1995-96 AUTOMATIC TRANSMISSIONS

ZF 5HP18 & ZF 5HP30 Electronic Controls & Overhaul

APPLICATION

TRANSMISSION APPLICATION

Application	Transmission Model
1995	
M3	ZF 5HP18
530i & 530iT	ZF 5HP18
540i	ZF 5HP18
740i	ZF 5HP30
840Ci	ZF 5HP30
1996	
740i	ZF 5HP30
840Ci	ZF 5HP30

IDENTIFICATION

Transmission identification plate is attached on side of transmission case. See **Fig. 1** . Numbers on identification plate indicate number of gears 5, type of controls "H" (Hydraulic), and type of gears "P" (Planetary).

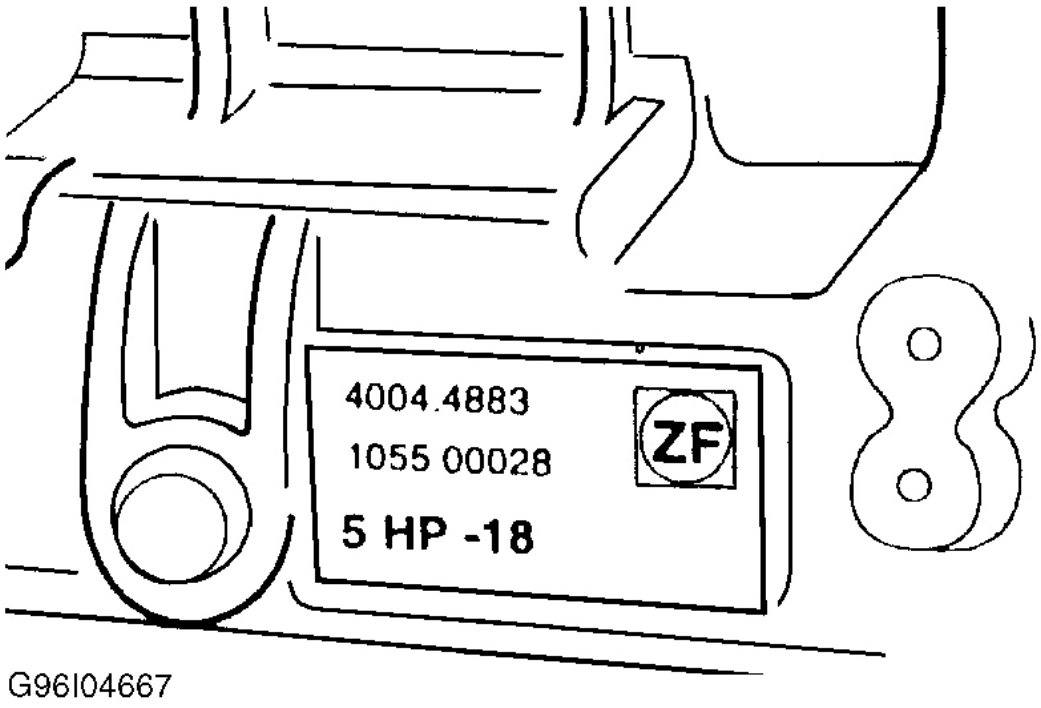

Fig. 1: Locating Transmission Identification Plate
Courtesy of BMW OF NORTH AMERICA, INC.

DESCRIPTION & OPERATION

Automatic transmission is electronically controlled and has 5 forward speeds and one reverse speed. Transmission consists of clutches, brakes, one-way clutches and a lock-up torque converter. See **Fig. 2** . Transmission shifting is controlled by operation of shift solenoids on the valve body. The Electronic Control Unit (ECU) or Transmission Control Unit (TCU) controls shift solenoid operation by information supplied by various inputs. Transmissions are equipped with various shift modes. See SHIFT MODES under DESCRIPTION & OPERATION.

SHIFT MODES

1. Transmission is equipped with 2 different shift modes, Manual ("M") mode and Economy ("A") mode. Economy ("A") mode may be used to provide maximum fuel efficiency. When in Economy mode, torque converter lock-up will activate.
2. Manual ("M") mode is for single gear driving. When in Manual mode, transmission will remain in the selected gear. For example, if shift lever is in "D" range, transmission will remain in 3rd gear. Manual or Economy mode may be selected by using shift mode switch, located near shift lever on console.

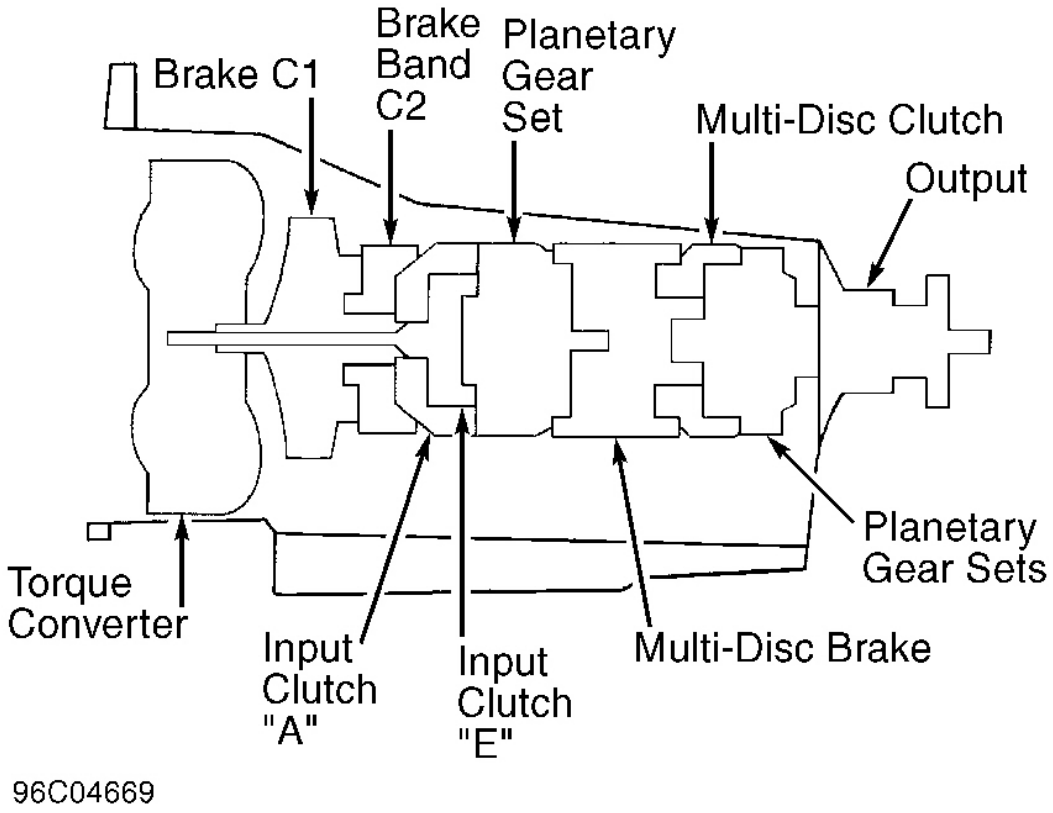

Fig. 2: Identifying Transmission Components (5HP18 Shown; 5HP30 Similar)
Courtesy of BMW OF NORTH AMERICA, INC.

LUBRICATION & ADJUSTMENTS

See **SERVICING** article.

TROUBLE SHOOTING

PRELIMINARY INSPECTION

NOTE: Following trouble shooting procedures apply to 5HP18 transmission. Trouble shooting procedures for 5HP30 transmission are not available from manufacturer at time of publication.

Transmission malfunctions may be caused by poor engine performance, improper adjustments, or failure of hydraulic or mechanical components. Always begin by checking fluid level, fluid condition, linkage and cable adjustments. Perform road test to determine if problem has been corrected. If problem still exists, several tests must be performed on transmission. See **TESTING** .

SHIFT LEVER IN POSITION "P"

Park Will Not Engage Or Does Not Hold

Selector linkage between selector lever and transmission improperly adjusted. Excessive friction in parking lock mechanism. Defective parking pawl mechanism.

Engine Cannot Be Started In "P"

Transmission switch faulty.

SHIFT LEVER IN POSITION "R"

No Reverse Gear

Selector linkage between selector lever and transmission improperly adjusted. Defective clutch "B". Brake "D" defective; also no engine braking in 1st gear. Brake "G" defective. Signal wire to solenoid No. 3 grounded. Valve piston for reverse gear lock not in parked position.

Hard Engaging Jolt "P"-"R" Or "N"-"R"

Idle speed too high. Brake "G" defective. Modulation pressure too high. Open in pressure regulator circuit. Pressure regulator defective.

Back-Up Lights Do Not Come On (Electrical System Okay)

Transmission switch faulty.

SHIFT LEVER IN POSITION "N"

Car Moves Or Creeps

Selector linkage between selector lever and transmission improperly adjusted. Defective clutch "A"

SHIFT LEVER IN POSITION "D"

No Forward Gear Engagement

Defective damper "A". Signal wire to solenoid No. 5 grounded.

Hard Engaging Jolt "N"-"D"

Idle speed too high. Clutch "A" damper defective. Open in pressure regulator circuit. Pressure regulator defective. Modulation valve defective. Defective valve body.

No 1-2 Or 2-1 Shift (Warm Or Cold)

Brakes C1 and C2 defective. Insufficient oil supply to brakes C1 and C2. Open in output speed sensor circuit.

Output speed sensor defective. Signal or other wiring to solenoid No. 1 grounded or open. Solenoid No. 1 defective. Shift valve No. 1 seized in parked or pushed position. Damper C2 or clutch valve C1 seized. Shift valve No. 3 seized in parked position.

No 2-3 Or 3-2 Shift

Clutch "F" defective. Insufficient oil supply to clutch "F". Signal wire to solenoid No. 2 defective. Solenoid No. 2 defective. Shift valve No. 2 seized in pushed position. Pulling valve 2-3 seized in parked position. Signal or positive wire to solenoid No. 2 defective. Shift valve seized in parked position. Pulling valve 2-3 seized in pushed position.

No 3-4 Or 4-3 Shift

Clutch "E" defective. Insufficient oil supply to clutch "E". Brake band C2 defective (shift 1-2 also not okay). Insufficient oil supply to brake C2. Signal or positive wire to solenoid No. 3 grounded. Solenoid No. 3 defective. Shift valve seized in pushed or parked position.

No 4-5 Or 5-4 Shift

Defective valve body. Clutch "A" defective. Signal or positive lead to solenoid valve No. 1 defective. Shift valve No. 4 seized in parked position. Damper C2 blocked. Solenoid No. 1 faulty. Shift valve No. 4 seized in pushed position.

Car Starts Off In 2nd Gear

Signal or positive wire to solenoid No. 1 defective. Shift valve No. 1 seized in parked position.

Car Starts Off In 3rd Gear

Signal or positive wire to solenoids No. 1 and 2 defective. Shift valves No. 1 and 2 seized in parked position.

Car Starts Off In 4th Gear

Open circuit in transmission voltage supply (transmission without current). Shift valves No. 1, 2, and 3 seized in parked position.

SHIFT POINTS

No-Load Shift Incorrect

Modulator valve defective. Wire to pressure regulator defective. Pressure regulator defective. Damper malfunction.

Full-Load Shift To Kickdown Too Long

Plates broken, Valve body defective. Pressure reducing valves No. 1 and 2 defective. Modulation valve function defective. Pressure regulator defective.

No Kickdown Shifts, Only Partial Load/Full Load Shifts

Open or short circuit in wiring. Kickdown switch defective. Kickdown switch misadjusted.

Shift Speed & Shift Quality Poor

Defective temperature sensor.

Engine "Flares" In Shift 2-1

Poor friction torque at plates. First gear one way gear defective.

Engine "Flares" In Shift 2-3/3-2

Poor friction torque at plates.

Engine "Flares" In Shift 4-3

Poor friction torque at plates. Third gear one way gear defective.

Engine "Flares" In Shift 4-5/5-4

Poor friction torque at plates.

Engine Dies From Shift 2-3/3-2 (Overlapped Condition)

Signal or positive lead to solenoid valve No. 4 defective. Solenoid No. 4 defective. Pull/push valve No. 1 moves too hard. Aperture for damper "G" clogged. Damper "F" moves too hard. Pull valve 2-3/3-2 moves too hard.

Engine Dies From Shift 4-5/5-4 (Overlapped Condition)

Signal or positive lead to solenoid valve No. 5 defective. Solenoid No. 5 defective. Pull/push valve No. 2 moves too hard. Damper C2 defective. Pull valve 4-5/5-4 moves too hard. Damper "A" moves too hard.

Wrong Shift Points Or Oscillating Shifts

Idle speed too high or low. Idle speed control valve defective.

No Engine Braking Effect/No Manual Downshift 5-4

Clutch "A" damaged. Valve body defective.

No Engine Braking Effect/No Manual Downshift 4-3/3-2

Valve body defective.

No First Gear/No Braking Action

Brake "D" defective. Valve body defective.

No Engagement In Forward Or Reverse

Driver pressed off impeller.

PROGRAM SWITCH

"A" Or "M" Program Always On Or Off

Open circuit in signal wire to program switch. Switch faulty.

SELECTOR LEVER POSITION SWITCH

Vehicle Remains In Shifted Gear

No voltage supply/fuse blown. Open circuit in signal wire. Switch defective.

TORQUE CONVERTER CLUTCH OPERATION

Torque Converter Lock-Up Clutch Engagement Too Hard

Defective converter clutch function. Torque converter defective.

No Converter Lock-Up Clutch

Defective torque converter. Signal or positive wire to solenoid No. 6 defective. Solenoid No. 6 defective.

Engine Dies When Stopping Car In Drive (Converter Lock-Up Clutch Always Engaged)

Signal wire to solenoid No. 6 grounded. Converter lock-up clutch valve seized in pushed position. Solenoid No. 6 defective.

NOISE FROM TRANSMISSION

Loud Oil Pump Intake Noise

Oil level too low. Valve body leaks. Oil strainer dirty. Round seal on oil filter missing or defective.

Noisy & No Gear Engagement After Long Trip

Oil filter screen dirty.

TRANSMISSION LEAKS

Oil Dripping From Converter Bellhousing

Round seal on oil pump body leaks. Round seal on pump body leaks. Radial oil seal for converter leaks.

Leak Between Transmission Case & Oil Sump

Mounting bolts loose. Gasket defective.

Output Leaks

Radial oil seal for output flange leaks. "O" ring for transmission extension leaks.

TESTING

HYDRAULIC PRESSURE TEST

Main Pressure

Connect Pressure Gauge (13 3 061) and Hose (24 0 021). Unscrew and remove plug from right side of transmission case. See **Fig. 3** . Install Adapter (24 0 022). Install pressure gauge and hose to adapter. Start and run engine at idle. Main pressure should be 78-92 psi (5.4-6.4 kg/cm^2).

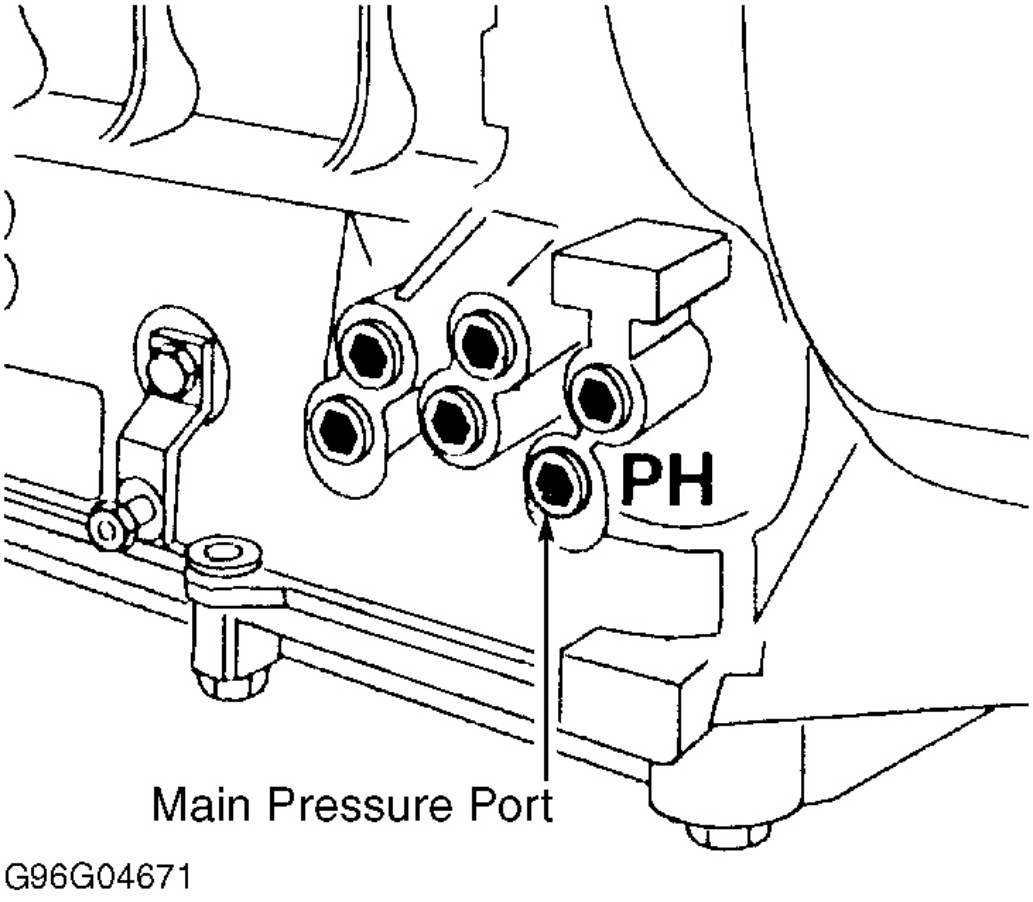

Fig. 3: Locating Pressure Test Port

Courtesy of BMW OF NORTH AMERICA, INC.

REMOVAL & INSTALLATION

TRANSMISSION

See **REMOVAL & INSTALLATION** article.

EXTENSION HOUSING BEARING

Removal & Installation (5HP18)

Remove output flange. See **OUTPUT FLANGE SEAL** . Remove lock ring and bearing. Heat transmission extension with a hot air blower around inner bearing race area. Press out outer bearing race. See **Fig. 4** . To install, reverse removal procedure.

Removal & Installation (5HP30)

Remove both inner bearing races. See **Fig. 5** . Remove lock ring. Remove bearing. To install, reverse removal procedure.

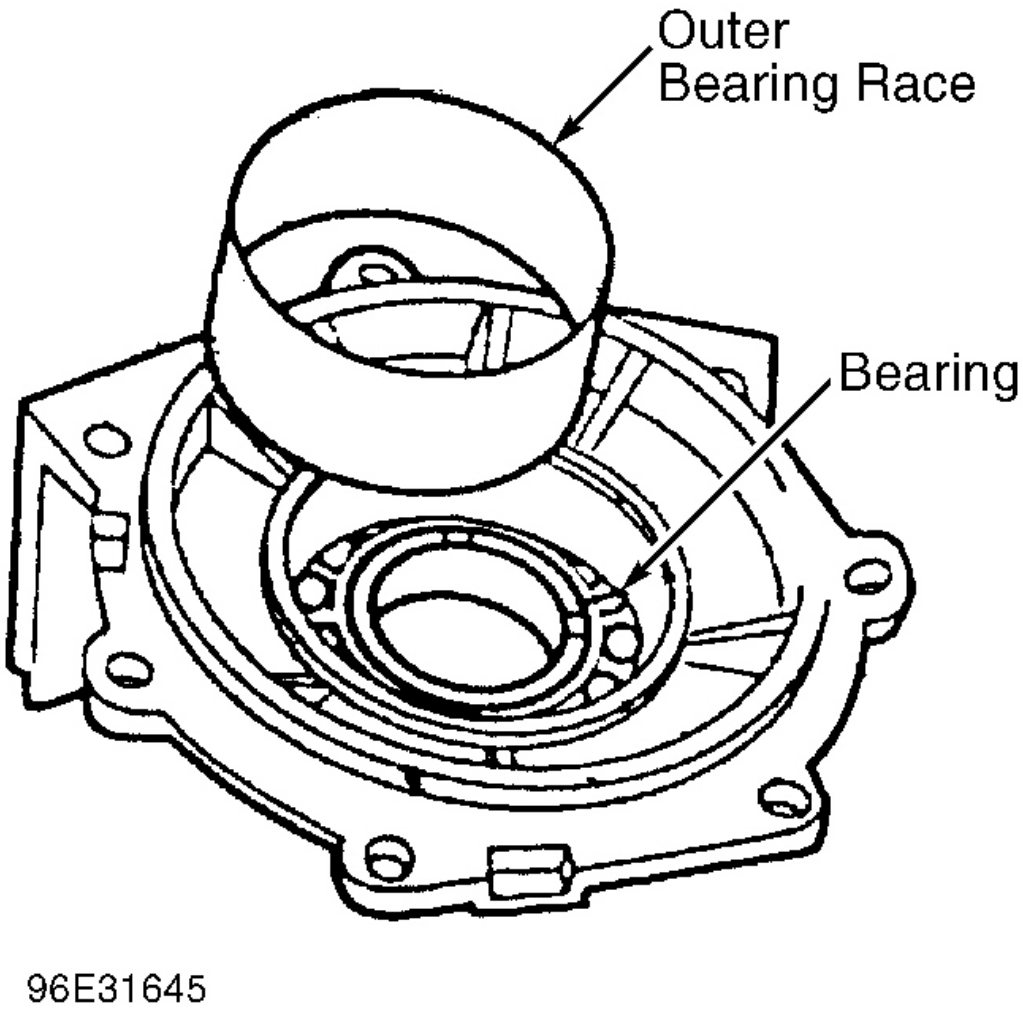

Fig. 4: Removing Outer Bearing Race (5HP18)
Courtesy of BMW OF NORTH AMERICA, INC.

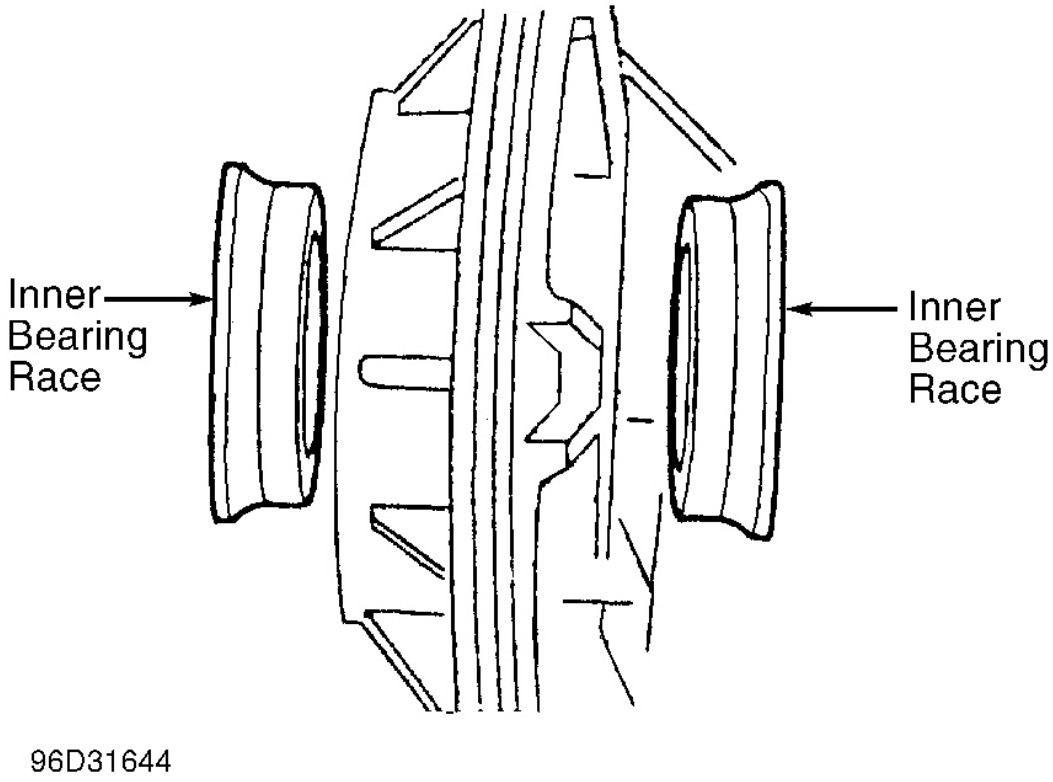

Fig. 5: Removing Inner Bearing Races (5HP30)
Courtesy of BMW OF NORTH AMERICA, INC.

OIL PAN

Removal & Installation (5HP18)

1. Remove drain plug from oil pan. Drain transmission oil. Remove oil pan bolts. See **Fig. 6** . Remove oil pan.
2. To install, reverse removal procedure. Clean oil pan and magnetic washers. Install rounded bracket on edges of oil pan. Install new gasket. Tighten oil pan bolts to specification. See **TORQUE SPECIFICATIONS** .

Removal & Installation (5HP30)

1. Remove drain plug from oil pan. Drain transmission oil. Remove oil pan bolts. Lift expansion tank off oil pan. Remove clips and magnets.
2. To install, reverse removal procedure. Clean oil pan and magnets. Install magnets. See **Fig. 7** . Install new gasket. Tighten oil pan bolts to specification. See **TORQUE SPECIFICATIONS** .

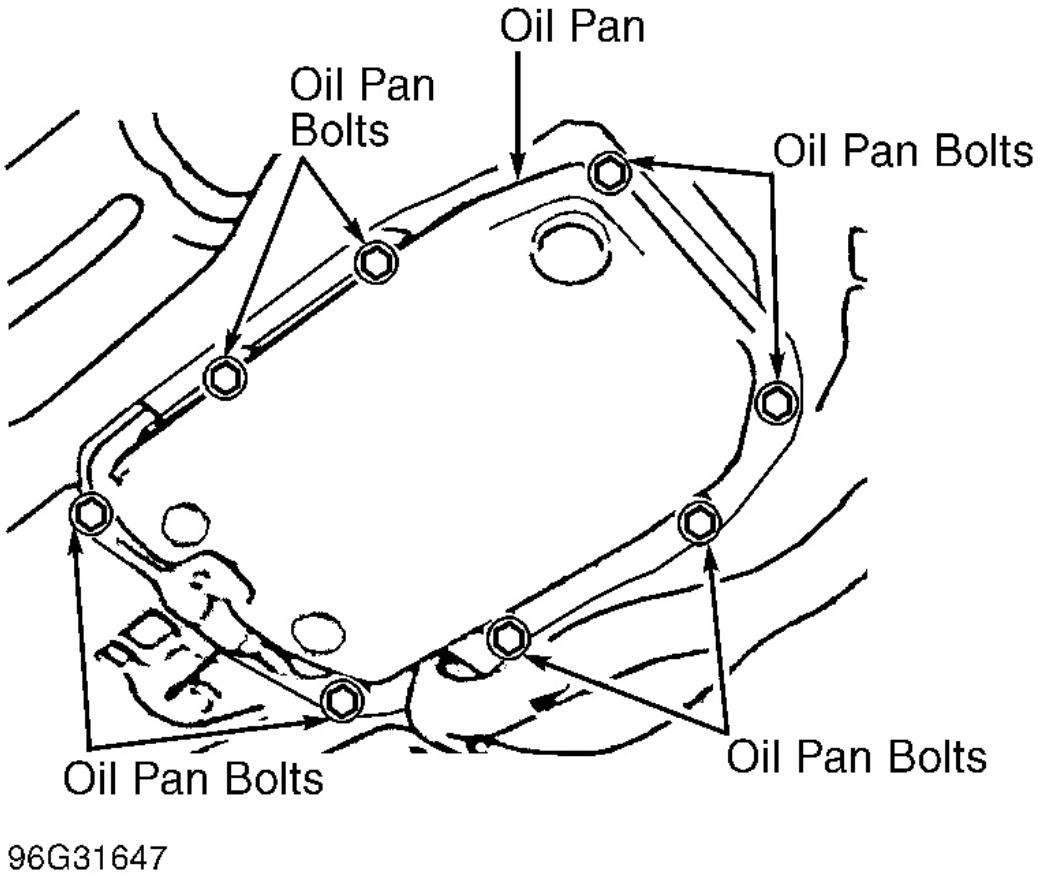

Fig. 6: Removing Oil Pan Bolts (5HP18)
Courtesy of BMW OF NORTH AMERICA, INC.

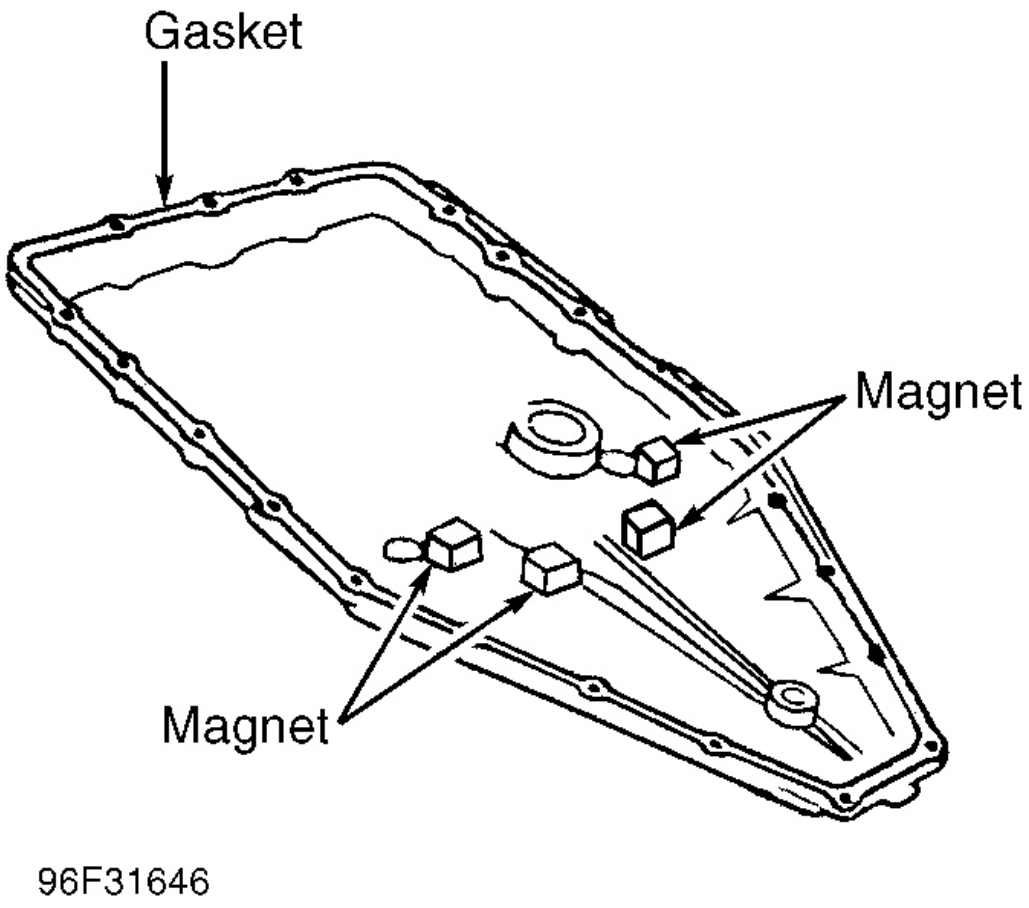

Fig. 7: Installing Magnets In Oil Pan (5HP30)
Courtesy of BMW OF NORTH AMERICA, INC.

OIL PUMP

Removal

1. Remove transmission. See **REMOVAL & INSTALLATION** article. Remove torque converter. Set transmission upright. Mark oil pump mounting location for reassembly reference. Remove 9 oil pump-to-transmission housing bolts.
2. Install Extractor (24180) on converter support shaft. Turn spindle on extractor and press out oil pump. Lift out oil pump housing. Pry out oil seal. Remove "O" ring from around oil pump.

Installation

1. Lubricate sealing lip of oil seal with ATF. Firmly seat oil seal using Seal Installer (240110) and

Supplementary Ring (240111). Install new "O" ring from around oil pump. Ensure thrust washer, needle bearing, and additional thrust washer are correctly installed before installing oil pump housing. See **Fig. 8** .

2. Coat "O" ring with ATF. Align marks made during removal. Install oil pump-to-transmission housing bolts with new sealing rings.

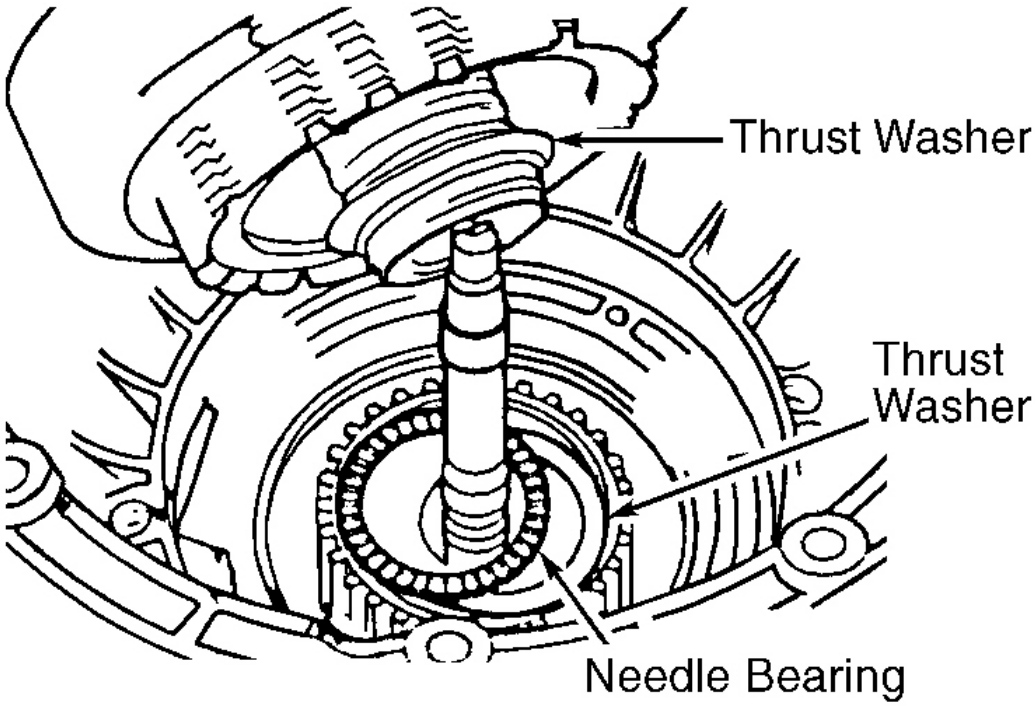

Fig. 8: Checking Thrust Washers & Needle Bearing Installation
Courtesy of BMW OF NORTH AMERICA, INC.

OUTPUT FLANGE SEAL

Removal

1. Remove exhaust assembly. Remove center heat shield. Remove left and right splash guard heat shields. Support transmission with transmission jack. Disconnect HO2S wiring from transmission crossmember. Remove crossmember.
2. Disconnect propeller shaft from transmission and secure to one side. Remove 7 (5HP18) or 5 (5HP30) transmission extension housing bolts. Remove extension housing. Knock back peened lock of slotted nut in extension housing. See **Fig. 9** . Loosen slotted nut. Pull output flange out of bearings. Pry out output flange seal.

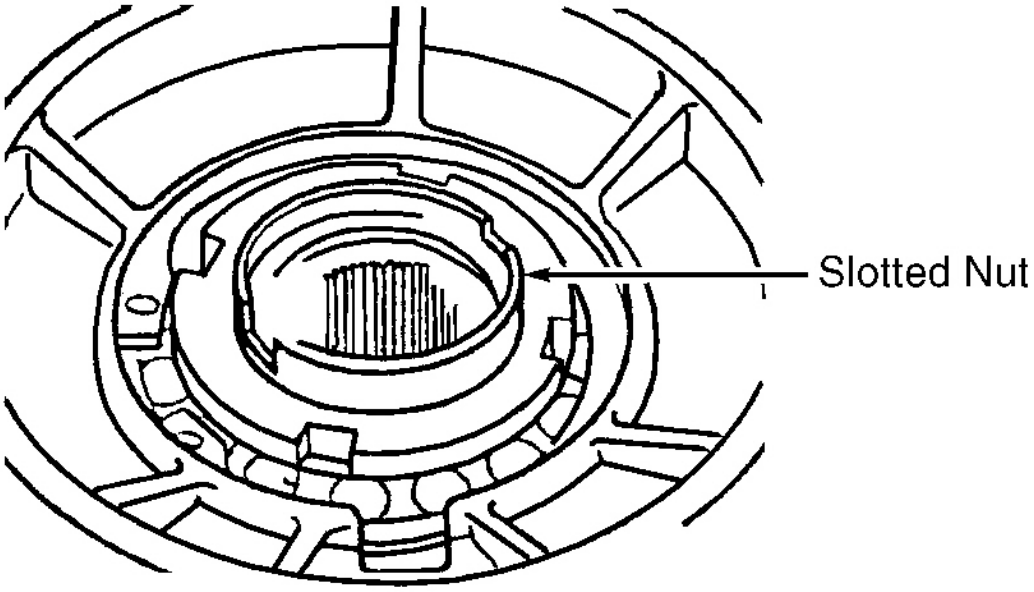

Fig. 9: Locating Slotted Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Install new output flange seal flush with output shaft groove. Coat sealing lip on output flange seal with ATF. Install grooved nut. Secure grooved nut by peening edge. Install extension housing. To complete installation, reverse removal procedure.

POSITION SWITCH SEAL

Removal & Installation (5HP30)

Move shift lever to "P" position. Remove rear splash guard. Using Wrench (245240), loosen shift lever nut. Remove retaining plate and cable. Remove shift lever nut. See **Fig. 10** . Remove shift lever. Using Seal Remover (245260), remove seal. To install, reverse removal procedure.

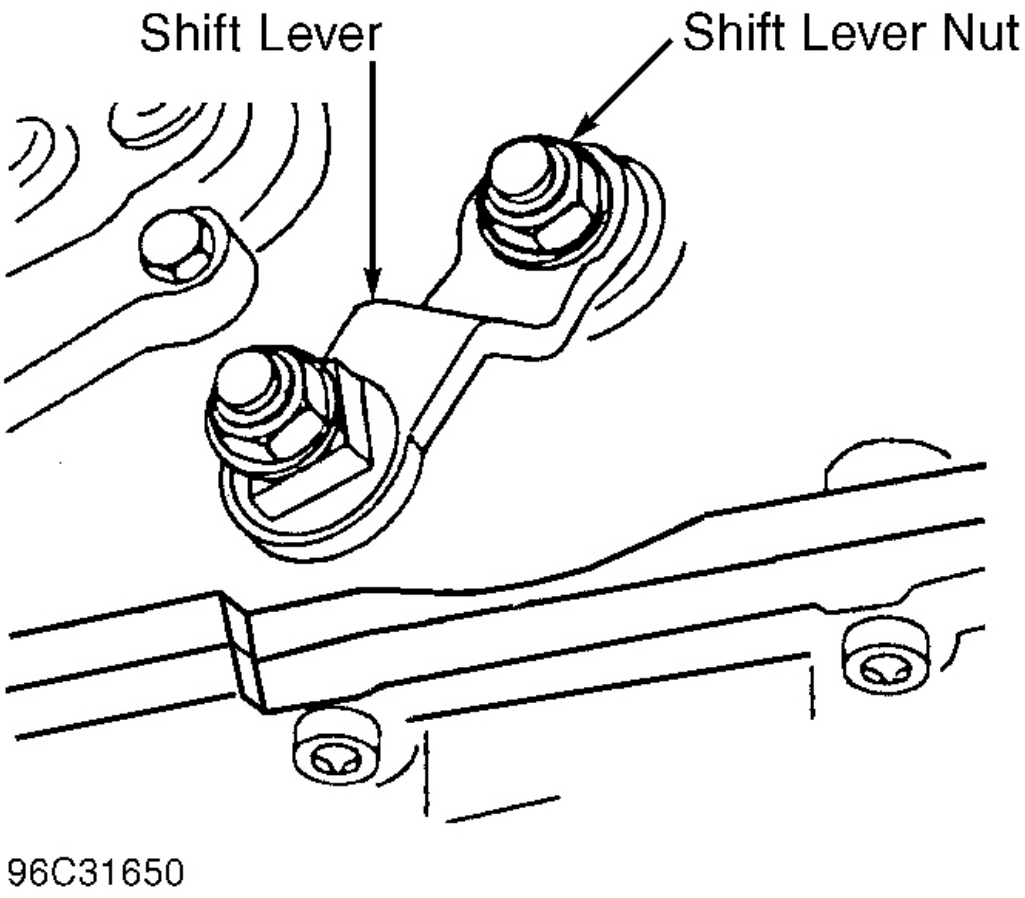

Fig. 10: Removing Shift Lever Nut
Courtesy of BMW OF NORTH AMERICA, INC.

POSITION SWITCH SHAFT SEAL

Removal & Installation (5HP30)

Remove 2 heat shield bolts. Remove heat shield. Remove position switch bolt. See **Fig. 11** . Remove position switch from manual shift valve shaft. Using Seal Remover (245260), remove seal. To install, reverse removal procedure.

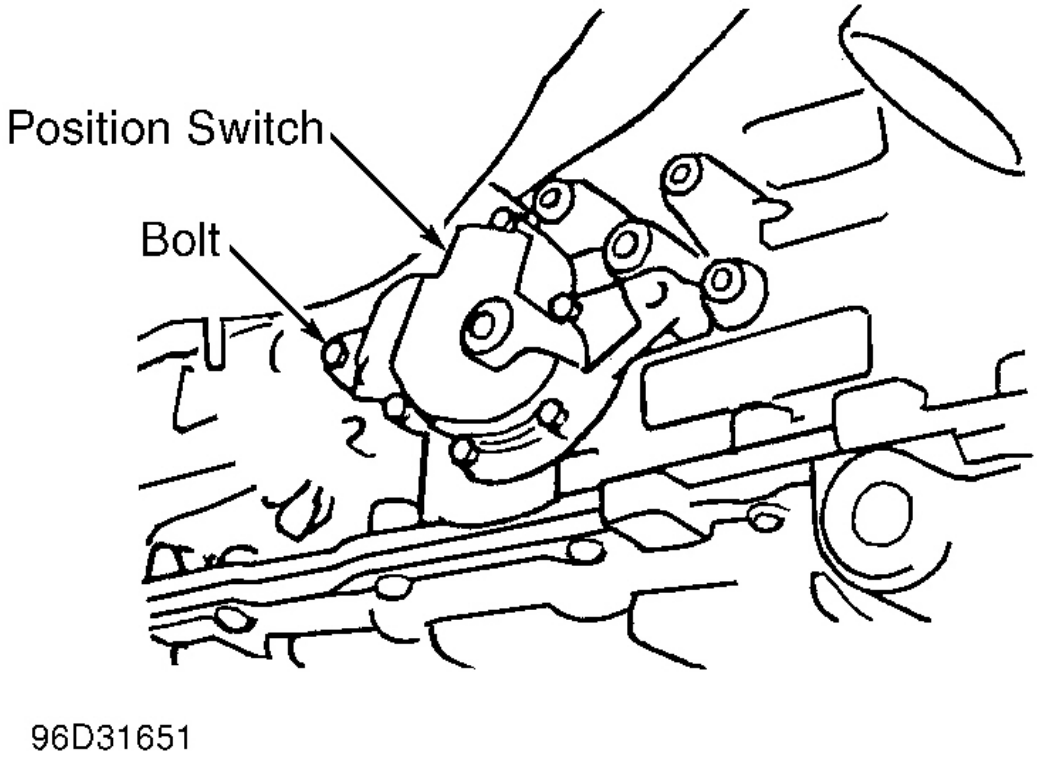

Fig. 11: Removing Position Switch Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

TORQUE CONVERTER

Removal & Installation

1. Remove transmission. See **REMOVAL & INSTALLATION** article. Once transmission is removed, lift torque converter from transmission.
2. To install, reverse removal procedure. Slide torque converter into transmission and rotate while applying slight pressure. Ensure recesses in torque converter align with primary pump. Use care to avoid damaging seal and bearing.

OVERHAUL

NOTE: Manufacturer does not provide overhaul procedures.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Extension Housing Bolt	17-19 (23-26)
Torque Converter Bellhousing-To-Transmission Case Bolt	34 (46)
	INCH Lbs. (N.m)
Oil Filter Bolt	62-80 (7.0-9.0)
Oil Pan Bolt	62-80 (7.0-9.0)
Oil Pan Drain Plug	115 (13.0)
Oil Pump Bolt	84-97 (9.5-11.0)

WIRING DIAGRAMS

Fig. 12: Transmission Wiring Diagram (1995-96 M3 - 1 Of 2)

Fig. 13: Transmission Wiring Diagram (1995-96 M3 - 2 Of 2)

Fig. 14: Transmission Wiring Diagram (1995 525i, 525iT, 530i, 530iT & 540i)

Fig. 15: Transmission Wiring Diagram (1995 740i & 740iL - 1 Of 2)

Fig. 16: Transmission Wiring Diagram (1995 740i & 740iL - 2 Of 2)

