	1273	87086	9

Overhaul Kits				
Application	Year	Kit #	Screen #	Quantity
G4A-EL	1986-89	2285	87085	4
G4A-EL	1986-89	2286	87085	4
G4A-EL	1990-92	2194	87085	4
G4A-EL	1993-On	2273	87086	9
G4A-EL	1990-On	2265	87085	9

## AW4 Adaptor Housing Seal...*continued from front cover*

OEM seal, manufactured by NOK in Japan. It is available in bulk from TransTec # 29805 (OEM # 83504055).

### About the AW4...

AW4 is Jeep's designation for this overdrive transmission which Toyota

calls the A340. TransTec offers the Overhaul Kit for it, part # 2195. The Overhaul Kit contains all the seals needed for Toyota applications, but the adaptor housing seal is offered separately because of limited usage (it is only needed for the 4WD Jeep).

## RE4R01A/R4A-EL Kit Update

The Nissan RE4R01A transmission was first introduced in the 1988 Nissan Pathfinder. By 1989, it was found in almost all Nissan rear drive vehicles. The Mazda MPV van also started using it in 1989, and Mazda 4 X 4 trucks starting in 1990.

Until 1992, the only differences between the Nissan and Mazda transmissions, as far as overhaul kit components, were the extension housing seals and speedometer seals.

Originally, this kit (#2253) contained only the Nissan extension housing seals for 2WD and 4WD. The Mazda 2WD extension housing seal was added later.

In 1992, Mazda started using this transmission in the 929, and in the RX-7 starting in 1993. The valve body gaskets in these units are different from the others, and are only used in the 929 and RX-7. They have been added to all TransTec overhaul kits with a date code of B95 or later. (All other models still use the original valve body gaskets.)

The part numbers of the new gaskets are TransTec #12786 (OEM #BV40-21-156) for the upper gasket, and #12787 (OEM #BV40-21-155) for the lower gasket.

With this update, these kits now cover Mazda and Nissan applications up to current models, with one exception: The RX-7 has a larger extension housing seal than the other Mazdas. Due to its low volume, we do not currently supply this seal. It can be purchased through Mazda - part # BV65-19-437.

### Tech Seminars

A TransTec representative will attend the following

Tech Seminars:

**June 3rd - Sarasota, FL**

**July 29th - San Antonio, TX**

REBUILDER  
**NEWS**

Denny Scher, Editor

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## WHAT TO DO IF A 4L30-E WINDS UP ON YOUR BENCH

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By Bob Bodossian, TransTec Transmission Product Engineer

Because you're seeing so many 4WD sport utility vehicles on the road these days, it's a sure thing that - sooner or later - you'll begin to see GM's 4L30-E transmission in your shop.

Actually, the 4L30-E has been around for quite a while, but few shops have seen one, much less worked on one. This trans is found on only three nameplates - which may account for its lack of familiarity.

One of the three makes is Opel, who put this trans into their Omega and Senator models. (Your chances of seeing one of those European models are virtually nonexistent, but just in case...)

### **Ole Pal Opel**

If you've been around as long as I have, you'll remember working on transmissions in Opel Kadettes. Or you may remember that Opels were sold through Buick dealerships in the 60s and early 70s. In those days, the trans was called a "Trimatic" and later, a "TH180," and finally a "TH180-C" after they added a converter clutch.

Here in the USA, GM put the 180 and the 180-C in Chevettes, and more recently, in the Geo Tracker, the Suzuki Sidekick, and into the Postal Vehicle.

Now, this old familiar trans is called a 3L30.

### **The Case is Familiar, but...**

In case you're wondering why you're reading all this ancient history, it's because the 3L30 is a sort of kissin' cousin to the hero of this article...the 4L30-E. Take away the overdrive section of the 4L30-E and what's left could pass as a twin of the 3L30.

General Motors took a basic 3L30, added an overdrive section to the front of it, and - shazzamm!...they had the 4L30-E.

Unlike the 200-4R, this overdrive unit even looks like an "add-on." The overdrive section is in a separate case that attaches to the front of the trans. It even has its own valve body and pan, even though the two sumps are connected. (They must have been in one huge hurry to get this trans in production!)

In addition to looking alike, both the 4L30-E and the 3L30 are built at General Motors' plant in Strasbourg, France. I figure this is what GM and Opel call the "French Connection."

### **The 4WDs You'll Get to Know**

By the way, the 4L30-E also shows up on some model 300 and 500 series Beemers, as well as on Isuzu's Trooper and Rodeo models, beginning in 1990/91. (It's these 4WD vehicles that I expect you'll see in your shop.)

Of course, if you're already familiar with the 3L30 and the TH200-4R, then working on a 4L30-E will be old hat. This little essay is for those of you who haven't yet had the pleasure offered by one of those trans.

As you'd guess from the 4L30-E designation, this is a 4-speed, longitudinally-mounted (north/south) transmission with a relatively low torque capacity and is electronically- controlled.

The electronics are handled by a Transmission Control Module (TCM) which processes input signals received from the different sensors, and then

controls the transmission's five solenoids accordingly.

The force motor solenoid controls line pressure, the 1-2/3-4 and 2-3 solenoids control shift points, the TCC solenoid controls the converter clutch, and the band apply solenoid controls the band application rate.

### **Three Operating Modes**

The TCM controls the 4L30-E in three different modes: Economy, Performance, or Winter. The driver selects the mode by pushing either the power/economy button, or pushing the winter button. By pushing the power button, the driver is really selecting the Performance mode.

Economy mode is used for normal driving conditions; the Performance mode delays upshifts and increases line pressure; and the Winter mode permits 3rd gear starts to reduce slippage on ice and snow.

### **Watch that Winter Mode!**

If you get a vehicle with 3rd gear starts and the Winter button hasn't been pushed, look for a bad Winter mode switch. Here's what to do: With the ignition key OFF, disconnect the switch harness and drive the vehicle. If the trans now shifts normally, replace the Winter mode switch.

You diagnose 4L30-E problems just as you diagnose other electronically-controlled transmissions. After you check out the customer's complaint by driving the vehicle, check the dash to see if the "Check Trans" light is on, to see if there are some trouble codes waiting for you.

### Is it just Off or Out?

Note that if the "Check Trans" light is not on when you first look, make sure it works. Turn the ignition key OFF and ON but don't start the engine. If everything is OK, the "Check Trans" light should come on for about 4 seconds and then go off again.

Use a scan tool to retrieve trouble codes. (The Isuzu manual calls for a Tech 1" scan tool, but others will work, too.)

### What If the Electronics are Good?

After you correct the codes - or if no codes show up but the trans still doesn't work correctly - disconnect the TCM and manually shift gears as you drive the vehicle.

In Manual 1, the trans should be in 1st gear. In Manual 2, the trans should be in 3rd gear. In Manual 3 or in "D" the trans should be in 4th gear. If the trans operates in any other ways than these after you disconnect the TCM, the 4L30-E you're working on has either a mechanical problem or a hydraulic problem.

To get a better idea of how this trans works, take a look at the Power Flow Chart in Figure 1. It shows the state of all the holding elements and the

electrical state of the shift solenoids in all the different gear ranges.

Note that the 1-2/3-4 solenoid is normally closed hydraulically but the 2-3 solenoid is normally open hydraulically. That means that when they are both electrically off, the 1-2/3-4 solenoid blocks signal oil from its shift valve while the 2-3 lets signal oil pass through and act on its shift valve.

The TCC solenoid is an Off-On solenoid (as are the shift solenoids). The TCC is normally closed, which means that when it's electrically Off, signal oil is blocked from reaching the TCC control valve. When energized, the TCC solenoid opens and lets signal oil act on the TCC control valve, moving it into the Apply position and locking up the converter.

### High-temp Problem

TCC is normally applied in 3rd and 4th gears, but in some models, if the fluid temperature gets too high, TCC applies in 2nd gear. TCC is released during all upshifts and downshifts.

The other two solenoids in the 4L30-E are the Force Motor and Band Apply solenoids. Fluid flow to the pressure regulator boost valve is controlled by the valve in the Force Motor sole-

noid. The TCM controls line pressure by varying the duty cycle of the Force Motor solenoid.

### Higher is less, or Versa Visa

The higher the duty cycle, the less fluid flows to the boost valve; lower line pressure results. The lower the duty cycle is, the more fluid flows to the boost valve, and higher line pressure results. Duty cycle is the percent of time that the solenoid is energized during each cycle.

The Band Apply solenoid - also called the PWM (Pulse Width Modulated) solenoid - controls the amount of fluid flow into the servo apply circuit.

### GM's Electronic Band

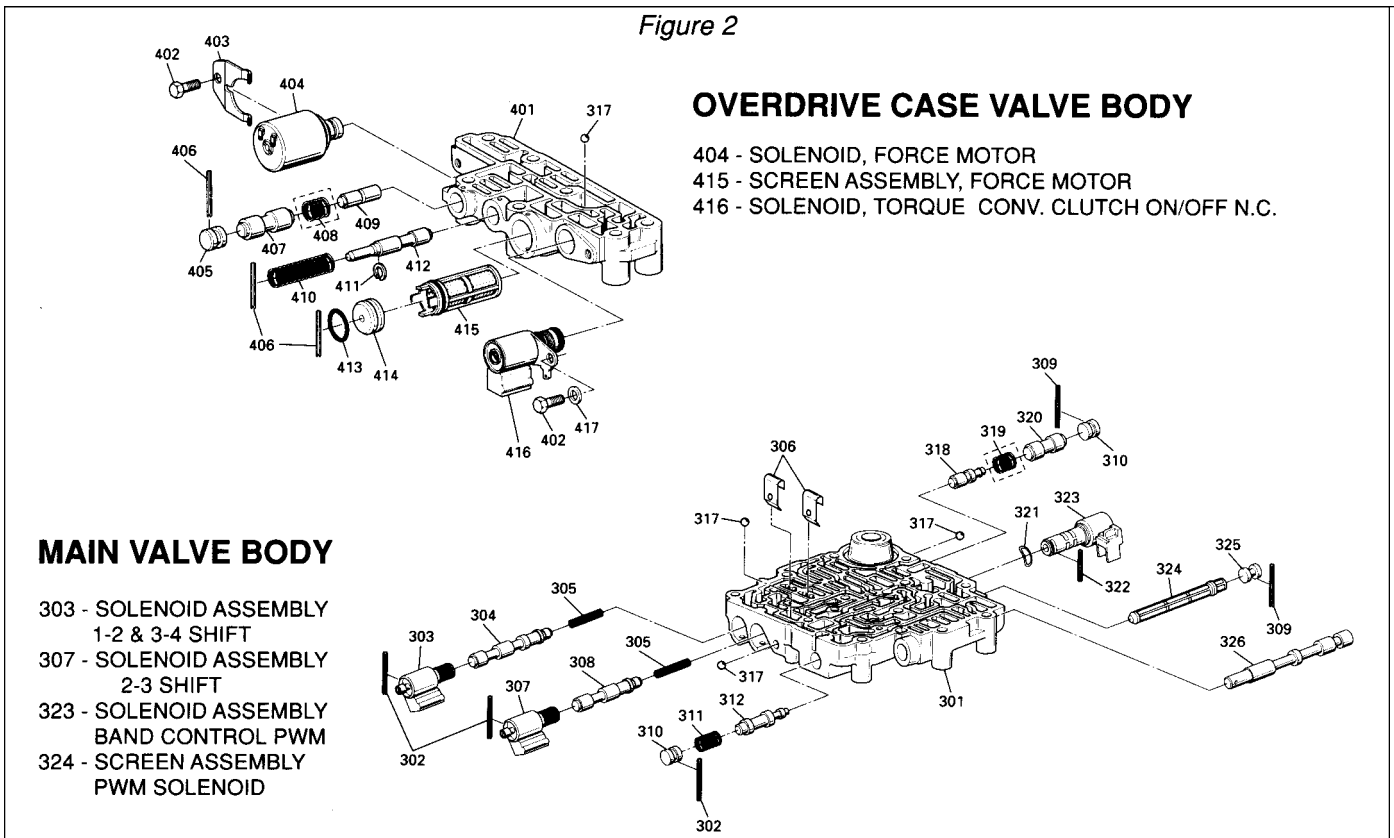
When that solenoid is off, fluid flows into the servo apply passage at a maximum rate and the band is applied. When this solenoid energizes, the valve blocks fluid flow from entering into the servo apply circuit, and the band releases. The TCM controls the band apply rate by varying the duty cycle of the PWM solenoid, which regulates the fluid flow to the servo. After all the band apply problems GM faced with the TH440, it's no surprise that they de-

Figure 1

RANGE	GEAR	1-2/3-4 SOL N.C.	2-3 SOL N.O.	O.DRIVE ROLLER CLUTCH	OVER RUN CLUTCH	FOURTH CLUTCH	THIRD CLUTCH	REVERSE CLUTCH	SECOND CLUTCH	INPUT SPRAG	1-2 BAND
P-N		OFF	ON		APPLIED						
R	REVERSE	OFF	ON	H	APPLIED			APPLIED		H	
D	1ST	OFF	ON	H	APPLIED					H	APPLIED
	2ND	ON	ON	H	APPLIED				APPLIED	F	APPLIED
	3RD	ON	OFF	H	APPLIED		APPLIED		APPLIED	NE	
	4TH	OFF	OFF	F		APPLIED	APPLIED		APPLIED	NE	
3	1ST	OFF	ON	H	APPLIED					H	APPLIED
	2ND	ON	ON	H	APPLIED				APPLIED	F	APPLIED
	3RD	ON	OFF	H	APPLIED		APPLIED		APPLIED	NE	
2	1ST	OFF	ON	H	APPLIED		APPLIED			H	APPLIED
	2ND	ON	ON	H	APPLIED				APPLIED	F	APPLIED
1	1ST	OFF	ON	H	APPLIED		APPLIED			H	APPLIED

H = HOLDING F = FREEWHEELING NE = NOT EFFECTIVE

Figure 2



cided to control this band electronically.

Taking this trans apart and putting it back together again won't cause you too much heartburn (but note the tips about reassembling the back end of this trans!) As we explained before, this trans has two pans and two valve bodies.

**Ahh...a Real Main Filter**

Like most electronic transmissions, this one has its fair share of filters. But unlike its 3L30 cousin, this trans has a

"real" main filter, not a metal screen. Besides this main filter, both shift solenoids and the TCC solenoid have integral screens. Screens for the Force Motor and PWM solenoids are also in the valve bodies. (Figure 2 shows locations of the screens and all five solenoids.)

"Double the valve bodies" doesn't mean "Double the fun" in this case, unless fixing hung-up valve bodies is your kind of fun. Both valve bodies are

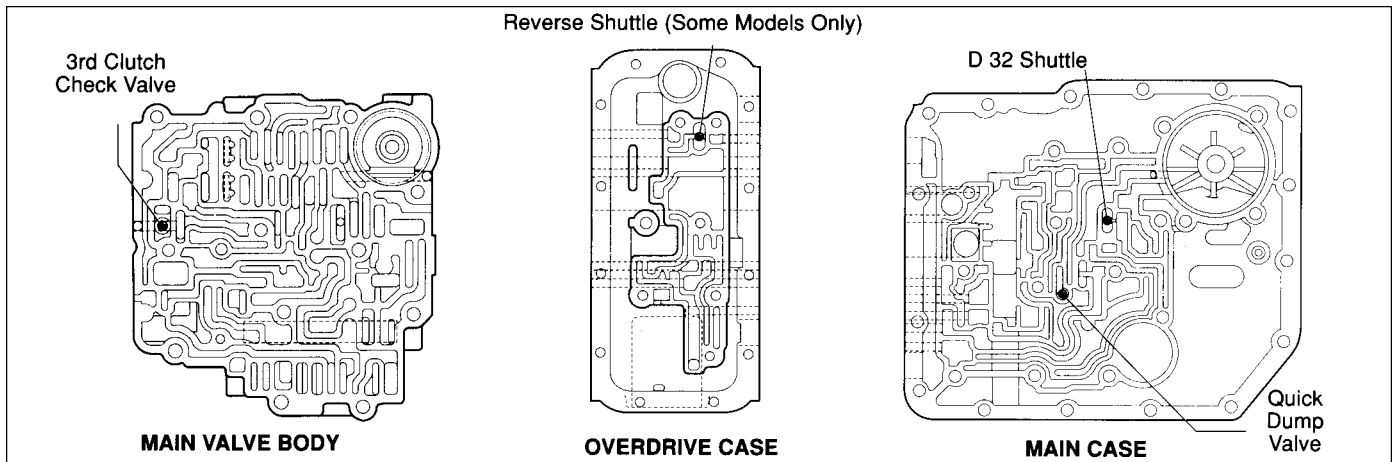
made of cast iron, and have few valves ...normally a trouble-free combination.

**Don't Get Stuck With the Short End**

When you take out the main valve body, note that the manual valve link has a long end and a short end. The long end goes into the manual valve, the short end goes into the rooster comb. This unit doesn't even have a lot of check balls to lose. Figure #3 shows check ball locations.

**CHECK BALL LOCATIONS**

Figure 3



### Spring Alert!

One you remove the valve body, take out the servo piston snap ring and then the piston. Be careful here, because the servo piston has a very stiff spring behind it.

When you reassemble this trans, the rounded end of the servo apply rod goes toward the band. To adjust the band, tighten the adjusting screw to 40 lb.-in. Back off the screw 5 turns and then tighten the locknut while you hold the adjusting screw.

Moving up to the front of the 4L30-E, you'll notice that the front seal is held in place by three bolts. (One can't be too cautious now, can one?) Behind the pump is the overdrive section which looks just like the 200-4R.

### These You Can Switch

As a matter of fact, here are a number of parts that can be interchanged with the 200-4R without any problem: The carrier thrust bearing, ring gear to center support washer, overrun drum bushing, carrier bushing, roller clutch, and roller clutch cam.

But *don't* even think of trying to interchange the overdrive carrier, ring gear, or overrun drum.

### Here's Why

The sun gear and the sun gear spline on the overrun drum are smaller. The carrier pinions are larger, and the ring gear's inside diameter is larger in the 4L30-E. The carrier uses hollow pinion pins and has a pressed on oil slinger to direct lube oil to the pinions, much like the late 700's rear planet.

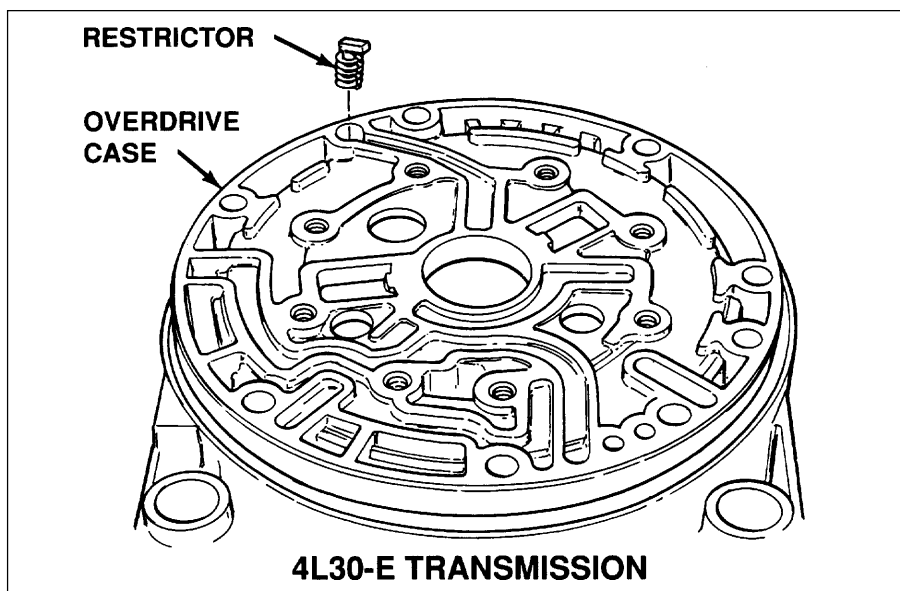


Figure 5

the overrun clutch piston on the later units is a bonded-rubber piston, while the early units used the same stamped steel piston found on a 200-4R. If the bonded-rubber piston is shot in the trans you're working on, and you run into a bind trying to find a new one, you can use a steel piston and lip seals from a 200-4R.

The overrun friction and steel plates in the 4L30-E are slightly thicker than plates in the 200-4R, and are a little different on the outside diameter. In a real pinch, the 200-4R plates should work, so long as the clutch pack clearance is OK.

### Here's a Twist

An unusual thing about this overrun clutch pack is that it is applied in all gears, even park and neutral. The only time this clutch is released is when the transmission shifts into 4th gear.

Line pressure is routed directly to the overrun lockout valve at all times.

Figure 4

Normally, this valve is open to the overrun clutch passage, allowing line pressure to apply this clutch. But when the 4L30-E shifts to 4th gear, 4th clutch feed oil moves the overrun lockout valve against the spring. That allows 4th clutch feed oil to enter the 4th clutch passage and - at the same time - blocks line pressure to the overrun clutch. Thus, the 4th clutch applies, releasing the overrun clutch.

### Endplay Settings

The overdrive case comes off this trans together with the center support. To set main case endplay, use the plastic selective thrust washer on the back of the center support. Use the same washer on the back of the pump to set overdrive case endplay. In both cases the endplay should be .004" to .031". The selective washers that are available are listed in Figure 4.

You have to remove the reverse clutch piston from the center support before you can separate the center support from the overdrive housing. The center support bolts are under the piston.

### How to Avoid a Whazzis??

Once you remove the center support, pay special attention to the small plastic piece in the fluid passage of the overdrive housing. This is an oil

ISUZU PART #	THICKNESS	COLOR
8-96013761 - 0	.060 - .064"	YELLOW
8-96013762 - 0	.067 - .072"	RED
8-96013763 - 0	.075 - .079"	BLACK
8-96013764 - 0	.082 - .086"	NATURAL
8-96013765 - 0	.090 - .094"	GREEN
8-96013766 - 0	.097 - .101"	BLUE

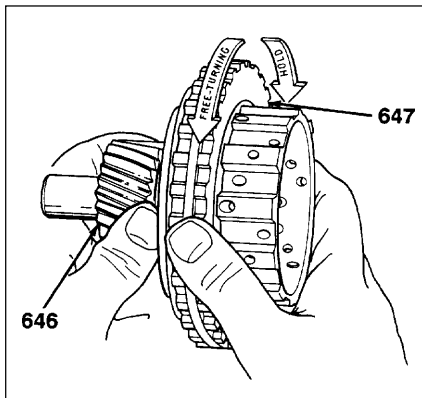
restrictor that sits in the overdrive lube passage, but if you found it sitting on your bench after you disassembled the rest of the trans, you'd never figure out what it is or where it goes. See Figure 5 for its proper location.

From here on back, the rest of the driveline is pretty much what you'll find in a 3L30. Without using a special tool, it can be a bit dicey to compress the snap ring and disassemble the 3rd clutch drum, but if you have a bit of patience, it can be done.

### Backwards is a BUMMER

Because the sprag in this drum can be installed backwards, make sure it holds and freewheels in the same direction as shown in Figure 6. If you put it in backwards, you'll know quickly and without the slightest doubt: The car won't back up, it won't have 1st gear except in Manual 1 or 2, and as soon as it shifts to 2nd, the trans will bind up.

Figure 6



Even though we've been saying how much the 4L30-E and the 3L30 are alike, there are some important differences. In the 3L30, the reaction sun gear and the 1-2 band drum are one piece. In the 4L30-E, the sun gear is a slip fit on the drum.

If you replace the bushing in this drum, be sure the thrust bearing race is in place before you press the bushing into place. The race sits between the

sun gear splines and the bushing. It can be removed or installed only after the bushing is removed.

### Meltdown: It's a Ring Thing

Since the 4L30-E has no governor, the parking lock gear doesn't have the three governor rings you'll find in the 3L30. But don't forget the one sealing ring that seals lube oil for the main case gear train. Leave this ring out and you'll develop an acute case of Main Case Meltdown, even though you'll have plenty of lube in the extension housing.

### Now, The Hard Part

Because of the way this planetary gear set is designed, assembling the back end of this trans can be very difficult. But there is a way to make life easier. If you follow the steps below, you'll see how it's done.

There are two sets of pinion gears in one carrier, front and rear sun gears, and an internal gear. These gears all have to mesh together. Unless you do it right, getting the input sun gear and the internal gear to mesh with the planetary is next to impossible.

### Here's what to do:

Index the planetary before you install it in the transmission case. Look closely at the front of the planet carrier; you'll see marks in the carrier by each

long pinion gear. Two spots have a double mark and two have a single mark.

Each of the long pinion gears also has a double marked and a single marked tooth, as you'll see in Figure 7. Again, look closely, because the marks on the gears are not always easy to see.

Once you know where those critically-important marks are, line up the marks on the gears with the corresponding marks on the carrier. When you have those lined up, carefully install the rear sun gear into the planetary carrier. Double-check to make sure those marks are still lined up, and then install the planetary and sun gear into the case together. Now you can easily install the input sun gear and internal gear into the planetary.

### Beware of Mismatched Ratios

There's one more thing to watch for when you're working with these planetary gears. The 4L30-E is available in a base gear ratio and in an optional ratio with a steeper 1st and 2nd gear. Normally, this option would make no difference. But if you have to replace any components of the planetary gear set, be sure you don't mismatch parts from different ratios. If you do that, even indexing won't save you.

As we noted when we began this article, the 3L30 was a pretty dependable performer. Since the 4L30-E is the next generation, there's no reason to suspect that it won't perform as well. But nothing is perfect, so if you do bump into one of these trans, you'll know what's on your bench.

Figure 7

