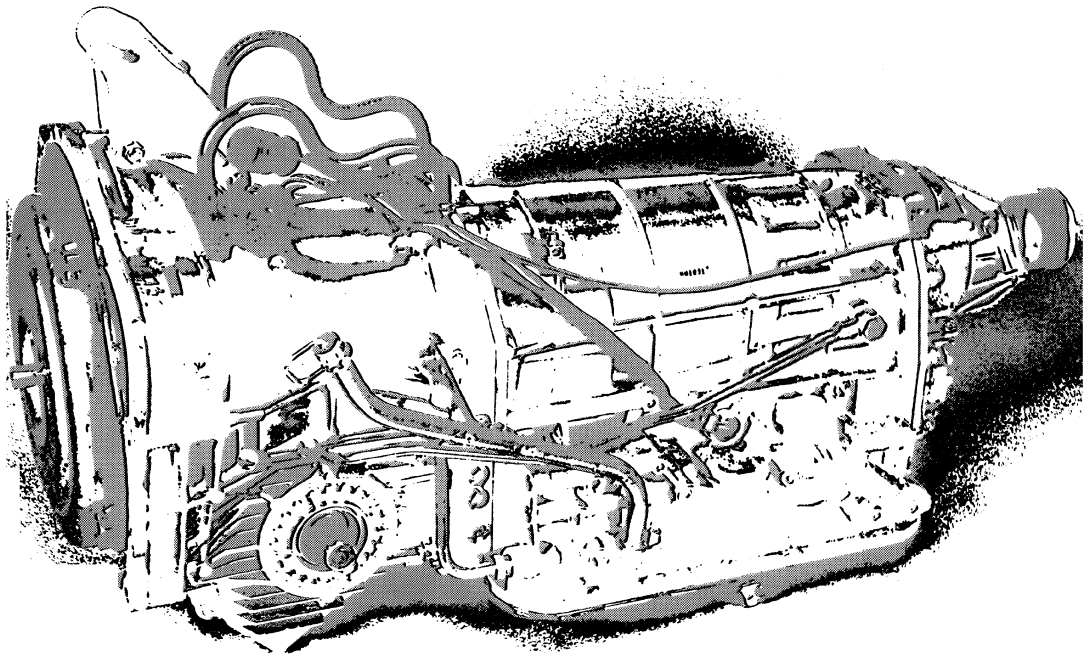
SUBARU®

4EAT TRANSMISSION DIAGNOSIS - PART II

Video Reference Booklet



TECHNICAL TRAINING

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FOREWORD

This Video Reference Booklet, or VRB accompanies the "4EAT Transmission Diagnosis, Part II" video tape. It summarizes the information contained within the video tape and, where appropriate, provides additional detail. The appendix includes additional specific diagnostic information for torque bind and shift problems not covered in the video.

Before viewing this presentation, we suggest that you review the earlier video program "4EAT Transmission Diagnosis", MSA5AV1290 and its corresponding Video Reference Booklet.

This program is only meant to supplement information presented in formal Subaru New Model Courses or training Modules.

We recommend that you use the applicable Subaru Service Manual and the latest Service Bulletins for detailed service procedures and specifications when performing service work.

INTRODUCTION

The 4EAT is a thoroughly modern, electronically controlled transmission. It is made up of three distinct but interrelated systems: mechanical, hydraulic, and electronic. Each of these systems contain many components. Although the transmission has proved extremely reliable in use, its very design means that effective diagnosis demands proper techniques.

The most important aspect of trouble-shooting is to understand the customer's complaint and distinguish between an engine problem, the electronic control system or the transmission itself. This diagnostic program is meant to be used in conjunction with the first 4EAT Diagnostic video. The earlier program dealt with a single customer complaint where the vehicle didn't move for several seconds after being placed in gear. The program was designed to illustrate the principles of effective 4EAT transmission diagnosis.

BASIC ASSUMPTIONS

This program makes several assumptions about any technician working on a 4EAT Transmission. The technician must:

- Know Basic Diagnostics
- Have 4EAT Module Training
- Use A Logical Approach
- Perform Basic Checks
- Verify the Symptom
- Do Easiest Steps First

BASIC CHECKS:

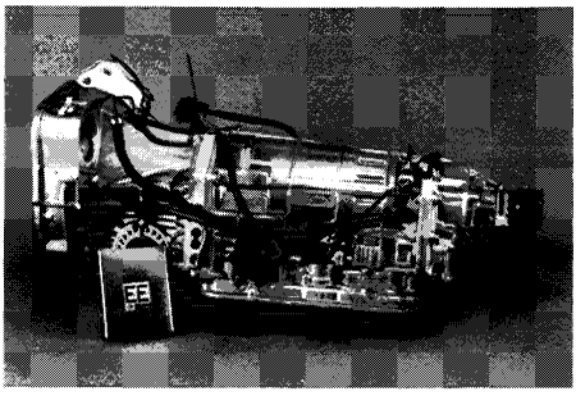
1. Oil Level Check
2. Oil Leak Check
3. Brake Band Adjustment
4. Stall Test
5. Line Pressure Test
6. Transfer Clutch Pressure Test
7. Time Lag Test
8. Road Test

OVERVIEW

For the purpose of this program, we assume that the technician has performed all of the basic troubleshooting procedures outlined in the Service Manual.

As you know, the component location, operation and servicing procedures are similar for all Subaru models equipped with a 4EAT transmission.

Whenever possible, try and talk to the customer yourself. The more you and your Service Writer learn from the customer about the problem, the easier it will be to diagnose.



4EAT and TCU

SAMPLE COMPLAINTS

In this program, we'll present a selection of actual 4EAT problems encountered by Subaru technicians. We'll discuss a couple of All Wheel Drive torque bind problems, shift complaint problems, and an internal mechanical problem.

TORQUE BIND - 1

Let's first look at a torque bind problem. The customer claims that the vehicle shakes and vibrates in turns and it is worse when the vehicle is in reverse. This is what we call torque bind.

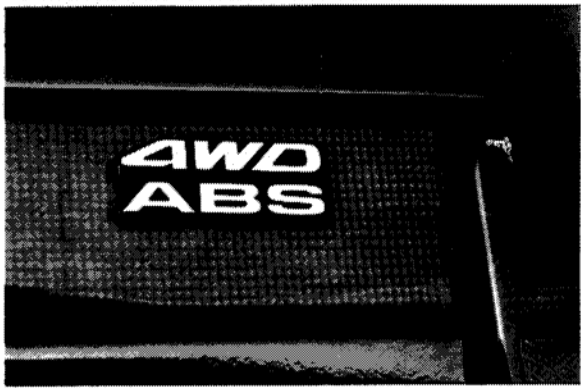
In All Wheel Drive vehicles, a certain amount of torque bind is normal.

In this case, when the technician got into the vehicle to verify the problem, he noticed the "Power Light" flashing.

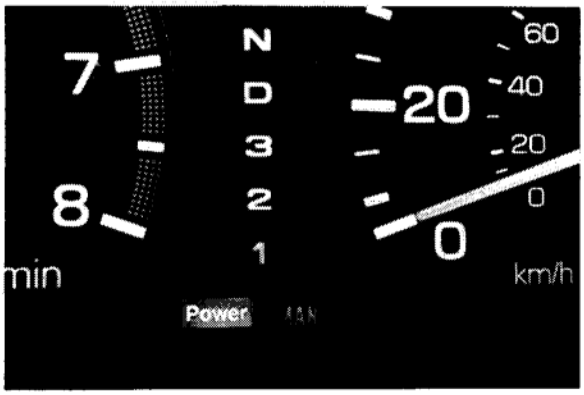
In this case, when the "Power Light" flashes 16 times upon start up, this is a clue that an electrical problem is indicated and it is most likely the cause.

NOTE: THIS SEQUENCE OCCURS ONLY ONCE AT START-UP. THE SEQUENCE DOES NOT REPEAT.

Use the Select Monitor or perform memory and D-checks in order to locate an electrical trouble code. By using the applicable 4EAT cartridge in the Select Monitor we found Trouble Code 24 in the U-Check Mode as well as in Memory.



AWD Legacy



Power Light "Flashing"

Select Monitor and D-Check Manual

Trouble Code	Item	Content of Diagnosis	Abbr. (Select Monitor)
11	Duty solenoid A	Detects open or shorted drive circuit, as well as valve seizure.	PL
12	Duty solenoid B	Detects open or shorted drive circuit, as well as valve seizure.	L/U
13	Shift solenoid 3	Detects open or shorted drive circuit, as well as valve seizure.	OVR
14	Shift solenoid 2	Detects open or shorted drive circuit, as well as valve seizure.	SFT2
15	Shift solenoid 1	Detects open or shorted drive circuit, as well as valve seizure.	SFT1
21	ATF temperature sensor	Detects open or shorted input signal circuit.	ATFT
*22	Atmospheric sensor	Detects open or shorted input signal circuit.	BARO. P
23	Engine revolution signal	Detects open or shorted input signal circuit.	EREV
24	Duty solenoid C	Detects open or shorted drive circuit, as well as valve seizure.	4WD
31	Throttle sensor	Detects open or shorted input signal circuit.	THV
32	Vehicle speed sensor 1	Detects open or shorted input signal circuit.	VSP1
33	Vehicle speed sensor 1	Detects open or shorted input signal circuit.	VSP2

Trouble Code 24 indicates a problem with Duty Solenoid "C". Therefore, check the circuit to duty solenoid "C" for an "open" or a "short".

In this case, by checking the repair history we found that there had been a previous repair involving the removal of the extension housing. While this might be another clue to the problem, we don't want to jump to any conclusions.

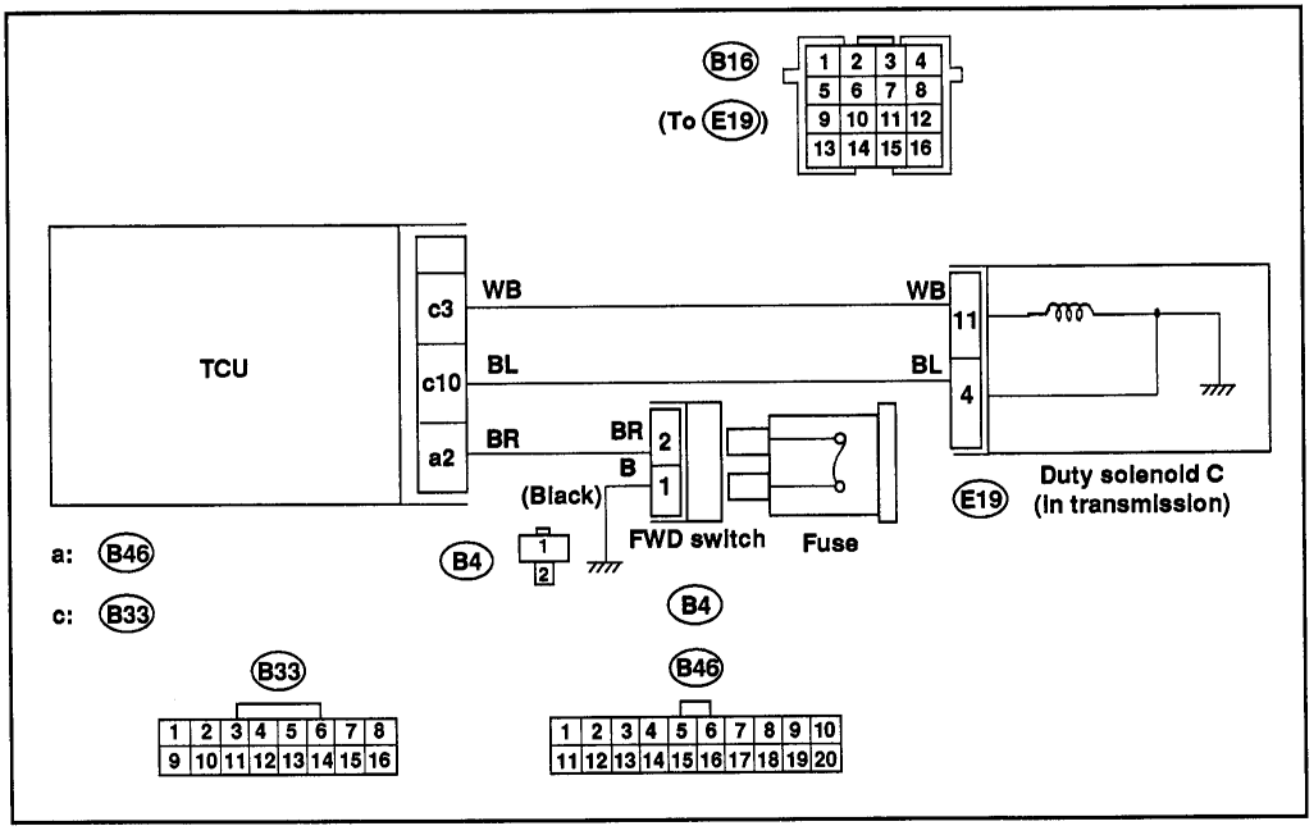
Our previous training taught us how to use the split half technique to help diagnose electrical problems. I'm sure you remember how Harry got carried away with his torch in the Electrical Diagnosis video program MSAAV124O.

At this point, the split half technique procedure was used to isolate the problem area in the circuit to Solenoid "C".

But first, we referred to the appropriate Subaru Service Manual, section 3-2, for the wire color (White & Black) and pin terminal location going from the Transmission Control Unit (TCU) to Solenoid "C".

Split Half Technique

1. Use the proper wiring diagram
2. Divide the circuit in half
   - Use connector with the best information
3. Check half of the circuit at a time
4. Repeat the process until the problem is found



Shift Control Schematic

If the vehicle is equipped with an SRS Air Bag System, please use care, so as not to damage the yellow airbag wiring harness.

AIRBAG

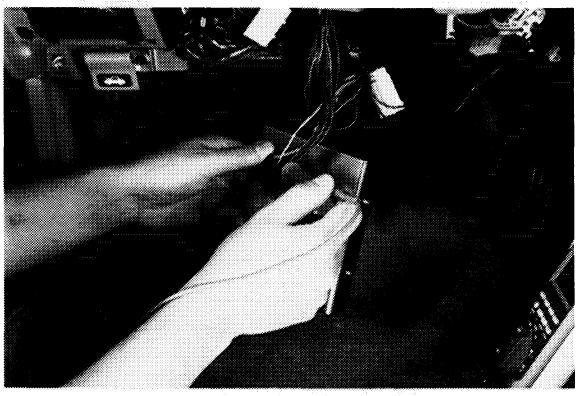
CAUTION: FOLLOW SRS AIRBAG PRECAUTIONS LISTED IN THE SUBARU SERVICE MANUALS.

With the ignition key in the "OFF" position, remove the appropriate transmission harness connector at the TCU.

Using an ohm meter with a good body ground connection, back probe the wire going from the TCU to Solenoid "C". In this case, it's the white wire with the black tracer (WB) found in pin #3 of connector B33. (Refer to diagram on pg. 5)

SRS Steering Wheel

TCU Transmission Harness



Back Probing TCU Connector

An ohm meter reading of infinity indicates that the wire is "OPEN" between the TCU and the Solenoid.

Next, using the split half technique, move to the intermediate connector located near the bellhousing. (In this case, connectors E19 / B16).

In a similar manner, using an ohm meter with a good body ground connection, probe the solenoid wire on the male side of the intermediate connector. This checks for continuity from the intermediate connector through the rest of the circuit.

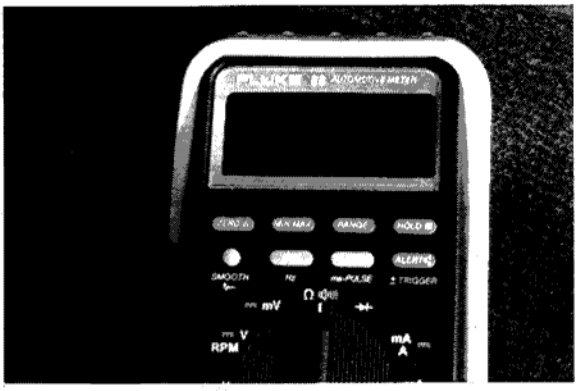
TIP:

The Wire Harness Changes Color Past The Intermediate Connector

Notice that the wire has changed colors from white with a black tracer to green with a red tracer. This is often the case when you go from the vehicle harness to a sub harness.

The ohm meter is still reading infinity. This would seem to indicate that the harness between the TCU and the intermediate connector is probably OK at this time.

The problem is now isolated to either the last section of the harness or to duty solenoid "C". With what we know now, the previous repair inside the extension housing may have some impact on our current problem.



Ohm Meter: Infinity ("O.L")

Intermediate 4EAT Connector

Probing Intermediate Connector

In this case, we placed the vehicle on a lift and followed the removal procedures outlined in the Subaru Service Manual.

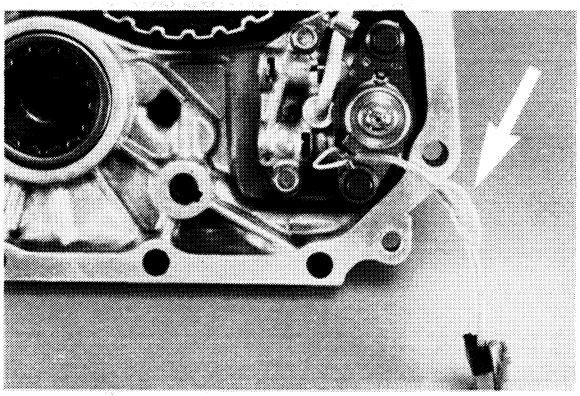
When the rear housing was removed, we found a damaged wire. It may have been pinched during the previous repair.

After making a repair, verify the fix by again back probing the white wire with the black tracer at the TCU connector.

At this point, proper duty solenoid resistance indicates that the problem is repaired.

Finally, the memory was cleared and the repair was verified with a test drive.

Removing Rear Housing



Damaged Solenoid "C" Wire

Back Probing TCU Connector

TORQUE BIND - 2

The second problem appears identical to the first problem. Again the customer claims that the vehicle shakes and vibrates in turns and it is worse when the vehicle is in reverse.

In this case however, the "Power Light" operates normally. It does not flash upon start up. In accordance with the complaint, this indicates a probable mechanical failure.

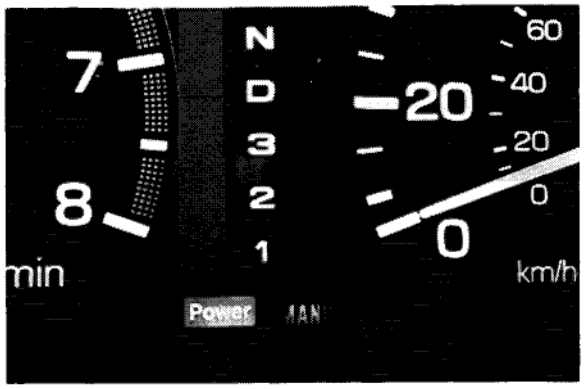
Hook up the Select Monitor in order to road test the vehicle and check the electrical operation of Duty Solenoid "C".

Since the Select Monitor displays normal fluctuating operation of the **All Wheel Drive** duty ratio, and there are no codes in U-check or memory,...

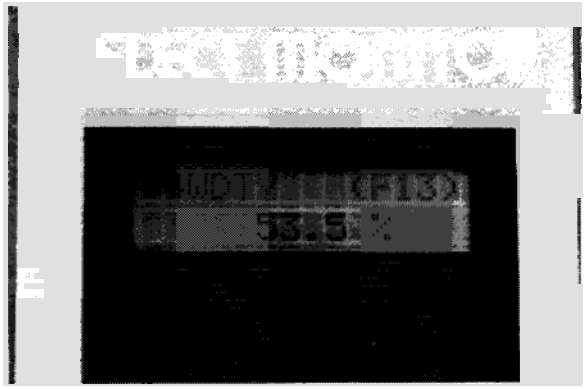
... temporarily pull to the side of the road to install the forced front wheel drive fuse. Then resume the road test.

NOTE: THE FWD FUSE DEACTIVATES THE MPT CLUTCH OPERATION.

Installing the front wheel drive fuse should deactivate MPT clutch operation. This eliminates an electrical problem as the cause of torque bind.



Power Light "ON"/"OFF"



Select Monitor

Installing FWD Fuse

The Select Monitor should now show a high duty ratio indicating that the TCU is sending the proper signal to Solenoid "C".

However, the road test indicates there is still no difference in the operation of the vehicle when the forced front wheel drive fuse is installed. At this point, its safe to assume that the binding is not being caused by the electrical control system.

When the car returns to the shop we know that the MPT clutch is "Engaged" all the time.

POSSIBLE CAUSE: This could be due to stuck, seized or broken components, or it could be due to incorrect hydraulic pressure.

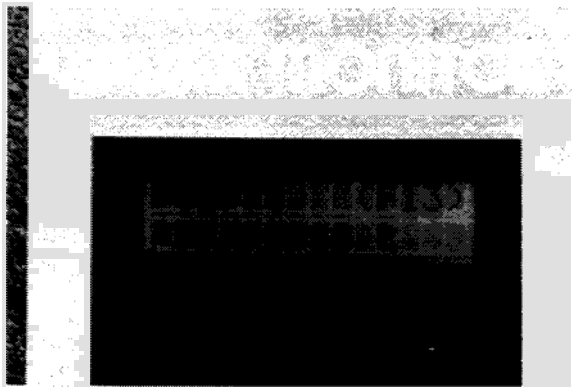
Next, check the MPT clutch pressure by attaching a pressure gauge to the MPT Pressure Port. Normally this installation would be performed on the vehicle. For better visability, we're showing the proper installation of the gauge in the MPT Pressure Port.

You can use this banjo fitting from the Kent Moore pressure testing kit to save yourselves a lot of aggravation. Alternately, you can use a front brake hose and union bolt assembly from a '79 Subaru.

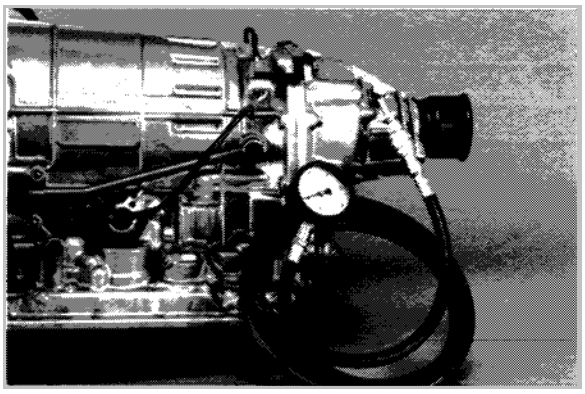
BRAKE HOSE: P/N 799925000

UNION BOLT: P/N 112925161

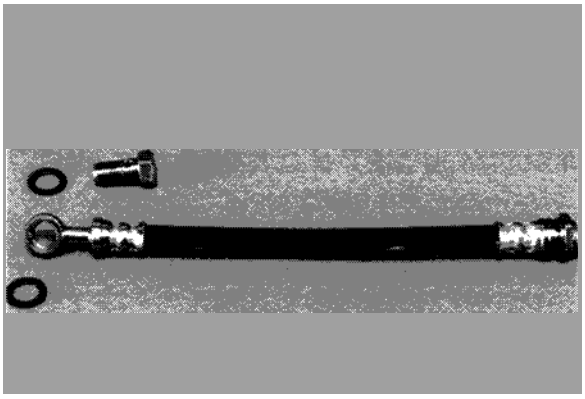
KENT-MOORE KIT: P/N J 39715



Select Monitor



K-M Gauge Ass'y in MPT Port



1979 Front Brake Hose Ass'y

After removing the forced Front Wheel Drive fuse installed earlier, we now road test the vehicle with the pressure gauge.

The MPT clutch pressure check reveals high pressure all the time.

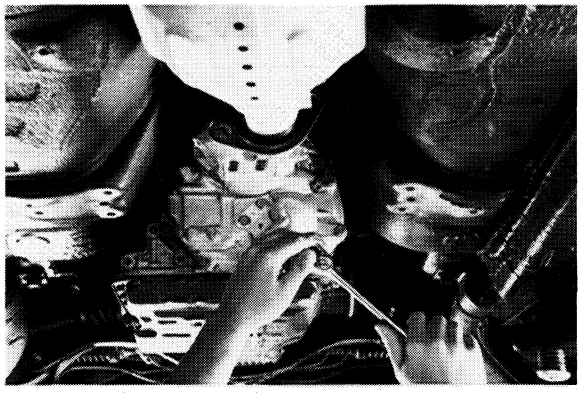
Under normal circumstances the clutch pressure should vary with the duty ratio of duty solenoid "C".

ASSUMPTION: The High MPT Pressure Is Caused By Duty Solenoid "C" Or The Transfer Valve Body.

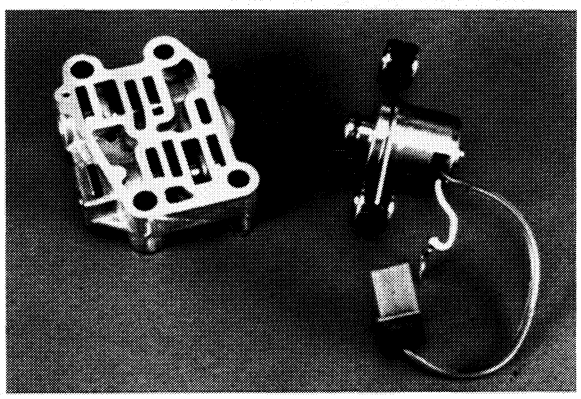
Since we have high pressure all of the time and the electronic controls are working normally, we have isolated the fault to the mechanical components controlling MPT clutch pressure. That's either duty solenoid "C" or the transfer valve body.

Finally, we returned to the shop, removed the rear case and disassembled the transfer housing to inspect duty solenoid "C" and the transfer valve body.

Removing FWD Fuse



Removing Rear Housing

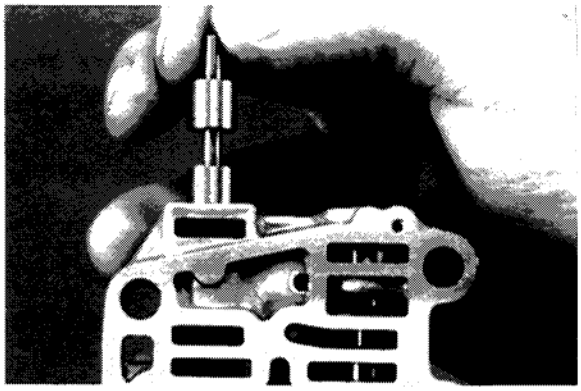


MPT Transfer Housing/Solenoid "C"

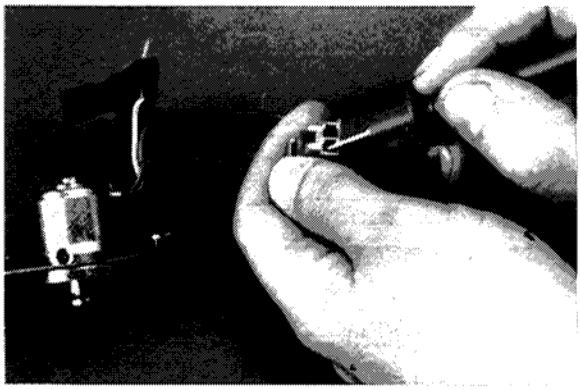
In this case, the valves in the transfer valve body were not damaged and moved freely.

We attempted to activate the solenoid by applying battery voltage with a pair of test leads. Since we didn't hear a click we knew that the solenoid was mechanically inoperative, so we replaced the solenoid.

As always, we verified the repair with a final road test where we noted the correct pressure range and the correct Select Monitor readings.



Transfer Valve Body



Solenoid "C"

Verifying Repair

SHIFT COMPLAINT - 1

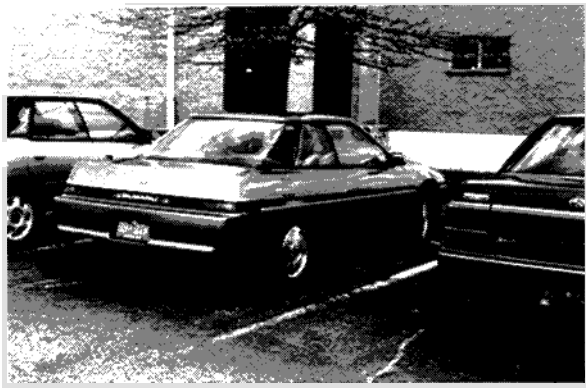
In this problem, we have a customer claiming that when the car is cold the transmission doesn't shift out of first gear. Once it warms up, however, the transmission shifts fine.

In order to duplicate the problem, we had the customer leave the vehicle over night.

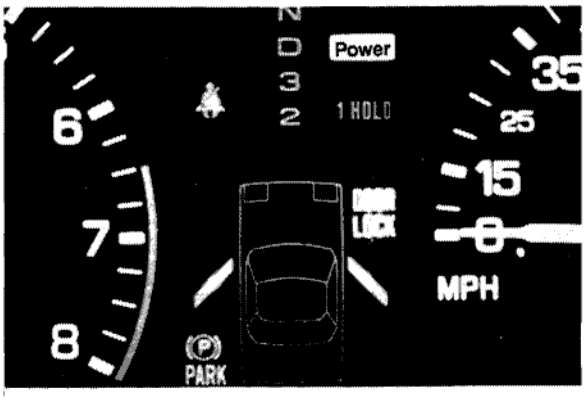
In this case, the "Power Light" operates normally and does not flash upon start up. In accordance with the complaint, this indicates a probable mechanical failure.

TIP:

To determine a mechanical, hydraulic or electrical problem you can use two (2) test lights to monitor the electrical operation of the shift solenoids. Label the test lights 1 and 2 corresponding to solenoid 1 and 2. Perform a road test. If the lights show the proper sequence there isn't an electrical problem. Therefore it must be a mechanical or hydraulic problem. On applicable vehicles, the Select Monitor can be used simultaneously, but it reacts slower than the test lights which read actual shift solenoid operations.



XT6



Power Light Comes "ON" Normally

Shift Problem Diagnostics

This symptom can be isolated by either of the two following methods:

- Select Monitor
- Test Lights

The Test light method can be used with all 4EAT equipped vehicles. The Select Monitor can only be used on vehicles that have an available 4EAT Select Monitor cartridge.

The object of both methods is to compare actual shift points with the displayed TCU (transmission control unit) outputs. For example, if the Select Monitor or test lights display a normal 1,2,3,4 upshift, but the transmission stays in first gear, or has any other abnormal shifting characteristic, the cause is a hydraulic/mechanical one. If the displayed TCU outputs correspond with the abnormal shifting characteristics, the cause is electrical in nature and would most likely be a TCU input problem such as the throttle position sensor or speed sensor. A possible but less likely cause is the TCU itself.

Procedures for Select Monitor Diagnosis

1. Make sure the vehicle is within the proper temperature range before conducting any tests.

2. Attach the Select Monitor and insert the correct model year and type cartridge.

3. Start the engine.

4. Turn on the Select Monitor and access the 4EAT side of the cartridge.

5. "Call Up" or scroll to the screen that displays the word "GEAR".

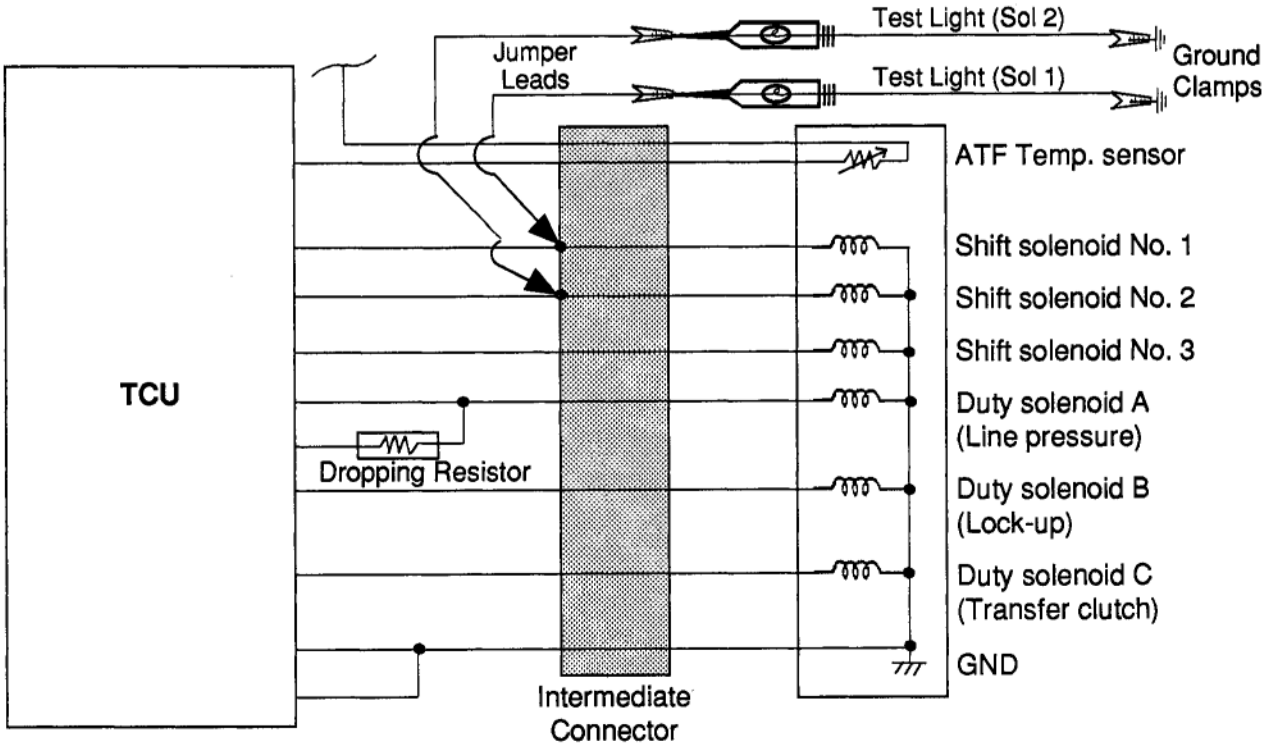
6. Place the select lever in "D" range. The number "1" will appear on the display designating first gear.

7. Drive the vehicle and observe the gear change display on the Select Monitor compared to the actual transmission gear changes.

NOTE: THE SELECT MONITOR WILL REACT SLIGHTLY SLOWER TO ACTUAL TRANSMISSION GEAR CHANGES. THIS IS DUE TO THE FACT THAT THE INFORMATION DISPLAYED ON THE SELECT MONITOR IS PROCESSED INFORMATION.

Procedures for the Test Light Diagnosis

1. Make sure the vehicle is within the proper temperature range before conducting any tests.
2. Locate the intermediate wiring harness connector between the TCU and the transmission. It is found in the engine compartment near the front of the bellhousing.
3. Probe the wires in the intermediate connector for shift solenoids 1 and 2 with jumper leads long enough to reach inside the passenger compartment.
4. Attach the probe end of the test lights to the other end of the jumper leads.
5. Attach the grounding clamps of each test light to a good body ground.
6. With a piece of masking tape or the like, mark each test light to correspond with the shift solenoid it is monitoring.
7. With the selector lever in "D" range, drive the vehicle and observe the On/Off pattern of the test lights. A normal On/Off pattern should match the shift control chart found in the Subaru Service Manual (Sec. 3-2) or on page 18 of this booklet. It is advisable to have a helper come along on the road test to monitor test light operation due to the fact that it can be a distraction while driving.



NOTE: REFER TO THE APPROPRIATE MODEL YEAR SERVICE MANUAL FOR PROPER WIRE COLOR AND CONNECTOR LOCATION IN ORDER TO PERFORM THE ABOVE PROCEDURE.

It is important to point out that when applicable, it doesn't matter whether you use the Select Monitor or the test lights. Both procedures monitor the TCU outputs which electrically control shift solenoids 1 and 2 by energizing and de-energizing them. The combination of these solenoids being energized and de-energized allow pilot pressure to be delivered to shift valves "A" and "B" in order to change their position in the valve body. The combining movement of these valves in turn delivers line pressure to the corresponding hydraulic components to create shifts or gear changes.

Electrical Problems

An electrically related problem will display a flashing "POWER" light (16 flashes) upon start up and quite possibly a code in memory.

Some electrical failures that can cause a shifting problem are:

1. Poor harness or pin connections.
2. Shorted transmission harness wires (shorted to the case where they enter the transmission or the internal transmission harness could be rubbed through by the forward clutch drum).
3. Shorted or open shift solenoids.
4. A failed TCU.

Mechanical Problems

A mechanical problem will not cause the "POWER" light to flash 16 times upon start up and there probably won't be any codes in memory. The most common types of mechanical failure causing a shift problem are:

1. Bound or stuck shift valves ("A" and "B").
2. A mechanically failed shift solenoid.
3. A seized servo piston.
4. A component failure.

Since the Select Monitor can't be used on an XT6, we'll go to the intermediate connector and attach a pair of test lights in parallel with shift solenoids "1" and "2".

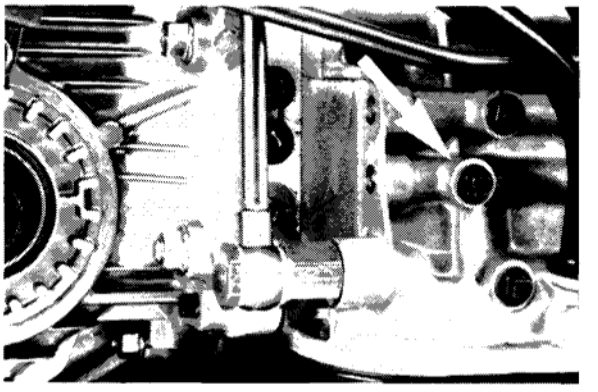
In addition to the test lights, we'll hook up a pressure gauge to the band "Two-apply" (2A) port before we road test the vehicle.

NOTE: THE BAND ACTIVATES 2ND GEAR.

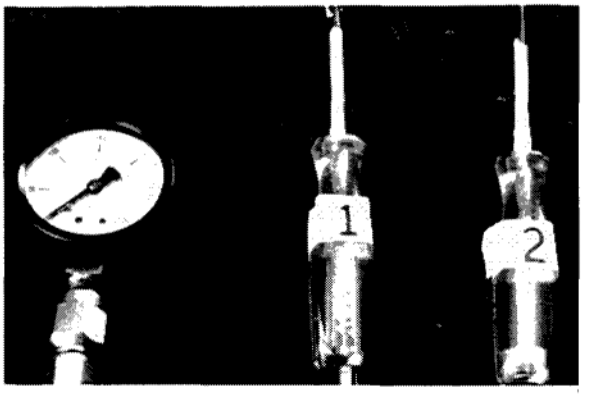
When the band is applied, the One Way Clutch 1-2 freewheels and 2nd gear is engaged.

The test lights are being used to verify that the TCU is sending the proper signals to the transmission solenoids "1" and "2".

Intermediate TCU Connector



"Two Apply" Port



Test Lights/Pressure Gauge

This chart shows the proper "ON" / "OFF" operation for shift solenoids #1 and #2. The test light pattern should correspond to this chart for any given gear.

In our example, the test lights show that the TCU is sending the proper signals. The solenoids are probably working.

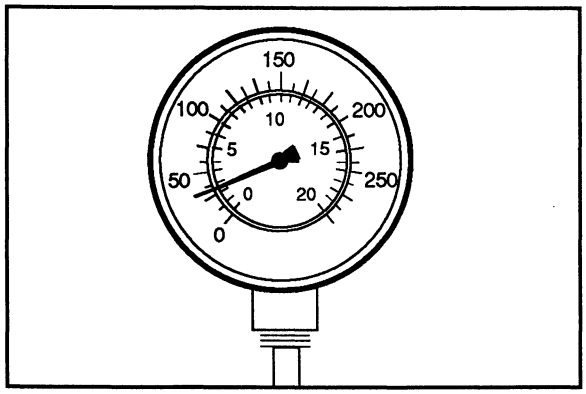
However, we don't have enough hydraulic pressure to apply the band.

Remember, the car functions normally when it's warm. So it's probably not a servo seal because they're either good or they're bad.

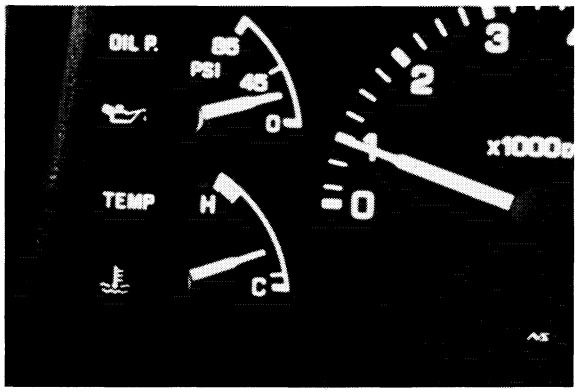
	Solenoid 1	Solenoid 2
1st	●	●
2nd	X	●
3rd	X	X
4th	●	X

● = ON X = OFF

Shift Control Chart



Pressure Gauge



Temperature Gauge (XT6)

ASSUMPTION

Low Apply Pressure Can be Caused By:

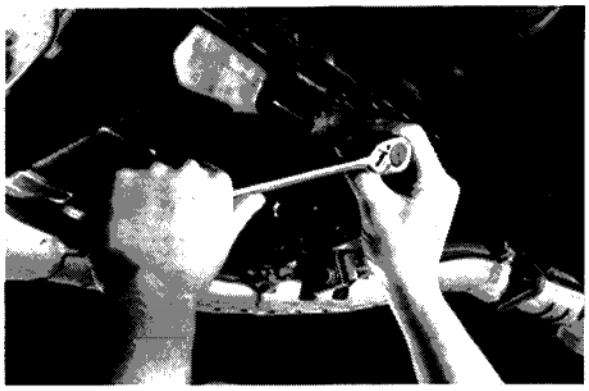
- **Solenoid #1**
- **Solenoid #2**
- **Shift Valve "A"**
- **Shift Valve "B"**

As the car is returned to the shop, we know that the "Two-apply" pressure to the Band is low. This could be due to a mechanical problem in the valve body with one or more of the solenoids or valves. More specifically with shift solenoids #1 and #2 or with shift valves "A" and "B" .

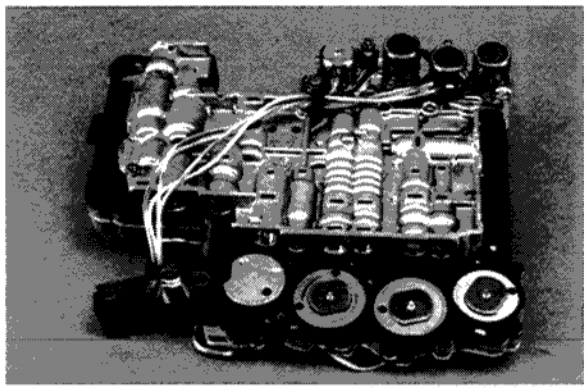
In this case, the next step is to remove the valve body from the vehicle in order to inspect the shift solenoids and the shift valves.

When we attempt to activate each solenoid, we hear a click. This indicates that the solenoids are mechanically and electrically good.

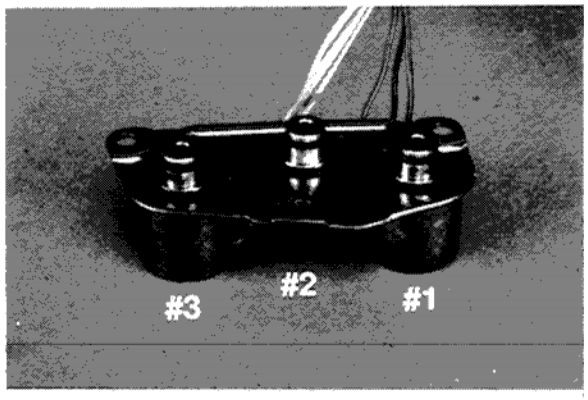
NOTE: THE SHIFT SOLENOIDS DON'T CYCLE LIKE A DUTY SOLENOID. AFTER THEY ARE ACTIVATED, THEY REQUIRE HYDRAULIC PRESSURE IN ORDER TO BE RESET. THEREFORE, WHEN BENCH TESTING, USE A SUITABLE PROBE TO PRESS THE SOLENOID PLUNGER INTO PLACE BEFORE TESTING.



Removing Valve Body



Valve Body

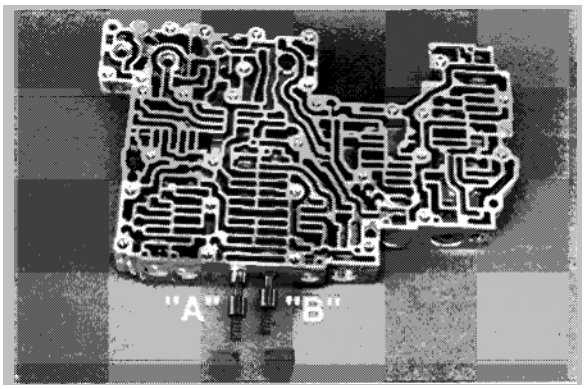


Shift Solenoids #1, #2, #3

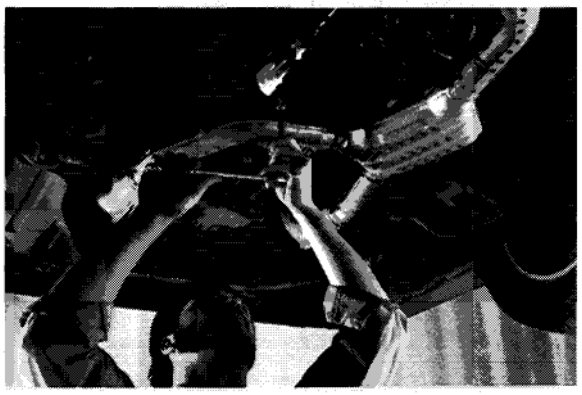
As we examine the valve body, however, we first find evidence of contamination and then find that shift valves “A” and “B” are binding in their bores.

At this point, we thoroughly cleaned and inspected all of the valve body components. We also flushed the transmission cooler. We then reassembled and installed the valve body as described in the Subaru Service Manual, section 3-2.

Finally, we road tested the vehicle to verify that the problem was resolved.



Shift Valves "A" & "B"



Installing Valve Body

SHIFT COMPLAINT - 2

For our last problem, the customer claims that the transmission doesn't shift properly and that it also makes a lot of noise.

A brief road test verified the complaint of improper shifting. There was also a loud whining/grinding noise that appeared to be coming from the transmission.

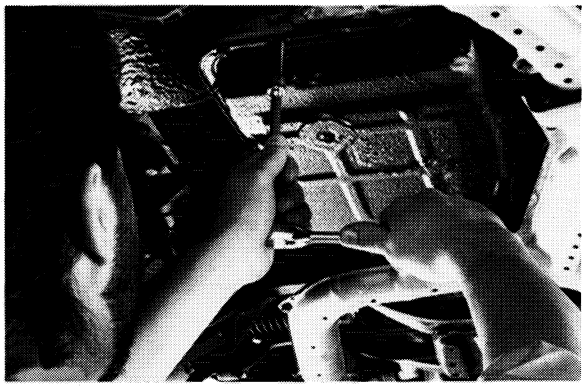
A check of the transmission fluid shows that it is discolored and smells burnt. At this point, there is no doubt that the transmission has an internal mechanical problem.

When the transmission pan was removed, we found a large amount of metal contamination confirming our suspicions.

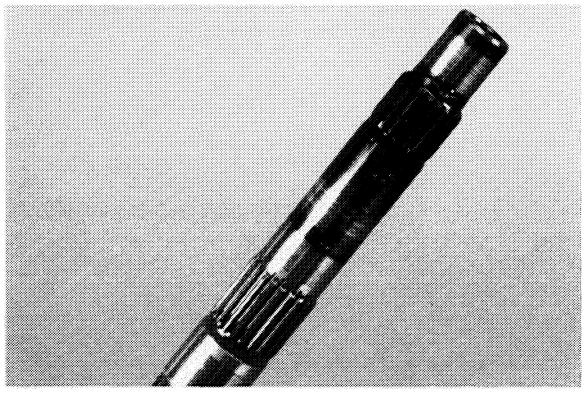
After removing the transmission, we disassemble the unit as outlined in the Subaru Service Manual, section 3-2, and inspected each component.

During the disassembly we noticed that the input shaft was blue in color back at the sun gear splines. This was the first indication of the source of our noise.

Transmission Fluid Dipstick



Removing Pan



Discolored Input Shaft

We also found the planetary gears blued and stripped.

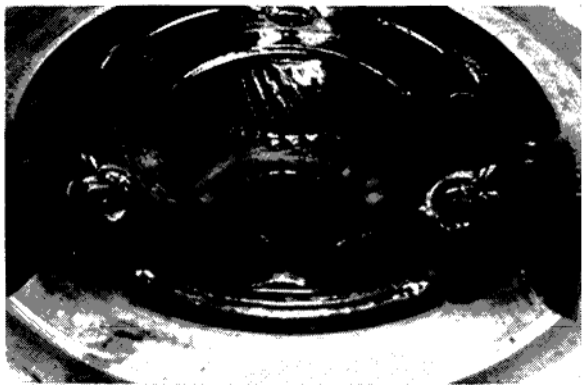
In addition, the needle bearings were damaged and the selective plastic thrust washers were melted. This was the cause of the noise and shifting problem.

ASSUMPTION: FAILURE CAUSED BY INADEQUATE LUBRICATION.

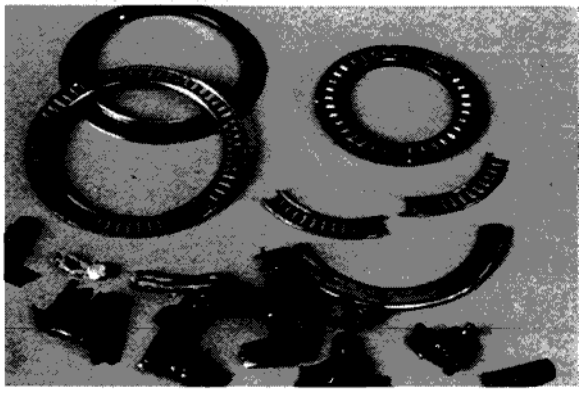
In this last example, the evidence indicated that the failure was caused by a blockage in the lubrication circuit. After assessing the damage, we drew up a parts list.

When the new parts were received we cleaned up the cases and other reusable parts. Reassembly followed the steps as outlined in the Service manual, section 3-2.

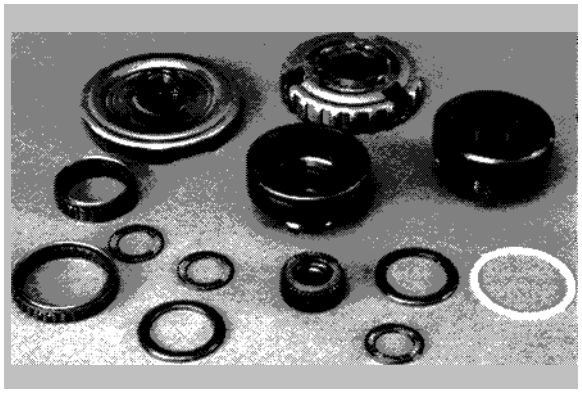
NOTE: PLEASE PAY PARTICULAR ATTENTION TO A THE CRITICAL REASSEMBLY STEPS WHICH FOLLOW REGARDING THE SEAL RINGS, ONE WAY CLUTCH 1-2, AND ONE WAY CLUTCH 3-4.



Damaged Planetary Gearset

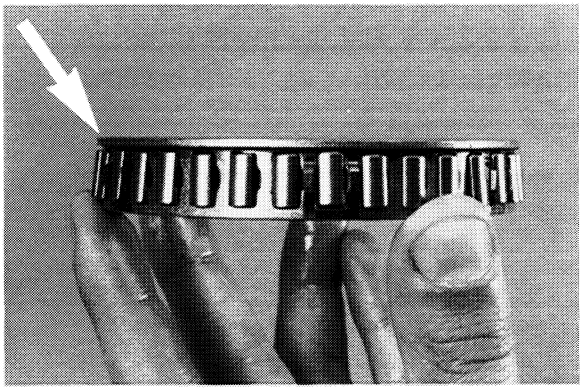


Damaged Bearings/Thrust Washers



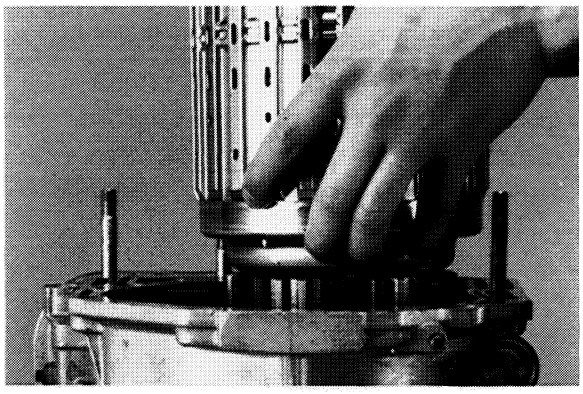
Replacement Parts

Whenever a new OWC 1-2 is installed, confirm the proper direction of the ridge.



One Way Clutch 1-2

With the forward clutch drum positioned with the Lo/Reverse brake splines facing upward, install OWC 1-2 with the ridge facing upward.



Installing OWC 1-2

Use petroleum jelly to liberally lubricate the seal rings on the OWC 1-2 inner race prior to installation.

Lubricating Seal Rings

Carefully install the forward clutch drum over the seal rings and on to the OWC 1-2 inner race. Take care not to cock the drum and damage the seal rings.

Installing Forward Clutch Drum

TIP:

For Easier Installation, Rotate the Drum in a Clockwise (CW) Direction until the Inner Race Protrudes Slightly (Approximately 2 Millimeters).

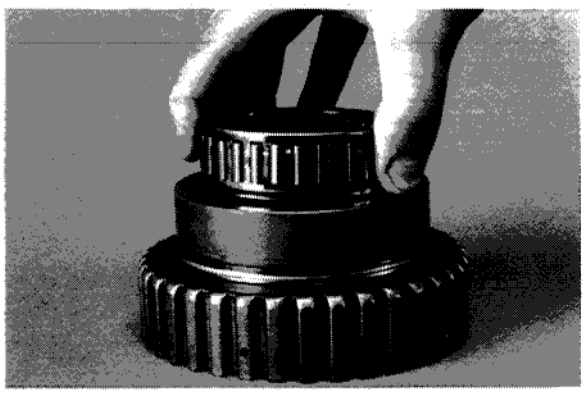
Finally, check for proper rotation of the OWC 1-2. Looking down at the forward clutch drum installed in the case, it should rotate clockwise (CW) and lock counter clockwise (CCW). (For greater clarity, the forward clutch drum is shown out of the case.)

Rotating OWC 1-2 Clockwise (CW)

Whenever installing OWC 3-4 confirm proper direction of the ridge.

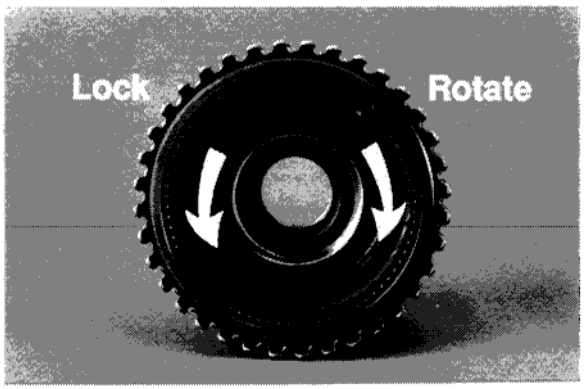
OWC 3-4 Assembly

Install the OWC 3-4 in its outer race, (also known as the forward clutch hub). With the splines of the forward clutch hub facing downward, the OWC 3-4 is installed with the ridge facing upward.



Installing OWC 3-4

Then check for proper rotation of the OWC 3-4 inner race (also known as rear internal gear). It must rotate clockwise (CW) within the forward clutch hub when viewed from the front and lock when rotated counter clockwise (CCW).



Checking OWC 3-4 Rotation (CW)

Note that the job doesn't end here. Just fixing the transmission won't necessarily solve the problem. You must find and fix whatever caused the transmission to fail.

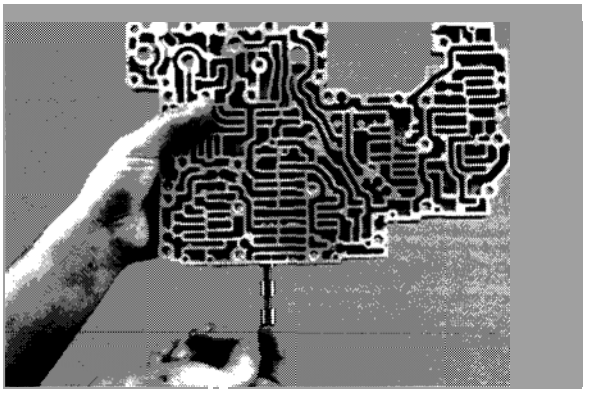
Don't forget to disassemble the valve body. After all the valve body components have been thoroughly cleaned,...

... lubricate all the valve body components in clean ATF and check that all of the valves slide in their bores under their own weight by tilting the valve body.

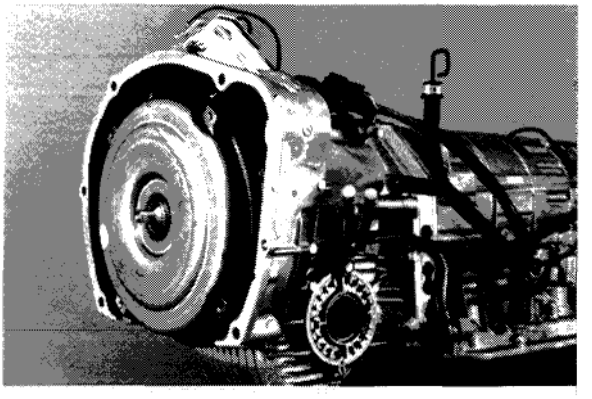
Finally, follow the details in service bulletins **16-35-89** and **16-43-90** for proper torque converter installation.

Whenever there is a severe contamination problem, flush the transmission cooler, and install the auxiliary transmission filter kit appropriate for the particular VIN as outlined in service bulletin **16-51-92R**.

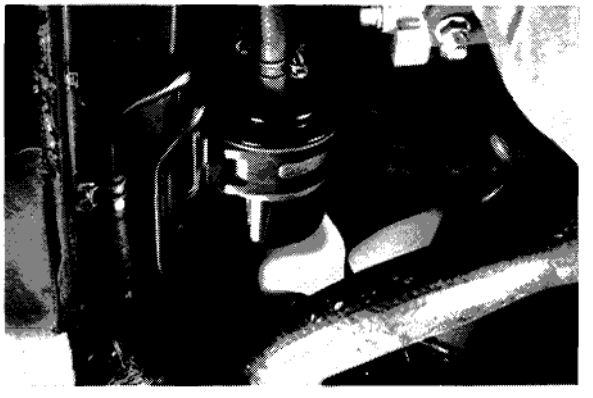
Finally, road test the vehicle to verify that the problem is resolved. The transmission shifts normally and the noise is gone.



Sliding Shift Valves



Installing Torque Converter



Transmission Cooler Filter (Under Car View)

CONCLUSION

As you saw, it is relatively easy to trouble shoot the 4EAT System. Just follow these simple steps:

- Verify the problem
- Follow the recommended safety precautions
- Start with the basic diagnostic procedures
- Correct the problem
- Verify the repair
- Clear the memory.

This concludes our program. Should you have any questions, refer first to this video reference booklet, and then to the other reference materials mentioned throughout this program.

NOTES:

APPENDIX

This section contains supplemental information not found in the video program.

OIL COOLER OUTLET PIPES

The factory original style oil cooler outlet pipe was only a flared union fitting. It did not contain a torque converter drainback check ball.

A modified oil cooler outlet with a check valve is available as a replacement for the original flared fitting.

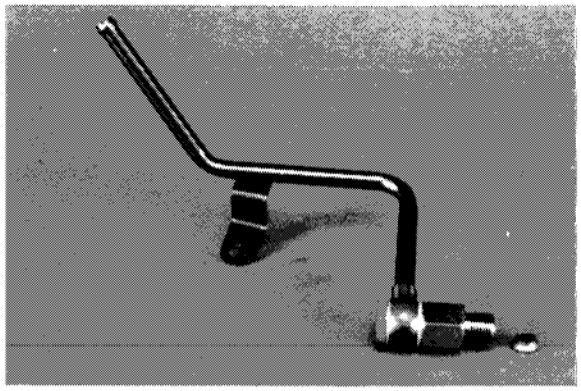
Current factory production includes the check ball.

CAUTION: DO NOT ADD THE MODIFICATION KIT TO UNITS THAT ALREADY HAVE A BANJO STYLE FITTING ON THE OIL COOLER OUTLET PIPE. THIS WILL CAUSE MAJOR INTERNAL TRANSMISSION DAMAGE.

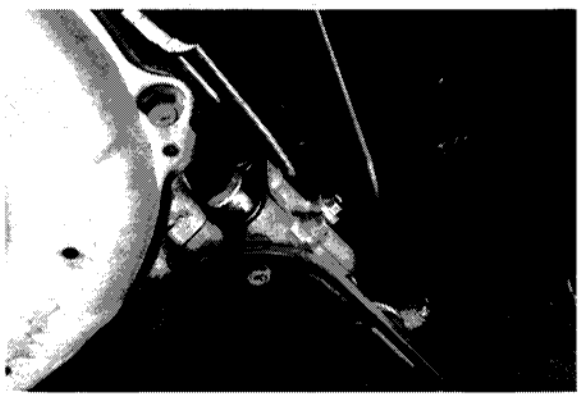
TIP:

The 4EAT transmission has been in service since the 87 1/2 XT and it is basically unchanged. There is more detailed background material in the 1987 XT Service Manual than in later manuals.

Original Factory Style



Dealer Modification Kit



Current Factory Production

TORQUE BIND CAUSED BY SEIZED MPT CLUTCH.

The MPT Clutch can become seized due to excessive slippage caused by teflon seal rings which are pinched and split from a previous repair for a different complaint/procedure. The latter complaint of binding may have been preceded by a complaint of no 4WD application. This would only be noticeable in conditions that would have required 4WD to keep the front wheels from breaking loose.

1. The "POWER" light does not flash upon start up indicating a probable mechanical failure.

2. Installation of the front wheel drive fuse makes no difference.

3. The Select Monitor shows normal operation of 4WD duty. However, there is a code for speed sensor "1" in memory due to the fact that some wheel slippage had occurred when the MPT clutch had been slipping before it seized. A quick check of both speed sensors as compared to the speedometer all show approximately the same speed.

4. MPT clutch pressure checks show lower than specifications.

5. A resistance check of the duty solenoid "C" circuit shows that the circuit is complete and the solenoid is within resistance specifications.

6. Disassembly of the transfer housing reveals an overheated and seized MPT clutch. In addition, the teflon seal rings are pinched, cut, and deformed.

NO UPSHIFT CAUSED BY SHORTED/OPEN SHIFT SOLENOID WIRE.

Transmission is in fail safe: third speed and reverse only. A definite indication of an electrical failure.

1. Power light flashes upon start up indicating an electrical failure.

2. Select Monitor displays affected shift solenoid circuit code in memory and U-check.

3. Check the solenoid circuit for an open or a short.

4. Perform split half technique to find problem area of harness.

NORMAL TRANSMISSION CHARACTERISTICS:

1. Vehicle doesn't shift into 4th until preset operating temperature is reached (Approx 50° F.)
2. Torque bind is always there to some extent with 4WD
3. The 2-3 shift can feel more like a "slide" than a shift

SIX-STEP TROUBLESHOOTING METHOD

1. Verify the problem
   - Does the problem exist?
2. Determine related symptoms
   - What else doesn't work?
3. Isolate the problem
   - Narrow diagnosis to a specific circuit
4. Identify the Cause
   - What is wrong in the circuit
5. Repair the problem
   - Fix what is wrong
6. Verify the operation
   - Does it work

SPLIT HALF TECHNIQUE

1. Use the proper wiring diagram
2. Divide the circuit in half
   - Use connector with the best information
3. Check half of the circuit at a time
4. Repeat the process until the problem is found

NOTE: WHENEVER ANY INTERNAL TRANSMISSION REPAIRS ARE PERFORMED, YOU MUST ALWAYS BACKFLUSH THE TRANSMISSION COOLER.

SERVICE BULLETINS

BULLETIN	#DATE	TITLE/SUBJECT
16-28-87	10-12-87	Proper Operation of 4EAT Gear Shift Lever
16-29-87	10-19-87	Automatic Transmission Control System
16-31-89	01-30-89	Extension Case Rear Oil Seal Installation
16-35-89	11-30-89	4-Speed Automatic Transmission Torque Converter Installations
03-44-89	09-20-89	Transmission Case Check Balls Leaking ATF
16-36-90	02-26-90	4EAT Slow Engagement
16-37-90	03-26-90	Driveline Binding During Sharp Turns at Low Speed
16-39-90	04-09-90	How to Remove Broken Pieces of Dipstick from Transmission Assembly
16-40-90	04-09-90	4EAT Slow Engagement - Service Bulletin Correction
16-42-90	08-20-90	Flushing the Transmission Oil Cooler
16-43-90	07-30-90	Torque Converter Seating
16-47-91	05-28-91	Manual Valve Stopper Retrofit
16-48-91	05-15-91	4EAT Slow Engagement (Improper Repair Procedures)
16-49-91	12-31-91	4EAT FWD and 4WD Brake Band Adjustment on Car Servicing
16-50-92	03-06-92	One Way Clutch Operation
16-51-92R	03-15-92	4EAT ATF Auxiliary Filter Installation
16-52-92	04-14-92	Reduction Gear and Transfer Gear Phase Matching

SELECT MONITOR DATA SHEET

TECHNICIAN_____

VIN # _____ENGINE # _____ TRANS # _____

MILEAGE _____ DATE _____ PROD. DATE _____

MOD	MODE NAME	ABBR	UNITS	TEST CONDITIONS	PERF STD	TEST RESULTS
00	Mode Display	---	---	Key "ON"	E-4AT 4WD YEAR	
01	Battery Voltage	VB	V	Engine idle after warm-up	Battery Voltage	
02	Vehicle speed sensor 1	VSP1	M/H	Compare with Mode 04 & speedometer		
03	Vehicle speed sensor 1	VSP1	KM/H	Compare with Mode 05 & speedometer		
04	Vehicle speed sensor 2	VSP2	M/H	Compare with Mode 02 & speedometer		
05	Vehicle speed sensor 2	VSP2	KM/H	Compare with Mode 03 & speedometer		
06	Engine RPM	EREV	RPM	Compare with tachometer in car		
07	ATF Temperature Sensor	ATFT	Deg F	Key "ON" Engine cold Ambient Temp.		
				Engine idle after warm-up	158-230 Deg F	
08	ATF Temperature Sensor	ATFT	Deg C	Key "ON" Engine cold Ambient Temp.		
				Engine idle after warm-up	70-110 Deg C	
09	Throttle Sensor	THV	V	Key "ON" Engine "OFF"	Voltage will change smoothly Compare it to ECU	
10	Gear Position	GEAR	----	Road testing car Will see each gear		
11	Line Pressure Duty	PLDTY	%	Engine warm key "ON"	Throttle closed 100%	
				Engine "OFF"	Throttle open 10%	
12	Lock-up Duty	LUDTY	%	Engine idling	Released 5%	
				Driving at 50 mph	Lock-up 95%	
13	AWD Duty	4WDTY	%	Engine warm	FWD Fuse in 95%	
				Key "ON" Engine "OFF"	In "D" Full throttle 25%	
14	Atmospheric Sensor	Baro P	MMHG	Engine idle after warm-up sea level	760 MMHG	
B0	Self Diagnosis	Diag. U	---	Current trouble code	----------	
B1	Self Diagnosis	Diag. M	---	Previous trouble code	----------	