

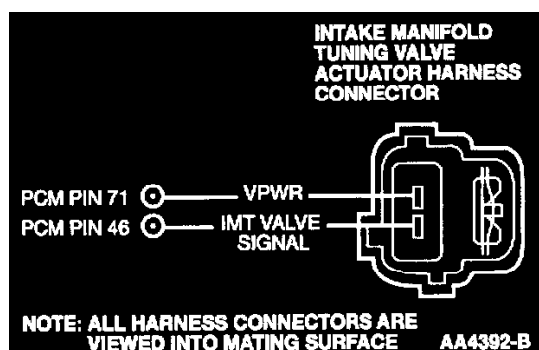
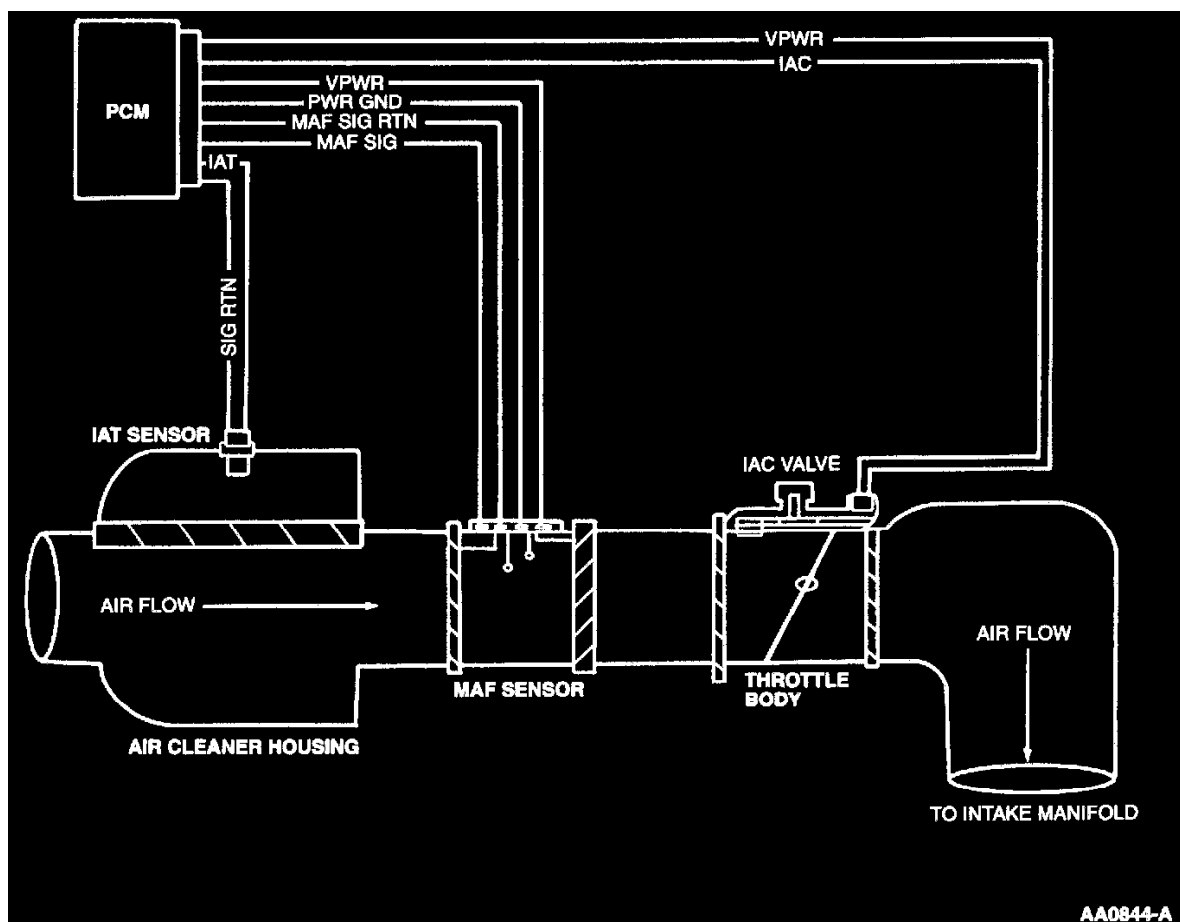
Computers and Control Systems: Pinpoint Tests

HU - Intake Air System

Test Notes

This Pinpoint Test is intended to diagnose the following:

- Throttle body assembly
- Speed control cable
- Accelerator cable linkage to throttle body
- Air cleaner assembly (including air cleaner element)
- Air inlet tube
- Clean air tube hose and resonator
- Intake Manifold Runner Control housing assembly (IMRC) and IMRC actuator assembly
- Harness circuits: IMRC, IMRC Monitor, SIG RTN, PWR GND, VPWR
- Intake Manifold Tuning (IMT Valve) electric
- Powertrain Control Module (PCM)



Test Step		Result	Action to Take
HU1	CHECK FOR INCORRECT IDLE SPEED		
	<p>NOTE: Vehicle must be at operating temperature and at idle for a minimum of one minute. If here for a part throttle symptom, GO to HU4.</p> <ul style="list-style-type: none"> ● Key on, engine running. ● Determine if idle speed is incorrect. Refer to the Typical Reference Value Charts if necessary. ● Read the vehicle tachometer (if equipped) or connect the scan tool to the data link connector (DLC) and view the rpm PID. ● Is vehicle idle speed incorrect? 	<p>Yes</p> <p>No</p>	<p>▶ For a high idle concern, be sure throttle arm contacts return stop, then GO to HU6. For other idle speed concerns, GO to HU7.</p> <p>▶ KEY OFF. GO to HU2.</p>
HU2	CHECK FOR STICKING / BINDING CONDITION		
	<ul style="list-style-type: none"> ● Gently cycle throttle from fully closed to fully open and back to fully closed. Check for binding / sticking in travel. ● Is a stick or bind condition present? 	<p>Yes</p> <p>No</p>	<p>▶ GO to HU3.</p> <p>▶ GO to HU4.</p>
HU3	ISOLATE BINDING / STICKING CONCERN		
	<ul style="list-style-type: none"> ● Disconnect accelerator cable and speed control cable from throttle body linkage. <p>CAUTION: Do not attempt to clean the throttle bore and plate area. Cleaning will damage the throttle body assembly.</p> <p>NOTE: Sticking or binding condition can either be within cables or throttle body assembly.</p> <ul style="list-style-type: none"> ● Rotate throttle body linkage. ● Does the throttle body rotate freely without a sticking, binding or grabbing condition? 	<p>Yes</p> <p>No</p>	<p>▶ REPAIR cable(s) causing the concern.</p> <p>▶ REPLACE throttle body assembly.</p>

Test Step		Result	Action to Take
HU4	CHECK FUNCTIONALITY OF THE THROTTLE POSITION SENSOR		
	<ul style="list-style-type: none"> ● Key on. ● View TP V PID with the scan tool. ● From closed throttle, slowly begin to press accelerator to wide open throttle. ● Did the TP V PID display a smooth reading during accelerator movement? 	Yes No	KEY OFF. GO to HU5 . REPLACE throttle position sensor.
HU5	CHECK FOR AIR CLEANER ELEMENT AND INLET FOR RESTRICTIONS		
	<ul style="list-style-type: none"> ● Remove air cleaner element. Check for a plugged or dirty element. ● Check for any restrictions along the air inlet path from the air inlet back to the throttle body. ● Are any restrictions present? 	Yes No	REPAIR air cleaner element or clear any restrictions. REINSERT original air cleaner element. GO to HU6 .
HU6	CHECK FOR A POSITIVE CRANK VENTILATION CONCERN		
	NOTE: A high idle may indicate incorrect PCV valve size or vacuum leak. <ul style="list-style-type: none"> ● Inspect PCV valve connections for leaks or cracks. ● Remove PCV valve and inspect for plugging or an incorrect valve. ● Is a PCV concern present? 	Yes No	REPLACE PCV valve or REPAIR leak or crack. For high idle, GO to HU9 , otherwise, RECONNECT PCV valve. GO to HU7 .
HU7	CHECK FOR IDLE AIR CONTROL VALVE RESPONSE		
	<ul style="list-style-type: none"> ● Key on, engine running. ● With vehicle at operating temperature and at idle for a minimum of one minute, disconnect the IAC valve harness connector. ● Did engine idle speed drop or nearly stall? 	Yes No	GO to HU8 . For a high idle with no idle speed drop when disconnecting IAC, GO to HU9 . For a low idle with no idle speed drop when disconnecting IAC, REPLACE the IAC valve.
HU8	INSPECT THROTTLE BODY PLATE HOLE FOR PLUGGING		
	NOTE: Only some applications have a throttle plate hole. If not equipped, return to symptom charts. <ul style="list-style-type: none"> ● Detach resonator from throttle body assembly. ● Inspect throttle plate hole for any restrictions. ● Is the throttle plate hole restricted? 	Yes No	CLEAR throttle plate hole. Return to Symptom Charts.

	Test Step	Result	Action to Take
HU9	<p>CHECK FOR VACUUM LEAKS</p> <ul style="list-style-type: none"> ● Listen for vacuum leaks. ● Inspect entire air intake system from the mass air flow (MAF) sensor to the intake manifold for leaks such as: <ul style="list-style-type: none"> — cracked or punctured inlet air tube. — loose connections on the inlet air tube at the air cleaner housing or throttle body. — idle air control (IAC) valve assembly or gasket seal. — EGR valve gasket seal leak to intake manifold. — Intake manifold assembly or gasket seal. — EGR valve diaphragm or control solenoid. — vacuum supply connectors and hose. ● Are any leaks detected? 	<p>Yes</p> <p>No</p>	<p>KEY OFF. REPAIR any leaks.</p> <p>REPLACE IAC valve if idle speed does not drop when disconnecting harness connector otherwise, KEY OFF. GO to HU10.</p>
HU10	<p>CHECK THROTTLE BODY FOR EXCESSIVE WEAR</p> <ul style="list-style-type: none"> ● Remove throttle body assembly. ● Hold throttle body up to a light source. ● Rotate the throttle lever to wide open throttle and inspect bore for excessive wear or grooving. ● Rotate the throttle lever to closed throttle position while inspecting for misaligned or worn plate. Look for excessive gap between bore and plate area. ● Is a concern detected? 	<p>Yes</p> <p>No</p>	<p>REPLACE throttle body.</p> <p>RETURN to Symptom Charts.</p>
HU15	<p>DTCS P 1516, P 1517, P 1518, P 1519 PERFORM VISUAL INSPECTION</p> <p>NOTE: Refer to the PCM connector pin numbers in the beginning of the pinpoint test.</p> <ul style="list-style-type: none"> ● View linkage or cable routing. Check for any binding or improper routing. Cable core wire (if applicable) at IMRC housing attachment must have slack and lever must contact close plate stop screw. For Escort / Tracer, view IMRC actuator lever. Make sure lever is visible. <p>NOTE: The IMRC return springs are strong. Make sure the return springs operate properly and plates open and close fully.</p> <ul style="list-style-type: none"> ● Manually open and close IMRC plates at intake manifold (press IMRC lever down for Escort / Tracer) and feel for sticking / binding. ● Is concern indicated? 	<p>Yes</p> <p>No</p>	<p>GO to HU16.</p> <p>GO to HU17.</p>

Test Step		Result	Action to Take
HU16	PERFORM IMRC PHYSICAL TEST		
	<ul style="list-style-type: none"> Disconnect IMRC linkage or cables(s) from runner(s) or remove actuator assembly for Escort / Tracer. <p>NOTE: IMRC return springs are strong.</p> <ul style="list-style-type: none"> Rotate IMRC lever(s) fully open to fully closed without obstruction and contacting closed stop screw. Feel for sticking or binding during rotation and spring tension of approximately .34 to .45 N-m (3 to 4 lb-in). Is concern indicated? 	<p>Yes</p> <p>No</p>	<p>CLEAN or REPAIR runners. GO to HU38.</p> <p>REPLACE IMRC actuator. GO to HU38.</p>
HU17	PERFORM IMRC FUNCTIONAL TEST		
	<ul style="list-style-type: none"> Connect scan tool to data link connector (DLC). Key on, engine off. <p>NOTE: If the IMRC plates open immediately when the key is turned on, Go to HU23.</p> <ul style="list-style-type: none"> Access Output Test Mode (OTM). <p>WARNING: KEEP FINGERS CLEAR OF IMRC LEVER / CABLE MECHANISM.</p> <ul style="list-style-type: none"> Turn all outputs on. When IMRC is commanded on, lever(s) should rotate to full-open position. At least one of the levers should contact the wide open stop, the other may be slightly off the wide open stop. For Escort / Tracer, IMRC actuator lever will rotate to full open position at approximately 90 degrees. Did the IMRC lever(s) cycle from fully closed and remain fully open while all outputs were on? 	<p>Yes</p> <p>No</p>	<p>GO to HU25.</p> <p>GO to HU18.</p>
HU18	CHECK IMRC ACTUATOR VPWR CIRCUIT FOR AN OPEN IN HARNESS		
	<ul style="list-style-type: none"> Disconnect IMRC actuator harness connector. Measure VPWR circuit voltage at the IMRC actuator harness connector. Is IMRC VPWR voltage greater than 10.5 volts? 	<p>Yes</p> <p>No</p>	<p>GO to HU19. For Escort / Tracer, GO to HU20.</p> <p>KEY OFF. REPAIR open circuit. GO to HU38.</p>
HU19	CHECK IMRC GROUND CIRCUIT FOR OPEN IN HARNESS		
	<ul style="list-style-type: none"> Measure voltage between ground and VPWR circuits at the IMRC actuator harness connector. Is voltage greater than 10.5 volts? 	<p>Yes</p> <p>No</p>	<p>GO to HU20.</p> <p>REPAIR open circuit. GO to HU38.</p>

Test Step		Result	Action to Take
HU20	VERIFY DRIVER CIRCUIT FUNCTION		
	<ul style="list-style-type: none"> Access Output Test Mode (OTM). Place a test lamp between VPWR and the IMRC signal circuit at the IMRC actuator harness connector. Turn all outputs on. Did the test lamp glow with all outputs on? 	Yes No	KEY OFF. GO to HU32 . KEY OFF. GO to HU21
HU21	CHECK IMRC DRIVER CIRCUIT FOR OPEN IN HARNESS		
	<ul style="list-style-type: none"> Disconnect PCM. Measure resistance of IMRC signal circuit between PCM harness connector and the IMRC actuator harness connector. Is resistance less than 5 ohms? 	Yes No	GO to HU22 . REPAIR open circuit. GO to HU38 .
HU22	CHECK IMRC DRIVER CIRCUIT FOR SHORT TO VPWR IN HARNESS		
	<ul style="list-style-type: none"> Key on, engine off. Measure voltage between IMRC signal circuit at the IMRC actuator harness connector and ground. Is voltage less than 10.5 ohms? 	Yes No	Possible intermittent concern. GO to Z1 . REPLACE PCM after determining concern is not intermittent. GO to HU38 . REPAIR short circuit. GO to HU38 .
HU23	CHECK IMRC DRIVER CIRCUIT FOR SHORT TO GROUND OR SHORT TO MONITOR CIRCUIT WITH PCM CONNECTED		
	<ul style="list-style-type: none"> Measure resistance between the IMRC driver circuit to PWR GND and then to SIG RTN and then to the monitor circuit at the IMRC harness connector. Are all resistances greater than 10,000 ohms? 	Yes No	REPLACE IMRC. GO to HU38 . GO to HU24 .
HU24	CHECK IMRC DRIVER CIRCUIT FOR SHORT TO GROUND OR SHORT TO MONITOR CIRCUIT WITH PCM DISCONNECTED		
	<ul style="list-style-type: none"> Disconnect PCM harness connector. Measure the resistance between the IMRC driver circuit to PWR GND and then to SIG RTN and then to the monitor circuit at the IMRC harness connector. Are all resistances greater than 10,000 ohms? 	Yes No	REPLACE PCM. GO to HU38 . REPAIR the appropriate circuit for short. GO to HU38 .

Test Step		Result	Action to Take
HU25	VIEW IMRC MONITOR PID TO DETERMINE PATH FOR POSSIBLE SHORT		
	<p>NOTE: All vehicles will display VREF for IMRCM PID except 3.8L and 4.2L which will display approximately 2.5 volts.</p> <ul style="list-style-type: none"> With the scan tool, monitor the IMRCM PID. Is the IMRCM PID displaying either VREF or approximately 2.5 volts? 	<p>Yes</p> <p>No</p>	<p>GO to HU26.</p> <p>GO to HU30.</p>
HU26	CHECK IMRC MONITOR PID TO DETERMINE A SHORT TO VPWR		
	<ul style="list-style-type: none"> With the scan tool, monitor the IMRCM PID while in Output Test Mode. Turn all output on. Is the IMRCM PID displaying less than 1 volt with all outputs on? 	<p>Yes</p> <p>No</p>	<p>GO to HU27.</p> <p>GO to HU32.</p>
HU27	CHECK IMRC MONITOR CIRCUIT FOR SHORT TO VPWR AT IMRC HARNESS CONNECTOR		
	<ul style="list-style-type: none"> Disconnect IMRC actuator harness connector. Key on, engine off. Measure voltage between monitor circuit at the IMRC actuator harness connector and ground. Is voltage greater than 10.5 volts? 	<p>Yes</p> <p>No</p>	<p>KEY OFF. GO to HU28.</p> <p>KEY OFF. GO to HU29.</p>
HU28	DETERMINE SHORT TO POWER WITH PCM DISCONNECTED		
	<ul style="list-style-type: none"> Key on, engine off. Disconnect PCM. Measure voltage between monitor circuit at the IMRC actuator harness connector and ground. Is voltage less than 10.5 volts? 	<p>Yes</p> <p>No</p>	<p>KEY OFF. REPAIR short circuit. GO to HU38.</p> <p>KEY OFF. REPLACE PCM. GO to HU38.</p>
HU29	CHECK MONITOR FOR SHORT TO VPWR AT IMRC ACTUATOR		
	<ul style="list-style-type: none"> Measure actuator resistance between the monitor circuit and VPWR. Is resistance greater than 10,000 ohms? 	<p>Yes</p> <p>No</p>	<p>Possible intermittent concern. GO to Z1. REPLACE PGM after determining fault is not intermittent. GO to HU38.</p> <p>REPLACE IMRC actuator. HU38.</p>

Test Step		Result	Action to Take
HU30	DETERMINE IMRC MONITOR CIRCUIT SHORT TO GROUND		
	<ul style="list-style-type: none"> With the scan tool, monitor the IMRCM PID. While viewing PID, disconnect the IMRC actuator harness connector. Did voltage change from less than 1 volt to VREF when disconnecting the IMRC actuator harness connector? 	Yes ▶ KEY OFF. REPLACE IMRC actuator. GO to HU38 . No ▶ KEY OFF. GO to HU31 .	
HU31	CHECK IMRC MONITOR HARNESS FOR SHORT TO GROUND		
	<ul style="list-style-type: none"> Disconnect PCM. Measure resistance between IMRC monitor and ground (if applicable) and SIG RTN pins at the IMRC actuator harness connector. Is resistance greater than 10,000 ohms? 	Yes ▶ REPLACE PCM. GO to HU38 . No ▶ REPAIR short circuit. GO to HU38 .	
HU32	CHECK MONITOR CIRCUIT RESPONSE		
	<ul style="list-style-type: none"> Disconnect IMRC actuator harness connector. With the scan tool, monitor the IMRCM PID. Connect a jumper lead from the IMRC monitor pin to ground at the harness connector. Did the IMRCM PID voltage cycle from VREF to less than 1 volt when inserting the jumper? 	Yes ▶ KEY OFF. GO to HU33 . No ▶ KEY OFF. GO to HU36 .	
HU33	CHECK SIG RTN OR CHASSIS GROUND CIRCUIT CONTINUITY WITH PCM CONNECTED		
	<ul style="list-style-type: none"> Measure resistance of SIG RTN or chassis ground circuit between IMRC actuator harness connector and B-. Is resistance less than 5 ohms? 	Yes ▶ GO to HU34 . No ▶ GO to HU35 .	
HU34	CHECK MONITOR LINE FOR INTERMITTENT OPEN		
	<ul style="list-style-type: none"> Measure resistance of monitor line while wiggling and bending harness from IMRC harness connector to PCM harness connector. Is the resistance fluctuating while checking the harness? 	Yes ▶ REPAIR intermittent open circuit. GO to HU38 . No ▶ REPLACE IMRC actuator. GO to HU38 .	
HU35	CHECK SIG RTN OR CHASSIS GROUND CIRCUIT CONTINUITY WITH PCM DISCONNECTED		
	<ul style="list-style-type: none"> Disconnect PCM from harness connector. Measure resistance of SIG RTN or chassis ground circuit between PCM harness connector and IMRC actuator harness connector. Is resistance less than 5 ohms? 	Yes ▶ Possible intermittent concern. GO to Z1 . REPLACE PCM after determining concern is not intermittent. GO to HU38 . No ▶ REPAIR open circuit. GO to HU38 .	

Test Step		Result	Action to Take
HU36	CHECK MONITOR LINE CONTINUITY		
	<ul style="list-style-type: none"> ● Disconnect PCM from harness connector. ● Measure resistance of IMRC monitor circuit between PCM harness connector and IMRC actuator harness connector. ● Is resistance less than 5 ohms? 	Yes No	GO to HU37 . REPAIR open circuit. GO to HU38 .
HU37	CHECK MONITOR CIRCUIT FOR INTERMITTENT OPEN		
	<ul style="list-style-type: none"> ● Measure resistance of monitor line while wiggling and bending harness from IMRC harness connector to PCM harness connector. ● Is the resistance fluctuating while checking the harness? 	Yes No	REPAIR intermittent open. GO to HU38 . REPLACE PCM. GO to HU38 .
HU38	IMRC REPAIR VERIFICATION DRIVE CYCLE		
	<ul style="list-style-type: none"> ● Key on, engine off. ● Connect scan tool to data link connector (DLC) ● Complete PCM reset. ● Access IMRC and IMRCM PIDs. ● Drive vehicle, obeying all traffic and safety laws. ● Safely perform three accelerations from stop to more than 3500 rpm. Watch for PIDs to change. <ul style="list-style-type: none"> ● Perform Quick Test. ● Are any DTCs received? 	Yes No	GO to Powertrain DTC chart. PASSED IMRC Drive cycle. No IMRC concern is present at this time.
HU65	DTC P1549: PERFORM VISUAL INSPECTION		
	NOTE: Refer to the PCM connector pin numbers in the beginning of this pinpoint test. <ul style="list-style-type: none"> ● Inspect IMT Valve System. Check to be sure the harness is intact and the connector is firmly in place. ● Is fault indicated? 	Yes No	REPAIR as necessary. VERIFY a symptom no longer is present. Passed visual inspection. GO to HU66 .
HU66	CHECK PCM DRIVER COMMAND		
	<ul style="list-style-type: none"> ● Connect scan tool to data link connector (DLC). ● Key on, engine running. ● Access IMTV PID. ● Increase engine speed to about 3500 rpm while observing IMTV PID. ● Does PID read 100% then drop to 50% while rpm was above 3500? 	Yes No	KEY OFF. Passed test. GO to HU67 . REPLACE damaged PCM. VERIFY a symptom no longer exists.

Test Step		Result	Action to Take
HU67	CHECK IMT VALVE ACTUATOR VPWR CIRCUIT FOR OPEN IN HARNESS		
	<ul style="list-style-type: none"> Disconnect harness connector from the actuator. Key on, engine off. Measure VPWR circuit voltage at the harness connector. Was the voltage greater than 10.5 volts? 	Yes No	KEY OFF. Passed check. GO to HU69 . REPAIR IMT valve actuator VPWR circuit for open. VERIFY a symptom no longer exists.
HU69	CHECK FOR OPEN SIGNAL CIRCUIT BETWEEN PCM AND IMT VALVE ACTUATOR		
	<ul style="list-style-type: none"> Install breakout box, leave PCM disconnected. Measure resistance of Circuit between PCM test pin 46 and actuator harness connector. Is the resistance less than 5.0 ohms? 	Yes No	Passed test. GO to HU70 . REPAIR IMT Valve Actuator Signal Circuit open. VERIFY a symptom no longer exists.
HU70	CHECK IMT VALVE ACTUATOR FOR SHORT TO PWR GND		
	<ul style="list-style-type: none"> Measure resistance between PCM test pin 46 and test pin 77 or 103. Is resistance greater than 10,000 ohms? 	Yes No	Passed check. GO to HU71 . REPAIR IMT Valve actuator signal circuit for short to PWR GND. VERIFY a symptom no longer exists.
HU71	CHECK IMT VALVE ACTUATOR SIGNAL CIRCUIT FOR SHORT TO VPWR		
	<ul style="list-style-type: none"> Key on, engine off. Measure voltage between PCM test pin 46 and 77 or 103. Is the voltage less than 1 volt? 	Yes No	KEY OFF. Passed check. GO to HU72 . REPAIR IMT Valve actuator signal circuit for short to VPWR. VERIFY a symptom no longer exists.
HU72	CHECK PCM DRIVER FOR IMT VALVE ACTUATOR		
	<ul style="list-style-type: none"> Reconnect PCM. Connect DVOM to VPWR and signal at the harness connector. Connect scan tool to data link connector (DLC). Key on, engine off. Access Output Test Mode (OTM) (Refer to scan tool instruction manual). Take a reading with the digital Multimeter. Command all outputs on. Take another reading with the digital Multimeter. Was the voltage less than 1 volt before commanding all outputs on and greater than 10.5 volts with all outputs on? 	Yes No	KEY OFF. Passed test. GO to HU73 . REPLACE PCM. VERIFY a symptom no longer exists.

Test Step		Result	Action to Take
HU73	CHECK IMT VALVE SHUTTER FOR DAMAGE		
	<ul style="list-style-type: none"> Remove IMT Valve. Visually inspect IMT valve shutter for damage. Rotate shutter by hand. Does the shutter bind or appear damaged? 	Yes No	Damaged shutter. REPLACE IMT valve. VERIFY a symptom no longer exists. Passed test. Leave IMT Valve disassembled. GO to HU74 .
HU74	CHECK IMT VALVE ACTUATOR FOR COIL DAMAGE		
	<ul style="list-style-type: none"> Reconnect IMT valve harness connector. Key on, engine off. Access Output Test Mode (OTM) (Refer to scan tool instruction manual). Command all outputs on. Did the IMT valve shutter rotate when commanding all outputs on? 	Yes No	Passed check. Fault is intermittent. GO to Pinpoint Test Step Z1 . REPLACE IMT valve actuator. VERIFY a symptom no longer exists.