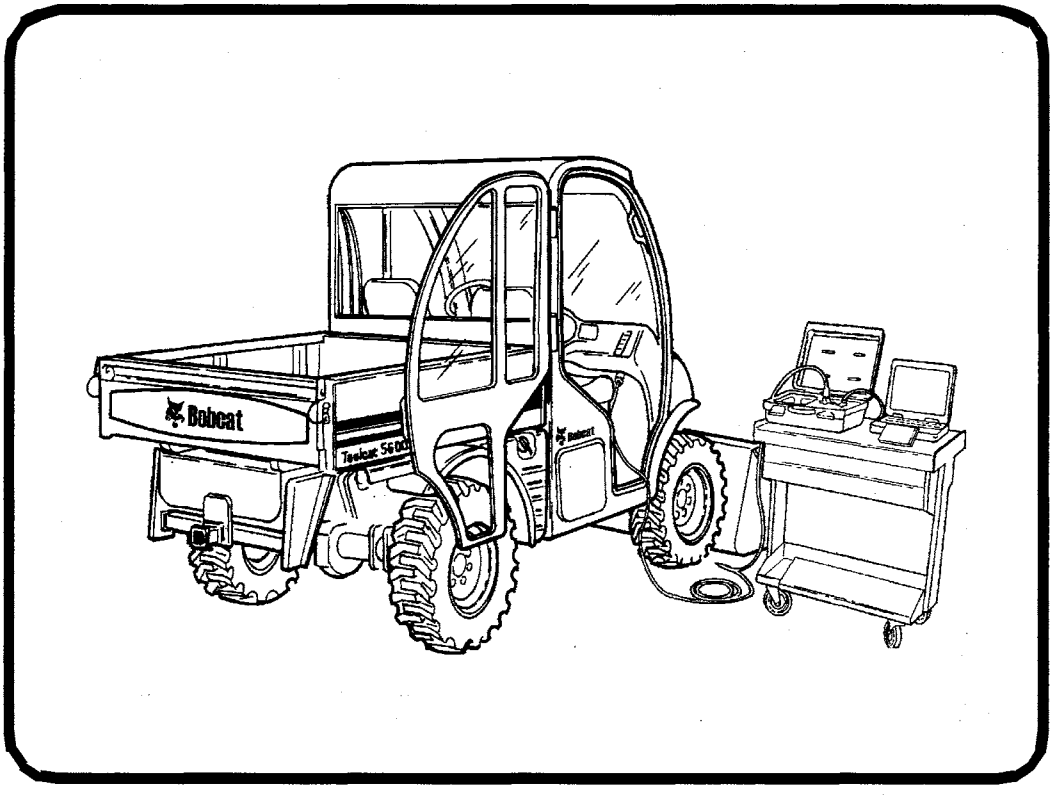
Bobcat®

Electrical System Service Manual
Toolcat™ 5600 Utility Work Machine

S/N 520511001 & Above
S/N 424811001 & Above
S/N 424711001 & Above
S/N A00211001 & Above
S/N A00311001 & Above



EQUIPPED WITH TOOLCAT INTERLOCK CONTROL SYSTEM (TICS)

Ingersoll Rand
Compact Vehicle Technologies

6902333 (3-06)

Printed in U.S.A.

Bobcat®

SERVICE MANUAL REVISION

ROUTE TO ATTENTION	
PARTS MANAGER	☐
SERVICE MANAGER	☒
SALES MANAGER	☐

NOTICE Insert This Sheet With The Below Listed Manual For Future Reference.

Revision No: TCE-1
Date: 23 March 2006
Product: Utility Work Machine
Model: 5600
Manual No: 6902333 (4-03)

Please discard your old Toolcat™ 5600 Utility Work Machine Electrical System Service Manual (P/N 6902333) Dated (4-03) and replace it with the revised Toolcat™ 5600 Utility Work Machine Electrical System Service Manual (P/N 6902333) Dated (3-06).

Ingersoll Rand
Compact Vehicle Technologies
Printed in U.S.A.

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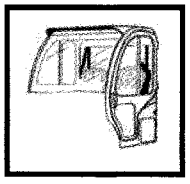
FOREWORD

This manual is for the Bobcat Loader excavator mechanic. It provides necessary servicing and adjustment procedures for the Bobcat Loader and its component parts and systems. Refer to the for operating instructions, starting procedure, daily checks, etc.

A general inspection of the following items must be made after the loader has had service or repair:

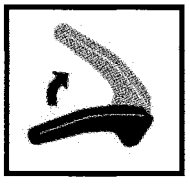
1. Check that the ROPS/FOPS (Including front and rear window) is in good condition and is not modified.



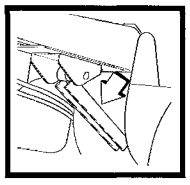
2. Check that ROPS mounting hardware is tightened and is Bobcat approved.

3. The seat belt must be correctly installed, functional and in good condition.

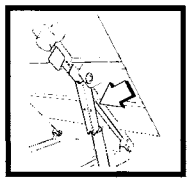
4. The arm rest interlock must be correctly adjusted, clean and lubricated.



5. Check lift arm suport device, replace if damaged.



6. Check cargo box support device, replace if damaged.



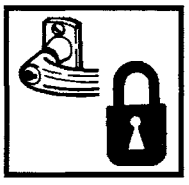
7. Machine signs must be legible and in the correct location.

8. Joystick control lever and foot pedals must return to neutral.

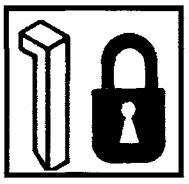
9. Check for correct function of the work lights.

10. The parking brake must function correctly.

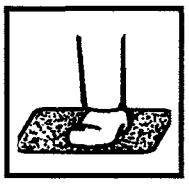
11. Enclosure door latches must open and close freely.



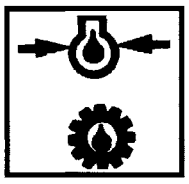
12. Bob-Tach wedges and linkages must function correctly and be in good condition.



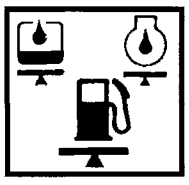
13. Safety treads and floor mats must be in good condition.



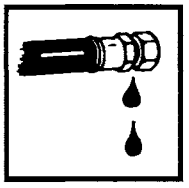
14. Check for correct function of indicator lamps.



15. Check hydraulic fluid level, engine oil level and fuel supply.

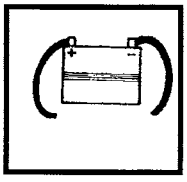


16. Inspect for fuel, oil or hydraulic fluid leaks.

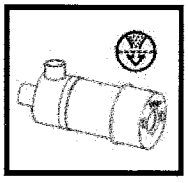


17. Lubricate the machine.

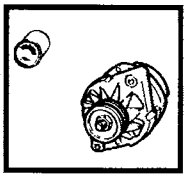
18. Check the condition of the battery and cables.



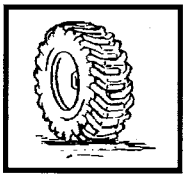
19. Inspect the air cleaner for damage or leaks. Check the condition of the element.



20. Check the electrical charging system.

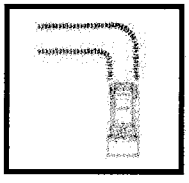


21. Check tires for wear and pressure.



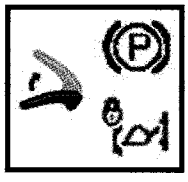
22. Inspect for loose or broken parts or connections.

23. Operate the machine and check all functions.

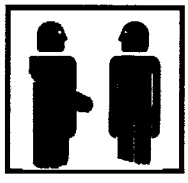


24. Check for any field modification not completed.

25. Check for correct function of the Toolcat Interlock Control System (TICS) before the machine is returned to the customer.



Recommend to the owner that all necessary corrections be made before the machine is returned to service.



CALIFORNIA
PROPOSITION 65 WARNING

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects and other reproductive harm.

Safety Alert Symbol

This symbol with a warning statement means: "Warning, be alert! Your safety is involved!" Carefully read the message that follows.

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Operator's Handbook and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.

W-2003-0903

Warnings on the machine and in the manuals are for your safety. Failure to obey warnings can cause injury or death.

W-2044-1285

IMPORTANT

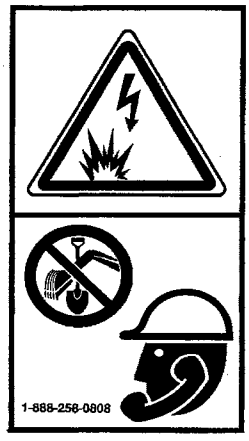
This notice identifies procedures which must be followed to avoid damage to the machine.

I-2019-0284

The following publications provide information on the safe use and maintenance of the Bobcat machine and attachments:

- The Delivery Report is used to assure that complete instructions have been given to the new owner and that the machine is in safe operating condition.
- The Operation & Maintenance Manual delivered with the machine or attachment contains operating information as well as routine maintenance and service procedures. It is a part of the machine and can be stored in a container provided on the machine. Replacement Operation & Maintenance Manuals can be ordered from your Bobcat dealer.
- Machine signs (decals) instruct on the safe operation and care of your Bobcat machine or attachment. The signs and their locations are shown in the Operation & Maintenance Manual. Replacement signs are available from your Bobcat dealer.
- An Operator's Handbook fastened to the operator cab. It's brief instructions are convenient to the operator. The handbook is available from your dealer in an English edition or one of many other languages. See your Bobcat dealer for more information on translated versions.
- The Service Manual and Parts Manual are available from your dealer for use by mechanics to do shop-type service and repair work.
- The Utility Work Machine Operator Training Course is available through your local dealer or at **www.training.bobcat.com** or **www.bobcat.com**. This course is intended to provide rules and practices of correct operation of the Utility Work Machine. The course is available in English and Spanish versions.
- The Utility Work Machine Safety Video is available from your Bobcat dealer or at **www.training.bobcat.com** or **www.bobcat.com**.

The dealer and owner/operator review the recommended uses of the product when delivered. If the owner/operator will be using the machine for a different application(s) he or she must ask the dealer for recommendations on the new use.



Call Before You Dig

1-888-258-0808

When you call, you will be directed to a location in your state/city for information about buried lines (telephone, cable TV, water, sewer, gas, etc.)

Fire Prevention

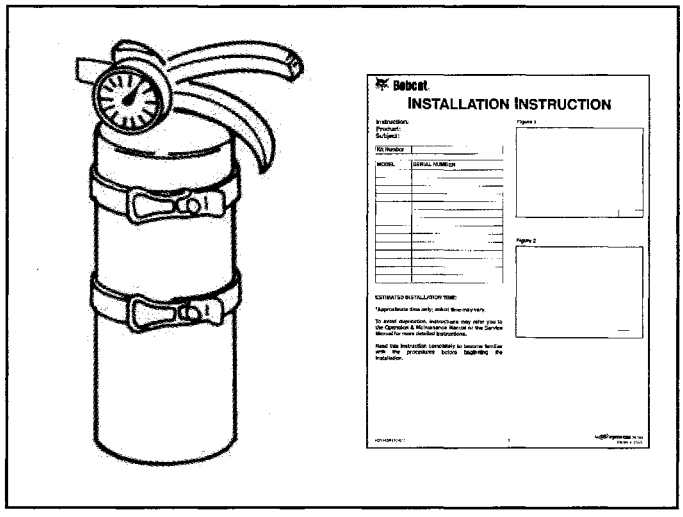
The machine and attachments have components that are at high temperature under normal operating conditions. The primary source of high temperatures is the engine and exhaust system. The electrical system, if damaged or incorrectly maintained, can be a source of arcs or sparks.

Flammable debris (leaves, straw, etc.) must be removed regularly. If flammable debris is allowed to accumulate, it will increase fire hazard. Clean often to avoid this accumulation. Flammable debris in the engine compartment is a potential hazard.

The spark arrestor muffler is designed to control the emission of hot particles from the engine and exhaust system, but the muffler and the exhaust gases are still hot.

- Do not use the machine where exhaust, arcs, sparks or hot components can contact flammable material, explosive dust or gases.
- The operator cab, engine compartment, and engine cooling system must be inspected every day and cleaned if necessary to prevent fire hazard and overheating.
- Check all electrical wiring and connections for damage. Keep the battery terminals clean and tight. Repair or replace any damaged part.
- Check fuel and hydraulic tubes, hoses and fittings for damage and leakage. Never use open flame or bare skin to check for leaks. Tighten or replace any parts that show leakage. Always clean fluid spills. Do not use gasoline or diesel fuel for cleaning parts. Use commercial nonflammable solvents.
- Do not use ether or starting fluids on any engine which has glow plugs. These starting aids can cause explosion and injure you or bystanders.
- Always clean the machine, disconnect the battery, and disconnect the wiring from the controllers before welding. Cover rubber hoses, battery and all other flammable parts. Keep a fire extinguisher near the machine when welding. Have good ventilation when grinding or welding painted parts. Wear a dust mask when grinding painted parts. Toxic dust or gas can be produced.
- Stop the engine and let it cool before adding fuel. NO SMOKING!
- Use the procedure in the Operation & Maintenance Manual for connecting the battery and for jump starting.
- Use the procedure in the Operation & Maintenance Manual for cleaning the spark arrestor muffler (if equipped).

Figure 1



- Know where fire extinguishers and first aid kits are located and how to use them. Fire extinguishers are available from your Bobcat dealer **[Figure 1]**.

SI TC-0206 SM

LIFTING AND BLOCKING THE UTILITY WORK MACHINE

Procedure For Jackstand Placement On The Axle

NOTE: For jackstand placement procedure used for axle removals and other axle related component procedures (See Procedure For Jackstand Placement On The Frame on Page X.)

WARNING

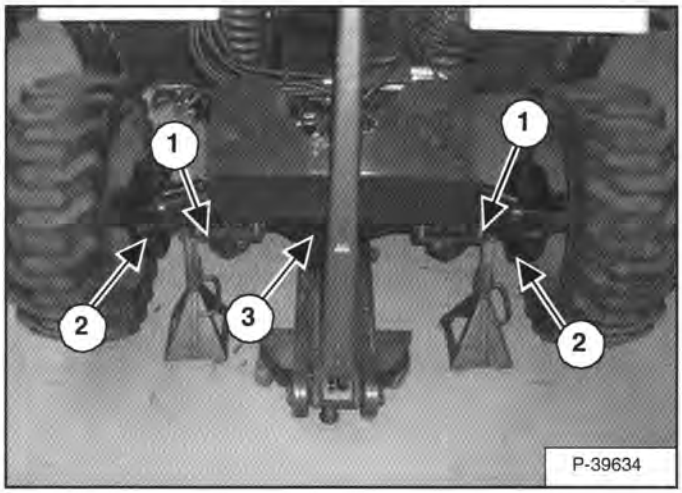
Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Operator's Handbook and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.

W-2003-0903

Always park the machine on a level surface.

Install the approved lift arm support device. (See Installing on Page XII.)

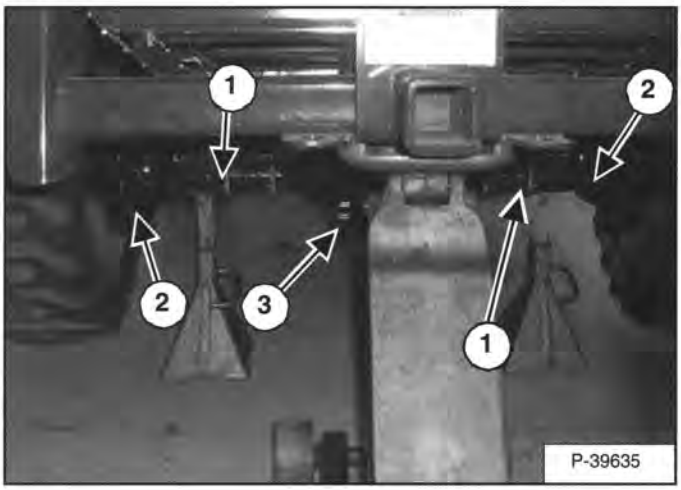
Figure 1



Place the jackstands on the front axle between the axle mounts (Item 1) and the axle hub (Item 2) **[Figure 1]**.

NOTE: When lifting the machine place the jack under the frame. Do not lift from the axle differential housing (Item 3) [Figure 1] this can cause the machine to tilt due to the suspension and the offset axle differential housing.

Figure 2



Place the jackstands on the rear axle between the axle mounts (Item 1) and the axle hub (Item 2) **[Figure 2]**.

NOTE: When lifting the machine place the jack under the rear hitch. Do not lift from the axle differential housing (Item 3) [Figure 2] this can cause the machine to tilt due to the suspension and the offset axle differential housing.

LIFTING AND BLOCKING THE UTILITY WORK MACHINE (CONT'D)

Procedure For Jackstand Placement On The Frame

WARNING

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Operator's Handbook and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.

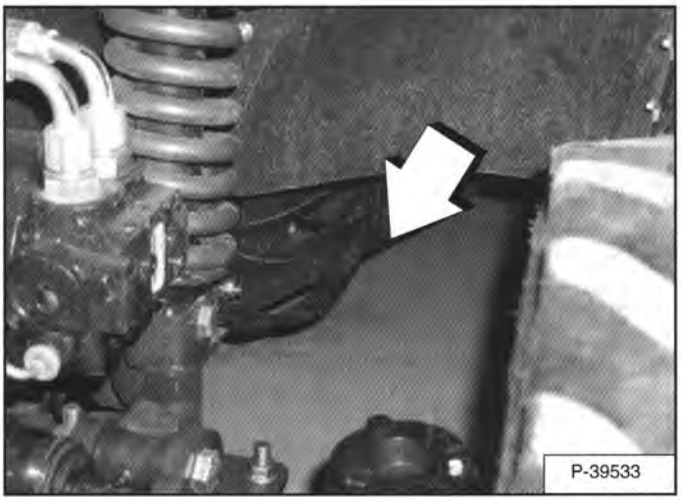
W-2003-0903

Always park the machine on a level surface.

Install the approved lift arm support device. (See Installing on Page XII.)

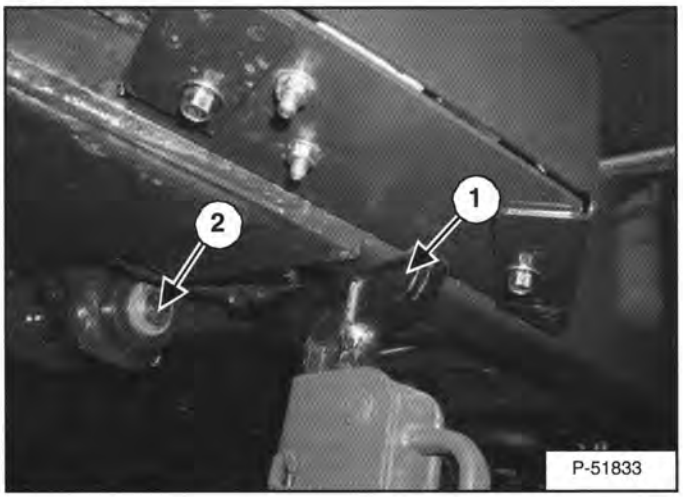
NOTE: This jackstand placement procedure is used for axle removals and other axle related component procedures.

Figure 3



Install the left jackstand behind the frame cutout. **[Figure 3]**.

Figure 4

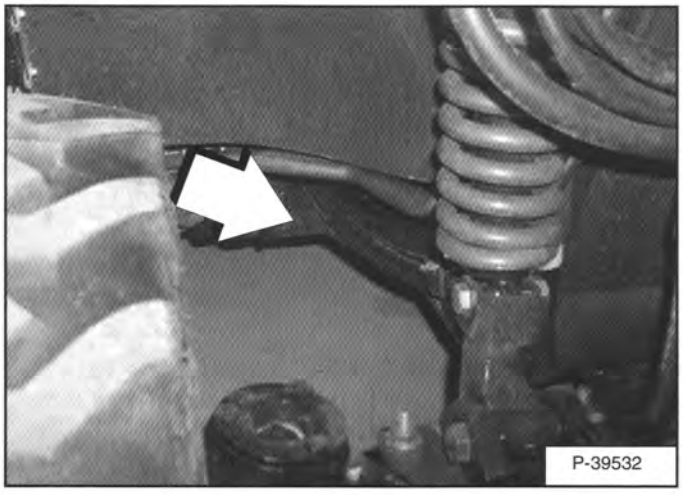


Install the left jackstand (Item 1) in the frame cut parallel with the lift cylinder base end pin (Item 2) **[Figure 4]**.

LIFTING AND BLOCKING THE UTILITY WORK MACHINE (CONT'D)

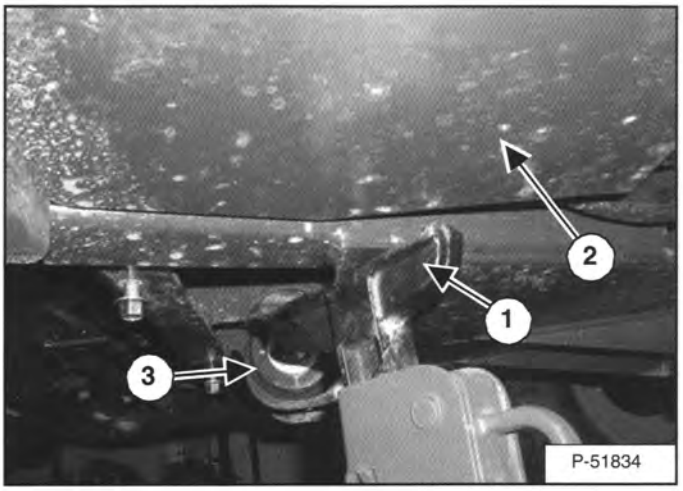
Procedure For Jackstand Placement On The Frame (Cont'd)

Figure 5



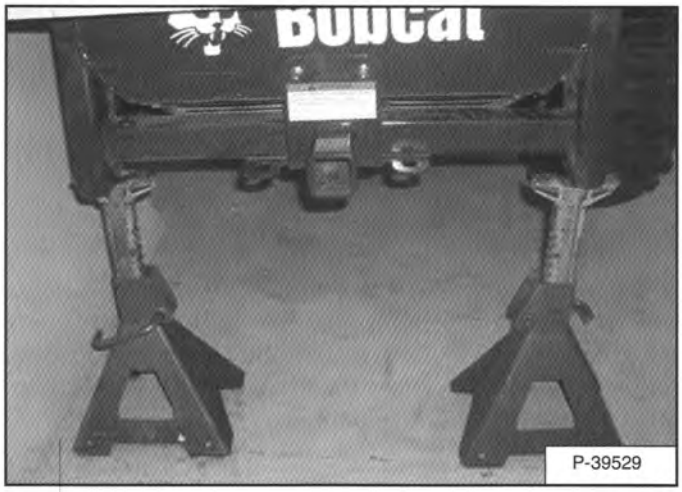
Install the right jackstand between the auxiliary valve and the lift cylinder base end pin **[Figure 5]**.

Figure 6



Install the right jackstand (Item 1) between the auxiliary fuel tank (Item 2) and the lift cylinder base end pin (Item 3) **[Figure 6]**.

Figure 7



Place the jackstands on the hitch as shown in **[Figure 7]**.

LIFT ARM SUPPORT DEVICE

Installing

⚠ WARNING

Never work on a machine with the lift arm up unless the lift arm is supported by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arm or attachment to fall and cause injury or death.

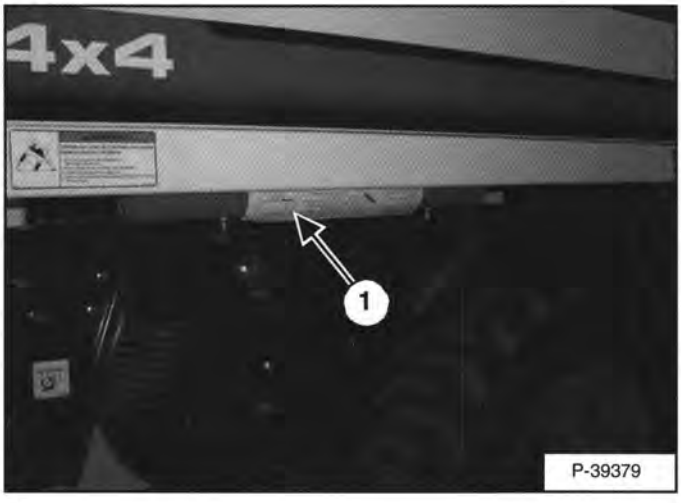
W-2447-1102

⚠ WARNING

Service lift arm support device if damaged. Using a damaged lift arm support can cause lift arm to drop causing injury or death.

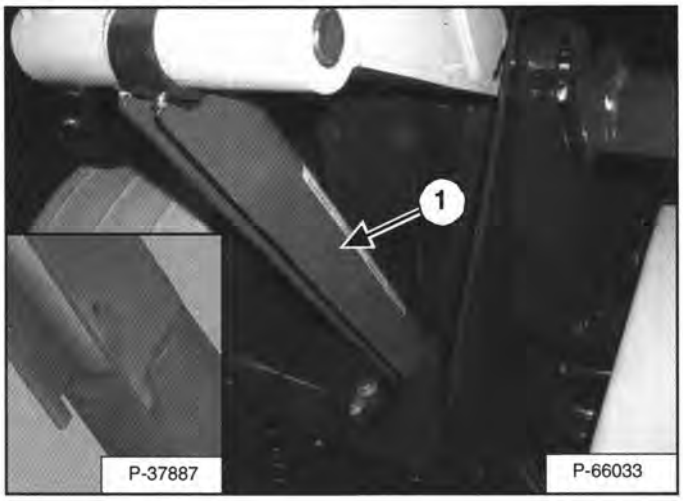
W-2448-1102

Figure 8



Remove the lift arm support device (Item 1) **[Figure 8]** from the storage position under the right side of the Cargo Box.

Figure 9



Enter the cab, lower the arm rest, fasten the seat belt and start the engine.

Remove any attachment from the Bob-Tach™.

Raise the lift arm all the way up.

Stop the engine and exit the cab.

Install the lift arm support device (Item 1) **[Figure 9]** over the rod of the lift cylinder. Be sure the tabs are over the end of the lift cylinder (Inset) **[Figure 9]**.

Enter the cab and start the engine.

Lower the lift arm until it is supported by the support device.

Removing

Start the engine and raise the lift arm all the way up. Stop the engine.

Remove the lift arm support device.

Enter the cab, start the engine and lower the lift arm all the way.

Stop the engine and exit the cab.

Return the lift arm support device to the storage position.

CARGO BOX SUPPORT DEVICE

Installing

⚠ WARNING

Never work on a machine with the cargo box up unless the cargo box is supported by an approved support device. Failure to use an approved support device can allow the cargo box to fall and cause injury or death.

W-2449-1102

⚠ WARNING

Service cargo box support device if damaged or if parts are missing. Using a damaged support or with missing parts can cause cargo box to drop causing injury or death.

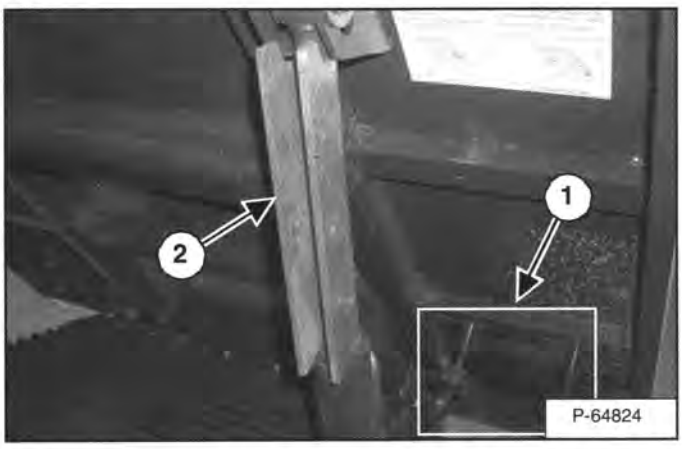
W-2450-1102

Empty the cargo box before installing the cargo box support device.

Enter the cab, lower the arm rest, fasten the seat belt, start the engine and raise the cargo box all the way.

Stop the engine and exit the cab.

Figure 10



Remove the cargo box support device from the storage position (Item 1) **[Figure 10]**.

Install the support device over the cargo box cylinder rod (Item 2) **[Figure 10]**.

Enter the cab, lower the arm rest, fasten the seat belt, start the engine and lower the cargo box until it is supported by the support device.

Removing

Enter the cab, lower the arm rest, fasten the seat belt, start the engine and raise the cargo box all the way.

Stop the engine and exit the cab.

Remove the support device (Item 2) **[Figure 10]** from the cylinder rod.

Enter the cab, lower the arm rest, fasten the seat belt, start the engine and lower the cargo box all the way.

Return the support device to the storage position.

Raising The Cargo Box When Engine Is Not Running

Figure 11

Install lift straps (or chains) through the stake holes at the front of the cargo box **[Figure 11]**.

Fasten the lift straps to a hoist.

Raise the hoist until the cargo box is all the way up.

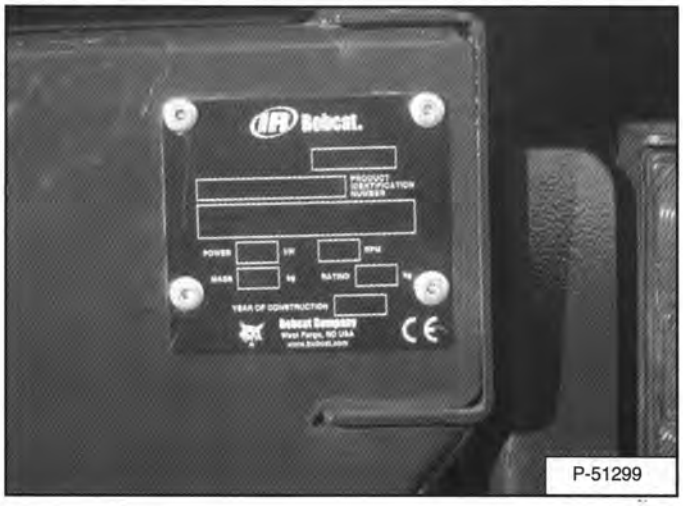
Install cargo box support device. (See Installing.)

SERIAL NUMBER LOCATIONS

Always use the serial number of the machine when requesting service information or when ordering parts. Early or later models (identification made by serial number) may use different parts, or it may be necessary to use a different procedure in doing a specific service operation.

Utility Work Machine Serial Number

Figure 12



The Utility Work Machine serial number plate is located on the rear of the frame below the Cargo Box **[Figure 12]**.

Explanation of machine Serial Number:

XXXX XXXXX

Module 2. - Production Sequence (Series)

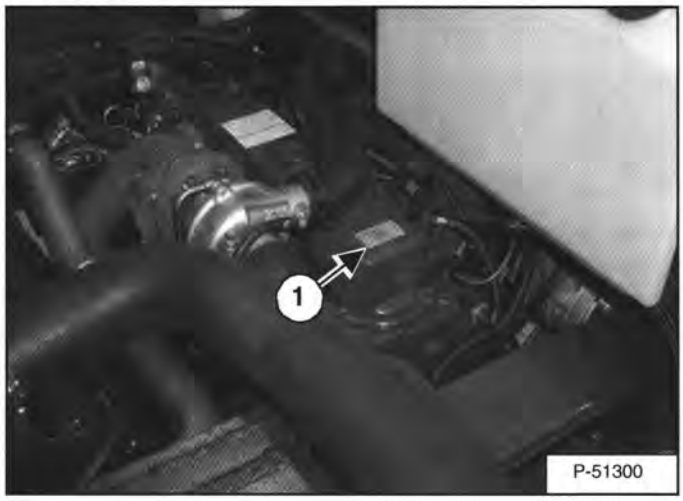
Module 1. - Model / Engine Combination

1. The four digit Model/Engine Combination Module number identifies the model number and engine combination.

2. The five digit Production Sequence Number identifies the order which the machine is produced.

Engine Serial Number

Figure 13



The engine serial number is located at the right end of the valve cover (Item 1) **[Figure 13]**.

This manual applies to the below listed Toolcat Machines:

MODEL	TOOLCAT SERIAL NUMBER
5600	520511001 & Above
	424711001 & Above
	424811001 & Above
	A00211001 & Above
	A00311001 & Above

PRELIMINARY UTILITY WORK MACHINE GLOSSARY OF TERMS

Master Password	Password set at factory and cannot be changed. Allows for full use of the Toolcat and set up of owner and user passwords. Available with deluxe instrumentation only.
Owner Password	Allows for full use of the Toolcat. Can change user password and set up operator password(s). Can not change master password. Available with deluxe instrumentation only.
User Password	Allows starting and operating the Toolcat. Can not change any passwords. Available with deluxe instrumentation only.
TICS	Toolcat Interlock Control System. A system that monitors safety related inputs and enables or disables use of lift, tilt and traction.
Service Code	Four digit code displayed on the left instrument panel by the Bobcat controller. Bobcat controller continuously monitors for service or problem conditions and displays associated condition in the form of service codes.
Standard Instrumentation	Key switch and icons in right side panel.
Deluxe Instrumentation	Numeric pad keyless ignition, icons and multi-use display in right side panel.
Bobcat Controller	Solid state module which communicates with instrument panels and optional attachment controllers. Receives sensor information, provides outputs to operator, machine solenoids and relays as programmed.
Service PC	Computer connected to the Bobcat remote start tool. Provides ability to initialize replacement Bobcat controller, monitor sensors for troubleshooting and displaying stored machine service codes.
Bobcat Remote Start Tool	Service tool for remote starting the loader and other functions normally operated from operator cab. Provides interconnection to a service PC.
Service Software	Software required when using service PC to allow communication with Bobcat controller.
Service Upgrade Software	Software program used by the service PC to check the version of software loaded in controllers and for upgrading controllers to latest software version.
Service Analyzer Software	Software program for service PC. Used to monitor sensors and display historic machine conditions.
Controller	Solid state device which receives inputs and provides outputs as designed.
ACD	Attachment Control Device. A module that receives inputs from the machine and provides outputs to control attachment functions.
RACD	Remote Attachment Control Device. A type of ACD that also allows starting and stopping the loader's engine and operating an attachment outside of the Toolcats operator cab.
Icon	Symbol representation of a condition or event.
Fault Tree	A graphic flow chart used to simplify troubleshooting procedures.
Fuse/Relay Panel	Panel which contains multiple fuses and relays. Located on the passenger side below the dash.
Display Service Code	Operator selection that when activated displays current service codes.
Short	When a wire or other electric component contacts another wire or other electric component when it should not.

PRELIMINARY UTILITY WORK MACHINE GLOSSARY OF TERMS (CONT'D)

Open	A condition when a wire or other electric current carrying component no longer makes electrical contact. (examples; broken wire, loose connector).
Continuity	A completed electrical circuit. When all connections in an electrical circuit are making complete contact and allow full designed current to flow. No opens.
Multi-Meter	A tool used to measure volts, ohms and electric current. The types of measurements available and ranges vary by model.
Electric Schematic	A drawing using standardized graphic symbols to indicate the function and interconnection of an electrical circuit. The schematic allows tracing the circuit and its functions without regard to the actual physical size, shape, or location of components or parts.
Auxiliary Bleed Valve	A valve located in the auxiliary circuit that, when activated, bleeds the auxiliary circuit to the reservoir.
Pressure Sensor Tester Special Tool	A tool used to monitor and troubleshoot the engine oil pressure and hydraulic charge pressure sensors.
Sensor Tester Special Tool	A tool used to monitor and troubleshoot the arm rest sensor.
Error ON	The Bobcat controller sensed an ON condition (voltage) when it should have been OFF. Such a condition would exist if a power wire shorted to a sensor wire in the harness.
Error OFF	The Bobcat controller sensed an OFF condition (no voltage) when it should have been ON. Such a condition would exist if a wire from a sensor was broken or disconnected in the harness.

GENERAL INSTRUCTIONS

Digital Multimeter

We recommend using a digital multimeter when testing voltage, resistance and continuity of a circuit. Follow the applicable instruction manual provided with the multimeter to become familiar with its operation.

Voltage Test

Figure 10-10-1

Install the test probes into the correct connections on the multimeter for taking DC voltage readings **[Figure 10-10-1]**.

Select voltage test and desired scale or range.

Connect the negative (Black) and positive (Red) probes across the location you wish to measure.

The meter will display the voltage difference between the negative test point and the positive test point.

Resistance Test (Ohms)

Figure 10-10-2

Install the test probes into the correct connections on the multimeter for taking resistance measurements **[Figure 10-10-2]**.

Select resistance test (Ohm meter) and select the desired scale or range.

Before connecting the probes to take a measurement, always disconnect the battery power from the circuit to be tested. Any battery voltage will give an incorrect resistance measurement.

Connect the negative (Black) and positive (Red) probes across the location you wish to measure.

The meter will display the resistance in Ohms between the negative test point and the positive test point.

Related Notes:

The ohmmeter actually measures the current which flows from the negative to positive test probes. The current source is the battery in the multimeter. This is important to know when checking diodes. A diode will show a very small or zero resistance when connected in one direction and a very high or infinite resistance when connected in the other direction. If the resistance is the same in both directions, the diode is defective.

When using an ohmmeter for checking the continuity of a wire harness, connect one probe to one end and the other probe to the other end. The meter should display a very small amount of resistance, usually less than one ohm. If the wire is broken or has a bad contact to a connector or splice, the resistance reading will be much higher or infinite. If the wire passes this test, but you think it may be shorted to another wire or ground, place one of the probes to each of other connector pins in the harness and check that the resistance is infinite to each of the other wires. Any lower resistance value indicates a short or other contact between the wires.

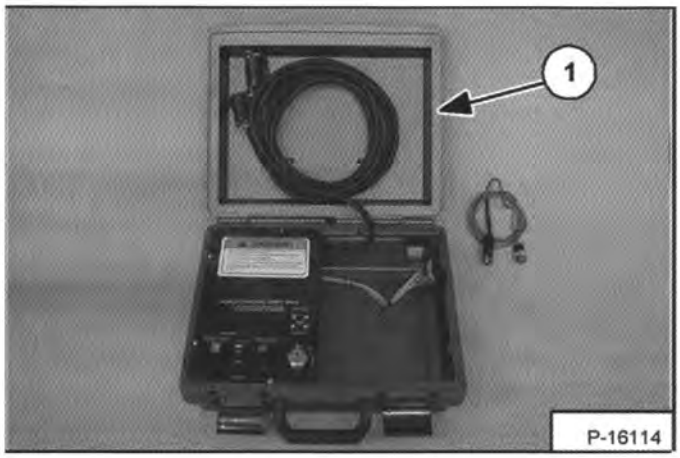
REMOTE START TOOL KIT-MEL1563

Remote Start Tool - MEL1563

Tools that will be needed to complete the following steps are:

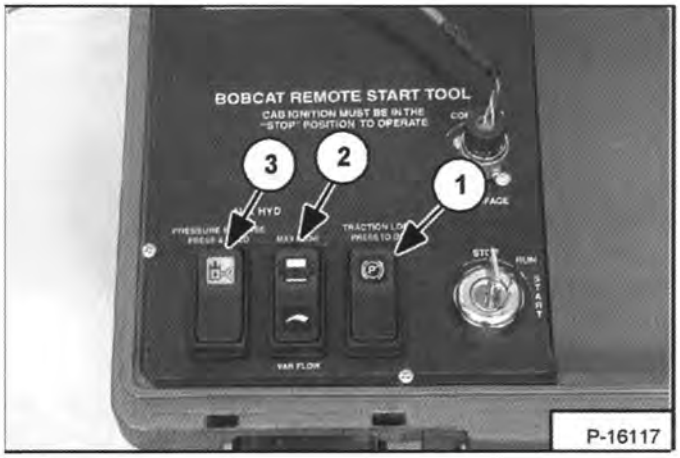
MEL1563 - Remote Start Tool
MEL1565 - Service Tool Harness Control
MEL1566 - Service Tool Harness Communicator (Computer Interface)

Figure 10-20-1



The remote start tool (Item 1) **[Figure 10-20-1]** is required for use with the Service PC.

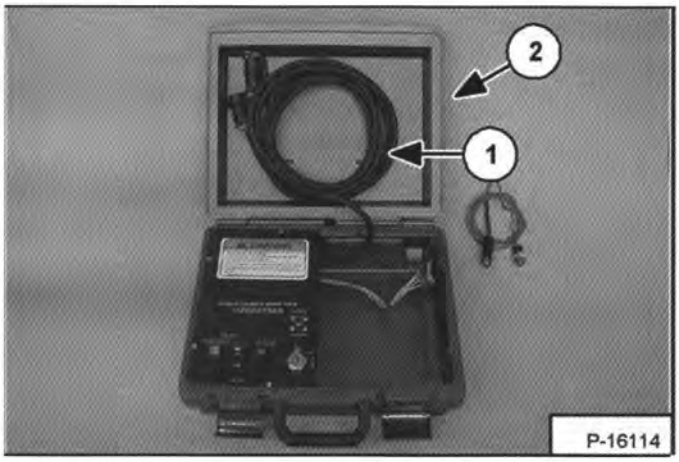
Figure 10-20-2



The traction lock switch (Item 1), maximum flow/variable flow switch (Item 2), and the auxiliary pressure release (Item 3) **[Figure 10-20-2]** is not used on the utility work machine.

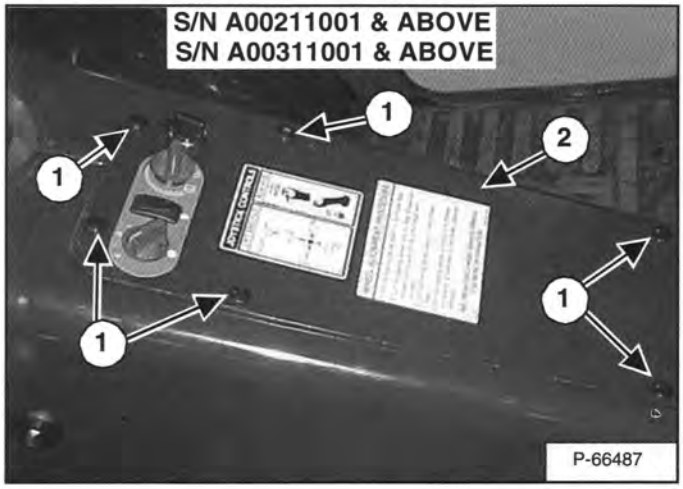
Service Tool Harness Control - MEL1565

Figure 10-20-3



The service tool harness control (Item 1) is used to connect the remote start tool (Item 2) **[Figure 10-20-3]** to the electrical system on the utility work machine.

Figure 10-20-4

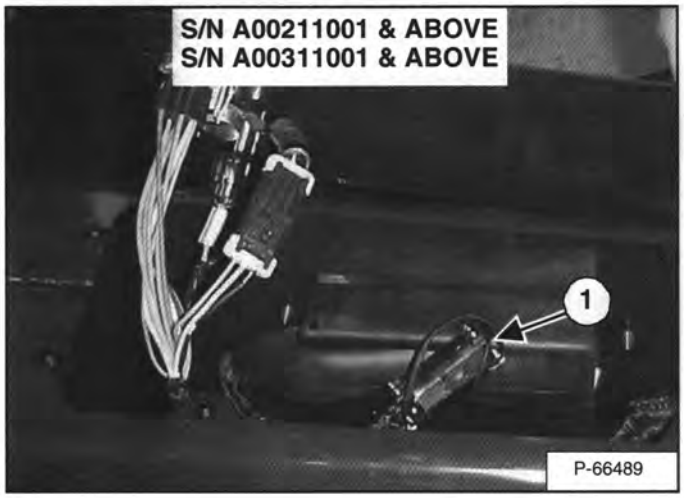


Remove the six screws (Item 1) securing the floor console access cover (Item 2) **[Figure 10-20-5]**.

NOTE: The connector is located below the floor console access cover (Item 2) [Figure 10-20-5].

Service Tool Harness Control - MEL1565 (Cont'd)

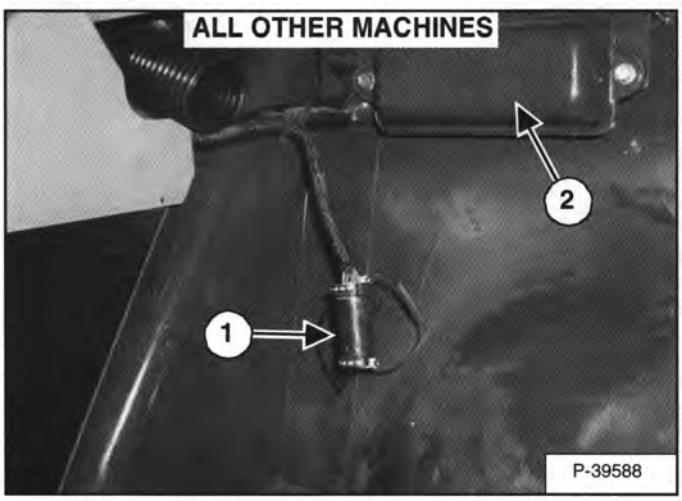
Figure 10-20-5



Lift the access cover and remove the plug (Item 1) **[Figure 10-20-5]** from the utility work machine harness connector.

Connect the service tool harness control to the utility work machine harness connector.

Figure 10-20-6



Remove the plug (Item 1) **[Figure 10-20-6]** from the utility work machine harness connector.

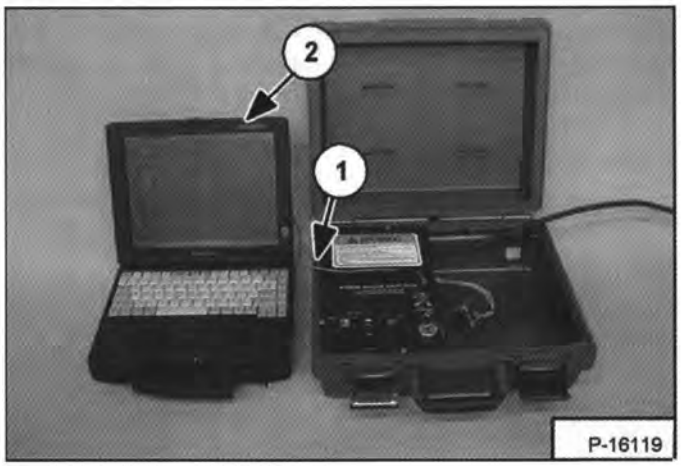
NOTE: The connector is located inside the cab on the passenger side near the fuse panel (Item 2) [Figure 10-20-6].

Connect the service tool harness control to the utility work machine harness connector.

Service Tool Harness Communicator - MEL1566

NOTE: To monitor, diagnose or load new software the Service PC must be connected to the Remote Start Tool Switch.

Figure 10-20-7



The service tool harness communicator (Item 1) is required to connect remote start tool to the Service PC (Item 2) **[Figure 10-20-7]**.

SERVICE PC (LAPTOP COMPUTER)

Minimum Requirements

Figure 10-30-1

To service the utility work machine electronics, Bobcat Company recommends that your dealership designate a portable computer as the "Service PC" **[Figure 10-30-1]**. Although a Desktop computer on a mobile cart is adequate a Laptop will be much more durable and convenient in a service environment. Your Service PC should meet the following minimum requirements to operate the Service Software and to allow for future upgrades and features.

Windows 95® operating system
Pentium® processor
32 MB of Memory
4GB of Hard Drive
24X CD-ROM

Installing Service Software

Figure 10-30-2

Download the Service Software from the BobcatNet **www.bobcatnet.com** to your laptop computer **[Figure 10-30-2]**. Download version 20 or higher for utility work machine, follow on screen instructions.

SERVICE PC (LAPTOP COMPUTER) (CONT'D)

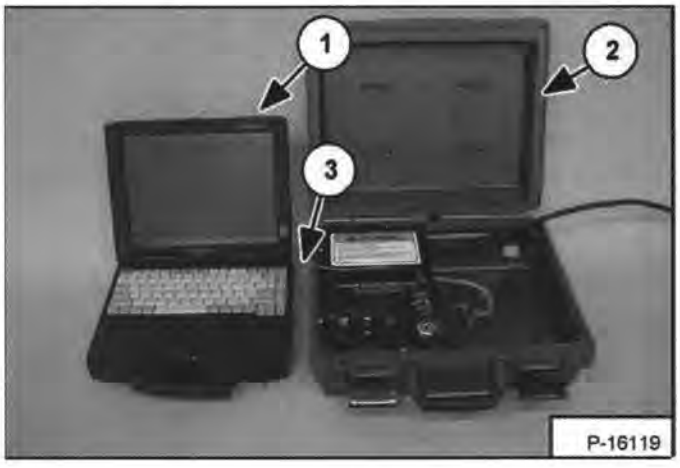
Connecting The Service PC

Tools that will be needed to complete the following steps are:

MEL1563 - Remote Start Tool
MEL1565 - Service Tool Harness Control
MEL1566 - Service Tool Harness Communicator (Computer Interface)

NOTE: Make all connections with the key in the OFF position.

Figure 10-30-3



The Service PC (Item 1) **[Figure 10-30-3]** with the remote start tool (Item 2) **[Figure 10-30-3]**. When connected to the utility work machine, the Service PC is used to monitor, conduct diagnostic and load software.

Connect the Service Tool Harness Communicator (MEL1566) (Item 3) **[Figure 10-30-3]** to the designated serial port on the Service PC.

NOTE: The recommended serial cable length should not exceed 15 feet. A serial cable longer than 15 feet will create a degraded signal causing communication errors.

Connect the other end to the connector on the remote start tool.

Connect the remote start tool to the utility work machine. (See REMOTE START TOOL KIT-MEL1563 on Page 10-20-1.)

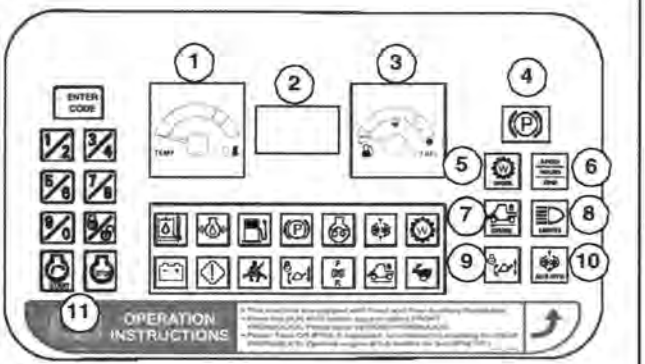
GENERAL INFORMATION

Display Controller Panel

The table below shows the DESCRIPTION and FUNCTION / OPERATION for each of the components of the display controller panel.

Press and hold LIGHTS Button (Item 8) for two seconds to view SERVICE CODES in the HOURMETER/CODE DISPLAY (Item 2) **[Figure 20-10-1]**. If more than one SERVICE CODE is present, the codes will scroll on the HOURMETER/CODE DISPLAY.

Figure 20-10-1

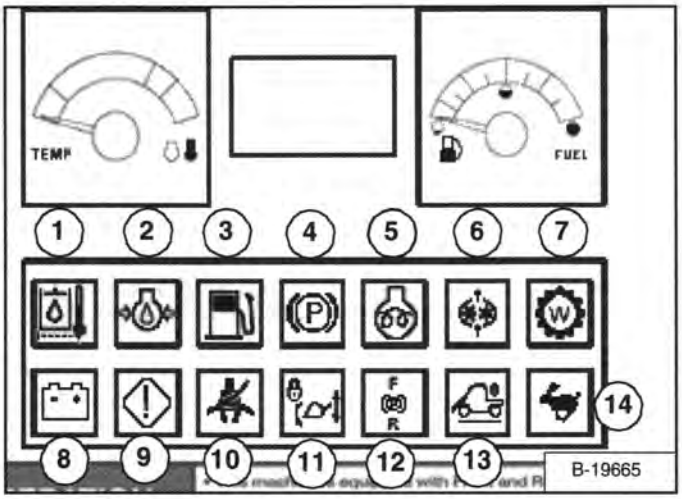


REF	DESCRIPTION	FUNCTION / OPERATION
1	Engine Temperature Gauge	Shows engine coolant temperature.
2	LCD (Liquid Crystal Display)	Speedometer/Hourmeter/Job/RPM & Diagnostic Codes
3	Fuel Gauge	Shows amount of fuel in the tank.
4	Parking Brake	Press to engage; press again to disengage.
5	Work / Drive Mode	Press button to engage WORK Mode. Press again to disengage.
6	SPEED / HOURS / RPM	Press button to toggle LCD for Speed (MPH or km/hr), Hours, Job Clock, Engine RPM. While screen is showing SPEED, press and hold to change units of measure (English / Metric).
	Additional Menu Functions	(Key OFF/Engine Stopped) Toggle the button until RPM is in the LCD. Press and hold the button for three seconds to get to additional menu functions. Keyless Start machines will show **CODES** in LCD - enter the master password using the keypad (Item 11). To scroll between options, press the SPEED / HOURS / RPM button.
6	SPEED / HOURS / RPM (Cont'd)	
	- Two-Speed (Option)	- If 2-Speed is installed, LCD will show 2-SPd or 1-SPd. Press the WORK button to toggle between enabled or disabled. When 2-SPd is displayed, the 2-Speed option will be enabled. Continue with additional changes or press and hold SPEED / HOURS / RPM button (Item 6) until **donE** appears on LCD to save and exit.
	- Axle- Matching *(When enabled, will detect when one axle is turning and the other is not; and will stop the turning axle and transfer power to the other axle.)*	- For axle-matching the LCD will show **0 - - - 0** (enabled) or **0 0** (disabled). Press the WORK button to toggle between enabled or disabled. When **0 - - - 0** is displayed, that selection is active. Continue with additional changes or press and hold SPEED / HOURS / RPM button (Item 6) until **donE** appears on LCD to save and exit.
	- High Flow (Option)	- If High-Flow is installed, the LCD will show **H FLO** or **L FLO**. Press the WORK button to toggle between enabled or disabled. When **H FLO** is displayed, that selection is enabled. To save selections, press and hold SPEED / HOURS / RPM button until **donE** is on LCD. To exit without saving, turn the key to RUN **or** wait 30 seconds without pressing any buttons.
7	Cruise Control	While traveling at the desired speed, press the button to continue traveling at that speed.
8	LIGHTS / Codes	Press & release to turn lights ON; press & release again to turn OFF. Press and hold for two seconds to reveal CODES in LCD.
9	Lift And Tilt Transport Lock	Press to lock lift and tilt functions when transporting.
10	Front Auxiliary Hydraulics (Std.)	-Press once to select Front Auxiliary Hydraulics. (Must be selected for Hi Flow to operate.) -Press a second time to deselect front auxiliary hydraulics.
	Rear Auxiliary Hydraulics (Option)	-Press two times to select Rear Auxiliary Hydraulics. After several seconds, the word **rEAr** will remain on the display. -Press a third time to deselect all auxiliary hydraulics.
11	Keypad for Keyless Start (Option)	Used in place of the key, to start the engine.

Display Controller Panel (Cont'd)

The table below shows the Icons and other components of the display controller panel.

Figure 20-10-2



REF NO	INDICATOR ICONS
	. . . when Indicator Icon Is Lighted
1	Plugged Hydraulic Filter or High Hydraulic Temperature
2	Low Engine Oil Pressure
3	Low Fuel Level
4	Parking Brake Engaged
5	Glow Plugs Activated
6	Auxiliary Hydraulics Engaged
7	Work Mode Engaged
8	Low Battery Voltage
9	General Warning (See DIAGNOSTIC SERVICE CODES on Page 30-10-1.)
10	Fasten Seat Belt Reminder
11	Lift Arm and Tilt Functions Deactivated
12	Return to PARK reminder (Must be in PARK to start engine.)
13	Cruise Control Engaged
14	High Speed Engaged

Note: If the return to PARK reminder is flashing and the Travel Direction Control Lever is in park, check the switched power circuit for 12 volts.

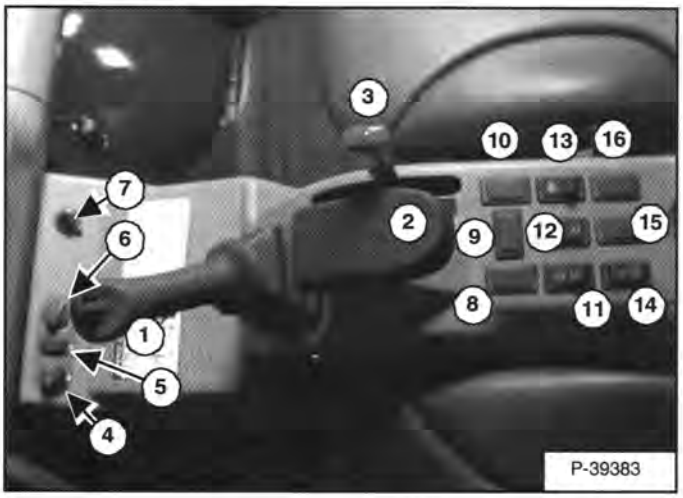
Switch Panel

Figure 20-10-3

REF NO	DESCRIPTION	FUNCTION / OPERATION
1	Not Used	- - -
2	Front Wiper / Washer	Press right side to turn ON; left to turn OFF. Press & Hold right side for washer.
3	Rotating Beacon Or Strobe Light (Option)	Press right side to turn ON; left to turn OFF.
4	Light Selection Switch (Option)	Left Position - headlights Center Position - front flood lights Right Position - front and rear flood lights
5	Not Used	- - -
6	Rear Wiper / Washer (Option)	Press right side to turn ON; left to turn OFF. Press & Hold for washer.
7	Hazard / Flasher Lights (Option)	Press right side to turn ON; left to turn OFF.
8	Direction Signal Indicators	Press left side for left signal; right for right signal.
9	Key Switch	For starting and stopping engine.

Center Console

Figure 20-10-4

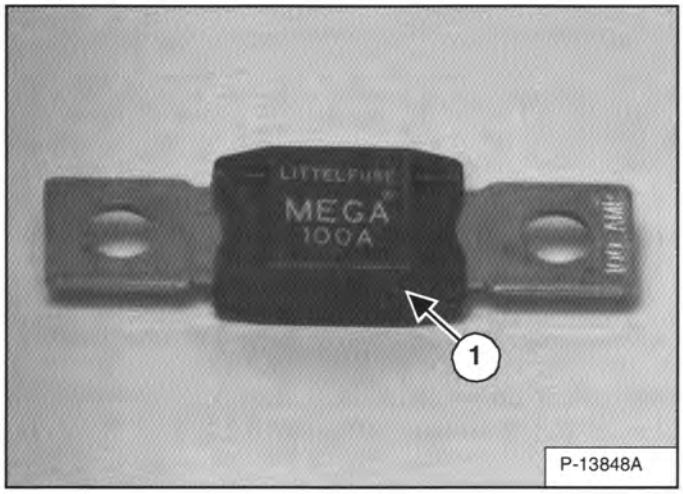


REF NO	DESCRIPTION	FUNCTION / OPERATION
1	Joystick	Lift Arm, Tilt & Auxiliary Hydraulic operation
2	Arm Rest	- - -
3	Engine Speed Control	Move forward to increase engine RPM; backward to decrease.
4	HVAC Fan	Turn clockwise to increase speed
5	Air Conditioner	Press top of switch to start; bottom to stop. Fan Motor (Item 4) must be On for A/C to operate.
6	Temperature Control	Turn clockwise to increase the cab temperature; counterclockwise to decrease.
7	Power Plug	Provides a 12 V receptacle for accessories.
8 9 10	Auxiliary Hydraulic Function (option)	See Attachment Operation & Maintenance Manual(s) for more information.
11	Steering Mode	Press front of switch to select Front Wheel Steer; rear to select All Wheel Steer (See Operation & Maintenance Manual for more information).
12	Wheel Alignment Indicator	Shows when wheels are aligned straight ahead
13	Rear Differential Lock	Must be stopped, in front wheel steer, and then press and hold the switch down.
14	Cargo Box Dump	Press rear of switch to dump; front to lower Cargo Box.
15	High Flow Auxiliary Hydraulics (Option)	Press and release front of switch to engage; back to disengage
16	Not Used	- - -

ELECTRICAL SYSTEM INFORMATION (S/N A00211001 & ABOVE AND S/N A00311001 & ABOVE)

Description

Figure 20-20-1



The loader has a 12 volt, negative ground alternator charging system. The electrical system is protected by a 100 amp master fuse (Item 1) **[Figure 20-20-1]** & **[Figure 20-20-3]** and other fuses and relays. The fuses will protect the electrical when there is an electrical overload which could lead to burned up harness or machine damage. The reason for the overload must be found and corrected before starting the engine again.

Figure 20-20-2

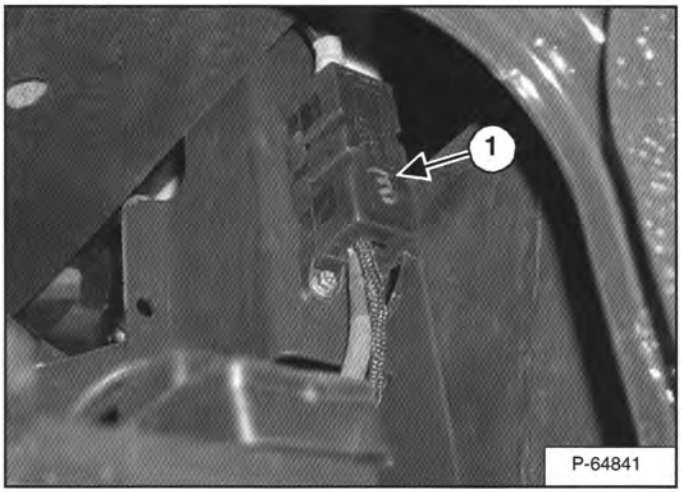
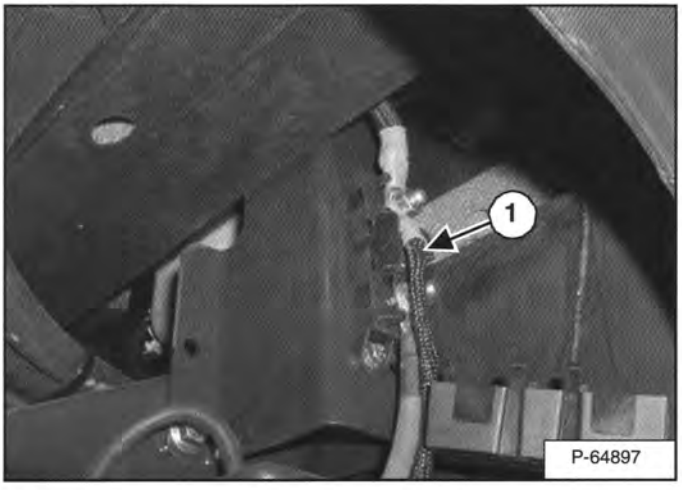


Figure 20-20-3

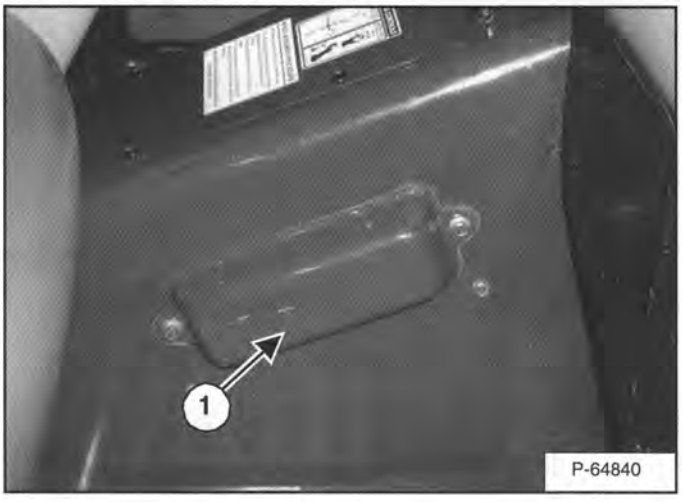


The fuse holder (Item 1) **[Figure 20-20-2]** & **[Figure 20-20-3]** is located in the battery compartment, above the battery.

ELECTRICAL SYSTEM INFORMATION (S/N A00211001 & ABOVE AND S/N A00311001 & ABOVE) (CONT'D)

Fuse Location

Figure 20-20-4



The electrical system is also protected by fuses and relays (Item 1) **[Figure 20-20-4]** on the passenger side of the floor console.

IMPORTANT

Do Not use silicone base sprays and/or sealants on harness connectors or components.

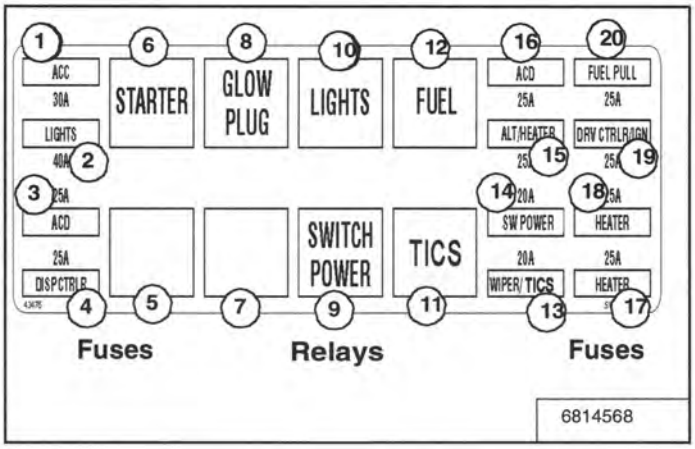
I-2123-0397

Figure 20-20-5

Remove the cover to check or replace the fuses.

The location and sizes are shown in **[Figure 20-20-5]** & **[Figure 20-20-6]**.

Figure 20-20-6



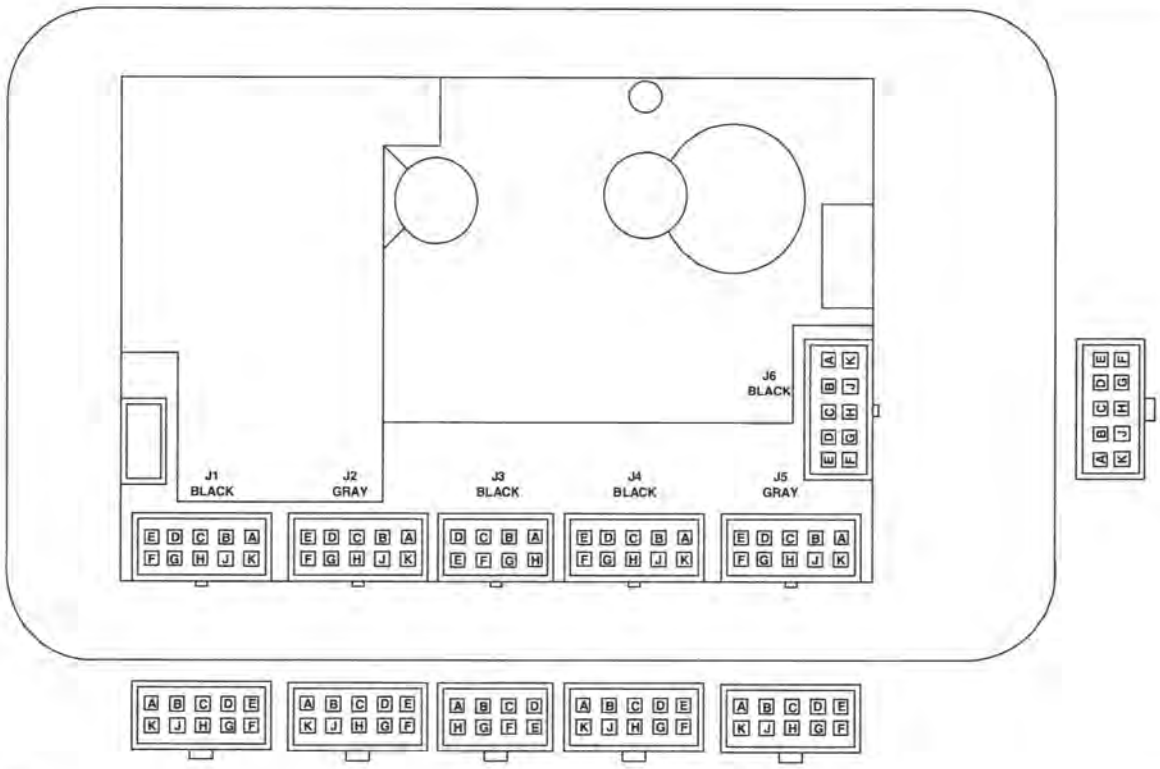
This is the decal inside the fuse panel cover which shows location and size of fuses **[Figure 20-20-6]**.

Description and amp ratings (or relays) are also shown below.

REF	DESCRIPTION	AMP	REF	DESCRIPTION	AMP
1	Accessories	30	11	TICS	R
2	Lights	40	12	Fuel Shut Off	R
3	Attachment Control Device (ACD)	25	13	Wiper / TICS	20
4	Display Controller	25	14	Switched Power	20
5	Not Used	R	15	Alternator / Heater	25
6	Starter	R	16	Attachment Control Device (ACD)	25
7	Not Used	R	17	Heater	25
8	Glow Plugs	R	18	Heater	25
9	Switched Power	R	19	Drive Controller / Ignition	25
10	Lights	R	20	Fuel Shut Off	25

DISPLAY CONTROLLER

Identification Chart (S/N 520511001 & Above)



J1

PIN #	WIRE #
A	9380
B	8150
C	6210
D	2900
E	1110
F	1120
G	2910
H	8510
J	8110
K	8000

J2

PIN #	WIRE #
A	4330
B	4340
C	SPARE
D	3930
E	4610
F	SPARE
G	SPARE
H	4410
J	9320
K	SPARE

J3

PIN #	WIRE #
A	3100
B	3200
C	3300
D	3900
E	SPARE
F	SPARE
G	4300
H	4310

J4

PIN #	WIRE #
A	SPARE
B	8550
C	8120
D	8250
E	9330
F	3430
G	3500
H	4760
J	9340
K	3600

J5

PIN #	WIRE #
A	9620
B	9520
C	4710
D	4700
E	4840
F	4320
G	4920
H	4720
J	4730
K	9720

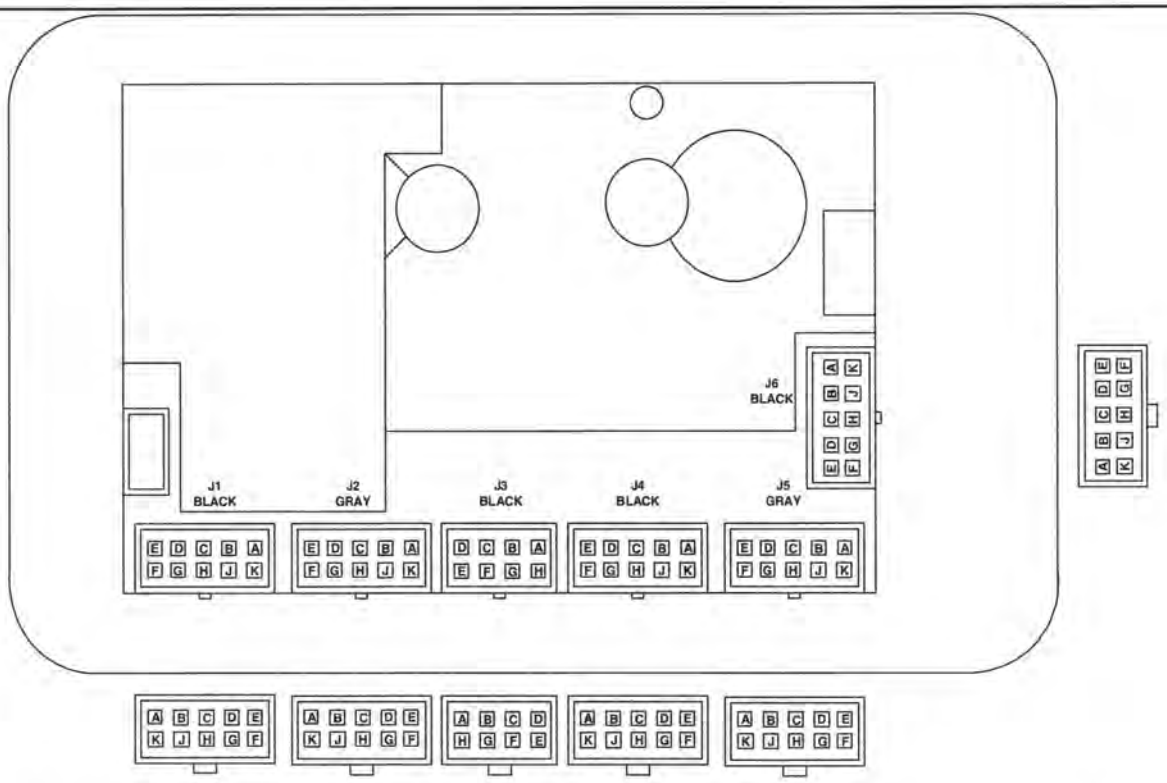
J6

PIN #	WIRE #
A	SPARE
B	9800
C	4750
D	SPARE
E	SPARE
F	SPARE
G	SPARE
H	SPARE
G	SPARE
H	SPARE

V-0235

DISPLAY CONTROLLER (CONT'D)

Identification Chart (S/N A00211001 & Above, A00311001 & Above, 424711001 & Above and 424811001 & Above)



J1

PIN #	WIRE #
A	9380
B	8150
C	6210
D	2900
E	1110
F	1120
G	2910
H	8510
J	8110
K	8000

J2

PIN #	WIRE #
A	4330
B	4340
C	SPARE
D	3930
E	4580
F	4210
G	SPARE
H	4410
J	9320
K	4230

J3

PIN #	WIRE #
A	3100
B	3200
C	3300
D	3900
E	SPARE
F	SPARE
G	4300
H	4310

J4

PIN #	WIRE #
A	SPARE
B	8550
C	8120
D	8250
E	9330
F	3430
G	3500
H	4760
J	9340
K	3600

J5

PIN #	WIRE #
A	9620
B	9520
C	4710
D	4700
E	4840
F	4320
G	4920
H	4720
J	4730
K	9720

J6

PIN #	WIRE #
A	SPARE
B	9800
C	4750
D	SPARE
E	SPARE
F	SPARE
G	SPARE
H	SPARE
G	SPARE
H	SPARE

V-0235

Display Controller Panel Removal And Installation

Figure 20-30-1

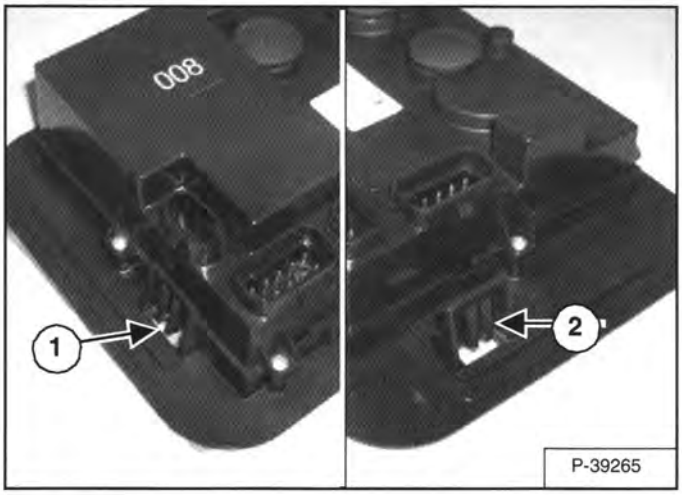
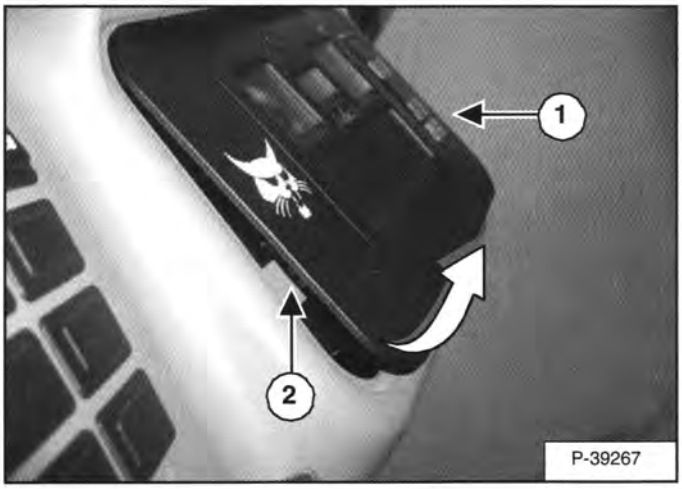
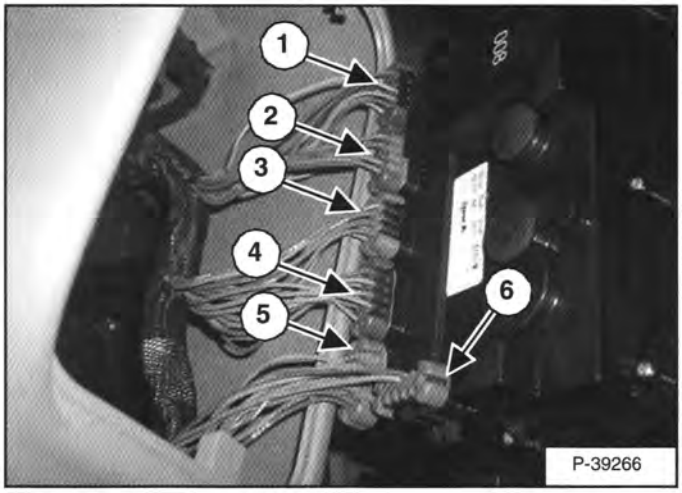


Figure 20-30-2



Push in the right hand side tab (Item 1) **[Figure 20-30-1]** & **[Figure 20-30-2]** and the left hand side tab (Item 2) **[Figure 20-30-1]** & **[Figure 20-30-2]** on the display controller by reaching behind the control panel from the bottom. Push the bottom of the display controller out as shown in **[Figure 20-30-2]**.

Figure 20-30-3



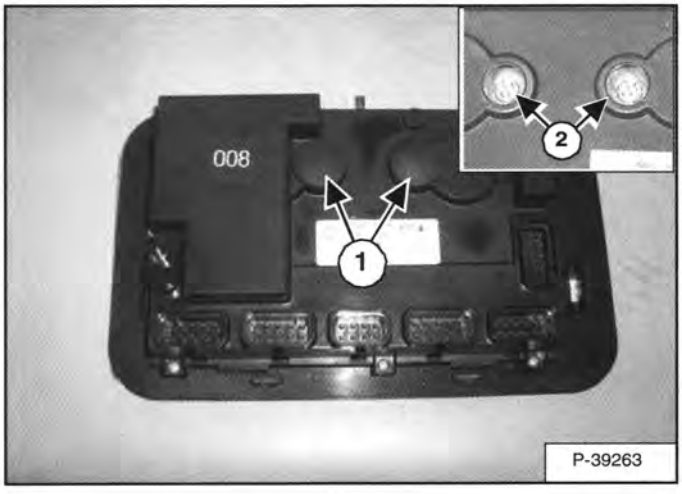
Disconnect the J1 connector (Item 1), J2 connector (Item 2), J3 connector (Item 3), J4 connector (Item 4), J5 connector (Item 5), and J6 connector (Item 6) **[Figure 20-30-3]** from the display controller.

Remove the controller.

Reverse the procedure to install the display controller.

Light Bulb Removal And Installation

Figure 20-30-4



Remove the two light bulb covers (Item 1) **[Figure 20-30-4]** from the back of the instrument panel.

With a flat blade screw driver, turn the light bulb counterclockwise (Item 2) **[Figure 20-30-4]** and remove the bulbs from the panel.

DIAGNOSTICS

Continued On Next Page

DIAGNOSTICS (CONT'D)

Continued On Next Page

DIAGNOSTICS (CONT'D)

IMPORTANT NOTE

The following troubleshooting procedures are intended for active codes only - those displayed on the hourmeter.

If a code is active (displayed) and the operator turns the key OFF, then back ON and the code does not reappear - "NONE" displayed, we no longer have an active code. This is referred to as an intermittent fault.

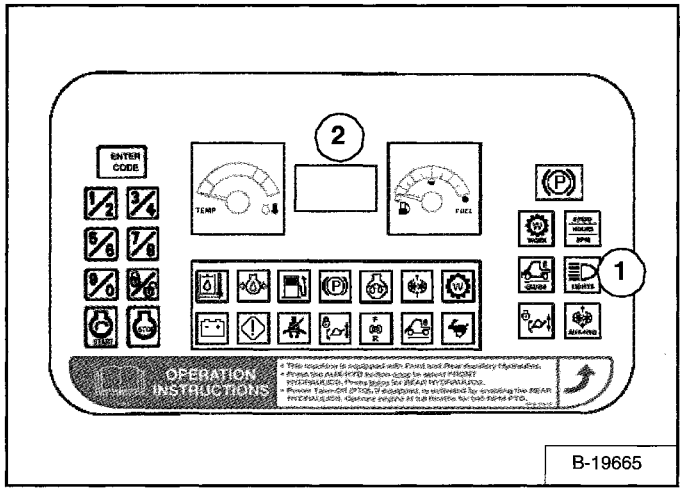
In this situation the following troubleshooting procedures may be inaccurate.

The troubleshooting procedures can be followed on the intermittent codes, but the harness and the connectors should be inspected carefully and moved back and forth during voltage and continuity tests. It is not recommended to replace the controller if the code is not active (intermittent) and no other causes for the code are found. Replacing the controller for active and intermittent codes is a last effort in the troubleshooting procedure only, when no other problem can be found.

DIAGNOSTIC SERVICE CODES

Display

Figure 30-10-1



Turn the key on (Key Switch) or press ENTER CODE (Keyless). Press and hold LIGHTS Button (Item 1) on the instrument panel for two seconds to view SERVICE CODES in the HOURMETER/CODE DISPLAY (Item 2) **[Figure 30-10-1]**. If more than one SERVICE CODE is present, the codes will scroll on the HOURMETER/ CODE DISPLAY.

Multiple SERVICE CODES and/or Abnormal Symptoms can be caused by corroded or loose ground connection. Flashing instrument panel lights, alarm beeping, front & rear lights flashing, low battery voltage, loose battery connectors, could also indicate a poor ground. Check all grounds before performing other diagnostics.

The following is a list of the SERVICE CODES. These CODES help analyze monitored functions of the Bobcat loader. Some service procedures must be performed ONLY BY QUALIFIED BOBCAT SERVICE PERSONNEL.

The Prefix, the first two numbers, followed by one or more Suffix, the last two numbers, will indicate a Function and the type of error or errors that have occurred.

DIAGNOSTIC SERVICE CODES (CONT'D)

Service Codes List

CODE		CODE	
02-16	Hydraulic charge filter not connected	21-02	Glow plug error ON
02-17	Hydraulic charge filter plugged	21-03	Glow plug error OFF
03-09	Battery voltage low	22-02	Starter error ON
03-10	Battery voltage high	22-03	Starter error OFF
03-11	Battery voltage extremely high		
03-14	Battery voltage extremely low	26-02	Front base solenoid error ON
03-22	Battery voltage out of range low	26-03	Front base solenoid error OFF
04-09	Engine oil pressure low	27-02	Front rod solenoid error ON
04-14	Engine oil pressure extremely low	27-03	Front rod solenoid error OFF
04-15	Engine oil pressure shutdown level		
		29-02	High flow solenoid error ON
06-10	Engine speed high	29-03	High flow solenoid error OFF
06-11	Engine speed extremely high		
06-13	Engine speed no signal	31-28	Interrupted power failure
06-15	Engine speed shutdown level		
06-18	Engine speed out of range	33-23	Main Controller (Bobcat Controller) not programmed
07-10	Hydraulic oil temperature high	35-05	Two Speed Fan Short to Battery
07-11	Hydraulic oil temperature extremely high	35-06	Two Speed Fan Short to Ground
07-15	Hydraulic oil temperature shutdown level		
07-21	Hydraulic oil temperature out of range high	36-48	ACD multiple controllers present
07-22	Hydraulic oil temperature out of range low		
		50-01	Travel Pedal High
08-10	Engine coolant temperature high	50-02	Travel Pedal Low
08-11	Engine coolant temperature extremely high	50-03	Travel Pedal Not Calibrated
08-15	Engine coolant temperature shutdown level	50-04	Brake Pedal High
08-21	Engine coolant temperature out of range high	50-05	Brake Pedal Low
08-22	Engine coolant temperature out of range low	50-06	Brake Pedal Not Calibrated
		50-07	FPR Switch No Signal
09-09	Fuel level low	50-08	FPR Switch Multiple Inputs
09-21	Fuel level out of range high	50-09	Front Wheel Speed Sensor High
09-22	Fuel level out of range low	50-10	Front Wheel Speed Sensor Low
		50-11	Rear Wheel Speed Sensor High
12-21	Front auxiliary PWM switch out of range high	50-12	Rear Wheel Speed Sensor Low
12-22	Front auxiliary PWM switch out of range low	50-13	Front Wheel Speed Sensor No Signal
12-23	Front auxiliary PWM switch not in neutral	50-14	Rear Wheel Speed Sensor No Signal
		50-24	Battery Voltage Over voltage
13-05	Fuel shut-off hold solenoid short to battery	50-25	Battery Voltage Under voltage
13-06	Fuel shot-off hold solenoid short to ground	50-27	Sensor Supply 1 High
13-07	Fuel shut-off solenoid open circuit	50-28	Sensor Supply 1 Low
14-02	Fuel shut-off pull solenoid error ON		
14-03	Fuel shut-off pull solenoid error OFF		

Service Codes List (Cont'd)

CODE		CODE	
50-29	Sensor Supply 2 High	65-05	Work Group Lockout Short To Battery
50-30	Sensor Supply 2 Low	65-06	Work Group Lockout Short to Ground
50-31	Front PWM Error ON	65-07	Work Group Lockout Open Circuit
50-33	Front PWM Error OFF		
50-34	Forward PWM Not Calibrated	69-05	TICS™ Relay Short to Battery
50-35	Front Forward Error ON	69-06	TICS™ Relay Short To Ground
50-36	Front Forward Error OFF	69-07	TICS™ Relay Open Circuit
50-37	Front Reverse Error ON		
50-38	Front Reverse Error OFF		
50-39	Rear PWM Error ON		
50-41	Rear PWM Error OFF		
50-42	Reverse PWM Not Calibrated		
50-43	Rear Forward Error ON		
50-44	Rear Forward Error OFF		
50-45	Rear Reverse Error ON		
50-46	Rear Reverse Error OFF		
50-47	Two Speed Error ON		
50-48	Two Speed Error OFF		
50-49	Brake Coil Error ON		
50-50	Brake Coil Error OFF		
50-51	Brake Coil No Signal		
50-52	Brake Light Error ON		
50-53	Brake Light Error OFF		
50-54	Differential Lock Error ON		
50-55	Differential Lock Error OFF		
50-56	CAN Comms Error		
50-57	Calibration Error		
50-58	Control Uncommanded Movement		
50-59	Front Wheel Speed Sensor Missing Pulses		
50-60	Rear Wheel Speed Sensor Missing Pulses		
50-61	Front Angle Sensor Low		
50-62	Front Angle Sensor High		
50-63	Front Angle Sensor Calibration Error		
50-64	Rear Angle Sensor Low		
50-65	Rear Angle Sensor High		
50-66	Rear Angle Sensor Calibration Error		
63-05	Console Switch Short To Battery		
63-06	Console Switch Short To Ground		
64-05	Accessory Relay Short to Battery		
64-06	Accessory Relay Short To Ground		
64-07	Accessory Relay Open Circuit		

Code 02-16

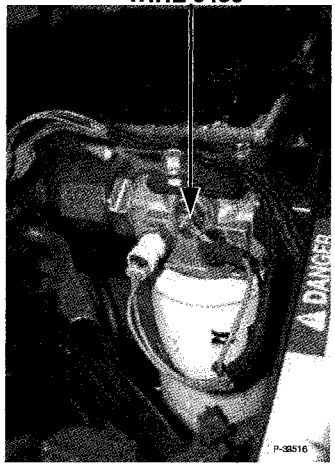
Code 02-16:
HYDRAULIC CHARGE FILTER NOT CONNECTED

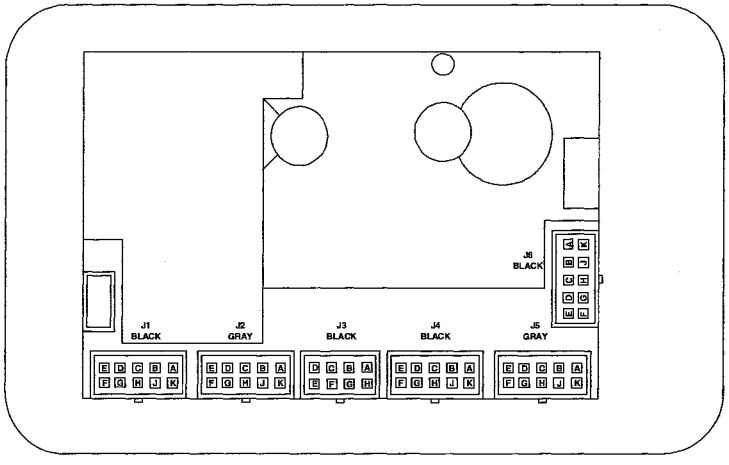
Refer to appropriate electrical schematics for circuit description.

Key OFF. Disconnect wire 3430 from hydraulic charge filter switch. Short the charge filter switch wire 3430 to ground, harness side. Turn key ON.

- Code clears. Replace hydraulic charge pressure switch.
- Code remains. Remove display controller, J4 connector. Check continuity between pin F, wire 3430 and ground, harness side.
  - No continuity. Disconnect connector C114. Check continuity between J4, pin F, wire 3430 and C144, pin 16, wire 3430.
    - Continuity. Repair or replace mainframe harness.
    - No continuity. Repair or replace cab harness.
  - Continuity. The circuit appears OK. Possible defective controller, replace display controller*.

HYDRAULIC FILTER SWITCH WIRE 3430

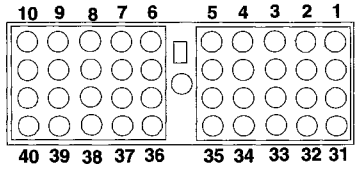




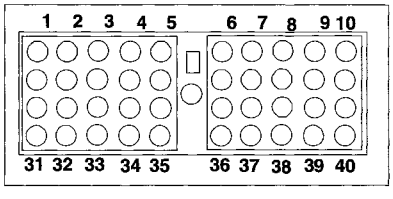
J4
HARNESS SIDE

C114

MAINFRAME HARNESS



CAB HARNESS



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 02-17

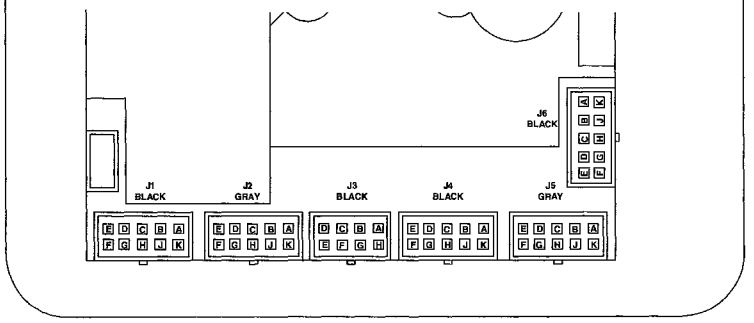
Code 02-17:
HYDRAULIC CHARGE FILTER PLUGGED

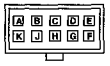
Refer to appropriate electrical schematics for circuit description.

Replace charge filter element. Start engine.

- Code clears. System is OK.
- Code remains. Stop engine. Disconnect hydraulic filter pressure switch wire 3430 from switch. Short wire 3430 to ground. Start engine
  - Code clears. Replace charge pressure switch.
  - Code remains. Disconnect display controller, J4 connector. Check continuity between pin F, wire 3430 and ground, harness side.
    - No continuity. Disconnect connector C114. Check continuity between J4, pin F, wire 3430 and C114, pin 16, wire 3430
      - No continuity. Repair or replace mainframe harness.
      - Continuity. Repair or replace cab harness.
    - Continuity. The circuit appears OK. Possible defective controller, replace display controller*.

HYDRAULIC FILTER SWITCH
WIRE 3430

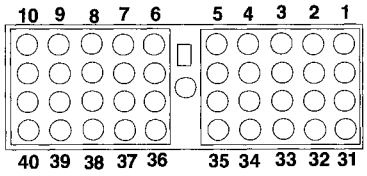




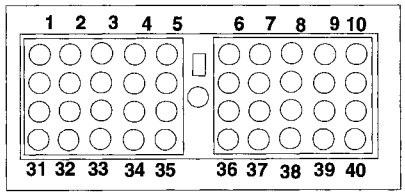
J4
HARNESS SIDE

C114

MAINFRAME HARNESS



CAB HARNESS

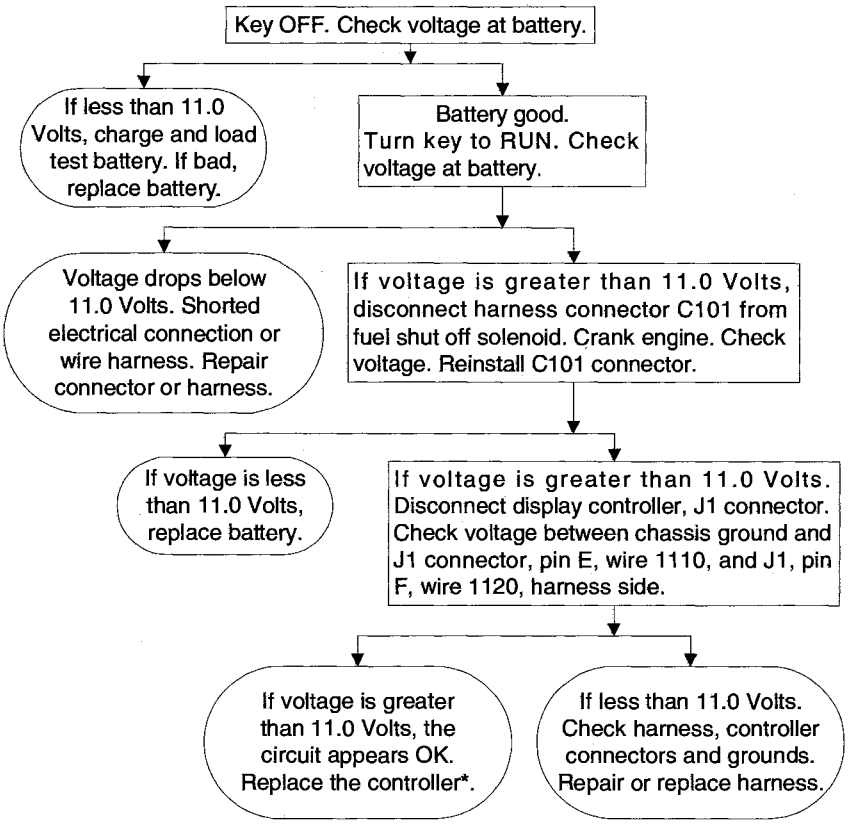


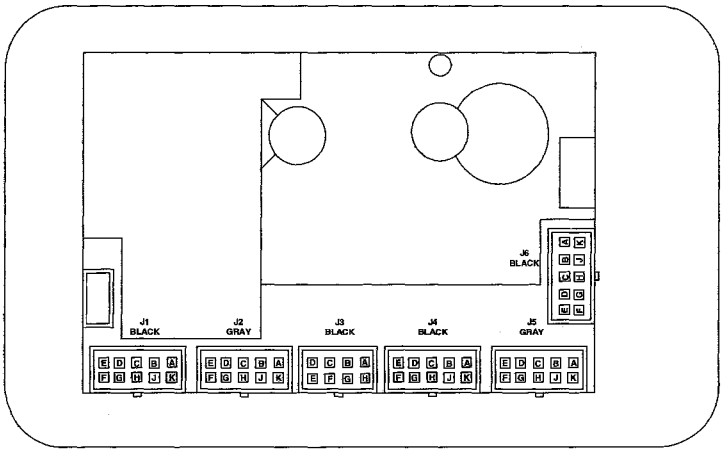
*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

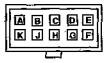
Code 03-09

Code 03-09:
BATTERY VOLTAGE LOW

Refer to appropriate electrical schematics for circuit description.





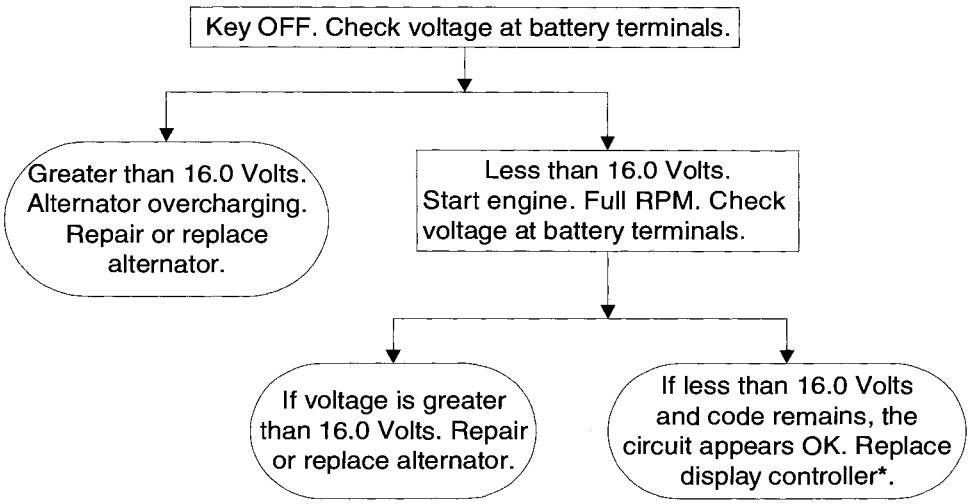


J1
HARNESS SIDE

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 03-10:
BATTERY VOLTAGE HIGH

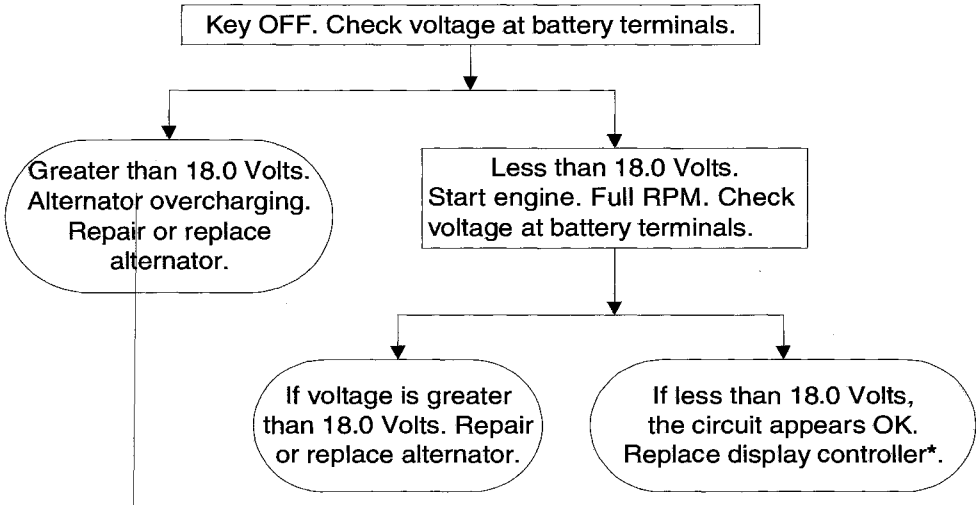
Refer to appropriate electrical schematics for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 03-11:
BATTERY VOLTAGE EXTREMELY HIGH

Refer to appropriate electrical schematics for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 03-14

Code 03-14:
BATTERY VOLTAGE EXTREMELY LOW

Refer to appropriate electrical schematics for circuit description.

Key OFF. Clean and tighten battery connections. Check voltage at battery terminals. If less than 10.0 Volts, charge battery and load test battery.

If load test indicates battery is bad, replace battery.

If battery is good. Turn key to RUN position. Check voltage at battery.

Voltage remains greater than 10.0 volts. Verify that the code has cleared.

Code clears. System is OK.

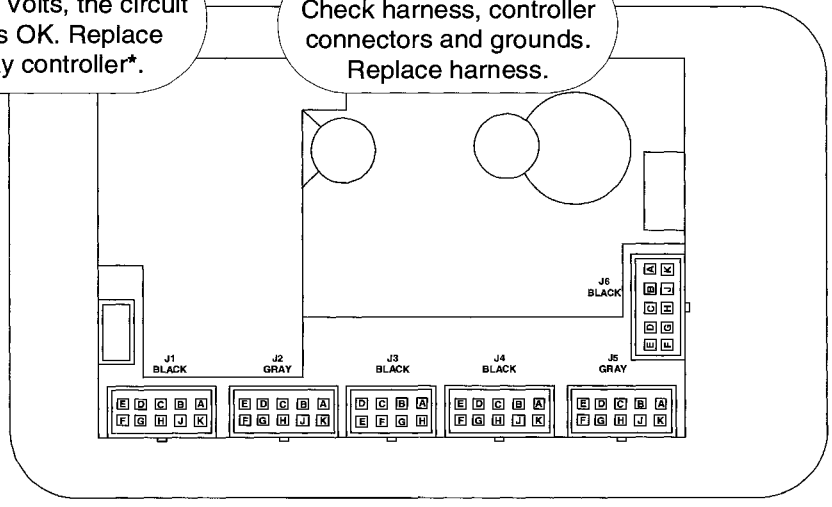
Code remains. Disconnect Fuel Shut Off Solenoid connector C101. Crank engine. Check voltage. If voltage is greater than 10.0 Volts, disconnect display controller, J1 connector. Check voltage between chassis ground and J1, pin E, wire 1110 and J1, pin F, wire 1130, harness side.

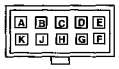
Voltage drops below 10.0 Volts.

Shorted electrical connector or harness. Repair connector or harness.

If voltage is greater than 10.0 Volts, the circuit appears OK. Replace display controller*.

If less than 10.0 Volts. Check harness, controller connectors and grounds. Replace harness.





J1
HARNESS SIDE

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 03-15:
BATTERY VOLTAGE IN SHUTDOWN

Code 03-11 **"Battery Voltage Extremely High"** or Code 03-14 **"Battery Voltage Extremely Low"** will be displayed prior to Code 03-15.

Voltage either is greater than 18.0 Volts or less than 10.0 Volts for ten seconds. If you are unsure which code was displayed prior to shut down, try restarting the machine and observing the code or connect the service tool and check the stored codes. Refer to the troubleshooting charts and then troubleshoot active Code 03-14.

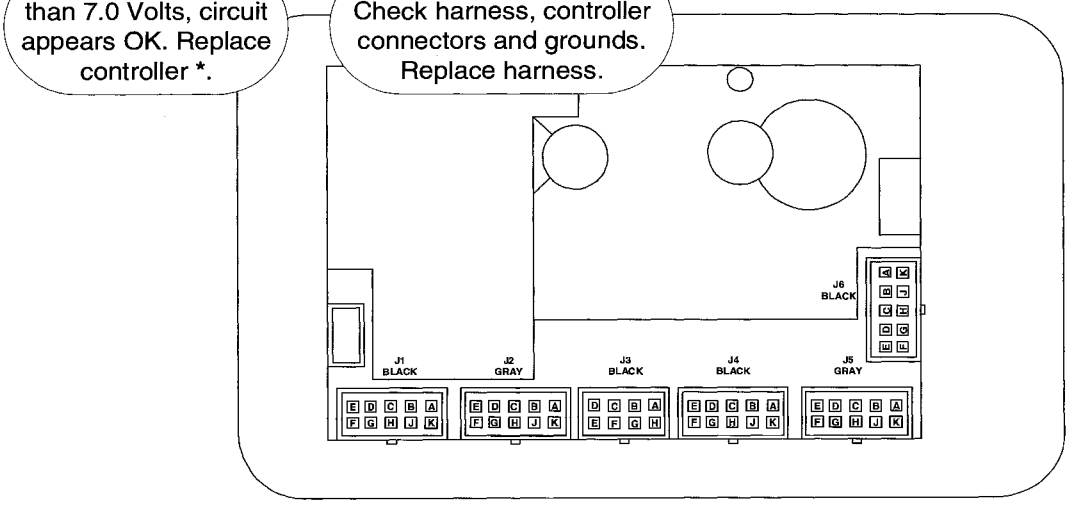
Code 03-22

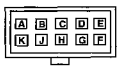
Code 03-22:
BATTERY VOLTAGE OUT OF RANGE LOW

Refer to appropriate electrical schematics for circuit description.

Key OFF. Clean and tighten battery connections. Check voltage at battery terminals. If voltage is between 6.0 and 11.0 Volts, charge battery and load test battery.

- If load test indicates battery is bad, replace battery.
- If battery is good. Turn key to RUN position. Recheck voltage at battery.
  - Voltage remains greater than 12.0 volts. Verify that the code has cleared.
    - Code clears. System is OK.
    - Code remains. Disconnect Fuel Shutoff Solenoid connector C101. Check voltage while cranking engine.
      - Voltage is greater than 7.0 Volts. Disconnect display controller J1 connector. Check voltage between chassis ground and J1, pin E, wire 1110 and J1 pin F, wire 1120, harness side.
        - If voltage is greater than 7.0 Volts, circuit appears OK. Replace controller *.
        - If less than 7.0 Volts. Check harness, controller connectors and grounds. Replace harness.
      - If voltage is less than 7.0 Volts, check starter.
        - Repair or replace starter.
  - Key ON. Voltage drops below 6.0 Volts.
    - Shorted electrical connector or harness. Repair connector or harness.





J1
HARNESS SIDE

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 04-14

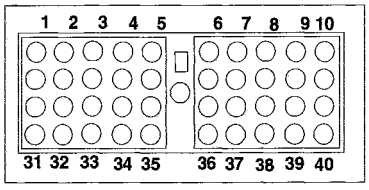
Code 04-14:
ENGINE OIL PRESSURE EXTREMELY LOW

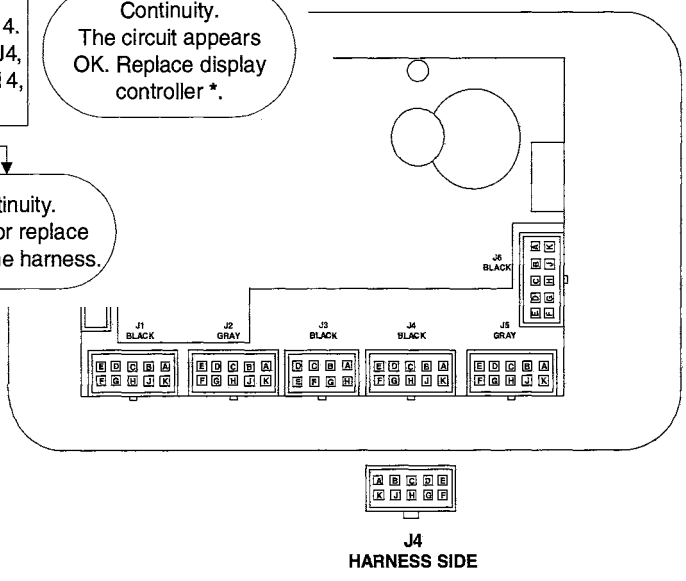
Refer to appropriate electrical schematics for circuit description.

Verify that the engine oil level is correct. If not, fill crankcase to the correct level. Start engine and check code status.

- Code clears. System is OK.
- Code remains. Disconnect wire 3500 from the engine oil pressure switch. Check for corrosion or a broken wire.
  - If wire is bad, repair or replace harness.
  - Wire is OK. Use jumper wire to short wire 3500 to ground. Start engine.
    - Code clears. Replace switch.
    - Code remains. Check engine oil pressure with a mechanical gauge. (See note for oil pressures.)
      - Low pressure, mechanical problem.
      - Oil pressure OK. Check harness for damage, check connectors for moisture, corrosion, pushed back pins, etc.
        - Harness or connector problem, repair or replace harness.
        - Harness appears OK. Remove and inspect display controller connector J4.
          - If moisture, corrosion or pushed back pins, repair or replace harness.
          - Connector J4 OK. Check continuity between J4, pin G, wire 3500 and the end of wire 3500 at the oil pressure switch.
            - Continuity. The circuit appears OK. Replace display controller *.
            - No continuity. Disconnect connector C114. Check continuity between J4, pin G, wire 3500 and C114, pin 17, wire 3500.
              - Continuity. Repair or replace mainframe harness.
              - No continuity, open. Repair or replace cab harness.

NOTE: Oil pressure.
700-1300 RPM: 9 PSI (62 kPa) or lower.
1400-1800 RPM: 13 PSI (90 kPa) or lower.
1800-2200 RPM: 17 PSI (117 kPa) or lower.
2200-5000 RPM 21 PSI (145 kPa) or lower.





*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 04-15

Code 04-15:
ENGINE OIL PRESSURE SHUTDOWN LEVEL

Refer to appropriate electrical schematics for circuit description.

Service code 04-14 "Engine Oil Pressure Extremely Low" will be displayed prior to shutdown.

Verify engine oil level is correct. If not, fill to correct level. Start engine and check code status.

Code clears. System is OK.

Code remains. Disconnect wire 3500 from the engine oil pressure switch. Check for corrosion or a broken wire.

Note : Oil Pressure.
700-1300 RPM : 9 PSI (62 kPa) or lower.
1400-1800 RPM : 13 PSI (90 kPa) or lower.
1800-2200 RPM : 17 psi (117 kPa) or lower.
2200-5000 RPM : 21 PSI (145 kPa) or lower.

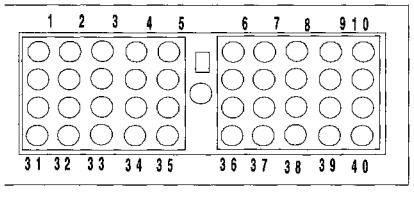
Wire bad. Repair or replace harness.

Wire OK. Use jumper wire to short wire 3500 to ground. Start engine.

Code clears. Replace switch.

Code remains. Remove the engine oil pressure sender and install a mechanical gauge. Start engine and check oil pressure.(See note for oil pressures.)

C114
CAB HARNESS



Oil pressure low. Refer to Toolcat Service Manual - Engine Section for repair procedure.

Oil pressure normal. Reinstall oil pressure switch. Inspect harness for damage, check connectors for moisture, corrosion, etc.

Harness appears OK. Remove display controller, J4 connector. Inspect J4 connector for corrosion, moisture or pushed back pins.

Harness or connector problem. Repair or replace harness.

J4 connector OK. Check continuity between J4, pin G, wire 3500 and harness wire 3500 at oil pressure switch.

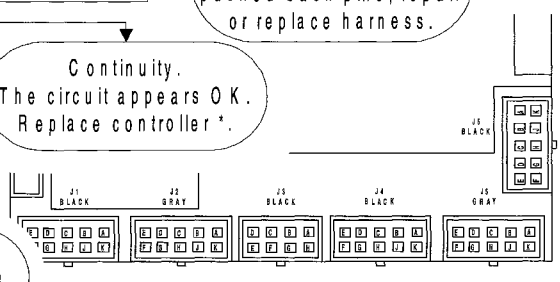
If connector has corrosion, moisture or pushed back pins, repair or replace harness.

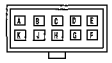
No continuity. Disconnect connector C114. Check continuity, J4, pin G, wire 3500 to C114, pin 17, wire 3500.

Continuity. The circuit appears OK. Replace controller *.

Continuity. Repair or replace mainframe harness.

No continuity. Repair or replace cab harness.



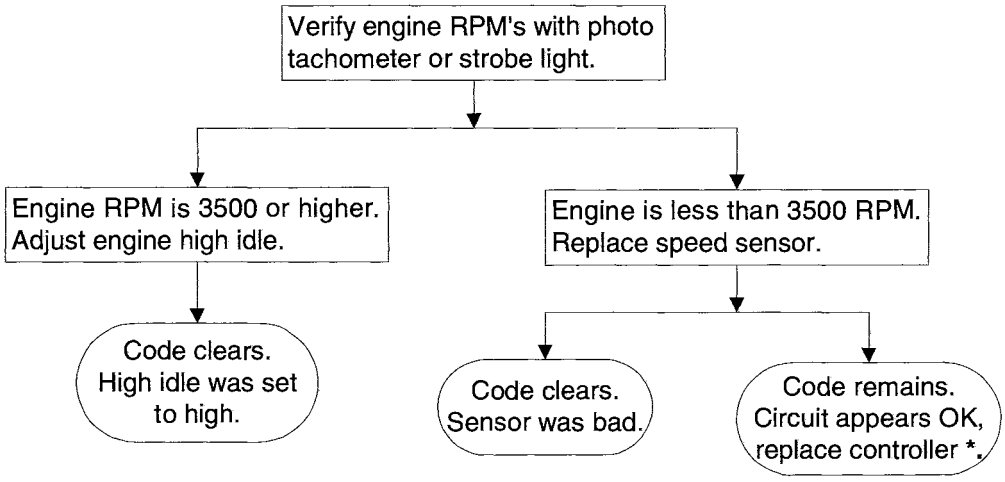


J4
HARNESS SIDE

* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.

Code 06-10:
ENGINE SPEED HIGH

Refer to appropriate electrical schematics for circuit description.

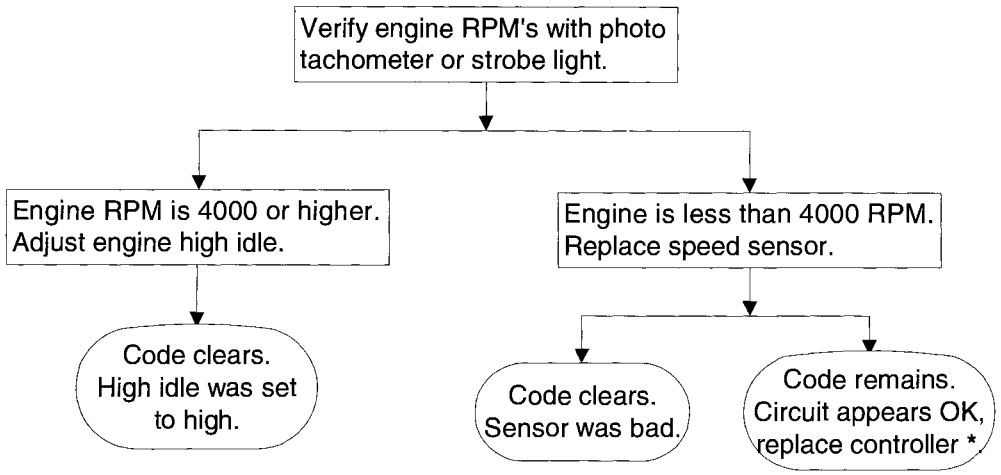


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 06-11

Code 06-11:
ENGINE SPEED EXTREMELY HIGH

Refer to appropriate electrical schematics for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

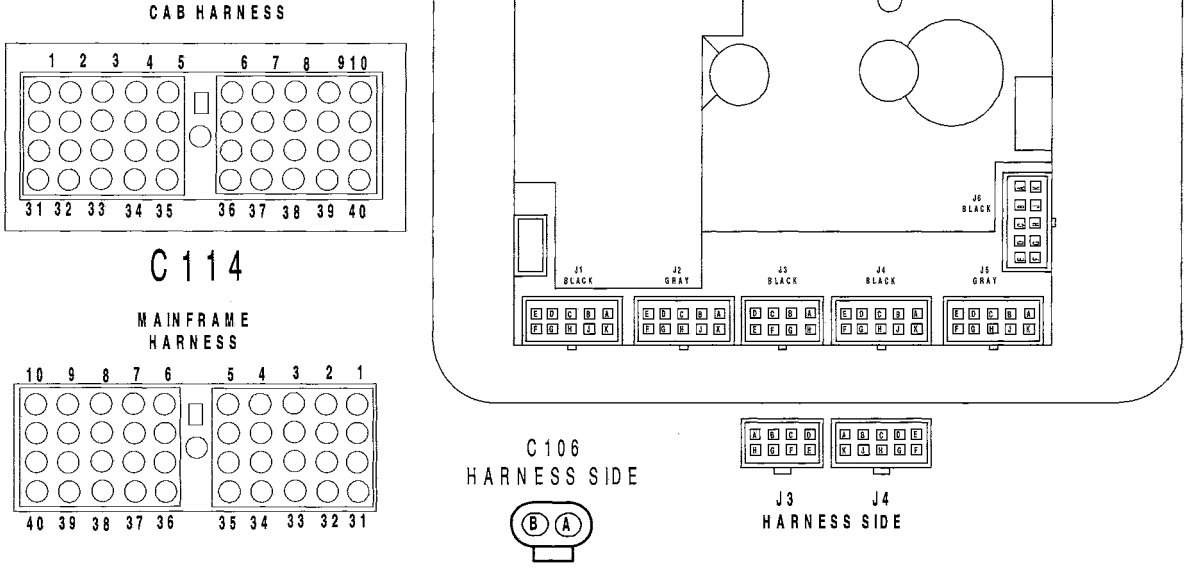
Code 06-13

Code 06-13:
ENGINE SPEED NO SIGNAL

Refer to appropriate electrical schematics for circuit description.

Check engine speed sensor connector C106, for moisture corrosion, pushed back pins, etc.

- Code clears. System OK.
- Code remains. Remove sensor. Check end of sensor for damage. Check spacing of sensor. Move closer if necessary. Check resistance of sensor. The resistance should be approximately 163 ohms ± 10%
  - Sensor is open or damaged. Replace sensor.
  - Sensor shows resistance. Disconnect display controller J3 and J4 connectors. Disconnect C106 harness connector from sensor. Check continuity between J4, pin K, wire 3600 and C106, pin A, wire 3600 at sensor connector. Check continuity between J3, pin H, wire 4310 and C106, pin B, wire 3630 at sensor connector.
    - No continuity. Disconnect connector C114. Check continuity between J4, pin K, wire 3600 and C114, pin 18, wire 3600. Check continuity between J3, pin H, wire 4310 and C114, pin 19, wire 3630.
      - No continuity. Repair or replace cab harness.
      - Continuity. Repair or replace mainframe harness.
    - Continuity. The circuit appears OK. Replace controller if alarm remains ON *.

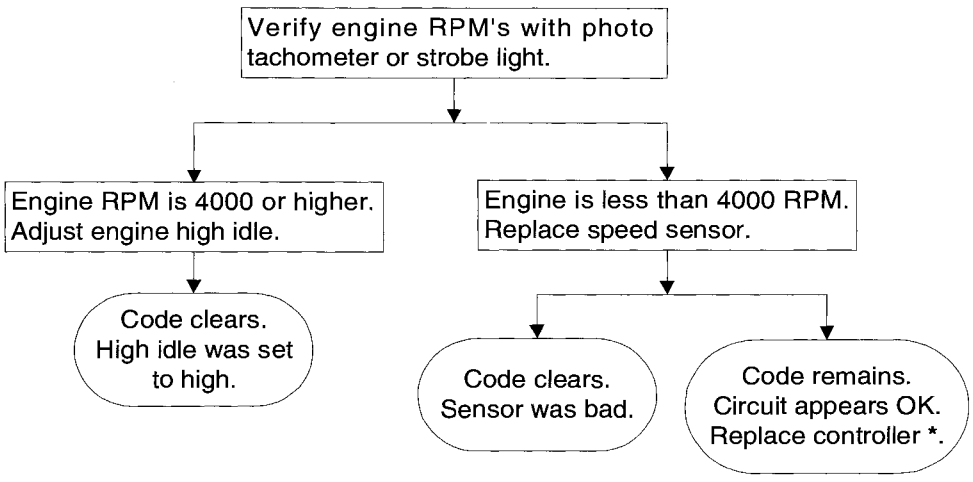


* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.

Code 06-15

Code 06-15:
ENGINE SPEED SHUTDOWN LEVEL

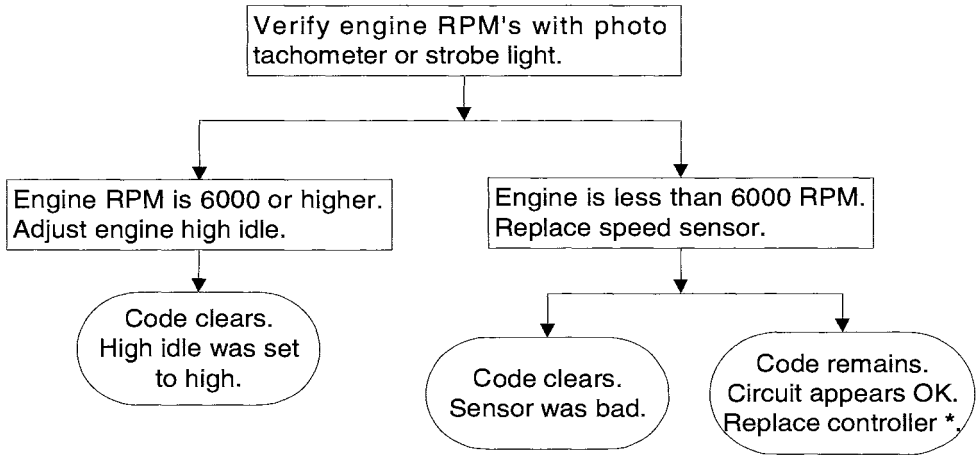
Refer to appropriate electrical schematics for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 06-18:
ENGINE SPEED OUT OF RANGE HIGH

Refer to appropriate electrical schematics for circuit description.

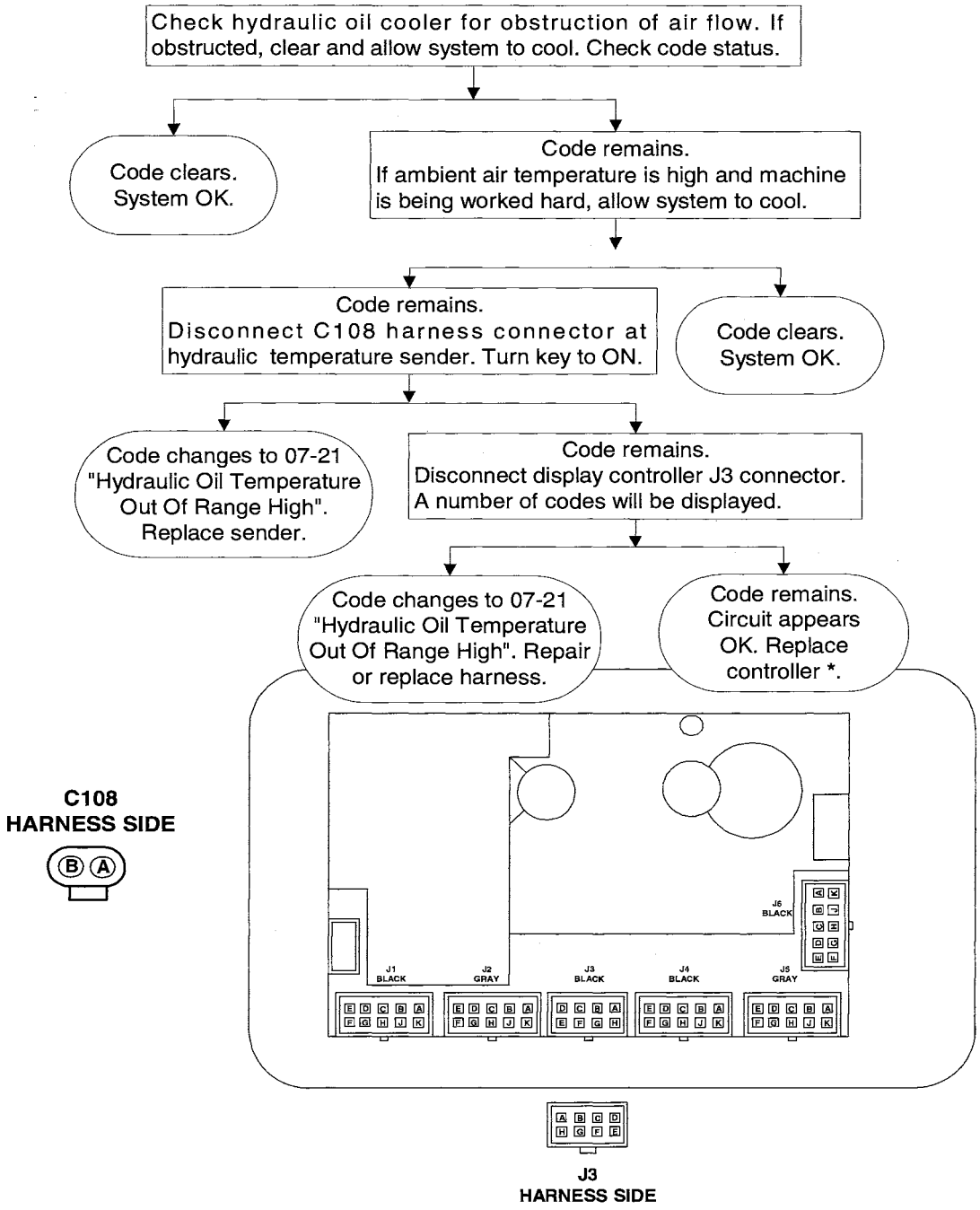


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Note: It is unlikely to have a wiring harness problem, since a short to 12.0 Volts actually reduces the RPM readings and a short to ground will give no signal service code.

Code 07-10:
HYDRAULIC OIL TEMPERATURE HIGH

Refer to appropriate electrical schematics for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

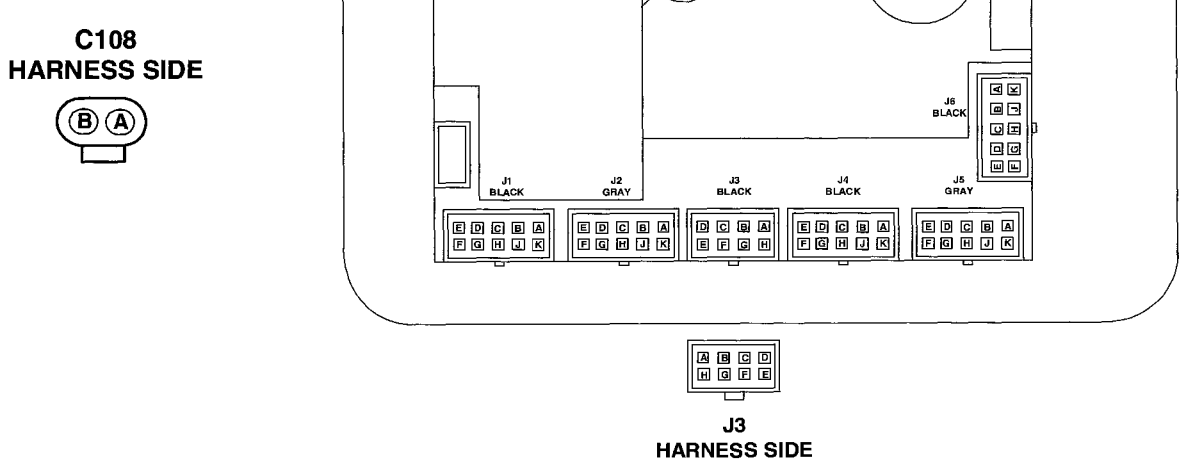
Code 07-11

Code 07-11:
HYDRAULIC OIL TEMPERATURE EXTREMELY HIGH

Refer to appropriate electrical schematics for circuit description.

Check hydraulic oil cooler for obstruction of air flow. If obstructed, clear and allow system to cool. Check code status.

- Code clears. System OK.
- Code remains. If ambient air temperature is high and machine is being worked hard, allow system to cool.
  - Code clears. System OK.
  - Code remains. Disconnect C108 harness connector at hydraulic temperature sender. Turn key to ON.
    - Code changes to 07-21 "Hydraulic Oil Temperature Out Of Range High". Replace sender.
    - Code remains. Disconnect display controller J3 connector. A number of codes will be displayed.
      - Code changes to 07-21 "Hydraulic Oil Temperature Out Of Range High". Repair or replace harness.
      - Code remains. Circuit appears OK. Replace controller.

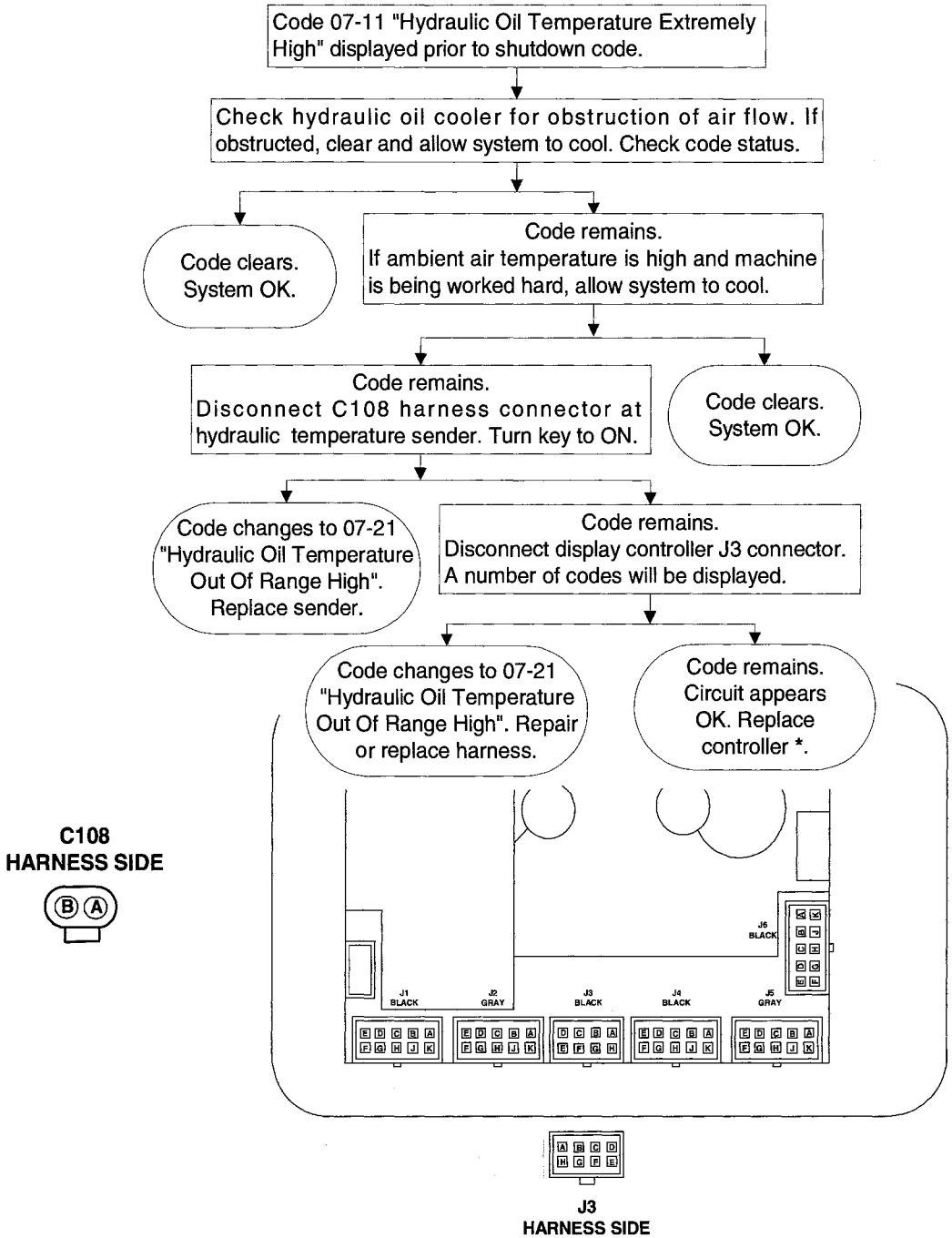


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 07-15

Code 07-15:
HYDRAULIC OIL TEMPERATURE SHUTDOWN LEVEL

Refer to appropriate electrical schematics for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

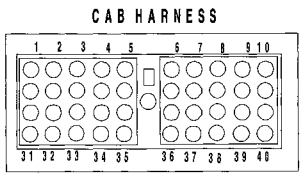
Code 07-21

Code 07-21:
HYDRAULIC OIL TEMPERATURE OUT OF RANGE HIGH

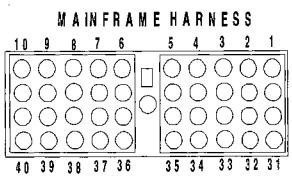
Refer to appropriate electrical schematics for circuit description.

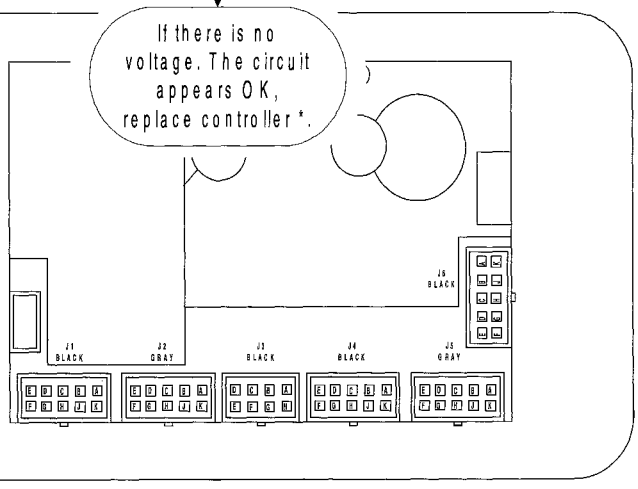
Disconnect C108 harness connector at hydraulic oil temperature sender. Short C108 harness connector, pin A, wire 3300 to ground.

- Code changes to 07-22 "Hydraulic Oil Temperature Out Of Range Low". Replace sender.
- Code remains. Disconnect display controller J3 connector. Check continuity between J3, pin C, wire 3300 to C108 harness connector, pin A, wire 3300.
  - No continuity. Disconnect connector C114. Check continuity between J3, pin C, wire 3330 and C114, pin 15, wire 3300.
    - No continuity. Repair or replace cab harness.
    - Continuity. Repair or replace mainframe harness.
  - Continuity. Check continuity between J3, pin H, wire 4310 and C108, pin B, wire 3320.
    - Continuity. Check C108 harness connector for voltage between pin A, wire 3300 and ground.
      - Voltage. Disconnect connector C114. Check voltage C114, pin 15, wire 3300.
        - Voltage. Repair or replace cab harness.
        - Vo voltage. Repair or replace mainframe harness.
      - If there is no voltage. The circuit appears OK, replace controller *.
    - No continuity. Disconnect connector C114. Check continuity between J3, pin H, wire 4310 and C114, pin 7, wire 2180.
      - No continuity. Repair or replace cab harness.
      - Continuity. Repair or replace mainframe harness.



C114





C108 HARNESS SIDE

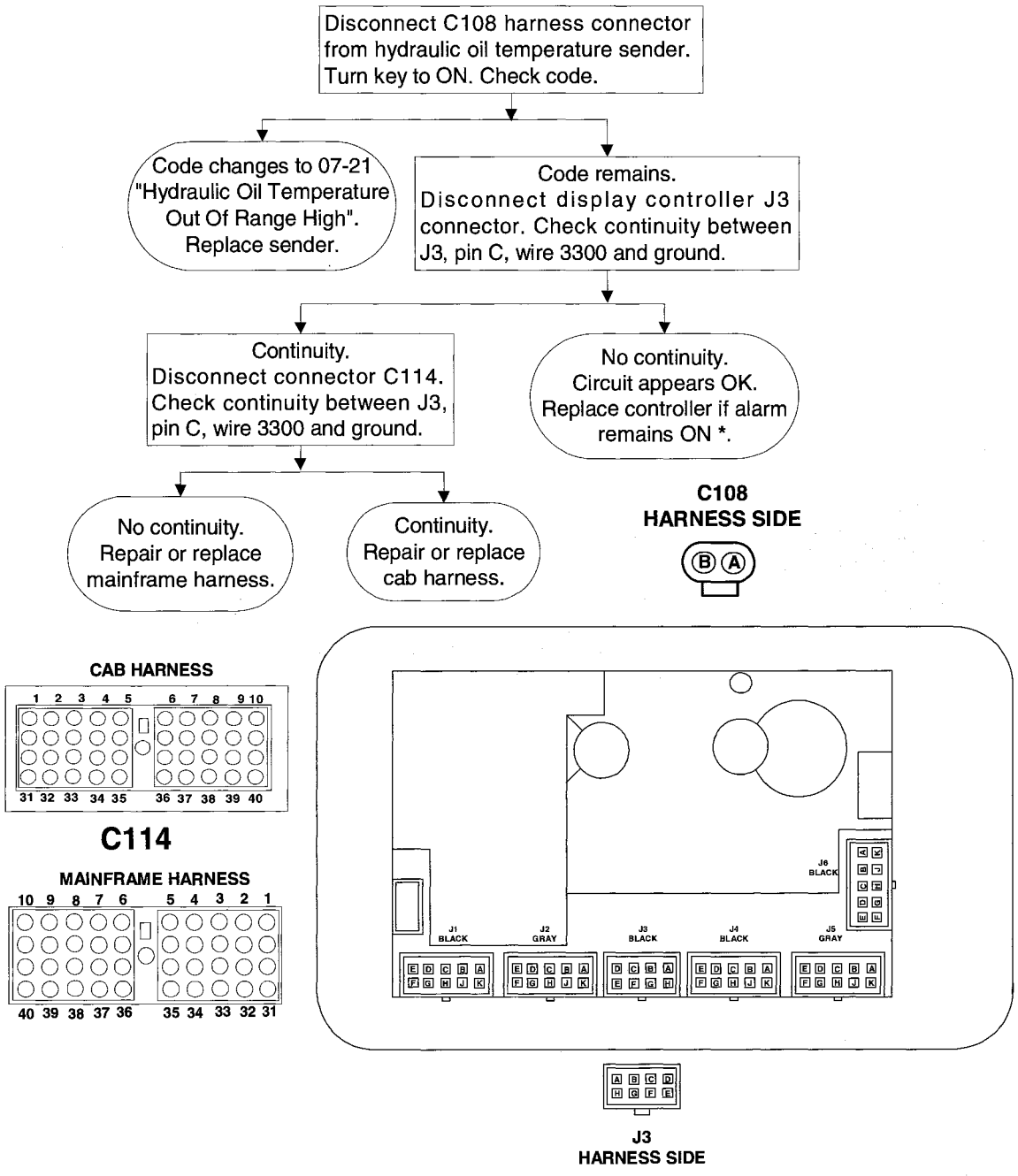
J3 HARNESS SIDE

* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.

Code 07-22

Code 07-22:
HYDRAULIC OIL TEMPERATURE OUT OF RANGE LOW

Refer to appropriate electrical schematics for circuit description.



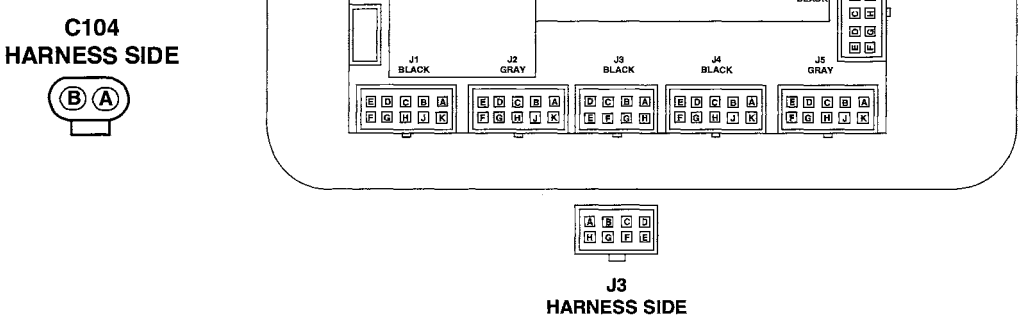
*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 08-10:
ENGINE COOLANT TEMPERATURE HIGH

Refer to appropriate electrical schematics for circuit description.

This code occurs when the engine temperature exceeds 230° F. (110° C.). Check coolant level. Check radiator and oil cooler for obstruction of airflow. If obstructed, clear and allow system to cool. Turn key to ON. Check code.

- Code clears. The electrical system is OK.
- Code remains. Replace the thermostat (See Loader Service Manual for correct procedure). Start loader and recheck for service code.
  - Code clears. System OK.
  - Code remains. Disconnect C104 harness connector at engine coolant sender.
    - Code changes to 08-21 "Engine Coolant Temperature Out Of Range High". Replace sender.
    - Code remains. Disconnect display controller J3 connector. There will be multiple codes displayed.
      - Code changes to 08-21 "Engine Coolant Temperature Out Of Range High". Repair or replace harness.
      - Code remains and the circuit appears OK. Replace controller.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

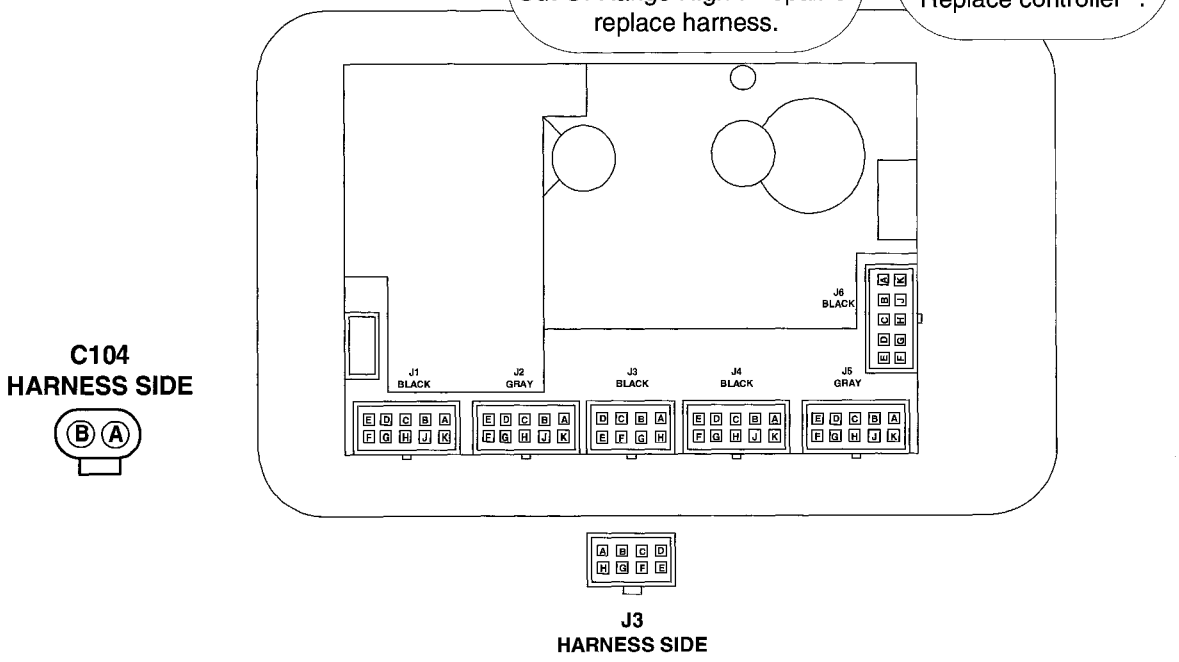
Code 08-11

Code 08-11:
ENGINE COOLANT TEMPERATURE EXTREMELY HIGH

Refer to appropriate electrical schematics for circuit description.

This code occurs when the engine temperature exceeds 235° F. (113° C.). Check coolant level. Check radiator and oil cooler for obstruction of airflow. If obstructed, clear and allow system to cool. Turn key to ON. Check code.

- Code clears. The electrical System OK.
- Code remains. Replace the thermostat (See Loader Service Manual for correct procedure). Start loader and recheck for service code.
  - Code clears. System OK.
  - Code remains. Disconnect C104 harness connector at engine coolant sender.
    - Code changes to 08-21 "Engine Coolant Temperature Out Of Range High". Replace sender.
    - Code remains. Disconnect display controller J3 connector. There will be multiple codes displayed.
      - Code changes to 08-21 "Engine Coolant Temperature Out Of Range High". Repair or replace harness.
      - Code remains, the circuit appears OK. Replace controller *.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 08-15

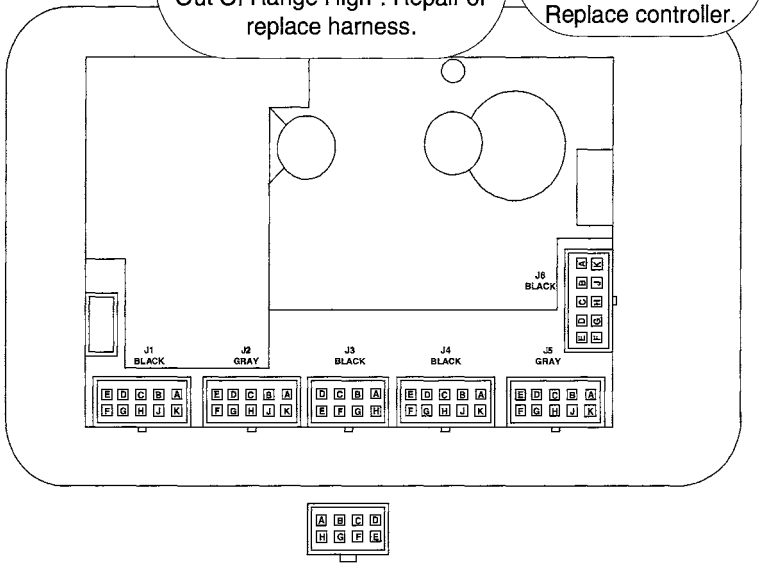
Code 08-15:
ENGINE COOLANT TEMPERATURE SHUTDOWN LEVEL

Refer to appropriate electrical schematics for circuit description.

This code occurs when the engine temperature exceeds 235° F. (113° C.) for ten seconds. Check coolant level. Check radiator and oil cooler for obstruction of airflow. If obstructed, clear and allow system to cool. Turn key to ON. Check code.

- Code clears. The electrical system OK.
- Code remains. Replace the thermostat (See Loader Service Manual for correct procedure). Start loader and recheck for service code.
  - Code clears. System OK.
  - Code remains. Disconnect C104 harness connector at sender.
    - Code changes to 08-21 "Engine Coolant Temperature Out Of Range High". Replace sender.
    - Code remains. Disconnect display controller J3 connector. There will be multiple codes displayed.
      - Code changes to 08-21 "Engine Coolant Temperature Out Of Range High". Repair or replace harness.
      - Code remains and the circuit appears OK. Replace controller.

C104
HARNESS SIDE



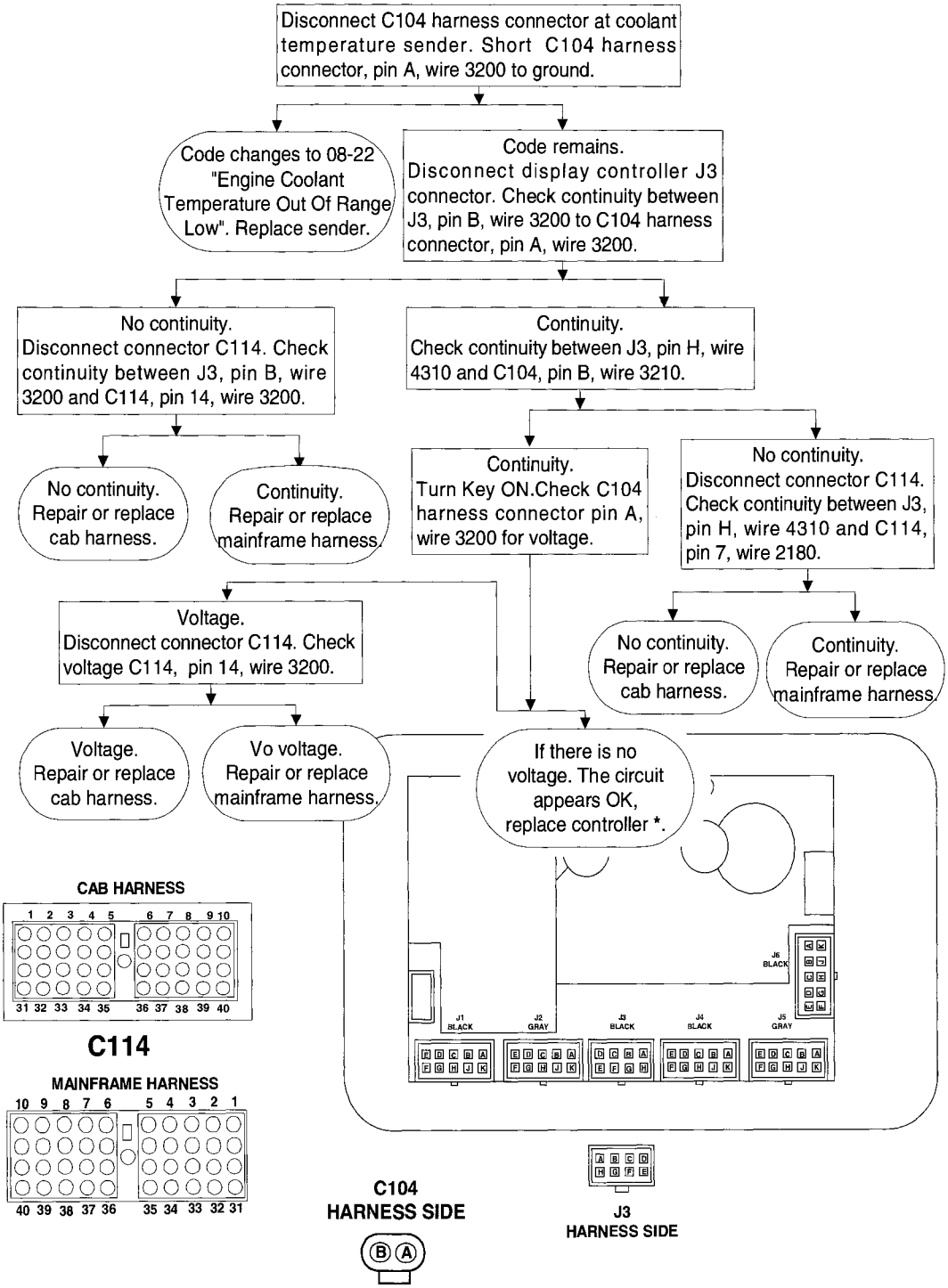
J3
HARNESS SIDE

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 08-21

Code 08-21:
ENGINE COOLANT TEMPERATURE OUT OF RANGE HIGH

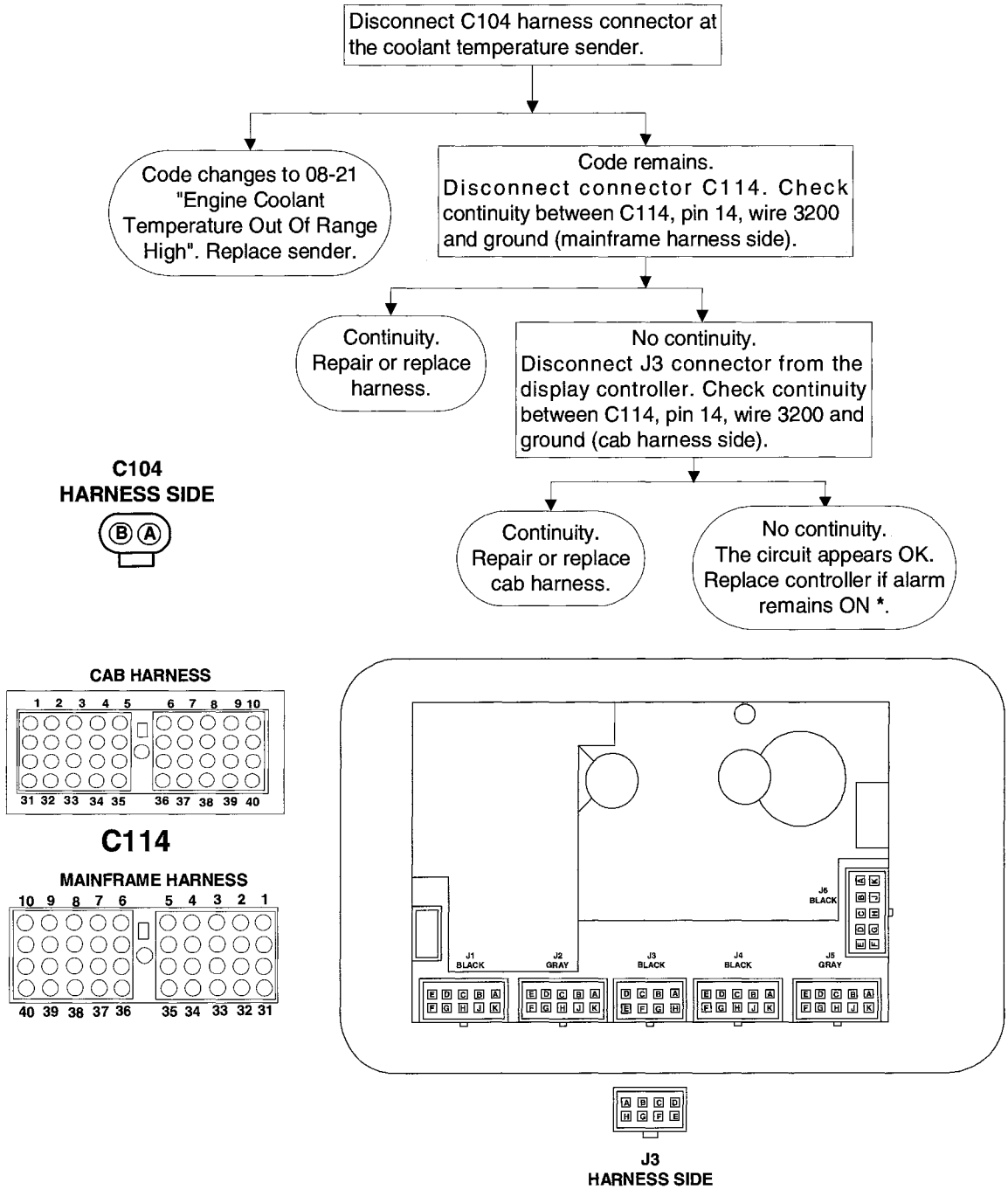
Refer to appropriate electrical schematics for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 08-22:
ENGINE COOLANT TEMPERATURE OUT OF RANGE LOW

Refer to appropriate electrical schematics for circuit description.

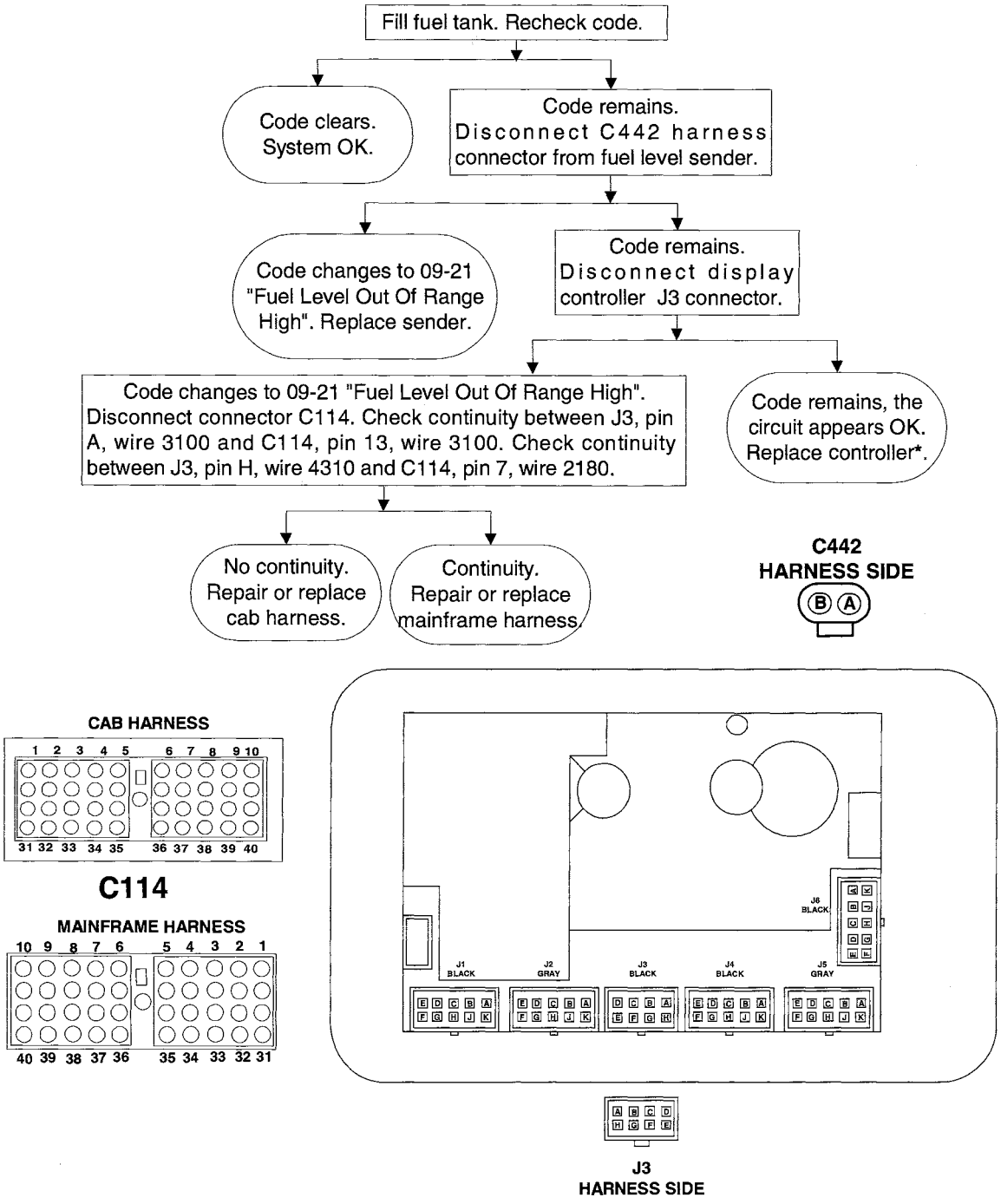


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 09-09

Code 09-09:
FUEL LEVEL LOW

Refer to appropriate electrical schematics for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

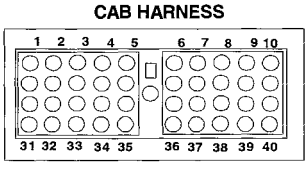
Code 09-21

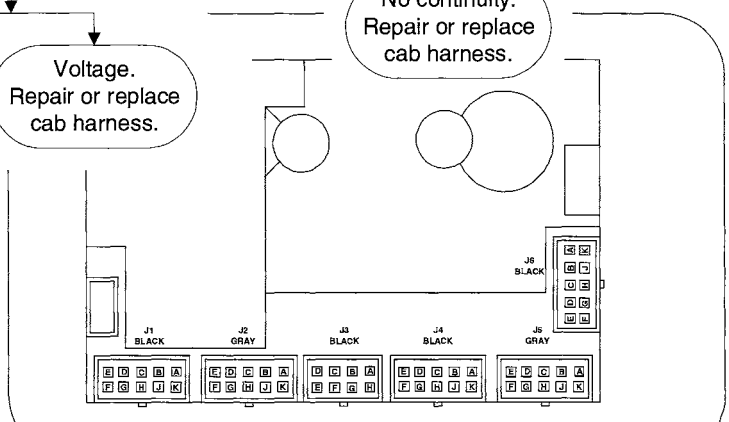
Code 09-21:
FUEL LEVEL OUT OF RANGE HIGH

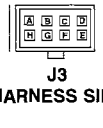
Refer to appropriate electrical schematics for circuit description.

Disconnect C442 harness connector from fuel level sender. Short harness connector C442, pin A, wire 3100 to ground.

- Code changes to 09-22 "Fuel Level Out Of Range Low". Replace sender.
- Code remains. Disconnect display controller J3 connector. Check continuity between J3, pin A, wire 3100 and C442 harness connector, pin A, wire 3100.
  - No continuity. Disconnect connector C114. Check continuity between J3, pin A, wire 3100 and C114, pin 13, wire 3100.
    - Continuity. Repair or replace mainframe harness.
    - No continuity. Repair or replace cab harness.
  - Continuity. Check continuity between J3, pin H, wire 4310 and C108, pin B, wire 3320.
    - Continuity. Turn key to ON. Check C442 harness connector, pin A, wire 3100 for voltage.
      - Voltage. Disconnect connector C114. Check for voltage on C114, pin 13, wire 3100.
        - No voltage. Repair or replace mainframe harness.
        - Voltage. Repair or replace cab harness.
      - If there is no voltage, the circuit appears OK. Replace display controller *.
    - No continuity. Disconnect connector C114. Check continuity between J3, pin H, wire 4310 and C114, pin 7, wire 2180.
      - Continuity. Repair or replace mainframe harness.
      - No continuity. Repair or replace cab harness.



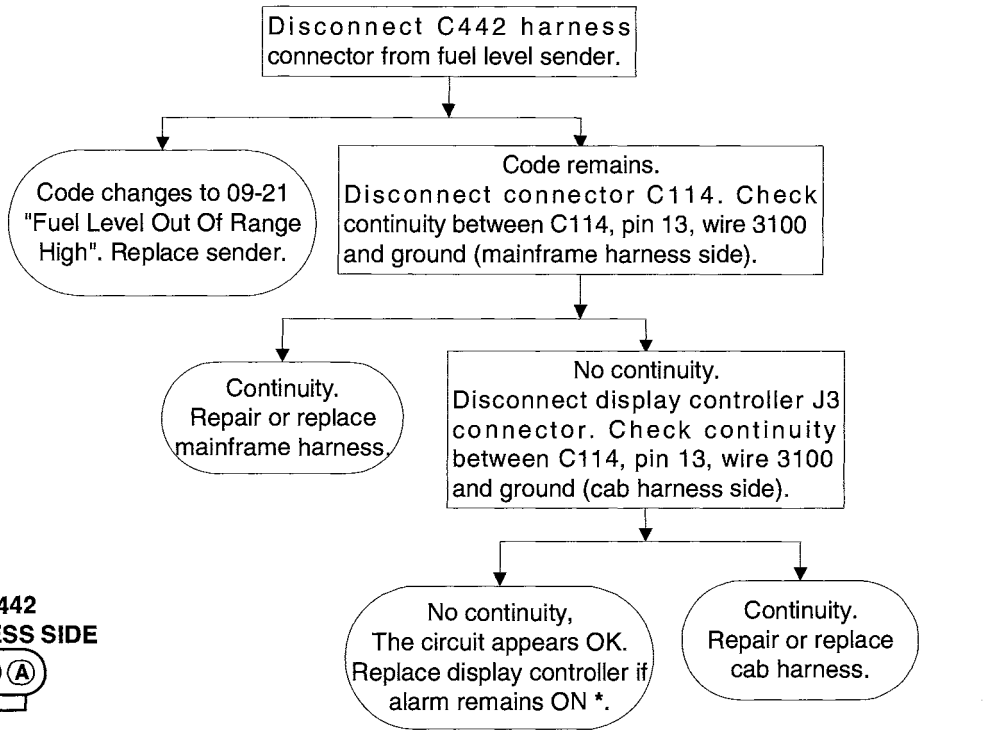




*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

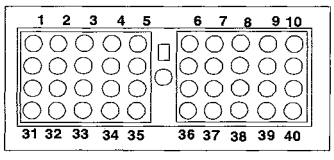
Code 09-22:
FUEL LEVEL OUT OF RANGE LOW

Refer to appropriate electrical schematics for circuit description.



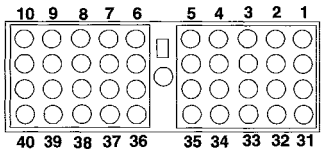
C442
HARNESS SIDE

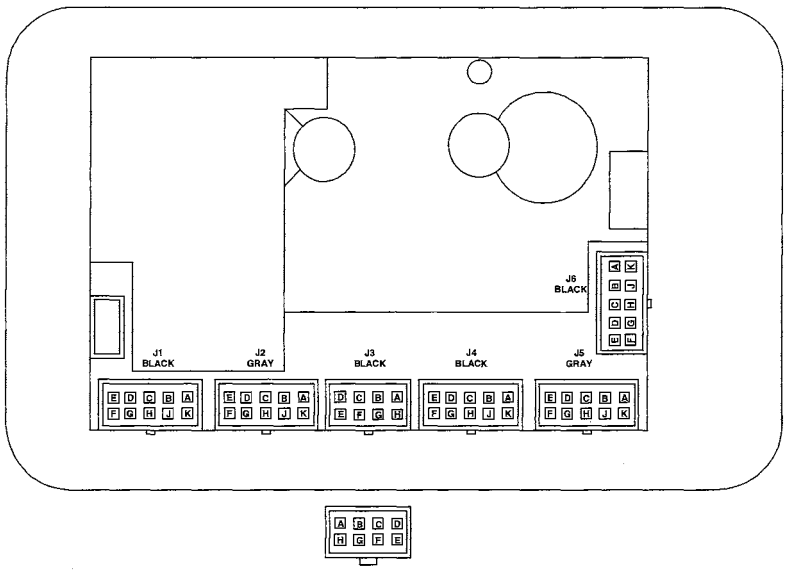
CAB HARNESS



C114

MAINFRAME HARNESS



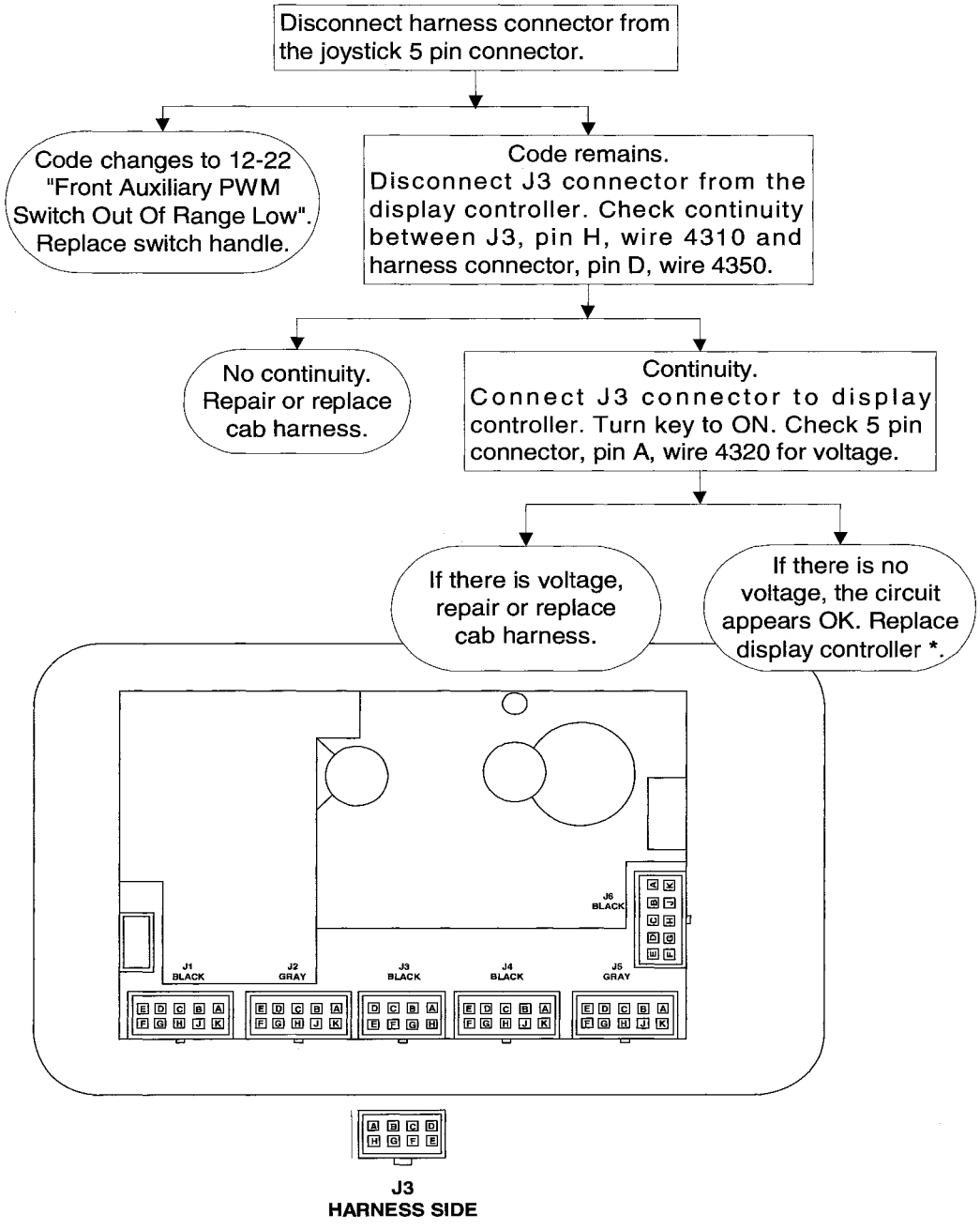


J3
HARNESS SIDE

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 12-21:
PRIMARY AUXILIARY PWM SWITCH OUT OF RANGE HIGH

Refer to appropriate electrical schematics for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 12-22

Code 12-22:
PRIMARY AUXILIARY PWM SWITCH OUT OF RANGE LOW

Refer to appropriate electrical schematics for circuit description.

Disconnect harness connector from the joystick 5 pin connector. Check between harness connector, pin E, wire 4360 and pin D, wire 4350 for 8.0 Volts.

No voltage.
Disconnect J3 connector from display controller. Check continuity between J3, pin G, wire 4300 and pin E, wire 4360 on the 5 pin harness.

If 8.0 Volts present.
Connect jumper wire between 5 pin harness connector, pin E. wire 4360 and pin A, wire 4320

No continuity.
Repair or replace cab harness.

Continuity.
With both J3 and J5 connectors disconnected, check continuity between J3, pin G, wire 4300 and ground.

Code remains.
Disconnect J5 connector from display controller. Check continuity between J5, pin F, wire 4320 and 5 pin harness connector, pin A, wire 4320.

Code changes to 12-21 "Front Auxiliary PWM Switch Out Of Range High". Replace switch handle.

No continuity,
the circuit appears OK. Replace display controller if alarm remains ON **.

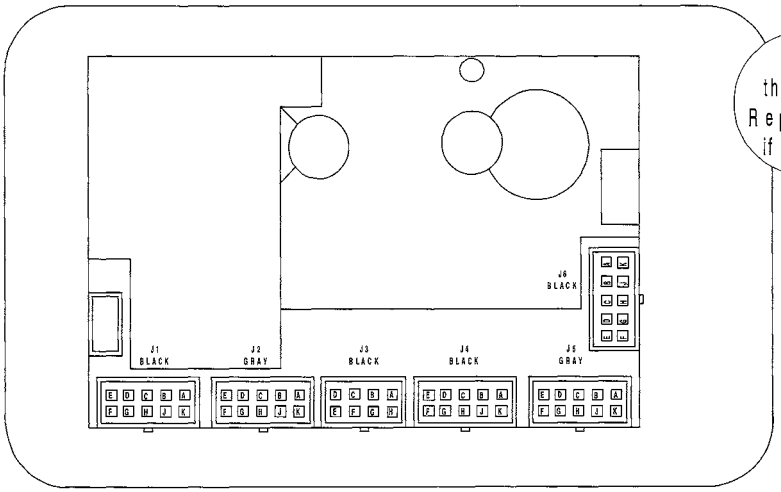
*** Continuity.**
Repair or replace cab harness.

No continuity.
Check harness and all connectors between sender and controller. Repair or replace cab harness.

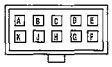
Continuity.
With both J3 and J5 connectors disconnected, check continuity between J5, pin F, wire 4320 and ground.

No continuity,
the circuit appears OK. Replace display controller if alarm remains ON **.

*** Continuity.**
Repair or replace cab harness.



J3
HARNESS SIDE



J5
HARNESS SIDE

* A defective PWM switch may cause an out of range high condition. (Refer to code 12-23 "Front Auxiliary PWM Switch Not Calibrated".

** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the

Code 12-23

Code 12-23:
PRIMARY AUXILIARY PWM SWITCH NOT CALIBRATED

Refer to appropriate electrical schematics for circuit description.

Disconnect harness connector from the joystick 5 pin connector.

Check continuity between handle connector, pin A (signal) and pin E (power). Push the switch: full left, approximately 1.6k Ohms; neutral, approximately 2.8k Ohms; full right, approximately 4.6k Ohms. Repeat the test several times.

Ohm values vary or are outside of ranges. Replace switch handle.

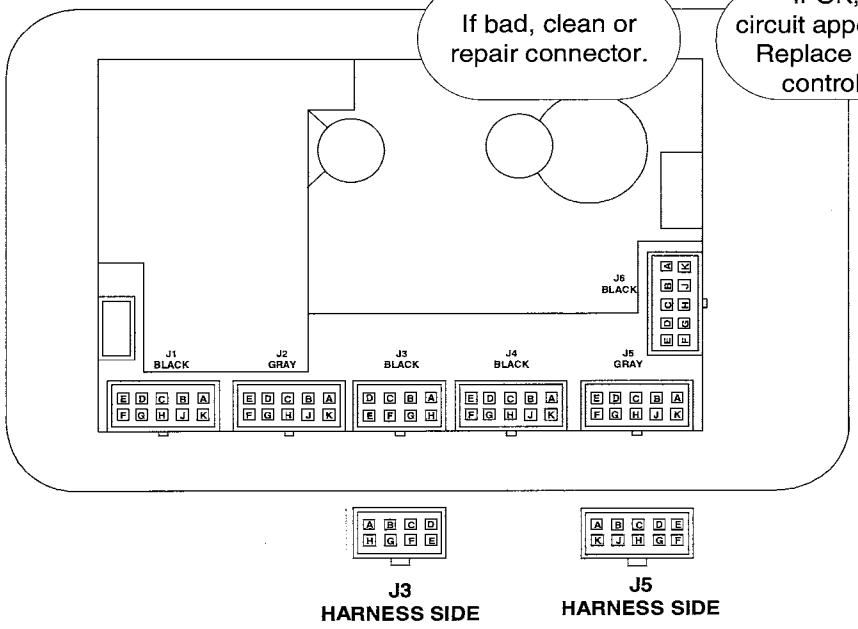
Ohm values close.
Check continuity between pin A (signal) and pin D (ground). Push the switch: full left, approximately 4.9k Ohms; neutral, approximately 3.2k Ohms; full right, approximately 1.4k Ohms. Repeat the test several times.

Ohm values vary or are outside of ranges. Replace switch handle.

Code remains.
Disconnect J3 and J5 connector from display controller. Check J3 and J5 harness, the 5 pin connector and the handle connectors for moisture, corrosion or pushed back pins.

If bad, clean or repair connector.

If OK, the circuit appears OK. Replace display controller *.



J3
HARNESS SIDE

J5
HARNESS SIDE

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 13-05:
FUEL SHUT-OFF HOLD SOLENOID SHORT TO BATTERY

Refer to appropriate electrical schematics for circuit description.

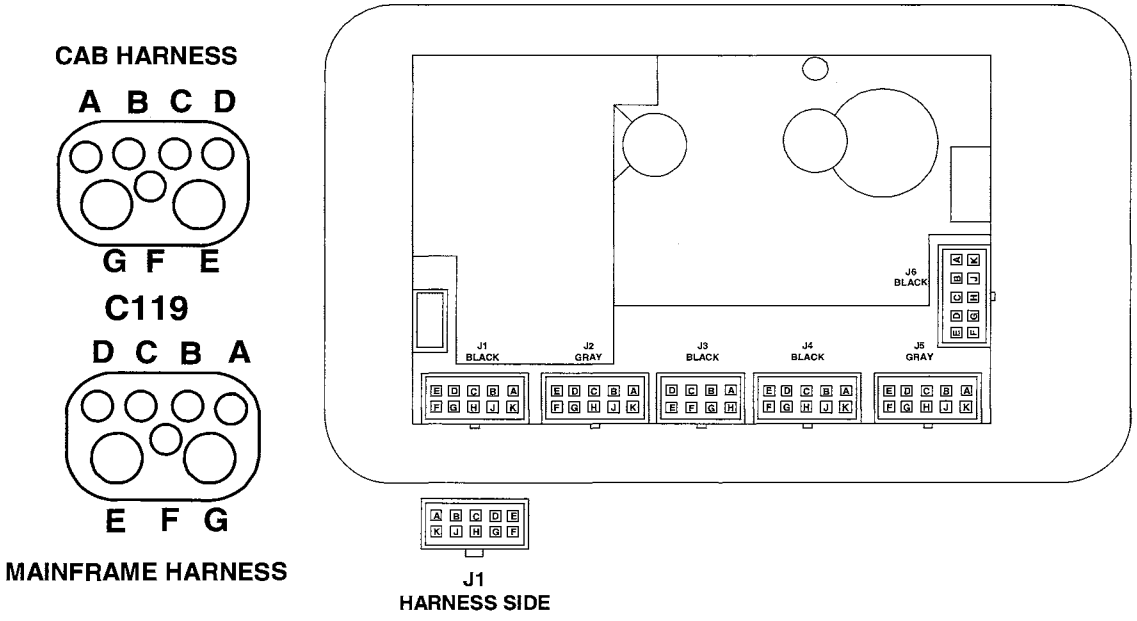
Disconnect harness connector C101 from fuel shut-off hold solenoid connector. Check harness connector, pin A, wire 8150 for approximately 5.4 Volts. (5.4 Volts is normal.)

If 5.4 Volts not present. Disconnect connector C119. Check C119, pin D, wire 8150 for voltage (cab harness side).

If 5.4 volts is present, the circuit appears OK. Replace the display controller *.

If 12.0 volts is present. Repair or replace cab harness.

If 5.4 volts is present. Repair or replace mainframe harness.

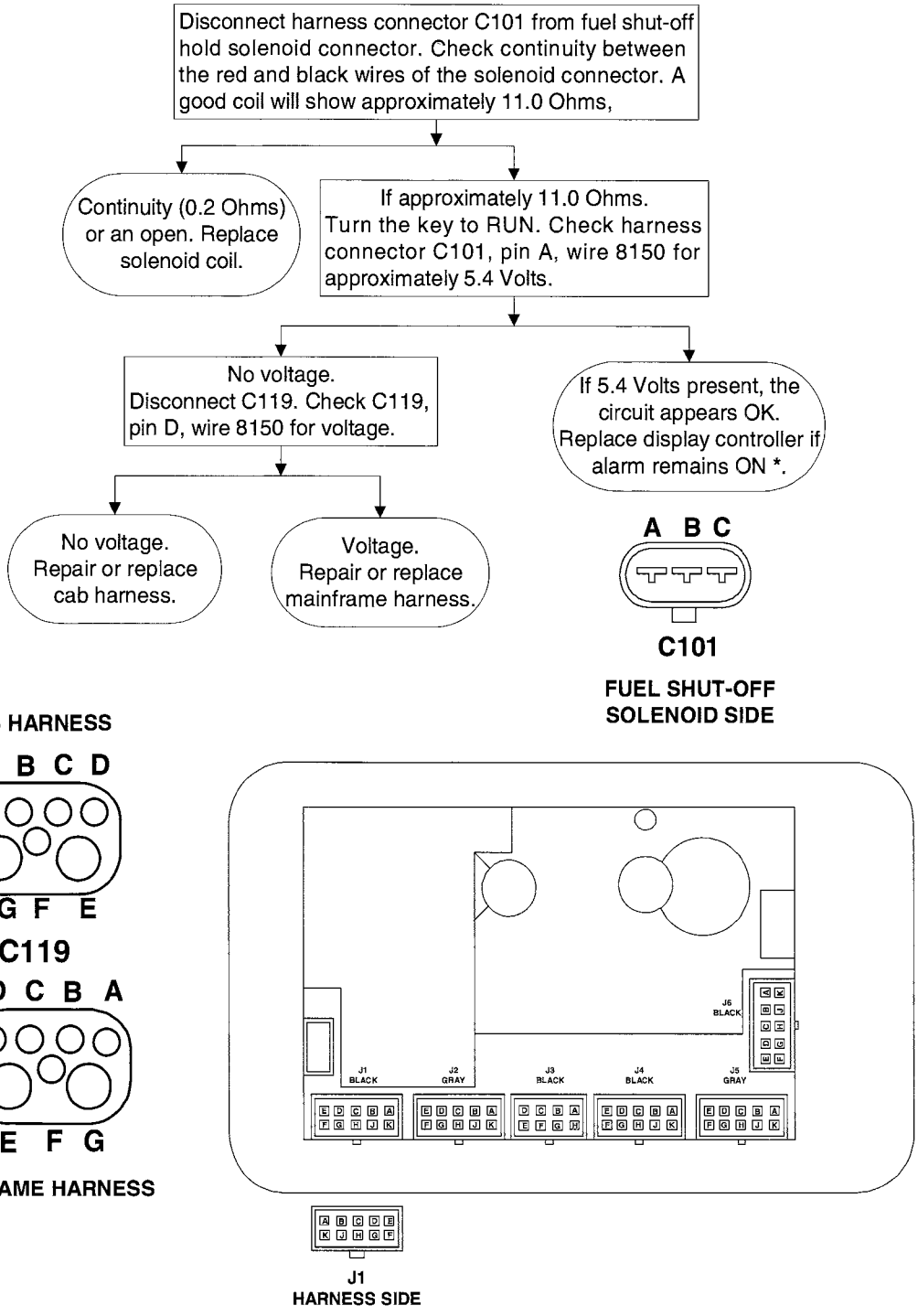


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 13-06

Code 13-06:
FUEL SHUT-OFF HOLD SOLENOID SHORT TO GROUND

Refer to appropriate electrical schematics for circuit description.



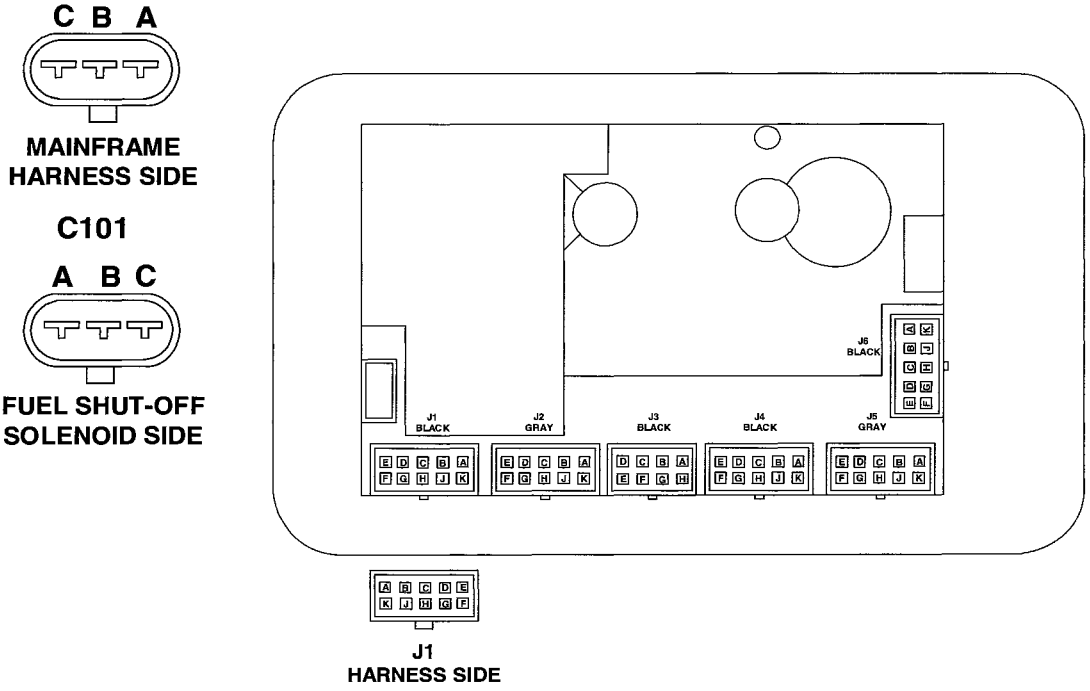
*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 13-07:
FUEL SHUT-OFF HOLD SOLENOID OPEN CIRCUIT

Refer to appropriate electrical schematics for circuit description.

Disconnect harness connector C101 from fuel shut-off solenoid connector. Check continuity between the red and black wires of the solenoid connector. A good coil will show approximately 11.0 Ohms,

- Continuity (0.2 Ohms) or an open. Replace solenoid coil.
- If approximately 11.0 Ohms. Disconnect J1 connector from display controller. Check continuity between J1, pin B, wire 8150 and harness solenoid connector C101, pin A, wire 8150. Also check solenoid connector C101, pin C, wire 2800 to a valid ground.
  - No continuity. repair or replace harness.
  - If there is continuity, the circuit appears OK. Replace display controller if alarm remains ON *.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

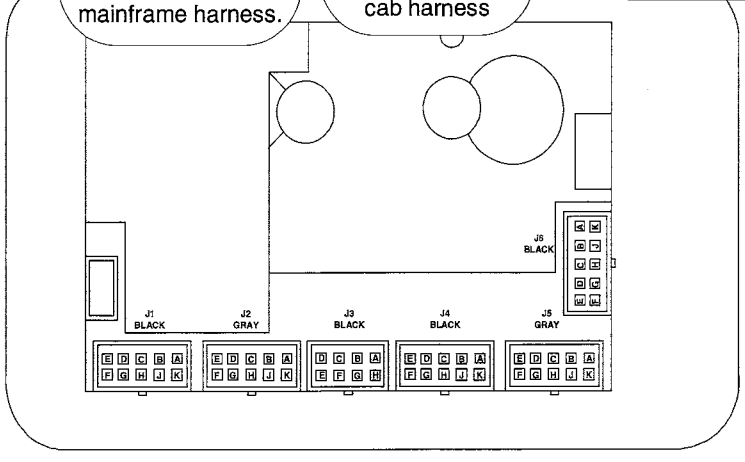
Code 14-02

Code 14-02:
FUEL SHUT-OFF PULL SOLENOID ERROR ON

Refer to appropriate electrical schematics for circuit description.

Remove the fuel shut-off relay. Turn the key to RUN. Check code.

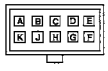
- Code remains. Disconnect connector J4 from the display controller. Check for voltage on J4, pin C, wire 8120.
  - No voltage, the circuit appears OK. Replace the display controller *.
  - Voltage. Disconnect connector C119. Check for voltage on C119, pin E, wire 8100 (mainframe harness side).
    - Voltage. Repair or replace mainframe harness.
    - No voltage. Repair or replace cab harness
- Code clears. Check for voltage between relay socket, pin 2, wire 8110 and ground.
  - 12.0 Volts. Disconnect J1 from display controller. Check for voltage between J1, pin J, wire 8110 and a valid ground.
    - Voltage. Repair or replace cab harness.
    - No voltage, the circuit appears OK. Replace the display controller *.
  - Less than 11.0 Volts. Replace relay.



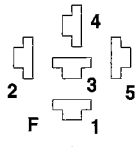
*** Before replacing controller, check between pin A, wire 8150 at fuel solenoid connector C101 and chassis ground. If no continuity, repair or replace harness. If OK, replace controller.**

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

J1
HARNESS SIDE

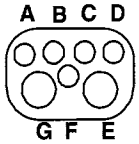


J4
HARNESS SIDE

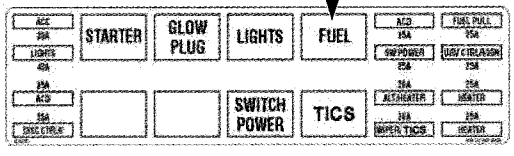


FUEL SHUT-OFF RELAY

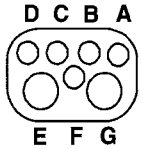
C119



CAB HARNESS SIDE



C119

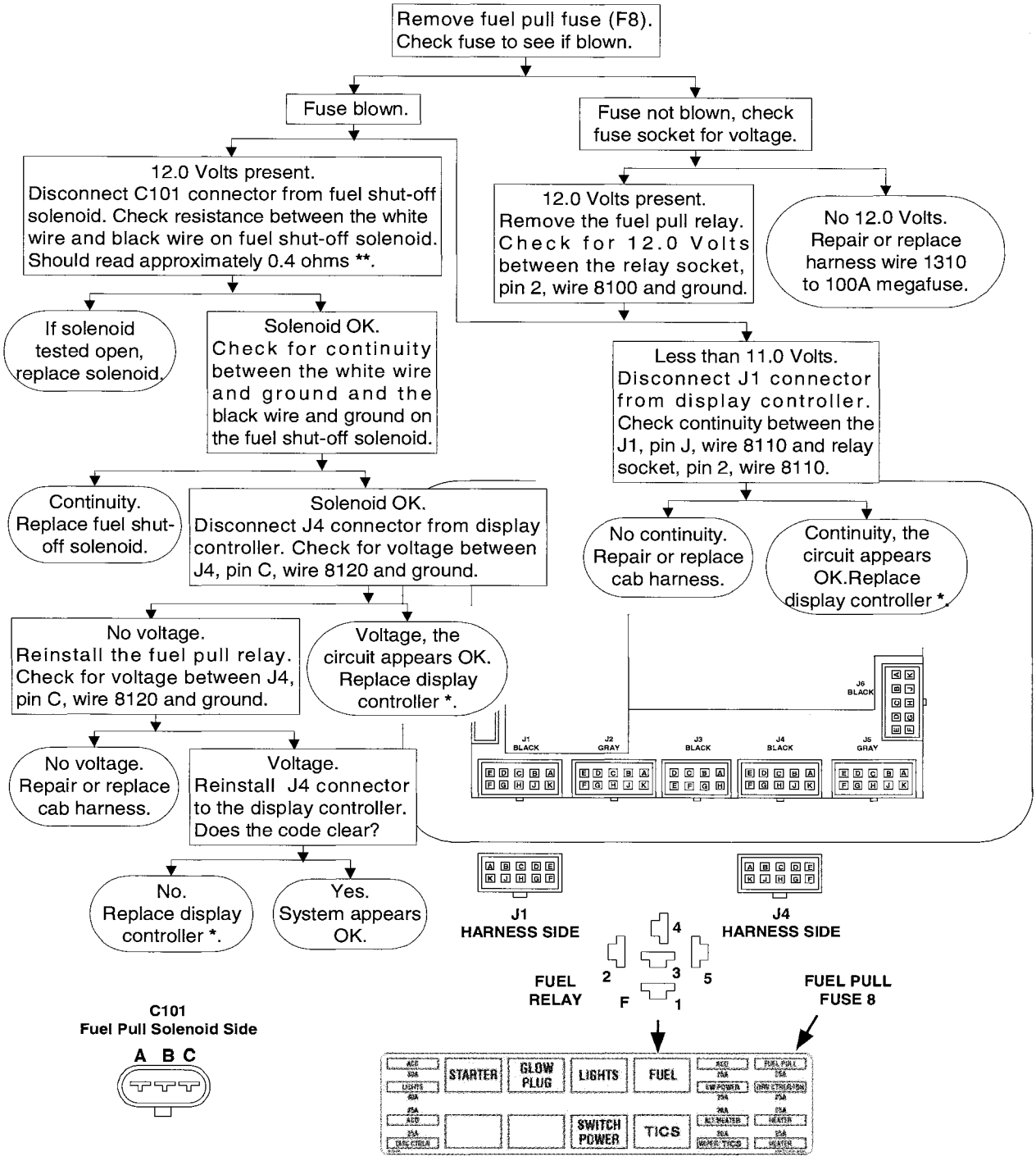


MAINFRAME HARNESS SIDE

Code 14-03

Code 14-03:
FUEL SHUT-OFF PULL SOLENOID ERROR OFF

Refer to appropriate electrical schematics for circuit description.



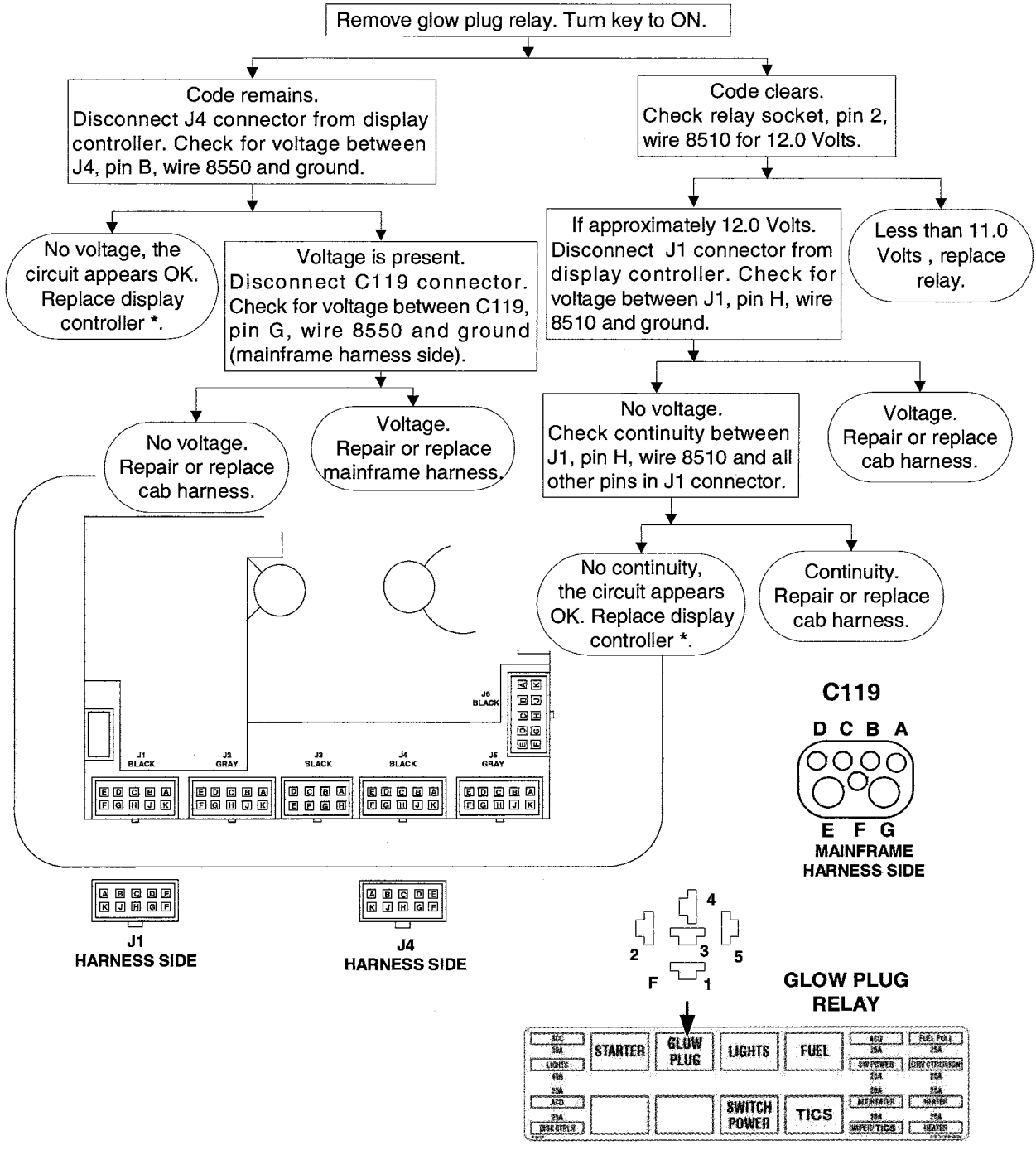
*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

**** NOTE: Zero out ohmmeter or short the leads and record reading. Add 0.4 ohms to the reading for proper resistance reading of coil.**

Code 21-02

Code 21-02:
GLOW PLUG OUTPUT ERROR ON

Refer to appropriate electrical schematics for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

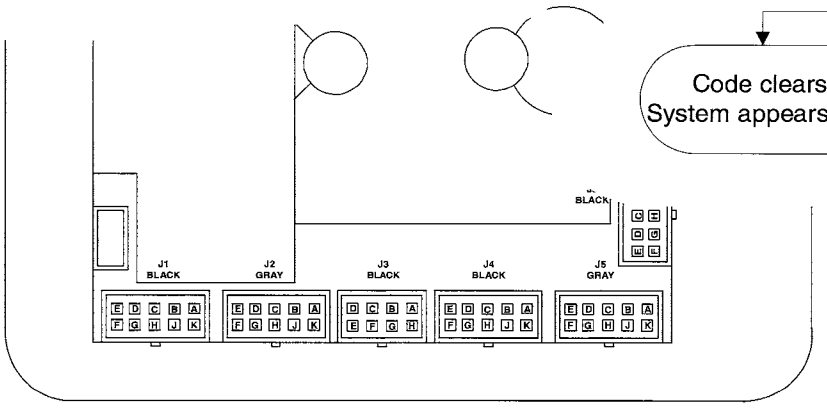
Code 21-03

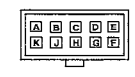
Code 21-03:
GLOW PLUG OUTPUT ERROR OFF

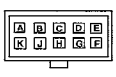
Refer to appropriate electrical schematics for circuit description.

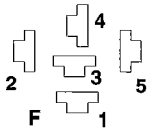
Remove glow plug relay. Turn key to ON. Check glow plug relay socket, pin 4, wire 1060 for 12.0 Volts.

- 12.0 Volts present. Disconnect J4 connector from display controller. Check for voltage between J4, pin B, wire 8550 and ground.
  - Voltage. Replace display controller *.
  - No voltage. Check for 12.0 Volts between Glow Plug socket, pin 5, wire 8510 and ground.
    - Less than 11.0 Volts. Disconnect J1 connector from display controller. Check for continuity between J1, pin H, wire 8510 and glow plug relay socket, pin 5, wire 8510.
      - No continuity. Repair or replace cab harness.
      - Continuity, the circuit appears OK. Replace display controller *.
    - 12.0 Volts present. Replace glow plug relay. Check for voltage between J4, pin B, wire 8550 and ground.
      - Voltage. Reinstall J4 connector into display controller. Does the code clear?
        - Code clears. System appears OK.
        - Code remains, the circuit appears OK. Replace display controller *.
      - No voltage. Repair or replace cab harness.
- No 12.0 Volts. Check harness, wire 1030 at 100 amp megafuse for 12.0 Volts.
  - If 12.0 Volts is present. Harness wire 1060, between relay socket and 100 amp megafuse is open. Repair or replace harness.
  - No 12.0 Volts. Check all connections. Check 100 amp megafuse.

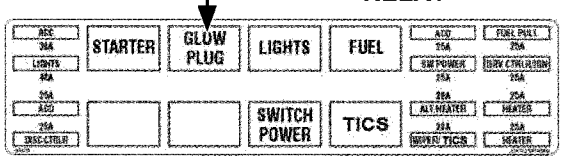



J1
HARNESS SIDE


J4
HARNESS SI



GLOW PLUG RELAY



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 22-02

Code 22-02:
STARTER RELAY OUTPUT ERROR ON

Refer to appropriate electrical schematics for circuit description.

Remove starter relay. Turn key to ON.

Code remains.
Turn key OFF. Disconnect wire 8200 from starter solenoid, S terminal. Turn key to ON. Check harness, wire 8200 for 12.0 Volts. Check harness, wire 8250 (R terminal) for 12.0 Volts.

12.0 Volts is present. Disconnect connector C114. Check for voltage between C114, pin 34, wire 8200 and ground.

No voltage. Repair or replace mainframe harness.

12.0 Volts. Replace cab harness

No 12.0 Volts, the system appears OK. Replace controller *.

Code clears.
Check starter relay socket, terminal 5, wire 9380 for 12.0 volts.

No 12.0 Volts. Replace starter relay.

Code clears. Relay was bad.

Code remains. Disconnect connector C114. Check for voltage between C114, pin 34, wire 8200 and ground (mainframe harness side).

12.0 Volts. Repair or replace cab harness.

No 12.0 Volts, the circuit appears OK. Replace controller *.

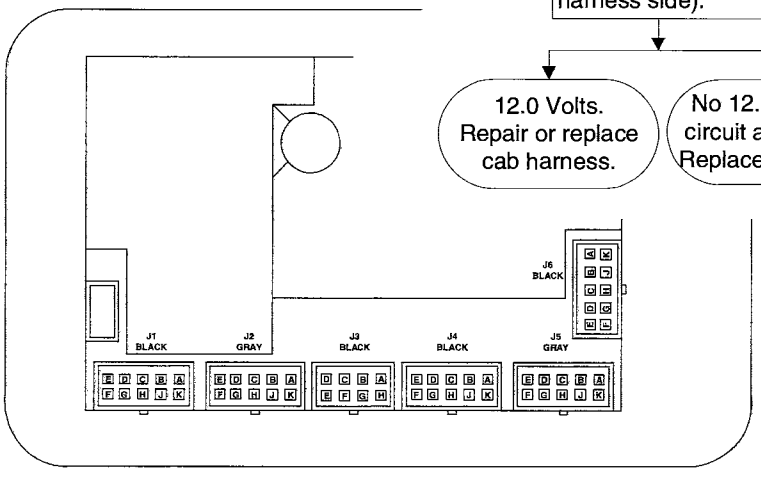
12.0 Volts is present. Disconnect display controller, J4 connector. Check for voltage between J4, pin A, wire 9380 and ground.

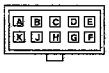
Voltage. Repair or replace cab harness.

No voltage. Check continuity between J4, pin A, wire 9380 and all other pins in J4 connector.

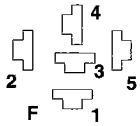
Continuity. Repair or replace cab harness.

No continuity, the circuit appears OK. Replace display controller *.

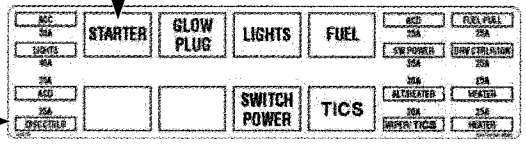




J4
HARNESS SI



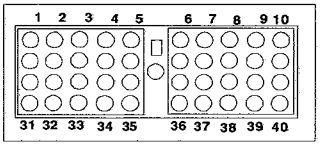
STARTER RELAY



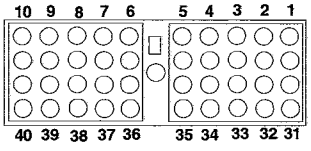
Fuse F9

C114

CAB HARNESS



MAINFRAME HARNESS



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

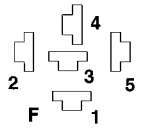
Code 22-03

Code 22-03:
STARTER RELAY OUTPUT ERROR OFF

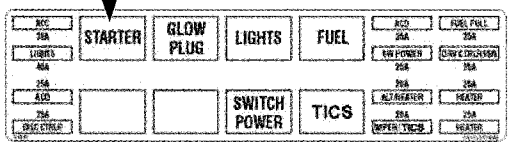
Refer to appropriate electrical schematics for circuit description.

Remove starter relay. Turn key to ON. Check starter relay socket, pin 4, wire 1070 for 12.0 Volts.

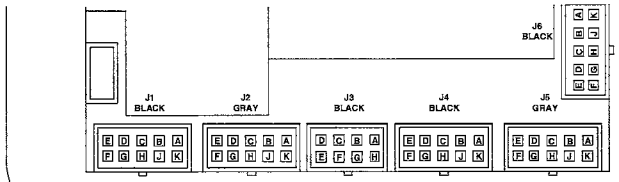
- 12.0 Volts is present. Check for voltage between the starter relay socket, pin 5, wire 9380 and ground.
  - 12.0 Volts is present. Replace relay. If problem persists, turn key to OFF. Disconnect harness wire 8250 at starter (terminal R). Check continuity between starter terminal and ground.
    - Continuity. Solenoid shorted. Replace solenoid.
    - No continuity. Disconnect J4 connector from the display controller. Disconnect connector C109. Check continuity between C109, pin B, wire 8250 and J4, pin D, wire 8250.
      - No continuity. Disconnect connector C114. Check continuity between C114, pin 35, wire 8250 and J4, pin D, wire 8250.
        - No continuity. Repair or replace cab harness.
        - Continuity. Repair or replace mainframe harness.
      - Continuity. Check continuity between C109, pin A, wire 8200 and C114, pin 34, wire 8200.
        - No continuity. Repair or replace mainframe harness.
        - Continuity. Check continuity between C114, pin 34, wire 8200 and starter relay socket, pin 1, wire 8200.
          - Continuity, the circuit appears OK. Replace display controller *.
          - No continuity. Repair or replace mainframe harness.
  - No voltage. Disconnect J1 connector from display controller. Check for continuity between J1, pin A, wire 9380 and starter relay socket, pin 5, wire 9380.
    - No continuity. Repair or replace cab harness.
    - Continuity, the circuit appears OK. Replace display controller *.
- No 12.0 Volts. Check harness, wire 1040 at 100 amp megafuse for 12.0 Volts.
  - No 12.0 Volts. Check connections. Check 100 Amp megafuse.
  - If 12.0 Volts is present. Wire 1040 between relay socket and 100 amp megafuse is open. Repair or replace harness.



STARTER RELAY

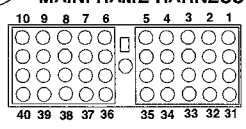


C109

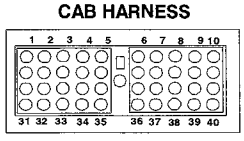


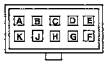
C114

MAINFRAME HARNESS

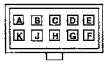


CAB HARNESS





J1
HARNESS SIDE

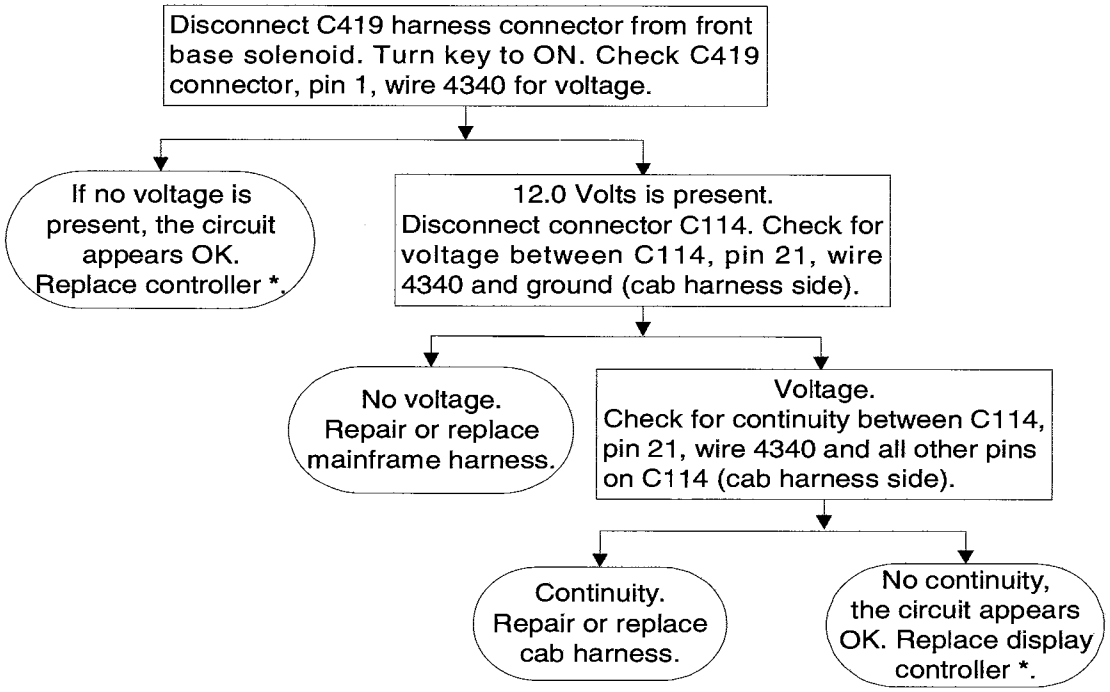


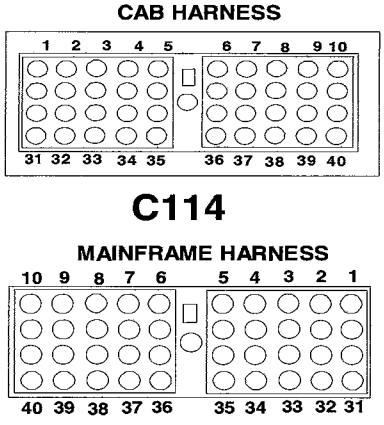
J4
HARNESS SIDE

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 26-02:
FRONT BASE OUTPUT ERROR ON

Refer to appropriate electrical schematics for circuit description.





*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 26-03

Code 26-03:
FRONT BASE OUTPUT ERROR OFF

Refer to appropriate electrical schematics for circuit description.

Disconnect C419 harness connector from front base solenoid. Check continuity of C419 connector, gray wires, solenoid side. Reading should be approximately (5.3 ohms for S/N 520511001 & Above) or (7.5 ohms for S/N 424711001 & Above, 424811001 & Above, A00211001 & Above and A00311001 & Above).

If near 0.0 Ohms (shorted), replace solenoid.

If approximately (5.15 ohms for S/N 520511001 & Above) or (8.5 ohms for S/N 424711001 & Above, 424811001 & Above, A00211001 & Above and A00311001 & Above) do the following:
Disconnect J2 connector from display controller. Check continuity between J2, pin B, wire 4340 and C419, pin 1, wire 4340.

No continuity.
Disconnect C114 connector. Check continuity between J2, pin B, wire 4340 and C114, pin 21, wire 4340.

Continuity.
Check continuity between J2, pin B, wire 4340 and ground.

Continuity.
Repair or replace mainframe harness.

No continuity.
Repair or replace cab harness.

No continuity, the circuit appears OK. Replace display controller *.

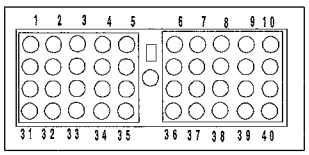
Continuity.
Disconnect C114 connector. Check continuity between J2, pin B, wire 4340 and ground.

Continuity.
Repair or replace cab harness.

No continuity.
Repair or replace mainframe harness.

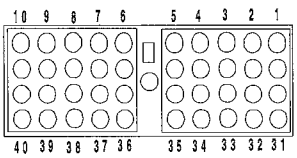
C419
FRONT BASE
SOLENOID
HARNESS SIDE

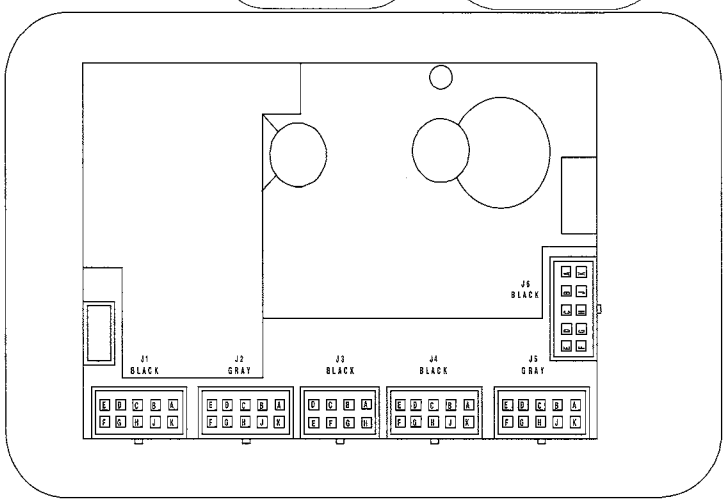
CAB HARNESS

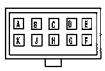


C114

MAINFRAME HARNESS





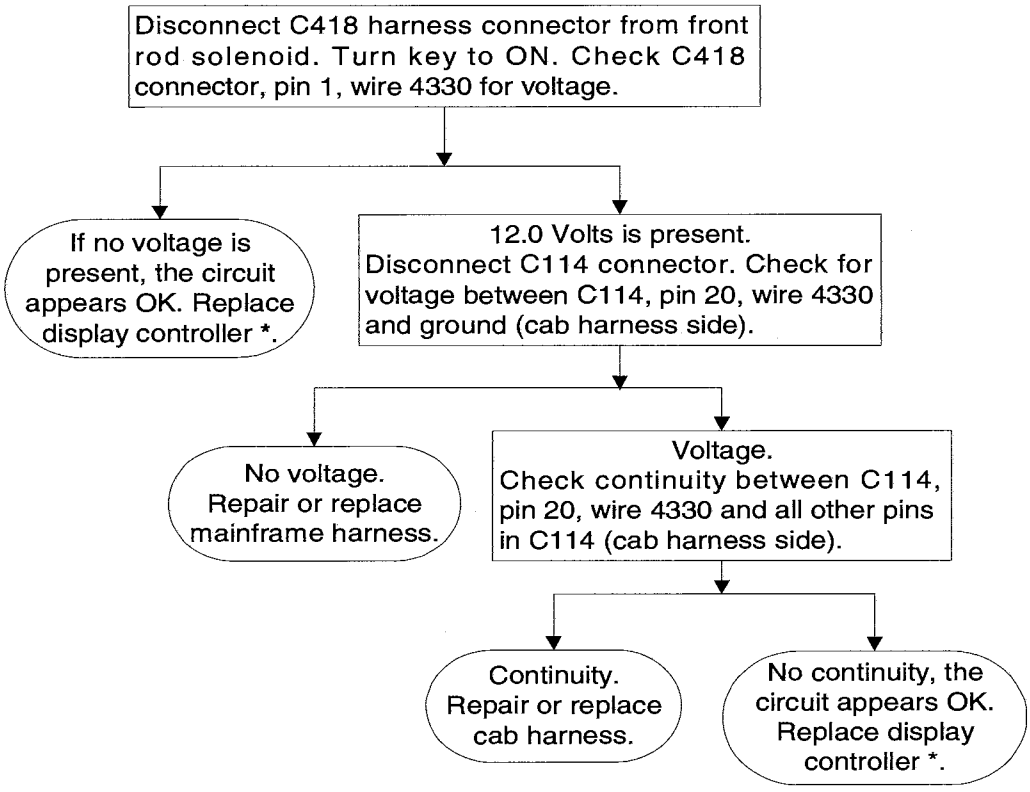


J2
HARNESS SIDE

* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this

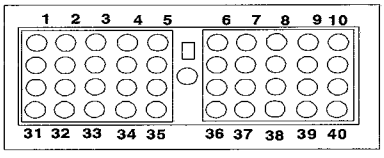
Code 27-02:
FRONT ROD OUTPUT ERROR ON

Refer to appropriate electrical schematics for circuit description.



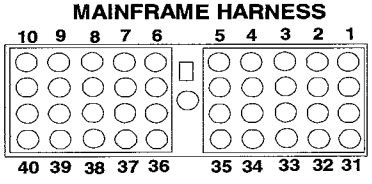
C418
FRONT ROD
SOLENOID
HARNESS SIDE

CAB HARNESS



C114

MAINFRAME HARNESS

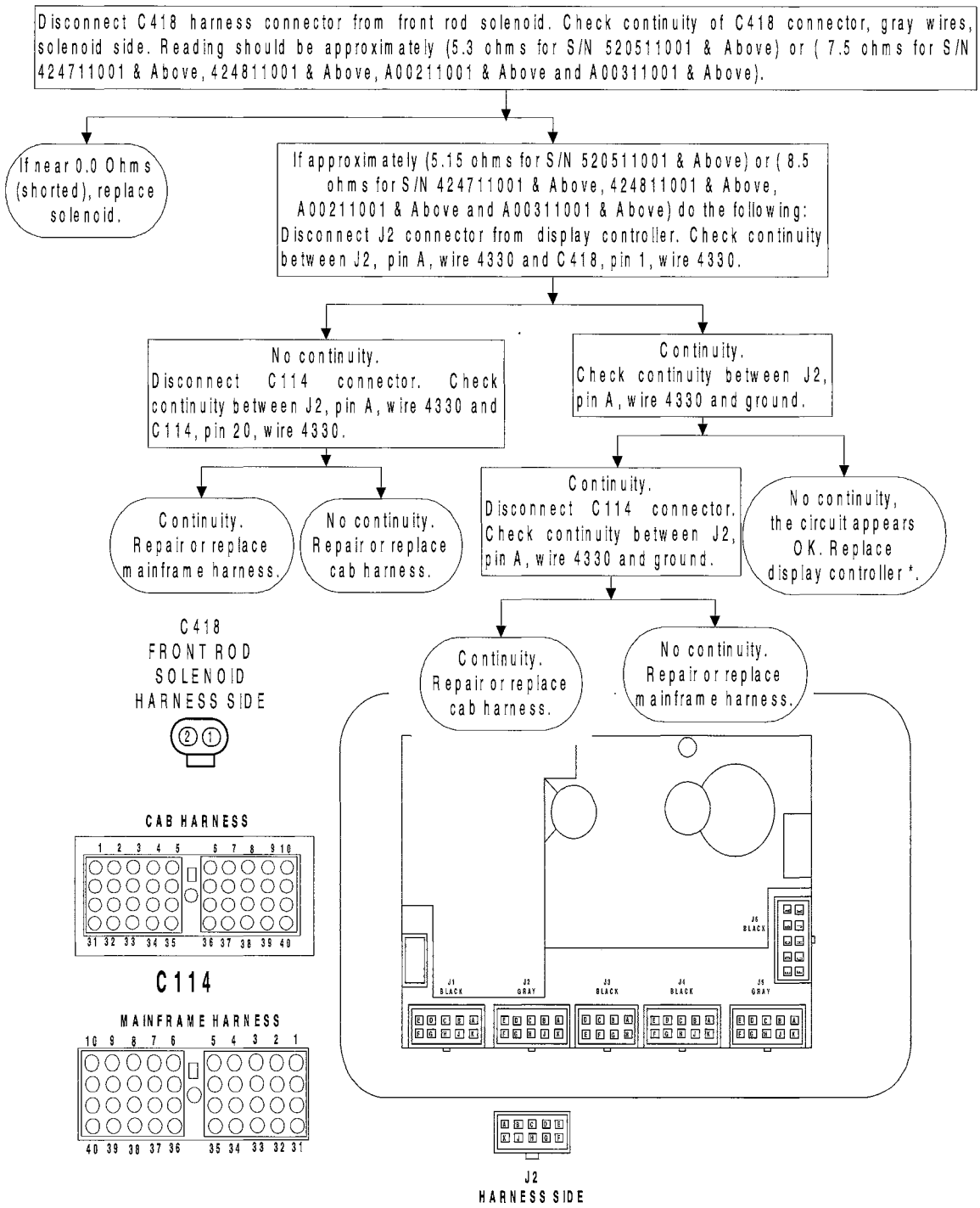


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 27-03

Code 27-03:
FRONT ROD OUTPUT ERROR OFF

Refer to appropriate electrical schematics for circuit description.



* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.

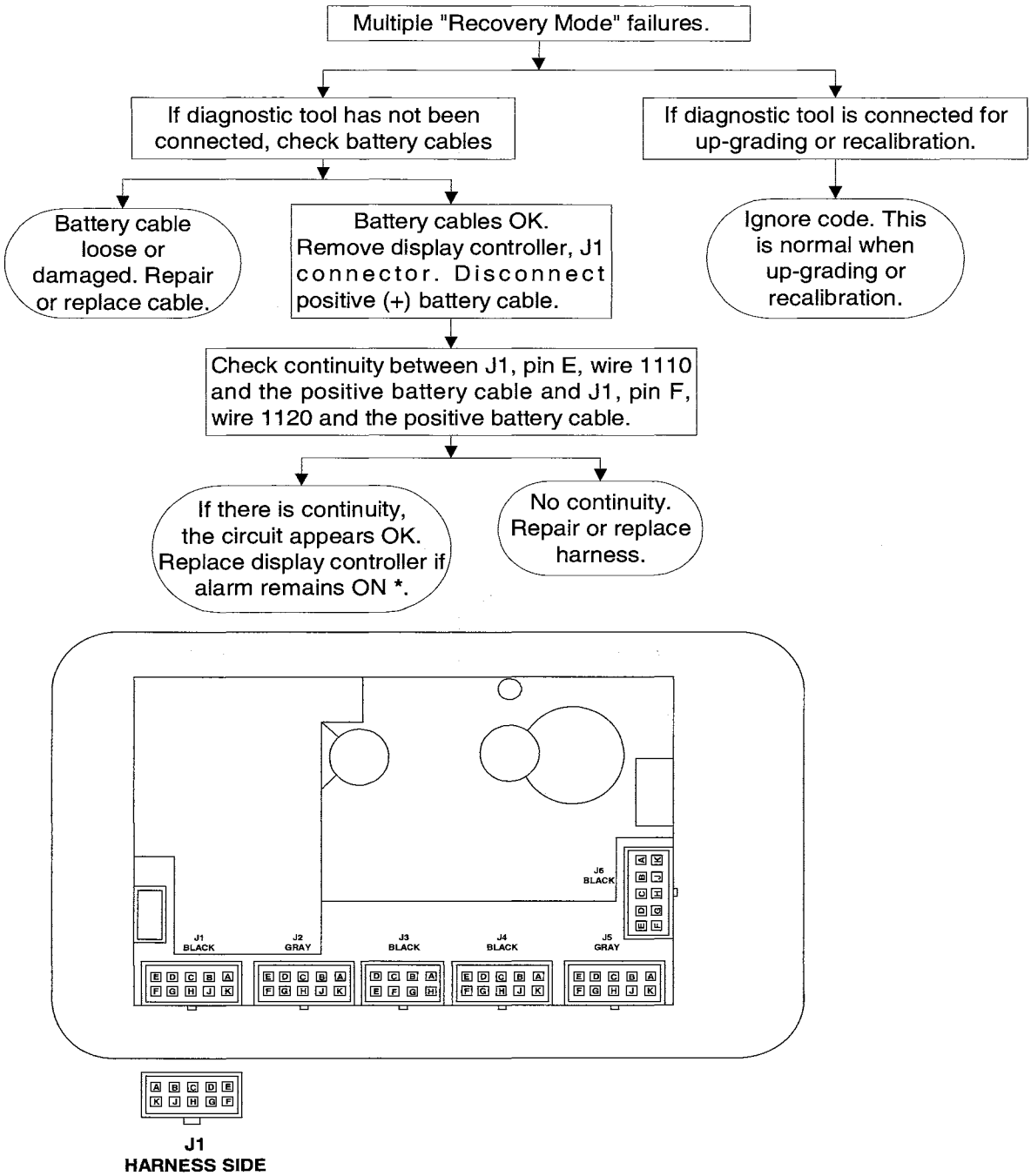
Code 30-28:
WATCH DOG FAILURE

During normal operation, the operator should never encounter this code. The service code should only be displayed under stored service codes, when connected to a diagnostic service tool. When the watch dog failure occurs, it is internally reset in the controller. If a number of these codes are stored, it could indicate a potential controller failure.

Probable cause: controller failure. (See the Service Manual for the correct replacement procedure.)

Code 31-28:
RECOVERY MODE FAILURE

Refer to appropriate electrical schematics for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 33-23:
CONSTANT DATA NOT CALIBRATED

This service code would occur if the controller was replaced with a service controller that was not programmed.

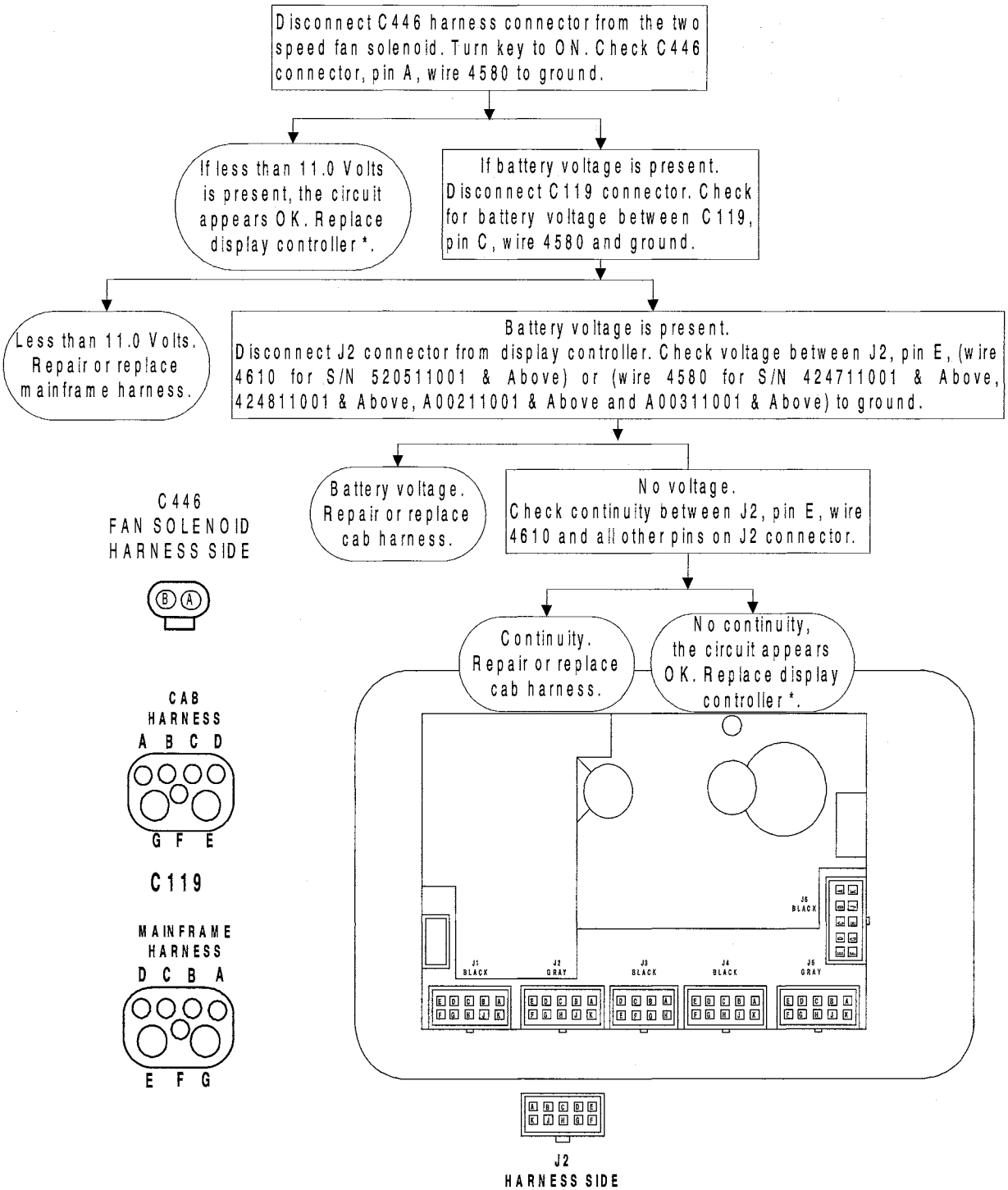
Probable cause: Display controller not initialized.

1. Go through programming (initialization) procedure as outlined in manual.

Code 35-05

Code 35-05:
TWO-SPEED FAN SHORT TO BATTERY

Refer to appropriate electrical schematic for circuit description.



* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.

Code 35-06

Code 35-06:
TWO-SPEED FAN SHORT TO GROUND

Refer to appropriate electrical schematic for circuit description.

Disconnect C446 harness connector from the two speed fan solenoid. Ohmmeter check across solenoid wires. The reading should be approximately (5.15 ohms for S/N 520511001 & Above) or (8.5 ohms for S/N 424711001 & Above, 424811001 & Above, A00211001 & Above and A00311001 & Above).

Solenoid shorted. Replace solenoid.

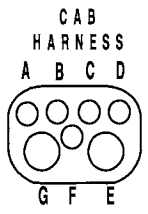
Solenoid checks OK.
Disconnect display controller J2 connector. Check J2, pin E, (wire 4610 for S/N 520511001 & Above) or (wire 4580 for S/N 424711001 & Above, 424811001 & Above, A00211001 & Above and A00311001 & Above) to ground.

No continuity, the circuit appears OK. Replace display controller *.

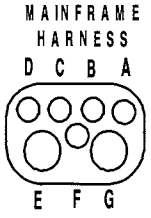
Continuity.
Disconnect C119 connector. Check contiinuity between J2, pin E, (wire 4610 for S/N 520511001 & Above) or (wire 4580 for S/N 424711001 & Above, 424811001 & Above, A00211001 & Above and A00311001 & Above) to ground.

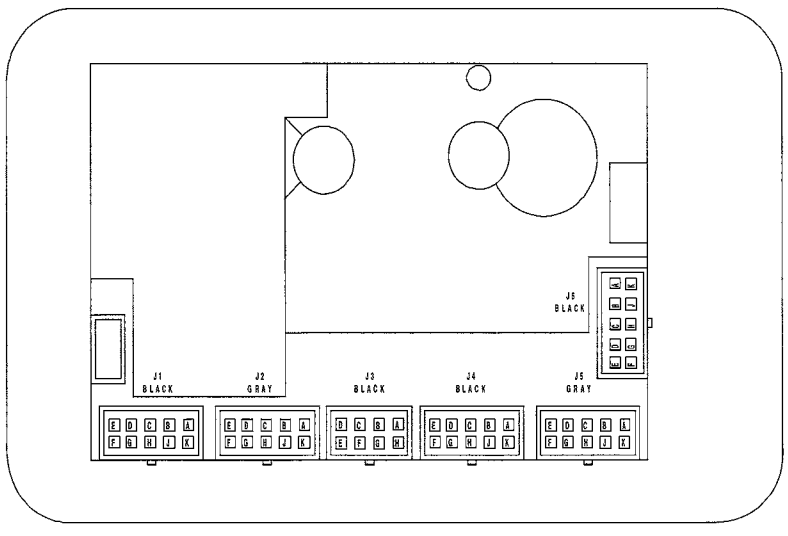
No continuity. Repair or replace mainframe harness.

Continuity. Repair or replace cab harness.

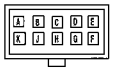


C119





C446
FAN SOLENOID
HARNESS SIDE



J2
HARNESS SIDE

* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.

Code 36-48:
ACD MULTIPLE CONTROLLERS PRESENT

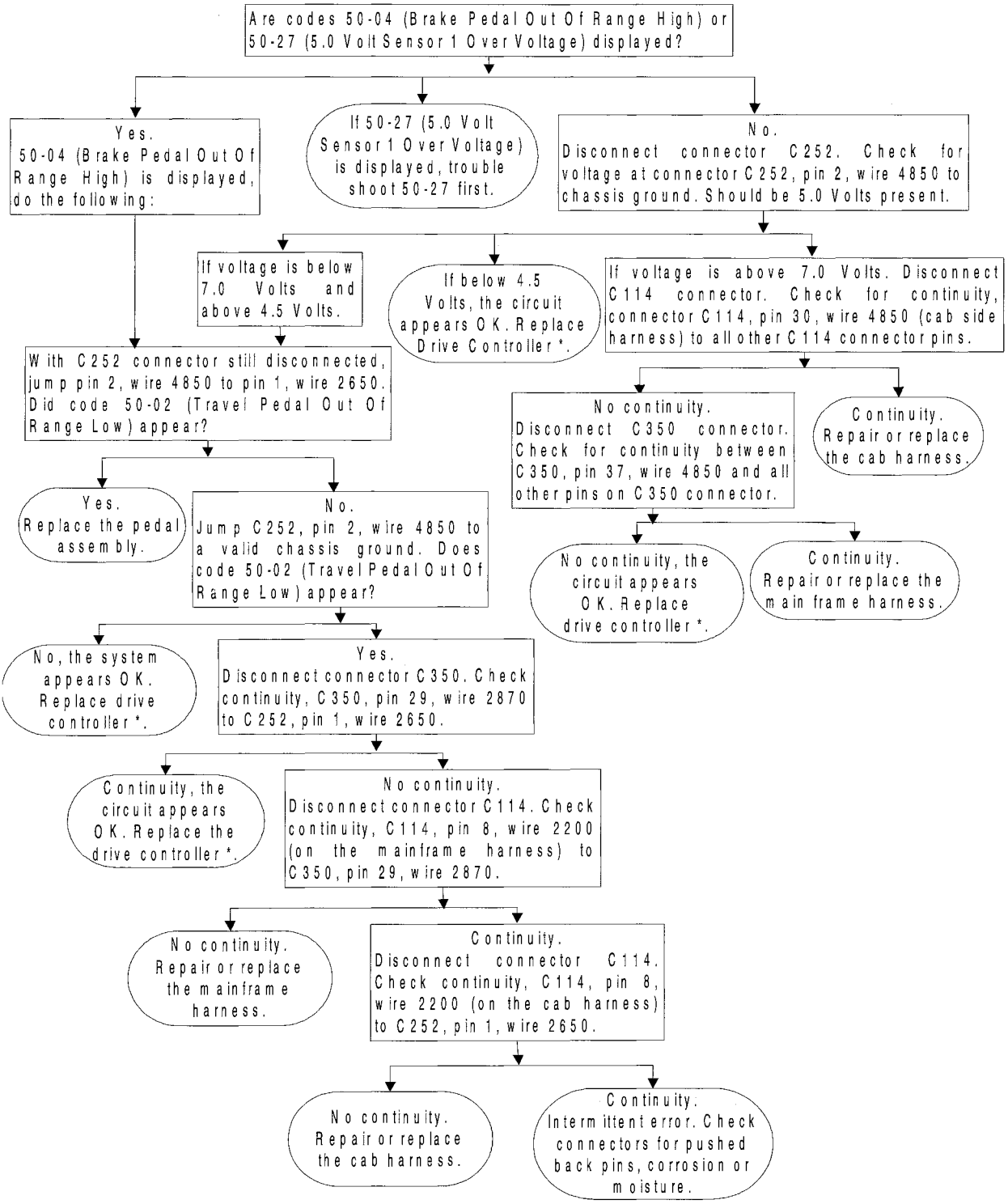
Refer to appropriate electrical schematics for circuit description.

Since the machine will only use the 7 pin attachment setup, we will not have more than one ACD in the system. This code could indicate a wiring harness or an ACD problem.

Code 50-01

Code 50-01:
TRAVEL PEDAL OUT OF RANGE HIGH

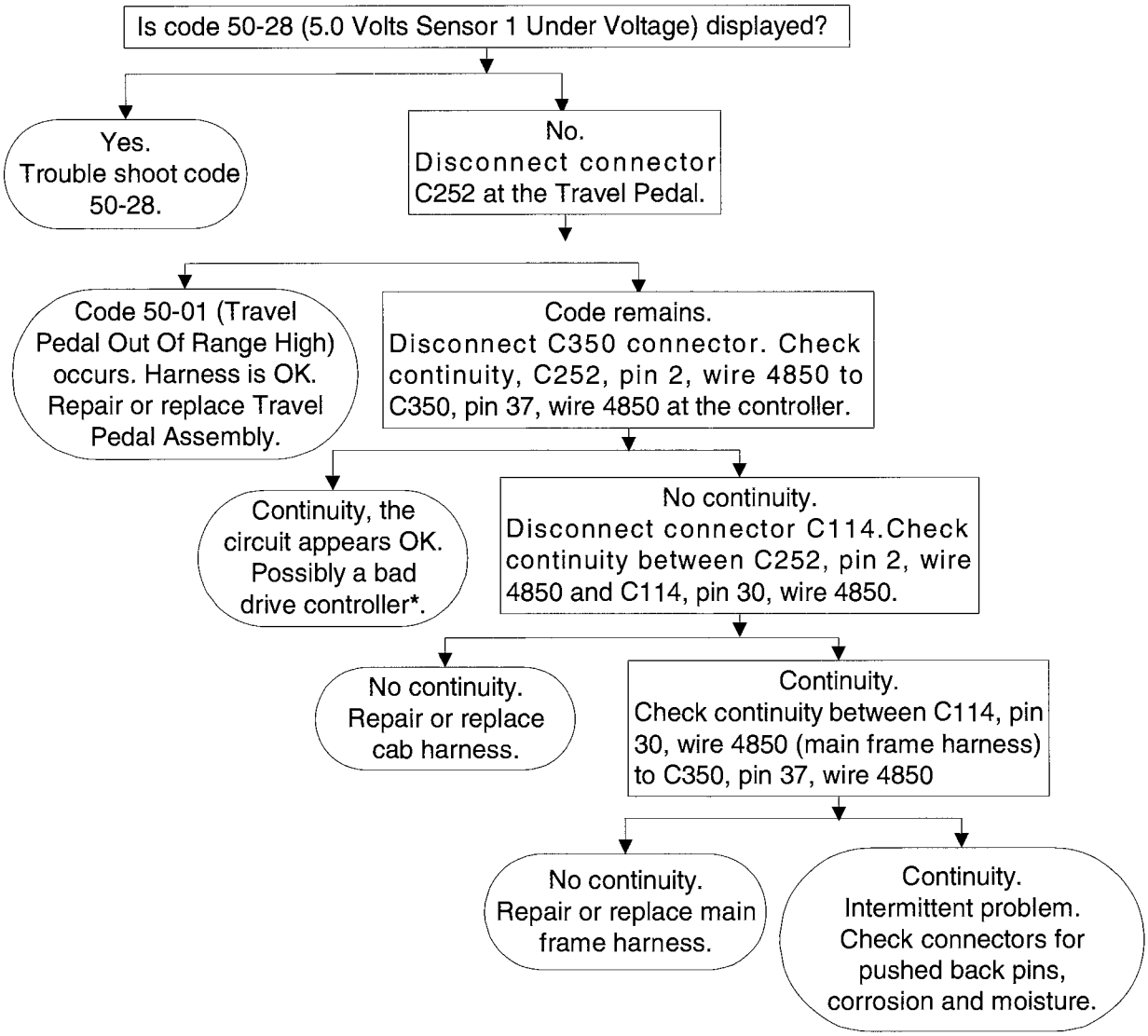
Refer to appropriate electrical schematic for circuit description.



* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.

Code 50-02:
TRAVEL PEDAL OUT OF RANGE LOW

Refer to appropriate electrical schematic for circuit description.



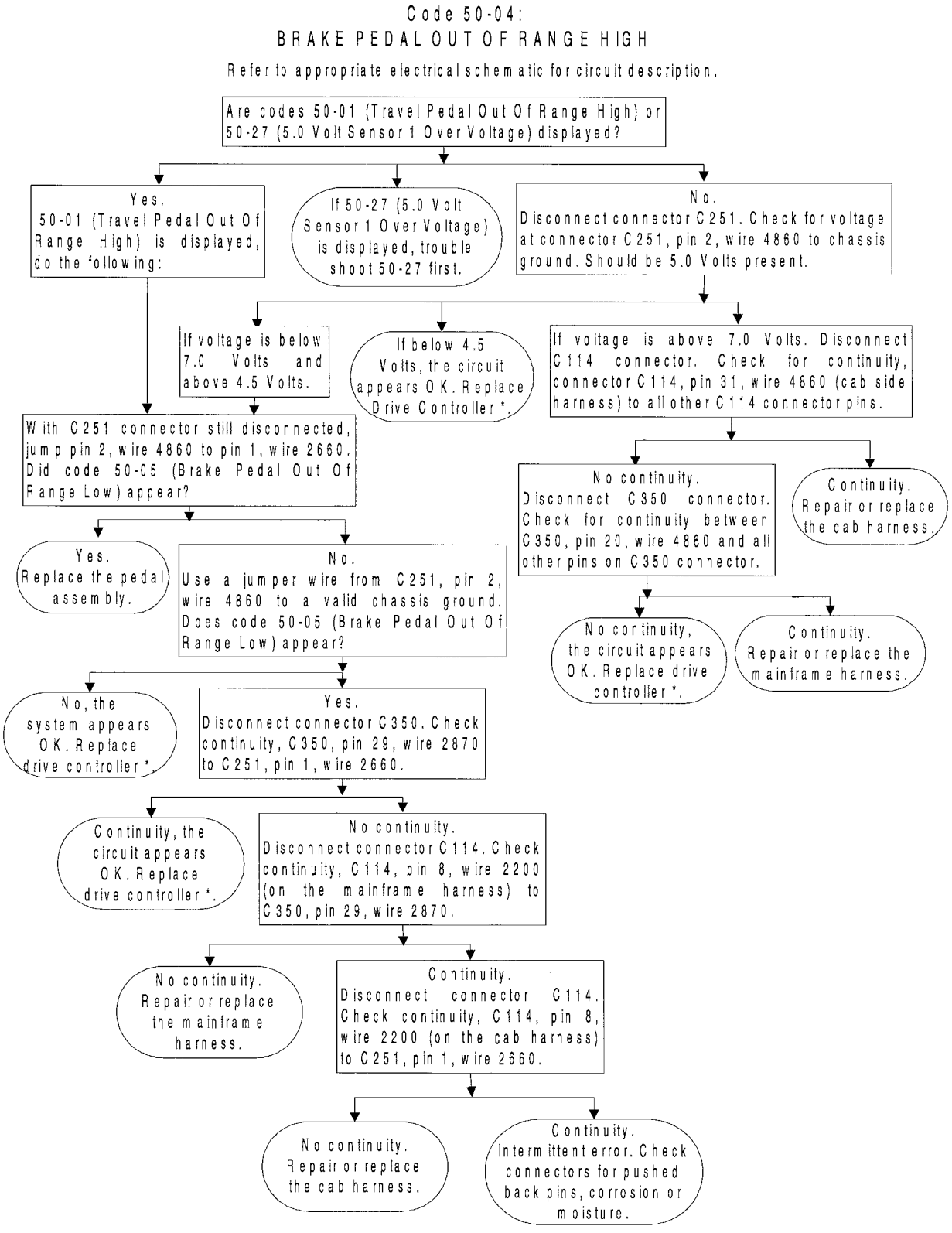
*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-03:
TRAVEL PEDAL NOT CALIBRATED

Refer to appropriate electrical schematics for circuit description.

Possible bad pedal senders or pedals did not achieve full stroke or pedals did not return to neutral during calibration. This code will also be active when the travel/brake pedal or the controller is replaced. If a new controller is installed, multiple codes will occur.

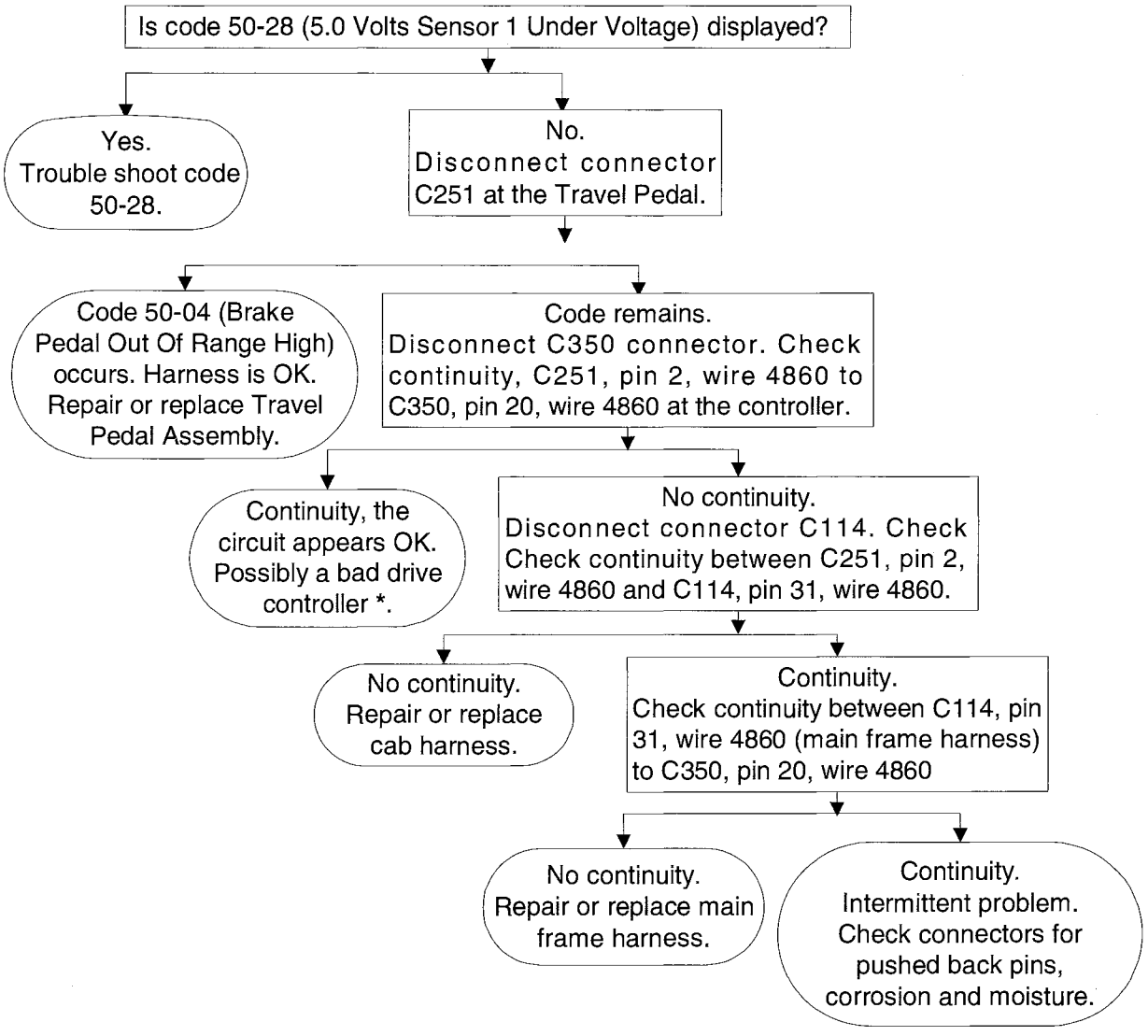
Code 50-04



* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.

Code 50-05:
BRAKE PEDAL OUT OF RANGE LOW

Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-06:
BRAKE PEDAL NOT CALIBRATED

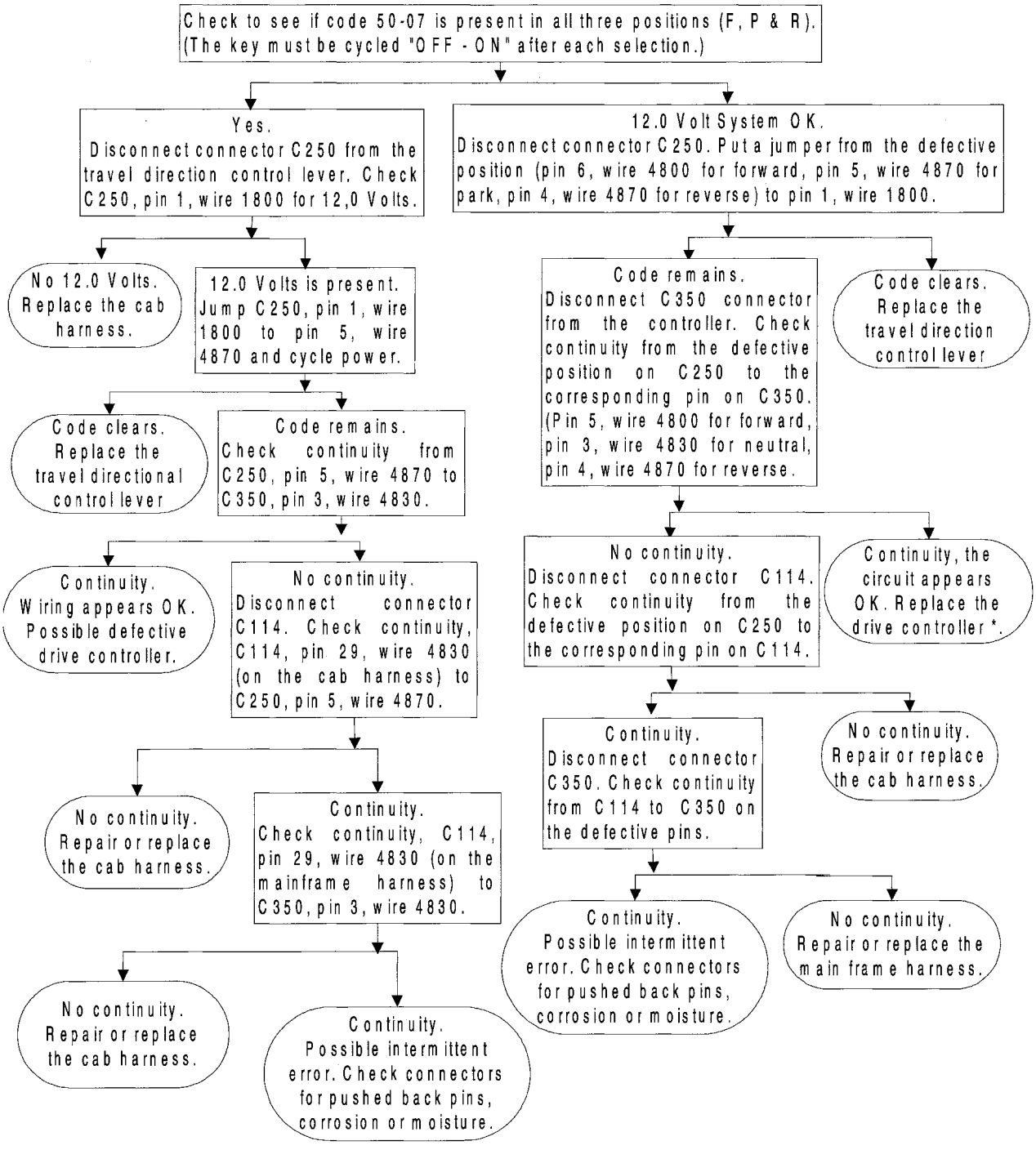
Refer to appropriate electrical schematics for circuit description.

Possible bad pedal senders or pedals did not achieve full stroke or pedals did not return to neutral during calibration. This code will also be active when the travel/brake pedal or the controller is replaced. If a new controller is installed, multiple codes will occur.

Code 50-07

Code 50-07:
TRAVEL DIRECTION CONTROL LEVER - NO SIGNAL

Refer to appropriate electrical schematic for circuit description.

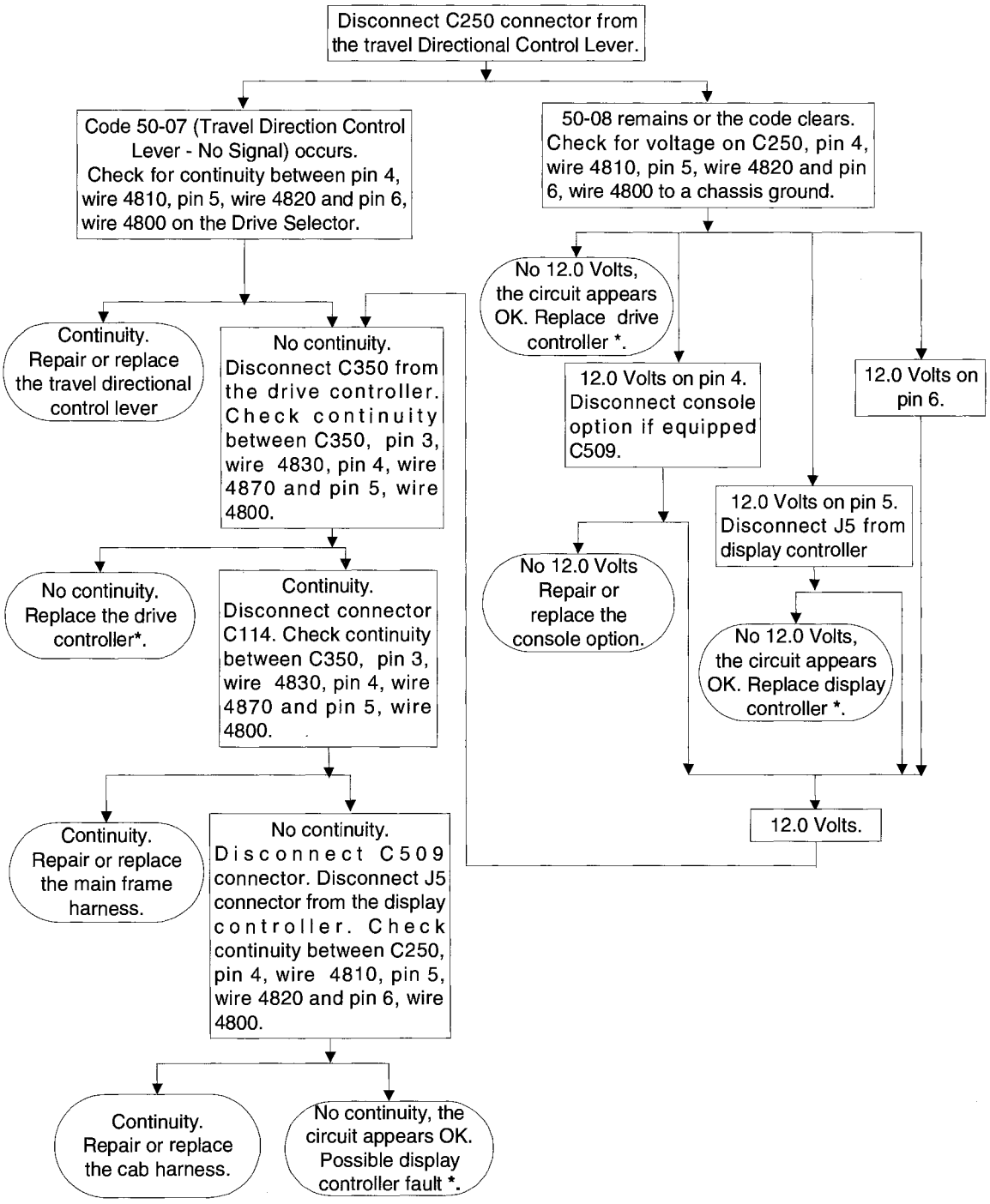


* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.

Code 50-08

Code 50-08:
TRAVEL DIRECTION CONTROL LEVER - MULTIPLE SIGNALS

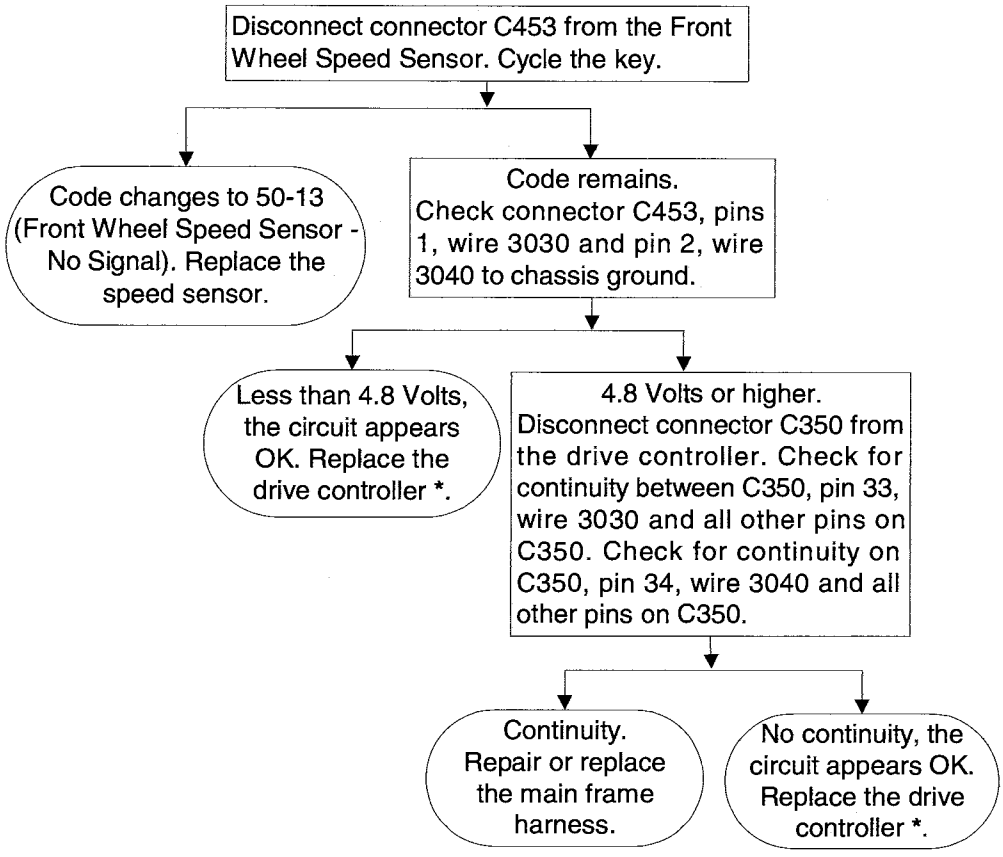
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: loose connections, corrosion, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-09:
FRONT WHEEL SPEED OUT OF RANGE HIGH

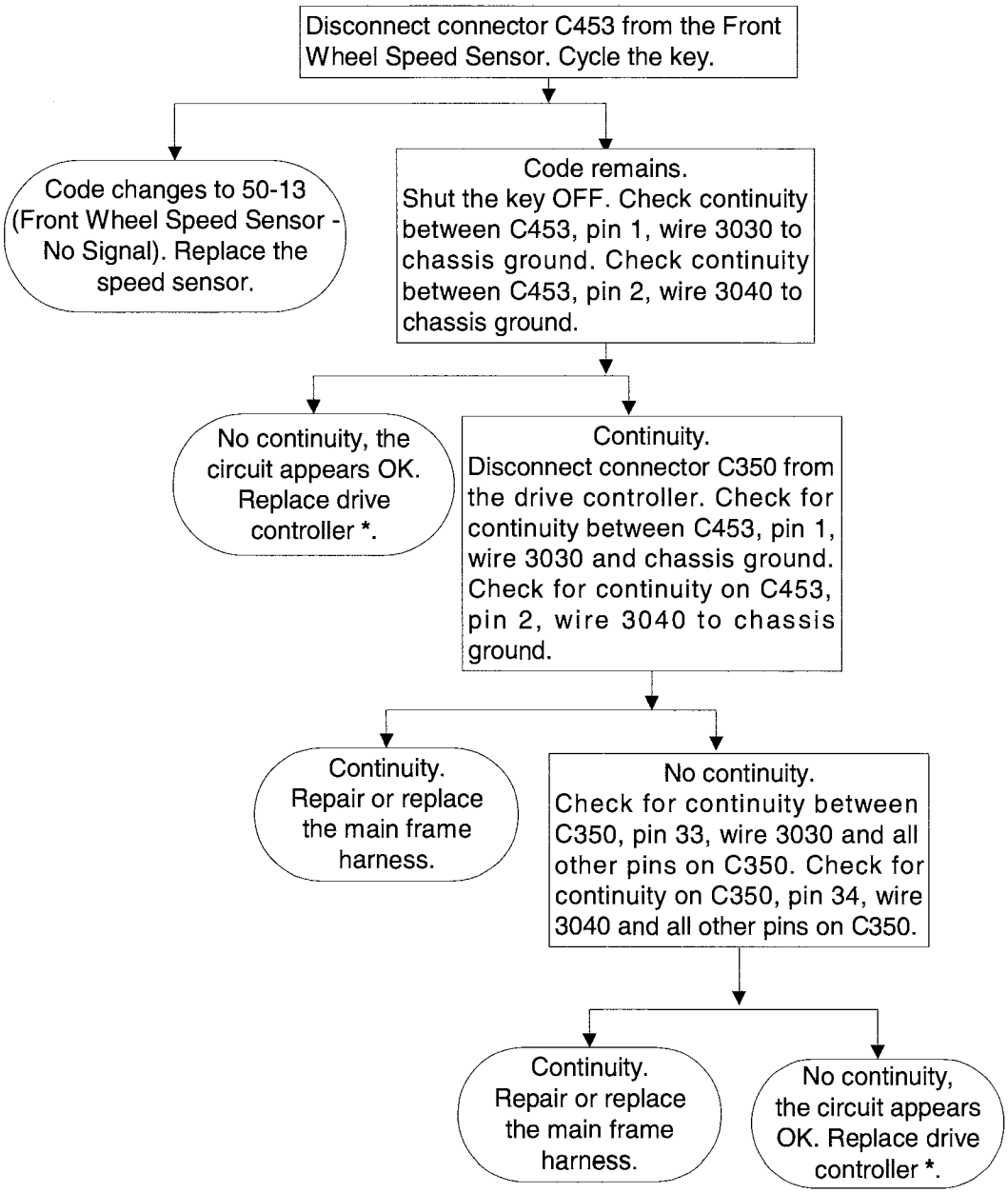
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-10:
FRONT WHEEL SPEED OUT OF RANGE LOW

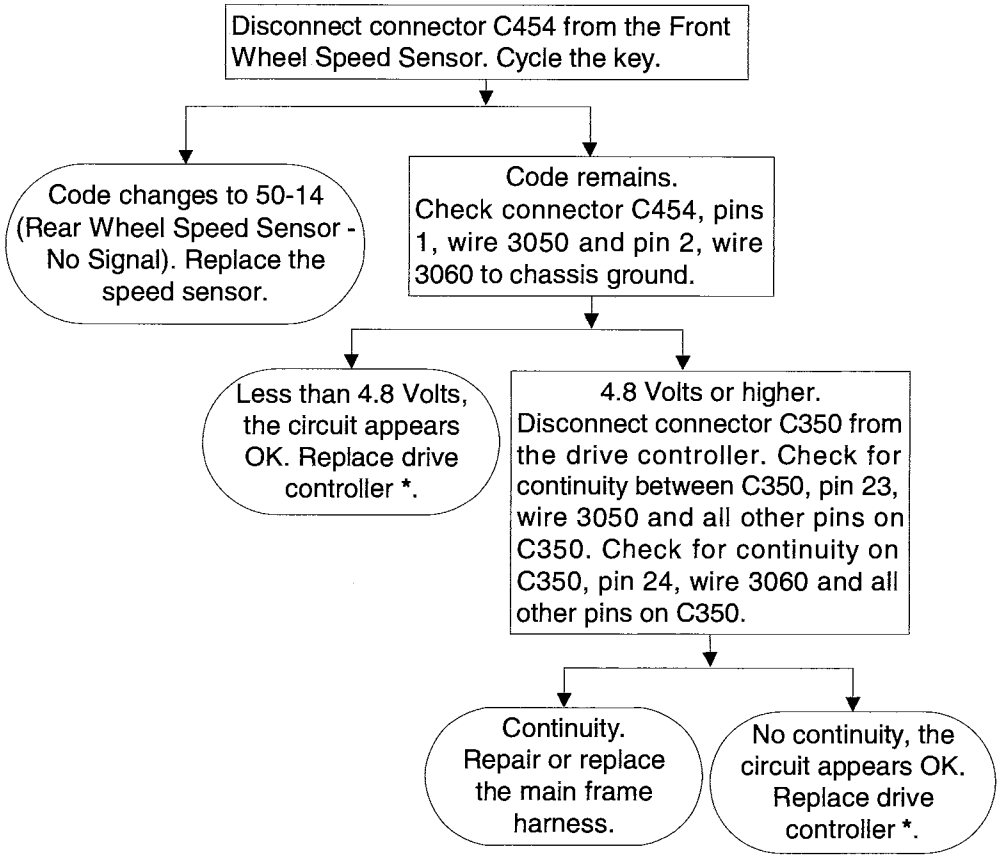
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-11:
REAR WHEEL SPEED OUT OF RANGE HIGH

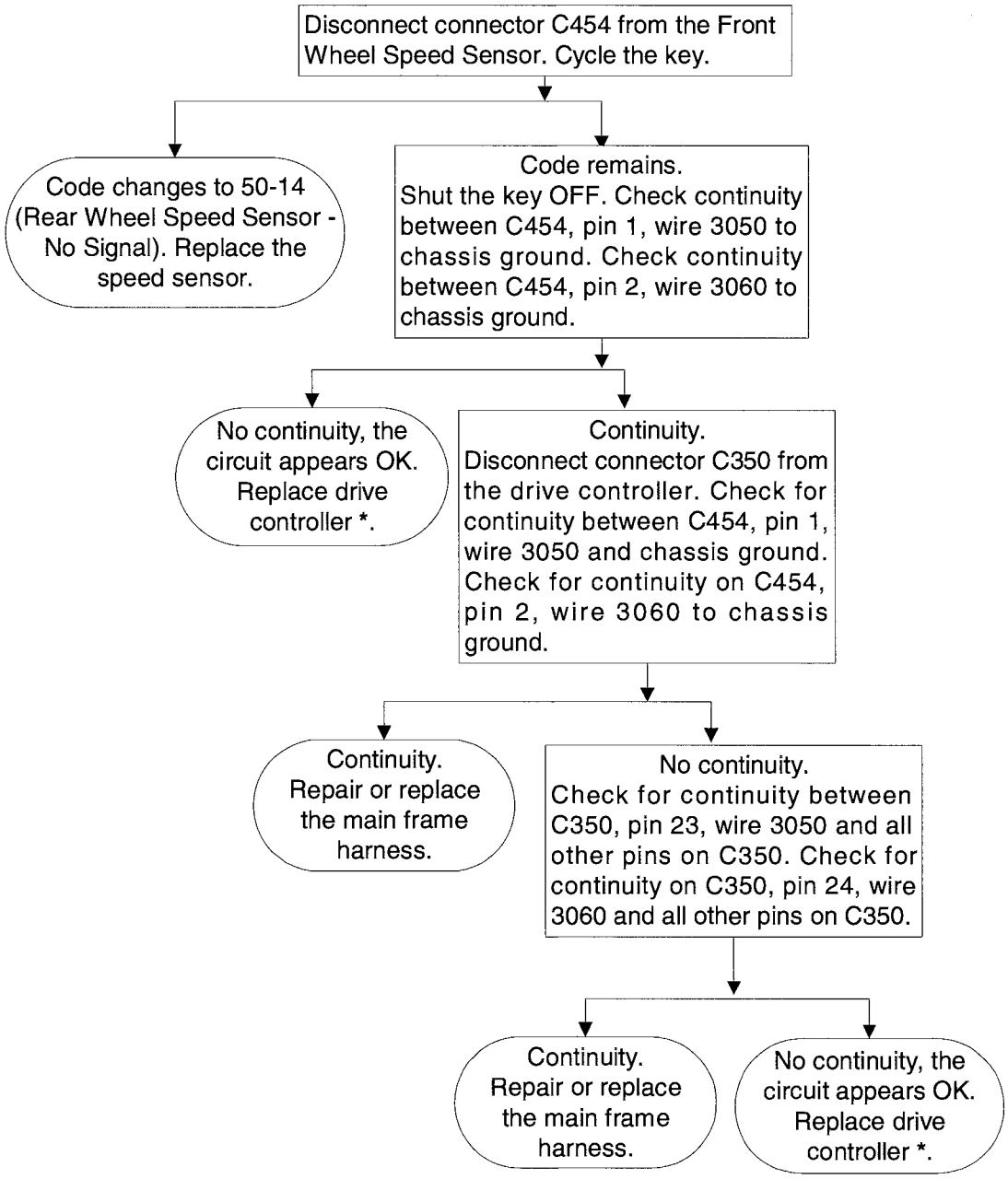
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-12:
REAR WHEEL SPEED OUT OF RANGE LOW

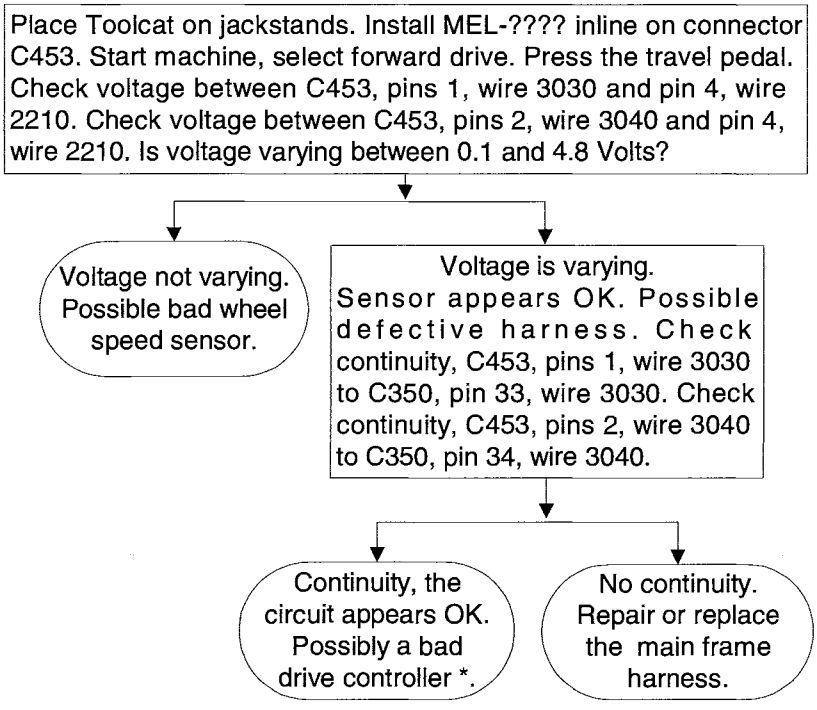
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-13:
FRONT WHEEL SPEED SENSOR - NO SIGNAL

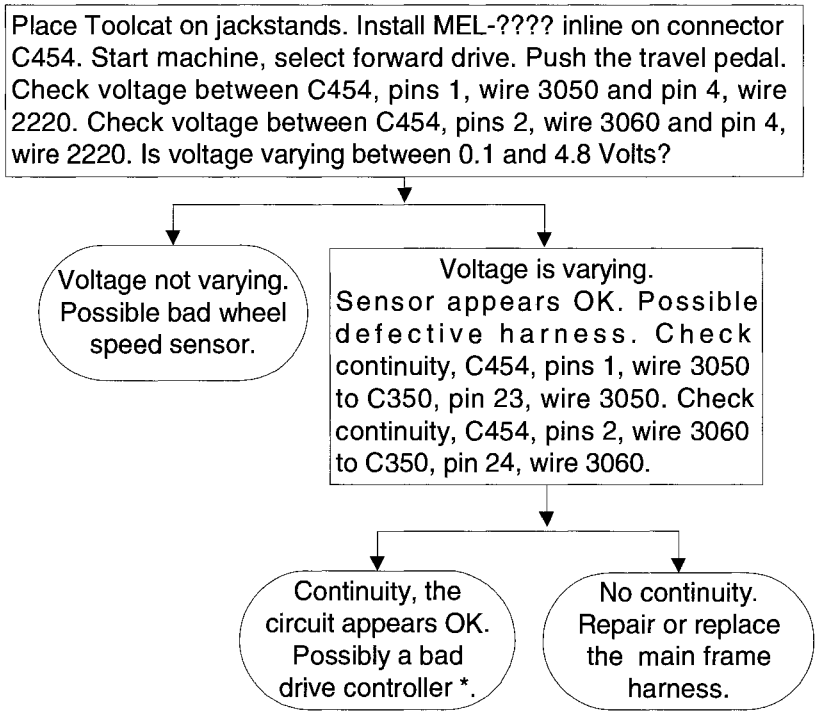
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-14:
REAR WHEEL SPEED SENSOR - NO SIGNAL

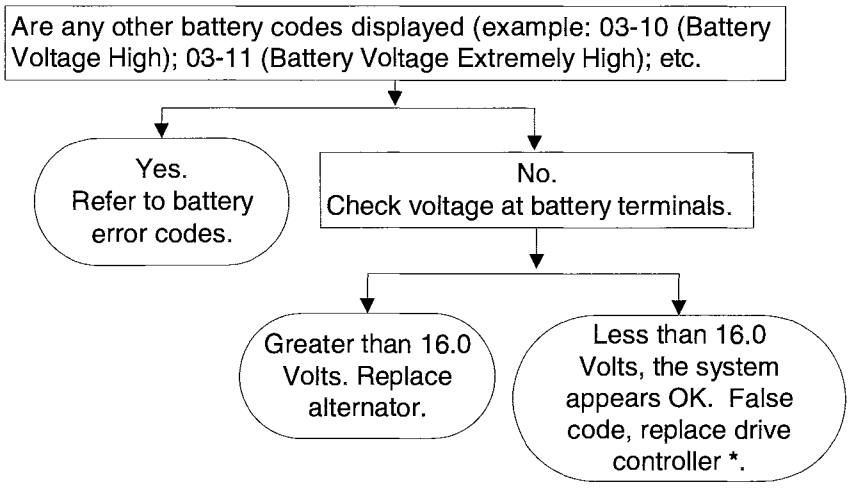
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-24:
BATTERY VOLTAGE OVERVOLTAGE - GREATER THAN 16.0 VOLTS

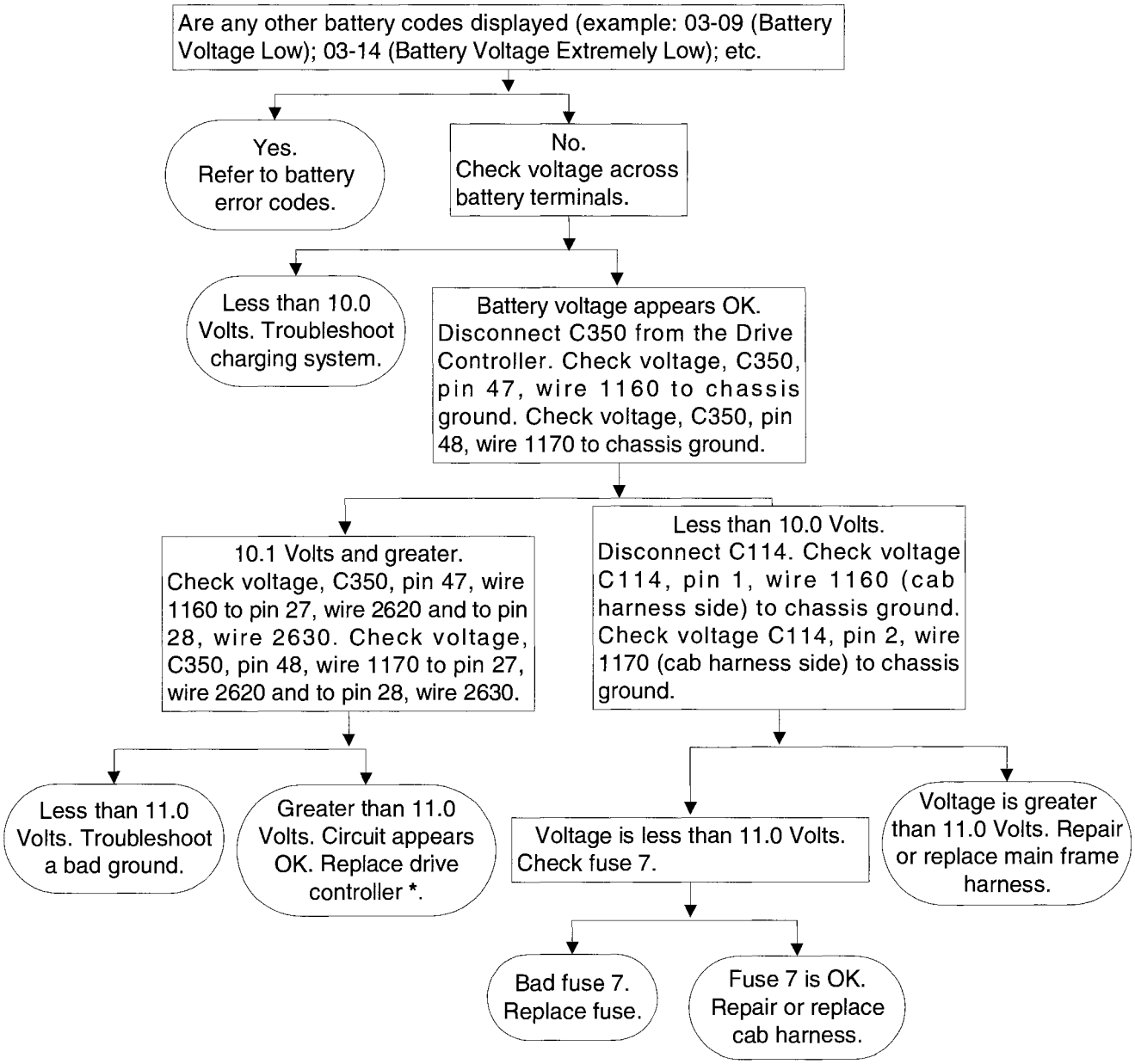
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-25:
BATTERY VOLTAGE UNDERVOLTAGE - LESS THAN 10 VOLTS

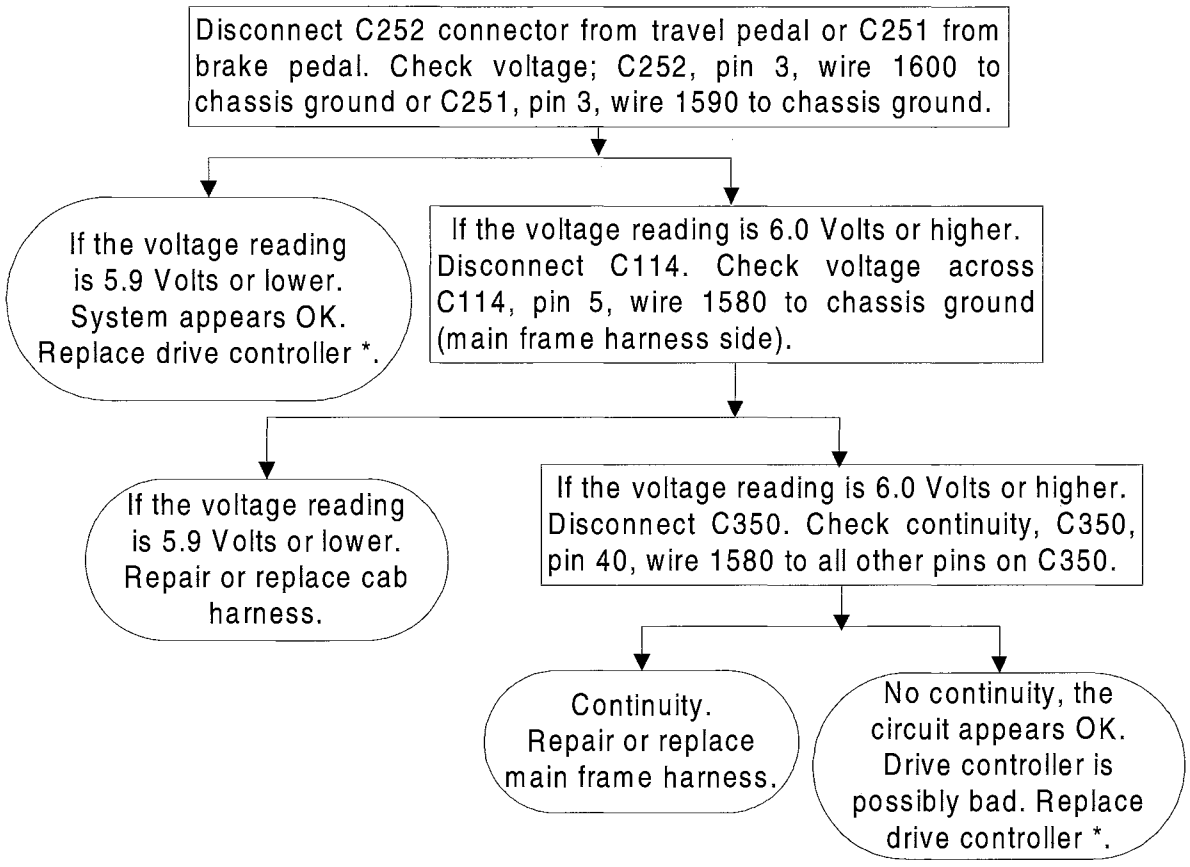
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-27:
5.0 VOLT SENSOR 1 OVERVOLTAGE

Refer to appropriate electrical schematic for circuit description.

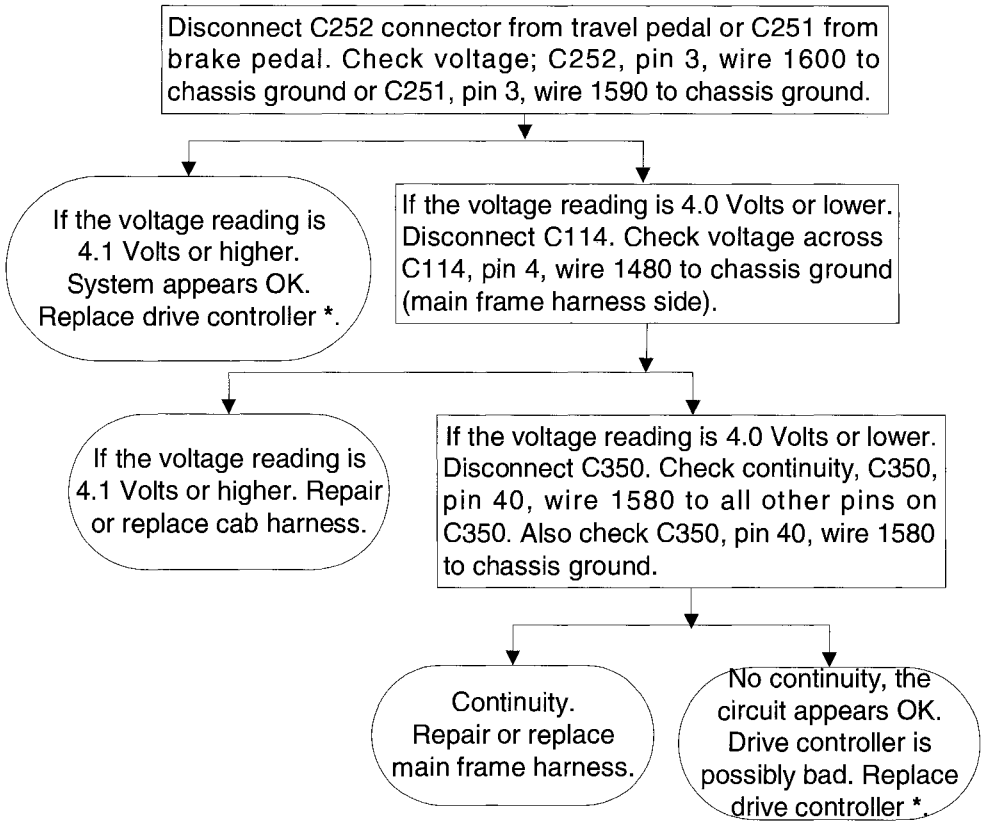


* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wire harness or a combination of these problems.

Code 50-28

Code 50-28:
5.0 VOLT SENSOR 1 UNDERVOLTAGE

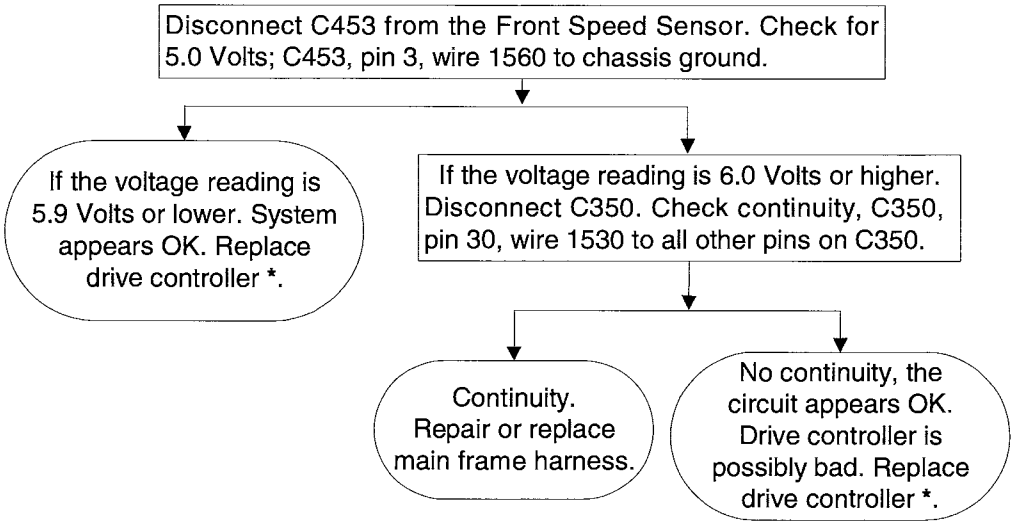
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-29:
5.0 VOLT SENSOR 2 OVERVOLTAGE

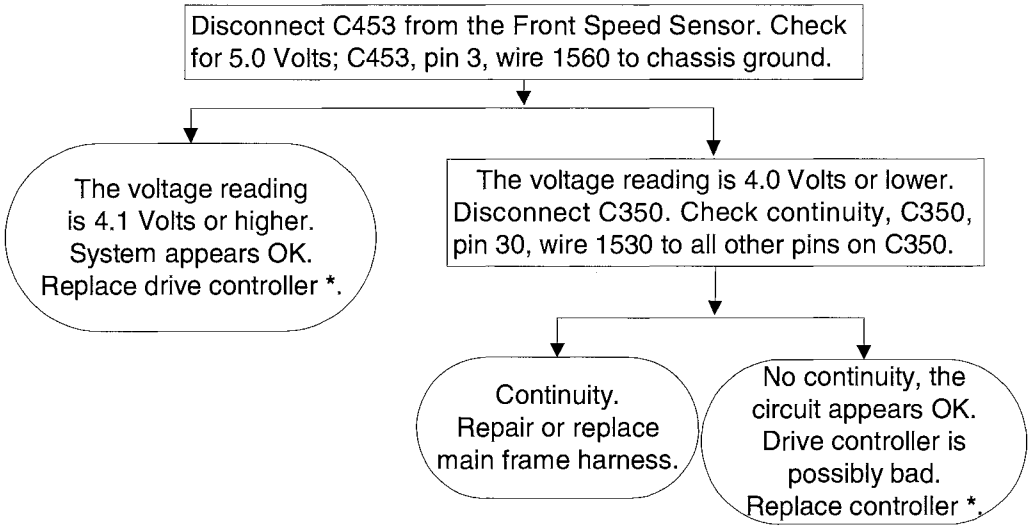
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-30:
5.0 VOLT SENSOR 2 UNDERVOLTAGE

Refer to appropriate electrical schematic for circuit description.

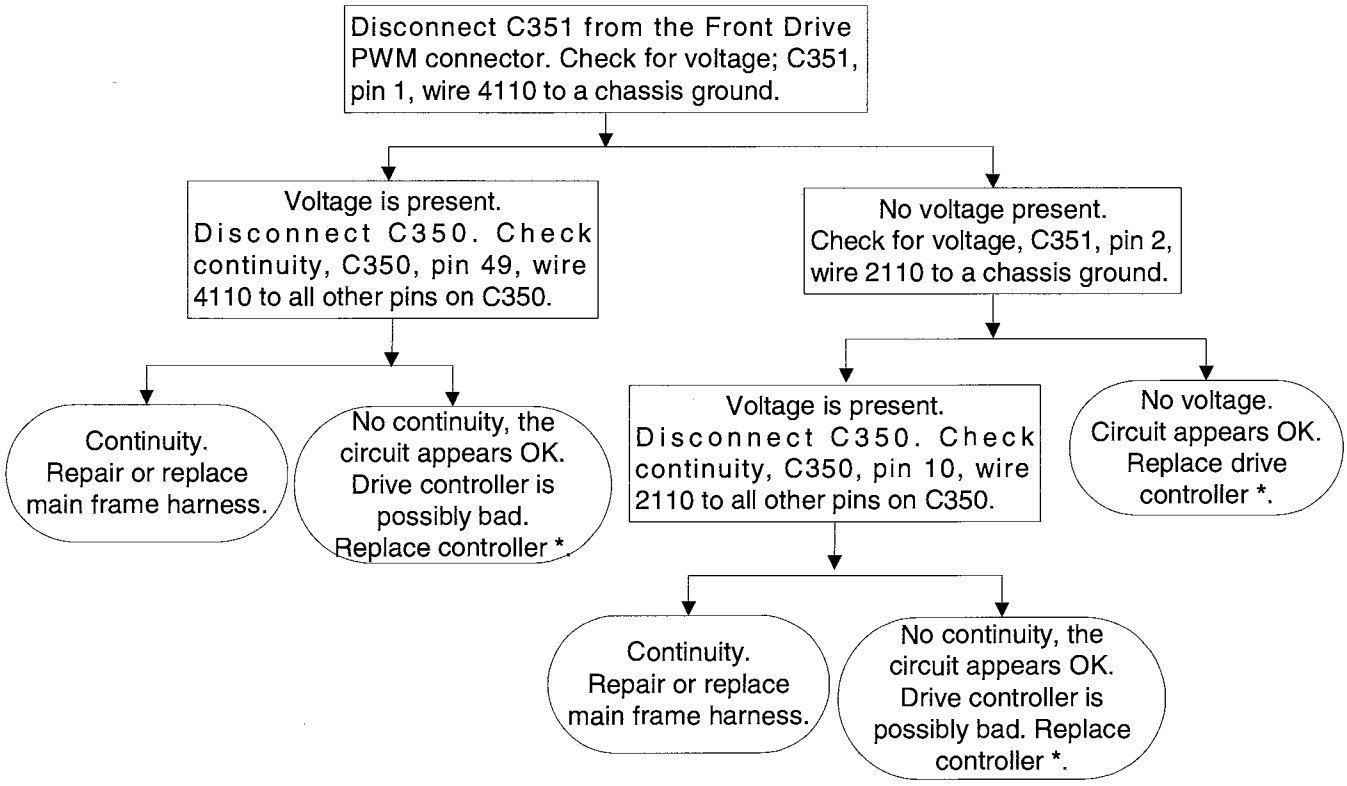


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-31

Code 50-31:
FRONT DRIVE PWM ERROR ON

Refer to appropriate electrical schematic for circuit description.

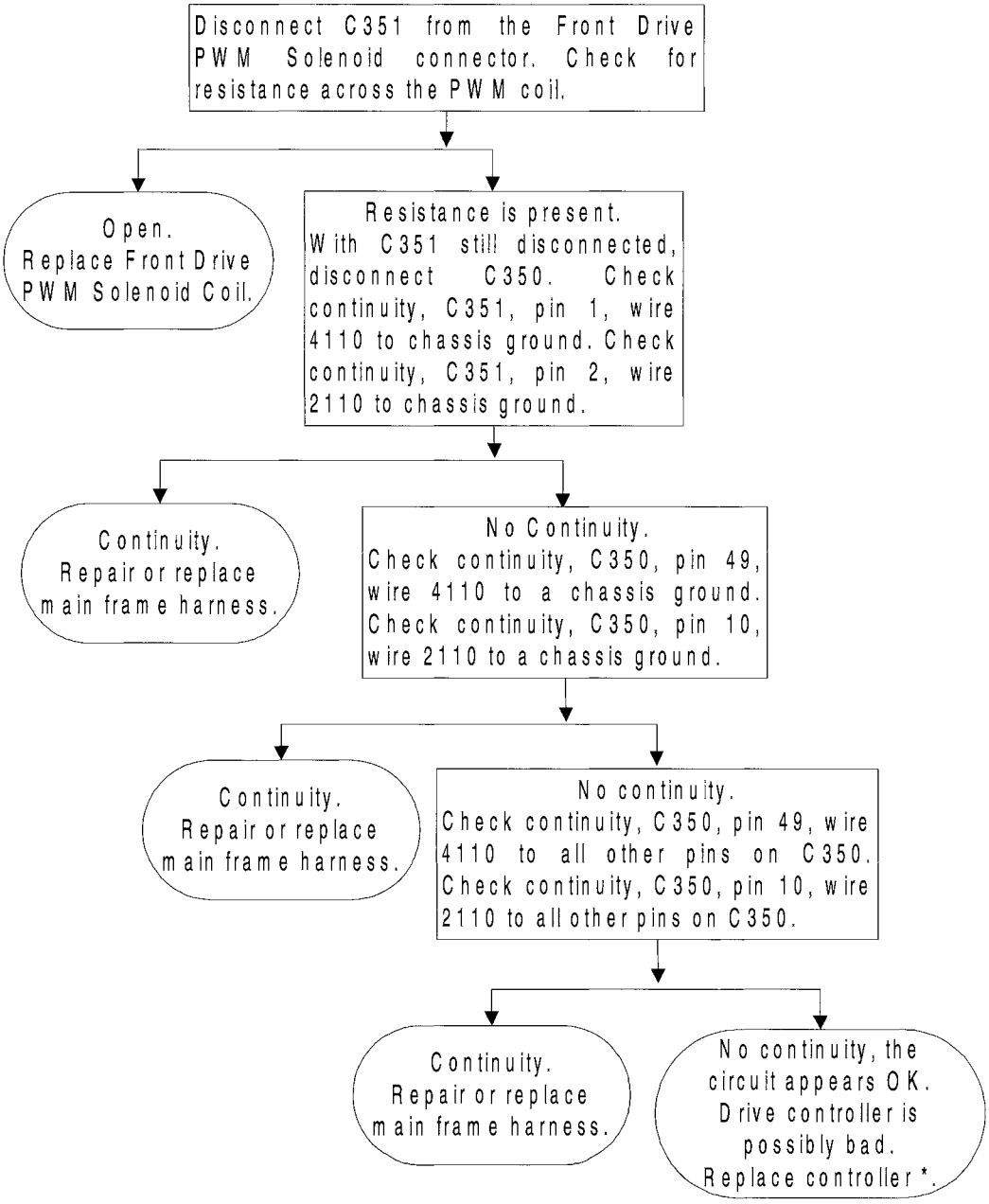


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-33

Code 50-33:
FRONT DRIVE PWM - NO SIGNAL

Refer to appropriate electrical schematic for circuit description.



* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.

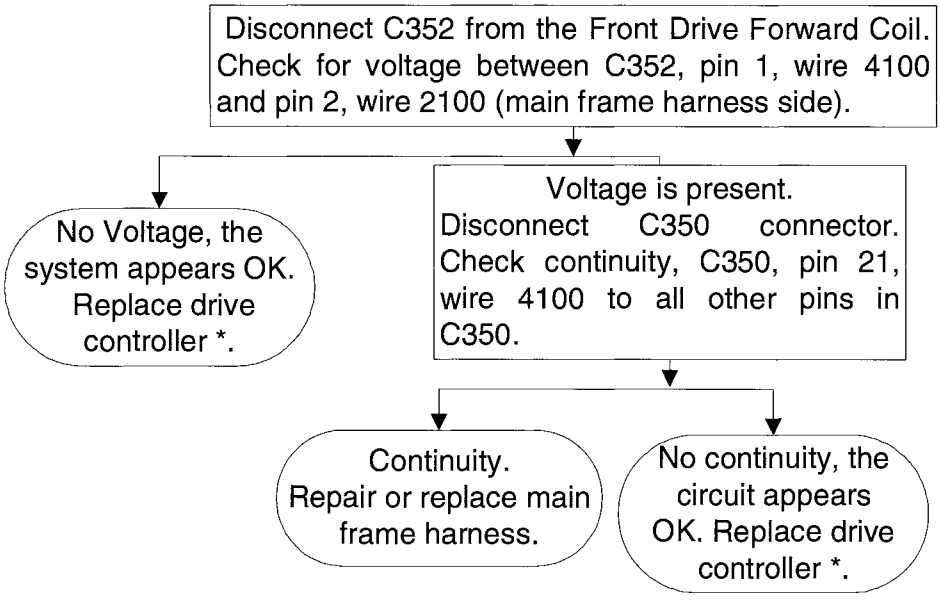
Code 50-34:
FRONT PWM NOT CALIBRATED

Refer to appropriate electrical schematics for circuit description.

See section 30 in the Service Manual for Drive Pump Calibration.

Code 50-35:
FRONT DRIVE FORWARD ERROR ON

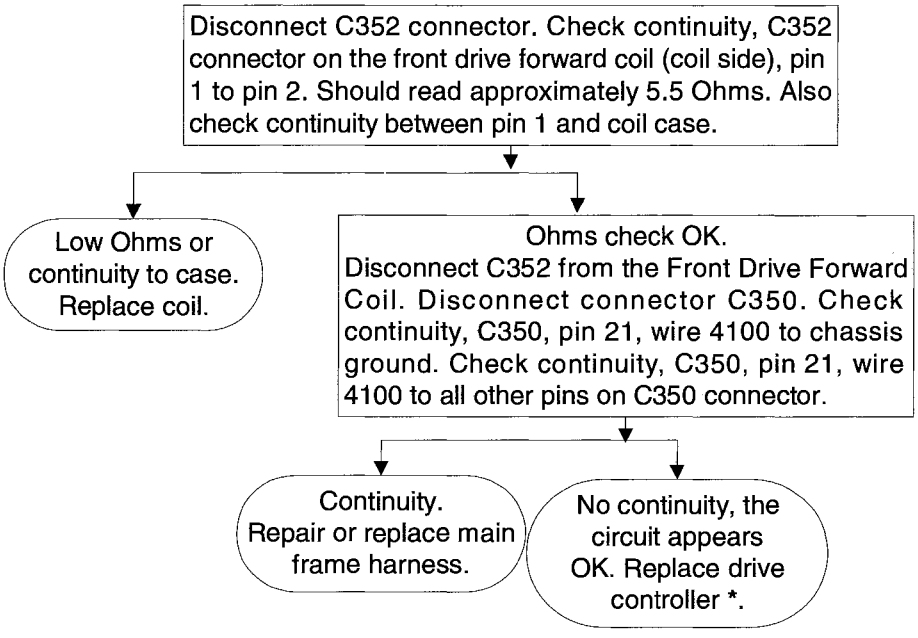
Refer to appropriate electrical schematic for circuit description.



* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be fou this time. Probable causes may include: Loose connections, pushed back pins, the controller, the w harness or a combination of these problems.

Code 50-36:
FRONT DRIVE FORWARD ERROR OFF

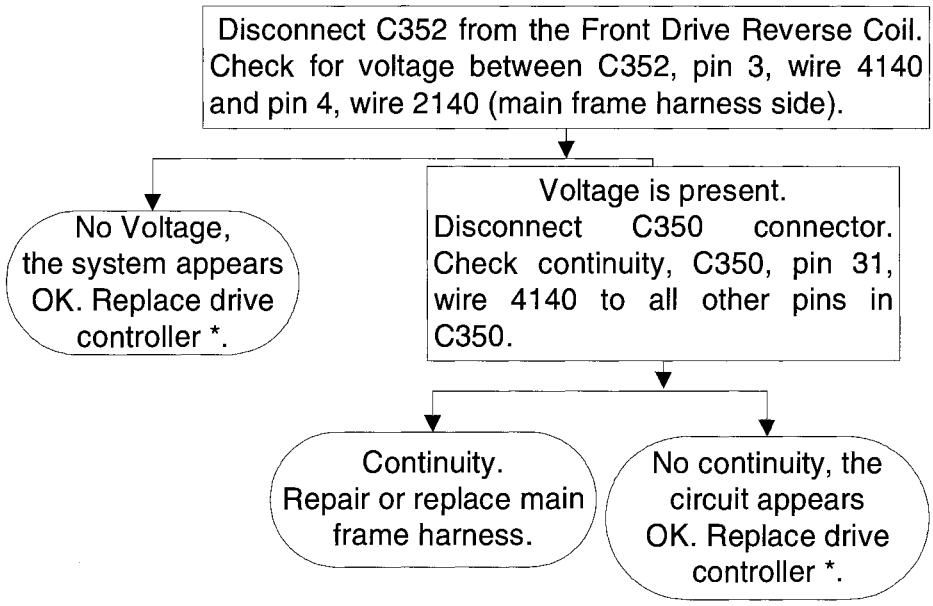
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-37:
FRONT DRIVE REVERSE ERROR ON

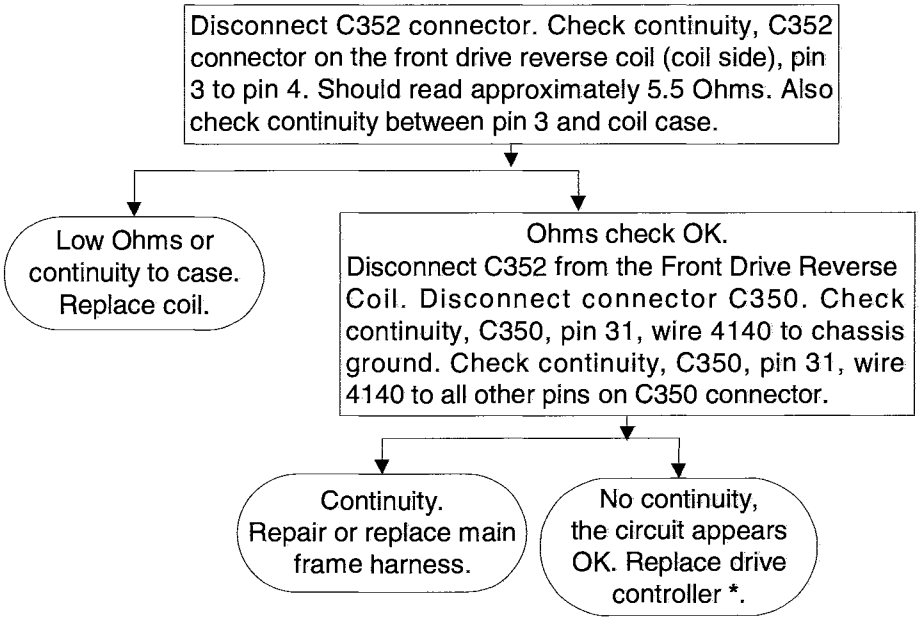
Refer to appropriate electrical schematic for circuit description.



* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiri harness or a combination of these problems.

Code 50-38:
FRONT DRIVE REVERSE ERROR OFF

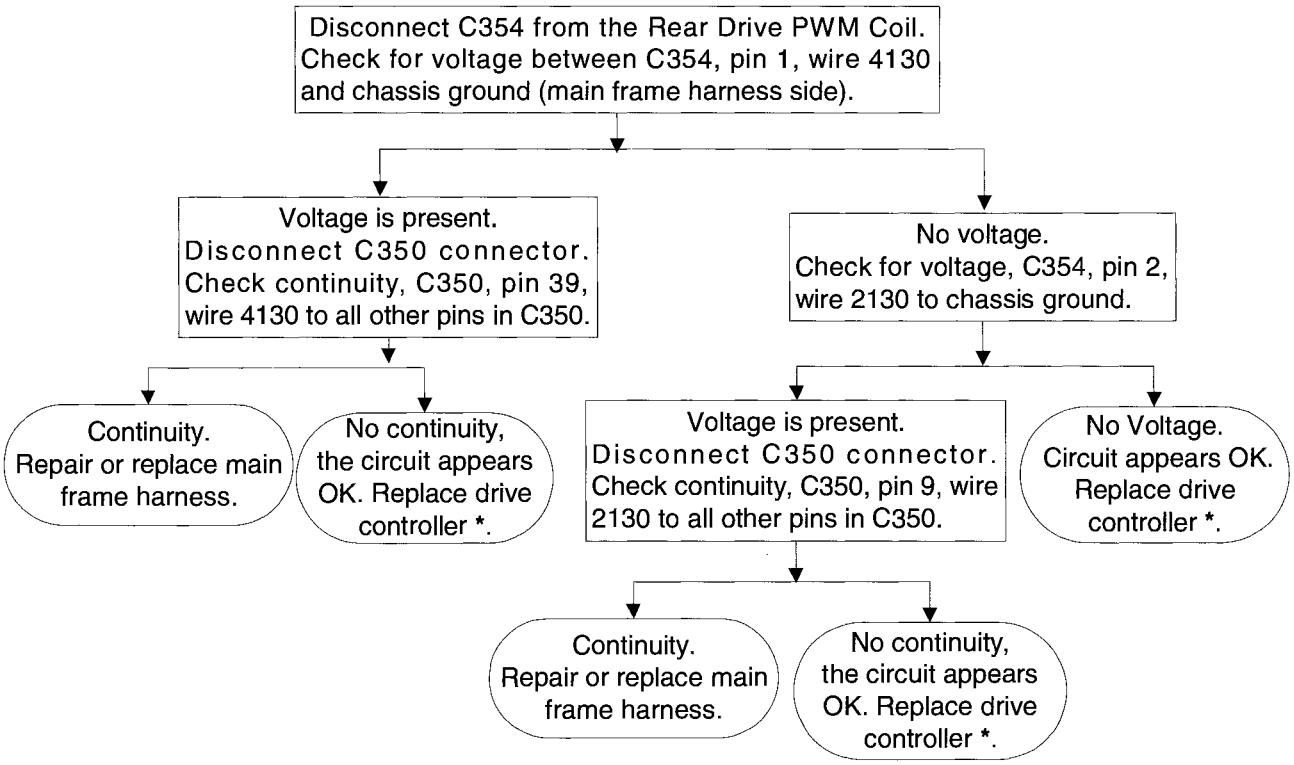
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-39:
REAR DRIVE PWM ERROR ON

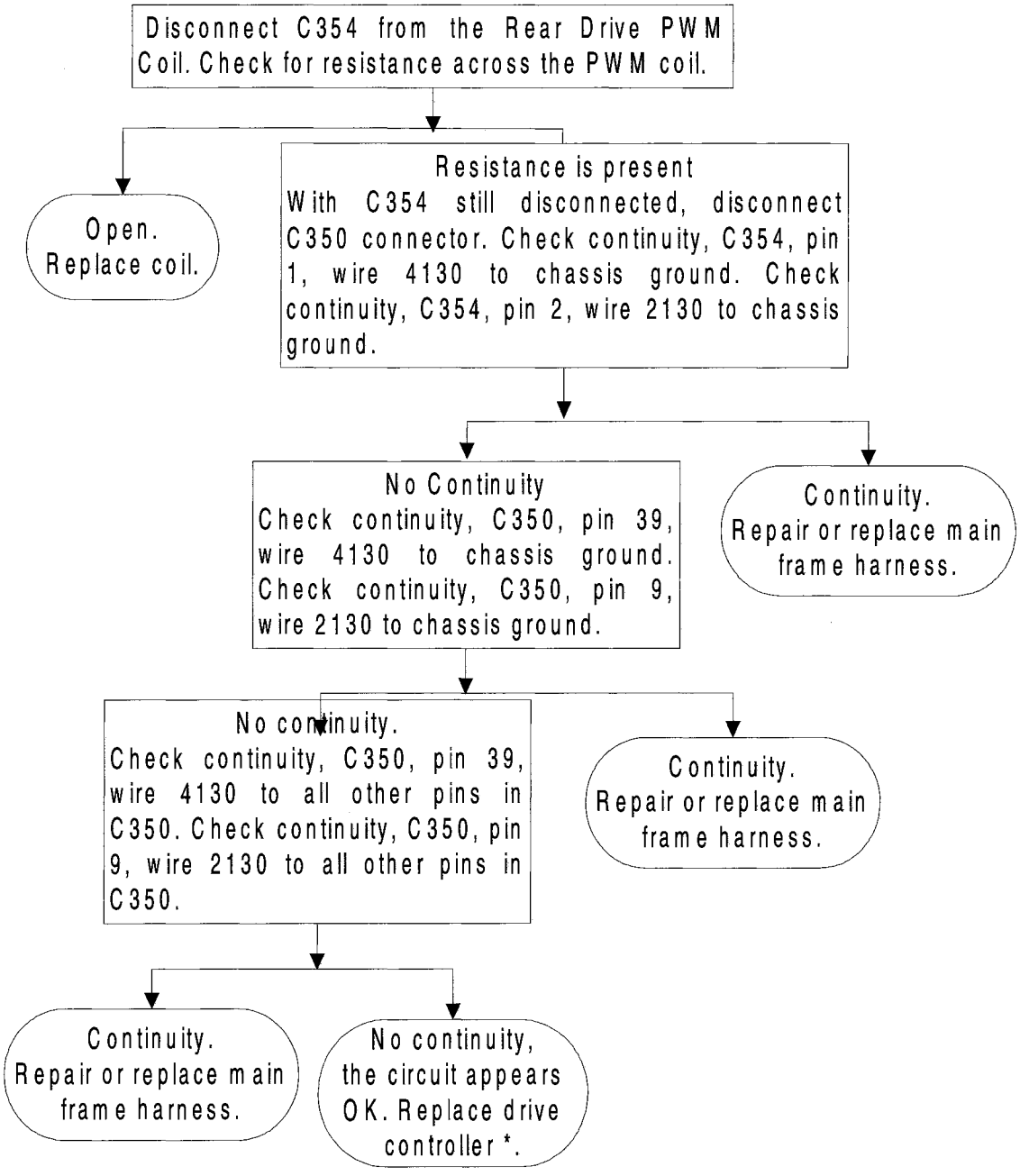
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-41:
REAR DRIVE PWM NO SIGNAL

Refer to appropriate electrical schematic for circuit description.



* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.

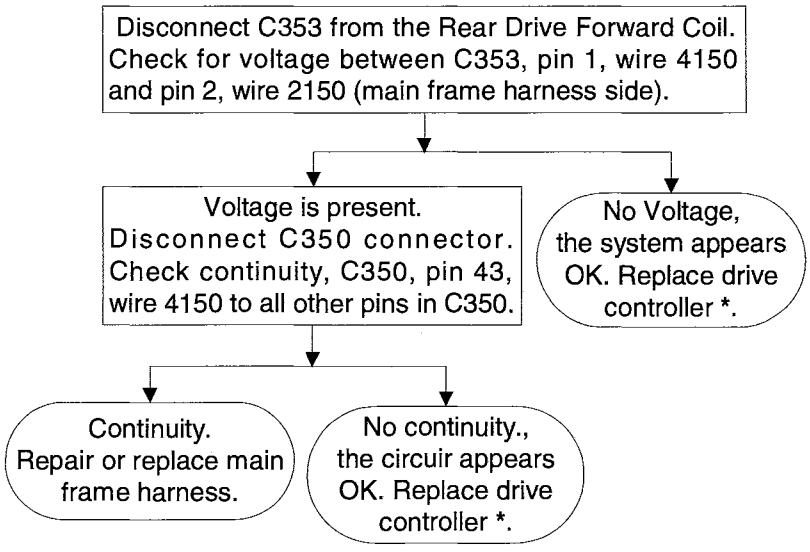
Code 50-42:
REAR PWM NOT CALIBRATED

Refer to appropriate electrical schematics for circuit description.

See section 30 in the Service Manual for Drive Pump Calibration.

Code 50-43:
REAR DRIVE FORWARD ERROR ON

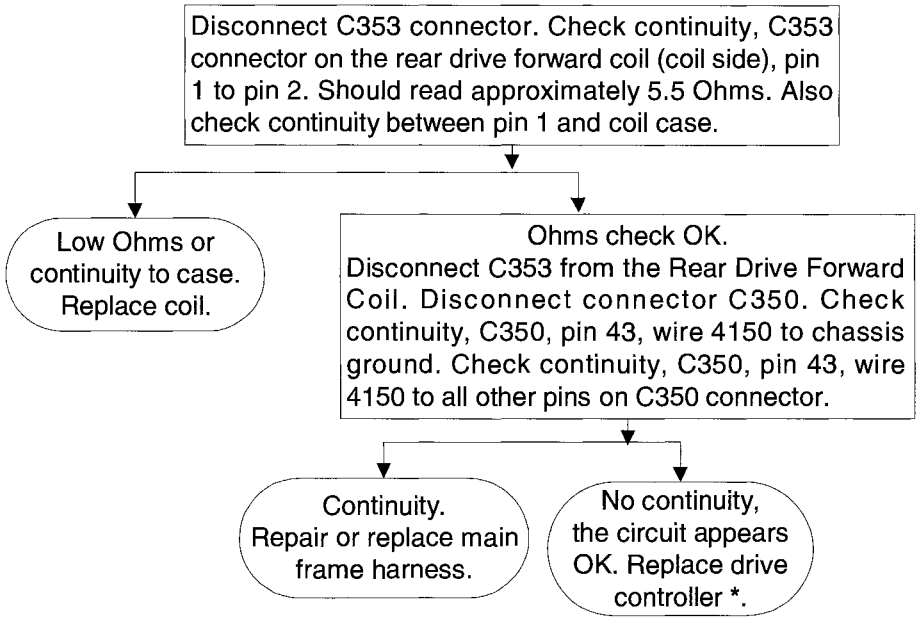
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-44:
REAR DRIVE FORWARD ERROR OFF

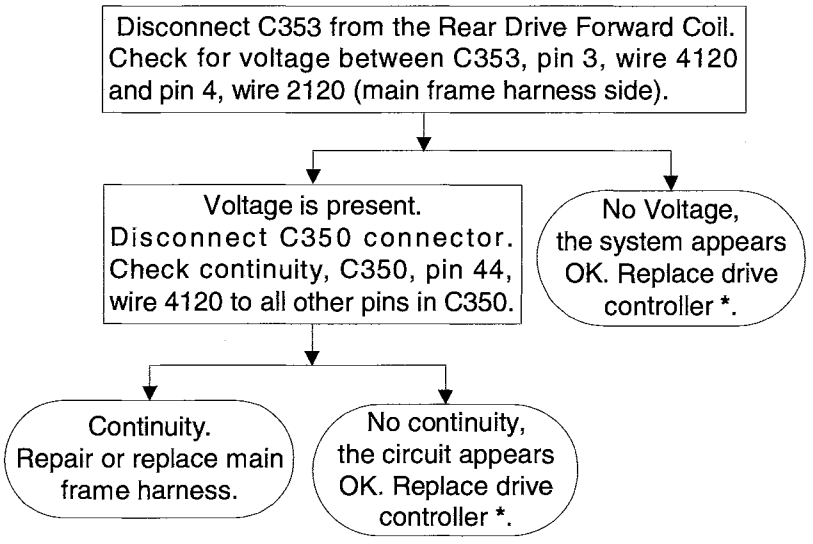
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-45:
REAR DRIVE REVERSE ERROR ON

Refer to appropriate electrical schematic for circuit description.

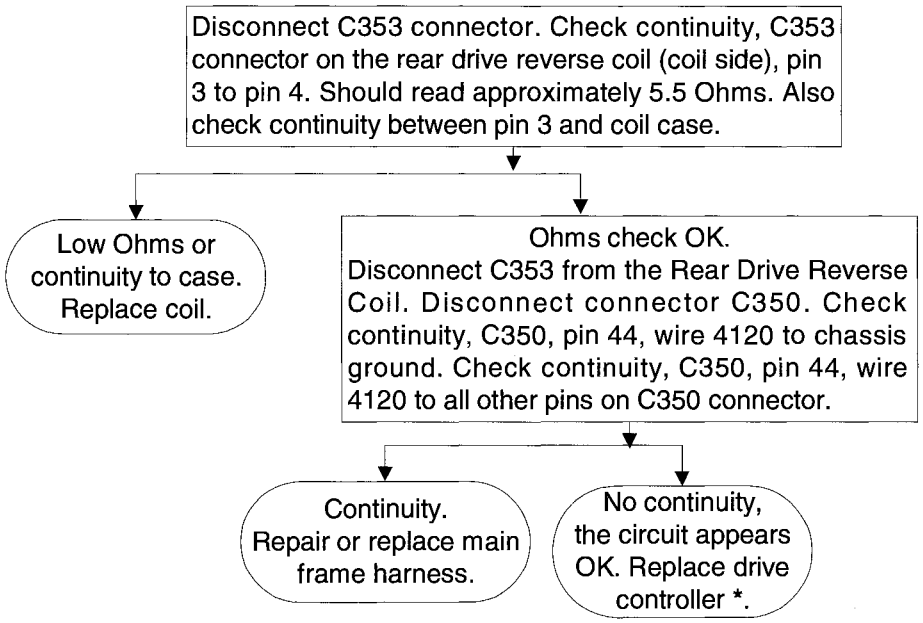


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-46

Code 50-46:
REAR DRIVE REVERSE ERROR OFF

Refer to appropriate electrical schematic for circuit description.

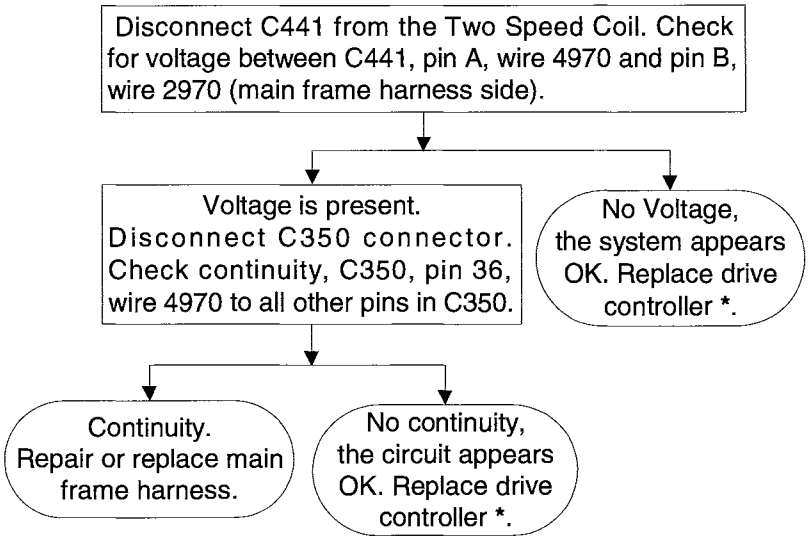


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-47

Code 50-47:
TWO SPEED ERROR ON

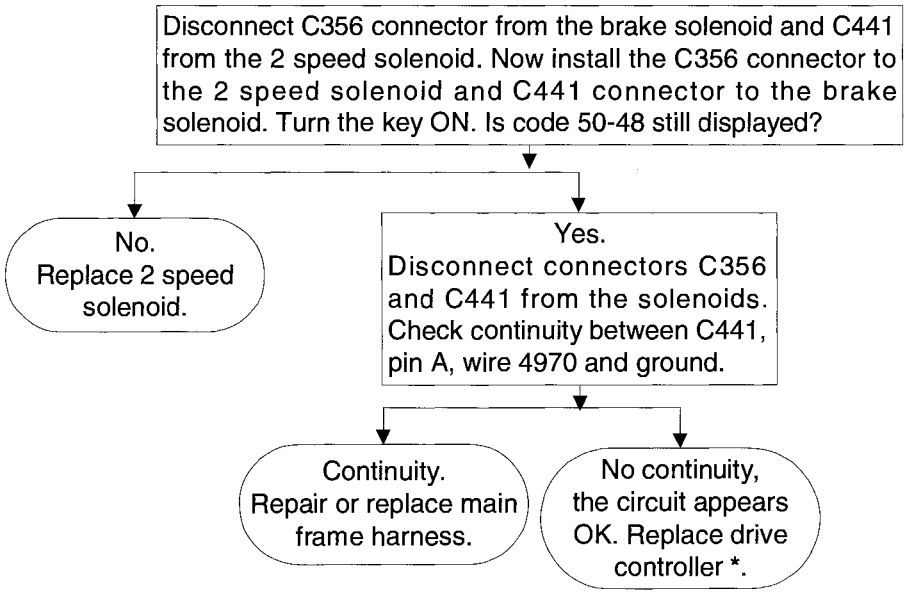
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-48:
TWO SPEED ERROR OFF

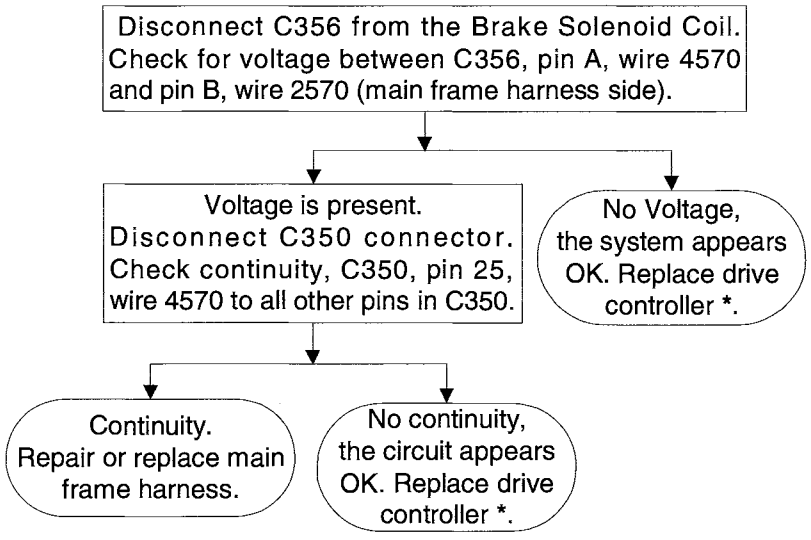
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-49:
BRAKE SOLENOID ERROR ON

Refer to appropriate electrical schematic for circuit description.

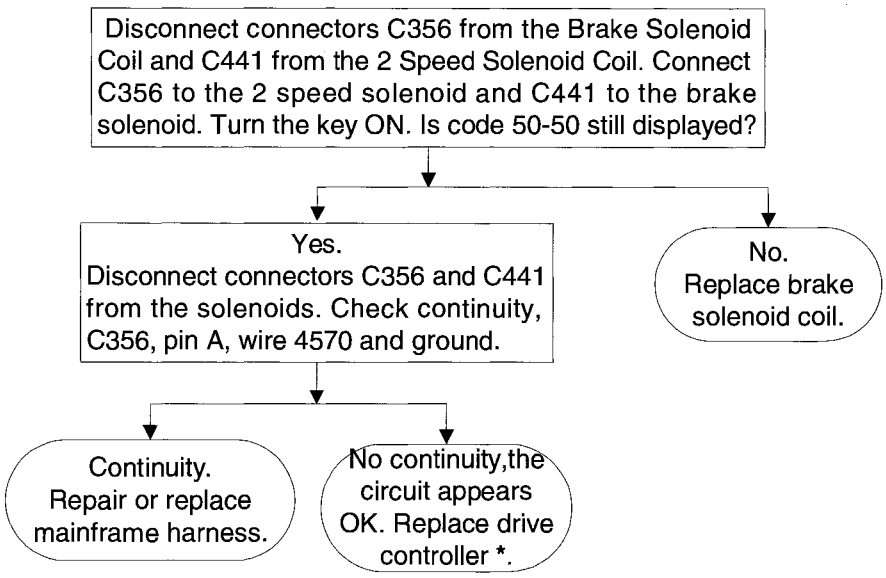


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-50

Code 50-50:
BRAKE SOLENOID ERROR OFF

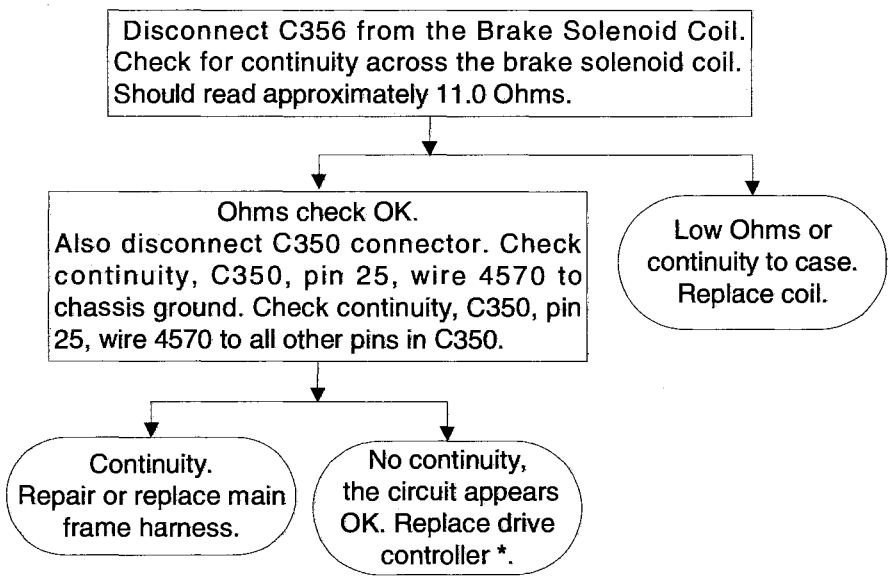
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-51:
BRAKE SOLENOID NO SIGNAL

Refer to appropriate electrical schematic for circuit description.

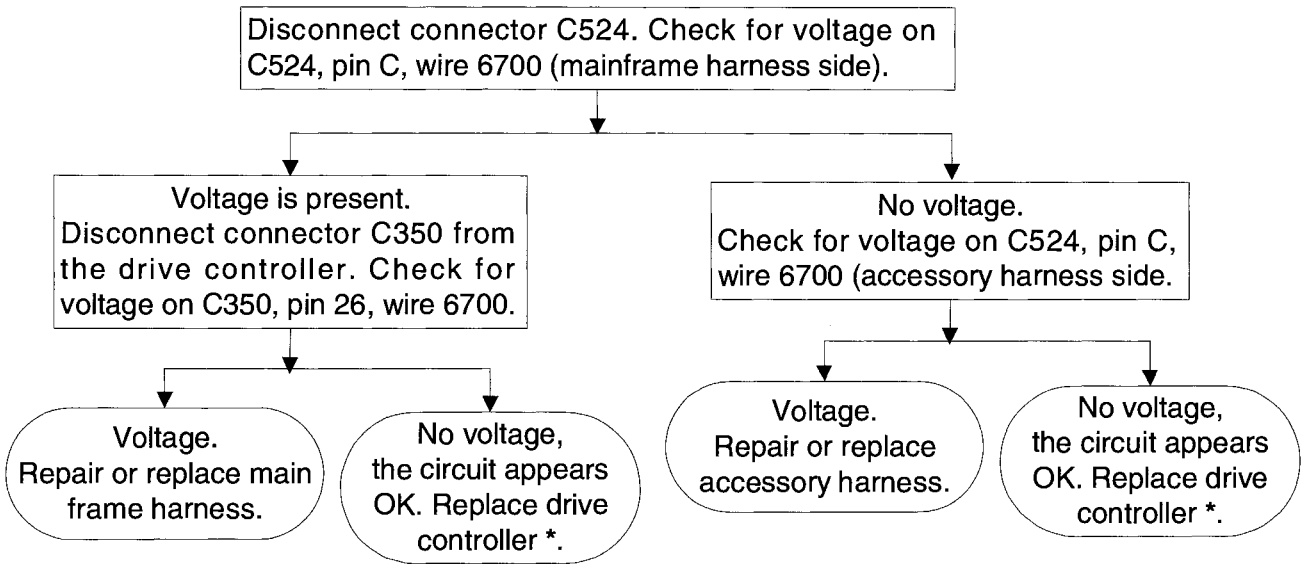


*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-52

Code 50-52:
BRAKE LIGHT ERROR ON

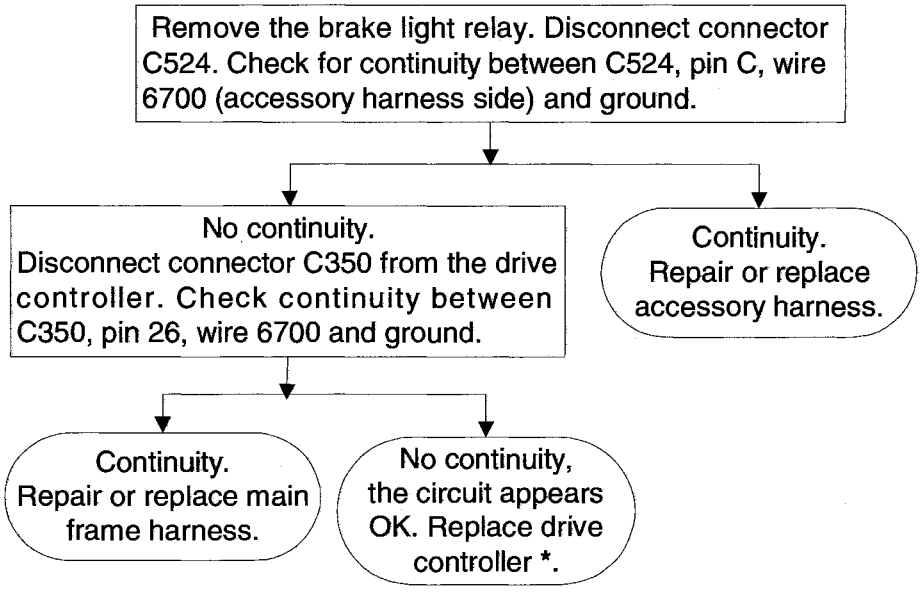
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-53:
BRAKE LIGHT ERROR OFF

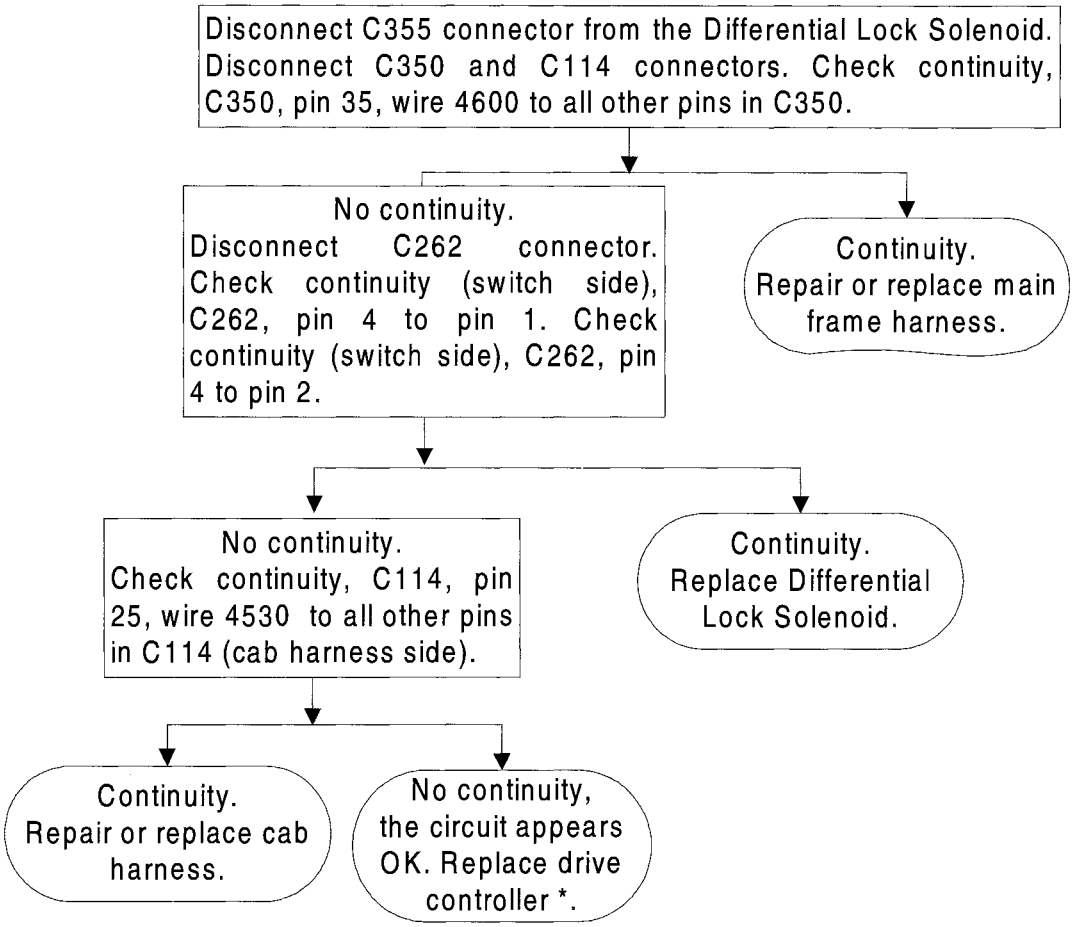
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-54:
DIFFERENTIAL LOCK ERROR ON

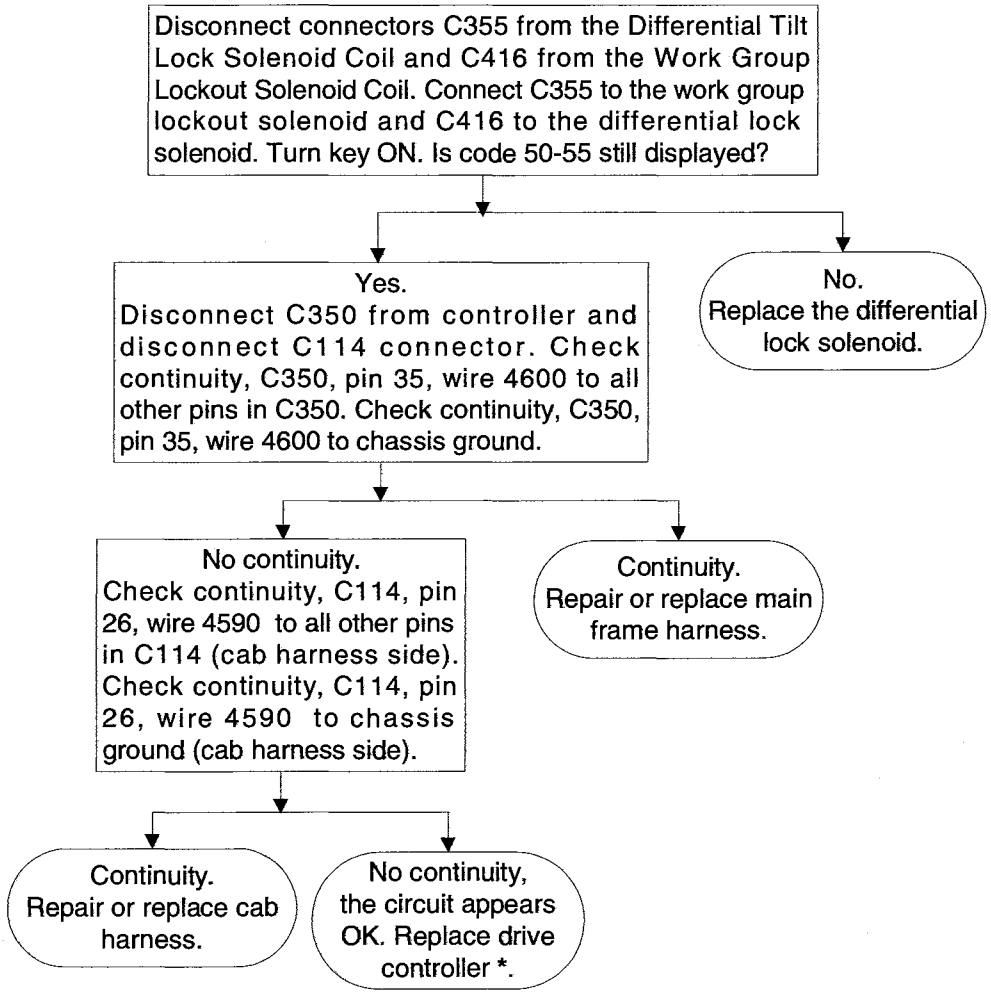
Refer to appropriate electrical schematic for circuit description.



* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be foun this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wi harness or a combination of these problems.

Code 50-55:
DIFFERENTIAL LOCK ERROR OFF

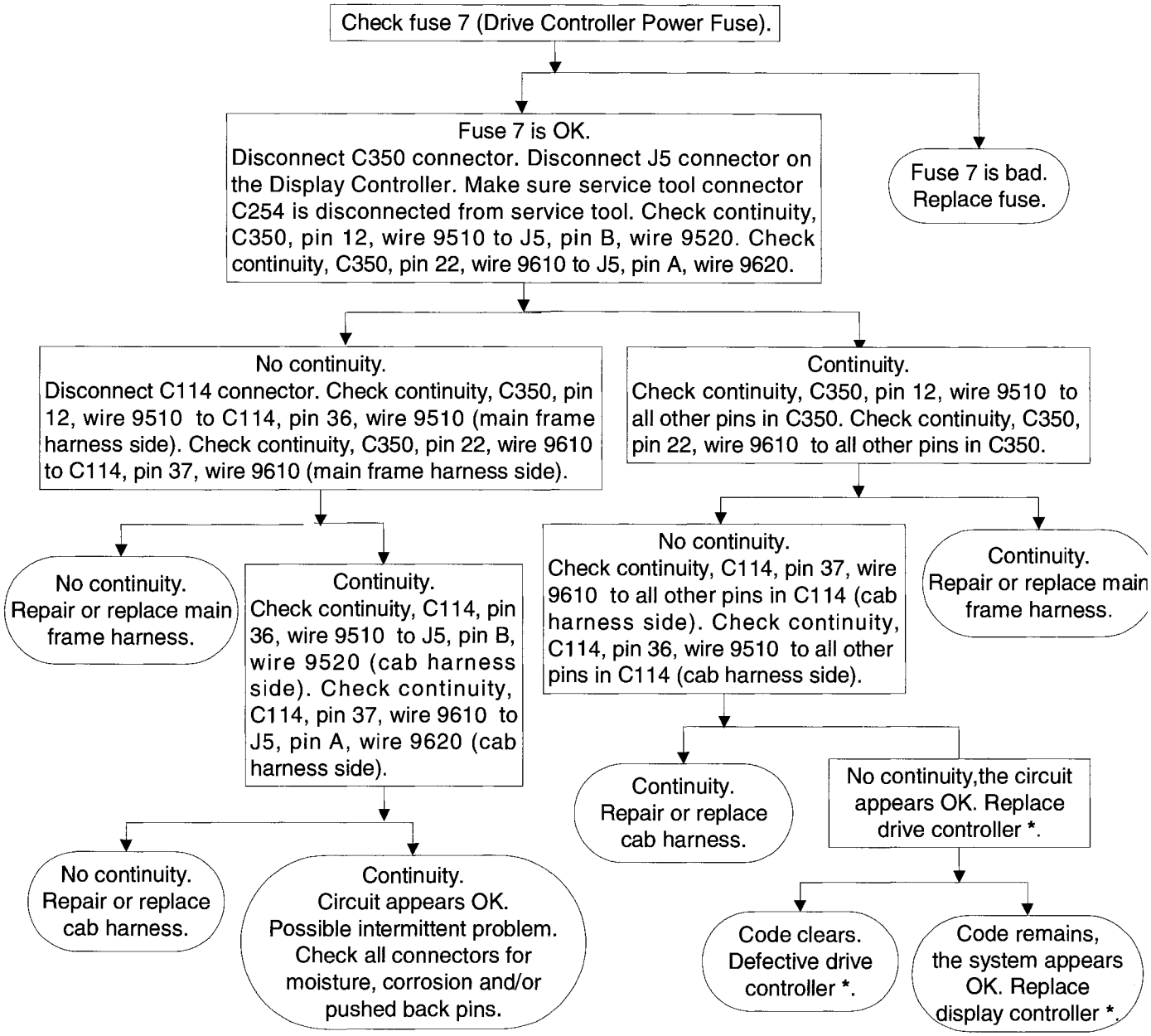
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-56:
CAN COMMUNICATIONS FAULT
(Drive Controller Is Not Talking To Display Controller)

Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-57:
DRIVE CONTROLLER NOT CALIBRATED

Refer to appropriate electrical schematics for circuit description.

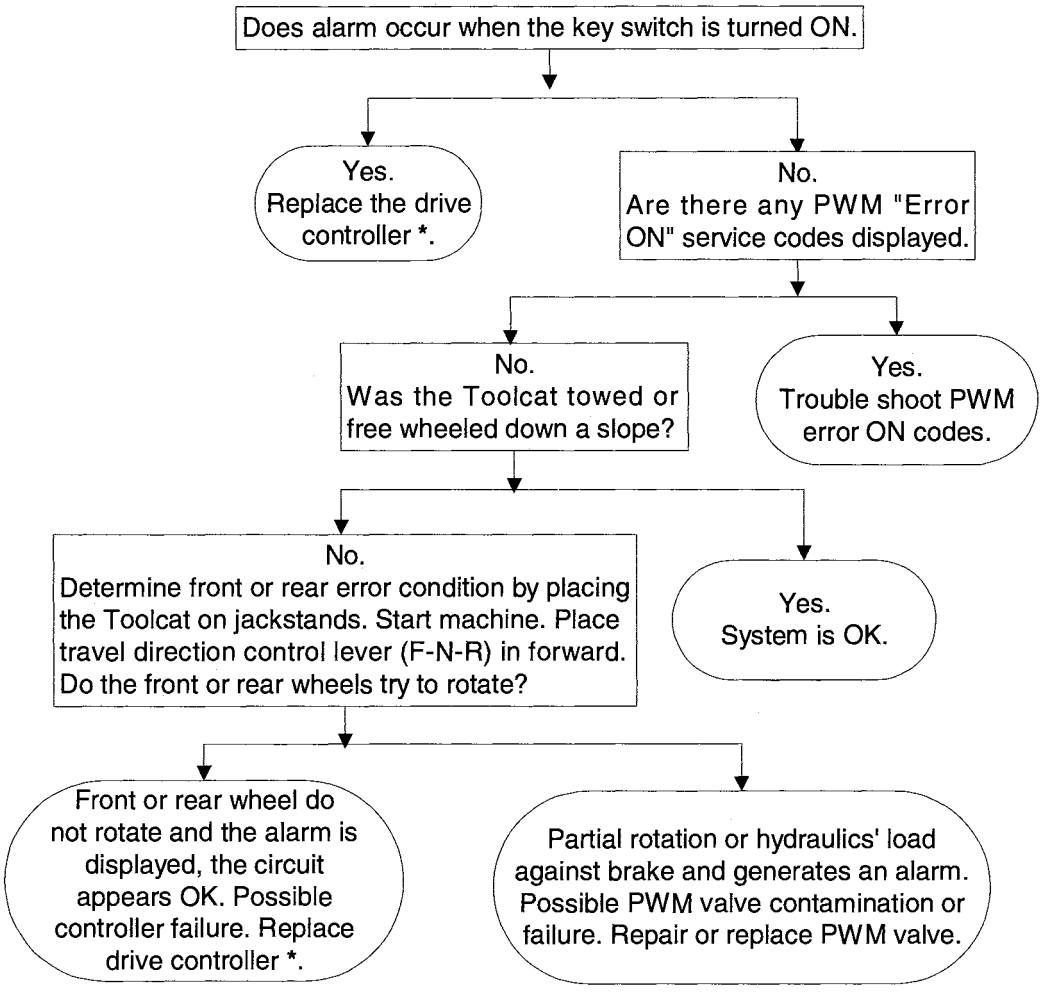
This code will clear when all required systems are calibrated.

See the Service Manual, Section 60, for the following calibration procedures:

Travel Pedal
Brake Pedal
Pump
Angle Sensor

Code 50-58:
UNCOMMANDED WHEEL SPEED

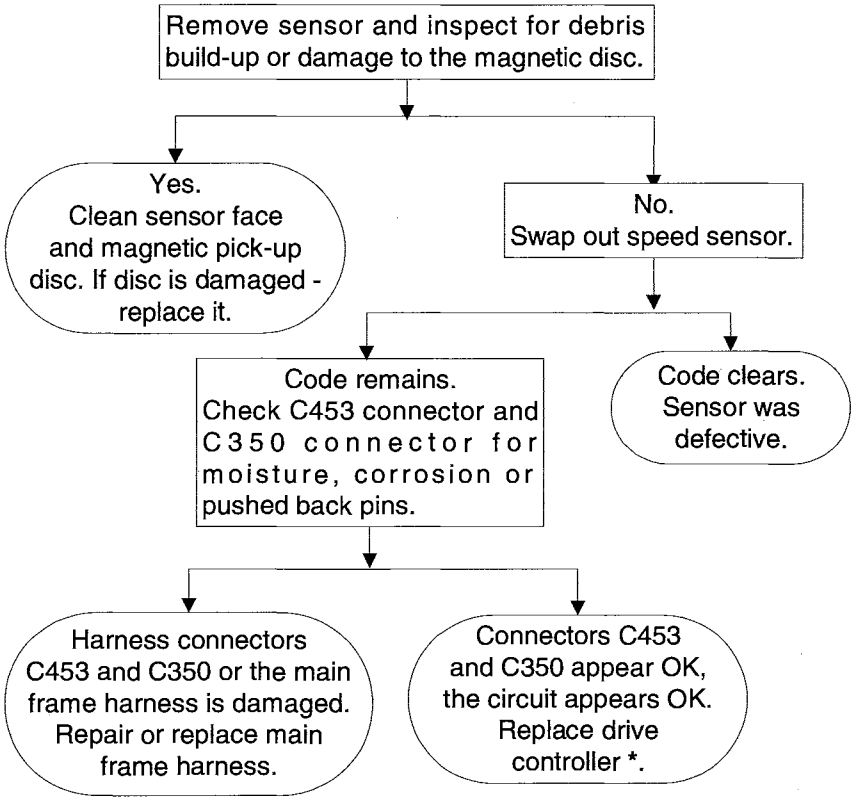
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-59:
FRONT SPEED SENSOR MISSING PULSES

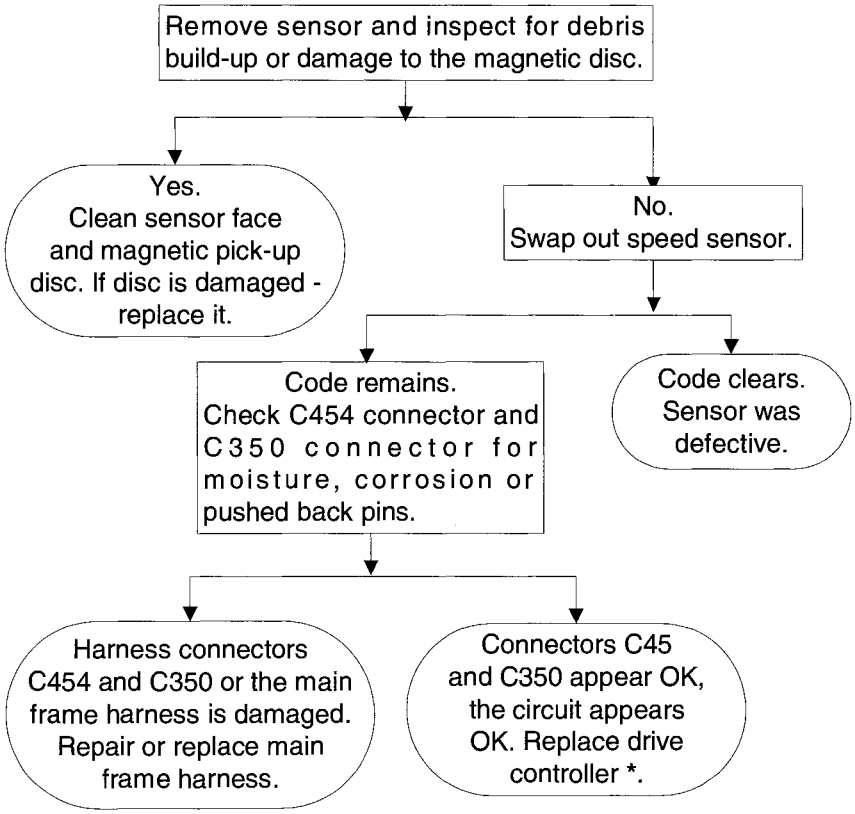
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-60:
REAR SPEED SENSOR MISSING PULSES

Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-63:
FRONT ANGLE SENSOR CALIBRATION ERROR

Refer to appropriate electrical schematics for circuit description.

This code will only be active when the controller is replaced. If a new controller is installed, multiple codes will occur.

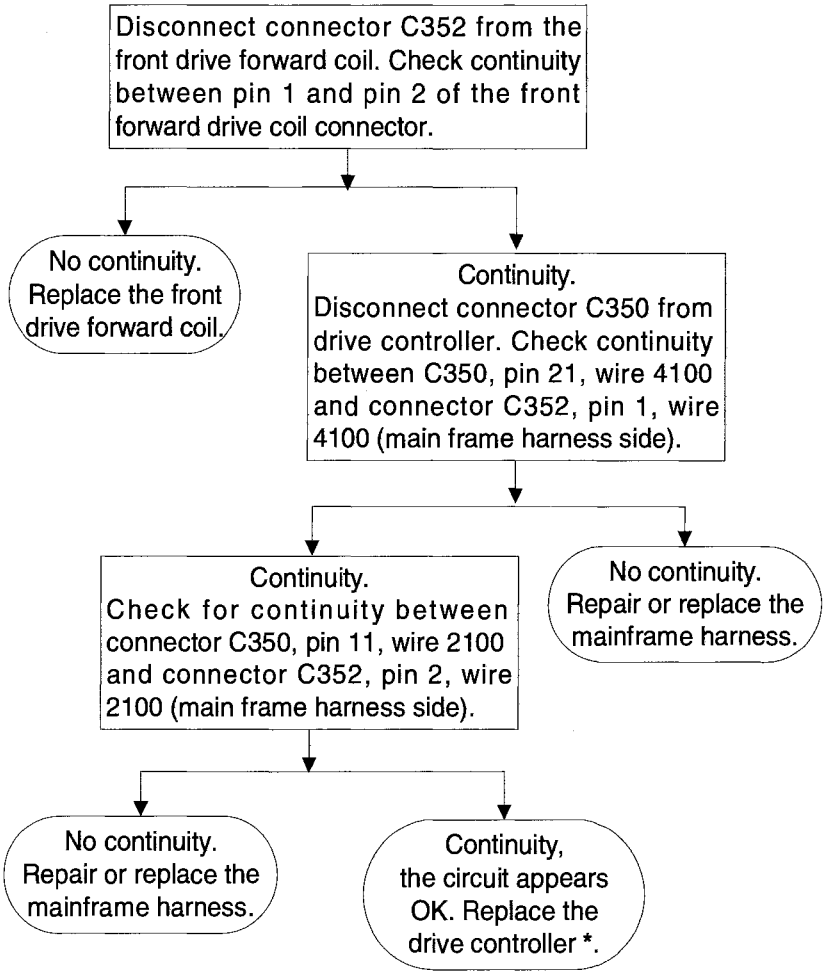
Code 50-66:
REAR ANGLE SENSOR CALIBRATION ERROR

Refer to appropriate electrical schematics for circuit description.

This code will only be active when the controller is replaced. If a new controller is installed, multiple codes will occur.

Code 50-67:
FRONT FORWARD NO SIGNAL

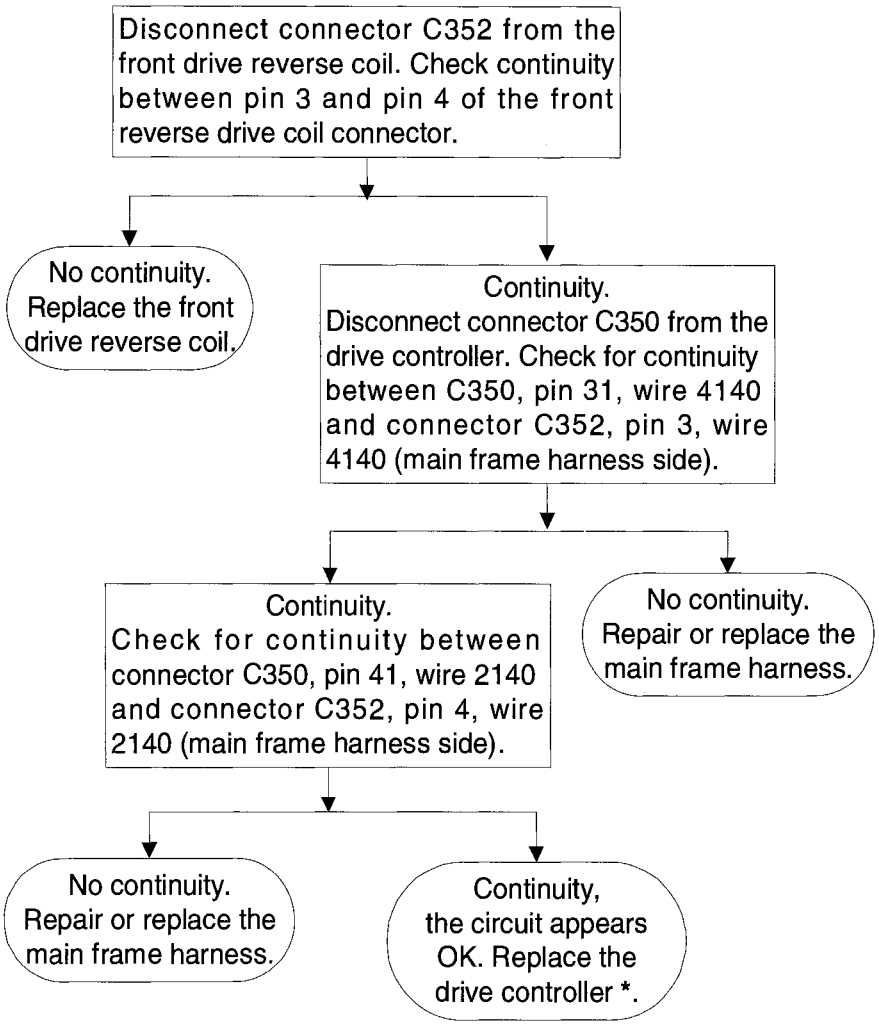
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-68:
FRONT REVERSE NO SIGNAL

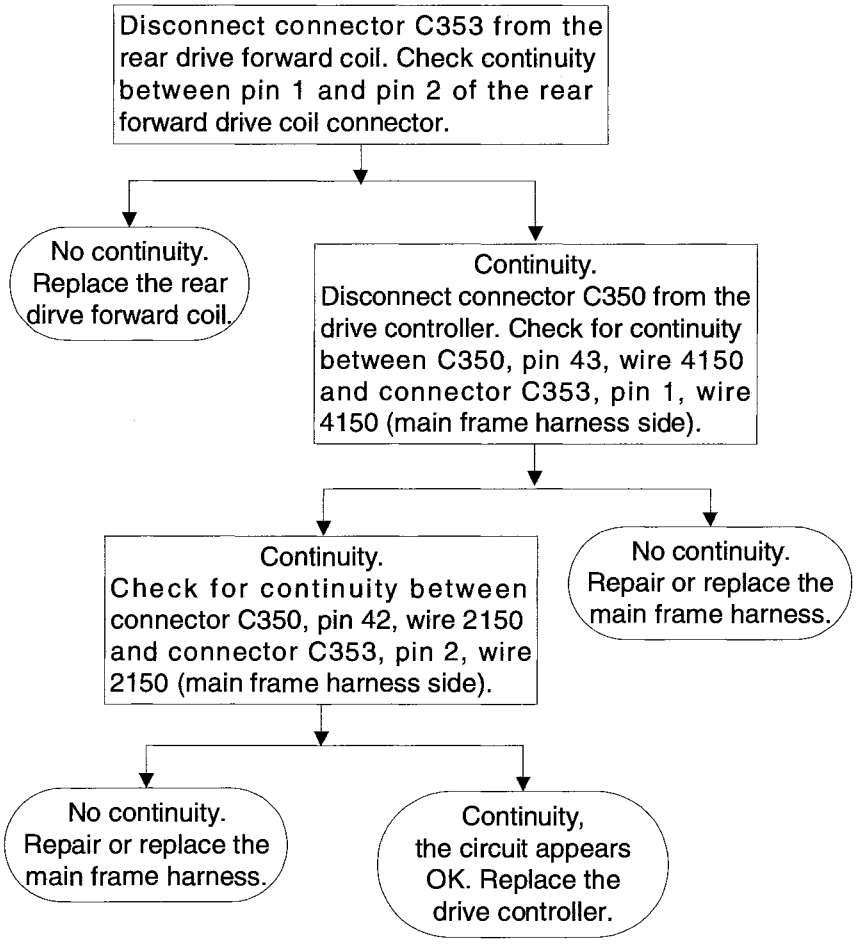
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-69:
REAR FORWARD NO SIGNAL

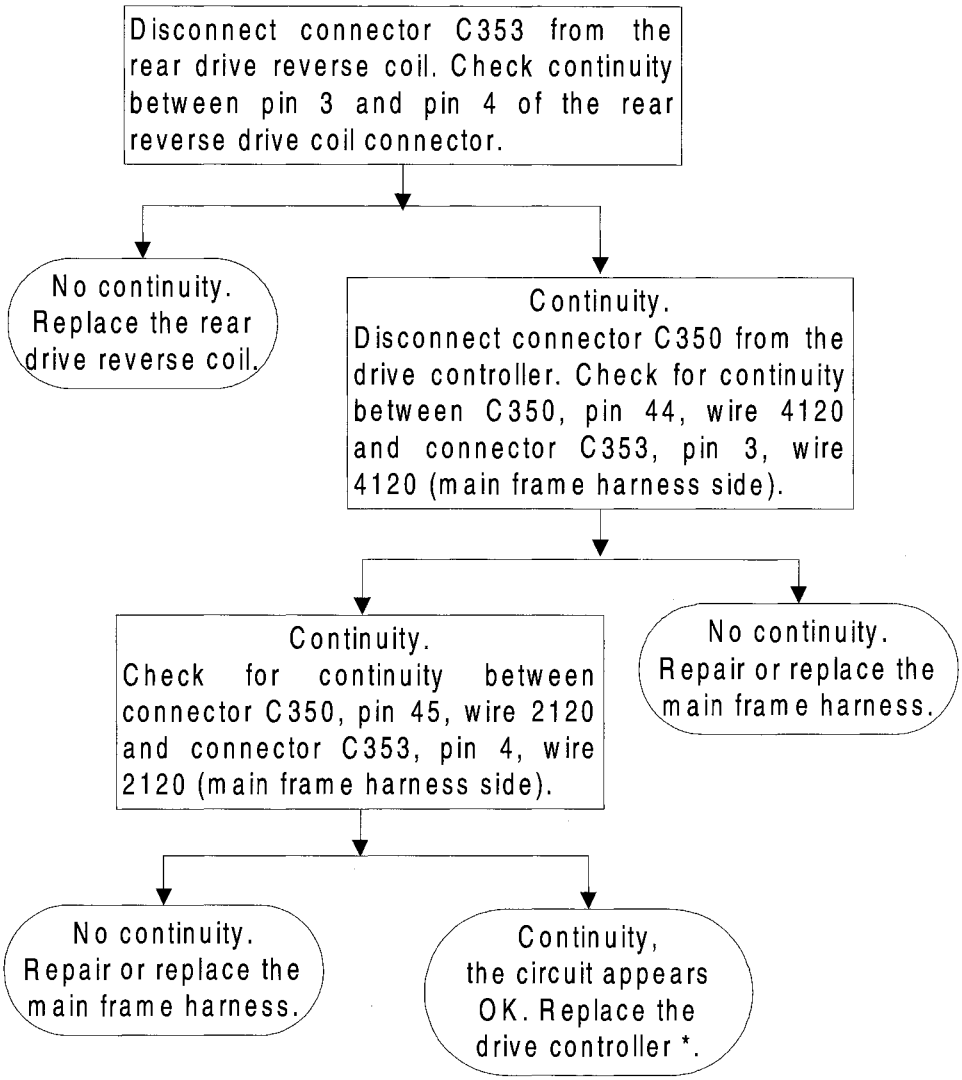
Refer to appropriate electrical schematic for circuit description.



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 50-70:
REAR REVERSE NO SIGNAL

Refer to appropriate electrical schematic for circuit description.



* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be foun this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wi harness or a combination of these problems.

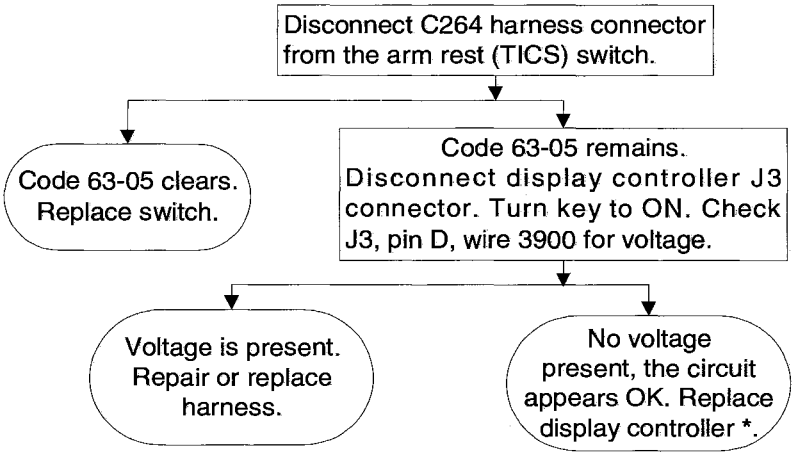
Code 50-99:
IN CALIBRATION MODE

Refer to appropriate electrical schematics for circuit description.

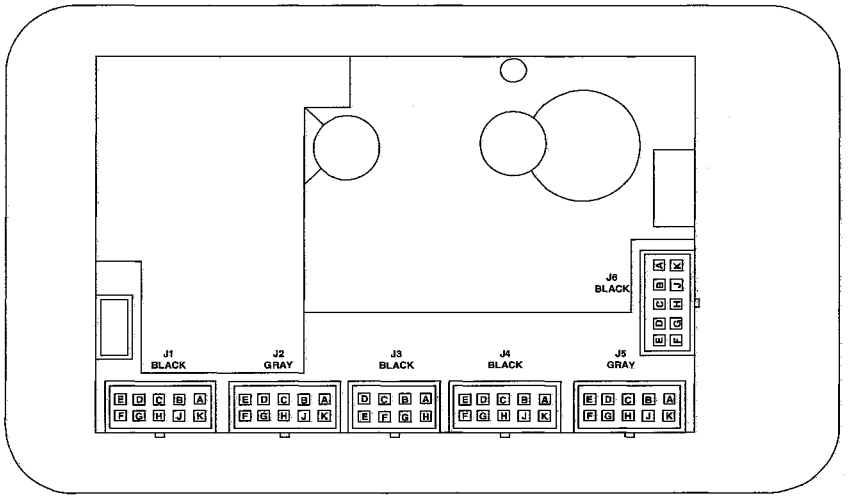
This code is displayed when performing a drive controller calibration. If this code is displayed and the machine was not being calibrated, it is likely the operator did a key stroke sequence to initiate calibration. Follow the correct calibration procedure outlined under service code 50-57 (Drive Controller Not Calibrated) to complete the calibration and clear the code.

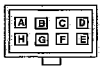
Code 63-05:
ARM REST (TICS) SWITCH SHORTED TO BATTERY

Refer to appropriate electrical schematic for circuit description.



C264
ARM REST (TICS)
SWITCH
HARNESS SIDE



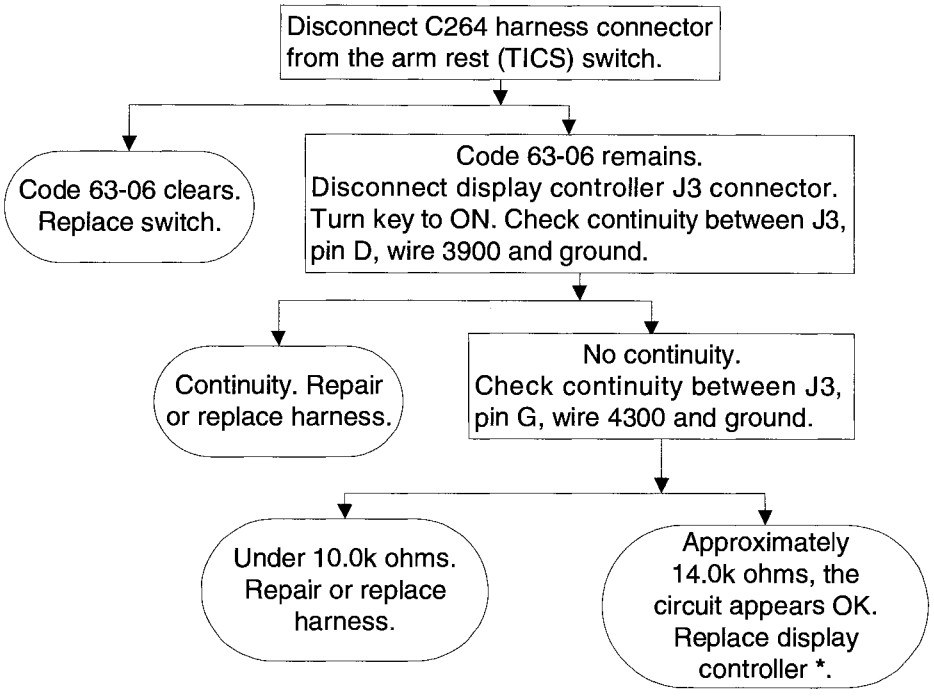


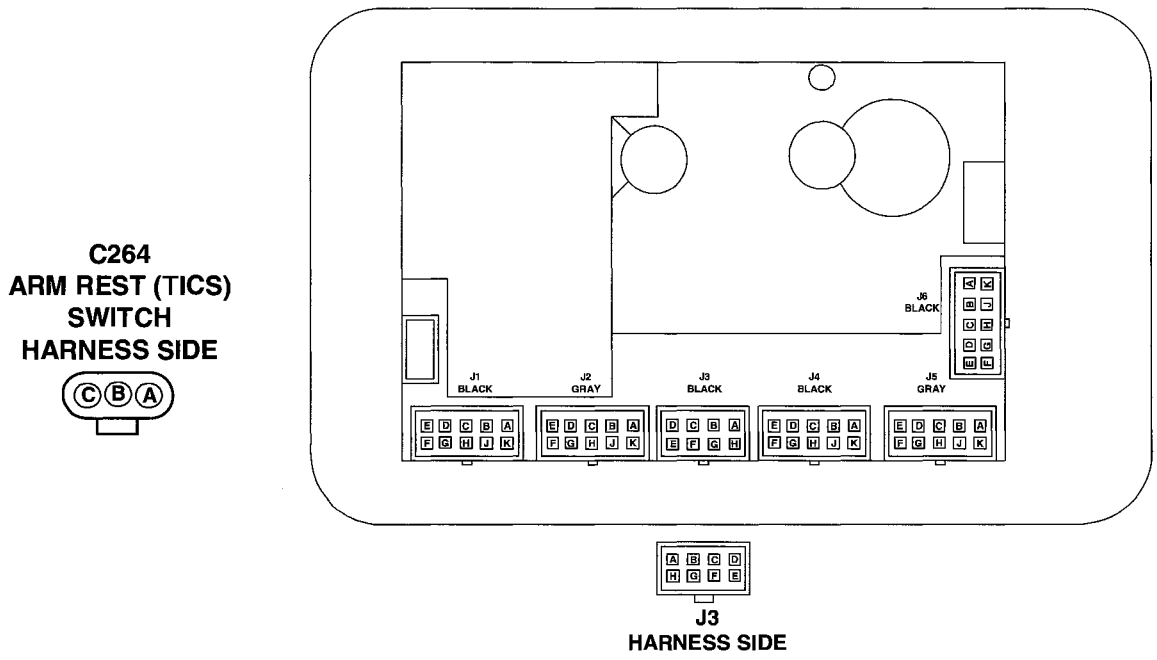
J3
HARNESS SIDE

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 63-06:
ARM REST (TICS) SWITCH SHORTED TO GROUND

Refer to appropriate electrical schematic for circuit description.





*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 64-05

Code 64-05:
SWITCHED POWER RELAY SHORT TO BATTERY

Refer to appropriate electrical schematic for circuit description.

With key switch OFF, remove the switched power relay. Check relay socket, pin 5, wire 8000 for 12.0 Volts.

If reading is approximately 5.0 Volts and the circuit appears OK, replace controller.

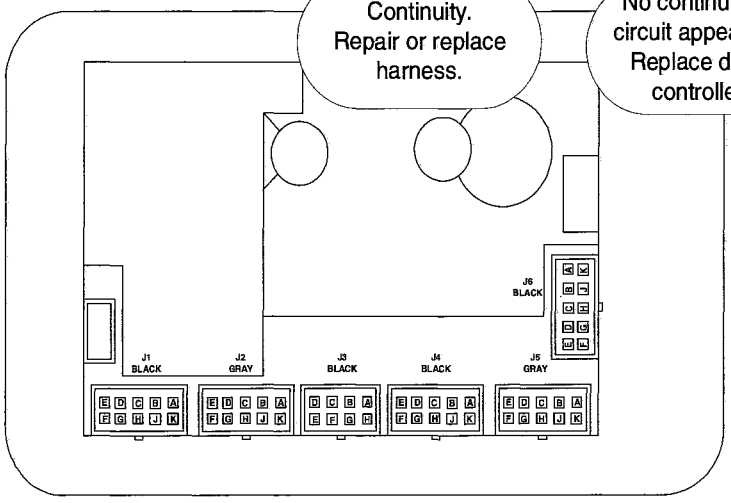
12.0 Volts is present. Check harness for damage. Check connectors for moisture, corrosion or pushed back pins.

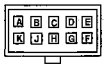
Damaged or corrosion. Repair or replace harness.

No damaged observed. Disconnect display controller, J1 connector. Check continuity between J1, pin K, wire 8000 and all other J1 pins.

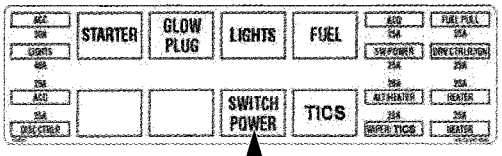
Continuity. Repair or replace harness.

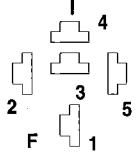
No continuity, the circuit appears OK. Replace display controller *.





J1
HARNESS SIDE





SWITCHED POWER RELAY

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 64-06

Code 64-06:
SWITCHED POWER RELAY SHORT TO GROUND

Refer to appropriate electrical schematic for circuit description.

With key switch OFF, remove the switched power relay. Turn key switch to ON.

Code 64-06 clears, code 64-07 is now active. Replace relay.

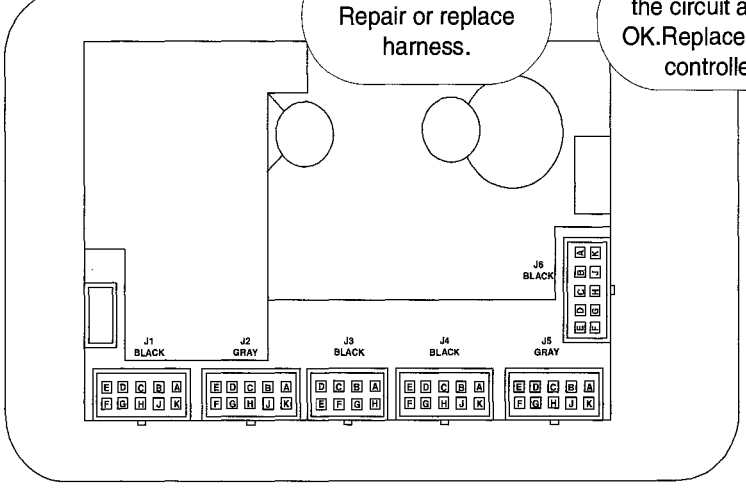
Code 64-06 remains. Check for voltage on relay socket, pin 5, wire 8000. Reading should be approximately 5.4 Volts.

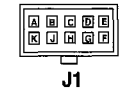
5.4 Volts present, the circuit appears OK. Replace display controller *.

Less the 5.4 Volts. Disconnect display controller, J1 connector. Check continuity between J1, pin K, wire 8000 and ground (with relay removed).

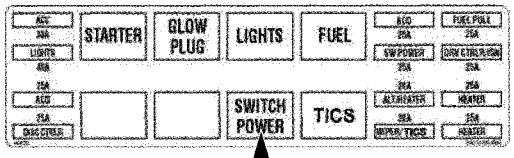
Continuity. Repair or replace harness.

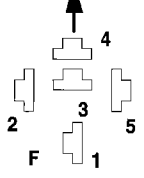
No continuity, the circuit appears OK.Replace display controller *.





J1
HARNESS SIDE





SWITCHED POWER RELAY

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 64-07:
SWITCHED POWER RELAY OPEN CIRCUIT

Refer to appropriate electrical schematic for circuit description.

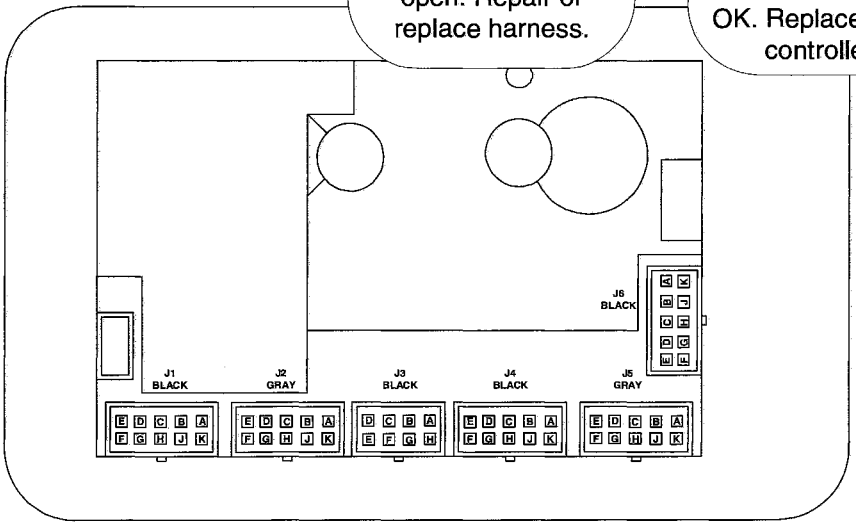
With key switch OFF, replace the switched power relay with a new relay. Turn key switch to ON.

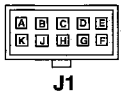
Code 64-07 clears, defective relay.

Code 64-07 remains.
Turn key switch OFF. Remove switched power relay. Disconnect display controller, J1 connector. Check continuity between J1, pin K, wire 8000 and relay socket, pin 2, wire 8000.

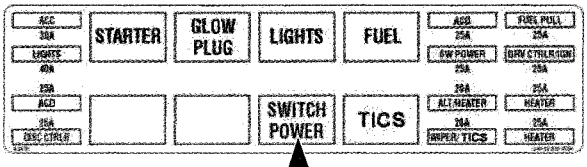
No continuity, open. Repair or replace harness.

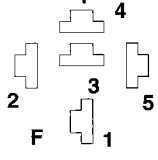
Continuity, the circuit appears OK. Replace display controller *.





J1
HARNESS SIDE





SWITCHED POWER RELAY

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

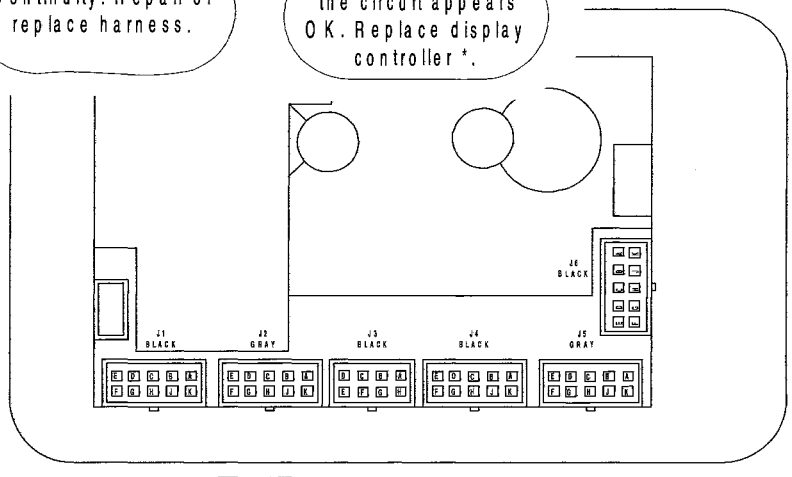
Code 65-05

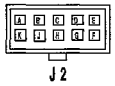
Code 65-05:
WORKGROUP LOCKOUT SOLENOID SHORT TO BATTERY

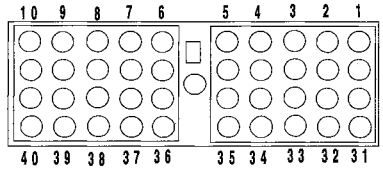
Refer to appropriate electrical schematic for circuit description.

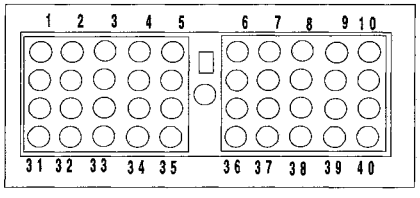
Disconnect workgroup solenoid connector C416. Check C416 connector, pin A, wire 4410 to ground for voltage.

- No voltage, the circuit appears OK. Replace display controller *.
- 12.0 Volts is present. Inspect harness for damage. Disconnect display controller, J2 connector. Do ohmmeter check between J2, pin H, wire 4410 and all other J2 pins.
  - Continuity. Repair or replace harness.
  - No continuity. With J2 still disconnected, disconnect C114 harness connector. With ohmmeter, check between connector C114, pin 22, wire 4410 and all other C114 pins (with workgroup solenoid still removed). Check both sides of harness connector C114 (male and female sides).
    - Continuity. Repair or replace harness.
    - No continuity, the circuit appears OK. Replace display controller *.









* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.

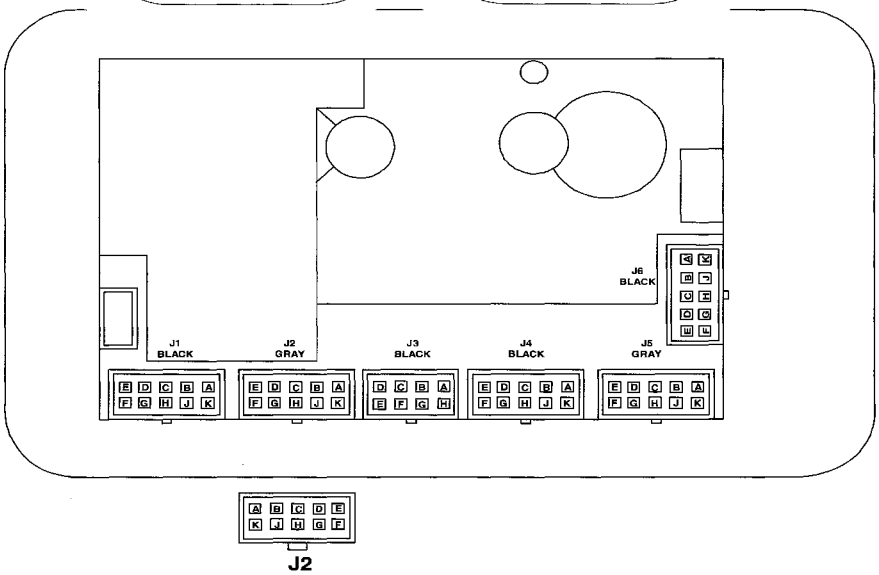
Code 65-06:
WORKGROUP LOCKOUT SOLENOID SHORT TO GROUND

Refer to appropriate electrical schematic for circuit description.

Disconnect connector C355 from the Differential Tilt Lock Solenoid and C416 from the Work Group Lockout Solenoid. Connect C355 to the work group lockout solenoid and C416 to the differential lock solenoid. Turn the key On. Is code 65-06 still displayed?

- No. Replace the work group lockout solenoid.
- Yes. Check continuity between C416, pin A, wire 4330 and ground.
  - Continuity. Repair or replace mainframe harness.
  - No continuity. Disconnect connector C114. Check continuity between C114, pin 22, wire 4410 and ground (cab harness side).
    - Continuity. Repair or replace cab harness.
    - No continuity, the circuit appears OK. Replace display controller *.

C416 WORKGROUP SOLENOID HARNESS SIDE



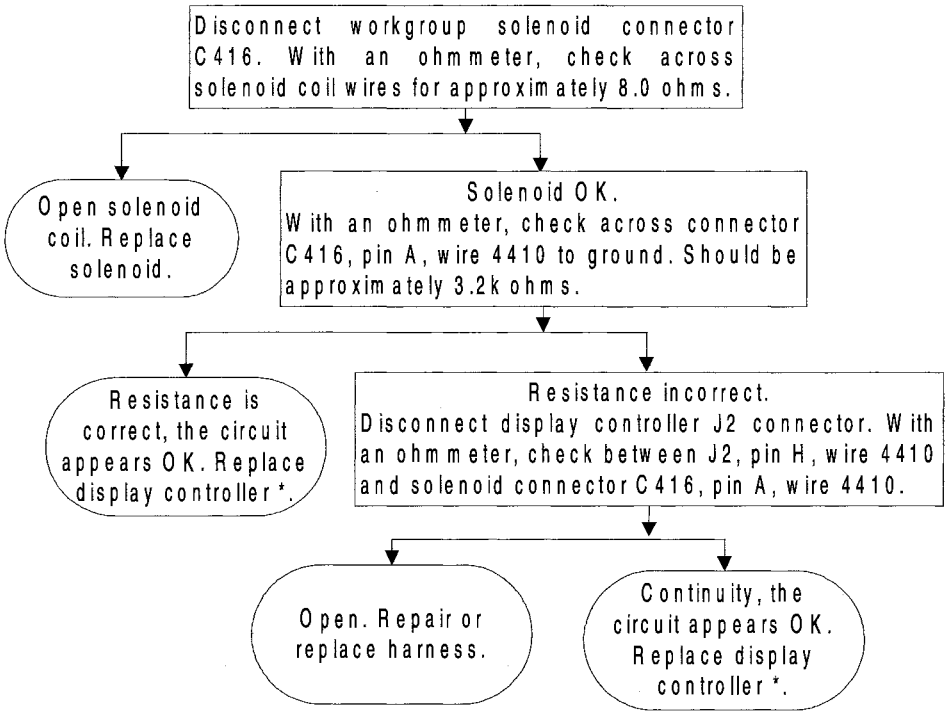
J2 HARNESS SIDE

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

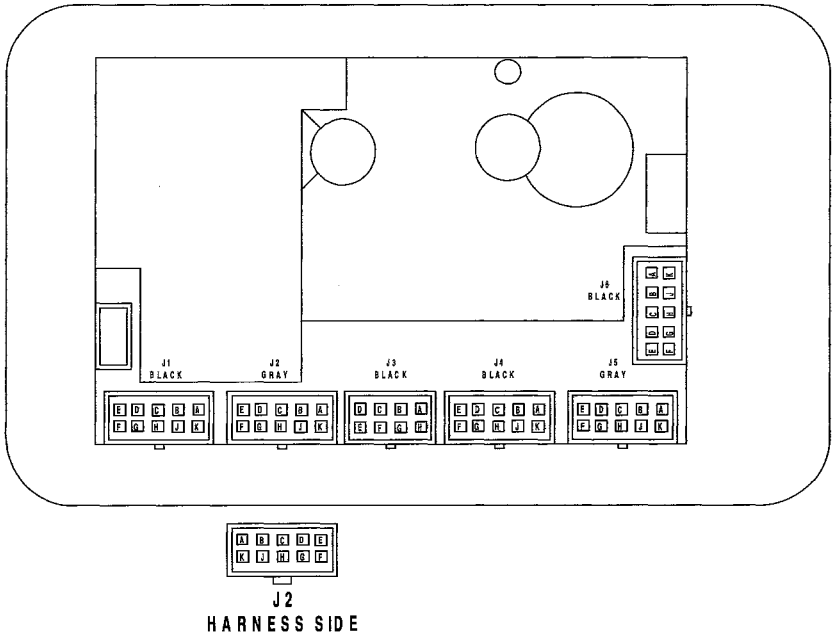
Code 65-07

Code 65-07:
WORKGROUP LOCKOUT SOLENOID OPEN CIRCUIT

Refer to appropriate electrical schematic for circuit description.



C416
WORKGROUP
SOLENOID
HARNESS SIDE



J2
HARNESS SIDE

* If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.

Code 69-05

Code 69-05:
TICS RELAY SHORT TO BATTERY

Refer to appropriate electrical schematic for circuit description.

With the key switch OFF, remove the TICS relay. Check relay socket, pin 5, wire 3930 for 12.0 Volts.

If reading is approximately 5.0 Volts, the circuit appears OK. Replace display controller *.

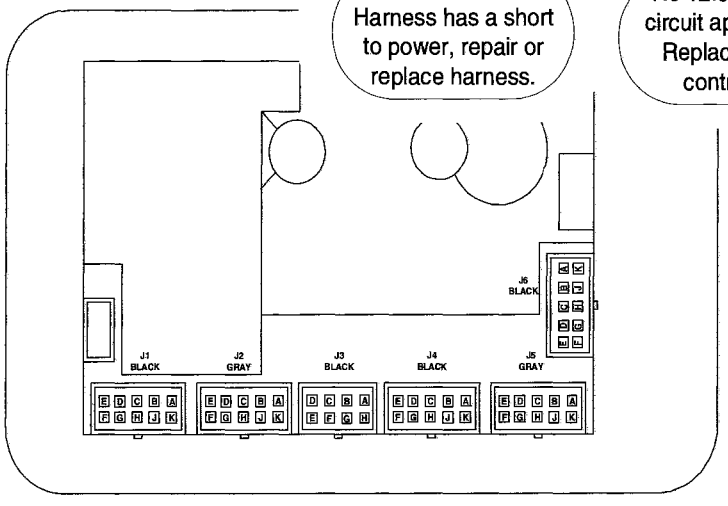
12.0 Volts present. Check harness for damage, check connectors for moisture, corrosion or pushed back pins.

Damaged or corrosion. Repair or replace harness.

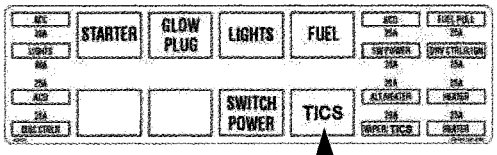
No damage observed. Disconnect display controller J2 connector. Check for 12.0 Volts at J2, pin D, wire 3930.

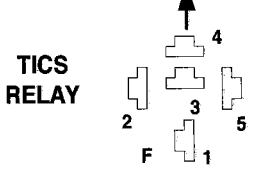
12.0 Volts. Harness has a short to power, repair or replace harness.

No 12.0 Volts, the circuit appears OK. Replace display controller *.



J2
HARNESS SIDE





TICS
RELAY

*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 69-06

Code 69-06:
TICS RELAY SHORT TO GROUND

Refer to appropriate electrical schematic for circuit description.

With the key switch OFF, remove the TICS relay. Turn key switch to ON.

Code 69-06 clears. Code 69-07 is now active. Replace relay.

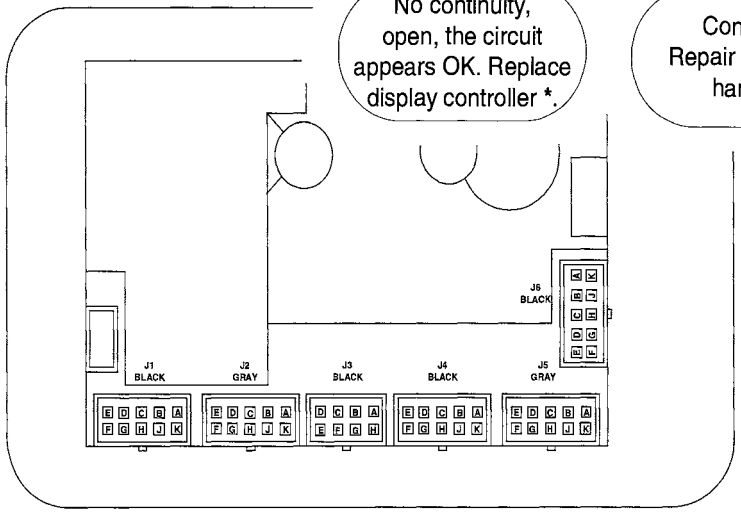
Code 69-06 remains. Check for voltage on relay socket, pin 5, wire 3930. Reading should be approximately 5.4 Volts.

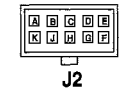
5.4 Volts present, the circuit appears OK. Replace display controller *.

Less than 5.4 Volts. Remove display controller J2 connector. Check continuity at J2, pin D, wire 3930 to ground (with TICS relay removed).

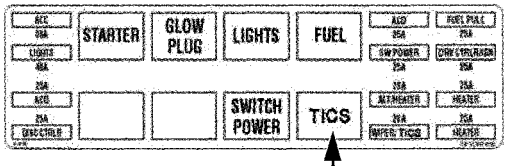
No continuity, open, the circuit appears OK. Replace display controller *.

Continuity. Repair or replace harness.

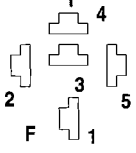




J2
HARNESS SIDE



TICS RELAY



*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

Code 69-07:
TICS RELAY OPEN CIRCUIT

Refer to appropriate electrical schematic for circuit description.

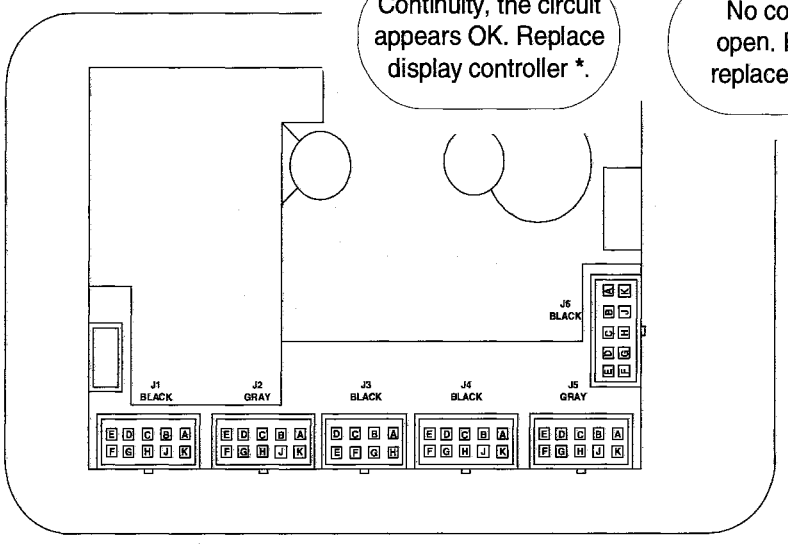
With the key switch OFF, remove the TICS relay and install new relay. Turn key switch to ON.

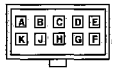
Code 69-07 clears. Defective relay.

Code 69-07 remains. Remove display controller J2 connector. Check continuity between J2, pin D, wire 3930 and relay socket, pin 5, wire 3930 (with TICS relay removed).

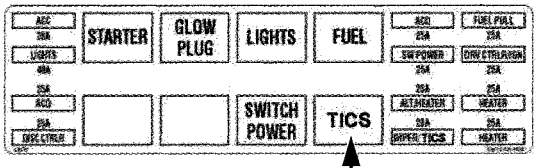
Continuity, the circuit appears OK. Replace display controller *.

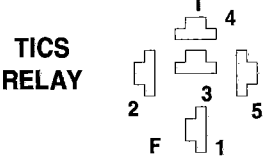
No continuity, open. Repair or replace harness.





J2
HARNESS SIDE





TICS
RELAY

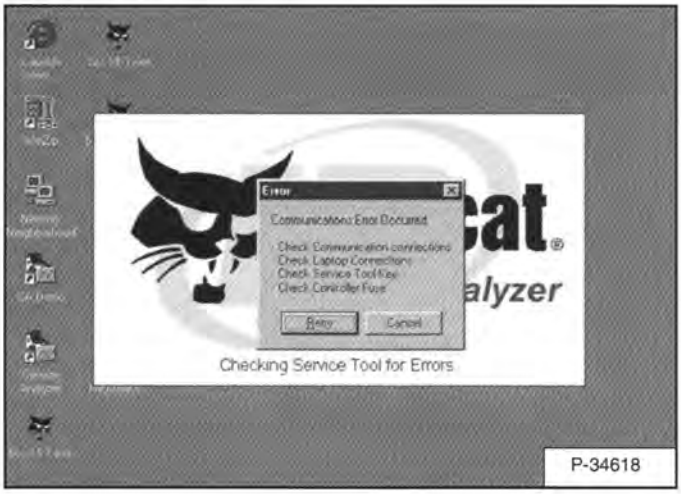
*** If the alarm is intermittent and not on at the time of testing, the cause of the alarm may not be found at this time. Probable causes may include: Loose connections, pushed back pins, the controller, the wiring harness or a combination of these problems.**

SERVICE 'PC' SOFTWARE

SERVICE SOFTWARE (ENTERING ANALYZER)

Bobcat Software Analyzer

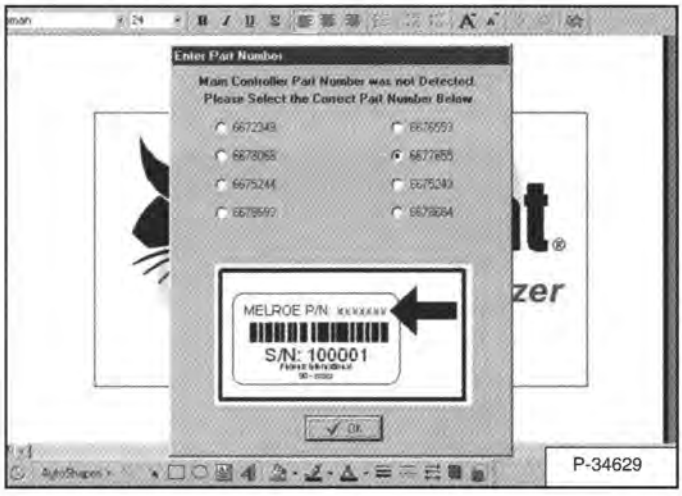
Figure 40-10-1



Click the **Analyzer** Icon **[Figure 40-10-1]**.

If this error appears the computer or the remote start tool is not connected, the key isn't on, or a fuse is open. The program can be entered by hitting cancel but will be unable to communicate with the Toolcat.

Figure 40-10-2



This error appears when the computer or the remote start tool is connected to the loader but the controller is locked up.

It is very important that the part number chosen is the correct part number **[Figure 40-10-2]**.

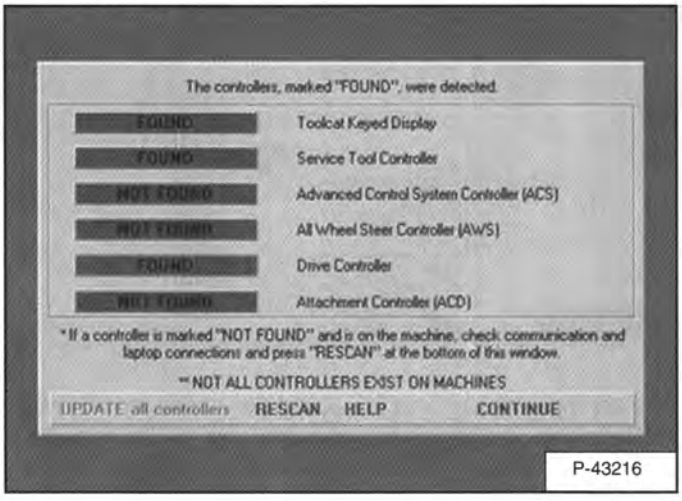
The part number is located on the back of the controller.

P/N	YEAR
6672349	1999
6676553	2000
6678068	2000
6677655	2001
6678673	Replacement 4 connector
6678674	2 connector
6675244	MINI X
6675243	MINI X
6678683	MINI X
6678684	MINI X
6678686 (Keyed)	Utility Work Machine
6678687 (Keyless)	Utility Work Machine

SERVICE SOFTWARE (ENTERING ANALYZER) (CONT'D)

Bobcat Software Analyzer (Cont'd)

Figure 40-10-3



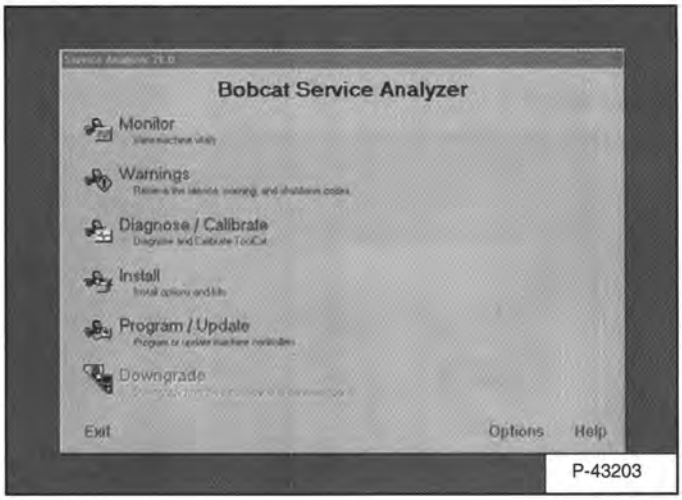
This is the screen that will appear when the program is communicating with the loader **[Figure 40-10-3]**.

The NEEDS UPDATING icon will appear when the program is a outdated version. The UPDATE all controllers icon will update all of the controllers with the latest version. Updating the program is recommended but not necessary.

If the IN ERROR icon appears the controller has a problem and needs to be updated.

The UNPROGRAMMED icon will appear when a new controller is installed.

Figure 40-10-4

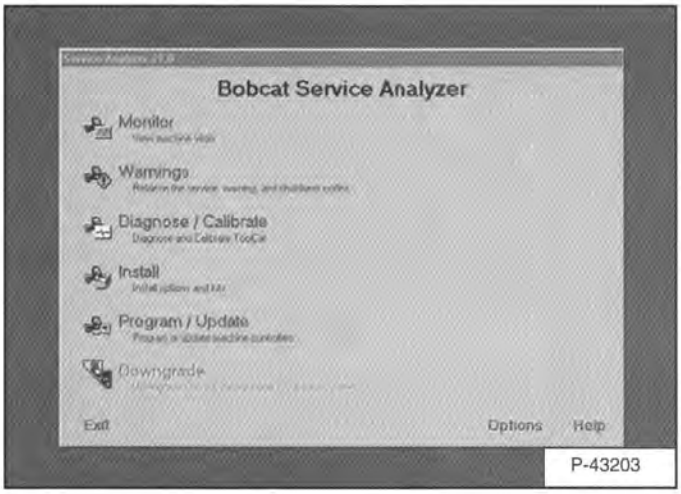


This is the Standard main screen of the analyzer program **[Figure 40-10-4]**.

SERVICE SOFTWARE (MONITOR)

Bobcat Software Analyzer

Figure 40-11-1



Click on the **Monitor** icon **[Figure 40-11-1]**.

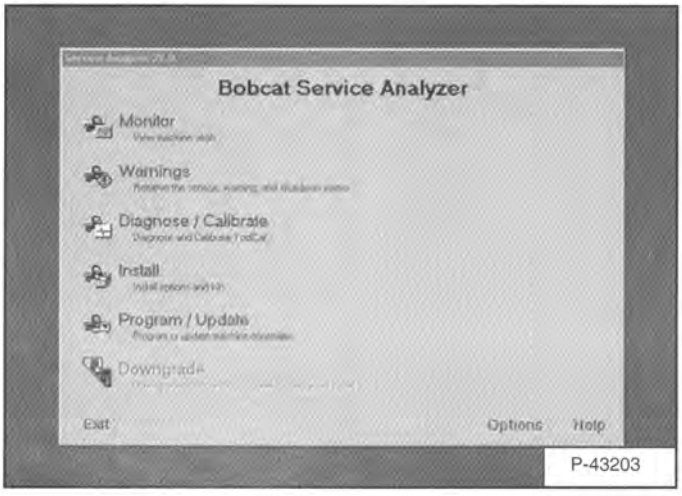
Figure 40-11-2

The monitor screen allows many diagnostic checks to be observed at one time. It also allows two checks on the split screen to be enlarged for easier viewing. The different checks can be changed on the split screen by clicking on the drop down arrow **[Figure 40-11-2]**.

SERVICE SOFTWARE (WARNINGS)

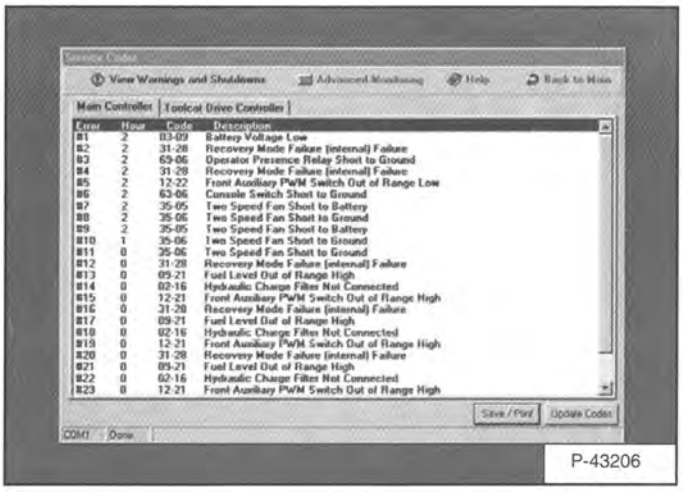
Bobcat Software Analyzer

Figure 40-12-1



Click on the **Warnings** Icon **[Figure 40-12-1]**.

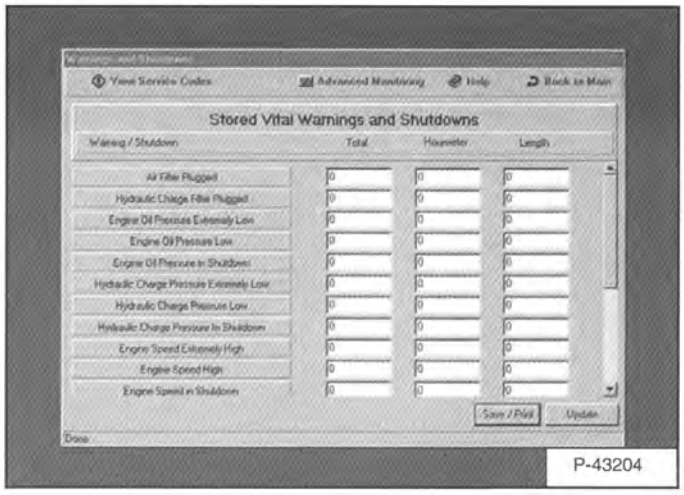
Figure 40-12-2



The first screen will show the main/display controller service codes listed from newest to oldest **[Figure 40-12-2]**.

By clicking on the toolcat drive controller icon will give the drive controller service codes listed from newest to oldest **[Figure 40-12-2]**..

Figure 40-12-3

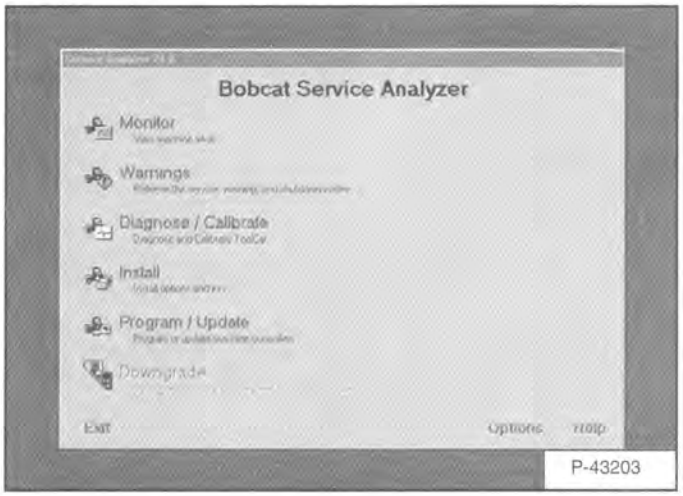


The Stored Vital Warnings and Shutdowns screen will show a number of alarms, the hours that the latest one occurred, and length in minutes that the alarm has been active

SERVICE SOFTWARE (DIAGNOSE/CALIBRATE)

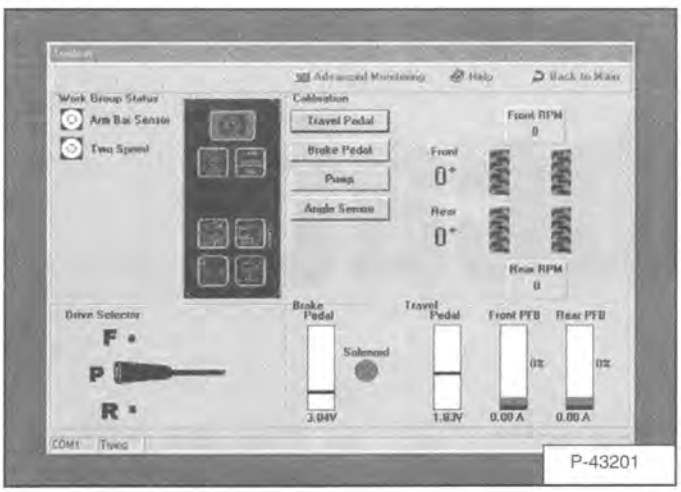
Bobcat Software Analyzer

Figure 40-13-1



Click on the **Diagnose / Calibrate** Icon **[Figure 40-13-1]**.

Figure 40-13-2



The Diagnose / Calibrate screen is broke up into six sections.

The Work Group Status section has nine different icons that should eliminate as the button or function is turned on and off. If the icon doesn't light up the controller is not receiving the input or the controller is not operating properly.

The Calibration section will calibrate the travel and brake pedal, hydrostatic pump, and the angle sensor on the axles.

The axle section will show the front and rear RPM and angle of the axles.

The Drive Selector shows the position of the drive selector.

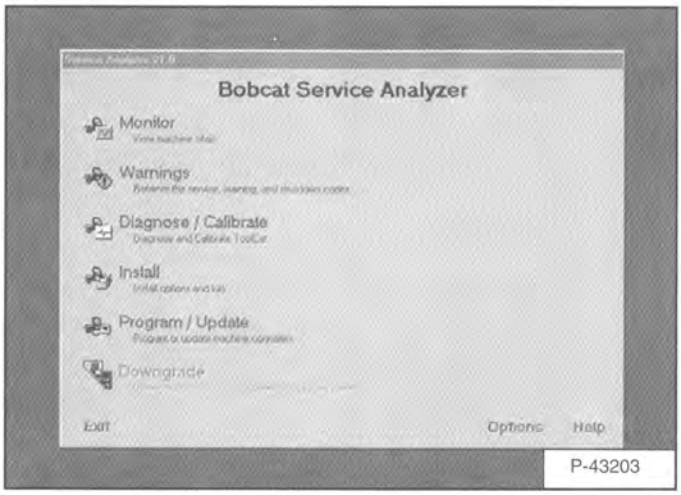
The Brake section shows the voltage from the brake pedal. When the brake pedal is pushed down the bar should go down on the graph. The brake solenoid icon should be off when the park brake is on.

The Travel section consists of a pedal voltage graph and front/rear pump PFB (Pump Feed Back) graphs. The travel pedal voltage graph shows the controller input from the travel pedal. The voltage should increase as the pedal is pressed down. The PFB graphs show the output current from the controller to the pump. The PFB graphs should increase evenly as current is increased.

SERVICE SOFTWARE (INSTALL)

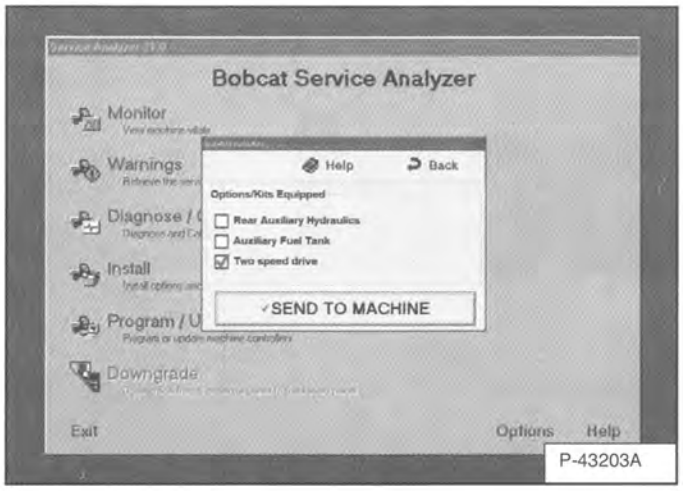
Bobcat Software Analyzer

Figure 40-14-1



Click on the **Install** Icon **[Figure 40-14-1]**.

Figure 40-14-2

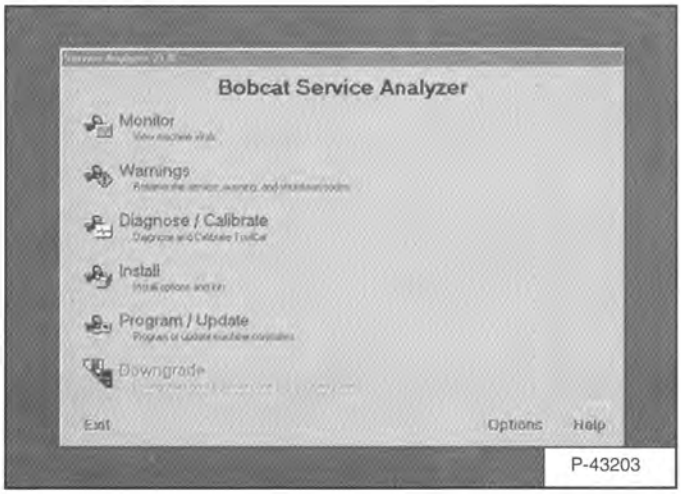


The Install Options/Kits screen is for updating and removing options. When installing a new option or kit the option box must be checked on the programmer and then sent to the controller. If the Toolcat is equipped with an option and it isn't checked on the screen the controller will not allow this option to work **[Figure 40-14-2]**.

SERVICE SOFTWARE (PROGRAM/UPDATE)

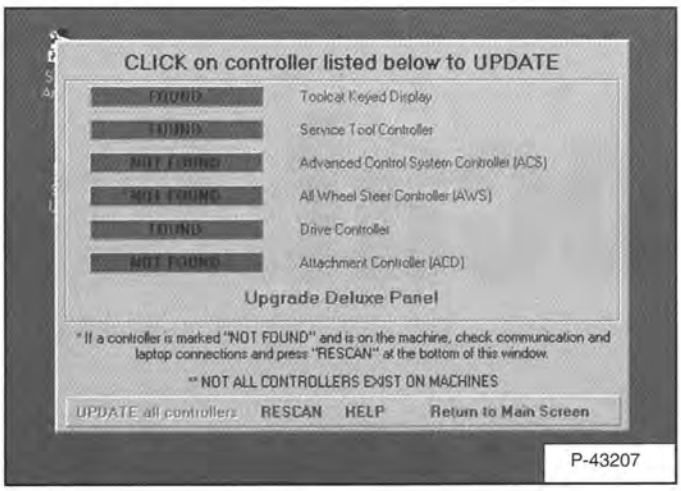
Bobcat Software Analyzer

Figure 40-15-1



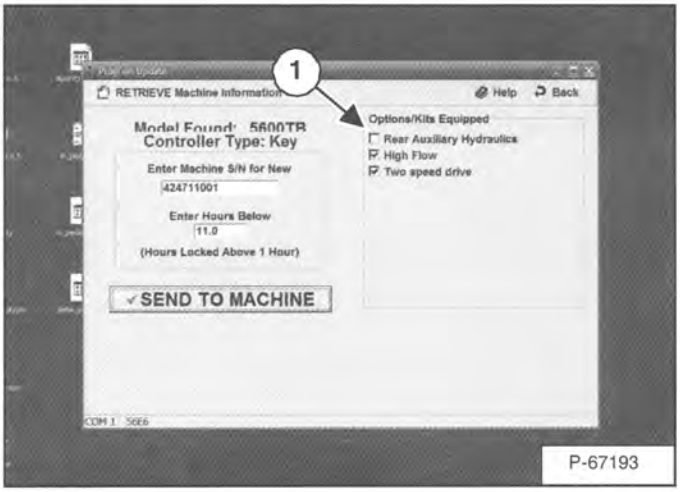
Click on the **Program / Update** Icon **[Figure 40-15-1]**.

Figure 40-15-2



Select the Display Controller **[Figure 40-15-2]**.

Figure 40-15-3



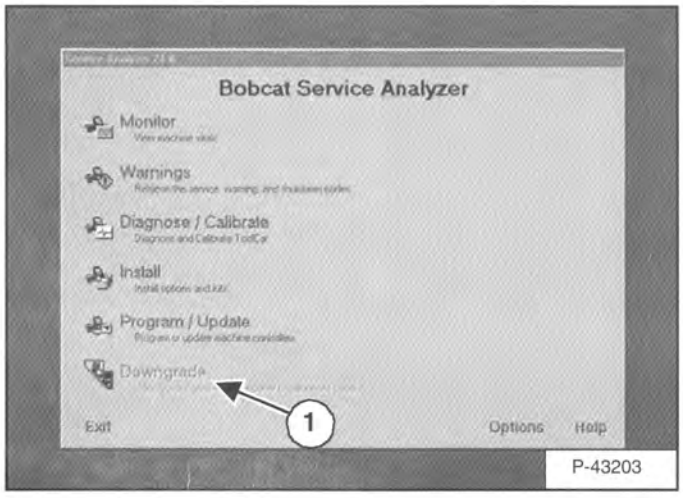
If the programmer is connected the machine S/N, Hours, and options should be filled in. If the information is not there or the serial number reads 200000001 the program is not communicating, controller is not working, or there is a new controller on the machine. If this is a new machine or has a new controller installed you must type in the information **[Figure 40-15-3]**.

Click on the appropriate boxes (Item 1) **[Figure 40-15-3]** to select the required options/kits that the machine is equipped with. If the Toolcat is equipped with an option and it isn't checked on the screen the controller will not allow this option to work.

SERVICE SOFTWARE (DOWNGRADE)

Bobcat Software Analyzer

Figure 40-16-1

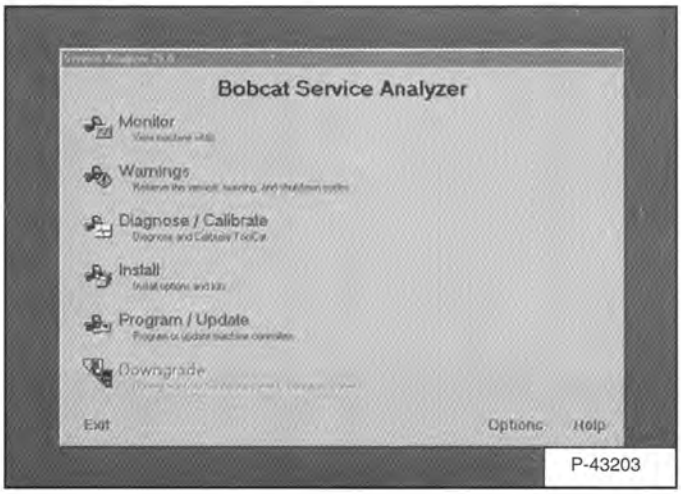


The **Downgrade** Icon (Item 1) **[Figure 40-16-1]** is not used for the Toolcat machine.

SERVICE SOFTWARE (OPTIONS)

Bobcat Software Analyzer

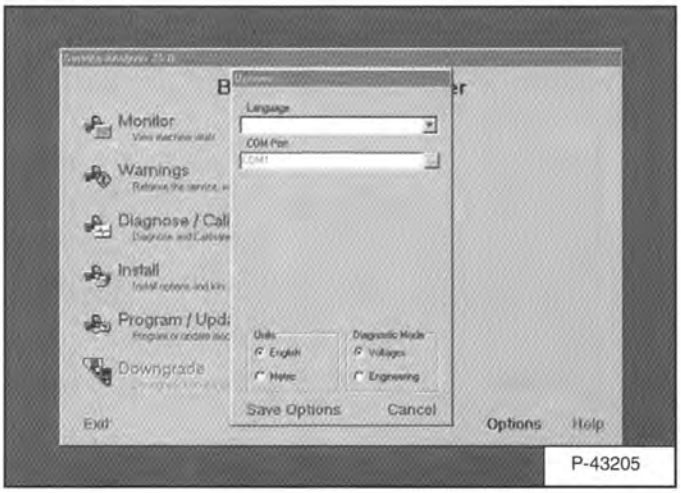
Figure 40-17-1



Click on the **Options** Icon **[Figure 40-17-1]**

On the options screen the language can be changed.

Figure 40-17-2



The COM port can also be changed. The COM port should only need to be changed when the Laptop is using com port 1 for another application/device **[Figure 40-17-2]**.

The Unit can be switched between English and Metric.

Diagnostic Mode should never be changed from voltage to engineering unless requested by Bobcat Service Personnel.

INSTALLING A KIT OR OPTION

Description

Two different procedures can be used to program the controller when installing kits or adding options.

If you are installing a new controller or need to program and update and existing controller, follow the Program/ Update procedure.

If you are installing a kit or option in a machine that is already programmed, follow the Install procedure.

Program/Update Procedure

Connect the Remote Start Tool. (See REMOTE START TOOL KIT-MEL1563 on Page 10-20-1.)

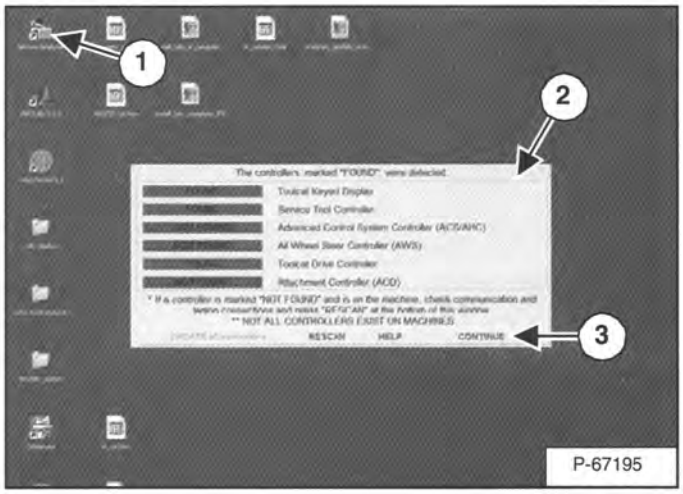
Connect the Service PC. (See SERVICE PC (LAPTOP COMPUTER) on Page 10-30-1.)

Figure 40-20-1

Turn the key to RUN on the Remote Start Tool **[Figure 40-20-1]**.

Turn the key to RUN or press RUN/Enter button on the Toolcat Display controller panel.

Figure 40-20-2

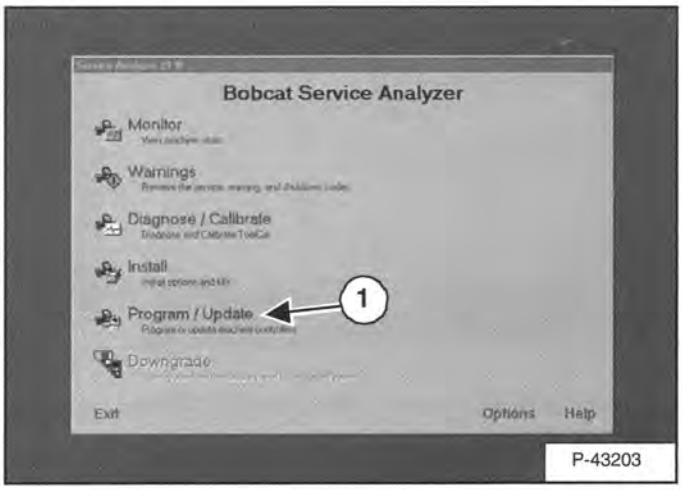


Start the service analyzer program by clicking on the desktop icon (Item 1) **[Figure 40-20-2]**.

The controllers found screen (Item 2) **[Figure 40-20-2]** is displayed showing which controllers are currently found on the machine being serviced.

Click on the continue button (Item 3) **[Figure 40-20-2]** to move on.

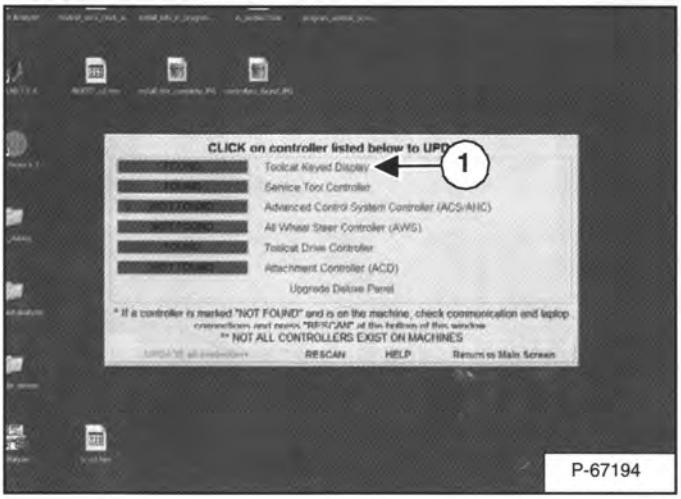
Figure 40-20-3



Select Program/Update (Item 1) **[Figure 40-20-3]** from the main screen.

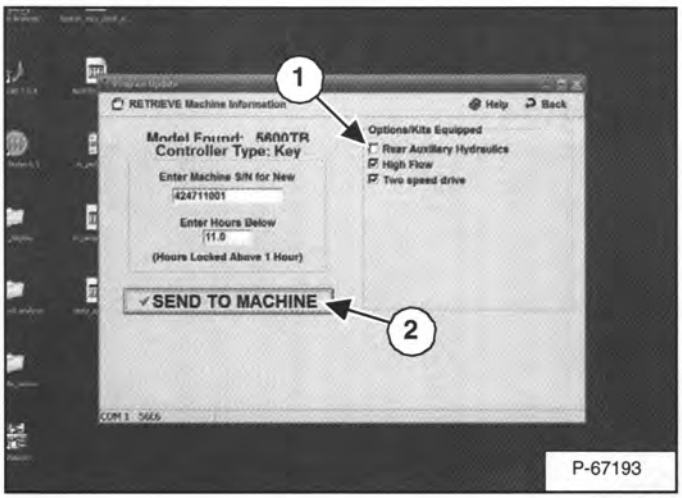
Program/Update Procedure (Cont'd)

Figure 40-20-4



Select Toolcat Keyed Display (Item 1) **[Figure 40-20-4]**.

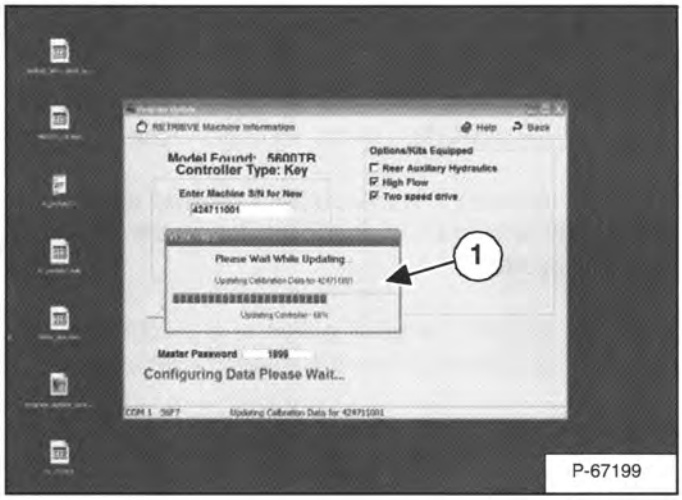
Figure 40-20-5



Click on the boxes (Item 1) **[Figure 40-20-5]** to select the required options.

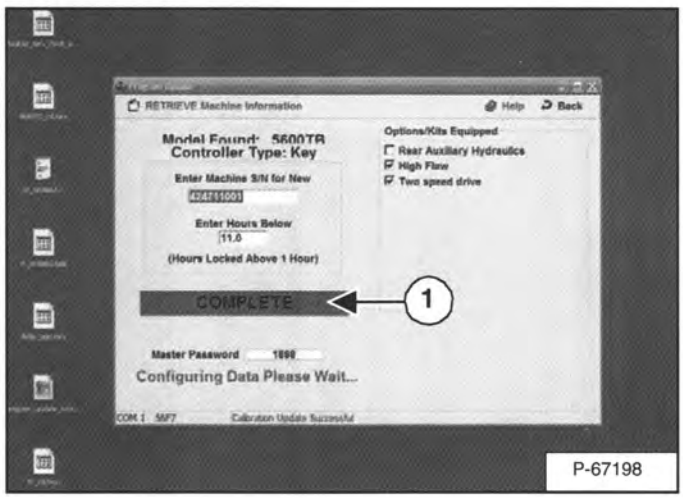
Click on the send to machine button (Item 2) **[Figure 40-20-5]**.

Figure 40-20-6



The Please Wait While Updating bargraph (Item 1) **[Figure 40-20-6]** will appear while the calibration is being performed.

Figure 40-20-7



After the information is processed, Complete (Item 1) **[Figure 40-20-7]** will be shown confirming that the update was successful.

INSTALLING A KIT OR OPTION (CONT'D)

Install procedure

Connect the Remote Start Tool. (See REMOTE START TOOL KIT-MEL1563 on Page 10-20-1.)

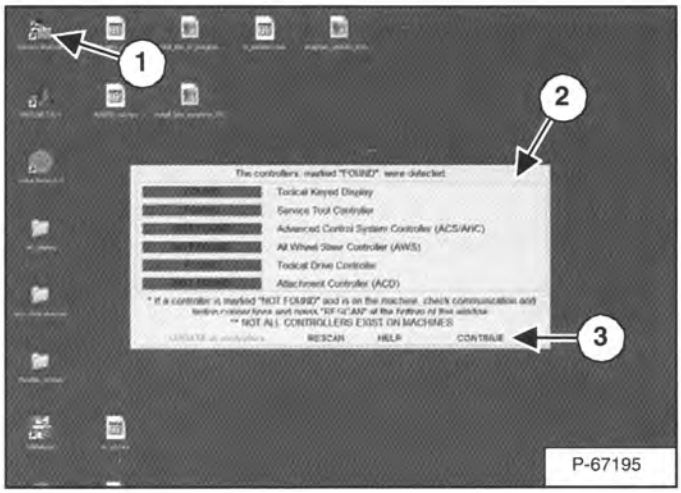
Connect the Service PC. (See SERVICE PC (LAPTOP COMPUTER) on Page 10-30-1.)

Figure 40-20-8

Turn the key to RUN on the Remote Start Tool **[Figure 40-20-8]**.

Turn the key to RUN or press RUN/Enter button on the Toolcat Display controller panel.

Figure 40-20-9

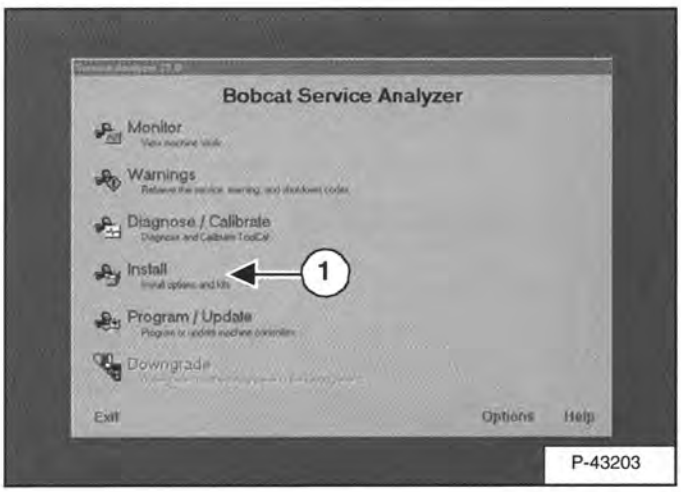


Start the service analyzer program by clicking on the desktop icon (Item 1) **[Figure 40-20-9]**.

The controllers found screen (Item 2) **[Figure 40-20-9]** is displayed showing which controllers are currently found on the machine being serviced.

Click on continue (Item 3) **[Figure 40-20-9]** to move on.

Figure 40-20-10

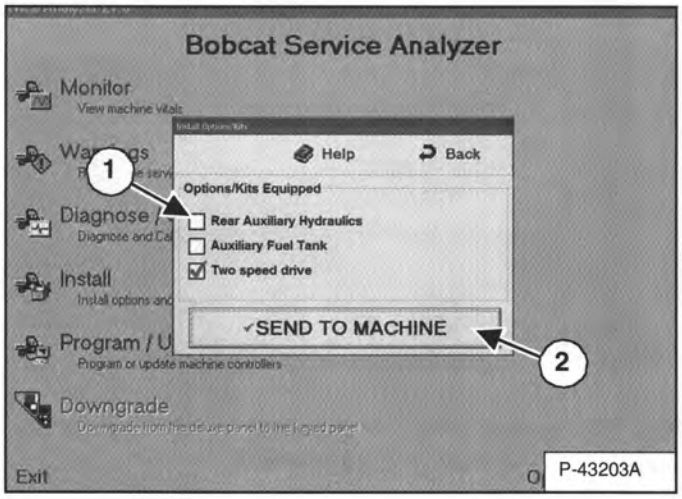


Click on the install icon (Item 1) **[Figure 40-20-10]**.

INSTALLING A KIT OR OPTION (CONT'D)

Install procedure (Cont'd)

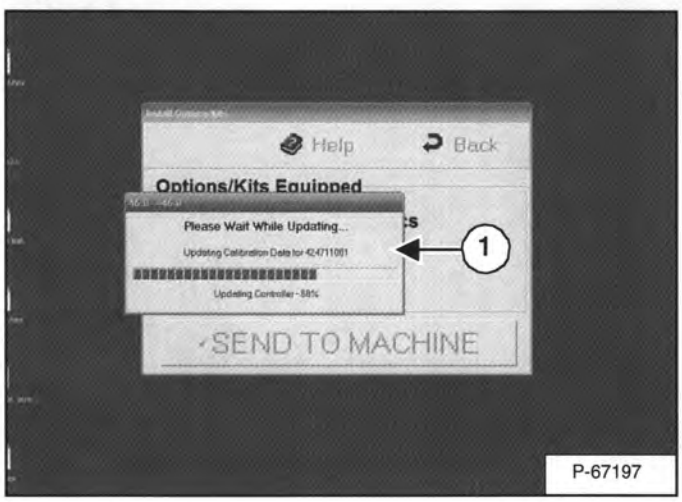
Figure 40-20-11



Click on the boxes (Item 1) **[Figure 40-20-11]** to select the required options.

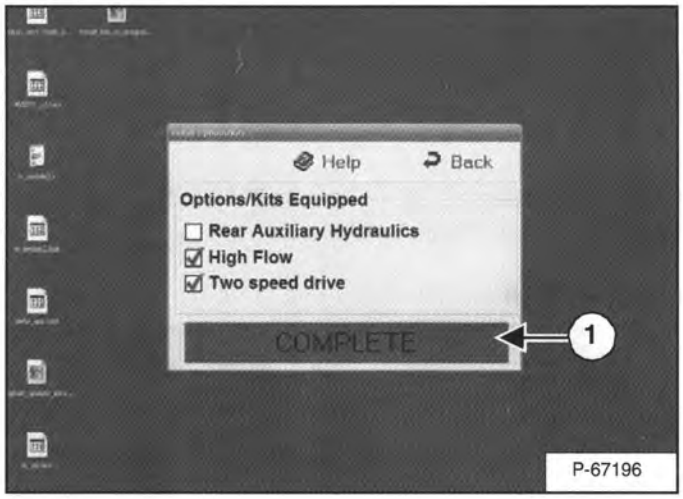
Click on the send to machine button (Item 2) **[Figure 40-20-11]** to send the information to the controller.

Figure 40-20-12



The Please Wait While Updating bargraph (Item 1) **[Figure 40-20-12]** will appear while the update is being performed.

Figure 40-20-13



After the information is processed, Complete (Item 1) **[Figure 40-20-13]** will be shown confirming that the calibration update was successful.