



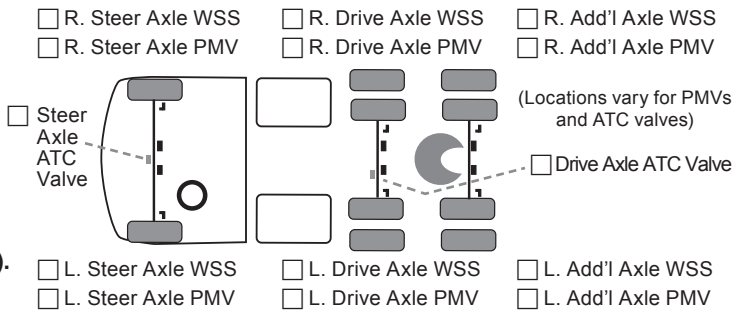
Bendix® EC-60™ ABS Controller Checklist

• This checklist only takes a few minutes.
Follow all General Safety Guidelines (see back page.)

Step 1: What equipment does the vehicle have?

Total of checked boxes:

- Wheel Speed Sensors (WSSs),
- Pressure Modulator Valves (PMVs).
- Automatic Traction Control Valves (ATCs).



Bendix Technical Help Line:

1-800-AIR-BRAKE,
(1-800-247-2725)
option 2-1,
Mon. - Fri.,
8 a.m. - 6 p.m. EST.

Step 2: What Blink Code (BC) numbers are showing as active?

We recommend that you use Bendix® ACom® Diagnostics Software (with associated RP1210 harnesses, etc.) to look up the BCs, but the blink code switch may also be used — see the info in the right column. Use the BC Event History feature in ACom Diagnostics to view any recurring or intermittent BCs that are not currently active, but may need attention. (visit www.bendix.com for a free software download)

Record here the BCs found:

(For example, 13-25)

Step 3: For blink codes starting with 13 followed by a second code of 1 through 7, 9 through 17, or 19 through 24, replace the ECU (go to Step 5).

Step 4: For each BC, use the tables below and take the actions suggested for the code; typically the steps shown will resolve the issue. See the Service Data Sheet for complete troubleshooting information, and for any other BCs not listed. Only go to Step 5 (over) in cases where the troubleshooting suggested, and any actions the technical help line(s) recommend, do not resolve the issue.

How to use the dash Blink Code switch to retrieve active BCs:

1. Wait at least two seconds after "ignition on."
2. Toggle the blink code switch once.
3. After a pause of 3.5 seconds, the ECU will begin responding with active BCs. For example twelve blinks, pause, five blinks = 12-5. There is a long pause before any further BCs.

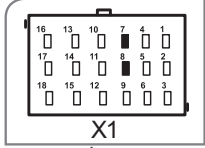
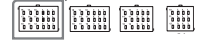
Note:

- Depress and release the BC switch three times to clear BCs.
- Depress and release the BC switch two times to see inactive BCs.

Blink Codes (BC)		Description	Go To Action
1st code	2nd code		
2	any	Left Steer Axle WSS	A
3	any	Right Steer Axle WSS	A
4	any	Left Drive Axle WSS	A
5	any	Right Drive Axle WSS	A
7	any	Left Steer Axle PMV	B
8	any	Right Steer Axle PMV	B
9	any	Left Drive Axle PMV	B
10	any	Right Drive Axle PMV	B
11	7	Transmission / Hill Start Link	C
11	Any (except 7)	J1939	D
12	4, 5	Retarder Relay or Hill Start Lamp	E
12	24, 25, or 26	Hill Start Solenoid	F

Blink Codes (BC)		Description	Go To Action
1st code	2nd code		
13	1-7, 9-17, 19-24	Go to Step 5	
13	8, or 18	ECU (16) or (19) - Call the Tech Team	
13	25	ECU "VIN Check"	G
14	any	Left Additional Axle WSS	A
15	any	Right Additional Axle WSS	A
16	any	Left Additional Axle PMV	B
17	any	Right Additional Axle PMV	B
20	any	Trailer PMV	B
21	any	Steering Angle Sensor	H
22	any	Yaw Rate Sensor	H
23	any	Lateral Acceleration Sensor	H
24	6	Brake Demand	J

Action	Key Troubleshooting Steps for the Blink Codes Shown Above	
	Quick Checks to Make	Next Steps
A	<input type="checkbox"/> Verify that the number of WSSs found in step 1 match the stored configuration <input type="checkbox"/> Verify, for the wheel end identified in the description, that all WSS electrical connections and wiring, from the wheel end through to the ECU, are properly installed and free from damage <input type="checkbox"/> Check that the WSS's face is touching the exciter ring/tone ring face <input type="checkbox"/> Verify 1500-2500 ohms across sensor leads. Reading: ohms* <input type="checkbox"/> While turning the wheel at 0.5 revs/sec, verify a minimum of 0.25 AC volts across the sensor leads. Reading: volts* (* Out of range? – go to BW2453 WSS inspection guide.)	<ul style="list-style-type: none"> • Clear the Blink Codes (BCs) • Is the same BC back? <input type="checkbox"/> Yes – see the Service Data sheet Troubleshooting section and/or contact the Bendix Tech Team <input type="checkbox"/> No – follow the actions above for any other remaining BCs
B	<input type="checkbox"/> Verify that the number of modulators found in step 1 match the stored configuration <input type="checkbox"/> Verify, for the wheel end identified in the description, that all PMV electrical connections and wiring, from the wheel end through to the ECU, are properly installed and free from damage <input type="checkbox"/> Verify 9.8 to 11.0 ohms from the release to hold. (12 volt systems.) Reading: ohms <input type="checkbox"/> With the brakes applied**, verify the chuff test runs at power-up (vehicle cannot be moving). Listen for the sequence: right steer; left steer; right drive; left drive; right add'l; left add'l ** Do not apply the brakes when testing the BC "20-any" trailer PMV blink code	
C	The ECU is expecting the transmission to be configured for Hill Start, but is not receiving the correct message from the transmission. Contact the OEM support line	

Key Troubleshooting Steps for the Blink Codes Shown Above		
Action	Quick Checks to Make	Next Steps
D	<input type="checkbox"/> Verify that the wiring and connections are free from damage <input type="checkbox"/> With the vehicle power off , remove the X-1 connector from the ECU. Verify the resistance between pins 7 and 8 is 60 ohms. Reading: ohms (Incorrect? – investigate harnesses and connectors) <input type="checkbox"/> With vehicle power on , remove the X-1 connector. Verify the voltage between pin 7 and ground, and also pin 8 and ground is 2.5 Vdc. Readings: (pin 7) Vdc, (pin 8) Vdc (Incorrect? – investigate harnesses and connectors)	<p>(Looking into the wire harness connector)</p>  <p>X1</p>  <ul style="list-style-type: none"> • Clear the Blink Codes (BCs) • Is the same BC back? <ul style="list-style-type: none"> <input type="checkbox"/> Yes – Contact the OEM support line for vehicle-level troubleshooting <input type="checkbox"/> No – follow the actions above for any other remaining BCs
E	<input type="checkbox"/> If there is a Hill Start dash switch installed, inspect the Hill Start lamp and switch wiring; if not, inspect for the retarder relay wiring for damage.	<ul style="list-style-type: none"> • Clear the Blink Codes (BCs) • Is the same BC back? <ul style="list-style-type: none"> <input type="checkbox"/> Yes – see the Service Data sheet and/or contact the Bendix Tech Team <input type="checkbox"/> No – follow the actions above for any other remaining BCs
F	<input type="checkbox"/> Verify that the resistance between the solenoid pins is approximately 7 to 8 ohms. (12 volt systems.) (Incorrect? – replace the solenoid, go to Next Steps) <input type="checkbox"/> Inspect the Hill Start solenoid for disconnected or damaged wiring and check the harness for continuity.	
G	Obtain the VIN stored in the ABS ECU, the VIN stamped on the vehicle, and the VIN stored in the engine controller. Next contact the OEM support line: the ABS ECU BC is for a mismatched VIN - this indicates the wrong ABS ECU has been installed	
H	<input type="checkbox"/> Verify all wiring and connectors are free from damage. When BOTH Blink Code 21-8 AND Blink Code 22-5 are reported, this is usually a wiring issue (check the harness for continuity). <input type="checkbox"/> If 21-8 alone, unplug the Steering Angle Sensor (SAS) connector harness and test with a replacement SAS. If the BC clears, replace the SAS, and re-calibrate with ACom® Diagnostics <input type="checkbox"/> If 22-5 alone, unplug the Yaw Rate Sensor (YRS) connector harness and test with a replacement YRS. If the BC clears, replace the YRS, and re-calibrate with ACom® Diagnostics <input type="checkbox"/> Any remaining sensor BCs, clear BCs and re-calibrate with ACom® Diagnostics <input type="checkbox"/> If BC returns, contact the Bendix Tech Team	<ul style="list-style-type: none"> • Clear the Blink Codes (BCs) • Is the same BC back? <ul style="list-style-type: none"> <input type="checkbox"/> Yes – see the Service Data sheet Troubleshooting section and/or contact the Bendix Tech Team <input type="checkbox"/> No – follow the actions above for any other remaining BCs
J	<input type="checkbox"/> Calibrate the brake demand sensor by fully applying the brakes for three seconds <input type="checkbox"/> Verify the sensor installation has not changed from the original OE configuration <input type="checkbox"/> Verify all wiring and connectors are free from damage	
Reference Documents - Service Data sheets: SD-13-4863 EC-60™ ABS/ATC standard & premium controllers, SD-13-4869 EC-60™ ABS/ATC ESP Advanced controllers Go to www.bendix.com for free downloads of Service Data Sheets and Warranty Policies and to order copies of the SD sheets		

Step 5: (If necessary.) Replace the ECU. If it is still under warranty coverage, file a claim and include: (a) the returned part, (b) a copy of this document and (c) a print-out of the ACom® Diagnostics report.

VIN #: _____ Claim #: _____

Vehicle Make: _____ Model: _____ Mileage: _____



GENERAL SAFETY GUIDELINES

WARNING! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO AVOID PERSONAL INJURY OR DEATH:

When working on or around a vehicle, the following general precautions should be observed **at all times**.

1. Park the vehicle on a level surface, apply the parking brakes, and always block the wheels. Always wear safety glasses.
2. Stop the engine and remove ignition key when working under or around the vehicle. When working in the engine compartment, the engine should be shut off and the ignition key should be removed. Where circumstances require that the engine be in operation, **EXTREME CAUTION** should be used to prevent personal injury resulting from contact with moving, rotating, leaking, heated or electrically charged components.
3. Do not attempt to install, remove, disassemble or assemble a component until you have read and thoroughly understand the recommended procedures. Use only the proper tools and observe all precautions pertaining to use of those tools.
4. If the work is being performed on the vehicle's air brake system, or any auxiliary pressurized air systems, make certain to drain the air pressure from all reservoirs before beginning **ANY** work on the vehicle. If the vehicle

5. is equipped with a Bendix® AD-IS® air dryer system or a dryer reservoir module, be sure to drain the purge reservoir.
5. Following the vehicle manufacturer's recommended procedures, deactivate the electrical system in a manner that safely removes all electrical power from the vehicle.
6. Never exceed manufacturer's recommended pressures.
7. Never connect or disconnect a hose or line containing pressure; it may whip. Never remove a component or plug unless you are certain all system pressure has been depleted.
8. Use only genuine Bendix® brand replacement parts, components and kits. Replacement hardware, tubing, hose, fittings, etc. must be of equivalent size, type and strength as original equipment and be designed specifically for such applications and systems.
9. Components with stripped threads or damaged parts should be replaced rather than repaired. Do not attempt repairs requiring machining or welding unless specifically stated and approved by the vehicle and component manufacturer.
10. Prior to returning the vehicle to service, make certain all components and systems are restored to their proper operating condition.
11. For vehicles with Automatic Traction Control (ATC), the ATC function must be disabled (ATC indicator lamp should be ON) prior to performing any vehicle maintenance where one or more wheels on a drive axle are lifted off the ground and moving.