

## **Installation Instructions**

1991+ GM 4L80E Transpak Kit Part Number 70376

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Thank you for choosing B&M, The performance company with over 50 years experience designing and manufacturing quality high performance automotive driveline components.

Before proceeding with the installation please read all of the B&M 4L80E Transpak Kit installation instructions so you will be familiar with the series of steps required to install this kit. For other service information on your 4L80E transmission consult the appropriate factory service manual for your vehicle.

Important Note: Since mid 1992 production the 4L80E has been assembled with a heavy duty reusable oil pan gasket. If your pan gasket is damaged or you have a 1991 or early

'92 transmission, you will have to purchase a replacement oil pan gasket at your parts supplier. An Oil Pan Gasket **IS NOT** supplied with this kit.

The B&M 4L80E Transpak Kit mechanically recalibrates your transmission to produce firm positive shifts, this helps reduce clutch pack heat build up and improves transmission durability. This kit does not change or modify shift point RPM in any range. All transmission shift point RPM and pressure control functions remain under full PCM (Powertrain Control Module) control as they were originally.

No recalibration kit can fix an already ailing transmission. If your 4L80E is slipping, overheating, shifting irregularly or making noise, you should have it

repaired before or, in conjunction with the installation of your B&M 4L80E Shift Improver Kit.

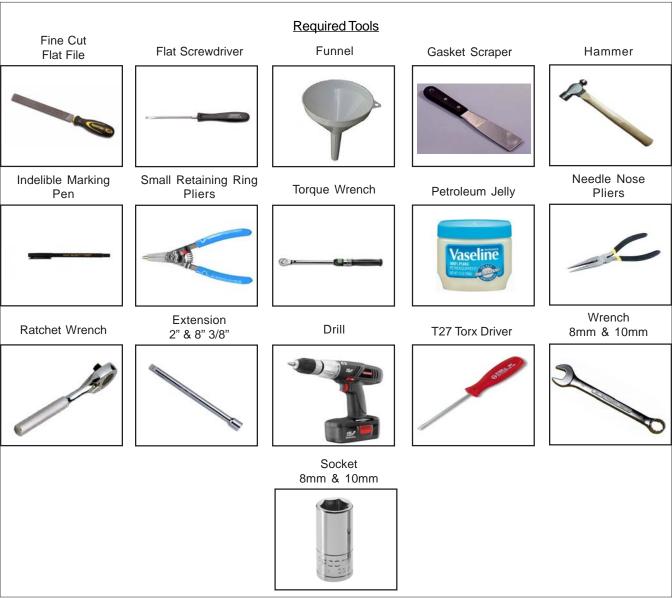
#### **GENERAL 4L80E INFORMATION**

B&M's 4L80E Transpak Kit was designed to provide firm positive shift quality and improve transmission durability in original vehicle installations, especially those with moderate engine power improvements. This kit was not designed for and is not suitable for all out racing applications.

Your 4L80E Transmission is controlled by the PCM which has full control of the 4L80E's operation. All of the parameters that control fluid pressures, shift point RPM and TCC (Torque Converter Clutch) lockup speed have been preprogramed into the PCM at the

## Parts in Kit 3/8" X 5/16" ID (red) Gasket, Case to Gasket, Accumulator Gasket, Valve Body to Drill (5/64, 3/32, #32) Spacer Plate Housing Spacer Spacer Plate 1/2"L x 51/4" ID Shifter Press Control 1/2"L x 5/16"ID (green) 3/8"L x 1/4"ID (white) (orange) Spacer Solenoid Filter Solenoid Filter Spacer Spacer Press Regulator TCC Press Regulator Oil Filter with (red) & 3rd Solenoid Filter Retaining Ring **Boost Valve Kit** Seal Accumulator (blue)

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factory. We have designed this kit as an easy way to overcome the less desirable features of the factory calibrated imperceptible shifts. With this kit you can set the shifting characteristics of your 4L80E to one of two levels of performance, **Heavy Duty** or **High Performance Street**.

- **Heavy Duty** level produces a solid, noticeably firm shift when compared to the stock shift feel.
- High Performance Street level produces a slightly quicker and more aggressive shift compared to Heavy Duty level.

After installing the B&M Transpak Kit the actual shift feel you get will depend on the factory PCM calibration, AutomaticTransmission Fluid (ATF) temperature and the type of ATF you

have used. As ATF temperature increases it becomes thinner (less viscous) which allows the fluid to flow faster through small orifices thereby producing faster shift rates. In addition to the effects of temperature, each type of ATF (B&M Trick Shift™ Dexron ® III, Type F, etc.) has a specific characteristic friction property. This characteristic friction property is one of the variables that determines shift feel and clutch torque capacity. Dexron® type ATF's were formulated to produce smooth imperceptible shifts, while Type F or B&M Trick Shift TM ATF with their higher friction properties results in firmer shift quality than Dexron ® III type ATF. Both DEXRON® III and B&M Trick Shift™ ATF's are suitable for use in your 4L80E transmission. For maximum performance and positive shift feel we

recommend B&M Trick Shift<sup>TM</sup>ATF.

#### SPECIAL INSTRUCTIONS

Choose a clean, dirt and dust free place to work on your 4L80E. Dirt, loose threads from rags and pieces of old gaskets can become lodged in valve bores and/or separator plate orifices and cause the transmission to malfunction. If you do not have a solvent cleaning setup available, get several cans of WD40® to clean your parts.

Warning: Almost all cleaning solvents pose a threat of fumes and or fire. Make sure to use cleaning solvents only in a well ventilated location away from any source of ignition such as open flames, sparks, hot water heaters, etc.

Be careful with the internal and external wiring harness. Wiring and/or connectors are easily damaged and difficult to troubleshoot if they are damaged.

#### VERY IMPORTANT

Use petroleum jelly to hold checkballs and gaskets in place during installation. **DO NOT** use any kind of wheel bearing grease to hold checkballs in place, these greases do not melt or mix readily with ATF and can block shift and pressure control solenoid feed circuit filters and orifices, causing erratic shifts and potentially serious transmission damage because of low line pressure.

#### **CAUTIONS ABOUT PCM.**

The MIL (Malfunction Indicator Light or Check Engine Light) may be illuminated (turned ON) if the vehicle is started and any of the transmission electrical connectors are disconnected or has wires that are broken, or have been pinched and/or shorted. The MIL is programmed to illuminate whenever a system (engine or transmission) component malfunctions and at the same time a DTC (Diagnostic Trouble Code) is set in the PCM. You may have to refer to your owners manual, a GM service manual or visit a GM dealer to determine the source of the malfunction(s) that cause(d) any DTC codes to be set and the required remedy. Make sure your engine is in good tune and any problems related to set trouble codes are repaired BEFORE attempting to install your B&M Transpak Kit.

Do Not attempt to jumper the Data Link connector to read a DTC from the PCM in your vehicle until you have checked your owners manual, GM service manual, or verified with your GM dealer that the particular PCM in your vehicle allows jumpering the data link. Jumpering the data link connector to read DTC's is not possible on any 1996 or later OBD II vehicle and can damage the PCM and result in a very expensive repair bill. Except for some 1991 to 1995 PCM's, all others will require the use of a diagnostic scanner to read. Some DTC codes are "hard codes" and may require a diagnostic scanner to turn them off after the malfunction which set the DTC has been repaired.

If electrical power to the transmission is cut or the PCM fails the 4L80E will

operate in "limp home" mode. If this happens, you will only have Reverse and Drive 2 range available.

Before installing your Shift Improver Kit there are several other B&M products you may wish to consider and are available at your B&M dealer:

## - TRICK SHIFTTMPERFORMANCE

ATF: The industry's only real performance ATF. A specially blended oil formulated with foam inhibitors, extreme pressure agents and shift improvers, this fluid assures protection while delivering the fastest possible shifts. You literally "Pour in performance".

#### - TRANSMISSION OIL COOLER:

We feel that it is very important that every vehicle used in heavy duty or high performance application should have an auxiliary oil cooler. Excessive heat is the primary cause of transmission failures, and an auxiliary oil cooler is an inexpensive safeguard against overheating and failure. B&M offers a wide range of transmission coolers to suit every need.

- DRAIN PLUG KIT (P/N: 80250): 1991 and early 1992 model 4L80E transmission oil pans do not come from the factory equipped with drain plugs. The B&M Drain plug kit is inexpensive and easy to install. It eliminates the mess when changing fluid or on pan removal.

- TEMPERATURE GAUGE KIT (P/N: 80212): Most transmission and converter failures can be traced directly to excessive heat. The B&M transmission temperature gauge can save you a costly repair bill by warning you of an overheated transmission. The B&M temperature gauge comes with all necessary hardware and is easy to install.

# PREPARATION FOR KIT INSTALLATION

Automatic transmissions operate at temperatures in the range of 150° and 250° Fahrenheit. We recommend the vehicle be allowed to cool for several hours before disassembly to avoid burns from hot oil and parts. The vehicle should be raised so there is at least 2 feet ground clearance for ease of installation and safety.

MAKE SURE THE VEHICLE IS RIGIDLY AND SECURELY SUPPORTED.

#### JACK STANDS, WHEEL RAMPS OR A HOIST WORK BEST, DO NOT USE JACKS ALONE.

Have an oil drain pan ready to catch oil and a tray on which to put small parts so they won't get lost.

It can never be said enough: Make sure you have a clean, dust free place to work. Burrs and dirt are the number one enemies of an automatic transmission. Contamination in the valve body or pressure regulator valve train can result in serious transmission damage and un-predictable operation. Transmission components are precision fit. Work slowly and do not force any parts.

This kit contains all parts necessary to obtain two different shift feel levels of performance depending on the intended use:

- **1. Heavy Duty level:** Towing, campers and, 4-wheel drive vehicles. Shift feel is firm and positive.
- **2. High Performance Street level:** Dual purpose performance vehicles. High Performance Street level produces the firmest shift feel.

#### **DISASSEMBLY**

**STEP 1.** Position your drain pan under the transmission to catch the ATF.Remove oil pan by first removing rear pan bolts, then work towards the front. Loosen but do not remove the three front bolts. If the pan sticks to the gasket, insert a flat screwdriver between the pan and case and pry down gently to break pan loose. Now slowly back out the front three bolts to permit draining the ATF. Remove pan gasket and inspect for damage. The Oil Pan Gasket is reusable (if not damaged) except on 1991 and early '92 transmissions. An Oil Pan Gasket IS NOT included with this kit. If your gasket is damaged, ypu will have to purchase one at your parts supplier.

**STEP 2.** Remove the oil filter from case by gripping it firmly and pulling it straight out away from the case. Inspect the filter pickup tube seal that is pressed into the pump housing (See Fig. 1). If the seal and filter appear to be in good condition they may be reused, otherwise both the seal and filter should be replaced.

**STEP 3.** There are several different wiring harness configurations used on the 4L80E. Before proceeding further, make a sketch and some notes describing your particular unit, recording

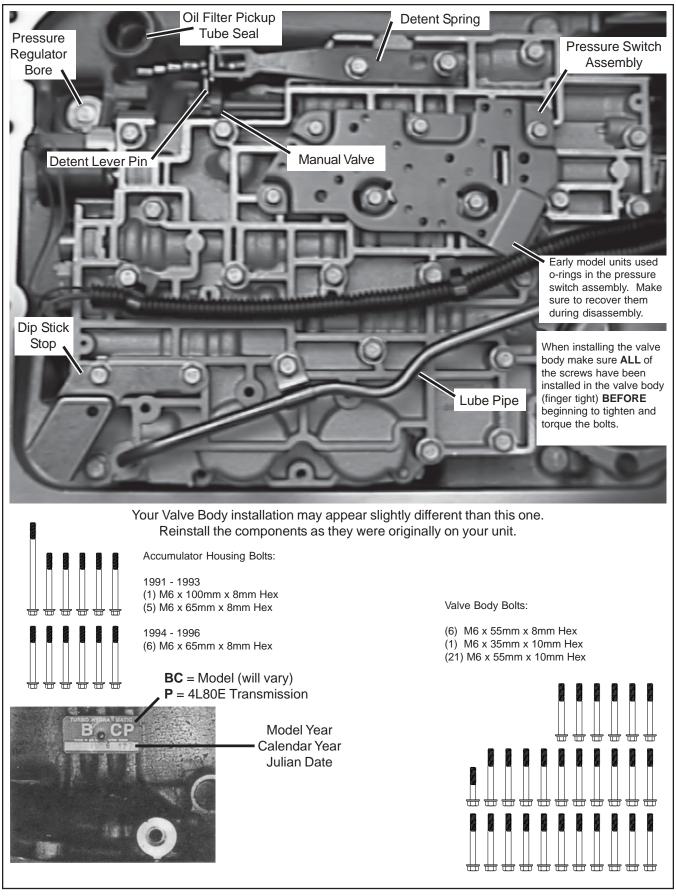


Figure 1: Valve Body & Trans I.D.

which connectors go to which solenoid (**See Fig. 1**). Pay particular attention to the location of the cable clamps and dipstick stop bracket. Notice how the connectors and wires are colored. Remove connectors from pressure switch assembly and solenoids then tie the wires up out of the way.

STEP 4. Remove all except the center valve body bolt. Pull the lube pipe out of the case, pulling it out first at the front then at the rear. When removing the pressure switch, be sure to recover all 5 switch assembly Oring seals as it is removed. Hold the valve body firmly with one hand and remove the remaining bolt slowly. Notice how the Manual Valve is engaged to the detent lever as you remove the valve body from case. Caution: There are eight (8) check balls in the case above the valve body along with several pints of oil (export units and some early models have nine (9) check balls). Have your drain pan ready to catch the oil and check balls. Save all the check balls in a secure place where they won't get lost.

**STEP 5.** Remove the 6 screws holding the accumulator housing to the valve body (**See Fig. 7**). Be careful to keep the 2 or 3 accumulator springs located inside the housing aligned with their respective bores.

**STEP 6.** Remove all of the old gasket material stuck to the Case flange, Oil Pan, Vavle Body, Spacer Plate and Accumulator Housing.

## **MODIFICATIONS**

#### Pressure Regulator STEP 7. Heavy Duty and High Performance Street levels:

Remove the snap ring at the end of the pressure regulator bore (See Fig. 2). Use a screwdriver to push against the spring loaded Boost Valve sleeve while removing the retaining ring. Remove Boost Valve Sleeve and Valve, Pressure Regulator Spring and the Pressure Regulator Valve. Reassemble the pressure regulator assembly in reverse order using the supplied RED Pressure Regulator Spring, Boost Valve, Boost Sleeve and Retaining Ring. Important: Early model 4L80E (1991-early 1992) require the Boost Valve and OEM pressure regulator valve to be modified. Follow Sonnax Instructions that are provided to make the required modifications. Do not intermix early and late Pressure Regulator Valves, Booster Valve or Sleeve. The provided Balance Oil Plug should only be installed when the transmission is out of the vehicle because the pump assembly needs to be out of the unit. It is installed on the backside of the Pressure Regulator Valve, refer to the Sonnax instructions provided. Make sure the retaining ring is fully seated in its groove when assembled. If the retaining ring is not fully seated in its groove, the pressure regulator assembly will blow out of its bore when the engine is started, resulting in NO LINE pressure.

## Spacer Plate STEP 8. Heavy Duty and High Performance Street levels:

Drill the orifices as indicated (See Figure 3) with the supplied drill bits. Be careful to use the specified size drill and only drill the holes indicated for the Perfomance Level you have chosen. For best results first use an indelible pen to mark the holes to be drilled on the spacer plate, and then double check your marks against Figure 3. Drill the smaller hole sizes first. If you incorrectly drill your spacer plate, you can obtain one from your GM Parts Department, B&M does not stock 4L80E Spacer Plates. Be sure to take the build Year and Model information (See Fig.1) located on the tag on the right hand side of the transmission when ordering parts for your 4L80E.

## Reassembly

STEP 9. Replace the Pressure Control Solenoid (PCS) Filter and Shift Solenoid Feed (SSF) Filter (See Fig. 4). in the Valve Body with the new filters supplied in the kit. Coat the O-rings on the filters with clean ATF prior to installation. The PCS Filter is removed by pulling it straight up out of the Valve body. Remove the SSF filter by first removing the Filter Bore Plug Retaining Pin and then the Manual Valve from its bore. Very carefully insert an 8" long 3/8" drive extension into the Manual Valve bore and gently push the SSF filter out of its bore. Reassemble both filters in reverse order of disassembly. Remove the TCC Solenoid Screen from the case (See Fig. 8) and replace it with the new filter from kit. STEP 10. Apply a few dabs of Petroleum Jelly to both sides of the CLEAN drilled and deburred Spacer Plate then stick the Spacer Plate Gaskets (See

**Fig. 5**) onto the appropriate sides of the plate and line up the holes. Place the Spacer Plate on the Valve Body and insert several Valve Body Screws to help line up with the holes.

#### **Accumulators**

## STEP 11. Heavy Duty Level Only:

Remove the 4th Accumulator piston from its bore (**See Fig. 6**). Install the 3/8" long WHITE or RED spacer over the piston pin and reinstall the piston. **STEP 12**. *High performance Street Level Only:* Remove the 4th Accumulator piston from its bore (**See Fig. 6**). Install the 1/2" long ORANGE or GREEN spacer over the piston pin and

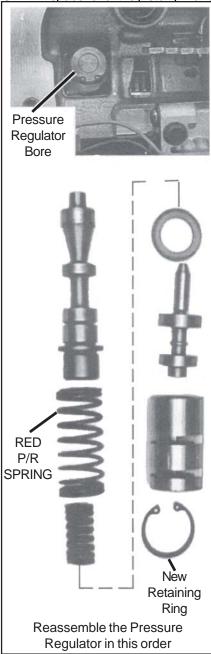
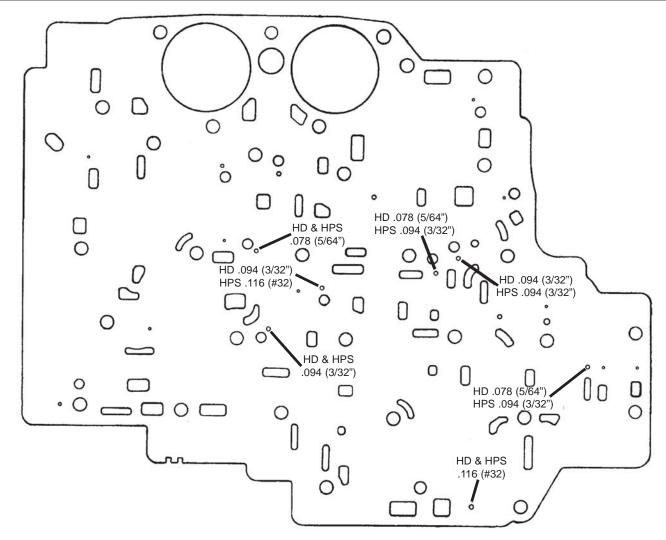


Figure 2: Pressure Regulator



**HD=Heavy Duty Level** 

**HPS=High Performance Street Level** 

There were 3 Spacer Plate designs used in the 4L80E from 1991 to 1996. The outline and some features on your Spacer Plate may appear slightly different when compared to the illustration. The drilled orifice locations however are the same for all 1991 through 1996 versions.

Using an indelible pen, first mark the orifices to be drilled on your spacer plate and then double check the marked locations against the above illustration. Drill the smaller orifice sizes first. Drilling the orifices larger than specified will result in unpredictable shift characteristics and possible transmission damage.

reinstall the piston.

**STEP 13.** Heavy Duty and High Performance Street levels: Replace the stock 3rd Accumulator Spring with the BLUE 3rd Accumulator Spring included in the kit (See Fig.6).

**STEP 14.** Stick the Accumulator gasket in place on the spacer plate with petroleum jelly. Place the accumulator springs and housing onto valve body. Install six (6) M6 x 65mm (Late model) of five (5) M6 x 65mm and one (1) M9 x 100mm (early model) bolts and turn them down evenly. Make sure all of the Spacer Plate and Gasket holes are lined up with the Valve Body holes then

Figure 3. Spacer Plate Modification

torque the Accumulator Housing bolts to 11 Nm(8 lb ft).

STEP 15. Check Balls: If the transmission is in the vehicle it is easiest to place the Check Balls (See Fig. 7) in the appropriate positions on the Spacer Plate and then install the Valve Body. If the transmission is on the bench then placing the Check Balls in the case cavities (See Fig. 8) is the correct placement method. Use a dab of Petroleum Jelly to hold the Check Balls in place. Most transmissions will have eight (8) Check Balls although, export models and some early models have nine (9). Only eight (8)

Check Ball positions are used with this kit regardless if you originall had nine (9) Check Balls or eight (8).

STEP 16. Make sure the Front Servo (See Fig. 8) is correctly installed if it was removed or fell out of its bore while the Valve Body was removed. Wiping the bore dry and then coating the piston with petroleum jelly will usually help to hold the Servo Piston up in the case during Valve Body installation.

**STEP 17.** Make sure the Spacer Plate gaskets are properly positioned and the Check Balls are in place. Carefully assemble the Valve Body to Case while



Figure 4: PCS and SSF Filters

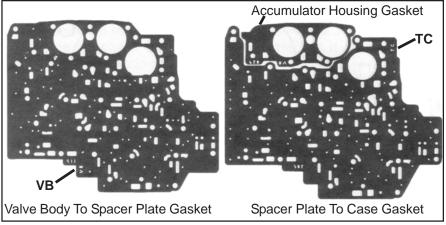


Figure 5: Spacer Plate Gaskets

guiding the Detent Lever Pin into the Manual Valve groove. Push the Valve Body firmly against the Case and install one (1) screw, finger tight, in the center of the Valve Body to hold it in place. Install the Pressure Switch Assembly with six (6) M6 x 55mm x 8mm Hex head screws. Install the Lube Tube, remaining clips and Dip Stick Stop. When all of the screws have been installed, torque them to 11 Nm (8 lb ft) starting in the center and working circularly outward. Attach wire loom electrical connectors.

**STEP 18.** Install the new oil filter with seal provided in kit (See Fig. 1) into the case.

## STEP 19. DOUBLE CHECK THE FOL-LOWING:

- **1.** Manual Valve Body is properly engaged with pin on detent lever.
- 2. All bolts are installed and torqued.
- **3.** Wiring harness connectors are engaged to switch assembly and solenoids.
- **4.** Pressure Regulator Retaining Ring is fully seated in its groove.

STEP 20. Coat the Oil Filter pickup tube with clean ATF then push the tube into the filter seal in the case. Install the Oil Pan and Gasket then torque the seventeen (17) bolts to 24 Nm (18 lb ft). Fill transmission with ATF to the full mark on dip stick. You will need about 6 to 7 quarts. Dexron®III

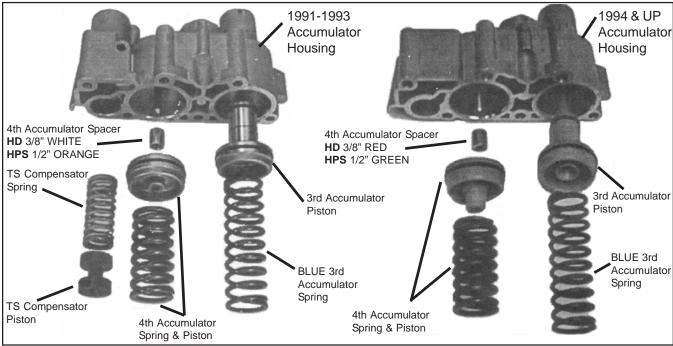


Figure 6. Accumulator Assembly

is fine for Heavy Duty Level applications however, we recommend B&M Trick Shift TMATF for High Performance Street level applications.

With the vehicle still off the ground, start the enging and shift the transmission through all gears. Check for leaks around oil pan flange and drain plug. Place selector in neutral and check the fluid level. Turn engine off and then lower vehicle.

**STEP 21.** Test drive vehicle and recheck for leaks while transmission is hot. Check fluid level again, adjusting level as required.

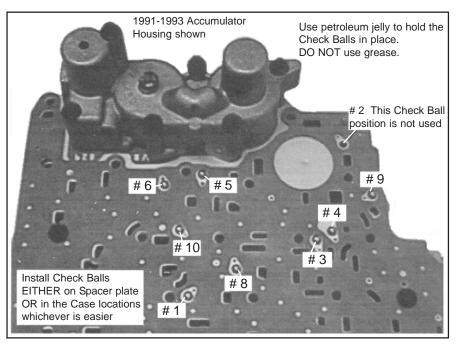


Figure 7. Check Ball Placement on Spacer Plate.

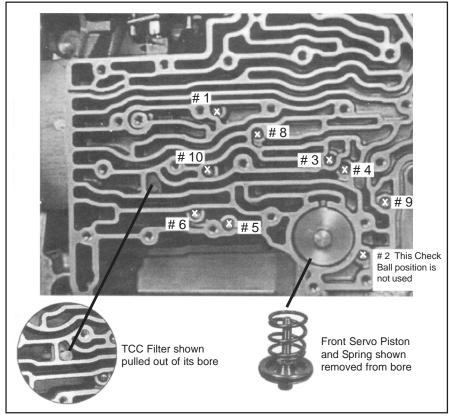


Figure 8. TCC Filter and Case Check Ball Locations.

ERROR CONDITION	WHERE TO LOOK	FOR CAUSE
High or Low Oil Pressure	Oil Pump	- Pressure Regulator Valve Stuck.
	Oil Filter	<ul> <li>P/R Retainnig Ring not fully seated in groove.</li> <li>Cracks in Filter Pickup Tube.</li> </ul>
	Oli Filler	- Pickup Tube Seal Damaged.
		<ul> <li>Wrong grease used on reassembly (clogged solenoid filter).</li> </ul>
	Wire loom	- Electrical connectors not fully engaged.
	Valve Body Assembly	- Spacer Plate or Gaskets misassembled or damaged.
		- Check Balls omitted or misassembled.
	5 0 1 10 1 11	- Valve Body or Accumulator Housing bolts loose.
Harsh/Soft Shifts	Pressure Control Solenoid	- Stuck "ON"
Haisi/Soil Sillis	Valve Body Assembly	<ul> <li>Wrong holes drilled is Spacer Plate.</li> <li>Spacer Plate or gaskets misassembled or damaged.</li> </ul>
		- Check Balls omitted or misassembled.
	Oil Pump	- Pressure Regulator Valve Stuck.
	Accumulator Assembly	- Wrong Spring or Spacer installed.
	Accumulator Accombly	- Damaged or missing Accumulator Housing gasket.
		- Accumulator Housing bolts loose.
Inconsistent or No Shifts	Valve Body Assembly	- Spacer Plate or gaskets misassembled or damaged.
	,	- Pressure Switch Assembly connector not fully engaged.
		- Pressure Swith Assembly/Valve Body bolts loose.
	External Linkage	<ul> <li>Manual Shift Lever Linkage misadjusted.</li> </ul>
	Wire loom	<ul> <li>Electrical connectors not fully engaged.</li> </ul>
No or Slips in 1st Gear	Low Oil Pressure	- (See above)
	Valve Body Assembly	- Spacer Plate or gaskets misassembled or damaged.
		- Solenoid disconnected or damaged.
No or Slipping 2-3 Shift	Valve Body Assembly	- Spacer Plate or gaskets misassembled or damaged.
No or Slipping 3-4 Shift	Valve Body Assembly	<ul> <li>Spacer Plate or gaskets misassembled or damaged.</li> <li>Solenoid disconnected or damaged.</li> </ul>
No or Slipping Reverse	Valve Body Assembly	- Spacer Plate or gaskets misassembled or damaged.
140 of Olipping Neverse	Oil Pump	- P/R Retaining Ring not fully seated in groove.
	External Linkage	- Manual Shift Lever Linkage Misadjusted.
No TCC Apply	TCC Solenoid	- Solenoid disconnected or wiring damaged.
'''		5 5

PART NUMBER 34200-03K

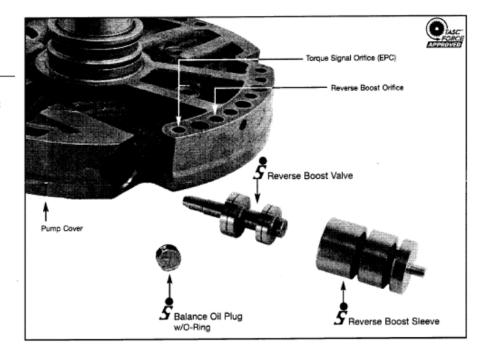
## "Factory Style" Reverse Boost Valve & Sleeve

#### 34200-03K

- 1 Boost Valve
- 1 Boost Sleeve
- 1 Balance Plug & O-Ring

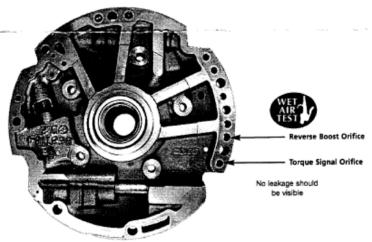
#### Notes

- Kit includes instructions to retrofit parts dating back to '89.
- Wet Air Tests can be done using either the reverse boost orifice or the torque signal orifice for this particular application.



#### **Wet Air Test**

To test for a worn reverse boost sleeve and valve assembly, perform a Wet Air Test with the pump halves still torqued together. Put a small amount of oil into either the reverse boost or torque signal orifice. Force low air pressure into the orifice. If oil comes out of the other orifice, there is leakage across the reverse boost/torque signal circuit. If there is a excessive leakage, the sleeve I.D. is worn, pump bore is leaking around the sleeve, or the pump is not flat. Discard both the OEM sleeve and valve and replace with Sonnax kit 34200-03K. It is a good idea to perform the Wet Air Test again after installing the Sonnax kit. Continued leakage after replacing the boost valve/sleeve (with o-ring design) indicates cross leakage between the pump halves. Replace or resurface the pump halves to eliminate the remaining leakage.





PART NUMBER 34200-03K

#### **Balance Oil Plug Instructions:**

- 1. Remove the balance oil plug last after disassembly of pump halves and pressure regulator valve.
- 2. Remove the roll pin and drive the plug outward from the pressure regulator bore.
- 3. Reinstall the end plug after the pressure regulator valve. This procedure will prevent the plug from being installed too far into the larger bore.

#### Bore Preparation Instructions (On o-ring designed parts):

Sharp leading edges or casting surfaces must be deburred with a file and/or a new ScotchBrite<sup>TM</sup> pad or 320 grit emery cloth. The areas that usually create a concern are the balance oil plug roll pin cross holes, the boost sleeve entry near the snap ring groove and the sleeves entry across the oval opening in the pump casting.

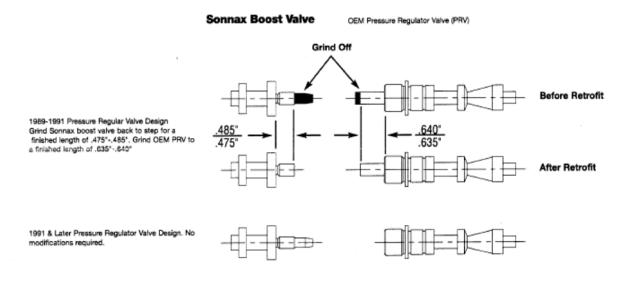
#### 1996 & Earlier vs. 1997 & Later OEM boost valve designs:

Starting in 1997 the larger of the two boost valve diameters was decreased from .855" to .830". A corresponding diameter change is also found in the mating boost sleeve. 1997 & later OEM boost valves/sleeves can be identified by a groove machined in the end of the sleeve. The design change was made to reduce the maximum reverse pressure by approximately 40-50 psi. 1996 & earlier boost valves can be replaced with the Sonnax design as long as the valve and sleeve are both replaced.

#### 1989-1991 Retrofit Instructions:

Between 1989 and 1991 the OEM pressure regulator valve and boost valve used a different design. The pressure regulator valve was longer and the boost valve shorter. The Sonnax boost valve can be modified for use with 1989-1991 OEM pressure regulator valves. The retrofit involves shortening both the Sonnax boost valve and the pressure regulator valve (see illustration). For newer OEM pressure regulator valve designs no alterations are required.

High line pressure will result from using the late design boost with an early unmodified pressure regulator valve.





**NOTE:** Complement your B&M Transpak Kit with some of the following products. Check the B&M website at www.bmracing.comforvarious options:



B&M Shift Plus 2 Transmission Controller #120001



B&M Remote TPS (Must be used with #120001) #120002



B&M Drain Plug Kit #80250



Cast Aluminum Deep Pan (Adds 3 qt.) #70295 For 4L80E 1993-1998



B&M Transmission Oil Cooler #70264 (SuperCooler) #70297 (Hi-Tek Cooler)



B&M Trick Shift <sup>TM</sup> (For Pre-2000 vehicles) #80286

## **Technical Service**

A highly trained technical service department is maintained by B&M Racing and Performance to answer your technical questions, provide additional product information and offer various recommendations.

Technical service calls, correspondence, and warranty questions should be directed to the following address:

B&M Racing and Performance 1500 Overland Ct West Sacramento, CA 95691 Phone (808) 544-4761 Monday-Thursday 6AM to 12PM AND 1PM to 5PM PST Friday 6AM to 130PM