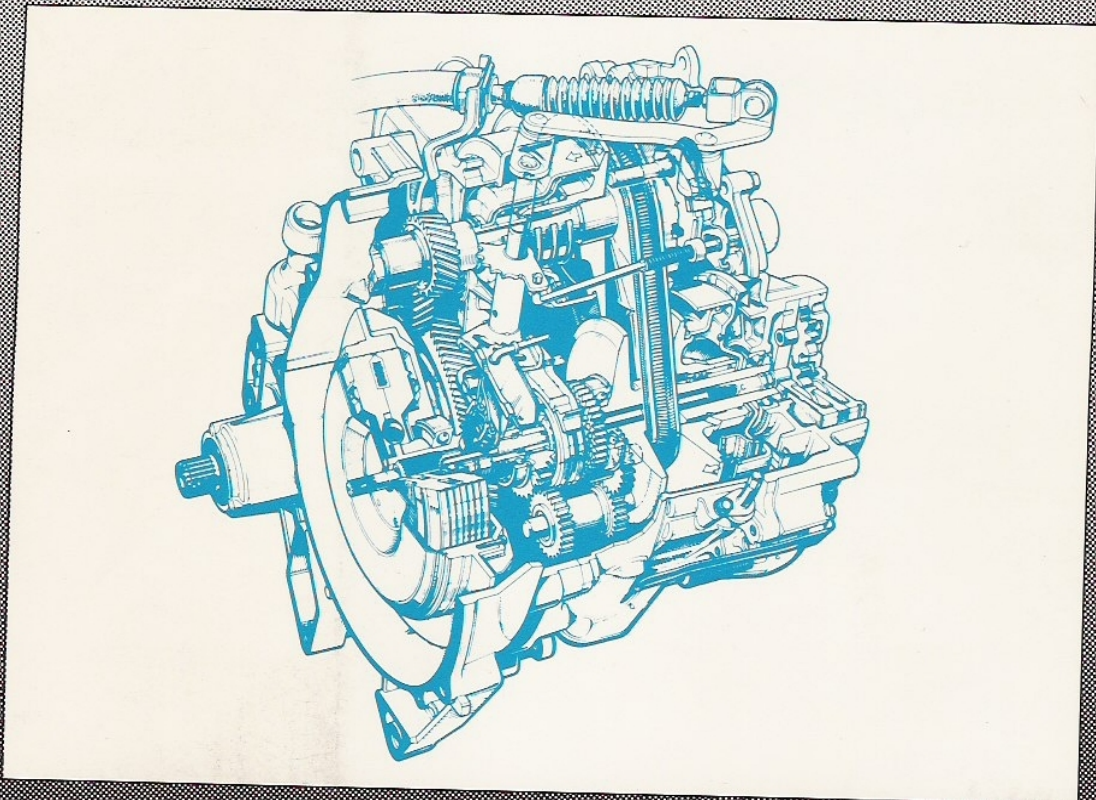

SUBARU

**ECVT TRANSMISSION
DIAGNOSIS PART II
Video Reference Booklet**



TECHNICAL TRAINING

**ECVT
TRANSMISSION
DIAGNOSIS**

Video Reference Booklet

TECHNICAL TRAINING

© Copyright 1991
Subaru of America

All rights reserved. This book may not be reproduced in whole or in part without the express written permission of Subaru of America.

Subaru of America reserves the right at any time to make changes or modifications to systems, procedures, descriptions and illustrations contained in this book without necessarily updating this document. Information herein is considered current as of December, 1991.

TABLE OF CONTENTS

FORWARD..... 4

OVERVIEW..... 5

INITIAL INSPECTION GUIDELINES..... 6

THE ROAD TEST..... 7

 The Select Monitor..... 7

 Safety Guidelines..... 7

 Key Items To Evaluate..... 8

 Vehicle Speed Vs. Engine Speed Chart..... 9

 Handling Unverifiable Problems..... 9

 Symptoms You May Encounter..... 11

PRELIMINARY INSPECTION..... 12

TROUBLESHOOTING..... 13

 Symptom 1: Engine Speed Increases Abruptly

 Symptom 2: Transmission is Stuck in Low or High Ratio

 Symptom 3: Vehicle Will Not Move

 Symptoms for Other ECVT Problems

SERVICING THE CONTROL VALVE BODY..... 26

FORWARD

This Video Reference Booklet, or VRB, accompanies the "ECVT Transmission Diagnosis, Part II" videotape. It summarizes the information covered in the videotape, and, where appropriate, provides additional detail.

We recommend that in addition to using this videotape and VRB, you refer to the first "ECVT Transmission Diagnosis" video, MSA5AV131O, and its corresponding VRB for normal ECVT operating characteristics and additional adjustment procedures.

These programs are not intended to replace formal ECVT Module Training. But when used together with the Justy Service Manual, Service Manual Supplement, any applicable Service Bulletins and Service Helpline Updates, they will further assist you with proper ECVT diagnosis.

OVERVIEW

In the first "ECVT Transmission Diagnosis" videotape and VRB, we provided a broad overview of how the ECVT transmission operates. Now in "Part II", we look at some actual ECVT problems encountered by Subaru technicians, and present specific troubleshooting guidelines and diagnostic procedures. Several additional ECVT problems not covered in the video presentation are highlighted in this booklet.

It is important to view the videotape in its entirety and follow the basic diagnostic steps in the sequence they are presented.

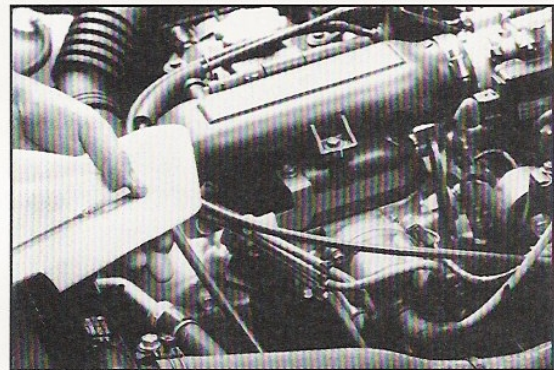


INITIAL INSPECTION GUIDELINES

Effective troubleshooting begins with getting an accurate description of the problem from the customer. Where possible, technicians should assist service writers in preparing meaningful questions to better pinpoint specific ECVT problems, and to save valuable diagnostic time.

Based on the customer complaint, start thinking about where you will begin your preliminary inspection. It is best to start at the **same** place **every** time.

Once the car is in the service bay, conduct a visual inspection, **regardless** of the problem or symptoms described. Check for any obvious signs of disconnected wires or control cables, and **always** check the ECVT fluid level.



ECVT Fluid Level Check

THE ROAD TEST

Before beginning the road test, review the Repair Order for an indication of the type of problem you are trying to identify. It can sometimes indicate a mechanical or hydraulic problem.

An electrical problem may also be suggested if the complaint is that the "CHECK ECVT" light (in Front Wheel Drive vehicles) or the "CLUTCH TEMP" light (in All Wheel Drive vehicles) remains on, or comes on intermittently while driving.

TIP

You can improve your road test diagnostics on 1990 and later models with the Select Monitor. (Use Justy Cartridge PN# 498 347 900.) Consult the appropriate model year Justy Service Manual for specific details on connecting the Select Monitor and the various modes available for checking the ECVT system.

Road Test: Safety Guidelines

- Always observe all traffic laws.
- Conduct the test in areas allowing at least 50 MPH speeds.
- Always wear safety belts.
- When stopping, use the turn signals and 4-way flashers.
- Use a clipboard to record test results, with the vehicle **stopped**.

Note: For optimum safety, conduct the test with two technicians... one to drive the vehicle, and one to observe the meter readings.



Select Monitor

Road Test: Key Items To Evaluate

- Assess the appearance of the vehicle to determine how it has been operated and cared for by the customer.
- Observe the operation of **all** transmission controls, including the shift selector mechanisms and the accelerator pedal switches.
(Note: Proper check procedures for these components are clearly outlined in the first "ECVT Transmission Diagnosis Video", MSA5AV131O.)
- Check for improper or abrupt ratio changes of the transmission by comparing vehicle speed to engine speed, in both "D" and "DS" ranges. Use the chart on page 9 for comparison purposes.
- Feel for unusual vibrations and listen for any unusual noises.
- Notice whether the clutch engagement is smooth, abrupt or slipping.
- Observe the operation of the ECVT and fuel system check lights.
- Assess the overall performance of the vehicle.
- If you discover a transmission problem **not** described by the customer complaint, make the necessary repair. It may actually be the problem that the customer is experiencing.

Vehicle Speed vs Engine Speed Chart

	Front Wheel Drive		All Wheel Drive	
	MPH	RPM	MPH	RPM
"D" Range	40	2000	40	2000
	45	2100	45	2400
	50	2400	50	2600
	55	2600	55	2900
"DS" Range	40	4000	40	4200
	45	4100	45	4300
	50	4200	50	4400
	55	4400	55	4500

Note: These ranges are approximate and for comparison purposes only. Speedometer and tachometer error, along with tire wear, must also be taken into consideration. This test must be done on a flat surface and at a steady throttle.

If You Cannot Verify The Problem...

If during the road test everything appears to be functioning normally, and the customer complaint cannot be verified, the following steps should be taken.

1. Re-verify the complaint. Call the customer again if further clarification is necessary.
2. Do not attempt to repair the vehicle unless you have a definite diagnosis.
3. If possible, go for a road test with the customer in an attempt to duplicate the complaint.

NOTES:

4. Explain to the customer that the complaint could not be verified, or that the vehicle is operating normally.

5. Return the vehicle to the customer and indicate clearly on the Repair Order that the customer complaint could not be duplicated.

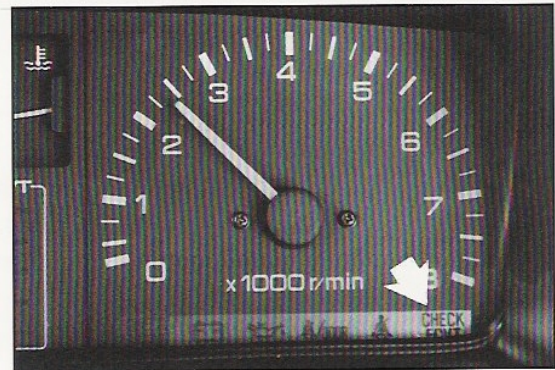
6. If the vehicle returns with the same complaint again, attempt to re-verify the complaint.

7. If the customer complaint cannot be duplicated, contact your District Technical Manager for further information.

Note: If the customer complaint is that the warning light comes “on” or goes “on” and “off” intermittently, and if during your road test you cannot duplicate this complaint, always perform a “Read Memory” and “D-Check” procedure. If a code is indicated, troubleshoot for that code.

TIP

Most intermittent electrical problems are due to loose or poor connections, inspect all pin connectors and ground connections related to the circuit, indicated by the trouble code. Also check for Service Bulletin information pertaining to the trouble code displayed.



ECVT Warning Light

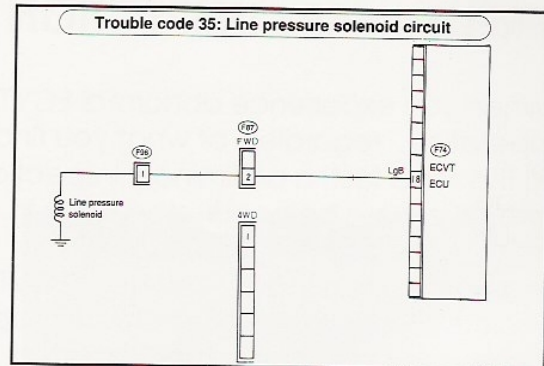
Diagnosing An Intermittent Trouble Code

If an intermittent Trouble Code 35 is indicated, check for loose pin connectors at connector numbers **F74, pin #18**; **F87, pin #2**; and **F96, pin #1**. This is done by performing a sliding resistance test on the female terminal. Also check for a shorted or damaged line pressure solenoid wire.

Symptoms You May Encounter

Here are some symptoms you might encounter during the road test which would indicate an ECVT problem. These are based on actual customer complaints.

- Engine speed increases abruptly while driving.
- Transmission will not up-ratio.
- Transmission stays in high-ratio.
- Abrupt down-ratio when coming to a stop.
- Abrupt up or down ratio change while driving.
- Engine brake is suddenly applied while driving. (As if you had shifted into DS range.)
- Vehicle creeps while in gear with your foot off the gas pedal.
- Vehicle appears to go into "Neutral" while driving.
- "DS" range does not function, but "D" range operates normally.
- Kickdown function does not operate in "D" range, or vehicle appears to be very sluggish.

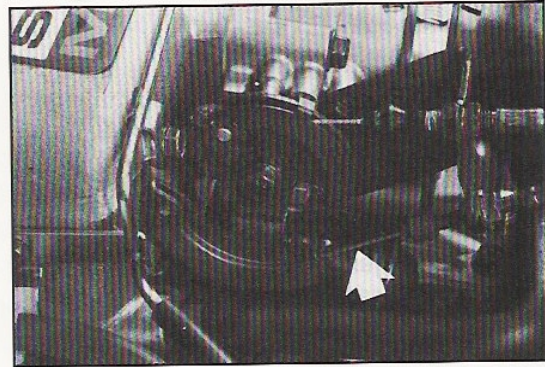


Trouble Code 35

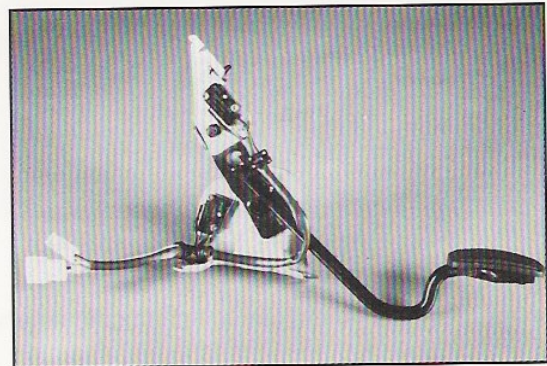
PRELIMINARY INSPECTION

When you experience abnormal ECVT operation, regardless of what you find in the road test, a preliminary inspection should always be conducted back in the service bay. Since actual field experience has shown that most ECVT malfunctions can be corrected through basic adjustments, it is important that these inspection procedures be conducted in a specific sequence. This will help you determine whether you have a mechanical, hydraulic or electrical problem.

1. Check the idle speed and ignition timing.
2. Again check the ECVT fluid level.
3. Perform a stall speed test.
4. Check the transmission control cable adjustment.
5. Check both accelerator pedal switch adjustments.
6. Check the shift control cable and inhibitor switch adjustments.
7. Perform a line pressure test.
8. If the problem is related to the "CHECK ECVT" or "CLUTCH TEMP" light, a "Read Memory" and "D-Check" diagnosis should also be performed.



Transmission Control Cable



Accelerator Pedal Switches

TROUBLESHOOTING

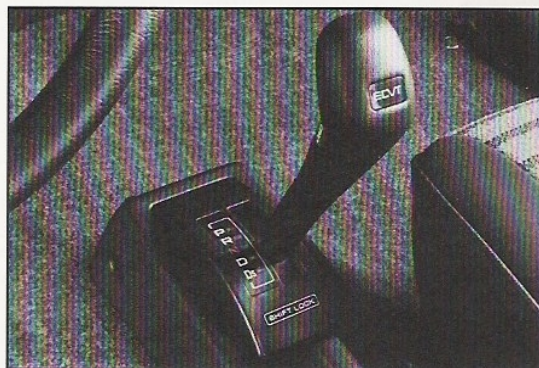
The following are basic troubleshooting approaches based on actual customer complaints. The intent of this information is not to eliminate the use of the Service Manual, but to offer clarification and time-saving steps for troubleshooting ECVT problems.

SYMPTOM 1: ENGINE SPEED INCREASES ABRUPTLY

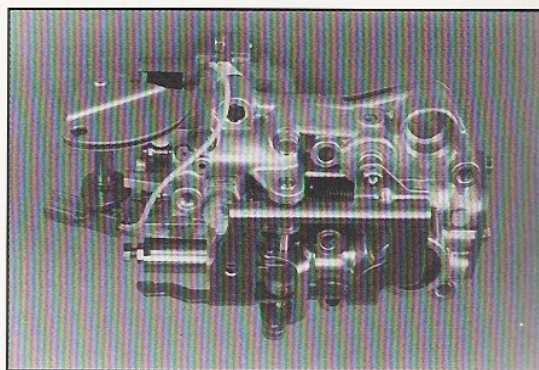
If you verify during the road test that the engine speed increases abruptly while driving, or the vehicle seems to go into neutral with the engine speed suddenly flaring up, you will most likely find the problem caused by any one of the following (in this order of probability):

- Mis-adjusted or defective inhibitor switch.
- Incorrect adjustment of the shift linkage or a shift selector cable problem.
- Malfunction in the clutch control circuit or the clutch assembly.
- A control valve body problem.
- A problem with the power supply to the ECU.
- An internal pulley problem.

NOTE: Once a problem is found and corrected, re-road test the vehicle to see if this eliminates the Symptom described in the customer complaint.



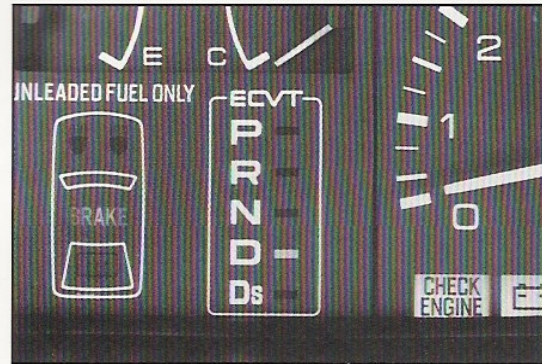
Shift Selector



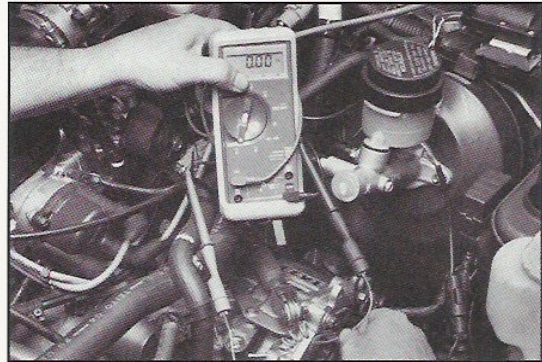
Control Valve Body

How To Troubleshoot This Symptom

1. If during the road test you noticed that either the "D" or "DS" indicator lights went out as the RPMs increased, check the inhibitor switch and shift control cable adjustments.
2. Next, measure the clutch current, looking for abnormally low or intermittent current. For a simple and accurate way to conduct this test under actual driving conditions, see page 16 "Using The Clutch Current Measurement Tool."
3. If this test indicates a clutch problem, continue to troubleshoot as if you had a Trouble Code 34. See the 1990 Justy ECVT Service Manual Supplement for diagnostic information.
4. Next, evaluate the line pressure. If the results indicate low line pressure, most likely you have a control valve body problem. (For troubleshooting procedures, start in the last trouble-free box entitled "Incorrect Gear Change" on page 96 of the 1990 Justy ECVT Service Manual Supplement.)



Indicator Lights



Measuring Clutch Current

Making The Measurement Tool

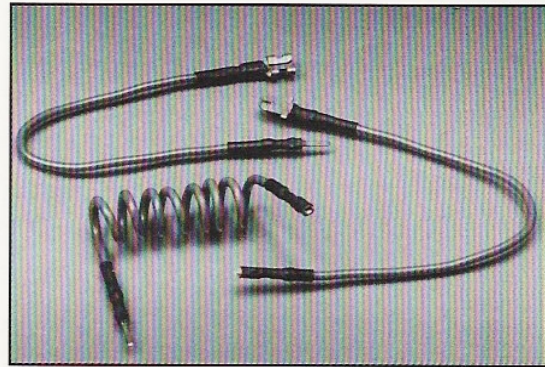
You Will Need:

- (2) 7-inch lengths of 16-gauge primary wire
- (1) 14-inch length of 16-gauge primary wire
- (1) Male spade terminal
- (1) Female spade terminal
- (2) PN 81072GA070 female*
- (2) PN 81072GA070 male*

***Note:** These terminals come in a package which includes both male and female terminals. They can also be found in Terminal Kit B, PN 81072GA150.

1. Solder (1) male and (1) female **PN 81072GA070** to each end of the 14-inch length of 16-gauge primary wire.
2. Solder (1) male **PN 81072GA070** on (1) 7-inch length of 16-gauge primary wire.
3. Solder (1) female **PN 81072GA070** on the other 7-inch length of wire.
4. Crimp the male and female spade terminals on the other end of both 7-inch wires. (It doesn't matter which spade terminal goes on which wire.)

Caution: Use shrink tubing to insulate as much of the terminals as practical. This will prevent accidental shorting between the clutch circuit wires or vehicle body ground. Shorting of the clutch control circuit wires to each other, or to body ground, will damage the clutch control unit.



Clutch Current Tool

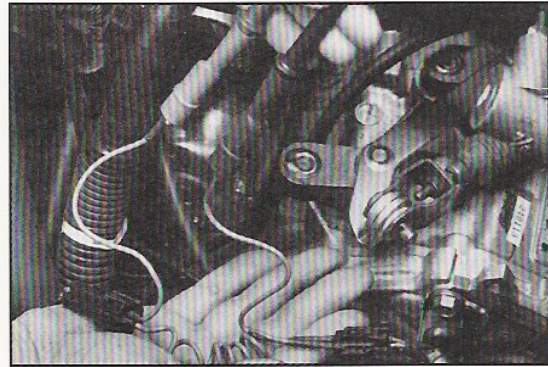
NOTES:

Using The Clutch Current Measurement Tool

1. Disconnect the electromagnetic clutch connector. (**F86**) 1989-1992 model years.
2. Connect the 14-inch wire in series with the #2 pin connectors.
3. Connect each of the 7-inch wires to the appropriate #1 pin connectors.
4. Connect the positive lead of the multimeter to the test wire coming from the control unit.
5. Connect the negative lead of the multimeter to the test wire going toward the brush holder.
6. Carefully run the meter leads so the multimeter can be read inside the vehicle.

Caution: Make sure that the test leads and test wires are kept away from each other and do not come in contact with body ground. Use electrical tape around each connection as an added measure to prevent this and also eliminate chances for an accidental disconnection.

7. When performing the clutch current test, either drive the vehicle at 45 MPH with a steady throttle in "D" range (both the acceleration and throttle position switches must be activated), or run the vehicle on the lift in "DS" range, again with both gas pedal switches activated. You should get a **steady** reading of approximately 3.5 amps. If the current measures more or less than 3.5 amps, check the operation of the gas pedal switches. In addition, troubleshoot the clutch control circuit using the steps for Trouble Code 34.



Connecting The Clutch Current Measurement Tool

SYMPTOM 2: TRANSMISSION IS STUCK IN LOW OR HIGH RATIO

These two symptoms use similar diagnostic procedures, and require pressure testing to pinpoint their causes.

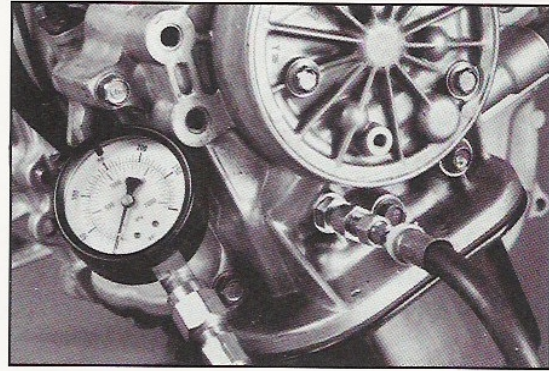
Troubleshooting for “Stuck In Low-Ratio” Symptom

1. Conduct a preliminary inspection, as outlined on page 12.
2. Conduct a pitot pressure test, by connecting a pressure gauge as shown in the box to the right and on page 18.
3. If pitot pressure is **okay**:
—Check the primary pulley pressure. Be sure to disconnect the line pressure solenoid.

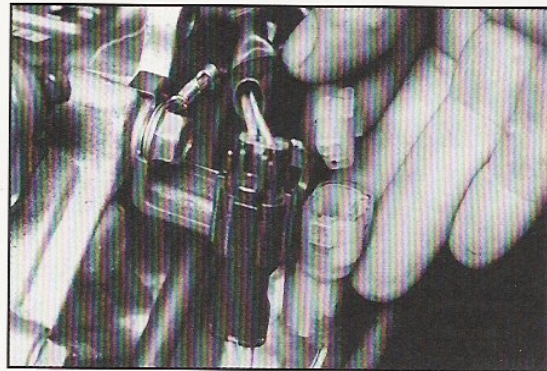
Note: This will turn on the “CHECK ECVT” or “CLUTCH TEMP” light, so remember to clear the Memory afterwards.

4. If pitot pressure is not **okay**:
—Disassembly of the transmission is required. Consult the **Pitot/Primary Pressure Ranges** chart for the approximate ranges you should see.
—Also, check the vehicle repair history for previous repairs involving the pulleys. It is possible the pitot tube was damaged during disassembly or reassembly of the primary pulley.

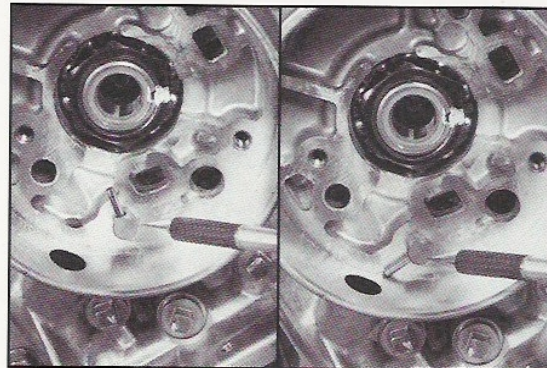
—**REMINDER:** When removing the primary pulley, place the pitot tube pin in the 11 o’clock position. After installing the primary pulley, make sure the pitot tube pin is moved to the 7 o’clock position before installing the oil pump.



Check Primary Pulley Pressure



Disconnect Line Pressure Solenoid



**Pitot Tube:
11 o'clock
position**

**Pitot Tube:
7 o'clock
position**

5. If the primary pulley pressure is also **okay**:

—The problem is most likely a stuck or damaged pulley, and an internal transmission inspection and repair will be necessary.

If the primary pulley pressure is not **okay**:

—The problem is most likely in the control valve body assembly such as a stuck shift control valve.

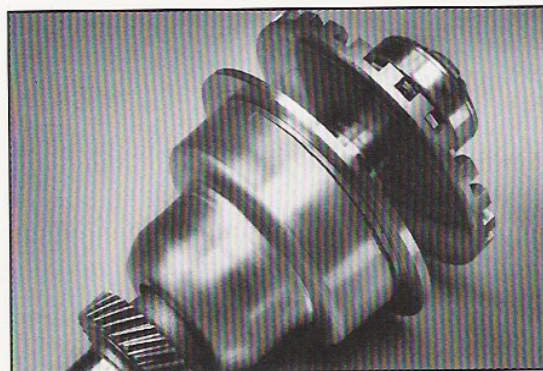
Pitot/Primary Pressure Testing:

Tools Required:

**PN 398573600 Pressure Gauge
(3AT +4EAT)**

**PN 498897100 Adaptor (4EAT)
Edeleman PN 272330 3/16-in.
fitting adaptor**

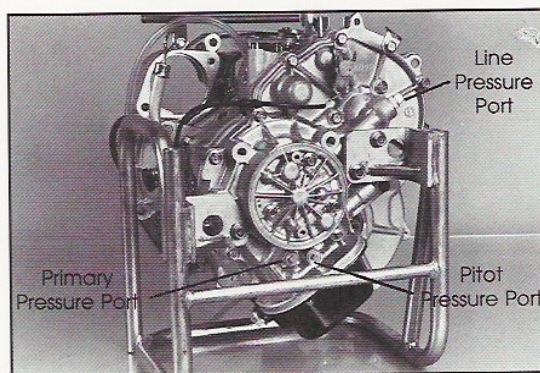
1. Place the vehicle on the lift with the wheels slightly off the ground.
2. Remove the pitot/primary pressure port plugs with o-ring.
3. Install the 3/16-in. thread adaptor to the **498897100** adaptor.
4. Install the **498897100** adaptor into the pitot/primary pressure port (finger tight only.)
5. Install the pressure gauge fitting into the 3/16-in. thread adaptor and lightly tighten it with a wrench and a back-up wrench, to prevent damage to the adaptors.
6. Carefully route the pressure gauge hose away from the tire and any other moving components.



Damaged Pulley



Pitot/Primary Pressure Gauge



Pressure Port Locations

7. Sit in the vehicle and observe the pressure readings at the appropriate speeds.

Note: When performing the *primary pressure test*, always disconnect the line pressure solenoid connector.

Pitot Pressure

Pitot pressure will start at "0" and should rise steadily to the approximate values given. These ranges apply to both Front Wheel Drive and All Wheel Drive vehicles.

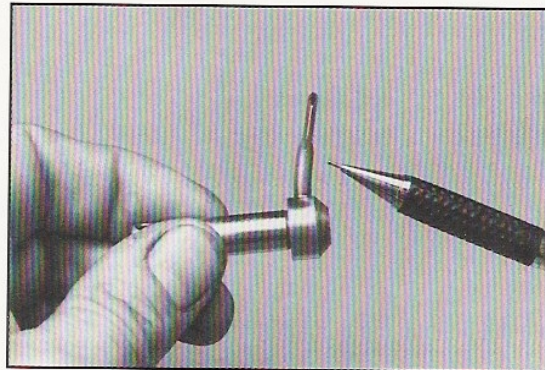
TIP

When a pitot pressure problem occurs, the test results will be drastically lower and in some cases the test result will be "0" PSI. In either case, a pitot tube problem exists and disassembly of the transmission is required.

PITOT PRESSURE RANGES

RPM*	PSI
2000	14-16
3000	30-32
4000	55-57
5000	84-86

** In "D" or "DS" Position.*



Damaged Pitot Tube

Primary Pressure Chart

With line pressure solenoid connector disconnected

	Front Wheel Drive		All Wheel Drive	
	MPH	PSI	MPH	PSI
"D" Range	40	150	40	160
"DS" Range	40	100	40	115

TIP

If primary pressure is extremely low at the speeds listed in the chart (and the pitot pressure is normal), this indicates a stuck shift control valve and relates to the symptom where the transmission is Stuck In Low Ratio.

TIP

If primary pressure is evident at 0 MPH, this also indicates a stuck shift control valve and relates to a symptom where the transmission is stuck in a higher ratio.

Caution: These pressure values are for comparison purposes only and are intended to be used as an indicator of pitot and primary pressure performance.

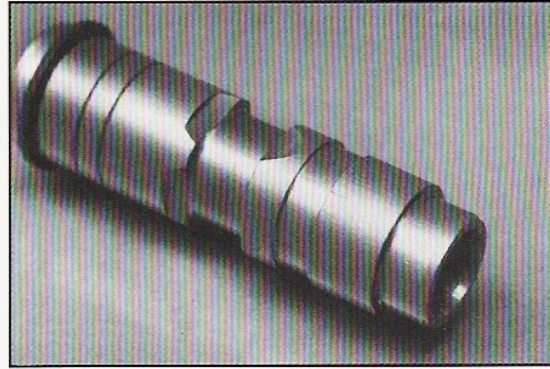
NOTES:

Troubleshooting For “Stuck In High-Ratio” Symptom

1. Perform a primary pressure test, as outlined on pages 18-20.
2. If primary pressure is **not okay**:
—Check for a stuck shift control valve in the control valve body assembly.
3. If primary pressure is **okay**:
—The problem is most likely a stuck or damaged pulley, which again requires removal and disassembly of the transmission.

4. Before you disassemble the transmission, carefully inspect the electromagnetic powder clutch using the stall speed test outlined in the 1990 Justy ECVT Service Manual Supplement and Section 3-2 of the regular Justy Service Manual.

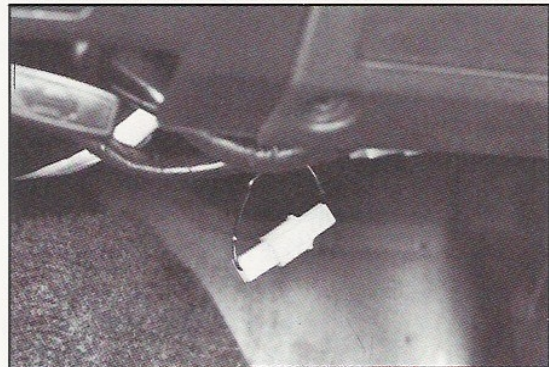
—If you discover higher or lower than normal resistance, remove the brush holder assembly and check for a strong odor which smells like burned electrical insulation.
—You may also notice heat discoloration on the slip rings and surrounding area.
—In either case, the clutch must be replaced.



Shift control valve

SYMPTOM 3: VEHICLE WILL NOT MOVE**Troubleshooting For “Vehicle Will Not Move” Symptom**

1. Perform a visual inspection and check for obvious causes:
 - Disconnected clutch control circuit connector
 - Lack of transmission fluid
 - Drive-line component failure
2. If you find little or no fluid in the transmission, look for leaks and repair the transmission accordingly.
3. If the problem is not obvious, conduct a full preliminary inspection.
4. To check for electrical problems, put the vehicle on the lift, start the vehicle and observe if the “CHECK ECVT” or “CLUTCH TEMP” light goes “OUT.” If it does, conduct a “Read Memory” using the Service Manual and the white, 1-pin test connector check to see if any electrical problems are indicated. If the memory is clear, the problem is most likely not electrical.
5. If the “CHECK ECVT” or “CLUTCH TEMP” light remains “ON” after the engine is started, turn the ignition switch off and connect the white 1-pin test mode connector. Re-start the engine and conduct a “D-Check.”
6. Use the Service Manual to troubleshoot for the code(s) indicated. Simply follow the D-check procedures as outlined starting on page 33 of the 1990 Justy ECVT Service Manual Supplement.

***Test Mode Connector***

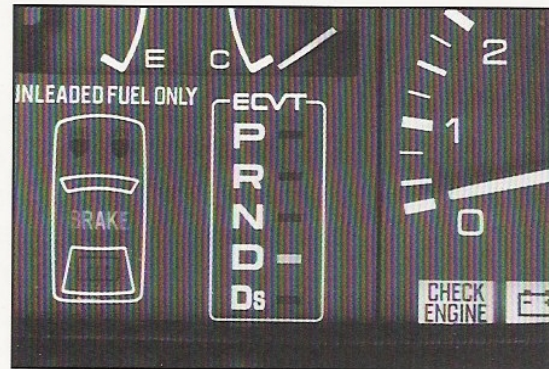
NOTE: If you do a "D-Check" and cannot move the wheels, you will get a speed sensor Trouble Code 33. Ignore this code now, but re-check for it after the repairs are made and then clear the memory.

NOTE: You can also use the Select Monitor to read trouble codes on 1990 or later model year vehicles.

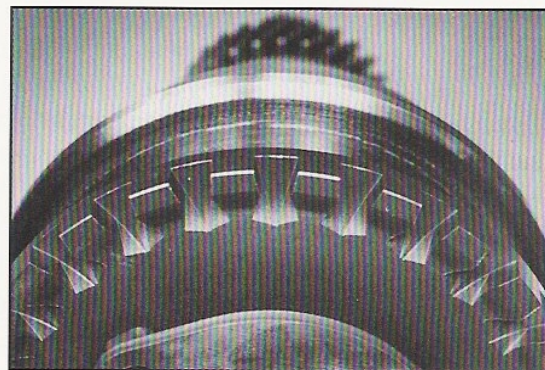
TROUBLESHOOTING FOR A MECHANICAL OR HYDRAULIC PROBLEM

If after performing the Read Memory and D-check procedures the problem is still not identified, you now need to troubleshoot for a mechanical or hydraulic problem as follows:

1. Check operation of the shifter and shift control cable. While shifting from "N" to both "R" and "D" it should feel "notchy" as you engage the synchronizer assembly. If there is **no resistance**, check for:
 - A broken shift control cable
 - A broken shift fork
 - A synchronizer problem
2. Conduct a line pressure test. If line pressure is **extremely low**:
 - Remove and internally inspect the control valve body assembly.
 - Visually inspect the Primary Pulley with the control valve body assembly removed. Then look for any signs of pulley damage.
3. If line pressure is **normal** and clutch resistance is **normal**, proceed to identify mechanical problems within the clutch or transmission as outlined on page 83 of the 1990 Justy ECVT Service Manual Supplement.



Shift Selector: D-Range



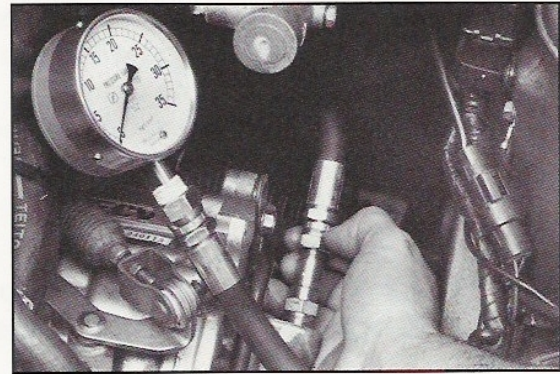
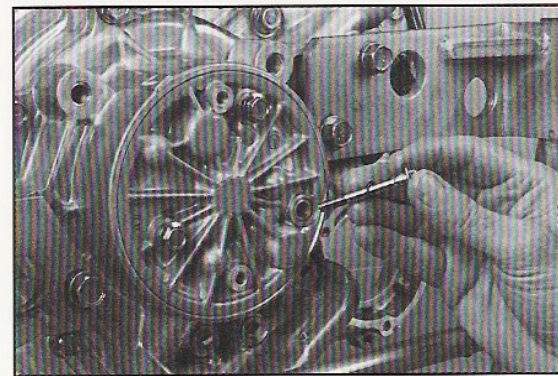
Damaged pulley

SYMPTOMS FOR OTHER ECVT PROBLEMS

While the accompanying video presentation covers several ECVT problems, an additional selection of ECVT customer complaints and diagnostic procedures will be presented in this section. Review the symptoms below and follow the sequence of troubleshooting steps to pin-point specific ECVT problem areas.

SYMPTOM: ABRUPT DOWN-RATIO WHEN COMING TO A STOP**Troubleshooting Steps:**

1. Perform a visual inspection of the vehicle.
2. Conduct a road test to verify the problem.
3. Perform a preliminary inspection including a line pressure test, D-Check and Read Memory.
4. Test Pitot Pressure and Primary Pressure.
5. If all above checks OK, symptom indicates one of the following problems:
 - loose oil pump bolts
 - torn or broken oil pump gasket
 - secondary pulley sealing rings leaking
 - cracked secondary or primary pulley

***Perform Preliminary Inspection******Oil Pump Bolts***

SYMPTOM: ENGINE BRAKE APPLIES SUDDENLY WHILE DRIVING IN D RANGE

(NOTE: This would feel like the transmission was shifted into DS range.)

Troubleshooting Steps:

1. Perform a visual inspection of the vehicle.
2. Conduct a road test to verify the problem.
3. Perform a preliminary inspection including a line pressure test, D-Check and Read Memory.
4. Test Pitot Pressure and Primary Pressure.
5. Proceed to steps outlined on page 90 of the 1990 Justy ECVT Service Manual Supplement for corresponding trouble-free symptoms.

SYMPTOM: VEHICLE CREEPS WHILE IN GEAR WITH FOOT OFF GAS PEDAL

(NOTE: This is sometimes associated with the customer complaint of "difficulty in shifting from R to D or D to R as you shift through N.")

Troubleshooting Steps:

1. Perform a visual inspection of the vehicle.
2. Conduct a road test to verify the problem.
3. Perform a preliminary inspection beginning with a Read Memory and D-Check.
(NOTE: A line pressure test will most likely not be required.)
4. This symptom most commonly is caused by a mis-adjusted or bad accelerator switch.
5. For more detailed troubleshooting procedures, refer to "The Vehicle Creeps" section on page 84 of the 1990 Justy ECVT Service Manual Supplement.

SYMPTOM: DS RANGE DOES NOT FUNCTION BUT D RANGE OPERATES NORMALLY

(NOTE: For this symptom the vehicle will operate the same in DS range as it does in D range.)

Troubleshooting Steps:

1. Perform a visual inspection of the vehicle.
2. Conduct a road test to verify the problem.
3. Perform a preliminary inspection including a line pressure test, D-Check and Read Memory.
4. Test Pitot Pressure and Primary Pressure.
5. If Primary Pressure **remains the same** in DS as in D:
—Refer to page 91 of the 1990 Justy ECVT Service Manual Supplement.

SYMPTOM: KICKDOWN FUNCTION DOES NOT OPERATE IN D RANGE.

(NOTE: Vehicle may feel very sluggish or appear to be going into higher ratios too quickly.)

Troubleshooting Steps:

1. Perform a visual inspection of the vehicle.
2. Conduct a road test to verify the problem.
3. Perform a preliminary inspection including a line pressure test, D-Check and Read Memory.
4. This problem often results from a mis-adjusted, disconnected or broken transmission control cable.
5. Other possible problem areas include:
—a stuck plunger (listed as item #5, section 3-2, page 53 of the 1990 Justy Service Manual and call-out #5 on the exploded view photo appearing on page 29.)
—a missing roll pin from the shift cam (item #10, section 3-2, page 53 of the 1990 Justy Service Manual and call-out #3 on the exploded view photo appearing on page 29.)

SERVICING THE CONTROL VALVE BODY ASSEMBLY

Service Tips

Follow These Basic Rules For Internal Repair

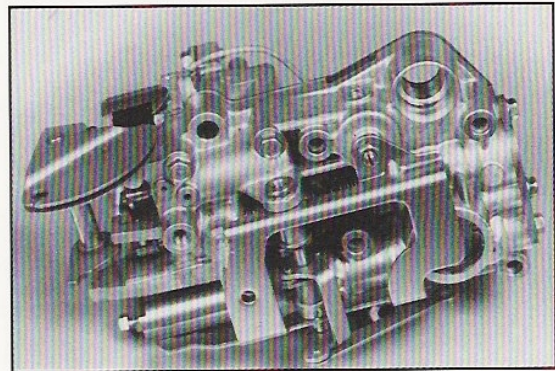
1. Work in a clean environment.
2. Use only lint-free shop towels.
3. Use only clean solvent and shop air for cleaning and drying components.
4. Use only small amounts of sealant on case halves.

NOTE: The purpose of the sealant is only to fill in the small marks left by the machining process. Therefore, only a small amount of liquid gasket is required to seal the case halves.

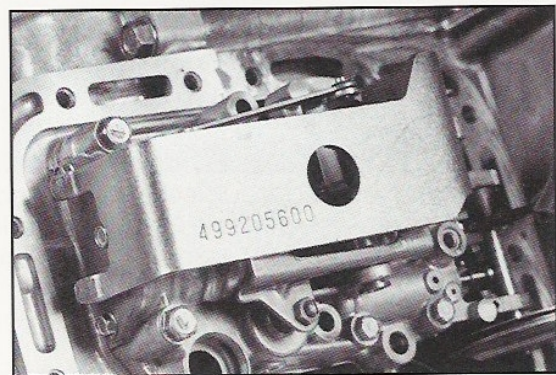
5. Use the Service Manual and related Service Bulletins.
6. Be sure to use proper special service tools and follow the approved service procedures as outlined.

Key Service Procedures

1. It is important to use the Control Valve Holder (Special Tool # **499205600**) when removing the Control Valve Body from the transmission.
2. Always lay out the components on a clean, lint-free surface **in order of their disassembly**. See exploded view photo on page 29 as an example.



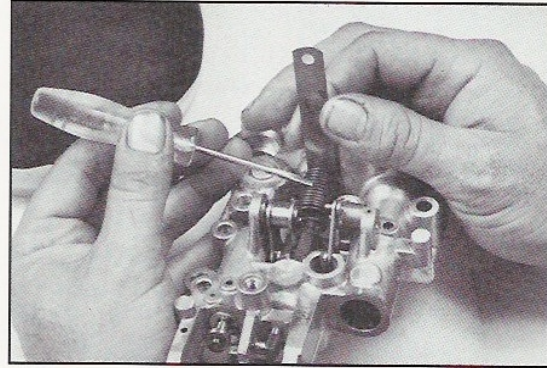
Control Valve Body



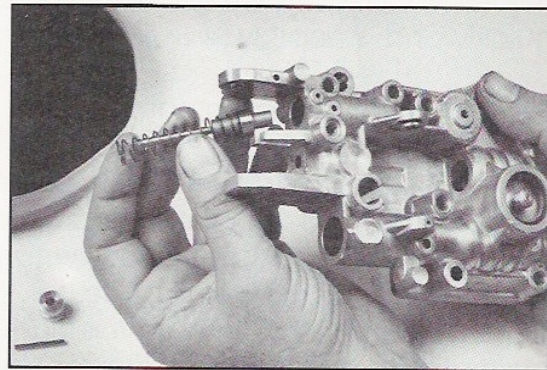
Control Valve Holder

3. Follow all steps given in the Justy Service Manual and Service Bulletin # 16-33-89 (dated 5/22/89) for control valve body disassembly and reassembly.
4. Place a thin, flat plate like a feeler gauge between the shift control valve bore and the low speed spring, when removing or installing the spring. This prevents creating burrs in the shift control valve bore.
5. Be sure the **loosely wound coils** of the spring face towards the low speed support during reassembly.
6. Some control valve body assemblies include a thin, low speed spring spacer (as shown in photo). Make sure you reinstall it as indicated, taking care not to bend it.
7. Clean each component carefully in clean solvent and dry them with shop air. Examine each component for damaging scores or scratches.
8. Lubricate each piece with clean Dexron II ATF before reinserting them into the valve body.
9. Check for smooth movement of the major valve body components without the accompanying springs or hardware.

NOTE: Any damage or lack of free movement discovered at this time requires complete replacement of the control valve body assembly.



Installing Low Speed Spring



Lubricating Components

10. When re-installing the Control Valve Body Assembly back into the transmission, use the Modulator Plate Special Tool (# 498255600) to set the modulator adjusting plate.

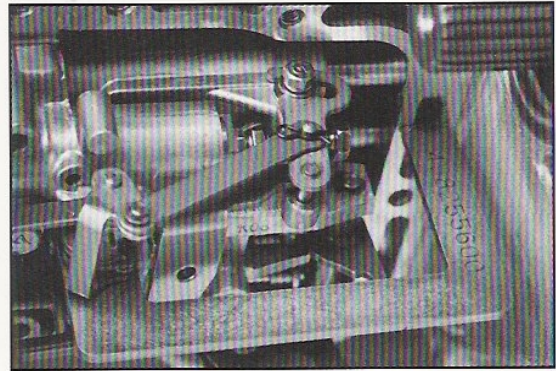
11. Once the modulator plate tool is installed, push the adjusting plate in the direction of the differential housing.

12. Backflush the transmission cooler with clean ATF and shop air, whenever the ECVT transmission has been internally serviced.

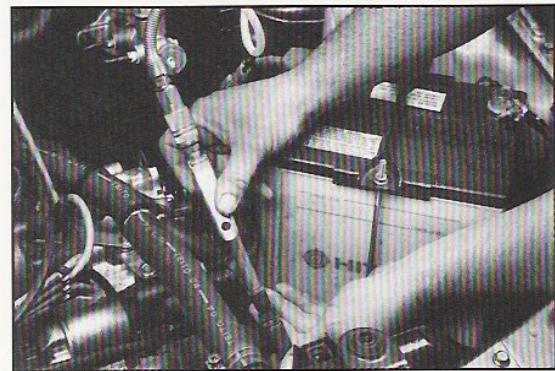
SUMMARY

Be sure to utilize the troubleshooting steps indicated for each ECVT problem symptom and the procedures outlined for effective control valve body repairs. You will find that by following these proven diagnostic and service techniques, your repairs will go much more quickly and smoothly.

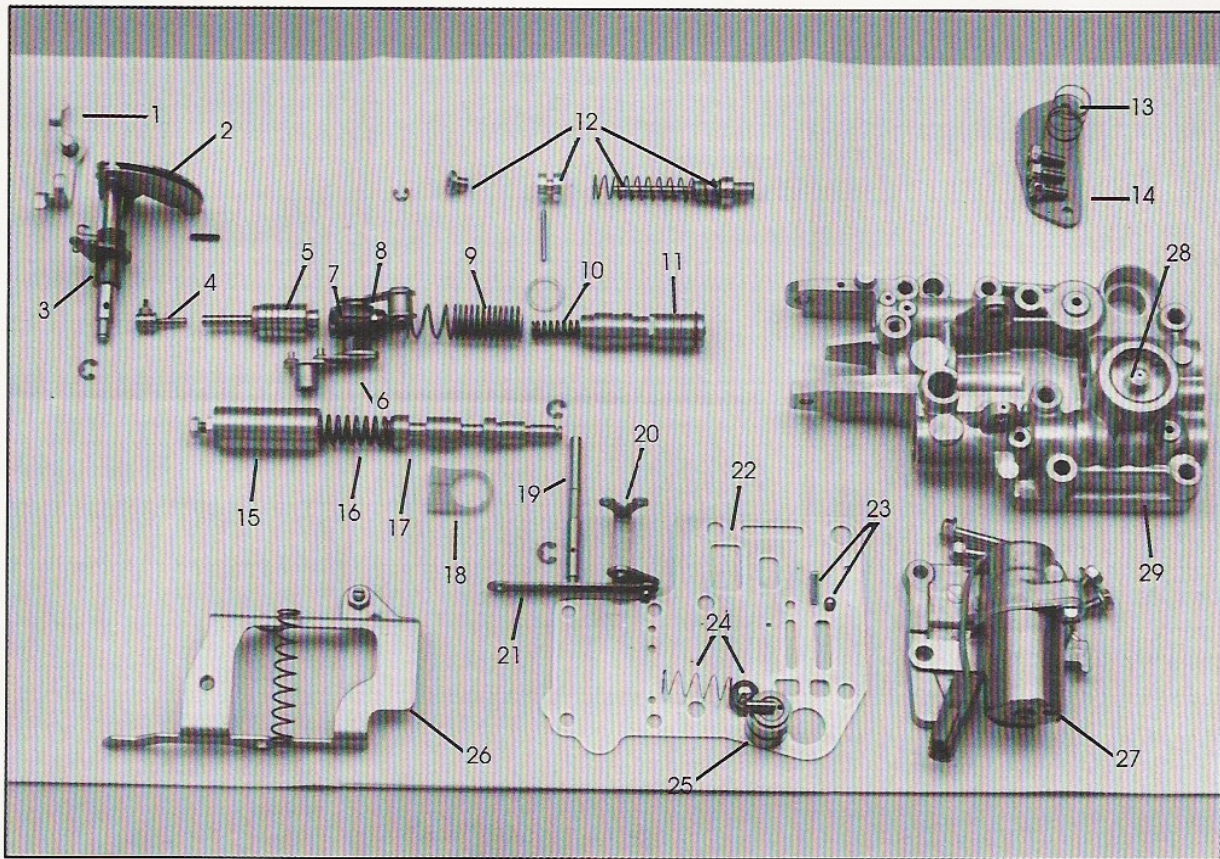
It is equally important to continuously refer to the Justy Service Manual, 1990 Justy ECVT Service Manual Supplement, appropriate Service Bulletins and Service Helpline Updates when performing any ECVT repair work. These resources, in combination with this video presentation and accompanying video reference booklet, will provide the most efficient solutions to all common ECVT transmission problems.



Modulator Plate



**Backflushing
Transmission Cooler**



Legend

- 1. DS Modifier Lever
- 2. Shift Control Lever
- 3. Shift Cam with Roll Pin
- 4. Shift Control Pin
- 5. Plunger (Shift Control)
- 6. Roller Assembly
- 7. Low Speed Support (Spring)
- 8. Linkage Guide (Roller Assembly)
- 9. Low Speed Spring
- 10. High Speed Spring
- 11. Shift Control Valve
- 12. Engine Brake Valve Assembly
- 13. Side Plate Spring (Shift Control)
- 14. Side Plate
- 15. Pressure Regulator Spring Guide
- 16. Pressure Regulator Spring
- 17. Pressure Regulator Valve
- 18. Spacer (Pressure Regulator)
- 19. Shaft (Shift Lock/Ratio Sensor)
- 20. Lever (Ratio Sensor)
- 21. Connecting Rod (Ratio Sensor)
- 22. Separator Plate
- 23. Small Check Ball And Spring (Pitot Pressure)
- 24. Large Check Ball And Spring (Lubrication Pressure)
- 25. Shift Lock Valve With Pin
- 26. Shift Lock Lever With Spring
- 27. Line Pressure Solenoid
- 28. Shift Lock Piston
- 29. Control Valve Body

SERVICE BULLETINS

No.	Date	Title	Remarks
01-112-89	04-17-89	Service Manual Correction and Clarification	Vol 11
01-119-89	08-16-89	Service Manual Correction (Diagnostic Chart)	Vol 11
02-70-89	08-24-89	Idle Speed Adjustment For MT and ECVT	Vol 11
02-82-91	08-15-91	Modified Valve Cover Gasket	Vol 13 Oil Leak Can Cause ECVT Brush Assembly to Develop a Poor Connection
07-38-88	10-12-88	Electrical Connector Diagnosis and Repair	Vol 11
16-32-89	05-10-89	Electromagnetic Clutch Rattle Noise	Vol 11
16-33-89	05-22-89	Valve Body Disassembly and Assembly	Vol 11
16-34-89	07-05-89	Alternate ECVT Adjustment Formula and Procedure	Vol 11
16-38-90	04-02-90	Intermittent Trouble Code 21	Vol 12
16-41-90	08-14-90	Trouble Code 25 In ECVT Control Unit	Vol 12
16-44-91	03-29-91	4WD Dash Lamp illuminates when vehicle is not engaged in 4WD Mode	Vol 13

RECOMMENDED TOOL LIST

Select Monitor Kit #498307500
 Select Monitor Cartridge #498347800
 Service Manual
 Service Manual Supplement
 Continuity Meter
 Digital VOM (With continuity feature if possible)
 Pressure Gauge #498575400
 Pressure Gauge Adapter #498895400
 Ignition Scope
 Terminal Repair Kit
 Crimping Pliers
 Induction Type Hand Held Tachometer (digital or analog)
 Drill Bit: 5/64 inches
 Timing Light (Induction Type)
 Vacuum Gauge
 Metal Scale (Ruler)
 Miscellaneous Hand Tools

APPENDIX

ECVT DIAGNOSTIC CHECK SHEET

Customer Name: _____ Production Date: _____

VIN #: _____ Trans #: _____

Customer Complaint: _____

Before Road Test:

Check ECVT fluid level:
 _____ OK _____ Low
 Location of visible leaks _____
 Indicate condition of fluid: _____ OK
 _____ Quantity Added _____ Discolored
 Other _____

Conduct a visual inspection of connectors,
 cables, etc. _____
 _____ OK
 Connector # _____ repaired

During Road Test:

Overall vehicle condition _____
 "Check ECVT"/"Clutch Temp" light:
 _____ Off _____ On _____ Intermittent On

Clutch operation: _____ OK
 _____ Abrupt _____ Slipping

Shift control cable adjustment:
 _____ OK _____ Need Adjustment
 Inhibitor switch operation:
 _____ OK _____ Needs Adjustment
 Gas pedal switches:
 _____ OK _____ Needs Adjustment
 Overall vehicle performance: _____ OK
 _____ Not OK _____ Comments _____

Vehicle Speed (MPH)	Engine Speed (RPM)
20	_____
25	_____
30	_____
35	_____
40	_____
45	_____
50	_____
55	_____

ECVT DIAGNOSTIC CHECK SHEET continued

After Road Test:

Was customer complaint verified:

___ Yes ___ No

Comments _____

Preliminary Inspection

Engine RPM _____ Ignition Timing _____

Stall Speed: _____ RPM

Transmission control cable adjustment:

___ OK ___ Adjusted

Acceleration switch adjustment:

___ OK ___ Adjusted

Throttle position switch adjustment:

___ OK ___ Adjusted

Transmission linkage:

___ OK ___ Adjusted

Inhibitor switch adjustment:

___ OK ___ Adjusted

Line pressure test: _____ PSI

(Disconnected line pressure solenoid)

Read Memory:

Clear _____

Codes displayed _____

D-Check Mode:

Clear _____

Codes displayed _____

Pitot Pressure at

_____ RPM _____ PSI

Primary Pressure

_____ MPH _____ PSI D-range

_____ MPH _____ PSI DS-range

Clutch Resistance _____ OHMS

Clutch Current

_____ Amperes @ _____ MPH

(Accelerator and throttle position switches actuated)

Brush condition: ___ OK ___ Replace

Other _____

NOTES:

SUBARU