Code 17

A code 17 is generated when reference voltage at pins 3 and 33 of the ABS ECU is low in comparison to the voltage at pin 53 or there is a power feed failure to the Hydraulic Control Unit. This voltage should be within 0.5 volts of battery voltage.

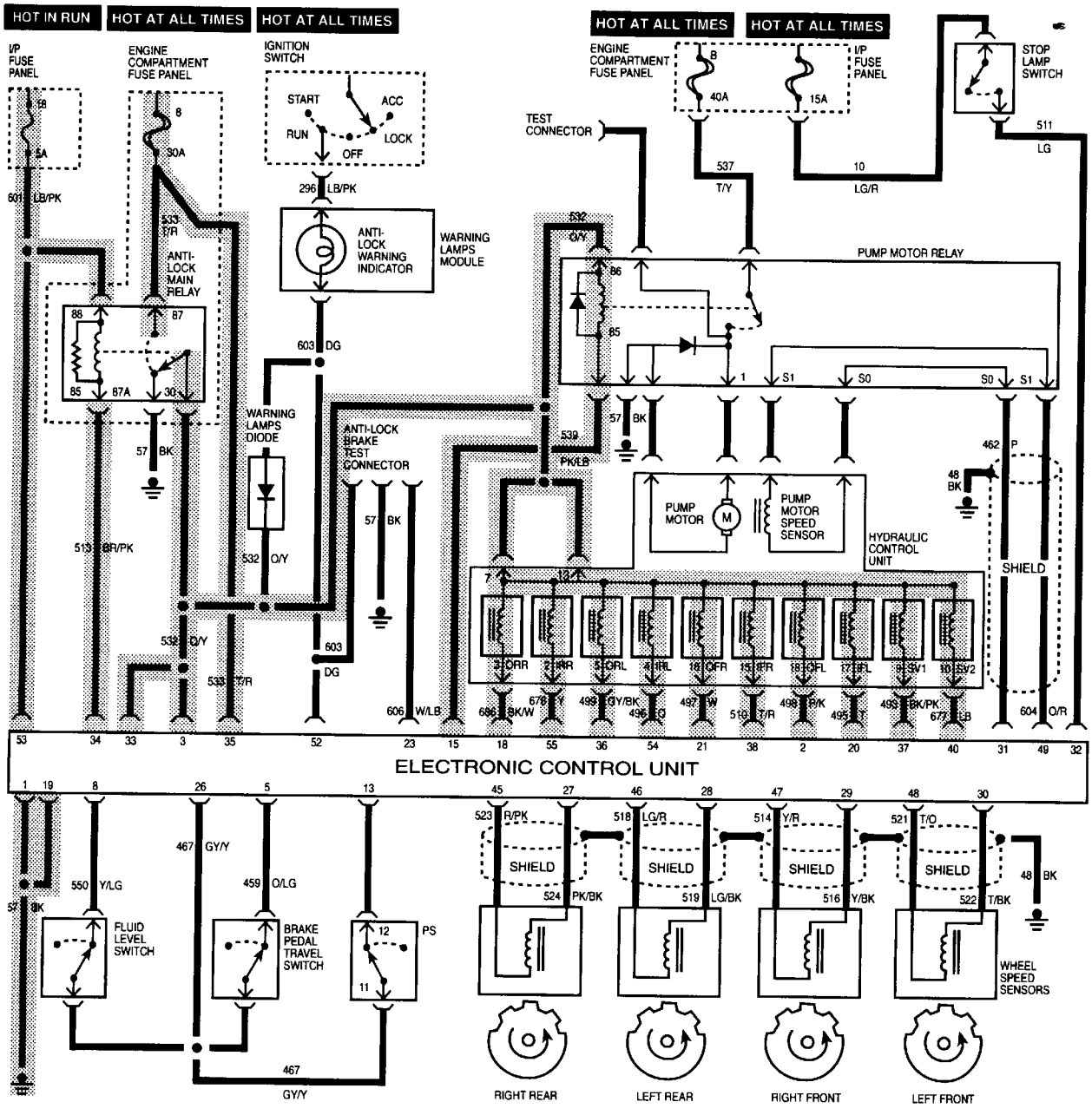
Description:
During initial power up of the ABS system, the ABS ECU grounds pin 34 to energize the ABS relay. Power is supplied through the ABS relay to pins 3 and 33 of the ABS ECU, to the Hydraulic Control Unit, and to the pump motor relay. The ABS ECU constantly monitors the voltage drop across each solenoid in the HCU. The ABS ECU also looks at the voltage at pins 3 and 33 compared to the voltage at pin 53. The voltage on pins 3 and 33 should be within 0.5 volts of the voltage on pin 53. If the ABS ECU detects a fault in the system, it will unlatch the relay by ungrounding pin 34 and turn the ABS light on steady.

Possible Contributing Components/ Vehicle Wiring Concerns

- Voltage drop across the main ABS relay because of water entry, corrosion, or dirty contacts in the relay.
- Low available voltage on circuit to pin 53 or circuit to the ABS relay.
- Open on circuit from the ABS ECU pin 34 to the ABS relay.
- Open or high resistance on circuit 532 from the ABS ECU pin 3 and 33 to the ABS relay.
- All tests for voltage should also be made while wiggling the HCU connector, ABS relay wiring and checking the harness for proper routing.
- Check all fuses for ignition switch and ABS Main Power Relay

If the voltage on the system goes low during power up or anytime during system operation, a code 17 may be generated. The threshold for setting a code is approximately 12 volts. If the vehicle has a weak battery, high resistance on battery cables or vehicle grounds, a code 17 may be set during system power up after the vehicle is started.

Code 17



NOTE: Refer to appropriate system schematic and/or EVTM for more detailed circuit number/color and connector number/locations, if necessary.

	TEST STEP	RESULT	ACTION TO TAKE
17-1	SERVICE CODE 17:CHECK REFERENCE VOLTAGE (BATTERY VOLTAGE) • Ignition OFF • Install Rotunda Breakout Box 014-00322 or equivalent and T90P-50-ALA adapter. • Measure and record battery voltage at battery. • **Is voltage greater than 11 volts?**	Yes No	GO to 17-2. SERVICE Battery. GO to 17-32 .
17-2	CHECK CHASSIS GROUND • Measure resistance between breakout box pin 60 and chassis ground. **Is resistance less than 5 ohms?**	Yes No	GO to 17-3. REPAIR ground circuit between chassis ground and ECU pin #1. See EVTM for circuit details. GO to 17-32.
17-3	CHECK SECONDARY GROUND CIRCUIT • Measure resistance between breakout box pins 60 and 19. • **Is resistance less than 5 ohms?**	Yes No	GO to 17-4. REPAIR ground circuit between chassis ground and ECU pin #19. See EVTM for circuit details. GO to 17-32.
17-4	CHECK MAIN POWER RELAY COIL • Measure resistance between breakout box pins 34 and 53. • **Is resistance between 45 and 90 ohms?**	Yes No	GO to 17-6. GO to 17-5.
17-5	CHECK MAIN POWER RELAY • Disconnect the wire harness from the main power relay and check the resistance across the coil, between pins 85 and 86. • **Is resistance between 45 and 90 ohms?**	Yes No	REPAIR wire that runs from ECU pin #53 to main relay pin #86 and/or wire that runs from ECU pin #34 to main relay pin #85. See EVTM for circuit details. GO to 17-32. REPLACE main power relay. GO to 17-32.
17-6	CHECK RELAY CIRCUIT RESISTANCE • Check resistance between breakout box pins 33 and 60. • **Is resistance less than 5 ohms?**	Yes No	GO to 17-7. REPAIR circuit 532 that runs from main power relay pin #30 and ECU pin #33. See EVTM for circuit details. GO to 17-32.
17-7	CHECK RELAY CIRCUIT RESISTANCE • Check resistance between breakout box pins 3 and 60. **Is resistance less than 5 ohms?**	Yes No	GO to 17-8. REPAIR circuit 532 that runs from main power relay pin #30 and ECU pin #3. See EVTM for circuit details. GO to 17-32.

TEST STEP	RESULT	ACTION TO TAKE
17-8 CHECK INLET FRONT LEFT VALVE		
• Check resistance between breakout box pins 3 and 20. • **Is resistance between 5 and 8 ohms?**	Yes(with or without pedal applied) ▶	GO to 17-9.
• **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	No (with or without pedal applied) ▶	GO to 22-1 for pinpoint test on Inlet Front Left Valve.
17-9 CHECK OUTLET FRONT LEFT VALVE		
• Check resistance between breakout box pins 3 and 2. • **Is resistance between 3 and 6 ohms?**	Yes(with or without pedal applied) ▶	GO to 17-10.
• **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	No (with or without pedal applied) ▶	GO to 23-1 for pinpoint test on Outlet Front Left Valve.
17-10 CHECK INLET FRONT RIGHT VALVE		
• Check resistance between breakout box pins 3 and 38. • **Is resistance between 5 and 8 ohms?**	Yes(with or without pedal applied) ▶	GO to 17-11.
• **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	No (with or without pedal applied) ▶	GO to 24-1 for pinpoint test on Inlet Front Right Valve.
17-11 CHECK OUTLET FRONT RIGHT VALVE		
• Check resistance between breakout box pins 3 and 21. • **Is resistance between 3 and 6 ohms?**	Yes(with or without pedal applied) ▶	GO to 17-12.
• **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	No (with or without pedal applied) ▶	GO to 25-1 for pinpoint test on Outlet Front Right Valve.
17-12 CHECK INLET REAR RIGHT VALVE		
• Check resistance between breakout box pins 3 and 55. • **Is resistance between 5 and 8 ohms?**	Yes(with or without pedal applied) ▶	GO to 17-13.
• **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	No (with or without pedal applied) ▶	GO to 26-1 for pinpoint test on Inlet Rear Right Valve.
17-13 CHECK OUTLET REAR RIGHT VALVE		
• Check resistance between breakout box pins 3 and 18. • **Is resistance between 3 and 6 ohms?**	Yes(with or without pedal applied) ▶	GO to 17-14.
• **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	No (with or without pedal applied) ▶	GO to 27-1 for pinpoint test on Outlet Rear Right Valve.
17-14 CHECK INLET REAR LEFT VALVE		
• Check resistance between breakout box pins 3 and 54. • **Is resistance between 5 and 8 ohms?**	Yes(with or without pedal applied) ▶	GO to 17-15.
• **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	No (with or without pedal applied) ▶	GO to 28-1 for pinpoint test on Inlet Rear Left Valve.

TEST STEP	RESULT	ACTION TO TAKE
17-15 CHECK OUTLET REAR LEFT VALVE • Check resistance between breakout box pins 3 and 36. • **Is resistance between 3 and 6 ohms?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied) ▶ No (with or without pedal applied) ▶	If vehicle is equipped with traction assist: GO to 17-16. If vehicle is not equipped with traction assist: GO to 17-18. GO to 29-1 for pinpoint test on Outlet Rear Left Valve.
NOTE: THE NEXT TWO TEST STEPS SHOULD ONLY BE PERFORMED IF THE VEHICLE IS EQUIPPED WITH TRACTION ASSIST- IF THE VEHICLE IS EQUIPPED WITH ABS ONLY, SKIP THESE STEPS AND GO TO 17-18.		
17-16 CHECK ISOLATION VALVE # 1 • Check resistance between breakout box pins 3 and 37. • **Is resistance between 5 and 8 ohms?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied) ▶ No (with or without pedal applied) ▶	GO to 17-17. GO to 18-1 for pinpoint test on Isolation Valve #1.
17-17 CHECK ISOLATION VALVE # 2 • Check resistance between breakout box pins 3 and 40. • **Is resistance between 5 and 8 ohms?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied) ▶ No (with or without pedal applied) ▶	GO to 17-18. GO to 19-1 for pinpoint test on Isolation Valve #2.
17-18 CHECK IGNITION FEED VOLTAGE • Place a jumper wire between breakout box pins 34 and 19. • Turn the ignition to RUN position. • Measure voltage between breakout box pins 53 and 60. • **Is voltage within .5V of Battery Voltage?**	Yes ▶ No ▶	Go to 17-19. SERVICE or REPLACE Ignition Fuse OR wiring between Ignition Switch and ECU pin # 53. See EVTM for circuit details. GO to 17-32.
17-19 CHECK BATTERY TO ECU VOLTAGE • With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 3 and 60. • **Is voltage within .5V of Battery Voltage?**	Yes ▶ No ▶	Go to 17-20. CHECK main power high current fuse, main power relay, and/or wiring between battery connection to relay or from relay to ECU pin #3 and valve block power feed pins. REPAIR/REPLACE as necessary. See EVTM for circuit details. GO to 17-32.

TEST STEP	RESULT ▶	ACTION TO TAKE
7-20 CHECK BATTERY TO ECU VOLTAGE • With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 33 and 60. • **Is voltage within .5V of Battery Voltage?**	Yes ▶ No ▶	Go to 17-21. CHECK main power high current fuse, main power relay, and/or wiring between battery connection to relay or from relay to ECU pin #33 and valve block power feed pins. REPAIR/REPLACE as necessary. See EVTM for circuit details. GO to 17-32.
7-21 CHECK INLET FRONT LEFT VALVE FOR SHORT TO GROUND • With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 20 and 60. • **Is voltage within .5V of Battery Voltage?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied) ▶ No (with or without pedal applied) ▶	GO to 17-22. GO to test 22-4 and check for short to ground on inlet front left valve.
7-22 CHECK OUTLET FRONT LEFT VALVE FOR SHORT TO GROUND • With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 2 and 60. • **Is voltage within .5V of Battery Voltage?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied) ▶ No (with or without pedal applied) ▶	GO to 17-23. GO to test 23-4 and check for short to ground on outlet front left valve.
7-23 CHECK INLET FRONT RIGHT VALVE FOR SHORT TO GROUND • With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 38 and 60. • **Is voltage within .5V of Battery Voltage?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied) ▶ No (with or without pedal applied) ▶	GO to 17-24. GO to test 24-4 and check for short to ground on inlet front right valve.

TEST STEP		RESULT	ACTION TO TAKE
17-24	CHECK OUTLET FRONT RIGHT VALVE FOR SHORT TO GROUND		
	• With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 21 and 60. • **Is voltage within .5V of Battery Voltage?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied) ▶ No (with or without pedal applied) ▶	GO to 17-25. GO to test 25-4 and check for short to ground on outlet front right valve.
17-25	CHECK INLET REAR RIGHT VALVE FOR SHORT TO GROUND		
	• With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 55 and 60. • **Is voltage within .5V of Battery Voltage?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied) ▶ No (with or without pedal applied) ▶	GO to 17-26. GO to test 26-4 and check for short to ground on inlet rear right valve.
17-26	CHECK OUTLET REAR RIGHT VALVE FOR SHORT TO GROUND		
	• With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 18 and 60. • **Is voltage within .5V of Battery Voltage?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied) ▶ No (with or without pedal applied) ▶	GO to 17-27. GO to test 27-4 and check for short to ground on outlet rear right valve.
17-27	CHECK INLET REAR LEFT VALVE FOR SHORT TO GROUND		
	• With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 54 and 60. • **Is voltage within .5V of Battery Voltage?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied) ▶ No (with or without pedal applied) ▶	GO to 17-28. GO to test 28-4 and check for short to ground on inlet rear left valve.

TEST STEP	RESULT	ACTION TO TAKE
7-28 CHECK OUTLET REAR LEFT VALVE FOR SHORT TO GROUND		
• With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 36 and 60. • **Is voltage within .5V of Battery Voltage?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied)	If vehicle is equipped with traction assist: GO to 17-29. If vehicle is not equipped with traction assist: GO to 17-31.
	No (with or without pedal applied)	GO to test 29-4 and check for short to ground on outlet rear left valve.
NOTE: THE NEXT TWO TEST STEPS SHOULD ONLY BE PERFORMED IF THE VEHICLE IS EQUIPPED WITH TRACTION ASSIST- IF THE VEHICLE IS EQUIPPED WITH ABS ONLY SKIP THESE STEPS AND GO TO 17-31.		
7-29 CHECK ISOLATION VALVE #1 FOR SHORT TO GROUND		
• With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 37 and 60. • **Is voltage within .5V of Battery Voltage?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied)	GO to 17-30.
	No (with or without pedal applied)	GO to test 18-4 and check for short to ground on isolation valve #1.
7-30 CHECK ISOLATION VALVE #2 FOR SHORT TO GROUND		
• With jumper wire still in place between breakout box pins 34 and 19. • Ignition still in RUN position. • Measure voltage between breakout box pins 40 and 60. • **Is voltage within .5V of Battery Voltage?** • **NOTE: This measurement should be taken a second time while an assistant applies the brake pedal.**	Yes(with or without pedal applied)	GO to 17-31.
	No (with or without pedal applied)	GO to test 19-4 and check for short to ground on isolation valve #2.
7-31 FAULT FOR CODE 17 NOT PRESENT AT THIS TIME. WHICH OF THE FOLLOWING CONDITIONS EXIST?		
1.) ABS Light ON steady and no other codes exist. 2.) ABS Light ON steady with other DTC's present. 3.) ABS Light comes ON intermittently.		GO to Test NC-1. GO to Test for next DTC. GO to Intermittent Test Procedures.

TEST STEP		RESULT	ACTION TO TAKE
17-32	REPAIR VERIFICATION		
	• Verify that ABS Light is out. • Run Self-Test to prepare ECU for DTC erasure. • Test drive vehicle - DTC's will erase when vehicle speed reaches approximately 30 mph providing ABS Light does not come ON. • Vehicle is repaired if light does not come ON and ABS performs correctly.	Vehicle repaired. ▶	Return vehicle to customer.
		ABS concern still exists. Which of the following concerns exist?	
		1.ABS Light ON steady and no other DTC's exist. ▶	GO to Test NC-1.
		2.ABS Light ON and other DTC's present. ▶	GO to Test for next DTC.
		3.ABS Light comes ON intermittently. ▶	GO to Intermittent Test Procedures.
		4.ABS or TA false cycles. ▶	GO to False Cycling Procedures.

Code 31

A code 31 can be caused by an open or a short in the Left Front Wheel Speed Sensor or the wiring from the sensor to the ECU.

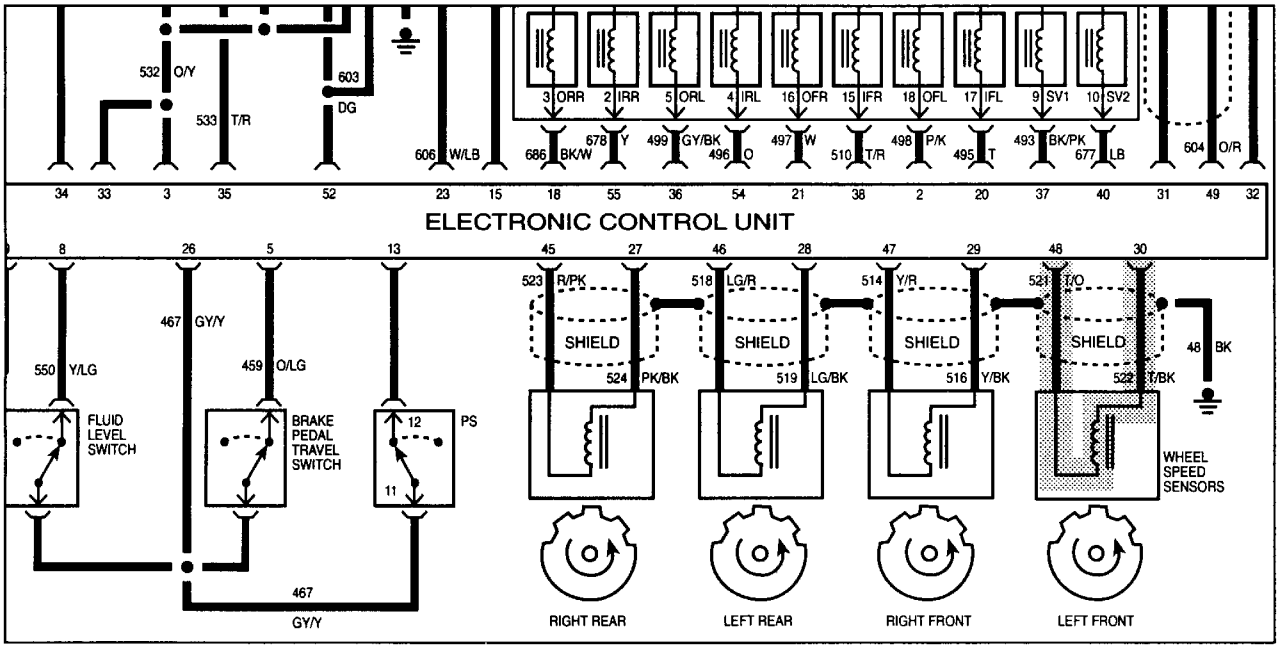
Description

Code 31 is generated when the ABS ECU detects an open or a short in the wheel speed sensor coil, or an open or a short in Circuit 521 or 522 between the wheel speed sensor and the ABS ECU. If this fault is detected during the ABS ECU's self-check after KEY ON, the ABS warning lamp will come on immediately. This generally indicates an existing wiring or component fault. If the ABS warning lamp proves out normally, but comes on later when the vehicle is driven, an intermittent wiring or component fault is generally indicated. This fault does not require the vehicle to be driven to generate a code.

Possible Contributing Components/ Vehicle Wiring Concerns

- Poor connections at the Left Front Wheel Sensor
- Terminal damage or backout in ABS ECU connector pins 30 and/or 48
- Terminal damage or backout in two-pin sensor connector
- Open or a short in the Left Front Speed Sensor coil
- Open or a short in Circuit 521 or 522
- Improper Left Front Wheel Speed Sensor cable routing leading to an open or a short circuit condition
- Harness shield wiring shorted to circuit 521 or 522
- Defective ABS ECU causing a failure in the electrical test of the Left Front Wheel Speed Sensor circuit
- Sensor resistance out of range

Affected circuit(s)/Electrical Component(s)



NOTE: Refer to appropriate system schematic and/or EVTM for more detailed circuit number/color and connector numbers/locations, if necessary.

TEST STEP		RESULT	ACTION TO TAKE
31-1	SERVICE CODE 31: CHECK LEFT FRONT SENSOR AND CIRCUITRY		
	• Ignition OFF • Install Rotunda Breakout Box 014-00322 or equivalent and T90P-50-ALA adapter. • Measure resistance between Pins 30 + 48 • **Is reading between 800 and 1400 ohms?**	Yes ▶ No ▶	GO to 31-5 GO to 31-2
31-2	CHECK RESISTANCE AT LEFT FRONT WHEEL SENSOR		
	• Disconnect left front sensor connector. • Measure resistance between the two pins on the sensor component connector. • **Is reading between 800 and 1400 ohms?**	Yes ▶ No ▶	Sensor resistance checks OK. GO to 31-3. REPLACE sensor. GO to 31-10.
31-3	CHECK CIRCUIT 521 CONTINUITY		
	• Measure resistance between Pin 48 on the breakout box and wheel speed sensor harness connector pin for Circuit 521. • **Is there less than 1 ohm?**	Yes ▶ No ▶	Continuity of circuit 521 checks OK. GO to 31-4. REPAIR open or high resistance on Circuit 521. GO to 31-10.
31-4	CHECK CIRCUIT 522 CONTINUITY		
	• Measure resistance between Pin 30 on the breakout box and wheel speed sensor harness connector pin for Circuit 522. • **Is there less than 1 ohm?**	Yes ▶ No ▶	Continuity of circuit 522 checks OK. GO to 31-5. REPAIR open or high resistance on Circuit 522. GO to 31-10.
31-5	CHECK SENSOR AND CIRCUITRY FOR SHORT TO GROUND		
	• If sensor was previously disconnected from wire harness, reconnect before taking measurement. • Measure resistance between Pins 60 + 48 on breakout box. • **Is there continuity?**	Yes ▶ No ▶	GO to 31-6. GO to 31-8.
31-6	CHECK CIRCUIT 521 SHORT TO GROUND		
	• Disconnect front left sensor connector. • Measure resistance between Pins 60 + 48 on breakout box. • **Is there continuity?**	Yes ▶ No ▶	REPAIR short to ground on Circuit 521. GO to 31-10. Circuit 521 checks OK. GO to 31-7.
31-7	CHECK CIRCUIT 522 SHORT TO GROUND		
	• Measure resistance between Pins 60 + 30 on the breakout box . • **Is there continuity?**	Yes ▶ No ▶	REPAIR short to ground on Circuit 522. GO to 31-10. Circuit 522 checks OK. GO to 31-8.
31-8	CHECK SENSOR (COMPONENT) FOR DAMAGE		
	• Inspect the wheel speed sensor cable at the affected wheel for chafing or other damage. • Check for short to ground from each sensor pin to chassis ground. • **Is damage or short to ground found?**	Yes ▶ No ▶	REPLACE sensor. GO to 31-10. GO to 31-9.
31-9	FAULT FOR CODE 31 NOT PRESENT AT THIS TIME . WHICH OF THE FOLLOWING CONDITIONS EXIST?		
	1.) ABS Light ON steady and no other codes exist. 2.) ABS Light ON steady with other DTC's present. 3.) ABS Light comes ON intermittently.	▶ ▶ ▶	GO to Test NC-1. GO to Test for next DTC. GO to Intermittent Test Procedures.

TEST STEP		RESULT ▶	ACTION TO TAKE
31-10	REPAIR VERIFICATION		
	• Verify that ABS Light is OUT. • Run Self-Test to prepare ECU for DTC erasure. • Test drive vehicle - DTC's will erase when vehicle speed reaches approximately 30 mph providing ABS Light does not come ON. • Vehicle is repaired if light does not come ON and ABS performs correctly.	Vehicle repaired. ▶ ABS concern still exists. Which of the following concerns exist? 1.ABS Light ON steady and no other DTC's exist. ▶ 2. ABS Light ON and other codes present. ▶ 3. ABS Light comes ON intermittently. ▶ 4. ABS or TA false cycles. ▶	Return vehicle to customer. GO to Test NC-1. GO to Test for next DTC. GO to Intermittent Test Procedures. GO to False Cycling Procedures.

Code 32

A code 32 can be caused by an open or a short in the Right Front Wheel Speed Sensor or the wiring from the sensor to the ECU.

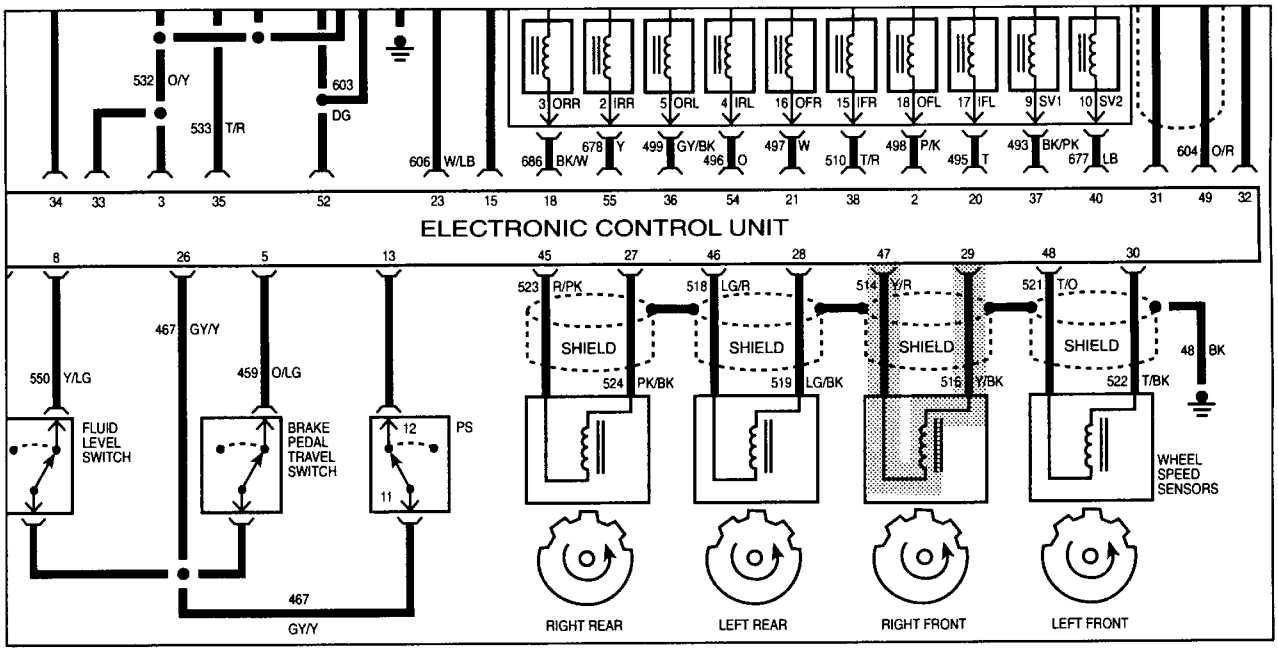
Description

Code 32 is generated when the ABS ECU detects an open or a short in the wheel speed sensor coil, or an open or a short in Circuit 514 or 516 between the wheel speed sensor and the ABS ECU. If this fault is detected during the ABS ECU's self-check after KEY ON, the ABS warning lamp will come on immediately. This generally indicates an existing wiring or component fault. If the ABS warning lamp proves out normally, but comes on later when the vehicle is driven, an intermittent wiring or component fault is generally indicated. This fault does not require the vehicle to be driven to generate a code.

Possible Contributing Components/ Vehicle Wiring Concerns

- Poor connections at the Right Front Wheel Sensor
- Terminal damage or backout in ABS ECU connector pins 29 and/or 47
- Terminal damage or backout in two-pin sensor connector
- Open or a short in the Right Front Speed Sensor coil
- Open or a short in Circuit 514 or 516
- Improper Right Front Wheel Speed Sensor cable routing leading to an open or a short circuit condition
- Harness shield wiring shorted to circuit 514 or 516
- Defective ABS ECU causing a failure in the electrical test of the Right Front Wheel Speed Sensor circuit
- Sensor resistance out of range

Affected circuit(s)/Electrical Component(s)



NOTE: Refer to appropriate system schematic and/or EVTM for more detailed circuit number/color and connector numbers/locations, if necessary.

TEST STEP		RESULT	ACTION TO TAKE
32-1	SERVICE CODE 32: CHECK RIGHT FRONT SENSOR AND CIRCUITRY		
	• Ignition OFF • Install Rotunda Breakout Box 014-00322 or equivalent and T90P-50-ALA adapter. • Measure resistance between Pins 29 + 47. • **Is reading between 800 and 1400 ohms?**	Yes ▶ No ▶	GO to 32-5 GO to 32-2
32-2	CHECK RESISTANCE AT RIGHT FRONT WHEEL SENSOR		
	• Disconnect right front sensor connector. • Measure resistance between the two pins on the sensor component connector. • **Is reading between 800 and 1400 ohms?**	Yes ▶ No ▶	Sensor resistance checks OK. GO to 32-3. REPLACE sensor. GO to 32-10.
32-3	CHECK CIRCUIT 514 CONTINUITY		
	• Measure resistance between Pin 47 on the breakout box and wheel speed sensor harness connector pin for Circuit 514. • **Is there less than 1 ohm?**	Yes ▶ No ▶	Continuity of circuit 514 checks OK. GO to 32-4. REPAIR open or high resistance on Circuit 514. GO to 32-10.
32-4	CHECK CIRCUIT 516 CONTINUITY		
	• Measure resistance between Pin 29 on the breakout box and wheel speed sensor harness connector pin for circuit 516. • **Is there less than 1 ohm?**	Yes ▶ No ▶	Continuity of circuit 516 checks OK. GO to 32-5. REPAIR open or high resistance on Circuit 516. GO to 32-10.
32-5	CHECK SENSOR AND CIRCUITRY FOR SHORT TO GROUND		
	• If sensor was previously disconnected from wire harness, reconnect before taking measurement. • Measure resistance between Pins 60 + 47 on the breakout box . • **Is there continuity?**	Yes ▶ No ▶	GO to 32-6. GO to 32-8.
32-6	CHECK CIRCUIT 514 SHORT TO GROUND		
	• Disconnect left front sensor connector. • Measure resistance between Pins 60 + 47 on the breakout box . • **Is there continuity?**	Yes ▶ No ▶	REPAIR short to ground on Circuit 514. GO to 32-10. Circuit 514 checks OK. GO to 32-7.
32-7	CHECK CIRCUIT 516 SHORT TO GROUND		
	• Measure resistance between Pins 60 + 29 on the breakout box. • **Is there continuity?**	Yes ▶ No ▶	REPAIR short to ground on Circuit 516. GO to 32-10. Circuit 516 checks OK. GO to 32-8.
32-8	CHECK SENSOR (COMPONENT) FOR DAMAGE		
	• Inspect the wheel speed sensor cable at the affected wheel for chafing or other damage. • Check for short to ground from each sensor pin to chassis ground. • **Is damage found?**	Yes ▶ No ▶	REPLACE sensor. GO to 32-10. GO to 32-9.
32-9	FAULT FOR CODE 32 NOT PRESENT AT THIS TIME . WHICH OF THE FOLLOWING CONDITIONS EXIST?		
	1.) ABS Light ON steady and no other codes exist. 2.) ABS Light ON steady with other DTC's present. 3.) ABS Light comes ON intermittently.	▶ ▶ ▶	GO to Test NC-1. GO to Test for next DTC. GO to Intermittent Test Procedures.

TEST STEP		RESULT	ACTION TO TAKE
32-10	REPAIR VERIFICATION		
	• Verify that ABS Light is OUT. • Run Self-Test to prepare ECU for DTC erasure. • Test drive vehicle - DTC's will erase when vehicle speed reaches approximately 30 mph providing ABS Light does not come ON. • Vehicle is repaired if light does not come ON and ABS performs correctly.	Vehicle repaired.	Return vehicle to customer.
		ABS concern still exists. Which of the following concerns exist?	
		1.ABS Light ON steady and no other DTC's exist.	GO to Test NC-1.
		2. ABS Light ON and other codes present.	GO to Test for next DTC.
		3. ABS Light comes ON intermittently.	GO to Intermittent Test Procedures.
		4. ABS or TA false cycles.	GO to False Cycling Procedures.

Code 33

A code 33 can be caused by an open or a short in the Right Rear Wheel Speed Sensor or the wiring from the sensor to the ECU.

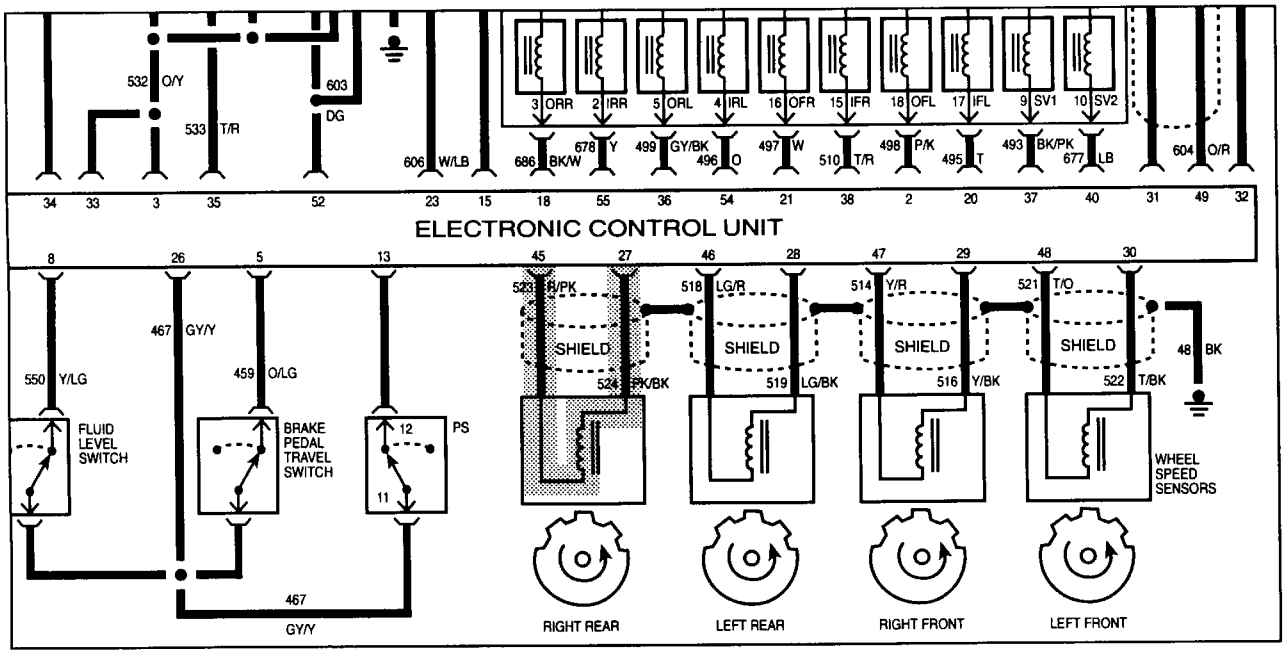
Description

Code 33 is generated when the ABS ECU detects an open or a short in the wheel speed sensor coil, or an open or a short in Circuit 523 or 524 between the wheel speed sensor and the ABS ECU. If this fault is detected during the ABS ECU's self-check after KEY ON, the ABS warning lamp will come on immediately. This generally indicates an existing wiring or component fault. If the ABS warning lamp proves out normally, but comes on later when the vehicle is driven, an intermittent wiring or component fault is generally indicated. This fault does not require the vehicle to be driven to generate a code.

Possible Contributing Components/ Vehicle Wiring Concerns

- Poor connections at the Right Rear Wheel Sensor
- Terminal damage or backout in ABS ECU connector pins 27 and/or 45
- Terminal damage or backout in two-pin sensor connector
- Open or a short in the Right Rear Speed Sensor coil
- Open or a short in Circuit 523 or 524
- Improper Right Rear Wheel Speed Sensor cable routing leading to an open or a short circuit condition
- Harness shield wiring shorted to circuit 523 or 524
- Defective ABS ECU causing a failure in the electrical test of the Right Rear Wheel Speed Sensor circuit
- Sensor resistance out of range

Affected circuit(s)/Electrical Component(s)



NOTE: Refer to appropriate system schematic and/or EVTM for more detailed circuit number/color and connector numbers/locations, if necessary.

TEST STEP		RESULT	ACTION TO TAKE
33-1	SERVICE CODE 33: CHECK RIGHT REAR SENSOR AND CIRCUITRY		
	• Ignition OFF • Install Rotunda Breakout Box 014-00322 or equivalent and T90P-50-ALA adapter. • Measure resistance between Pins 27 + 45 • **Is reading between 800 and 1400 ohms?**	Yes ▶ No ▶	GO to 33-5 GO to 33-2
33-2	CHECK RESISTANCE AT RIGHT REAR WHEEL SENSOR		
	• Disconnect right rear sensor connector. • Measure resistance between the two pins on the sensor component connector. • **Is reading between 800 and 1400 ohms?**	Yes ▶ No ▶	Sensor resistance checks OK. GO to 33-3. REPLACE sensor. GO to 33-10.
33-3	CHECK CIRCUIT 523 CONTINUITY		
	• Measure resistance between Pin 45 on the breakout box and wheel speed sensor harness connector pin for circuit 523. • **Is there less than 1 ohm?**	Yes ▶ No ▶	Continuity of circuit 523 checks OK. GO to 33-4. REPAIR open or high resistance on Circuit 523. GO to 33-10.
33-4	CHECK CIRCUIT 524 CONTINUITY		
	• Measure resistance between Pin 27 on the breakout box and wheel speed sensor harness connector pin for Circuit 524. • **Is there less than 1 ohm?**	Yes ▶ No ▶	Continuity of circuit 524 checks OK. GO to 33-5. REPAIR open or high resistance on Circuit 524. GO to 33-10.
33-5	CHECK SENSOR AND CIRCUITRY FOR SHORT TO GROUND		
	• If sensor was previously disconnected from wire harness, reconnect before taking measurement. • Measure resistance between Pins 60 + 45 on the breakout box. • **Is there continuity?**	Yes ▶ No ▶	GO to 33-6. GO to 33-8.
33-6	CHECK CIRCUIT 523 SHORT TO GROUND		
	• Disconnect right rear sensor connector. • Measure resistance between Pins 60 + 45 on the breakout box. • **Is there continuity?**	Yes ▶ No ▶	REPAIR short to ground on Circuit 523. GO to 33-10. Circuit 523 checks OK. GO to 33-7.
33-7	CHECK CIRCUIT 524 SHORT TO GROUND		
	• Measure resistance between Pins 60 + 27 on the breakout box. • **Is there continuity?**	Yes ▶ No ▶	REPAIR short to ground on Circuit 524. GO to 33-10. Circuit 524 checks OK. GO to 33-8.
33-8	CHECK SENSOR (COMPONENT) FOR DAMAGE		
	• Inspect the wheel speed sensor cable at the affected wheel for chafing or other damage. • Check for short to ground from each sensor pin to chassis ground. • **Is damage or short to ground found?**	Yes ▶ No ▶	REPLACE sensor. GO to 33-10. GO to 33-9.
33-9	FAULT FOR CODE 33 NOT PRESENT AT THIS TIME . WHICH OF THE FOLLOWING CONDITIONS EXIST?		
	1.) ABS Light ON steady and no other codes exist. 2.) ABS Light ON steady with other DTC's present. 3.) ABS Light comes ON intermittently.	▶ ▶ ▶	GO to Test NC-1. GO to Test for next DTC. GO to Intermittent Test Procedures.

TEST STEP		RESULT	ACTION TO TAKE
33-10	REPAIR VERIFICATION		
	• Verify that ABS Light is OUT. • Run Self-Test to prepare ECU for DTC erasure. • Test drive vehicle - DTC's will erase when vehicle speed reaches approximately 30 mph providing ABS Light does not come ON. • Vehicle is repaired if light does not come ON and ABS performs correctly.	Vehicle repaired. ▶	Return vehicle to customer.
		ABS concern still exists. Which of the following concerns exist?	
		1.ABS Light ON steady and no other DTC's exist. ▶	GO to Test NC-1.
		2. ABS Light ON and other codes present. ▶	GO to Test for next DTC.
		3. ABS Light comes ON intermittently. ▶	GO to Intermittent Test Procedures.
		4. ABS or TA false cycles. ▶	GO to False Cycling Procedures.

Code 67

A code 67 is generated when the ABS ECU detects the ABS Pump Motor has run when it was not called for, or if the ABS Pump Motor runs longer than it should during system prove-out.

Description

Code 67 is generated by the ABS ECU's detection of an ABS Pump Motor Speed Sensor signal when the pump is not supposed to be running or if the ABS Pump Motor Runs longer than it should during system prove-out. The ABS ECU constantly monitors the voltage signal on pins 31 and 49 from the ABS Pump Motor Speed Sensor. If the ECU detects voltage on these pins but has not called for the ABS Pump Motor operation, a code 67 will be set and the ABS Indicator will be illuminated. Also, when the system is initially powered up and the vehicle reaches 19 MPH (7 MPH on 1992 and earlier Vehicles), the ABS ECU runs the pump motor momentarily and checks the Speed Sensor Voltage. If the ECU detects voltage on pins 31 and 49 after it has run the pump prove-out check, a Code 67 can be generated. A code due to this condition is usually caused by the pump motor taking too long to stop, usually a condition that exists with higher mileage vehicles in which the pump tolerances have opened slightly due to normal wear.

Possible Contributing Conditions/ Vehicle Wiring Concerns

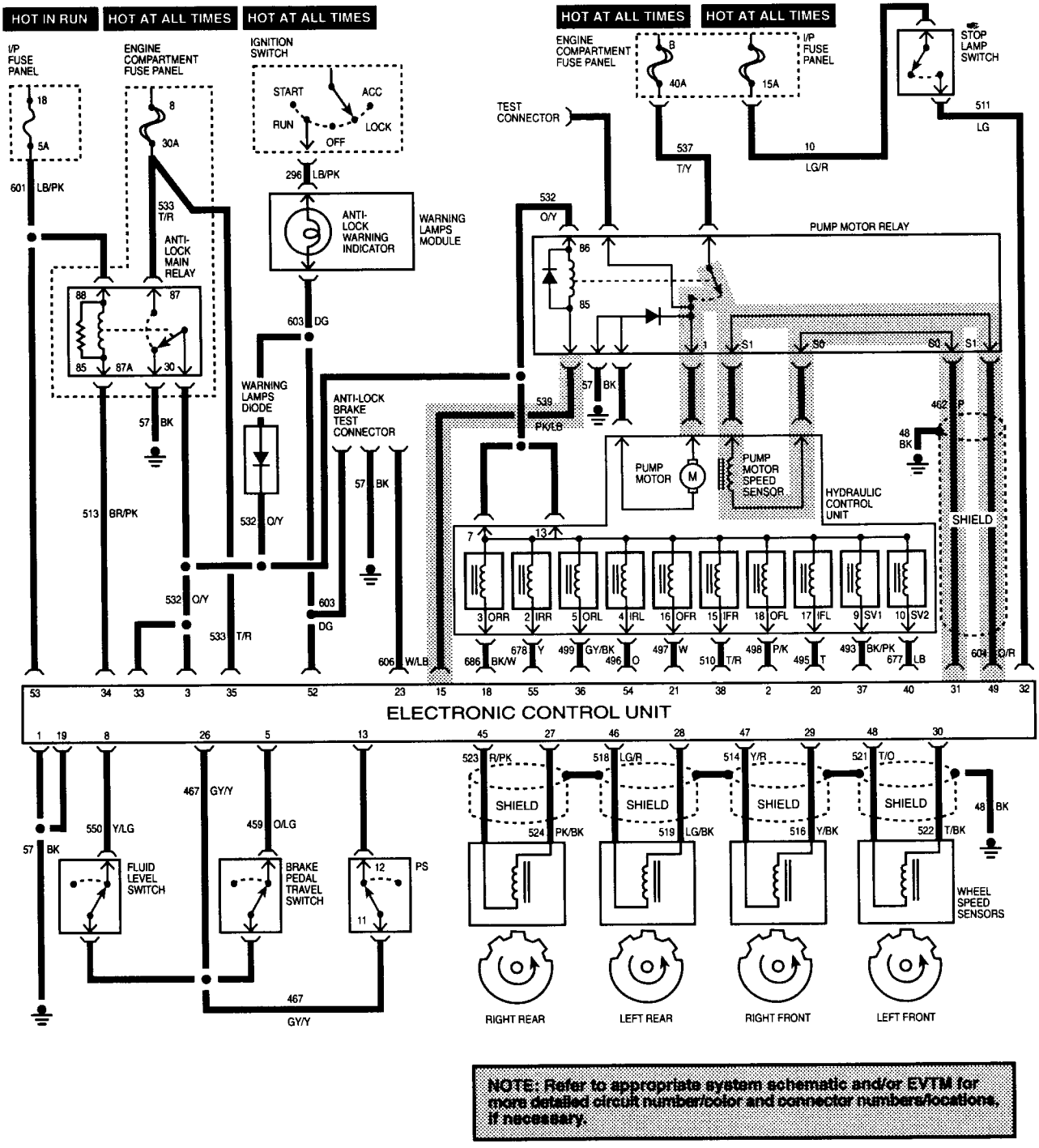
If a Code 67 is generated during Pump Motor prove-out check (19 mph on 1993 and later vehicles and 7 mph on 1992 and earlier vehicles) the possible cause of this condition is:

- The ABS Pump tolerances have opened slightly over time, thus allowing the motor to take longer to come to rest after the relay has been unlatched. The only fix for this condition is replacement of the ABS Pump Assembly.

The following tests should be performed for a code 67 if the ABS Lamp comes on immediately after the initial key cycle or while driving any time other than when the ABS ECU runs the Pump prove-out check at 19 mph (7 mph on 1992 and earlier vehicles). The EEC-IV breakout box and the ABS test adapter (T90P-50-ALA) should be installed and all tests done using a DVOM.

- Jumper pins 19 to 34, cycle ignition "ON", and check for the ABS Pump Motor operation. If the pump motor runs, a short to ground is present on the circuit between the ABS Pump Relay and pin 15 at the ECU.

Code 67



NOTE: Refer to appropriate system schematic and/or EVTM for more detailed circuit number/color and connector numbers/locations, if necessary.

TEST STEP		RESULT	ACTION TO TAKE
67-1	VERIFY PUMP MOTOR CONDITION		
	• Vehicle standing still. • Check to see if pump runs with ignition in either ON or OFF position. • **Does pump run? (with ignition ON or OFF)**	Yes - pump runs with ignition OFF. ▶ Yes - pump runs only with ignition ON. ▶ No ▶	REPLACE pump motor relay. GO to 67-5. GO to 67-2. GO to 67-3.
67-2	CHECK PUMP TRIGGER CIRCUIT FOR SHORT TO GROUND		
	• Ignition OFF • Install Rotunda Breakout Box 014-00322 or equivalent and T90P-50-ALA adapter. • Check for continuity between Breakout Box Pins 15 + 60. • **Is there continuity?**	Yes ▶ No ▶	REPAIR short to ground on circuit that runs from pump motor relay to ECU pin #15. GO to 67-5. GO to 67-4.
67-3	CHECK FOR REPEATABILITY OF FAILURE		
	• NOTE: The system will run a self-check of the pump motor speed sensor the first time that vehicle speed reaches either 11 kph (7 mph) on 1990-1992 model years or 30 kph (19 mph) on 1993-1996 model years. • Start vehicle and drive through the applicable pump check speed. Repeat this a few times. NOTE: You must stop the vehicle and turn the ignition OFF to repeat this check. • **Does the ABS light come on each time the vehicle reaches the pump check speed and the ECU stores a code 67?**	Yes ▶ No ▶	REPLACE pump & motor assembly. GO to 67-5. GO to 67-4.
67-4	FAULT FOR CODE 67 NOT PRESENT AT THIS TIME. WHICH OF THE FOLLOWING CONDITIONS EXIST?		
	1.) ABS Light ON steady and no other codes exist. 2.) ABS Light ON steady with other DTC's present. 3.) ABS Light comes ON intermittently.	▶ ▶ ▶	GO to Test NC-1. GO to Test for next DTC. GO to Intermittent Test Procedures.
67-5	REPAIR VERIFICATION		
	• Verify that ABS Light is out. • Run Self-Test to prepare ECU for DTC erasure. • Test drive vehicle - DTC's will erase when vehicle speed reaches approximately 30 mph providing ABS Light does not come ON.' Vehicle is repaired if light does not come ON and ABS performs correctly.	Vehicle repaired. ▶ ABS concern still exists. Which of the following concerns exist? 1.ABS Light ON steady and no other DTC's exist. ▶ 2.ABS Light ON and other DTC's present. ▶ 3.ABS Light comes ON intermittently. ▶ 4.ABS or TA false cycles. ▶	Return vehicle to customer. GO to Test NC-1. GO to Test for next DTC. GO to Intermittent Test Procedures. GO to False Cycling Procedures.