

# TM 10-3930-675-20-1

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## TECHNICAL MANUAL

### ORGANIZATIONAL MAINTENANCE MANUAL

FOR

**ROUGH TERRAIN CONTAINER HANDLER (RTCH):  
RT 240; 53,000 LB CAPACITY; 4 X 4  
(NSN 3930-01-473-3998)**



Approved for public release; distribution is unlimited.

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**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**JULY 2001**



**LIST OF EFFECTIVE PAGES/WORK PACKAGES**

Date of issue for original manual is:

Original 1 July 2001

**TOTAL NUMBER OF VOLUMES IS 2. TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 24 AND TOTAL NUMBER OF WORK PACKAGES IS 205 CONSISTING OF THE FOLLOWING:**

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## WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of this equipment. Failure to observe these precautions could result in serious injury or death to personnel. Also included are explanations of safety and hazardous materials icons used within the technical manual.



**BIOLOGICAL** - abstract symbol bug shows that a material may contain bacteria or viruses that present a danger to life or health.



**CHEMICAL** - drops of liquid on hand shows that the material will cause burns or irritation to human skin or tissue.



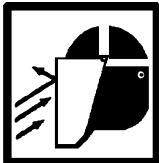
**ELECTRICAL** - electrical wire to arm with electricity symbol running through human body shows that shock hazard is present.



**EYE PROTECTION** - person with goggles shows that the material will injure the eyes.



**FIRE** - flame shows that a material may ignite and cause burns.



**FLYING PARTICLES** - arrows bouncing off face with face shield shows that particles flying through the air will harm face.



**HEAVY OBJECT** - human figure stooping over heavy object shows physical injury potential from improper lifting technique.



**HEAVY PARTS** - hand with heavy object on top shows that heavy parts can crush and harm.



HEAVY PARTS - heavy object on human figure shows that heavy parts present a danger to life or limb.



HOT AREA - hand over object radiating heat shows that part is hot and can burn.



RADIOACTIVE - identifies a material that emits radioactive energy and can injure human tissue or organs.



VAPOR - human figure in a cloud shows that material vapors present a danger to life or health.



HYDRAULIC FLUID PRESSURE - hydraulic fluid spraying human figure shows that fluid escaping under great pressure can cause injury or death.

**FOR INFORMATION ON FIRST AID, REFER TO FM 21-11.**



**WARNING**

***CARBON MONOXIDE (EXHAUST GASES) CAN KILL!***

- Carbon monoxide is a colorless, odorless, deadly poison which, when breathed, deprives the body of oxygen and causes suffocation. Exposure to air containing carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death can result from severe exposure.
  - Carbon monoxide occurs in exhaust fumes of internal combustion engines. Carbon monoxide can become dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to ensure safety of personnel when engine of RTCH is operated.
1. DO NOT operate RTCH engine in enclosed areas.
  2. DO NOT idle RTCH engine without adequate ventilation.
  3. DO NOT drive RTCH with inspection plates or cover plates removed.
  4. BE ALERT for exhaust poisoning symptoms. They are:
    - Headache
    - Dizziness
    - Sleepiness
    - Loss of muscular control
  5. If you see another person with exhaust poisoning symptoms:
    - Remove person from area.
    - Expose to fresh air.
    - Keep person warm.
    - Do not permit physical exercise.
    - Administer cardiopulmonary resuscitation (CPR), if necessary.
    - Notify a medic.
  6. BE AWARE. The field protective mask for nuclear-biological-chemical (NBC) protection will not protect you from carbon monoxide poisoning.

***The Best Defense Against Carbon Monoxide Poisoning Is Good Ventilation!***



**WARNING**  
*BATTERIES*

- To avoid injury, eye protection and acid-resistant gloves must be worn when working around batteries. Do not smoke, use open flame, make sparks or create other ignition sources around batteries. If a battery is giving off gases, it can explode and cause injury to personnel. Remove all jewelry such as rings, ID tags, watches, and bracelets. If jewelry or a tool contacts a battery terminal, a direct short will result in instant heating, damage to equipment, and injury to personnel.
- Sulfuric acid contained in batteries can cause serious burns. If battery corrosion or electrolyte makes contact with skin, eyes or clothing, take immediate action to stop the corrosive burning effects. Failure to follow these procedures may result in death or serious injury to personnel.
  - a. **Eyes.** Flush with cold water for no less than 15 minutes and seek medical attention immediately.
  - b. **Skin.** Flush with large amounts of cold water until all acid is removed. Seek medical attention as required.
  - c. **Internal.** If corrosion or electrolyte is ingested, drink large amounts of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Seek medical attention immediately.
  - d. **Clothing/Equipment.** Wash area with large amounts of cold water. Neutralize acid with baking soda or household ammonia.

**WARNING**

*CLEANING AGENTS*

Improper cleaning methods and use of unauthorized cleaning agents can injure personnel and damage equipment. To prevent this, refer to TM 9-247 for further instructions.



**WARNING**  
*COMPRESSED AIR*

Compressed air used for cleaning or drying purposes, or for clearing restrictions, should never exceed 30 psi (207 kPa). Use protective equipment and exercise caution to avoid injury to personnel.



**WARNING**  
*DIESEL FUEL HANDLING*

- DO NOT perform fuel system checks, inspections or maintenance while smoking or near fire, flames or sparks. Fuel may ignite, causing damage to vehicle and injury or death to personnel.
- Wear fuel-resistant gloves when handling fuels and promptly wash exposed skin and change fuel-soaked clothing.





**WARNING**

***DRY CLEANING SOLVENT***



Dry cleaning solvent P-D-680 type III is toxic and flammable. Wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and do not breathe vapors. Do not use near open flames or excessive heat. The solvent's flash point is 200°F (94°C). If you become dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If solvent contacts eyes, wash your eyes and get medical aid immediately.



**WARNING**

***ELECTRICAL SYSTEM MAINTENANCE***

Remove all jewelry, watches, rings, etc. prior to disconnecting cables from batteries or other electrical source. Items can come in contact with battery or electrical source and cause electrical shock. Failure to follow this warning may result in personnel injury or death.



**WARNING**

***ETHER COLD START SYSTEM***

- Ether is extremely flammable and explosive. DO NOT perform ether cold start system checks, inspections or maintenance while smoking or near fire, flames or sparks. Failure to follow this warning may cause a fire and explosion, causing serious injury or death to personnel.
- Avoid breathing cold start system fluid vapors. Wear goggles and fuel-resistant gloves when handling fluid. Failure to follow this warning may cause serious injury or death to personnel.



**WARNING**

***FIRE EXTINGUISHER***

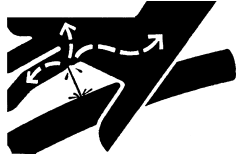
Discharging large quantities of dry chemical fire extinguisher in cab may result in temporary breathing difficulty during and immediately after the discharge event. If at all possible, discharge fire extinguisher from outside the cab. Ventilate cab thoroughly prior to reentry.



**WARNING**

***HAZARDOUS WASTE DISPOSAL***

When servicing this vehicle, performing maintenance, or disposing of materials such as engine coolant, hydraulic fluid, lubricants, battery acids or batteries, and CARC paint, consult your unit/local hazardous waste disposal center or safety office for local regulatory guidance. If further information is needed, please contact The Army Environmental Hotline at 1-800-872-3845.



**WARNING**  
**HYDRAULIC SYSTEM**



- DO NOT disconnect or remove any hydraulic system line or fitting unless hydraulic system pressure has been relieved. Tighten all connections before applying pressure. Escaping hydraulic fluid under pressure can penetrate the skin, causing serious injury.
- Search for leaks with a piece of cardboard. Protect hands and body from high-pressure fluids. If an accident occurs, see a doctor immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.
- At operating temperature, hydraulic oil is hot. Allow hydraulic oil to cool before disconnecting any hydraulic lines. Failure to do so could result in injury.
- Hydraulic fluid is very slippery. Immediately wipe up any spills. Failure to follow this warning may result in injury to personnel.

**WARNING**

**IR LIGHTS**

DO NOT look directly at IR source without eye protection and maintain a minimum of 12 inches from energized IR lights to prevent possible eye discomfort or damage.



**WARNING**  
**LIFTING HEAVY COMPONENTS**



- Hydraulic jacks are intended only for lifting RTCH, not for supporting vehicle to perform maintenance. DO NOT get under vehicle after it is raised unless it is properly supported with blocks or other suitable cribbing. Failure to observe this warning may result in death or injury to personnel.
- Use extreme caution when handling heavy parts. Provide adequate support and use assistance during procedure. Ensure that any lifting device used is in good condition and of suitable load capacity. Keep clear of heavy parts supported only by lifting device. Failure to follow this warning may result in death or injury to personnel.
- Improper use of lifting equipment and improper attachment of cables to vehicle can result in serious personnel injury and equipment damage. Observe all standard rules of safety.



**WARNING**

***NBC EXPOSURE***



If NBC exposure is suspected, all air cleaner media should be handled by personnel wearing protective equipment. Consult your NBC Officer or NBC NCO for appropriate handling or disposal procedures.

**WARNING**

IF NBC EXPOSURE IS SUSPECTED ALL AIR FILTER MEDIA WILL BE HANDLED BY PERSONNEL WEARING FULL NBC PROTECTIVE EQUIPMENT. SEE OPERATOR/MAINTENANCE MANUAL.

7690-01-114-3702

***To order this NBC decal use:***

National Stock Number (NSN) - 7690-01-114-3702

Part Number (PN) - 12296626

Commercial and Government Entity Code (CAGEC) - 19207



**WARNING**

***PRESSURIZED COOLING SYSTEM***

- DO NOT service cooling system unless engine has been allowed to cool down. This is a pressurized cooling system and escaping steam or hot coolant will cause serious burns.
- DO NOT remove cooling system radiator cap when engine is hot. Allow engine to cool down. Failure to follow this warning may cause serious burns.
- Wear effective eye, glove, and skin protection when handling coolants. Failure to do so may cause injury.



**WARNING**

***R-134A REFRIGERANT***



- Liquid refrigerant, when exposed to air, quickly evaporates and will freeze skin or eye tissue. Use care to prevent refrigerant from touching your skin or eyes. Serious injury or blindness may result if you come in contact with refrigerant.
- Refrigerant R-134a air conditioning systems should not be pressure tested or leak tested with compressed air. Combustible mixtures of air and R-134a may form, resulting in a fire or explosion, which could cause personnel injury.



**WARNING**

***SLAVE STARTING***

- When slave starting RTCH, use NATO slave cable that DOES NOT have loose or missing insulation.
- DO NOT proceed if suitable cable is not available.
- DO NOT use civilian-type jumper cables.

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FOR

ROUGH TERRAIN CONTAINER HANDLER (RTCH)  
RT 240; 53,000 LB CAPACITY; 4 X 4  
(NSN 3930-01-473-3998)

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Submit your DA Form 2028 (*Recommended Changes to Equipment Technical Publications*), through the Internet, on the Army Electronic Product Support (AEPS) website. The Internet address is <http://aeps.ria.army.mil>. If you need a password, scroll down and click on "ACCESS REQUEST FORM". The DA Form 2028 is located in the ONLINE FORMS PROCESSING section of the AEPS. Fill out the form and click on SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or e-mail your letter, DA Form 2028 direct to: AMSTA-LC-CI/TECH PUBS, TACOM-RI, 1 Rock Island Arsenal, Rock Island, IL 61299-7630. The e-mail address is: TACOM-TECH-PUBS@ria.army.mil. The fax number is DSN 793-0726 or Commercial (309) 782-0726.

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# HOW TO USE THIS MANUAL

## INTRODUCTION

1. This manual is designed to help you perform Organizational Maintenance and Troubleshooting on the RT 240 Rough Terrain Container Handler (RTCH).
2. The *Repair Parts and Special Tools List (RPSTL)*, TM 10-3930-675-24P, is to be used in conjunction with this manual, to locate and obtain the repair parts and special tools needed to maintain this equipment.
3. This manual is written in Work Package format:
  - a. Chapters divide the manual into major categories of information (e.g., *Introductory Information with Theory of Operation, Troubleshooting Procedures, Organizational Maintenance Instructions, and Supporting Information*).
  - b. Each Chapter is divided into Work Packages, which are identified by a 6-digit number (e.g. 0001 00, 0002 00, etc.) located on the upper right-hand corner of each page. The Work Package page number (e.g. 0001 00-1, 0001 00-2, etc.) is located centered at the bottom of each page.
  - c. If a Change Package is issued to this manual, added Work Packages use the 5<sup>th</sup> and 6<sup>th</sup> digits of their number to indicate new material. For instance, Work Packages inserted between WP 0001 00 and WP 0002 00 are numbered WP 0001 01, WP 0001 02, etc.
4. This manual is published in two volumes: Volume I covers Chapters 1 and 2, Work Packages 0001 00 thru WP 0047 00 and includes all troubleshooting. Volume II includes Chapters 3 and 4, WP 0048 00 thru 0205 00.
5. Scan thru this manual to become familiar with its organization and contents before attempting to maintain the equipment.

## CONTENTS OF THIS MANUAL

1. A *Warning Summary* is located at the beginning of each volume of the manual. Become familiar with these warnings before operating or performing troubleshooting or maintenance on the vehicle.
2. A *Table of Contents* in Volume I lists the contents of Volumes I and II. The *Table of Contents* in Volume II lists the contents of Volume II only.
  - a. The Table of Contents also provides *Reporting Errors and Recommending Improvements* information and DA Form 2028 addresses, for the submittal of corrections to the manual.
  - b. If you cannot find what you are looking for in the Table of Contents, refer to the alphabetical *Index* at the back of the manual. The alphabetical Index for each volume lists only those Work Packages found in that volume.
3. Chapter 1, *Introductory Information with Theory of Information*, provides general information on the manual and the equipment.
4. Chapter 2, *Troubleshooting Procedures*, contains all applicable troubleshooting.
  - a. Before attempting to perform troubleshooting, carefully read the information in WP 0004 00, *Troubleshooting Introduction*. It explains how to perform both non-error code and error code-driven troubleshooting. Included at the end of this Work Package are locator diagrams of all electrical and hydraulic components that may be hard to locate.
  - b. The *Troubleshooting Symptom Index* in WP 0005 00 is divided into three sections. The first is an alphabetical listing, by system, of non error code-driven malfunctions. The second is a "Numerical Error Code Symptom Index". The third is an "Alphabetical Error Code Symptom Index".
  - c. The corrective action for certain malfunctions is to notify "SRA". Refer to Table 3 in the MAC (WP 0202 00) for further information about the Specialized Repair Activity for the RTCH.
5. Chapter 3 covers all *Organizational Maintenance Instructions*. Work Packages are organized in the same Functional Group Code (FGC) sequence as the Maintenance Allocation Chart (MAC) found in TM 10-3930-675-20-2.
6. Chapter 4 includes *Supporting Information: References, Expendable and Durable Items List, Tool Identification List* and a complete listing of *Error Codes* resident on the RTCH.
7. Following the alphabetical *Index* are *Foldouts* of the RTCH hydraulic systems.

## FEATURES OF THIS MANUAL

1. WARNINGS, CAUTIONS, NOTES, subject headings, and other important information are highlighted in **BOLD** print as a visual aid.

### **WARNING**

A WARNING indicates a hazard which may result in death or serious injury.

### **CAUTION**

A CAUTION is a reminder of safety practices or directs attention to usage practices that may result in damage to equipment.

### **NOTE**

A NOTE is a statement containing information that will make the procedures easier to perform.

2. Statements and words of particular interest may be printed in CAPITAL LETTERS to create emphasis.
3. Within a procedural step, reference may be made to another Work Package in this manual or to another manual. These references indicate where you should look for more complete information.
  - a. If you are told: "Replace engine ECU (WP 0078 00)", go to the first page of Work Package 0078 00 in Volume II of this manual for instructions on replacing the engine ECU. Be sure to read the "Initial Setup" on page 1 of the Work Package, to determine contents of Work Package as well as information regarding tools and equipment, spare parts, and personnel required, etc.
  - b. If you are told: "Check coolant level (TM 10-3930-675-10)", go to TM 10-3930-675-10 for complete instructions on checking the coolant level. Use the *Table of Contents* or alphabetical *Index* in TM 10-3930-675-10 to find procedure.
4. Illustrations are placed after, and as close to, the procedural steps to which they apply. Callouts placed on the art may be text or numbers, or both; whichever method is easier for the soldier.
5. Numbers located at lower right corner of art (e.g. 350-001; 350-002, etc.) are art control numbers and are used for tracking purposes. Disregard these numbers.
6. Dashed leader lines used in illustrations indicate that called out items are not visible in the view depicted (i.e. they are located within or behind the structure).
7. Technical instructions include metric units as well as standard units. For your reference, a *Metric Conversion Chart* is located on the inside back cover of the manual.

### **NOTE**

If at any time you are unsure how to use this manual or you cannot locate the information you need, notify your supervisor.

**CHAPTER 1**  
**INTRODUCTORY INFORMATION WITH**  
**THEORY OF OPERATION**

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**GENERAL INFORMATION**

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0001 00

**SCOPE**

1. **Type of Manual.** This manual is for use in performing Organizational Maintenance and Troubleshooting on the Rough Terrain Container Handler (RTCH), RT 240.
2. **Equipment Name and Model Number.** Rough Terrain Container Handler (RTCH): RT 240, 53,000 lb capacity, 4 X 4.
3. **Purpose of Equipment.** The RTCH-RT 240 is designed to lift and stack 20 and 40 ft International Standard Organization (ISO) containers, loaded to a gross weight of 53,000 lb (24,062 kg).

**MAINTENANCE FORMS, RECORDS, AND REPORTS**

Department of the Army forms and procedures used for the equipment will be those prescribed by DA Pam 738-750, *Functional User's Manual for the Army Maintenance Management System (TAMMS)*, as contained in the Maintenance Management Update.

**REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRS)**

If your truck needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF Form 368 (*Product Quality Deficiency Report*). Mail it to us at: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-AC-NML, Rock Island, Illinois 61299-7630. We'll send you a reply.

**CORROSION PREVENTION AND CONTROL (CPC)**

1. Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.
2. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem. If a corrosion problem is identified, it can be reported using SF Form 368 (*Product Quality Deficiency Report*). Use of key words such as "corrosion," "rust," "deterioration," or "cracking" will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA Pam 738-750.

**OZONE DEPLETING SUBSTANCES**

Listing to be provided by requiring activity.

**DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE**

For destruction of Army materiel to prevent enemy use, refer to TM 750-244-6.

**PREPARATION FOR STORAGE OR SHIPMENT**

For preparation for storage or shipment procedures, refer to WP 0193 00.

**WARRANTY INFORMATION**

The vehicles are warranted by Kalmar RT in accordance with TB 10-3930-675-14. Warranty starts on the date found in block 23, DA Form 2408-9 in the logbook. Report all defects in material or workmanship to your supervisor, who will take appropriate action through your Organizational Maintenance shop.

**LIST OF ABBREVIATIONS/ACRONYMS**

**NOTE**

Refer to ASME Y14.38-1999 for standard abbreviations.

<b>ABBREVIATION/ACRONYMS</b>	<b>DEFINITION</b>
AAL.....	Additional Authorization List
AOAP.....	Army Oil Analysis Program
BII.....	Basic Issue Items
C.....	Centigrade or Celsius
CAN-BUS.....	Controller Area Network-BUS
CID.....	Cubic Inch Displacement
cm.....	Centimeter
COEI.....	Components of End Item
ECM.....	Electronic Control Module
ECS.....	Electronic Control System
GCWR.....	Gross Combination Weight Rating
GVWR.....	Gross Vehicle Weight Rating
IETM.....	Interactive Electronic Technical Manual
ISO.....	International Organization for Standardization
kg.....	Kilogram
km.....	Kilometer
kPa.....	Kilopascal
kph.....	Kilometers per Hour
kW.....	Kilowatt
l.....	Liter
lb-ft.....	Pound Foot
lph.....	Liters per Hour
mm.....	Millimeter
NATO.....	North Atlantic Treaty Organization
Nm.....	Newton Meter
OEM.....	Original Equipment Manufacturer
PMCS.....	Preventive Maintenance Checks and Services
RTCH.....	Rough Terrain Container Handler
SOP.....	Standard Operating Procedure
SPORT.....	Soldier's Portable On-System Repair Tool
SRA.....	Specialized Repair Activity
ULLS-G.....	Unit Level Logistics System - Ground



**EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES**1. **Characteristics.**

- a. The Rough Terrain Container Handler (RTCH) RT 240 is designed to lift, move, stack or unstack 20 and 40 ft by 8 ft wide ISO containers.
- b. The RTCH-RT 240 has a lift capacity of 53,000 lb (24,062 kg) and operates on hard and/or unimproved surfaces, to include beach operations.
- c. The RTCH-RT 240 can be utilized as a forklift with an operator-installed forklift kit.

2. **Capabilities and Features.**a. **Capabilities.**

- (1) Container handling capabilities:
  - Stack or unstack 8 ft high ISO containers stacked three (3) high with a gross weight of 53,000 lb (24,062 kg) in the first row.
  - Stack or unstack 8 ft high ISO containers stacked three (3) high with a gross weight of 27,500 lb (12,485 kg) in the second row.
  - Stack or unstack 4.3 ft high ISO containers stacked seven (7) high.
  - Container tophandler adjusts to 20 ft or 40 ft ISO container lengths.
  - Container tophandler oscillates 7° left and right.
  - Container tophandler rotates 195° clockwise and 105° counterclockwise.
  - Container tophandler tilts 8° forward and 12° to the rear.
  - Container tophandler side shifts ± 15 in (± 400 mm) from the center.
- (2) Forklift kit is operator-installed and attaches to the tophandler. The forklifts are adjustable from 24 in (61 cm) center-to-center to 81.5 in (207 cm) center-to-center. Lift capacity is 44,000 lb (19,976 kg).
- (3) Maximum speed of RTCH is 23 mph (37 kph) on level ground with NO LOAD; maximum speed on level ground LOADED is 15 mph (24 kph).
- (4) Maximum fording depth is 60 in (1.52 m).
- (5) Operation in temperatures from -25°F (-32°C) to +125°F (+52°C), and to -40°F (-40°C) with arctic kit installed.

b. **Features.**

- (1) Electronically-controlled 400 hp, six-cylinder turbocharged engine.
- (2) Electronic semi-automatic shift controlled transmission with 4 ranges forward and 3 reverse. Operator selects range and ECM controls shift points.
- (3) The drive axles provide traction for two- or four-wheel drive.
- (4) Limited slip differentials and multi-disc-wet brakes are an integral part of the axle assemblies. Multi-disc-wet brakes are hydraulically cooled to prevent overheating. Accumulators store energy for the emergency braking system.
- (5) The steering system is capable of two-wheel, four-wheel, crab, and emergency modes of operation.
- (6) The parking brake is hydraulically released and spring-applied by disc brake assemblies mounted on the front and rear differentials.
- (7) The operator's cab has a fully adjustable operator's seat, fresh air (filtered) ventilation system, and heater/defroster/air conditioning systems.

***EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - CONTINUED***

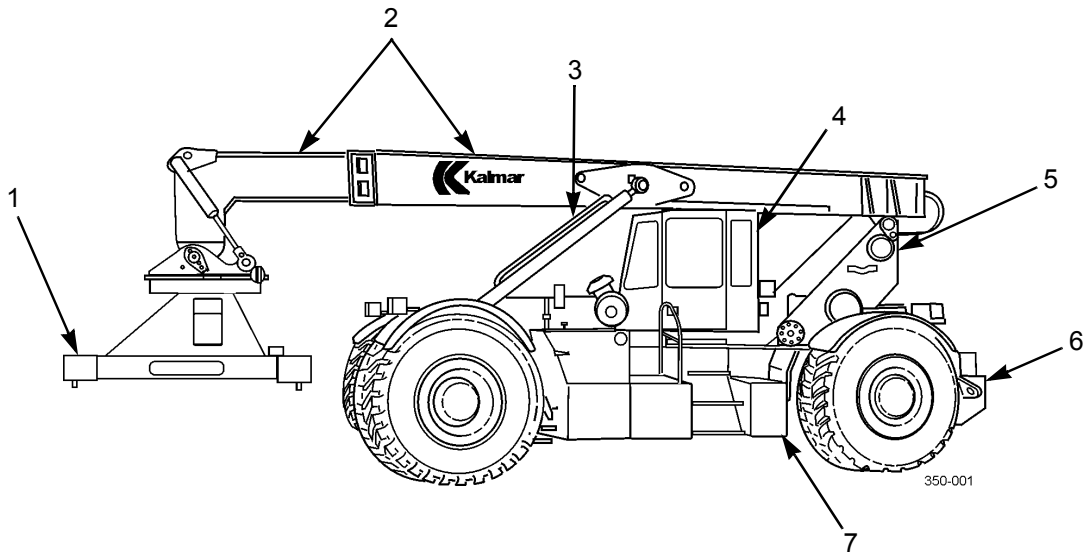
- (8) Operator's controls include: adjustable steering wheel; accelerator and brake pedals; transmission range selector; steering mode selection rocker switches; and a single joystick control for all boom, tophandler, and forklift operations.
- c. **Transport Modes.**

**NOTE**

Refer to TM 10-3930-675-10 for detailed instructions to prepare the RTCH for transport.

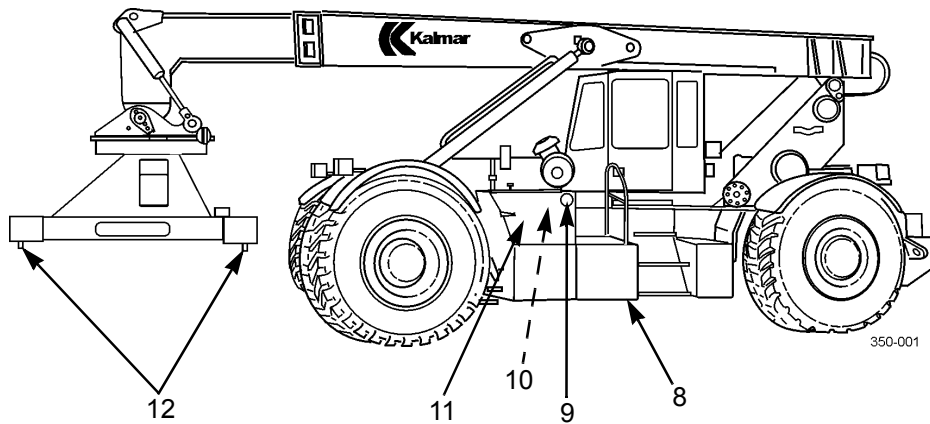
- Self Deployment
- Highway Transport
- Rail Transport
- Marine Transport
- Air Transport

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS



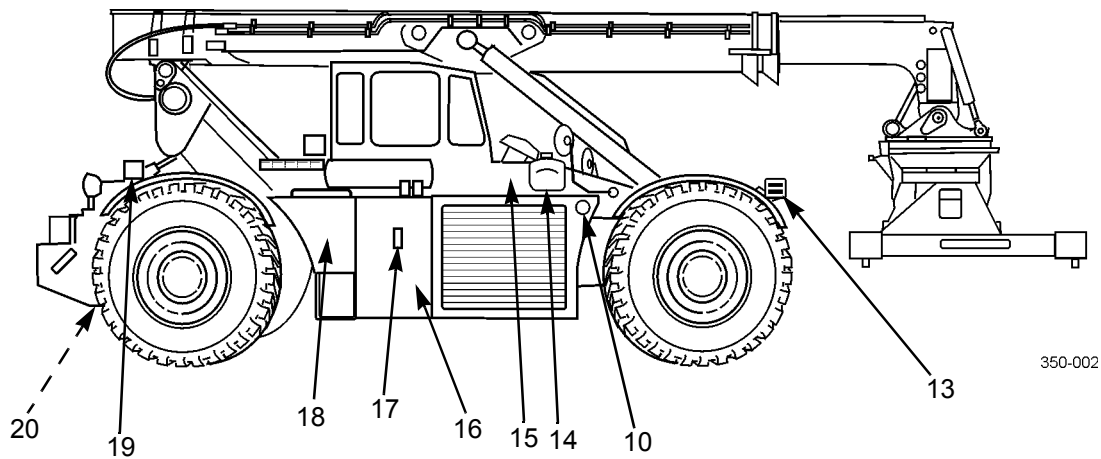
KEY	COMPONENT	DESCRIPTION
1	Tophandler	Electro-hydraulically operated 20-40 ft tophandler. Capable of sideshifting, rotation, forward/rear tilting, left/right tilting, and load position leveling and locking. Also interfaces with forklift attachment.
2	Boom Assembly	Electro-hydraulically operated heavy duty steel boom designed for moving, lifting, and stacking 20-40 ft ISO containers.
3	Boom Lift Cylinders	Electro-hydraulically operated cylinders raise, lower, and support the boom assembly.
4	Operator's Cab	Contains all driving and container handling controls as well as heating, air conditioning, and filtered ventilation system controls. During air transport operations the cab is moved to the left side of the chassis, then lowered and secured in place.
5	Boom Support	Rear support and pivot point for the boom to include an unlocking device that allows the boom assembly to be lowered into the transport position.
6	Frame	A heavy-duty steel construction with tie-downs, towing lugs, and pintle hook.
7	Remote Hydraulic Control Compartment	Location of selected hydraulic remote controls. Also access to hydraulic system test and AOAP sampling ports.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



KEY	COMPONENT	DESCRIPTION
8	Dolly Wheels Storage Compartment	Storage location for the tophandler air transport dolly wheels.
9	Master Battery Switch	ON/OFF control of electrical power from batteries to vehicle electrical system.
10	Slave Receptacle	Provides an electrical connection for slave starting. A receptacle is located on each side of the truck.
11	Battery Compartment	Stores four 12-volt batteries and required cabling. Batteries are accessible from the side and/or the top.
12	Twistlocks	Electro-hydraulically operated and monitored ISO twistlocks, located at each corner of the tophandler. Also utilized to attach forklift attachment to tophandler.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - CONTINUED



KEY	COMPONENT	DESCRIPTION
13	Front Service and Blackout Lights	Headlight, blackout drive light, and composite turn signal with blackout markers.
14	Coolant Expansion Tank	Contains cooling system overflow. Provides means to visually check coolant level and add coolant to system.
15	Engine Compartment	Houses the six-cylinder turbocharged diesel engine that supplies power for the automotive, electrical, and hydraulic systems.
16	Hydraulic Reservoir	Stores and vents system hydraulic oil.
17	Hydraulic Reservoir Sight Gage	Visual indicator of hydraulic oil level. If oil is NOT visible in sight gage with boom completely lowered and tophandler retracted, do not start engine.
18	Fuel Tank	Stores fuel supply for vehicle.
19	Rear Service and Blackout Lights	Composite tail, stop, and blackout markers; turn signals; and backup lights.
20	Bogie Wheels	Distribute weight equally between bogie wheels and rear axle for air transportability.

**EQUIPMENT DESCRIPTION AND DATA - CONTINUED**

**0002 00**

**EQUIPMENT DATA**

**Engine:**

Manufacturer . . . . .	Cummins
Model . . . . .	QSM 11
Horsepower @ 2150 rpm . . . . .	400 hp (298 kW)
Torque @ 1200 rpm . . . . .	1450 lb-ft (1966 Nm)
Cylinders . . . . .	6
Displacement . . . . .	661 CID (10.8 liters)
Weight . . . . .	2070 lb (940 kg)
Fuel System . . . . .	Fully electronic
Cooling System, Thermostat Range . . . . .	180° - 200°F (82° - 93°C)

**Transmission:**

Manufacturer . . . . .	ZF-Hydromedia
Model . . . . .	4 WG-260
Type . . . . .	4 forward and 3 reverse speeds
Range Selection . . . . .	Automatic, electronically-controlled

**Axles:**

Manufacturer . . . . .	Kessler
Model:	
Front . . . . .	LT102PL341/528NLB4650
Rear . . . . .	LT102PL341/528NLB4460
Weight:	
Front . . . . .	8379 lb (3804 kg)
Rear . . . . .	5733 lb (2602 kg)

**Tires:**

Front and Rear:	
Manufacturer . . . . .	Bridgestone
Size . . . . .	29.5 R 35 XRB
Inflation . . . . .	85 psi (586 kPa)
Weight . . . . .	2315 lb (1050 kg)
Bogie Wheels (Transport Operations):	
Manufacturer . . . . .	Michelin
Size . . . . .	355/65 R 15 XZM
Inflation . . . . .	85 psi (586 kPa)
Dolly Wheels (Tophandler Transport):	
Manufacturer . . . . .	Michelin
Size . . . . .	225/75 R 10 XZR
Inflation . . . . .	85 psi (586 kPa)

**Dimensions:**

Length:	
Tophandler Lateral . . . . .	37.7 ft (11.5 m)
Tophandler Longitudinal . . . . .	49.2 ft (15.0 m)
Height:	
Operational w/ Boom Level . . . . .	13.1 ft (4.0 m)
Highway Transport Mode . . . . .	9.8 ft (3.0 m)
Width, Tophandler Longitudinal . . . . .	12 ft (3650 mm)

**EQUIPMENT DESCRIPTION AND DATA - CONTINUED**

**0002 00**

***EQUIPMENT DATA - CONTINUED***

**Weights:**

GVWR .....	118,000 lb (53,572 kg)
GVWR w/ Forklift Kit .....	128,400 lb (58,294 kg)

**Capacities:**

Fuel Tank .....	103 gal. (390 l)
Cooling System .....	23.7 gal. (90.1 l)
Cooling Engine Only .....	3.4 gal. (12.9 l)
Hydraulic Oil Reservoir .....	180 gal. (680 l)
Engine Crankcase w/Filter .....	38.6 qt (36.5 l)
Transmission w/Filter .....	36 qt (34 l)

**Electrical System:**

Type .....	24 volt, negative ground
------------	--------------------------

Batteries:

Quantity .....	4
Voltage .....	12 volt

**Miscellaneous:**

Maximum Lifting Capacity:

First Stacking Row .....	53,000 lb (24,062 kg)
Second Stacking Row .....	27,500 lb (12,485 kg)

Maximum Lift Height .....	33 ft (10.06 m)
---------------------------	-----------------

Maximum Lifting Capacity, w/Forklift Kit

First Stacking Row .....	44,000 lb (19,976 kg)
Second Stacking Row .....	24,600 lb (11,168 kg)

Maximum Lift Height, w/Forklift Kit .....	21.8 ft (6.65 m)
-------------------------------------------	------------------

Forklift Kit, Fork Tines Center-to-Center Range .....	24-81.5 in (61-207 cm)
-------------------------------------------------------	------------------------

Maximum Forward Reach (Boom Level) .....	20.6 ft (6.28 m)
------------------------------------------	------------------

Curb-to-Curb Turning Circle:

Four-Wheel Steering .....	65 ft (19.8 m)
---------------------------	----------------

Ground Clearance .....	18 in (45.7 cm)
------------------------	-----------------

Fording Depth .....	60 in (1.5 m)
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Maximum Travel Speeds:

Empty .....	23 mph (37 kph)
Loaded .....	15 mph (24 kph)

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**INTRODUCTION**

1. The RTCH-RT 240 consists of the following major components and functional systems: drive train, fuel system, exhaust system, cooling system, electrical and electronic systems, steering and brake systems, hydraulic system, cab system, and lifting boom with tophandler. A forklift kit may be added as required.
2. This work package explains how the components and systems of the RT 240 work together. A functional description is provided for each major component and system.

**DRIVE TRAIN**

1. The engine is a six-cylinder turbocharged diesel which supplies power to the transmission. The engine cooling system is pressurized and includes a thermostat, controlled bypass, and coolant recovery bottle. Engine lubrication is pressurized and full-flow filters continuously clean oil.
2. The transmission is a semi-automatic electronically-controlled unit. The operator electronically selects range of gears and the transmission ECM controls shift points up to the highest selected gear. A shift inhibitor circuit controls downshifts in forward and reverse gears. The transmission can be manually or electronically shifted through 4 forward and 3 reverse gears. A torque converter provides interface to the engine.
3. The drive shafts transmit rotation of the transmission output to the front and rear axles. Connections at both ends are made thru universal joints to compensate for any misalignments due to operating on uneven surfaces.
4. The front and rear axles are identical in operating principles. Both axles are hydraulically steered with planetary wheel ends and wet-disc brakes. The rear axle oscillates above and below horizontal to allow for operation on uneven surfaces.

**FUEL SYSTEM**

1. Fuel to power the engine is pumped from the fuel tank by a fuel transfer pump to the electronically controlled fuel injector nozzles.
2. The engine electronic control module manages, monitors, and stores key engine functions, to include engine idle speed, limits maximum engine speed, and engine diagnostic data.
3. The engine-mounted fuel/water separator is a spin-on replaceable type with drain.

**EXHAUST SYSTEM**

The exhaust system removes exhaust gases from the engine through the exhaust manifold and turbocharger. The gases flow into exhaust pipes and muffler to the atmosphere along the right side and to the rear of the operator's cab.

**COOLING SYSTEM**

1. The cooling system consists of an engine-mounted circulating pump, 180°- 200°F (82°- 93°C) thermostat, oil cooler/after cooler manifolds, a radiator, engine-mounted coolant filter, and hydraulically-driven cooling fan.
2. The cooling system cools the engine by means of circulating pressurized ethylene glycol-based coolant through the engine and radiator.

**ELECTRICAL SYSTEM**

1. The system voltage is 24 volts. Four 12-volt batteries, connected in series and charged by an alternator across electronic rectifying and voltage stabilization circuits, provide the voltage.
2. The negative and positive poles are both connected across the master battery switch. The negative pole is connected to the chassis.
3. NATO slave-starting receptacles are provided.

**STEERING SYSTEM**

1. The electro-hydraulic steering system provides three modes of steering control; two-wheel steer, four-wheel steer, and crab steer.
2. The variable rate steering system utilizes two front and two rear hydraulic steer cylinders and electronic wheel position sensors connected to an electronic control module to maintain direction and control. The variable rate system allows the system to change or adjust to different modes of operation.
3. An emergency steering pump is provided in the event the engine is inoperative. If the engine quits while operating the RTCH, the emergency steering pump provides sufficient hydraulic pressure to control the truck until it is brought to a safe stop.

**BRAKE SYSTEM**

1. The brakes are totally enclosed within the front and rear drive axle housings, next to the wheel ends.
2. The brake system is a wet brake system that is comprised of three separate hydraulic circuits: service brake circuit, cooling circuit, and parking brake circuit.
3. The brake system also includes six pressurized accumulators that provide adequate stored energy to stop the RTCH in the event of engine shutdown.
4. The service brake circuit is applied by depressing either the left or right floor-mounted hydraulic brake pedals. Brake pressure is applied to eight cylinders per side within the front axle and one cylinder per side in the rear axle.
5. The brake system cooling circuit cools the brake disks using oil pumped from the main hydraulic system through brake chambers during operation.
6. The parking brake assemblies are mounted at the input flanges of the front and rear axles. The brakes are applied by spring pressure and released hydraulically. A warning buzzer sounds if driver leaves seat without applying the parking brakes. In the event of an emergency the parking brake may be utilized to stop the truck.

**HYDRAULIC SYSTEM**

The RTCH hydraulic system is comprised of the following major components that provide hydraulic power to operate and control the container tophandler, boom, steering, and brake systems. In addition the hydraulic system is used to place the cab and bogie wheels into transport mode.

1. Three variable piston-type hydraulic pumps are driven by the transmission power take-off (PTO). The pumps provide hydraulics for the steering system and tophandler.
2. One double vane-type pump is driven by the transmission PTO. It provides hydraulics for the boom cylinders, service, and parking brake systems.
3. One single-vane pump is driven by the engine. It provides hydraulics for a cooling fan.
4. Main valves control the main hydraulics. The valves are controlled by an electro-hydraulic servo system from the joystick control in the operator's cab.
5. High-pressure oil filters clean hydraulic oil before returning oil to the reservoir. Breather filters allow venting of the hydraulic reservoir.
6. Hydraulic system oil cooler and fan maintain and control hydraulic oil temperature. The cooling fan is powered by hydraulics from an engine-driven hydraulic pump.
7. Emergency systems: one ground-driven hydraulic pump maintains steering control in the event of engine failure; a 24-volt electric hydraulic pump provides power to lower boom and release the twist locks in the event of engine failure. The electric pump also provides a means to place the operator's cab into the transport mode.

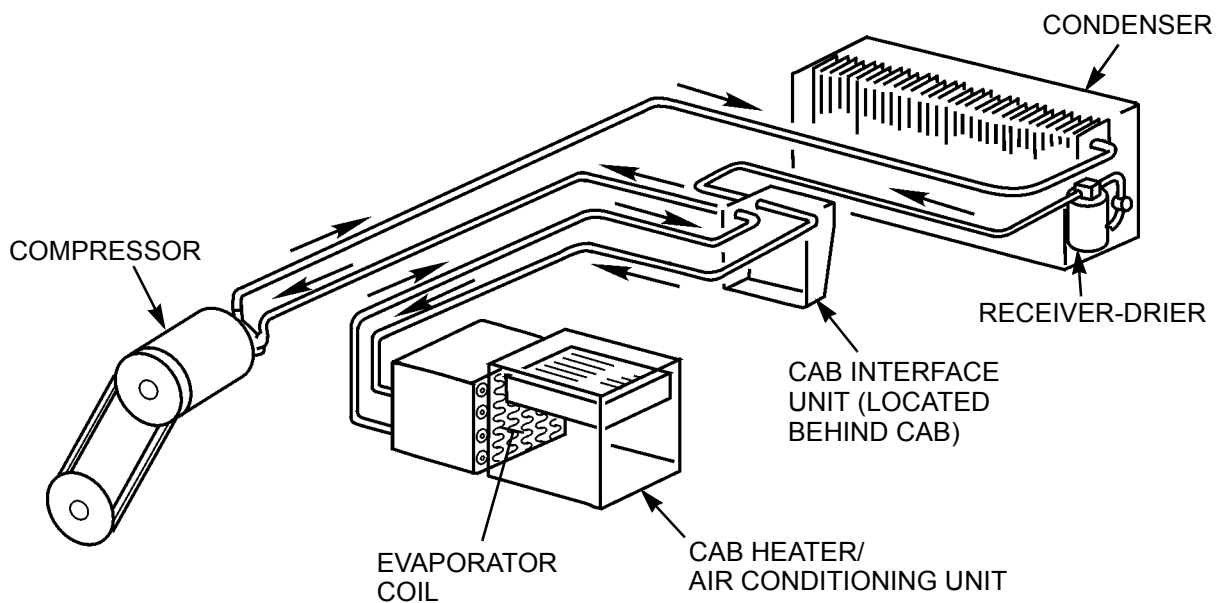
### CAB SYSTEM

The operator's cab is a sound and weather insulated unit that provides the operator with the systems to control and monitor both standard automotive functions and container handling functions. The following components or systems are also contained within the cab:

1. Adjustable steering column and adjustable suspension seat.
2. Heater, air conditioning, and filtered ventilation system.
3. Portable fire extinguisher and rifle mount.

### AIR CONDITIONING SYSTEM

1. The air conditioning system unit is part of the heater and is mounted at the front of cab. It is a single unit consisting of a heater core, air conditioning evaporator coil, blower motor, control valves, and air ducts.
2. The system is turned on by the air conditioning control switch on the instrument panel in the cab. The two-speed blower switch controls flow rate.
3. An even cab temperature is maintained by controlling the refrigerant flow through the evaporator coil, by the air conditioner temperature control switch.



350-1021

### ELECTRONIC SYSTEM

The RT 240 is equipped with several electronic modules, all connected using CAN-BUS technology. The modules can be diagnosed using the IETM and OEM testing equipment. They assist in the operation of major systems such as engine, transmission shifting, steering mode and wheel position, the safe working load control, and many related functions that require data input to operate correctly for the intended uses of the RT 240.

***LIFTING BOOM AND TOPHANDLER***

The lifting boom and tophandler is an electro-hydraulic operated heavy-duty telescoping boom and spreader assembly, designed to lift, move, and stack/unstack 20-40 ft (6.1-12.2 m) ISO containers. The operator joystick provides complete control of the lifting boom and tophandler during container handling operations. The boom provides lifting/lowering, extending/retracting operations. The tophandler or spreader provides for sideshifting, rotation, forward/rear tilting, left/right tilting, and load leveling and locking operations. The tophandler also provides interface capability with a forklift attachment.

***FORKLIFT KIT***

The forklift kit is attached to the tophandler twistlocks and two hydraulic hose quick disconnects. Forklift operation is controlled from the tophandler joystick to include adjustable forktines. The forktines and vertical support beams fold under the forklift framework for transport.

**CHAPTER 2**  
**TROUBLESHOOTING PROCEDURES**

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**GENERAL**

1. The RTCH has an extensive on-board diagnostic capability that enables the user to isolate faults based on error codes. This diagnostic capability, when used in conjunction with traditional troubleshooting techniques, enables the user to fault isolate most malfunctions that will occur on the RTCH.
2. This chapter provides information for identifying and correcting malfunctions which may develop while operating the RTCH. Both error code and non-error code troubleshooting are contained within this chapter.
  - a. Work Package 0006 00 addresses non-error code troubleshooting.
  - b. Work Packages 0007 00 thru 0047 00 address error code troubleshooting.
3. The Troubleshooting Symptom Indexes in WP 0005 00 list common malfunctions which may occur (non-error code malfunctions and electronically-identified error codes) and refer you to the proper work package for a troubleshooting procedure. Three separate indexes are provided as an aid to the user:
  - a. *Non-Error Code Symptom Index.* This index is organized alphabetically by functional group/system. Symptoms within each functional group/system are listed in alphabetical order. The page number listed in the Troubleshooting Procedure Page column takes you directly to the troubleshooting task.
  - b. *Alphabetical Error Code Symptom Index.* This index lists the functional group/system in alphabetical order. Error codes underneath each system are listed in ascending numeric order. The page number listed in the Troubleshooting Procedure Page column takes you to the first page of the work package, so that initial setup data can be reviewed prior to starting the specific troubleshooting task.
  - c. *Numerical Error Code Symptom Index.* This index lists all error codes in ascending numeric order. Since certain error codes are present within multiple systems, a column has been added that identifies the functional group/system that is impacted by the error code. For example, Error Code 130 is listed for 6 different systems. You will need to know in which system (i.e., Boom In/Out or Tophandler Slewing, etc.) the error occurred before you can determine which work package you'll need.
4. It is not possible to list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed, or is not corrected by the listed corrective actions, notify your supervisor.
5. If you are unsure of the location of an item mentioned in troubleshooting, refer to WP 0002 00. This work package identifies the major components on the RTCH.
6. Figures 1 thru 13, at the end of this work package, illustrate electrical and hydraulic components that may be difficult to find during the troubleshooting process.
7. As an aid to the user, electrical diagrams are contained in WP 0199 00. Each troubleshooting procedure references you to the diagram in Work Package 0199 00 that applies to your particular troubleshooting task.
8. Before performing troubleshooting, read and follow all safety instructions found in the Warning Summary at the front of this manual.

**PRELIMINARY TROUBLESHOOTING PROCEDURES****NOTE**

Fluid leaks are classified as either Class I, Class II or Class III

- Class I:* Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
- Class II:* Leakage of fluid great enough to form drops, but not enough to cause drops to drip from item being checked/inspected.
- Class III:* Leakage of fluid great enough to form drops that fall from item being checked/inspected.

1. Before starting any specific troubleshooting procedures, perform the following:
  - a. Visually check for ruptured oil, fuel or hydraulic lines and for Class II or Class III leaks.

**PRELIMINARY TROUBLESHOOTING PROCEDURES - CONTINUED**

- b. Check for mechanical jamming or binding caused by rocks or other foreign matter.
  - c. Check fluid levels in subject area and service as required (TM 10-3930-675-10 or WP 0050 00 in this manual).
2. Ensure all applicable Operator Troubleshooting has been performed before proceeding.

**EXPLANATION OF TROUBLESHOOTING TABLE COLUMNS**

The columns in troubleshooting tables are defined as follows:

1. **MALFUNCTION.** Indicates fault that has occurred in system/equipment.
2. **TEST OR INSPECTION.** Indicates test or inspection to be performed to isolate probable cause for fault symptom.
3. **CORRECTIVE ACTION.** Indicates procedure to correct the problem.

**GENERAL ELECTRICAL INFORMATION - ERROR CODE AND NON-ERROR CODE TROUBLESHOOTING****NOTE**

Refer to *Electrical General Maintenance Instructions* (WP 0111 00) for instructions on using a multimeter to check for continuity or shorts and to perform voltage checks.

1. Analyze the symptoms and conditions and use common sense and logic to determine the most likely cause for the problem, then troubleshoot that circuit first. The more information you have concerning the problem, the easier it will be to troubleshoot.
2. Isolate to the subsystem level (in cases where more than one subsystem is involved); next isolate the problem to a single circuit within the subsystem; then, isolate the problem to the faulty component using the Troubleshooting Symptom Index (WP 0005 00).
3. Frayed, broken, loose or corroded wiring is a common source of problems in any electrical circuit. Always make visual inspection before starting detailed troubleshooting. Observe in particular contacts to ground. Components with case grounds are especially troublesome.

**CAUTION**

- DO NOT use test lights or non-digital multimeters to troubleshoot the RTCH. Only digital multimeters may be used. Failure to follow this caution may damage electronic components.
  - When making continuity checks, make sure test equipment is isolated from power source.
4. Most of the checks are made by voltage checks. Pay particular attention to the voltages being checked in the procedures. This equipment has a combination of 12 and 24 volt systems. Instructions prior to the step instruct to disconnect at test point from the potential malfunctioning component. Once the check has been made, either repair the component or go to the referenced step. If going to another step, reconnect connection or do as otherwise instructed, such as install and use jumper wires. When ready to make the prescribed check, apply power to the circuit (if required). A helper may be required if the switch or power source is out of reach. Release the power function prior to going on, to avoid damage to equipment.

**NON-ERROR CODE TROUBLESHOOTING**

Even though the RTCH has on-board diagnostics, not all malfunctions will produce error codes. Use non-error code troubleshooting when no error code is generated, yet the RTCH is not functioning properly. When troubleshooting a non-error code type malfunction:

1. Perform *Preliminary Troubleshooting Procedures*. If this doesn't solve the problem, go to step 2.
2. Locate the symptom or symptoms in WP 0005 00 that best describe the malfunction.



**NON-ERROR CODE TROUBLESHOOTING - CONTINUED**

3. Turn to the page in WP 0006 00 where the troubleshooting procedures for the malfunction in question are described. Headings at the top of each troubleshooting table show how each troubleshooting procedure is organized: MALFUNCTION, TEST OR INSPECTION, and CORRECTIVE ACTION.
4. Perform each step in the order listed until the malfunction is corrected. DO NOT perform any maintenance task unless the troubleshooting procedure tells you to do so.
5. If the problem is still not corrected, access the Diagnostic Menu to see if any additional information might be available.

**ERROR CODE TROUBLESHOOTING**

1. The RTCH has six (6) Electronic Control Units (ECUs) that are at the heart of the on-board diagnostic system. The location of each computer (ECU) is identified in Table 1 below and in Figures 1 and 2 at the end of this work package.
2. The driver's Electronic Control System (ECS) screen displays error codes based on data collected from each of the other computers. Refer to *Explanation of Error Code Display*, in this work package, for more information on how to read this display.
3. WP 0205 00, *Error Codes*, provides a complete listing of the error codes visible to both the operator and maintainers of the RTCH.
4. While performing troubleshooting, it may be necessary to access the system Diagnostic, Calibration or Initialization Menus. As a maintainer of the RTCH, you are authorized to access these menus as part of the troubleshooting process. These menus, which are not normally available to the operator, provide additional information that will help you diagnose a problem.
  - a. *Diagnostic Menu, Access Code 12443 (Table 2)*. Many of the error code troubleshooting procedures will direct you to use this menu as part of the troubleshooting task. To access the Diagnostic Menu:
    - (1) Turn ON ignition switch, but do not start engine unless required to do so to accomplish the troubleshooting procedure.
    - (2) Using left or right arrows on operator's control panel, scroll thru operational screens, stopping at the Kalmar maintenance icon (TM 10-3930-675-10). Press "Enter".
    - (3) Enter access code "12443".
    - (4) To select DIAG SERVO menu, press "Enter". Use arrow keys to scroll thru menu. Press "Enter" at end of each menu to return to main menu.
    - (5) Press right arrow key to scroll to additional DIAG menus:
      - DIAG ATTACHMENT (Tophandler)
      - DIAG STEERING
      - DIAG GEARBOX (Transmission)
      - DIAG ENGINE
      - DIAG EXTRA FUNC
    - (6) Use right or left arrow keys to scroll thru each menu. Press "Enter" at end of each menu to return to main menu.
  - b. *Calibration Menu, Access Code 13221 (Table 3)*. Some of the troubleshooting procedures direct you to calibrate the steering, boom with tophandler or the transmission. The calibration menu identifies calibration requirements for these systems. Additionally, there are specific calibration procedures in Chapter 4 that address the calibration requirements for these three items. To access the Calibration Menu:
    - (1) Turn ON ignition switch, but do not start engine unless required to do so to accomplish the troubleshooting procedure.

**ERROR CODE TROUBLESHOOTING - CONTINUED**

- (2) Using left or right arrows on operator’s control panel, scroll thru operational screens, stopping at the Kalmar maintenance icon (TM 10-3930-675-10). Press “Enter”.
  - (3) Enter access code “13221”.
  - (4) To select CALIBR SERVO menu, press “Enter”. Use arrow keys to scroll thru menu. Press “Enter” at end of each menu to return to main menu.
  - (5) Press right arrow key to scroll to additional CALIBR menus:
    - CALIBR STEERING
    - CALIBR GEARBOX (Transmission)
  - (6) Use right or left arrow keys to scroll thru each menu. Press “Enter” at end of menu to return to main menu.
- c. *Initialization Menu, Access Code 32131 (Table 4).* The initialization menu defines factory-set parameters for the RTCH. This is an informational menu that may be helpful during the troubleshooting process and can also be used to increase/decrease values. To access the Initialization Menu:
- (1) Turn ON ignition switch, but do not start engine unless required to do so to accomplish the troubleshooting procedure.
  - (2) Using left or right arrows on operator’s control panel, scroll thru operational screens, stopping at the Kalmar maintenance icon (TM 10-3930-675-10). Press “Enter”.
  - (3) Enter access code “32131”.
  - (4) Use right or left arrow keys to scroll thru initialization menu. Press “Enter” at end of menu to return to main menu.
  - (5) Use “+” key to increase a value and “-” key to decrease a value. Press “Enter” to save changes.
  - (6) The “R” key is used to reset the display after an error message. Most error codes can be cleared in this manner. However, the error message and red blinking light will return if the error has not been corrected.

**Table 1. Location of Electronic Control Units (ECUs).**

ECU NAME	ECU NUMBER	DIAGRAM NUMBER	LOCATION
Hydraulic Servo	790	A34648.0200	Under driver’s seat
Tophandler	791	A34652.0200	Forward end of boom
Steering System	792	A34651.0200	Inside cab behind right-rear panel
Transmission	793	A34650.0200	Inside cab behind right-rear panel
Engine	794	A34649.0200	Left side of engine
ECS Display Screen	795	A34647.0200	Driver’s control panel

TROUBLESHOOTING INTRODUCTION - CONTINUED

Table 2. Diagnostic Menu, Access Code 12443.

DIAG SERVO	DIAG ATTACHMENT	DIAG STEERING	DIAG GEARBOX	DIAG ENGINE	DIAG EXTRA FUNCT.
↓	↓	↓	↓	↓	↓
DIAG SERVO 1 (13) SYSTEM POWER 24.00V POWER RI CAN 24.00V POWER LE CAN 24.00V 10V REF OUT 10.00V	DIAG ATTACHMENT 1(16) SYSTEM POWER 24.00V POWER RI CAN 24.00V POWER LE CAN 24.00V 10V REF OUT 10.00V	DIAG STEERING 1(16) DIG IN STEERING 2WD 0 STEERING 4WD 0 STEERING CRAB 0	DIAG GEARBOX 1(12) SPEED: 0mph 0kph ENGINE 0rpm OUTPUT SHAFT 0rpm	DIAG ENGINE 1(5) DEMAND TORQUE 0 ACTUAL TORQUE 0 ENGINE SPEED 0rpm	EXTRA FUNCT. 1(13) SET ENGINE SPEED 0 TO 1000rpm (+/-)
DIAG SERVO 2(13) OVER RIDE 0 TWIST LOCK 0	DIAG ATTACHMENT 2(16) TILT ANGLE 5.00V	DIAG STEERING 2(16) ERROR CODE 255 FROM 792, STEERING	DIAG GEARBOX 2(12) ERROR CODE (HEX) 0 FROM 793, GEARBOX	DIAG ENGINE 2(5) ENGINE SPEED 0rpm (+) INCREASE (-) INCREASE	EXTRA FUNCT. 2(13) CUT OFF THE THE HYDRAULIC PUMP (+/-) 0rpm
DIAG SERVO 3(13) SIDE SHIFT RI 0 SIDE SHIFT LE 0 PISTOL 0	DIAG ATTACHMENT 3(16) ALIGNMENT LE FRONT0 RI FRONT0 LE REAR 0 RI REAR 0	DIAG STEERING 3(16) REQ. PROGRAM 0 0:2WD 1:4WD 2:CRAB 3:EMERGENC	DIAG GEARBOX 3(12) GEAR PROGRAM 0:2WD 1:4WD 2:CRAB 3:MANUAL	DIAG ENGINE 3(5) ENGINE OIL TEMP 0GrC COOLANT TEMP 0GrC INTAKE MAN.TEMP 0GrC	EXTRA FUNCT. 3(13) EL HYD. PUMP INPUT 0 EL HYD. PUMP OUTPUT 0
DIAG SERVO 4(13) LOCK TILT 0 LOCK OSCILLATE 0	DIAG ATTACHMENT 4(16) TWIST LOCK LE UNL. 1 RI UNL. 1 LE LOCK 0 RI LOCK 0	DIAG STEERING 4(16) EMB.OPERATION MODE 0 STEER.PROG CHANGE 0 NEUTRAL GEAR STAT. 0	DIAG GEARBOX 4(12) SHIFT LEVER POSITION: FORWARD 0 NEUTRAL 1 REVERS 0	DIAG ENGINE 4(5) OIL PRESSURE 0Bar BOOST PRESS. 0Bar	EXTRA FUNCT. 4(13) WATER LEVEL 0 (=CUT OFF FAN)
DIAG SERVO 5(13) LIFT/LOWER 5.00V BOOM IN/OUT 5.00V	DIAG ATTACHMENT 5(16) DAMPING 20/40 0 ATTACHMENT SIG 1 1 ATTACHMENT SIG 2 1	DIAG STEERING 5(16) PRESSUR SW. STAT 0 SUPPLY PRESSUR 0	DIAG GEARBOX 5(12) SH.POSITION RANGE 3 DRIVE LINE ENGANGE 0	DIAG ENGINE 5(5) DIAGNOSIS OF ENGINE DONE ENTER	EXTRA FUNCT. 5(13) BLACKOUT 0 WORK. LIGHT ATTACH. 0
DIAG SERVO 6(13) SLEW CW/CW 5.00V TILT IN/OUT 5.00V	DIAG ATTACHMENT 6(16) TW-LOCK OUTPUT INPUT UNLOCKED 0.00V 0mA LOCKED 0.00V 0mA	DIAG STEERING 6(16) ERROR STATUS AXLE 1:0 AXLE 2:0 AXLE 3:0 AXLE 4:0	DIAG GEARBOX 6(12) OIL TEMP 0GrC OIL TEMP SUMP 0GrC	DIAG ENGINE 6(5) DIAGNOSIS OF ENGINE DONE ENTER	EXTRA FUNCT. 6(13) HYD.FILTER BOOM 0 HYD.FILTER STEERING 0 HYD.FILTER ATTACH. 0 HYD.FILTER RET.OIL 0
DIAG SERVO 7(13) LENGTH SENSOR 1.00V ANGLE SENSOR 1.50V	DIAG ATTACHMENT 7(16) SIDE SH.OUTPUT INPUT LEFT 0.00V 0mA RIGHT 0.00V 0mA	DIAG STEERING 7(16) STEERING WHEEL SIG LE 0 RI 0	DIAG GEARBOX 7(12) ACTUALE DIRECTION: FORWARD 0 NEUTRAL 1 REVERS (REV. LAMP) 0	DIAG ENGINE 7(5) DIAGNOSIS OF ENGINE DONE ENTER	EXTRA FUNCT. 7(13) BRAKE CIRCUIT 1 0 BRAKE CURCUIT 2 0
DIAG SERVO 8(13) PRESS RETURN 2.00V 1.50V PRESS RI 2.00V 1.50V PRESS LE 2.00V 1.50V	DIAG ATTACHMENT 8(16) OUTPUT INPUT 20'->40' 0mA 0mA 40'->20' 0mA 0mA	DIAG STEERING 8(16) RI FRONT WHEEL ANGLE SIGNAL 1 0 SIGNAL 2 0	DIAG GEARBOX 8(12) ACTUAL GEAR 0 LIMIT TO 1:ST GEAR 0 0=2WD 1=4WD 0	DIAG ENGINE 8(5) DIAGNOSIS OF ENGINE DONE ENTER	EXTRA FUNCT. 8(13) ETER START OK 0 CABIN OP. POS. 0 CABIN SIDE POS. 0
DIAG SERVO 9(13) OUTPUT INPUT LIFT 0mA 0mA LOWER 0mA 0mA	DIAG ATTACHMENT 9(16) LAMPS OUTPUT WORKING LIGHT 0.00V	DIAG STEERING 9(16) RI REAR WHEEL ANGLE SIGNAL 1 0 SIGNAL 2 0	DIAG GEARBOX 9(12) GEARBOX MODE: NORMAL 1 SUBST.CLUTCH CONT. 0 LIMP HOME 0	DIAG ENGINE 9(5) DIAGNOSIS OF ENGINE DONE ENTER	EXTRA FUNCT. 9(13) Rx 792, STEERING 0 Rx 793, GEARBOX 0 Rx 794, ENGINE 0
DIAG SERVO 10(13) OUTPUT INPUT BOOM IN 0mA 0mA BOOM OUT 0mA 0mA	DIAG ATTACHMENT10(16) IND.LAMP OUTPUT TW UNLOCKED 24.00V TW LOCKED 0.00V	DIAG STEERING 10(16) LE REAR WHEEL ANGLE SIGNAL 1 0 SIGNAL 2 0	DIAG GEARBOX 10(12) TRANS. SHUTDOWN 0 TCU SHUTDOWN 0 SHIFT IN PROGRESS 0	DIAG ENGINE 10(5) DIAGNOSIS OF ENGINE DONE ENTER	EXTRA FUNCT. 10(13) ACT. SPEED CONTROL 0 MAX RPM 0
DIAG SERVO 11(13) OUTPUT INPUT FAN 0mA 0mA BL.VALVE 0.00V 0mA	DIAG ATTACHMENT11(16) IND.LAMP OUTPUT ALIGNMENT 0.00V	DIAG STEERING 11(16) LE FRONT WHEEL ANGLE SIGNAL 1 0 SIGNAL 2 0	DIAG GEARBOX 11(12) P-BRAKE 0 INCHING 0 STEERING SYST. OK 0	DIAG ENGINE 11(5) DIAGNOSIS OF ENGINE DONE ENTER	EXTRA FUNCT. 11(13) INTAKE TEMP 23 FAN COOLANT TEMP 43 SPD GEARBOX TEMP 52 33 HYD OIL TEMP 55
DIAG SERVO 12(13) VALVES OUTPUT INPUT ATTACH. 0.00V 0mA PUMP OFF 0.00V 0mA	DIAG ATTACHMENT12(16) OUTPUT INPUT SLEW CW 0mA 0mA SLEW CCW 0mA 0mA	DIAG STEERING 12(16) RI FRONT WHEEL SOLENOID CW 0 SOLENOID CCW 0	DIAG GEARBOX 12(12) DIAGNOSIS OF GEARBOX DONE ENTER	DIAG ENGINE 12(5) DIAGNOSIS OF ENGINE DONE ENTER	EXTRA FUNCT. 12(13) WHEEL END FRONT 50 WHEEL END REAR 51 HYD TANK 40 BRAKE COOLING 1
DIAG SERVO 13(13) DIAGNOSIS OF EL.SERVO DONE ENTER	DIAG ATTACHMENT13(16) OUTPUT INPUT TILT IN 0mA 0mA TILT OUT 0mA 0mA	DIAG STEERING 13(16) RI REAR WHEEL SOLENOID CW 0 SOLENOID CCW 0	DIAG GEARBOX 13(12) DIAGNOSIS OF GEARBOX DONE ENTER	DIAG ENGINE 13(5) DIAGNOSIS OF ENGINE DONE ENTER	EXTRA FUNCT. 13(13) DIAGNOSIS OF EXTRA FUNCT. DONE ENTER
	DIAG ATTACHMENT14(16) OUTPUT INPUT OSC. RI 0mA 0mA OSC. LE 0mA 0mA	DIAG STEERING 14(16) LE REAR WHEEL SOLENOID CW 0 SOLENOID CCW 0			
	DIAG ATTACHMENT15(16) ACTIVE OUTPUT INPUT OSC. 24.00V 900mA TILT 24.00V 900mA	DIAG STEERING 15(16) LE FRONT WHEEL SOLENOID CW 0 SOLENOID CCW 0			
	DIAG ATTACHMENT16(16) DIAGNOSIS OF ATTACHMENT DONE ENTER	DIAG STEERING 16(16) DIAGNOSIS OF STEERING DONE ENTER			

Table 3. Calibration Menu, Access Code 13221.

CALIBR SERVO	CALIBR STEERING	CALIBR GEARBOX	CALIBR RETURN TO MAIN MENU
↓	↓	↓	
CALIBR SERVO 1(10) LOWER MINIMUM           713 BOOM ANGLE       713	CALIBR STEERING 1(10) TURNING SPEED FOR BUTTON STEERING           60	CALIBR GEARBOX 1(2) ABB CYCLE NR ABB MAIN CODE ABB SUB CODE	
CALIBR SERVO 2(10) LOWER MINIMUM           334 TILT ANGLE         334	CALIBR STEERING 2(10) AXEL 1 ADJUST WHEEL     0 ANGLE              0	CALIBR GEARBOX 2(2) CALIBRATION OF GEARBOX DONE ENTER	
CALIBR SERVO 3(10) LIFT MAXIMUM           354 BOOM ANGLE       354	CALIBR STEERING 3(10) AXEL 1 SET WHEEL         0 ANGLE              0		
CALIBR SERVO 4(10) LIFT MAXIMUM           716 TILT ANGLE         716	CALIBR STEERING 4(10) AXEL 2 ADJUST WHEEL     0 ANGLE              0		
CALIBR SERVO 5(10) BOOM MIN EXTENSION    37	CALIBR STEERING 5(10) AXEL 2 SET WHEEL         0 ANGLE              0		
CALIBR SERVO 6(10) BOOM MAX EXTENSION    441	CALIBR STEERING 6(10) AXEL 3 ADJUST WHEEL     0 ANGLE              0		
CALIBR SERVO 7(10) INIT BY MIN LOAD LE 548 RI 552 548   552	CALIBR STEERING 7(10) AXEL 3 SET WHEEL         0 ANGLE              0		
CALIBR SERVO 8(10) INIT BY MAX LOAD LE 787 RI 790 787   790	CALIBR STEERING 8(10) AXEL 4 ADJUST WHEEL     0 ANGLE              0		
CALIBR SERVO 9(10) ALLOWED LOAD 25000 kg ACTUAL LOAD       kg L-LC               2.6 m	CALIBR STEERING 9(10) AXEL 4 SET WHEEL         0 ANGLE              0		
CALIBR SERVO 10(10) CALIBRATION OF EL.SERVO DONE ENTER	CALIBR STEERING 10(10) CALIBRATION OF STEERING DONE ENTER		

Table 4. Initialization Menu, Access Code 32131.

INITIALISATION 1(19) UNITS 0 0=SI-Europe 1=US	END CURRENT 650mA TILT 650mA
INITIALISATION 2(19) START CURRENT 200mA LIFT 200mA	INITIALISATION 16(19) START CURRENT 270mA OSCILLATE 270mA
INITIALISATION 3(19) END CURRENT 655mA LIFT 655mA	INITIALISATION 17(19) END CURRENT 550mA OSCILLATE 550mA
INITIALISATION 4(19) START CURRENT 200mA LOWER 200mA	INITIALISATION 18(19) ERROR MENU OF INFORMATION TYPE DISABLE 1
INITIALISATION 5(19) END CURRENT 718mA LOWER 718mA	INITIALISATION 19(19) RETURN TO MAIN MENU
INITIALISATION 6(19) START CURRENT 200mA BOOM OUT 200mA	
INITIALISATION 7(19) END CURRENT 800mA BOOM OUT 800mA	
INITIALISATION 8(19) START CURRENT 200mA BOOM IN 200mA	
INITIALISATION 9(19) END CURRENT 600mA BOOM IN 600mA	
INITIALISATION 10(19) START CURRENT 290mA CLOCKWISE 290mA	
INITIALISATION 11(19) END CURRENT 600mA CLOCKWISE 600mA	
INITIALISATION 12(19) START CURRENT 290mA ANTI-CLOCKWISE 290mA	
INITIALISATION 13(19) END CURRENT 600mA ANTI-CLOCKWISE 600mA	
INITIALISATION 14(19) START CURRENT 290mA TILT 290mA	

***ERROR CODE TROUBLESHOOTING - CONTINUED***

5. When troubleshooting electronically-identified (error code) malfunctions:
  - a. Locate the symptom or symptoms in WP 0005 00 that best describe the malfunction. Use either the “Alphabetical Error Code Symptom Index” or the “Numerical Error Code Symptom Index”.
  - b. Turn to the work package where the troubleshooting procedures for the malfunction in question are described. Perform any initial setup requirements, then proceed to the table that addresses your particular error code. Headings at the top of each troubleshooting table show how each troubleshooting procedure is organized: MALFUNCTION, TEST OR INSPECTION, and CORRECTIVE ACTION.
  - c. Perform each procedure in the order listed until the malfunction is corrected. DO NOT perform any maintenance task unless the troubleshooting procedure tells you to do so.




**EXPLANATION OF ERROR CODE DISPLAY**

**NOTE**

There are three kinds of information in the Electronic Control System (ECS) display.






- Icons in the *left lower corner* of the display describe what the driver should do. Table 5 defines each of the three driver actions.

**Table 5. Driver Action Icons.**

ICON	DESCRIPTON
	<b>STOP VEHICLE IMMEDIATELY in a safe way.</b> Can be a safety issue. Machine performance may be restricted. Read operator’s manual for instructions. Contact maintenance personnel.
	<b>WARNING - DEGRADED OPERATION, stop vehicle in a safe way.</b> Read operator’s manual for instructions. Contact maintenance personnel. Confirm that error message is acknowledged by pressing RESET button. Error will appear every three minutes as long as error is active. It can be reset every time it shows.
	<b>INFORMATION/MAINTENANCE action is needed.</b> Error code shows once when vehicle starts up. Acknowledge error message by pressing RESET. These error codes may be deactivated for driver, so that they only show when maintenance personnel activate them.

- Icons in the *center* of the display identify the type of fault. Table 6 describes the five fault types used in the display.











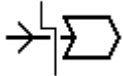

**Table 6. Type of Fault Icons.**

ICON	DESCRIPTON		ICON	DESCRIPTION
	Sensor			Lever
	Valve			Temperature
	Pressure			

**EXPLANATION OF ERROR CODE DISPLAY - CONTINUED**

- Icons in the *right* of the display identify what function or vehicle system the fault is related to. Table 7 lists the various functions or vehicle systems used in the display.

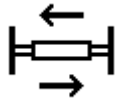



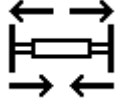


**Table 7. Function Icons.**

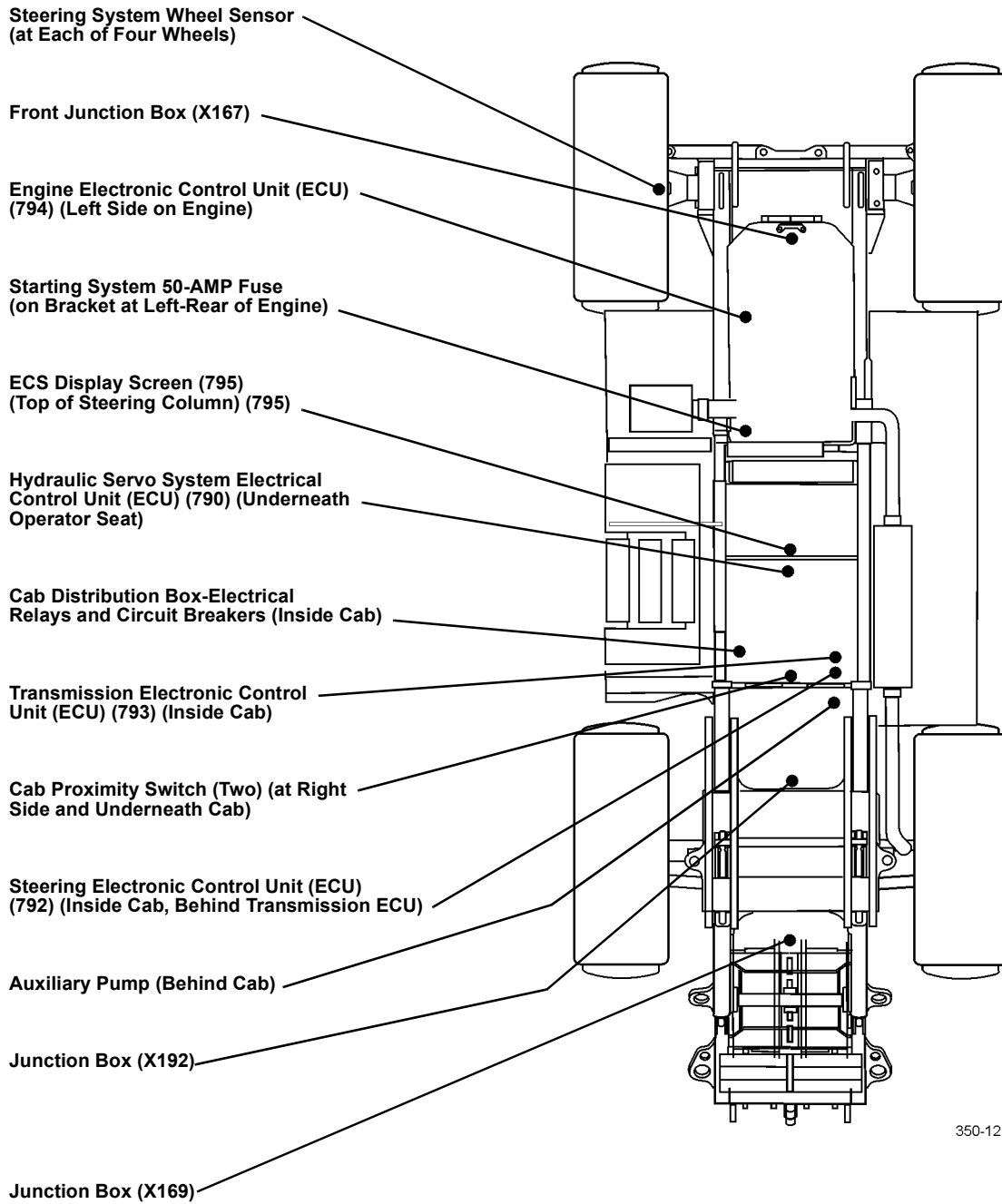
ICON	DESCRIPTON		ICON	DESCRIPTION
	Battery			Twistlock
	Forklift kit			Up/Down
	Emergency stop or battery			In/Out
	Rotation			Transmission
	Hydraulic filter			Fan
	Communication			Engine



EXPLANATION OF ERROR CODE DISPLAY - CONTINUED

Table 7. Function Icons - Continued.

ICON	DESCRIPTON		ICON	DESCRIPTION
	Sideshifting			No overload protection
	Oscillation (leveling)			Brake
	Spreading			Tilt
	Steering			



350-1216

Figure 1. Electrical Component Location - Chassis.

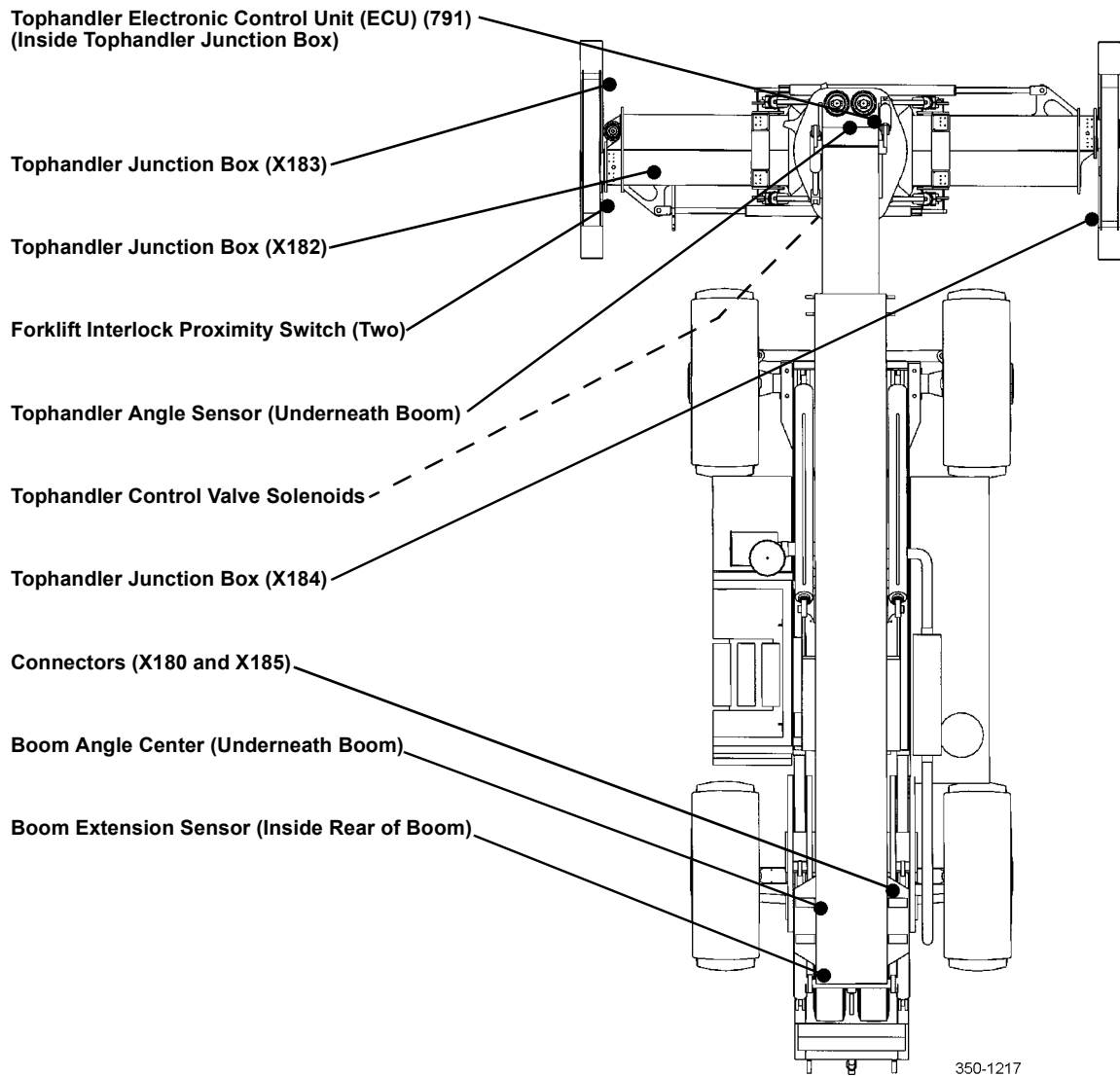
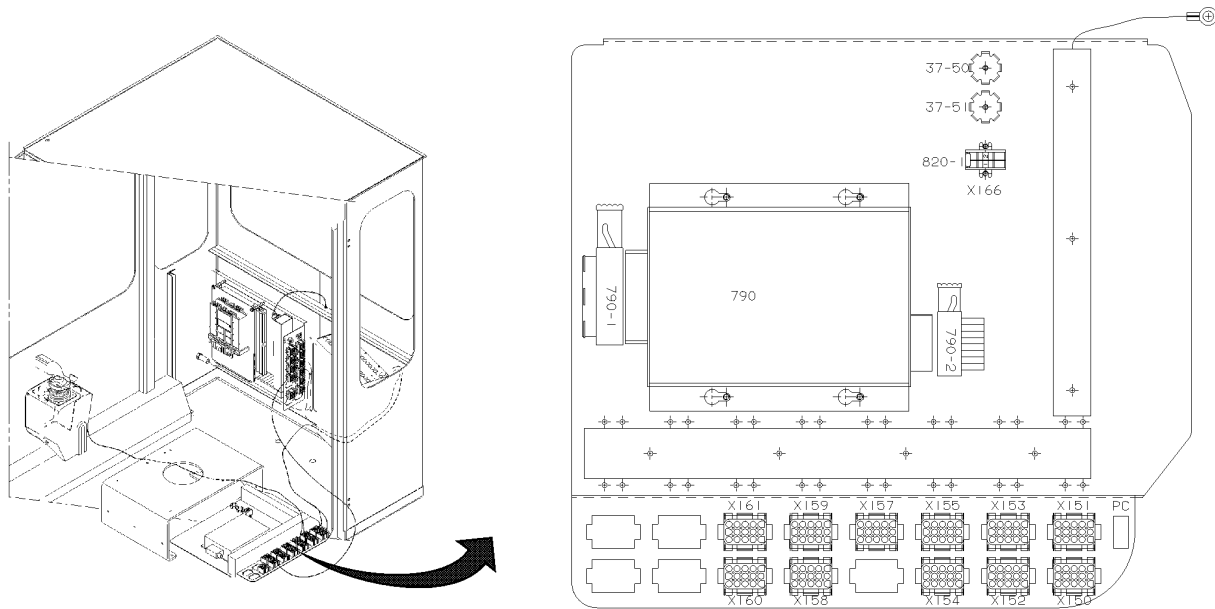


Figure 2. Electrical Component Location - Boom and Tophandler.

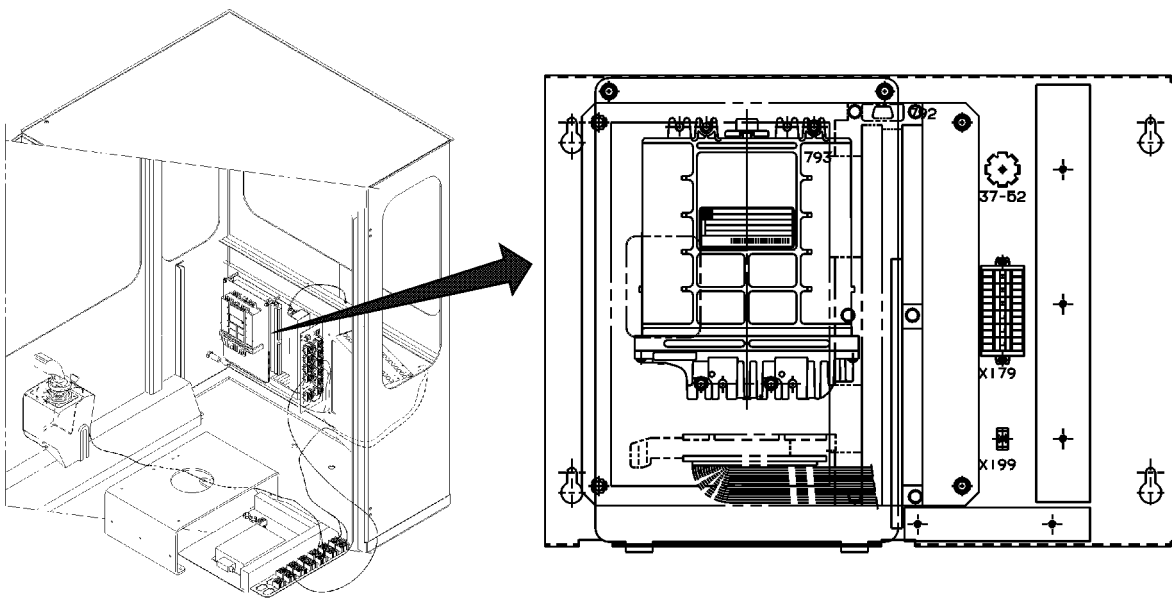


350-1337

**CONNECTORS:**

X150	X154	X159
X151	X155	X160
X152	X157	X161
X153	X158	X166

**Figure 3. Electrical Connectors - Under Operator's Seat.**



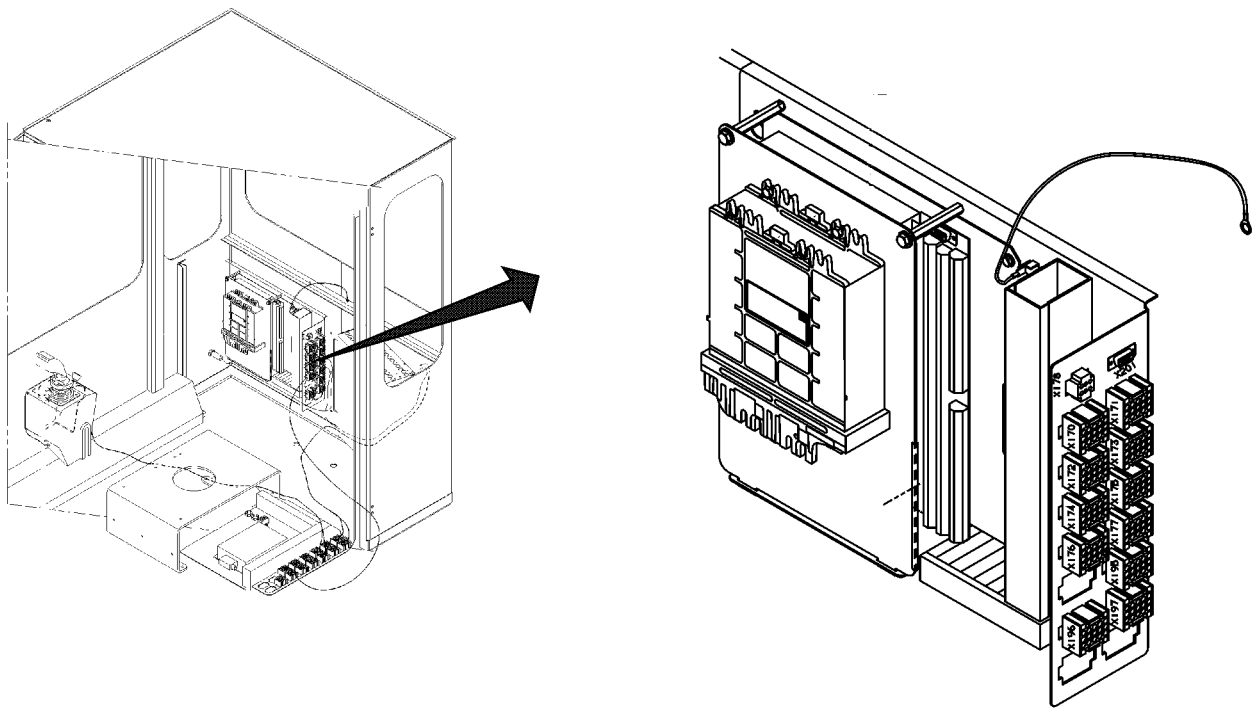
350-1338

**CONNECTORS:**

X179

X199

**Figure 4. Electrical Connectors - Behind Right-Rear Panel, Cab Rear Wall.**

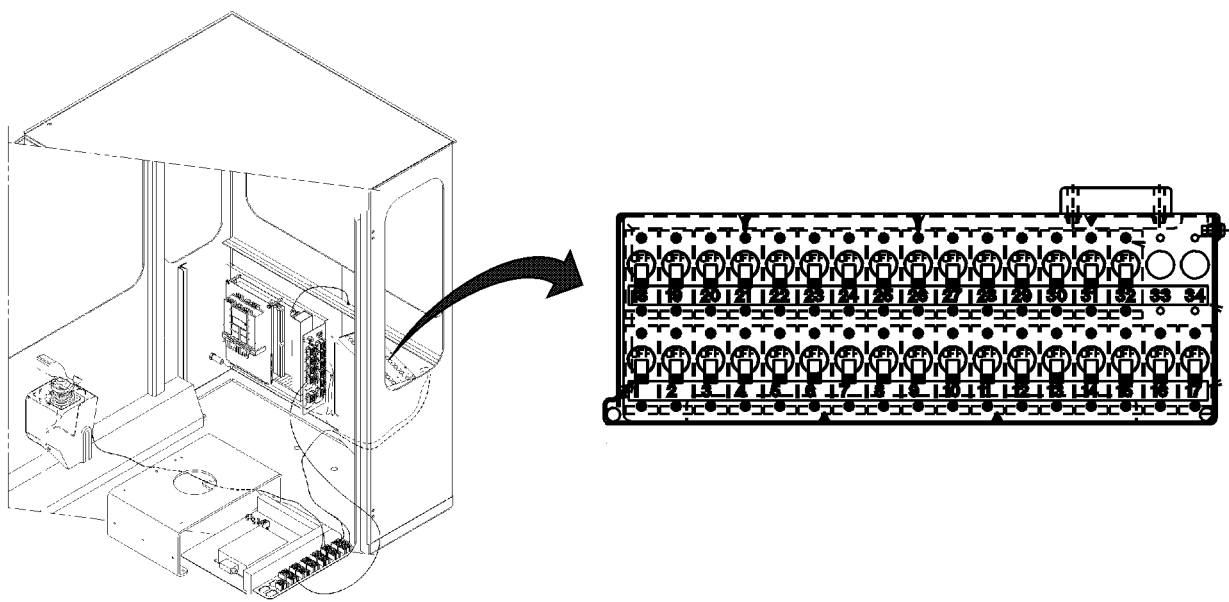


350-1339

**CONNECTORS:**

X170	X175	X196
X171	X176	X197
X172	X177	X201
X173	X178	
X174	X195	

**Figure 5. Electrical Connectors - Behind Center Panel, Cab Rear Wall.**

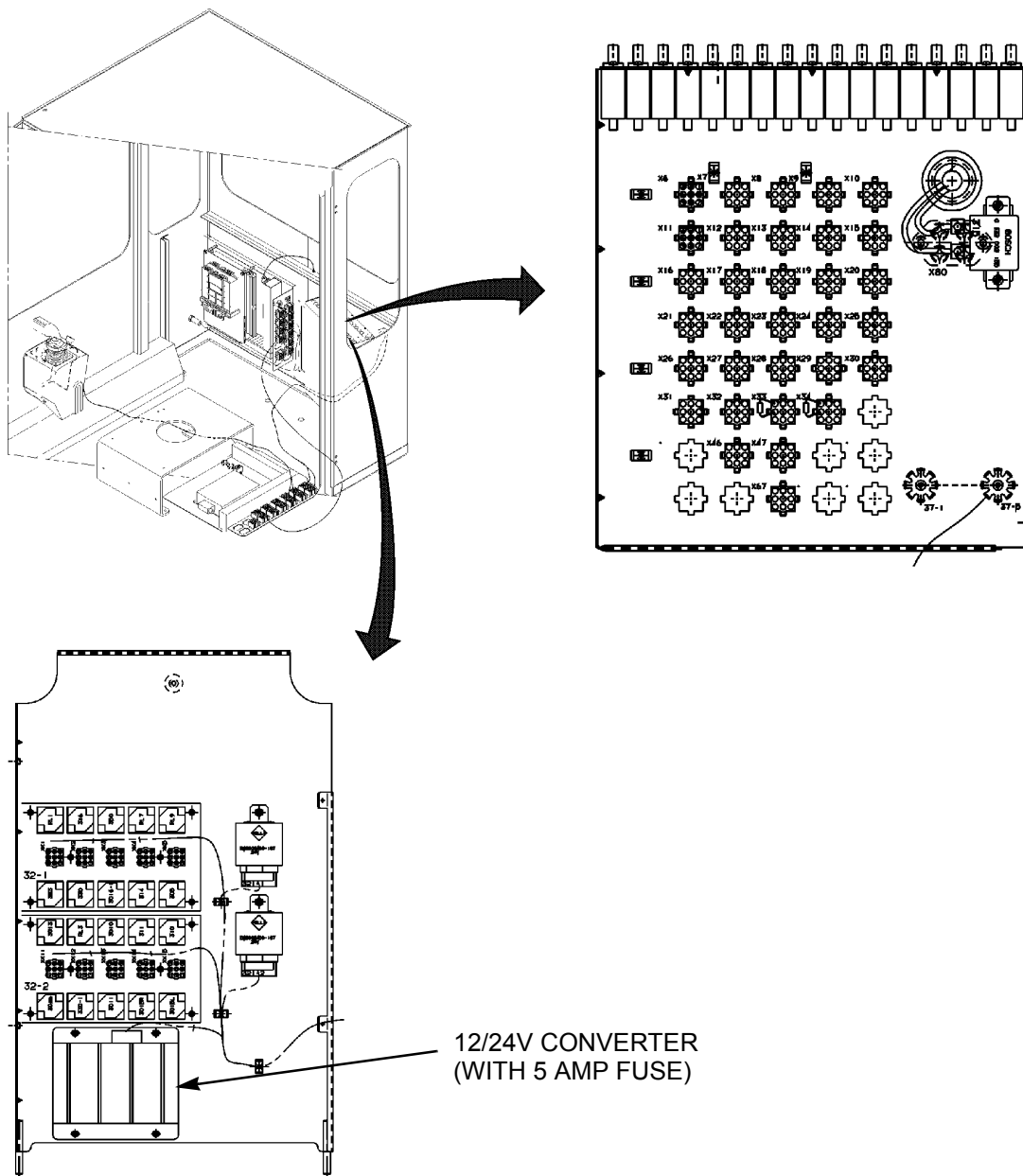


350-1340

**CIRCUIT BREAKERS (CB):**

F1 to F6	(10A)	F13 and F14	(5A)	F27 to F29	(10A)
F7 and F8	(5A)	F15	(10A)	F30	(15A)
F9 and F10	(10A)	F16	(15A)	F31 and F32	(5A)
F11	(25A)	F17	(10A)	F33 and F34	(20A)
F12	(15A)	F18 to F26	(5A)		

**Figure 6. Circuit Breakers - Behind Left-Rear Panel, Cab Rear Wall.**



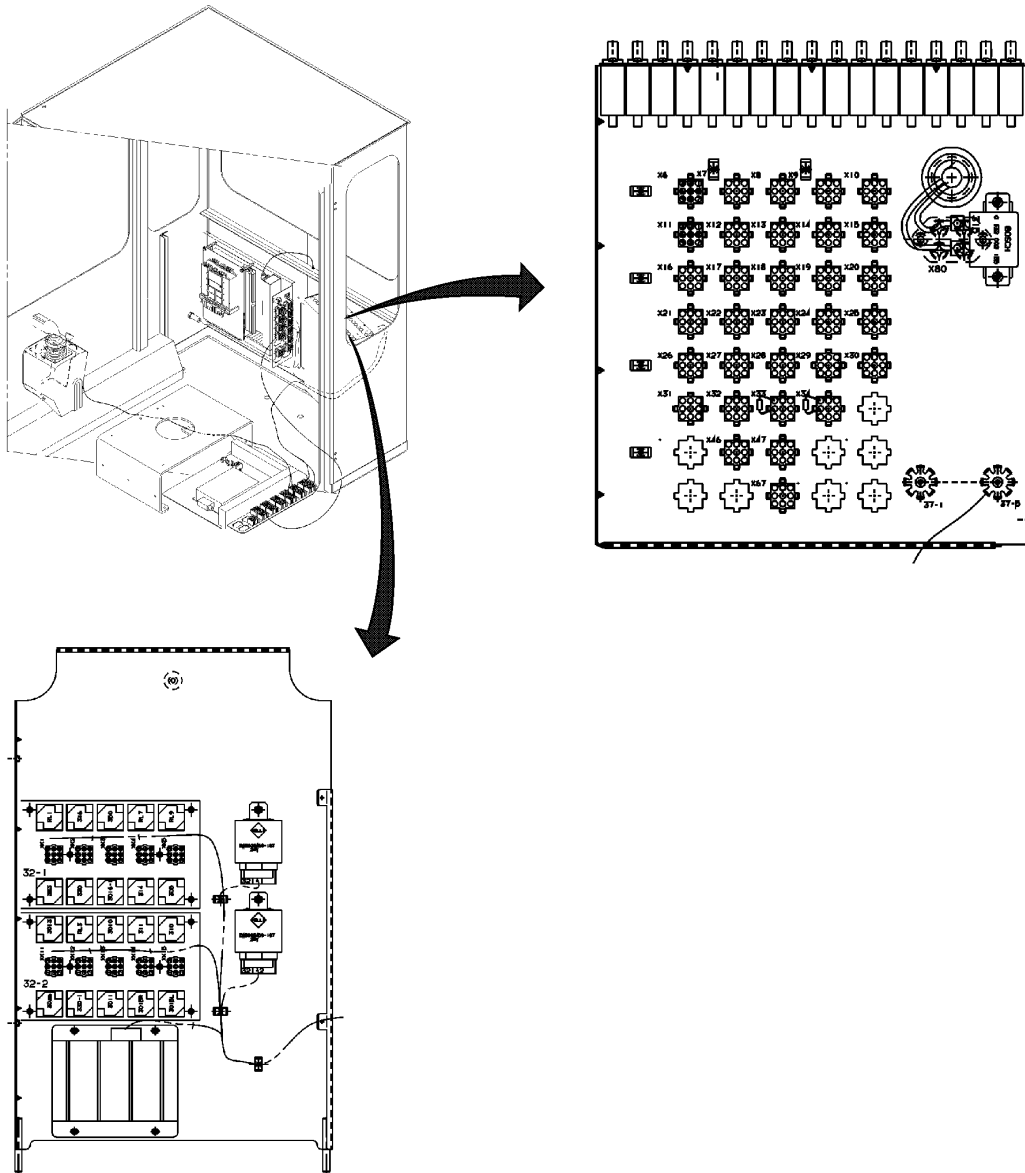
350-1341

**CONNECTORS:**

XK1	XK11	X6 to X10	X31 to X34
XK2	XK12	X11 to X15	X46
XK3	XK13	X16 to X20	X47
XK4	XK14	X21 to X25	X67
XK5	XK15	X26 to X30	X80

**Figure 7. Electrical Connectors and Voltage Converter - Behind Left-Rear Panel, Cab Rear Wall.**



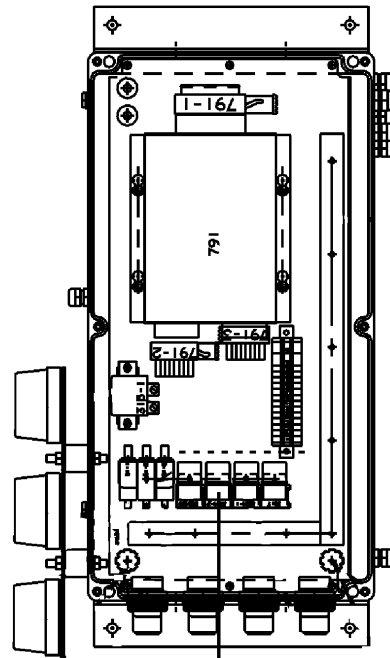
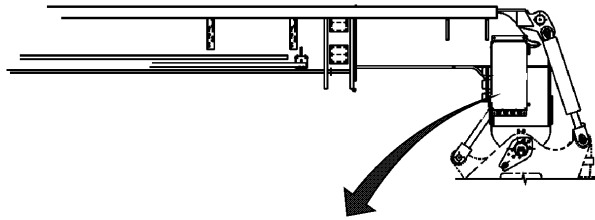


350-1341

**RELAYS:**

323	Turn Signal	3013	Boom Work Light STD/BO	3015L	Turn Signal, Brake Light, Left
316	Wiper	3016	Horn	310	Left Direction
330	Starter Interlock	330-1	Starter Interlock	321-1	Wiper, Intermittent
350	Pump Control	3010	Brake Light	321-2	Wiper, Intermittent, Rear
3016-1	Seat Buzzer	3011	Reversing Light STD/BO	315	Ignition
314	Parking Brake	311	Right Direction		
305	Taillight	3015R	Turn Signal, Brake Light, Right		

**Figure 8. Relays - Behind Left-Rear Panel, Cab Rear Wall.**



350-1342

**CONNECTORS:**

- |      |      |
|------|------|
| X180 | X189 |
| X181 | X194 |
| X188 |      |

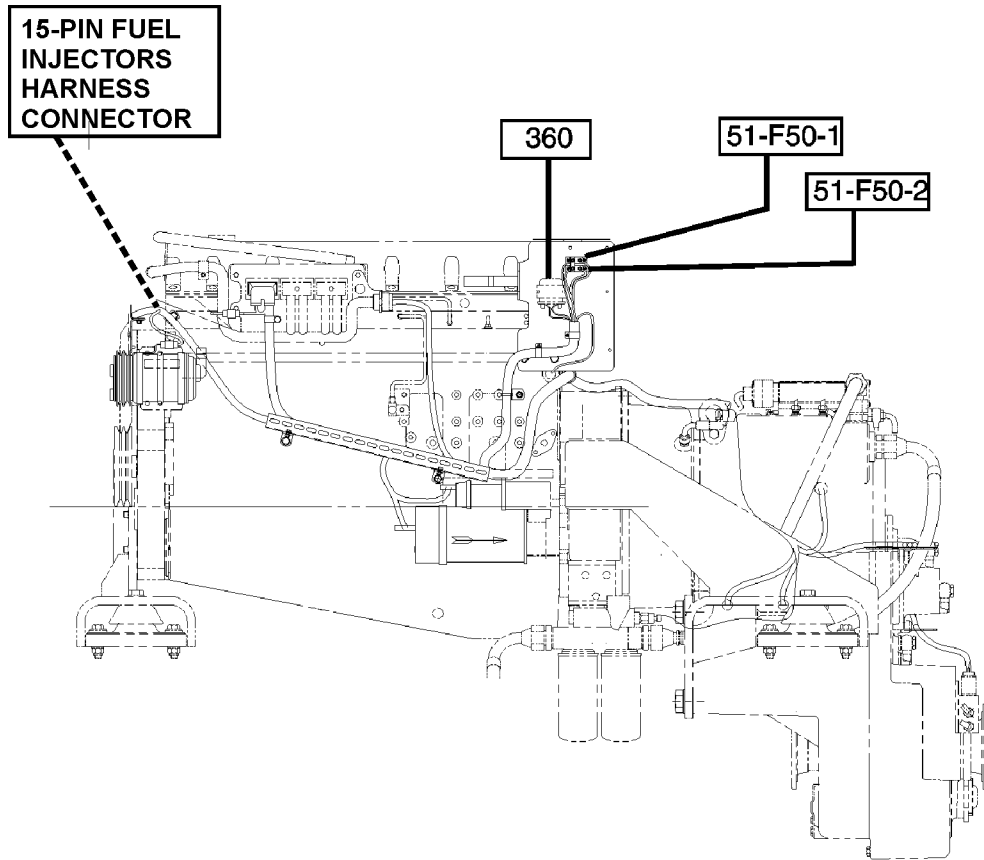
**CIRCUIT BREAKERS (CB):**

- |     |       |
|-----|-------|
| F41 | (10A) |
| F42 | (10A) |
| F43 | (10A) |

**RELAYS:**

- |        |                |
|--------|----------------|
| 315-1  | Starting Key   |
| 3009-1 | Emergency Stop |
| 3009-2 | Emergency Stop |
| 3009-3 | Emergency Stop |
| 3017   | Work Lights    |

Figure 9. Electrical Connectors, Circuit Breakers (CB), and Relays - Inside Tophandler Junction Box.



350-1343

**CIRCUIT BREAKERS (CB):**

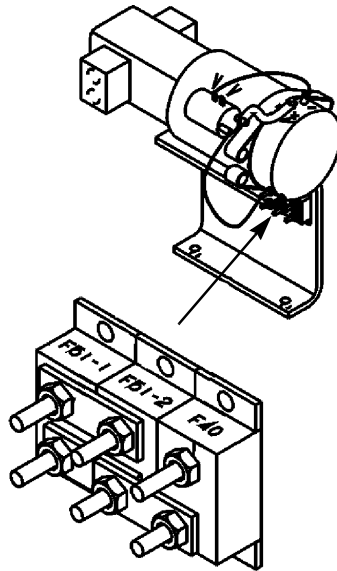
F50-1 (50A)

F50-2 (50A)

**RELAY:**

360 Starter Solenoid

**Figure 10. Circuit Breakers (CB) and Relay - Left Side of Engine.**



350-1344

**CONNECTOR:**

X25

**CIRCUIT BREAKERS (CB):**

F51-1 (50A)

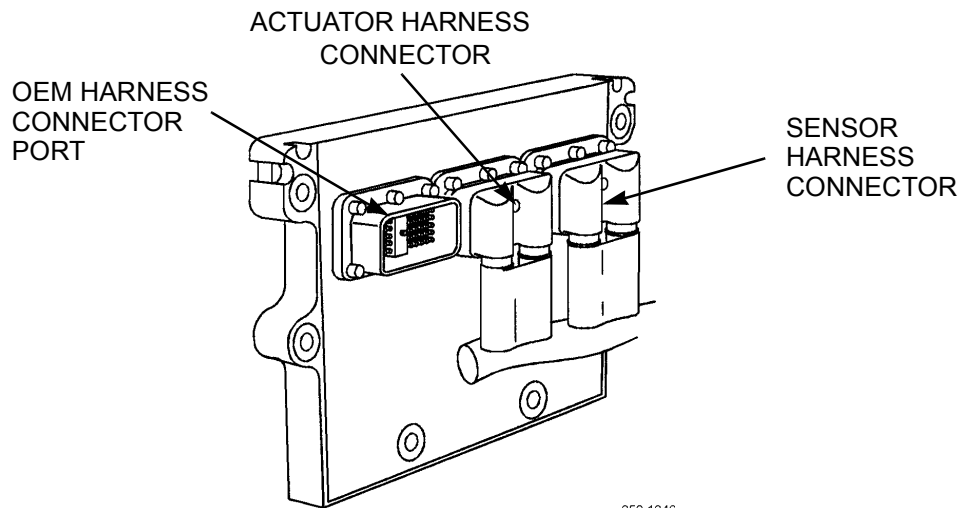
F51-2 (50A)

F40 (50A)

**RELAY:**

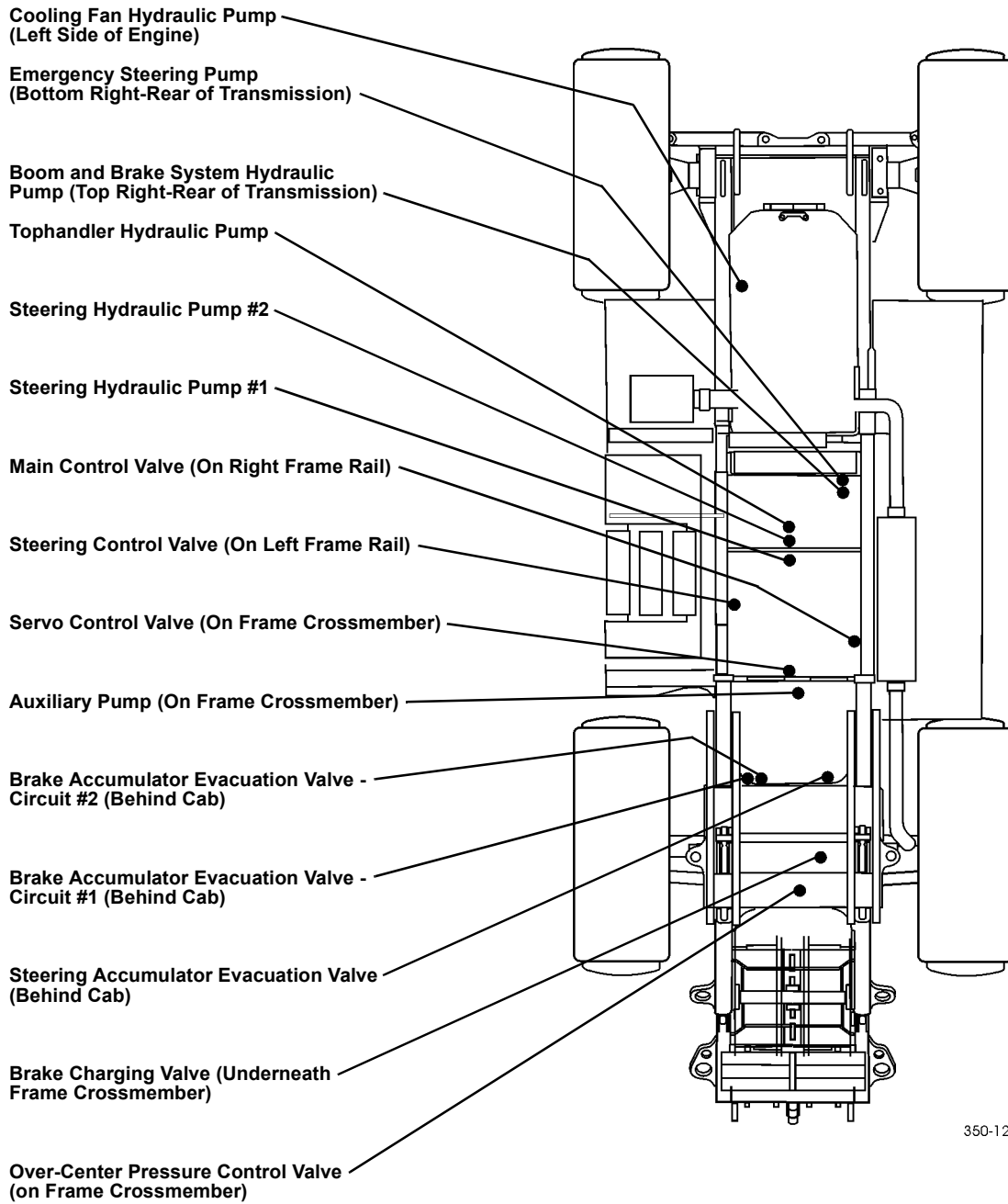
350-1 Aux Ele Hyd Pump

**Figure 11. Electrical Connector, Circuit Breakers (CB), and Relay - Auxiliary Pump.**



350-1346

**Figure 12. Engine ECU Connectors.**



350-1218

Figure 13. Hydraulic Component Location.

END OF WORK PACKAGE

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**TROUBLESHOOTING SYMPTOM INDEX**

**0005 00**

**NON-ERROR CODE SYMPTOM INDEX**

**Malfunction/Symptom**

**Troubleshooting Procedure Page**

**AUXILIARY PUMP**

Auxiliary Pump Not Working . . . . . 0006 00-21

**BOGIE WHEEL SYSTEM**

Bogie Wheels Will Not Lift or Lower . . . . . 0006 00-29

**BOOM SYSTEM**

Boom Folding Cylinders Not Working . . . . . 0006 00-23

Boom Locking Pin Cylinders Not Working . . . . . 0006 00-24

Boom Will Not Extend or Retract Properly . . . . . 0006 00-22

Boom Will Not Lift or Lower Properly . . . . . 0006 00-22

**BRAKE SYSTEM**

Braking is Poor or Nonexistent . . . . . 0006 00-16

Parking Brake Will Not Engage . . . . . 0006 00-17

Parking Brake Will Not Release . . . . . 0006 00-16

**ELECTRICAL SYSTEM**

AC System Producing Low or No Cool Air . . . . . 0006 00-13

Backup Alarm Will Not Sound When Truck is Placed In Reverse . . . . . 0006 00-9

Backup Lights Do Not Operate When Truck is Placed In Reverse . . . . . 0006 00-9

Blackout Drive and Marker Lights Do Not Operate When Switch is Turned On . . . . . 0006 00-8

Blower Motor Not Working . . . . . 0006 00-13

Cab Interior Light (s) Not Working . . . . . 0006 00-12

Driver's ECS Display Screen Will Not Display . . . . . 0006 00-14

Front/Rear Side Marker Light(s) Do Not Operate When Headlight Switch is Turned On . . . . . 0006 00-6

Front Windshield Wiper Motor Not Working . . . . . 0006 00-11

Fuel Gage Not Working Properly . . . . . 0006 00-14

Headlight(s) Do Not Operate When Switch is Turned On . . . . . 0006 00-6

Headlight(s) High/Low Beam Function Not Working . . . . . 0006 00-6

Heater/Defroster Producing Low or No Heat . . . . . 0006 00-13

Horn Will Not Sound When Button is Pressed . . . . . 0006 00-9

IR Work Light (s) Do Not Operate When Switch is Turned On . . . . . 0006 00-10

Rear Windshield Wiper Motor Not Working . . . . . 0006 00-11

Roof Windshield Wiper Motor Not Working . . . . . 0006 00-11

Stoplight(s) Do Not Operate When Brake Pedal(s) is Pressed . . . . . 0006 00-7

Taillight(s) Do Not Operate When Headlight Switch is Turned On . . . . . 0006 00-7

Turn Signals or Emergency Flashers Are Not Working . . . . . 0006 00-8

**NON-ERROR CODE SYMPTOM INDEX - CONTINUED**

**Malfunction/Symptom Troubleshooting Procedure Page**

**ELECTRICAL SYSTEM - CONTINUED**

Windshield Washer Not Working . . . . . 0006 00-12  
 Work Light(s) Do Not Operate When Switch is Turned On . . . . . 0006 00-10  
 12-V Utility Plug Not Working . . . . . 0006 00-12

**ENGINE**

Engine Acceleration - Poor . . . . . 0006 00-2  
 Engine Cold Start System Not Working . . . . . 0006 00-5  
 Engine Deceleration - Poor . . . . . 0006 00-2  
 Engine Difficult to Start or Will Not Start (Exhaust Smoke) . . . . . 0006 00-1  
 Engine Difficult to Start or Will Not Start (No Exhaust Smoke) . . . . . 0006 00-1  
 Engine Oil Pressure - High . . . . . 0006 00-5  
 Engine Oil Pressure - Low . . . . . 0006 00-4  
 Engine Overheats . . . . . 0006 00-4  
 Engine Performance (Power) - Low . . . . . 0006 00-2  
 Engine Runs Rough . . . . . 0006 00-3  
 Engine Shuts Off Unexpectedly . . . . . 0006 00-3  
 Engine Speed Surges (Idle or Under Load) . . . . . 0006 00-3  
 Engine Starts But Will Not Keep Running . . . . . 0006 00-3  
 Engine Vibration Excessive . . . . . 0006 00-4  
 Excessive Exhaust Smoke - Black . . . . . 0006 00-2  
 Excessive Exhaust Smoke - White . . . . . 0006 00-1  
 Fuel Consumption Excessive . . . . . 0006 00-4

**FORKLIFT KIT**

Fork Functions Not Working . . . . . 0006 00-30

**OPERATOR'S CAB**

Operator's Cab Will Not Lift or Lower . . . . . 0006 00-19  
 Operator's Cab Will Not Move Left or Right . . . . . 0006 00-19

**STEERING SYSTEM**

Steering Control is Poor or Nonexistent . . . . . 0006 00-18

**TOPHANDLER SYSTEM**

Tophandler Twistlocks Will Not Rotate Properly . . . . . 0006 00-27  
 Tophandler Spreader Will Not Open or Close Properly . . . . . 0006 00-26  
 Tophandler Will Not Oscillate (Level) Properly . . . . . 0006 00-25  
 Tophandler Will Not Rotate Left or Right Properly . . . . . 0006 00-27  
 Tophandler Will Not Sideshift Properly . . . . . 0006 00-26  
 Tophandler Will Not Tilt Forward or Rearward Properly . . . . . 0006 00-25



**ALPHABETICAL ERROR CODE SYMPTOM INDEX****Malfunction/Symptom****Troubleshooting Procedure Page****AUXILIARY PUMP**

Error Code 169 - Tophandler Emergency Function Supply Valve, Open or Short Circuit Failure . . . . .	0037 00-1
Error Code 411 - Auxiliary Pump, Control Current Short Circuit Failure . . . . .	0037 00-1
Error Code 417 - Auxiliary Hydraulic Pump, Input from Switch Failure . . . . .	0037 00-1

**AXLE BRAKE COOLING SYSTEM**

Error Code 191 - Temperature in Front Axle Above Critical Threshold . . . . .	0032 00-1
Error Code 192 - Temperature in Rear Axle Above Critical Threshold . . . . .	0032 00-1
Error Code 414 - Bypass Valve Short Circuit Failure . . . . .	0032 00-1

**BOOM IN/OUT**

Error Code 127 - Joystick-to-ECU (790) Failure . . . . .	0041 00-1
Error Code 130 - Overload Protection System Failure . . . . .	0041 00-1
Error Code 160 - Extension Cylinder Boom IN Control, Wiring Circuit Failure . . . . .	0041 00-1
Error Code 161 - Extension Cylinder Boom IN Control, Component Failure . . . . .	0041 00-1
Error Code 163 - Extension Cylinder Boom OUT Control, Wiring Circuit Failure . . . . .	0041 00-1
Error Code 164 - Extension Cylinder Boom OUT Control, Wiring Component Failure . . . . .	0041 00-1

**BOOM LIFTING/LOWERING**

Error Code 126 - Joystick-to-ECU (790) Failure . . . . .	0040 00-1
Error Code 130 - Overload Protection System Failure . . . . .	0040 00-1
Error Code 151 - Lift Cylinder Locking Valve, Wiring Circuit Failure . . . . .	0040 00-1
Error Code 152 - Lift Cylinder Locking Valve, Component Failure . . . . .	0040 00-1
Error Code 154 - Lift Cylinder Boom Up Valve, Wiring Circuit Failure . . . . .	0040 00-1
Error Code 155 - Lift Cylinder Boom Up Valve, Component Failure . . . . .	0040 00-1
Error Code 157 - Lift Cylinder Boom Down Valve, Wiring Circuit Failure . . . . .	0040 00-1
Error Code 158 - Lift Cylinder Boom Down Valve, Component Failure . . . . .	0040 00-1

**BRAKE SYSTEM**

Error Code 118 - Brake System Pressure, Circuit 1 and Circuit 2 Failure . . . . .	0031 00-1
Error Code 119 - Brake System Pressure, Circuit 1 Failure . . . . .	0031 00-1
Error Code 120 - Brake System Pressure, Circuit 2 Failure . . . . .	0031 00-1

**COOLING FAN OPERATION AND FAN CONTROL**

Error Code 166 - Cooling Fan Speed, Wiring Circuit Failure . . . . .	0009 00-1
Error Code 167 - Cooling Fan Speed, Short Circuit Failure . . . . .	0009 00-1
Error Code 426 - Fording Level Switch, Input Read Incorrect . . . . .	0009 00-1

**ECU-TO-ECU COMMUNICATIONS**

Error Code 105 - Communications Failure Between Display ECU (795) and Servo ECU (790) . . . . .	0013 00-1
Error Code 106 - Communications Failure Between Display ECU (795) and Tophandler ECU (791) . . . . .	0013 00-1
Error Code 107 - Cable Failure Between Tophandler ECU (791) and Display ECU (795) . . . . .	0013 00-1
Error Code 108 - Cable Failure Between Tophandler ECU (791) and Servo ECU (790) . . . . .	0013 00-1

**ALPHABETICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

**Malfunction/Symptom**

**Troubleshooting Procedure Page**

**ECU-TO-ECU COMMUNICATIONS - CONTINUED**

Error Code 109 - Cable Failure Between Servo ECU (790) and Display ECU (795) . . . . . 0013 00-1  
 Error Code 110 - Communication Failure Between Display ECU (795) and Steering ECU (792) . . . . . 0013 00-1  
 Error Code 111 - Communications Failure Between Display ECU (795) and Transmission ECU (793) . . . . . 0013 00-1  
 Error Code 112 - Communications Failure Between Display ECU (795) and Engine ECU (794) . . . . . 0013 00-1  
 Error Code 345 - Communication Failure Between Steering ECU (792) and Display ECU (795) . . . . . 0013 00-1  
 Error Code 346 - Communication Failure Between Steering ECU (792) and Transmission ECU (793) . . . . . 0013 00-1  
 Error Code 684 - Communication Failure Between Transmission ECU (793) and Display ECU (795) . . . . . 0013 00-1  
 Error Code 685 - Communication Failure Between Transmission ECU (793) and Steering ECU (792) . . . . . 0013 00-1  
 Error Code 1285 - Engine Detects a Communication Failure on the J1939 Datalink . . . . . 0013 00-1  
 Error Code 1286 - Engine Detects a Communication Failure on the J1939 Datalink . . . . . 0013 00-1

**ELECTRONIC CONTROL UNIT (ECU) INPUT VOLTAGE**

Error Code 121 - Supply Voltage to Servo ECU (790) Failure . . . . . 0012 00-1  
 Error Code 122 - Supply Voltage to Servo ECU (790) Failure . . . . . 0012 00-1  
 Error Code 123 - 10V Reference Voltage for Servo ECU (790) Failure . . . . . 0012 00-1  
 Error Code 201 - Supply Voltage to Tophandler ECU (791) Failure . . . . . 0012 00-1  
 Error Code 202 - Supply Voltage to Tophandler ECU (791) Failure . . . . . 0012 00-1  
 Error Code 203 - 10V Reference Voltage for Tophandler ECU (791) Failure . . . . . 0012 00-1

**ELECTRONIC CONTROL UNIT (ECU) SUPPLY VOLTAGE**

Error Code 451 - Voltage Supply Too High for Steering ECU (792) . . . . . 0015 00-1  
 Error Code 452 - Voltage Supply Too Low for Steering ECU (792) . . . . . 0015 00-1  
 Error Code 811 - Voltage Supply Too Low for Transmission ECU (793) . . . . . 0015 00-1  
 Error Code 812 - Voltage Supply Too High for Transmission ECU (793) . . . . . 0015 00-1  
 Error Code 813 - Voltage Failure at Transmission Gearshift Valve Supply . . . . . 0015 00-1  
 Error Code 814 - Voltage Failure at Transmission Gearshift Valve Supply . . . . . 0015 00-1

**ENGINE AMBIENT AIR PRESSURE SENSOR AND CIRCUITS**

Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit . . . . . 0021 00-1  
 Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit . . . . . 0021 00-1  
 Error Code 1295 - Ambient Air Pressure Sensor Circuit Failure . . . . . 0021 00-1

**ENGINE BATTERY VOLTAGE CIRCUITS**

Error Code 1434 - Unswitched Battery Supply Circuit Failure . . . . . 0025 00-1  
 Error Code 1441 - Unswitched Battery Supply Circuit Failure . . . . . 0025 00-1  
 Error Code 1442 - Unswitched Battery Supply Circuit Failure . . . . . 0025 00-1  
 Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure . . . . . 0025 00-1  
 Error Code 1596 - Voltage Monitor, High Voltage Failure . . . . . 0025 00-1  
 Error Code 1597 - Voltage Monitor, Low Voltage Failure . . . . . 0025 00-1  
 Error Code 1598 - Voltage Monitor, Very Low Voltage Failure . . . . . 0025 00-1

**ALPHABETICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

**Malfunction/Symptom Troubleshooting Procedure Page**

**ENGINE ELECTRONIC CONTROL UNIT (ECU)**

Error Code 1187 - Sensor Voltage Supply Failure .....	0017 00-1
Error Code 1227 - Sensor Voltage Supply Failure .....	0017 00-1
Error Code 1254 - Sensor Voltage Supply Failure .....	0017 00-1
Error Code 1352 - Sensor Voltage Supply Failure .....	0017 00-1
Error Code 1443 - Throttle Voltage Supply Failure .....	0017 00-1

**ENGINE FUEL INJECTOR CIRCUITS**

Error Code 1311 - Injector Circuit Failure .....	0007 00-1
Error Code 1312 - Injector Circuit Failure .....	0007 00-1
Error Code 1313 - Injector Circuit Failure .....	0007 00-1
Error Code 1314 - Injector Circuit Failure .....	0007 00-1
Error Code 1315 - Injector Circuit Failure .....	0007 00-1
Error Code 1321 - Injector Circuit Failure .....	0007 00-1
Error Code 1322 - Injector Circuit Failure .....	0007 00-1
Error Code 1323 - Injector Circuit Failure .....	0007 00-1
Error Code 1324 - Injector Circuit Failure .....	0007 00-1
Error Code 1325 - Injector Circuit Failure .....	0007 00-1
Error Code 1331 - Injector Circuit Failure .....	0007 00-1
Error Code 1332 - Injector Circuit Failure .....	0007 00-1
Error Code 1951 - Injector Circuit Failure .....	0007 00-1

**ENGINE FUEL PRESSURE SENSORS AND CIRCUITS**

Error Code 1255 - Fuel Shutoff Solenoid Supply Circuit Failure.....	0023 00-1
Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure .....	0023 00-1
Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure .....	0023 00-1

**ENGINE OIL PRESSURE SENSOR**

Error Code 1135 - Oil Pressure Sensor Circuit Failure.....	0019 00-1
Error Code 1141 - Oil Pressure Sensor Circuit Failure.....	0019 00-1
Error Code 1143 - Oil Pressure Sensor Circuit Failure.....	0019 00-1
Error Code 1415 - Oil Pressure Sensor Circuit Failure.....	0019 00-1
Error Code 1435 - Oil Pressure Sensor Circuit Failure.....	0019 00-1

**ENGINE POSITION SENSOR CIRCUITS**

Error Code 1115 - Engine Position Sensor Circuit Failure .....	0018 00-1
Error Code 1121 - Engine Position Sensor Circuit Failure .....	0018 00-1
Error Code 1234 - Engine Overspeed Failure.....	0018 00-1

**ALPHABETICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

**Malfunction/Symptom**

**Troubleshooting Procedure Page**

**ENGINE PRESSURE SENSOR**

Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure . . . . . 0022 00-1  
 Error Code 1123 - Intake Manifold Pressure Sensor Circuit Failure . . . . . 0022 00-1  
 Error Code 1419 - Intake Manifold Pressure Sensor Circuit Failure . . . . . 0022 00-1  
 Error Code 1433 - Intake Manifold Pressure Sensor Circuit Failure . . . . . 0022 00-1

**ENGINE TEMPERATURE SENSORS AND CIRCUITS**

Error Code 1144 - Coolant Temperature Sensor Circuit Failure. . . . . 0020 00-1  
 Error Code 1145 - Coolant Temperature Sensor Circuit Failure. . . . . 0020 00-1  
 Error Code 1151 - Coolant Temperature Sensor Circuit Failure. . . . . 0020 00-1  
 Error Code 1153 - Intake Air Temperature Sensor Circuit Failure . . . . . 0020 00-1  
 Error Code 1154 - Intake Air Temperature Sensor Circuit Failure . . . . . 0020 00-1  
 Error Code 1155 - Intake Air Temperature Sensor Circuit Failure . . . . . 0020 00-1  
 Error Code 1212 - Oil Temperature Sensor Circuit Failure . . . . . 0020 00-1  
 Error Code 1213 - Oil Temperature Sensor Circuit Failure . . . . . 0020 00-1  
 Error Code 1214 - Oil Temperature Sensor Circuit Failure . . . . . 0020 00-1  
 Error Code 1697 - ECU Internal Temperature Sensor Circuit Failure . . . . . 0020 00-1  
 Error Code 1698 - ECU Internal Temperature Sensor Circuit Failure . . . . . 0020 00-1

**ENGINE TPS AND IDLE VALIDATION SWITCH**

Error Code 1131 - Throttle Position Sensor Circuit Failure . . . . . 0008 00-1  
 Error Code 1132 - Throttle Position Sensor Circuit Failure . . . . . 0008 00-1  
 Error Code 1431 - Idle Validation Switch Circuit Failure . . . . . 0008 00-1  
 Error Code 1432 - Accelerator Pedal Circuit Failure . . . . . 0008 00-1  
 Error Code 1551 - Idle Validation Switch Circuit Failure . . . . . 0008 00-1

**FUEL INLET RESTRICTION SENSOR CIRCUIT FAILURE**

Error Code 1583 - Fuel Inlet Pressure Sensor Circuit Failure . . . . . 0024 00-1

**HYDRAULIC FILTER INDICATORS**

Error Code 1 - Boom Hydraulic System Sensor Indicating Clogged Filter . . . . . 0039 00-1  
 Error Code 2 - Steering Hydraulic System Sensor Indicating Clogged Filter . . . . . 0039 00-1  
 Error Code 3 - Tophandler Hydraulic System Sensor Indicating Clogged Filter . . . . . 0039 00-1  
 Error Code 4 - Hydraulic Reservoir Return Sensor Indicating Clogged Filter . . . . . 0039 00-1  
 Error Code 432 - Boom Hydraulic System Filter Sensor, Broken Circuit Failure . . . . . 0039 00-1  
 Error Code 433 - Steering Hydraulic System Filter Sensor, Broken Circuit Failure . . . . . 0039 00-1  
 Error Code 434 - Tophandler Hydraulic System Filter Sensor, Broken Circuit Failure . . . . . 0039 00-1  
 Error Code 435 - Hydraulic Reservoir Return System Filter Sensor, Broken Circuit Failure . . . . . 0039 00-1  
 Error Code 786 - Transmission Hydraulic System Sensor Indicating Clogged Filter . . . . . 0039 00-1

**ALPHABETICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

**Malfunction/Symptom Troubleshooting Procedure Page**

**HYDRAULIC PISTON PUMP CUT-OFF**

Error Code 172 - Hydraulic Piston Pump Cut-Off, Open or Short Circuit Failure. . . . . 0038 00-1

**HYDRAULIC SERVO SYSTEM ELECTRONIC CONTROL UNIT (ECU) (790)**

Error Code 125 - Memory Failure. . . . . 0036 00-1

Error Code 141 - Internal Communication Failure . . . . . 0036 00-1

Error Code 142 - Internal Communication Failure . . . . . 0036 00-1

**INPUT AND OUTPUT SIGNALS FOR STEERING ECU (792)**

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268	Tophandler Leveling Right, Short Circuit Failure	Tophandler Leveling . . . . .	0044 00-1
270	Tophandler Leveling Left, Open Circuit Failure	Tophandler Leveling . . . . .	0044 00-1
271	Tophandler Leveling Left, Short Circuit Failure	Tophandler Leveling . . . . .	0044 00-1
300	Steering ECU (792) Hardware Failure	Steering ECU (792), Transmission ECU (793), and Engine ECU (794) . . . . .	0014 00-1
301	Right-Front Wheel Sensor Circuit Failure	Steering Sensor . . . . .	0035 00-1
302	Right-Rear Wheel Sensor Circuit Failure	Steering Sensor . . . . .	0035 00-1
303	Left-Rear Wheel Sensor Circuit Failure	Steering Sensor . . . . .	0035 00-1
304	Left-Front Wheel Sensor Circuit Failure	Steering Sensor . . . . .	0035 00-1
305	Right-Front Wheel Sensor Circuit Failure	Steering Sensor . . . . .	0035 00-1
306	Right-Rear Wheel Sensor Circuit Failure	Steering Sensor . . . . .	0035 00-1
307	Left-Rear Wheel Sensor Circuit Failure	Steering Sensor . . . . .	0035 00-1
308	Left-Front Wheel Sensor Circuit Failure	Steering Sensor . . . . .	0035 00-1

**NUMERICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

<b>ERROR CODE</b>	<b>DESCRIPTION</b>	<b>SYSTEM</b>	<b>TROUBLESHOOTING PROCEDURE PAGE</b>
309	Right-Front Wheel Sensor Circuit Failure	Steering Sensor.....	0035 00-1
310	Right-Rear Wheel Sensor Circuit Failure	Steering Sensor.....	0035 00-1
311	Left-Rear Wheel Sensor Circuit Failure	Steering Sensor.....	0035 00-1
312	Left-Front Wheel Sensor Circuit Failure	Steering Sensor.....	0035 00-1
313	Right-Front Wheel Sensor Circuit Failure	Steering Sensor.....	0035 00-1
314	Right-Rear Wheel Sensor Circuit Failure	Steering Sensor.....	0035 00-1
315	Left-Rear Wheel Sensor Circuit Failure	Steering Sensor.....	0035 00-1
316	Left-Front Wheel Sensor Circuit Failure	Steering Sensor.....	0035 00-1
317	Right-Front Wheel Angle Cannot Reach Set Point Value	Mechanical or Hydraulic Steering Failure .....	0034 00-1
318	Right-Rear Wheel Angle Cannot Reach Set Point Value	Mechanical or Hydraulic Steering Failure .....	0034 00-1
319	Left-Rear Wheel Angle Cannot Reach Set Point Value	Mechanical or Hydraulic Steering Failure .....	0034 00-1
320	Left-Front Wheel Angle Cannot Reach Set Point Value	Mechanical or Hydraulic Steering Failure .....	0034 00-1
321	Right-Front Wheel is Not Calibrated Correctly	Mechanical or Hydraulic Steering Failure .....	0034 00-1
322	Right-Rear Wheel is Not Calibrated Correctly	Mechanical or Hydraulic Steering Failure .....	0034 00-1
323	Left-Rear Wheel is Not Calibrated Correctly	Mechanical or Hydraulic Steering Failure .....	0034 00-1
324	Left-Front Wheel is Not Calibrated Correctly	Mechanical or Hydraulic Steering Failure .....	0034 00-1
325	Right-Front Wheel Valve Solenoid, Broken Circuit Failure	Steering Valve Circuit .....	0033 00-1
326	Right-Rear Wheel Valve Solenoid, Broken Circuit Failure	Steering Valve Circuit .....	0033 00-1
327	Left-Rear Wheel Valve Solenoid, Broken Circuit Failure	Steering Valve Circuit .....	0033 00-1
328	Left-Front Wheel Valve Solenoid, Broken Circuit Failure	Steering Valve Circuit .....	0033 00-1

**NUMERICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

<b>ERROR CODE</b>	<b>DESCRIPTION</b>	<b>SYSTEM</b>	<b>TROUBLESHOOTING PROCEDURE PAGE</b>
329	Right-Front Wheel Valve Solenoid, Short Circuit Failure	Steering Valve Circuit	0033 00-1
330	Right-Rear Wheel Valve Solenoid, Short Circuit Failure	Steering Valve Circuit	0033 00-1
331	Left-Rear Wheel Valve Solenoid, Short Circuit Failure	Steering Valve Circuit	0033 00-1
332	Left-Front Wheel Valve Solenoid, Short Circuit Failure	Steering Valve Circuit	0033 00-1
340	Hydraulic Steering Pressure Below Critical Threshold [1450 psi (100 bar)]	Steering Valve Circuit	0033 00-1
341	Steering Wheel Signal Not Consistent	Steering Valve Circuit	0033 00-1
342	One Steering Wheel Signal is Interrupted	Steering Valve Circuit	0033 00-1
343	One Steering Wheel Signal is Interrupted	Steering Valve Circuit	0033 00-1
344	Both Steering Wheel Signals are Interrupted	Steering Valve Circuit	0033 00-1
345	Communication Failure Between Steering ECU (792) and Display ECU (795)	ECU-to-ECU Communications	0013 00-1
346	Communication Failure Between Steering ECU (792) and Transmission ECU (793)	ECU-to-ECU Communications	0013 00-1
347	No Steering Mode Selected	Steering Valve Circuit	0033 00-1
401	Transmission Neutral Signal from Steering ECU (792) Failure	Input and Output Signals for Steering ECU (792)	0016 00-1
404	Short Circuit Failure of 2WD Steering Control Lamp	Input and Output Signals for Steering ECU (792)	0016 00-1
405	Short Circuit Failure of 4WD Steering Control Lamp	Input and Output Signals for Steering ECU (792)	0016 00-1
406	Short Circuit Failure of Crab Steering Control Lamp	Input and Output Signals for Steering ECU (792)	0016 00-1
408	Short Circuit Failure of Unlocked Twistlock Control Lamp	Input and Output Signals for Steering ECU (792)	0016 00-1
409	Short Circuit Failure of Locked Twistlock Control Lamp	Input and Output Signals for Steering ECU (792)	0016 00-1
410	Short Circuit Failure of Alinement Control Lamp	Input and Output Signals for Steering ECU (792)	0016 00-1



**NUMERICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

<b>ERROR CODE</b>	<b>DESCRIPTION</b>	<b>SYSTEM</b>	<b>TROUBLESHOOTING PROCEDURE PAGE</b>
411	Auxiliary Pump, Control Current Short Circuit Failure	Auxiliary Pump . . . . .	0037 00-1
412	Short Circuit Failure of Ether Start Valve	Input and Output Signals for Steering ECU (792) . . . . .	0016 00-1
413	Short Circuit Failure of Boom Folding Supply Valve	Input and Output Signals for Steering ECU (792) . . . . .	0016 00-1
414	Bypass Valve Short Circuit Failure	Axle Brake Cooling System . . . . .	0032 00-1
416	Steering Pressure Sensor Circuit Failure	Input and Output Signals for Steering ECU (792) . . . . .	0016 00-1
417	Auxiliary Hydraulic Pump, Input from Switch Failure	Auxiliary . . . . .	0037 00-1
418	2WD Steering Selection Switch, Circuit Failure	Input and Output Signals for Steering ECU (792) . . . . .	0016 00-1
419	4WD Steering Selection Switch, Circuit Failure	Input and Output Signals for Steering ECU (792) . . . . .	0016 00-1
420	Crab Steering Selection Switch, Circuit Failure	Input and Output Signals for Steering ECU (792) . . . . .	0016 00-1
422	Cab in Transport Position Proximity Switch, Circuit Failure	Input and Output Signals for Steering ECU (792) . . . . .	0016 00-1
423	Ether Start Kit Switch, Circuit Failure	Input and Output Signals for Steering ECU (792) . . . . .	0016 00-1
426	Fording Level Switch, Input Read Incorrect	Cooling Fan Operation and Fan Control . . . . .	0009 00-1
427	Tophandler Work Light Switch, Circuit Failure	Input and Output Signals for Steering ECU (792) . . . . .	0016 00-1
432	Boom Hydraulic System Filter Sensor, Broken Circuit Failure	Hydraulic Filter Indicators . . . . .	0039 00-1
433	Steering Hydraulic System Filter Sensor, Broken Circuit Failure	Hydraulic Filter Indicators . . . . .	0039 00-1
434	Tophandler Hydraulic System Filter Sensor, Broken Circuit Failure	Hydraulic Filter Indicators . . . . .	0039 00-1
435	Hydraulic Reservoir Return System Filter Sensor, Broken Circuit Failure	Hydraulic Filter Indicators . . . . .	0039 00-1
450	Temperature Inside Steering ECU (792) Above Critical Threshold [184°F (85°C)]	Input and Output Signals for Steering ECU (792) . . . . .	0016 00-1
451	Voltage Supply Too High for Steering ECU (792)	Electronic Control Unit (ECU) Supply Voltage. . . . .	0015 00-1
452	Voltage Supply Too Low for Steering ECU (792)	Electronic Control Unit (ECU) Supply Voltage. . . . .	0015 00-1

**NUMERICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

<b>ERROR CODE</b>	<b>DESCRIPTION</b>	<b>SYSTEM</b>	<b>TROUBLESHOOTING PROCEDURE PAGE</b>
618	Signal From Gear Selector Not Correct	Miscellaneous Transmission Failure . . . . .	0029 00-1
622	Feedback Signal From 2WD/4WD Switch Not Correct	Miscellaneous Transmission Failure . . . . .	0029 00-1
637	Transmission Sump Temperature Sensor Failure, Open Circuit or Short Circuit to Battery	Transmission Temperature . . . . .	0026 00-1
638	Transmission Sump Temperature Sensor Failure, Short Circuit to Chassis	Transmission Temperature . . . . .	0026 00-1
639	Converter Output Temperature Sensor Failure, Open Circuit or Short Circuit to Battery	Transmission Temperature . . . . .	0026 00-1
640	Converter Output Temperature Sensor Failure, Short Circuit to Chassis	Transmission Temperature . . . . .	0026 00-1
649	Engine Speed Sensor Failure, Open Circuit or Short Circuit to Battery	Transmission Speed Sensors . . . . .	0027 00-1
650	Engine Speed Sensor Failure, Short Circuit to Chassis	Transmission Speed Sensors . . . . .	0027 00-1
651	Engine Speed Sensor Failure, Logical Error	Transmission Speed Sensors . . . . .	0027 00-1
652	Turbine Speed Sensor Failure, Open Circuit or Short Circuit to Battery	Transmission Speed Sensors . . . . .	0027 00-1
653	Turbine Speed Sensor Failure, Short Circuit to Chassis	Transmission Speed Sensors . . . . .	0027 00-1
654	Turbine Speed Sensor Failure, Logical Error	Transmission Speed Sensors . . . . .	0027 00-1
655	Internal Speed Sensor Failure, Open Circuit or Short Circuit to Battery	Transmission Speed Sensors . . . . .	0027 00-1
656	Sensor Failure, Short Circuit to Chassis	Transmission Speed Sensors . . . . .	0027 00-1
657	Internal Speed Sensor Failure, Logical Error	Transmission Speed Sensors . . . . .	0027 00-1
658	Output Speed Sensor Failure, Open Circuit or Short Circuit to Battery	Transmission Speed Sensors . . . . .	0027 00-1
659	Output Speed Sensor Failure, Short Circuit to Chassis	Transmission Speed Sensors . . . . .	0027 00-1
660	Output Speed Sensor Failure, Logical Error	Transmission Speed Sensors . . . . .	0027 00-1
662	Output Speed Sensor Failure, Logical Speed Error	Transmission Speed Sensors . . . . .	0027 00-1

**NUMERICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

<b>ERROR CODE</b>	<b>DESCRIPTION</b>	<b>SYSTEM</b>	<b>TROUBLESHOOTING PROCEDURE PAGE</b>
684	Communication Failure Between Transmission ECU (793) and Display ECU (795)	ECU-to-ECU Communications . . . . .	0013 00-1
685	Communication Failure Between Transmission ECU (793) and Steering ECU (792)	ECU-to-ECU Communications . . . . .	0013 00-1
713	Clutch K1 Short Circuit to Battery Failure	Transmission Clutch Circuit. . . . .	0028 00-1
714	Clutch K1 Short Circuit to Chassis Failure	Transmission Clutch Circuit. . . . .	0028 00-1
715	Clutch K1 Open Circuit Failure	Transmission Clutch Circuit. . . . .	0028 00-1
716	Clutch K2 Short Circuit to Battery Failure	Transmission Clutch Circuit. . . . .	0028 00-1
717	Clutch K2 Short Circuit to Chassis Failure	Transmission Clutch Circuit. . . . .	0028 00-1
718	Clutch K2 Open Circuit Failure	Transmission Clutch Circuit. . . . .	0028 00-1
719	Clutch K3 Short Circuit to Battery Failure	Transmission Clutch Circuit. . . . .	0028 00-1
720	Clutch K3 Short Circuit to Chassis Failure	Transmission Clutch Circuit. . . . .	0028 00-1
721	Clutch K3 Open Circuit Failure	Transmission Clutch Circuit. . . . .	0028 00-1
729	Clutch K4 Short Circuit to Battery Failure	Transmission Clutch Circuit. . . . .	0028 00-1
730	Clutch K4 Short Circuit to Chassis Failure	Transmission Clutch Circuit. . . . .	0028 00-1
731	Clutch K4 Open Circuit Failure	Transmission Clutch Circuit. . . . .	0028 00-1
732	Clutch KV Short Circuit to Battery Failure	Transmission Clutch Circuit. . . . .	0028 00-1
733	Clutch KV Short Circuit to Chassis Failure	Transmission Clutch Circuit. . . . .	0028 00-1
734	Clutch KV Open Circuit Failure	Transmission Clutch Circuit. . . . .	0028 00-1
735	Clutch KR Short Circuit to Battery Failure	Transmission Clutch Circuit. . . . .	0028 00-1
736	Clutch KR Short Circuit to Chassis Failure	Transmission Clutch Circuit. . . . .	0028 00-1
737	Clutch KR Open Circuit Failure	Transmission Clutch Circuit. . . . .	0028 00-1
746	Backup Alarm Control Circuit, Short Circuit Failure	Miscellaneous Transmission Failure . . . . .	0029 00-1

**NUMERICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

<b>ERROR CODE</b>	<b>DESCRIPTION</b>	<b>SYSTEM</b>	<b>TROUBLESHOOTING PROCEDURE PAGE</b>
747	Backup Alarm Control Circuit, Open Circuit Failure	Miscellaneous Transmission Failure . . . . .	0029 00-1
761	2WD/4WD Connection Valve Circuit, Short Circuit to Chassis Failure	Miscellaneous Transmission Failure . . . . .	0029 00-1
762	2WD/4WD Connection Valve Circuit, Short Circuit to Battery Failure	Miscellaneous Transmission Failure . . . . .	0029 00-1
763	2WD/4WD Connection Valve Circuit, Open Circuit Failure	Miscellaneous Transmission Failure . . . . .	0029 00-1
777	Internal Transmission Failure at Clutch K1	Internal Transmission Clutch Slippage Failure . . . . .	0030 00-1
778	Internal Transmission Failure at Clutch K2	Internal Transmission Clutch Slippage Failure . . . . .	0030 00-1
779	Internal Transmission Failure at Clutch K3	Internal Transmission Clutch Slippage Failure . . . . .	0030 00-1
780	Internal Transmission Failure at Clutch K4	Internal Transmission Clutch Slippage Failure . . . . .	0030 00-1
781	Internal Transmission Failure at Clutch KV	Internal Transmission Clutch Slippage Failure . . . . .	0030 00-1
782	Internal Transmission Failure at Clutch KR	Internal Transmission Clutch Slippage Failure . . . . .	0030 00-1
783	Sump Temperature Critical Threshold [212°F (100°C)] Failure	Transmission Temperature . . . . .	0026 00-1
786	Transmission Hydraulic System Sensor Indicating Clogged Filter	Hydraulic Filter Indicators . . . . .	0039 00-1
795	Converter Output Temperature Critical Threshold [248°F (120°C)] Failure	Transmission Temperature . . . . .	0026 00-1
811	Voltage Supply Too Low for Transmission ECU (793)	Electronic Control Unit (ECU) Supply Voltage. . . . .	0015 00-1
812	Voltage Supply Too High for Transmission ECU (793)	Electronic Control Unit (ECU) Supply Voltage. . . . .	0015 00-1
813	Voltage Failure at Transmission Gearshift Valve Supply	Electronic Control Unit (ECU) Supply Voltage. . . . .	0015 00-1
814	Voltage Failure at Transmission Gearshift Valve Supply	Electronic Control Unit (ECU) Supply Voltage. . . . .	0015 00-1
841	Transmission ECU (793) Memory Failure	Steering ECU (792), Transmission ECU (793), and Engine ECU (794) . . . . .	0014 00-1
843	Application Error Failure	Steering ECU (792), Transmission ECU (793), and Engine ECU (794) . . . . .	0014 00-1

**NUMERICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

<b>ERROR CODE</b>	<b>DESCRIPTION</b>	<b>SYSTEM</b>	<b>TROUBLESHOOTING PROCEDURE PAGE</b>
845	Clutch Failure Detected During Calibration	Internal Transmission Clutch Slippage Failure . . . . .	0030 00-1
846	Clutch Adjustment Data Lost	Internal Transmission Clutch Slippage Failure . . . . .	0030 00-1
1111	Engine ECU (794) Memory Failure	Steering ECU (792), Transmission ECU (793), and Engine ECU (794) . . . . .	0014 00-1
1115	Engine Position Sensor Circuit Failure	Engine Position Sensor Circuits . . . . .	0018 00-1
1121	Engine Position Sensor Circuit Failure	Engine Position Sensor Circuits . . . . .	0018 00-1
1122	Intake Manifold Pressure Sensor Circuit Failure	Engine Pressure Sensor . . . . .	0022 00-1
1123	Intake Manifold Pressure Sensor Circuit Failure	Engine Pressure Sensor . . . . .	0022 00-1
1131	Throttle Position Sensor Circuit Failure	Engine TPS and Idle Validation Switch . . . . .	0008 00-1
1132	Throttle Position Sensor Circuit Failure	Engine TPS and Idle Validation Switch . . . . .	0008 00-1
1135	Oil Pressure Sensor Circuit Failure	Engine Oil Pressure Sensor . . . . .	0019 00-1
1141	Oil Pressure Sensor Circuit Failure	Engine Oil Pressure Sensor . . . . .	0019 00-1
1143	Oil Pressure Sensor Circuit Failure	Engine Oil Pressure Sensor . . . . .	0019 00-1
1144	Coolant Temperature Sensor Circuit Failure	Engine Temperature Sensors and Circuits . . . . .	0020 00-1
1145	Coolant Temperature Sensor Circuit Failure	Engine Temperature Sensors and Circuits . . . . .	0020 00-1
1151	Coolant Temperature Sensor Circuit Failure	Engine Temperature Sensors and Circuits . . . . .	0020 00-1
1153	Intake Air Temperature Sensor Circuit Failure	Engine Temperature Sensors and Circuits . . . . .	0020 00-1
1154	Intake Air Temperature Sensor Circuit Failure	Engine Temperature Sensors and Circuits . . . . .	0020 00-1
1155	Intake Air Temperature Sensor Circuit Failure	Engine Temperature Sensors and Circuits . . . . .	0020 00-1
1187	Sensor Voltage Supply Failure	Engine Electronic Control Unit (ECU) . . . . .	0017 00-1
1212	Oil Temperature Sensor Circuit Failure	Engine Temperature Sensors and Circuits . . . . .	0020 00-1
1213	Oil Temperature Sensor Circuit Failure	Engine Temperature Sensors and Circuits . . . . .	0020 00-1
1214	Oil Temperature Sensor Circuit Failure	Engine Temperature Sensors and Circuits . . . . .	0020 00-1
1221	High Voltage Detected at Ambient Air Pressure Sensor Circuit	Engine Ambient Air Pressure Sensor and Circuits . . . . .	0021 00-1
1222	Low Voltage Detected at Ambient Air Pressure Sensor Circuit	Engine Ambient Air Pressure Sensor and Circuits . . . . .	0021 00-1
1227	Sensor Voltage Supply Failure	Engine Electronic Control Unit (ECU) . . . . .	0017 00-1

**NUMERICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

<b>ERROR CODE</b>	<b>DESCRIPTION</b>	<b>SYSTEM</b>	<b>TROUBLESHOOTING PROCEDURE PAGE</b>
1234	Engine Overspeed Failure	Engine Position Sensor Circuits . . . . .	0018 00-1
1254	Sensor Voltage Supply Failure	Engine Electronic Control Unit (ECU) . . . . .	0017 00-1
1255	Fuel Shutoff Solenoid Supply Circuit Failure	Engine Fuel Pressure Sensors and Circuits . . . . .	0023 00-1
1285	Engine Detects a Communication Failure on the J1939 Datalink	ECU-to-ECU Communications . . . . .	0013 00-1
1286	Engine Detects a Communication Failure on the J1939 Datalink	ECU-to-ECU Communications . . . . .	0013 00-1
1295	Ambient Air Pressure Sensor Circuit Failure	Engine Ambient Air Pressure Sensor and Circuits. . . . .	0021 00-1
1311	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1312	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1313	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1314	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1315	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1321	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1322	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1323	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1324	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1325	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1331	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1332	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1
1341	Engine ECU (794) Loss of Data Failure	Steering ECU (792), Transmission ECU (793), and Engine ECU (794) . . . . .	0014 00-1
1343	Engine ECU (794) Internal Communication Failure	Steering ECU (792), Transmission ECU (793), and Engine ECU (794) . . . . .	0014 00-1
1346	Engine ECU (794) Software Failure	Steering ECU (792), Transmission ECU (793), and Engine ECU (794) . . . . .	0014 00-1
1352	Sensor Voltage Supply Failure	Engine Electronic Control Unit (ECU) . . . . .	0017 00-1
1415	Oil Pressure Sensor Circuit Failure	Engine Oil Pressure Sensor . . . . .	0019 00-1
1419	Intake Manifold Pressure Sensor Circuit Failure	Engine Pressure Sensor . . . . .	0022 00-1
1431	Idle Validation Switch Circuit Failure	Engine TPS and Idle Validation Switch. . . . .	0008 00-1
1432	Accelerator Pedal Circuit Failure	Engine TPS and Idle Validation Switch. . . . .	0008 00-1
1433	Intake Manifold Pressure Sensor Circuit Failure	Engine Pressure Sensor . . . . .	0022 00-1

**NUMERICAL ERROR CODE SYMPTOM INDEX - CONTINUED**

<b>ERROR CODE</b>	<b>DESCRIPTION</b>	<b>SYSTEM</b>	<b>TROUBLESHOOTING PROCEDURE PAGE</b>
1434	Unswitched Battery Supply Circuit Failure	Engine Battery Voltage Circuits. . . . .	0025 00-1
1435	Oil Pressure Sensor Circuit Failure	Engine Oil Pressure Sensor . . . . .	0019 00-1
1441	Unswitched Battery Supply Circuit Failure	Engine Battery Voltage Circuits. . . . .	0025 00-1
1442	Unswitched Battery Supply Circuit Failure	Engine Battery Voltage Circuits. . . . .	0025 00-1
1443	Throttle Voltage Supply Failure	Engine Electronic Control Unit (ECU) . . . . .	0017 00-1
1474	Starter Solenoid Lockout Relay Driver Circuit Failure	Engine Battery Voltage Circuits. . . . .	0025 00-1
1551	Idle Validation Switch Circuit Failure	Engine TPS and Idle Validation Switch. . . . .	0008 00-1
1581	Fuel Inlet Restriction Sensor Circuit Failure	Engine Fuel Pressure Sensors and Circuits . . . . .	0023 00-1
1582	Fuel Inlet Restriction Sensor Circuit Failure	Engine Fuel Pressure Sensors and Circuits . . . . .	0023 00-1
1583	Fuel Inlet Pressure Sensor Circuit Failure	Fuel Inlet Restriction Sensor Circuit Failure . . . . .	0024 00-1
1596	Voltage Monitor, High Voltage Failure	Engine Battery Voltage Circuits. . . . .	0025 00-1
1597	Voltage Monitor, Low Voltage Failure	Engine Battery Voltage Circuits. . . . .	0025 00-1
1598	Voltage Monitor, Very Low Voltage Failure	Engine Battery Voltage Circuits. . . . .	0025 00-1
1697	ECU Internal Temperature Sensor Circuit Failure	Engine Temperature Sensors and Circuits . . . . .	0020 00-1
1698	ECU Internal Temperature Sensor Circuit Failure	Engine Temperature Sensors and Circuits . . . . .	0020 00-1
1951	Injector Circuit Failure	Engine Fuel Injector Circuits . . . . .	0007 00-1

**END OF WORK PACKAGE**

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**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

**Table 1. Engine Troubleshooting Procedures (Non-Error Code).**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. Engine Difficult to Start or Will Not Start (No Exhaust Smoke).</b></p>	<ol style="list-style-type: none"> <li>1. Check for damaged or loose battery connections.</li> <li>2. Check for damaged or leaking fuel lines, hoses, and fittings.</li> <li>3. Check for clogged fuel/water separator.</li> <li>4. Check for dirty or clogged air cleaner element.</li> <li>5. Remove starter relay from starter relay and engine cold start ether canister mounting bracket. Check relay for shorts and damage.</li> <li>6. Perform continuity/voltage checks on two 50A starter circuit breakers mounted on starter relay mounting bracket.</li> <li>7. Check for faulty fuel shutoff valve solenoid (FSOV).</li> </ol>	<p>Tighten or repair battery connections (WP 0108 00).</p> <p>Tighten or repair fuel lines, hoses, and fittings (WP 0059 00).</p> <p>Replace fuel/water separator (WP 0058 00).</p> <p>Service or replace air cleaner element (WP 0056 00).</p> <p>Replace shorted or damaged relay (WP 0073 00).</p> <p>Replace shorted or damaged circuit breakers (WP 0073 00).</p> <ol style="list-style-type: none"> <li>a. Tighten any loose connections (WP 0055 00).</li> <li>b. Check for power at FSOV (12 volts) (WP 0055 00).</li> </ol>
<p><b>2. Engine Difficult to Start or Will Not Start (Exhaust Smoke).</b></p>	<ol style="list-style-type: none"> <li>1. Check for damaged or leaking fuel lines, hoses, and fittings.</li> <li>2. Check for clogged fuel/water separator.</li> <li>3. Check for dirty or clogged air cleaner element.</li> <li>4. Perform cold starting procedures (TM 10-3930-675-10).</li> </ol>	<p>Tighten or repair fuel lines, hoses, and fittings (WP 0059 00).</p> <p>Replace fuel/water separator (WP 0058 00).</p> <p>Service or replace air cleaner element (WP 0056 00).</p> <p>See cold starting system maintenance (WP 0060 00).</p>
<p><b>3. Excessive Exhaust Smoke - White.</b></p>	<p>Check and monitor engine operating temperature</p>	<ol style="list-style-type: none"> <li>a. Allow engine to warm to operating temperature.</li> <li>b. Perform cooling system troubleshooting checks (WP 0005 00).</li> </ol>

Table 1. Engine Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>4. Excessive Exhaust Smoke - Black.</b></p>	<p>1. Check for dirty or clogged air cleaner element.</p> <p>2. Check for restricted or damaged fuel return line.</p> <p>3. Check for leaking or damaged air intake hoses, lines, and clamps.</p>	<p>Service or replace air cleaner element (WP 0056 00).</p> <p>Repair or replace fuel return line (WP 0059 00).</p> <p>Tighten or repair air intake hoses, lines, and clamps (WP 0057 00).</p>
<p><b>5. Engine Acceleration - Poor.</b></p>	<p>1. Check and monitor engine operating temperature</p> <p>2. Check for leaking or damaged air intake hoses, lines, and clamps.</p> <p>3. Check for restricted or sticking accelerator pedal.</p> <p>4. Check and test throttle position sensor operation (WP 0008 00).</p> <p>5. Check for clogged fuel/water separator.</p>	<p>a. Allow to warm to operating temperature.</p> <p>b. Perform cooling system troubleshooting checks (WP 0005 00).</p> <p>Tighten or repair air intake hoses, lines and clamps (WP 0057 00).</p> <p>Remove restrictions from accelerator pedal on cab floor.</p> <p>Replace throttle position sensor (WP 0061 00).</p> <p>Replace fuel/water separator (WP 0058 00).</p>
<p><b>6. Engine Deceleration - Poor.</b></p>	<p>1. Check for restricted or sticking accelerator pedal.</p> <p>2. Check and test throttle position sensor operation (WP 0008 00).</p>	<p>Remove restriction(s) from accelerator pedal.</p> <p>Replace throttle position sensor (see WP 0061 00).</p>
<p><b>7. Engine Performance (Power) - Low.</b></p>	<p>1. Check engine oil level.</p> <p>2. Check for clogged fuel/water separator.</p> <p>3. Check for dirty or clogged air cleaner element.</p> <p>4. Check for leaking or damaged air intake hoses, lines, and clamps.</p>	<p>Verify engine oil is not overfilled. (see LO 10-3930-675-12).</p> <p>Replace fuel/water separator (WP 0058 00).</p> <p>Service or replace air cleaner element (WP 0056 00).</p> <p>Tighten or repair air intake hoses, lines and clamps (WP 0057 00).</p>

Table 1. Engine Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
7. Engine Performance (Power) - Low - Continued.	5. Check for air in fuel system and restricted fuel return line.	Tighten, repair, or replace fuel system lines and hoses (WP 0059 00).
8. Engine Runs Rough.	1. Check for air in fuel system and restricted fuel return line.  2. Check for loose or damaged engine mounts.  3. Check and monitor engine operating temperature.	Tighten, repair, or replace fuel system lines and hoses (WP 0059 00).  a. Tighten loose engine mounts. b. Notify DS Maintenance if engine mounts are damaged.  a. Allow engine to warm to operating temperature. b. Perform cooling system troubleshooting checks (WP 0005 00).
9. Engine Speed Surges (Idle or Under Load).	Check for air in fuel system or restricted fuel line or hoses.	Tighten, repair, or replace fuel system lines and hoses (WP 0059 00).
10. Engine Shuts Off Unexpectedly.	1. Check for faulty fuel shutoff valve solenoid (FSOV).  2. Check for air in fuel system and restricted fuel line or hoses.  3. Check for damaged and loose battery connections.	a. Tighten any loose connections (WP 0055 00). b. Check for power at FSOV (12 volts) (WP 0055 00).  Tighten, repair, or replace fuel system lines and hoses (WP 0059 00).  Tighten or repair battery connections (WP 0108 00).
11. Engine Starts But Will Not Keep Running.	1. Check for clogged fuel/water separator.  2. Check for air in fuel system and restricted fuel line or hoses.  3. Check for faulty fuel shutoff valve solenoid (FSOV).	Replace fuel/water separator (WP 0058 00).  Tighten, repair, or replace fuel system lines, hoses, and fittings (WP 0059 00).  a. Tighten any loose connections (WP 0055 00). b. Check for power at FSOV (12 volts) (WP 0055 00).

Table 1. Engine Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>11. Engine Starts But Will Not Keep Running - Continued.</b></p>	<p>4. Check for restricted or damaged air intake and exhaust hoses, lines, and clamps.</p>	<p>Tighten or repair air intake or exhaust hoses, lines, and clamps (WP 0057 00 and WP 0062 00).</p>
<p><b>12. Engine Vibration Excessive.</b></p>	<p>1. Observe if engine is running rough.</p> <p>2. Check for loose or damaged engine mounts.</p> <p>3. Check for loose or damaged engine vibration damper.</p>	<p>Refer to engine troubleshooting.</p> <p>a. Tighten loose engine mounts. b. Notify DS Maintenance if engine mounts are damaged.</p> <p>a. Tighten loose engine vibration damper. b. Notify DS Maintenance if engine vibration damper is damaged.</p>
<p><b>13. Fuel Consumption Excessive.</b></p>	<p>1. Check for loose, leaking, or damaged fuel lines, hoses, and fittings.</p> <p>2. Check for dirty or clogged air cleaner element.</p>	<p>Tighten, repair, or replace fuel system lines, hoses, and fittings (WP 0059 00).</p> <p>Service or replace air cleaner element (WP 0056 00).</p>
<p><b>14. Engine Overheats.</b></p>	<p>1. Check cooling system for loose or damaged hoses, lines, and clamps.</p> <p>2. Visually check radiator assembly for signs of leakage or damage.</p> <p>3. Remove engine thermostat.</p>	<p>Tighten or repair cooling system hoses, lines or clamps (WP 0064 00).</p> <p>If radiator is leaking or damaged, notify DS Maintenance.</p> <p>Replace engine thermostat (WP 0066 00).</p>
<p><b>15. Engine Oil Pressure - Low.</b></p>	<p>1. Check engine oil level.</p> <p>2. Visually check for external engine oil leaks.</p> <p>3. Check if engine oil is contaminated or does not meet specification for current operating conditions.</p>	<p>Fill engine oil to the correct level (LO 10-3930-675-12).</p> <p>Tighten leaking lines or fittings.</p> <p>Replace engine oil and filter (LO 10-3930-675-12).</p>

Table 1. Engine Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>16. Engine Oil Pressure - High.</b></p>	<p>Check if engine oil is contaminated or does not meet specification for current operating conditions.</p>	<p>Replace engine oil and filter (LO 10-3930-675-12).</p>
<p><b>17. Engine Cold Start System Not Working.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure circuit breaker no.17 is not tripped.</li> <li>2. Remove engine cover and check cold start ether canister.</li> <li>3. Perform continuity check of cold start rocker switch.</li> <li>4. Check ether supply tube for damage between cold start activation solenoid and engine intake.</li> <li>5. Perform voltage check of cold start activation solenoid mounted on starter relay mounting bracket.</li> </ol>	<p>Reset circuit breaker (see WP 0073 00).</p> <p>Replace empty or missing canister (see WP 0060 00).</p> <p>Replace rocker switch if faulty (see WP 0072 00).</p> <p>Replace damaged tube (see WP 0060 00).</p> <p>Replace shorted or damaged solenoid. (see WP 0060 00).</p>

Table 2. Electrical Troubleshooting Procedures (Non-Error Code).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>SERVICES LIGHTS</b></p> <p><b>1. Headlight(s) Do Not Operate When Switch is Turned On.</b></p> <p><b>2. Headlight(s) High/Low Beam Function Not Working.</b></p> <p><b>3. Front/Rear Side Marker Light(s) Do Not Operate When Headlight Switch is Turned On.</b></p>	<p>1. Check position of blackout drive/marker light switch.</p> <p>2. Ensure that headlight circuit breaker numbers 18, 19, 20, and 21 are not tripped.</p> <p>3. Ensure that blackout light circuit breaker numbers 16, 24, and 25 are not tripped.</p> <p>4. Inspect headlights for damage and burned out lamps.</p> <p>5. Check headlight wiring harnesses and connectors for damage, continuity, and proper voltage (WP 0199 00-41).</p> <p>6. Check instrument panel rocker switch for damage and continuity (WP 0199 00-41).</p> <p>7. Check accessory control lever switches and wiring for damage and continuity (WP 0199 00-41).</p> <p>1. Inspect headlights for damage and burned out lamps.</p> <p>2. Check accessory control lever switches and wiring for damage and continuity (WP 0199 00-41).</p> <p>1. Ensure taillight and side marker light circuit breaker numbers 22 and 23 are not tripped.</p>	<p>Place blackout drive/marker light switch in OFF position.</p> <p>Reset circuit breakers as required (WP 0073 00).</p> <p>Reset circuit breakers as required (see WP 0073 00).</p> <p>a. Replace burned out lamps (WP 0083 00). b. Replace damaged headlight (WP 0083 00).</p> <p>Repair or replace damaged wires or connectors (see WP 0111 00).</p> <p>Replace damaged rocker switch (WP 0072 00).</p> <p>Replace damaged accessory control lever unit (WP 0112 00).</p> <p>a. Replace burned out lamps (WP 0083 00). b. Replace damaged headlight (WP 0083 00).</p> <p>Replace damaged accessory control lever unit (WP 0112 00).</p> <p>Reset circuit breakers as required (WP 0073 00).</p>

Table 2. Electrical Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>3. Front/Rear Side Marker Light(s) Do Not Operate When Headlight Switch is Turned On - Continued.</b></p>	<p>2. Inspect marker lights for damage and burned out lamps.</p> <p>3. Inspect marker lights, wiring harnesses, and connectors for damage, continuity, and proper voltage (WP 0199 00-41).</p>	<p>a. Replace burned out lamps (WP 0085 00). b. Replace damaged marker light (WP 0085 00).</p> <p>Repair or replace damaged wires or connectors (WP 0111 00).</p>
<p><b>4. Taillight(s) Do Not Operate When Headlight Switch is Turned On.</b></p>	<p>1. Ensure that taillight and side marker light circuit breaker numbers 22 and 23 are not tripped.</p> <p>2. Inspect taillights for damage and burned out lamps.</p> <p>3. Inspect taillight wiring harness and connectors for damage, continuity, and proper voltage (24V).</p>	<p>Reset circuit breakers as required (WP 0073 00).</p> <p>Replace burned out lamps (WP 0085 00).</p> <p>Repair or replace damaged wires or connectors (WP 0111 00).</p>
<p><b>5. Stoplight(s) Do Not Operate When Brake Pedal (s) is Pressed.</b></p>	<p>1. Check position of blackout drive/marker light switch.</p> <p>2. Ensure that brake light circuit breaker numbers 03 and 10 are not tripped.</p> <p>3. Ensure blackout light circuit breaker number 24 is not tripped.</p> <p>4. Inspect stoplights for damage and burned out lamps.</p> <p>5. Inspect stoplight wiring harness and connectors for damage, continuity, and proper voltage.</p> <p>6. Remove stoplight relay numbers 3010 (RL5), 3015R, and 3015L and check for shorted and damaged relay.</p>	<p>Place blackout drive/marker light switch in OFF position.</p> <p>Reset circuit breakers as required (WP 0073 00).</p> <p>Reset circuit breaker as required (WP 0073 00).</p> <p>Replace burned out lamps (WP 0085 00).</p> <p>Repair or replace damaged wires or connectors (WP 0111 00).</p> <p>Replace shorted or damaged relay (WP 0073 00).</p>

Table 2. Electrical Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>6. Turn Signals or Emergency Flashers Are Not Working.</b></p>	<ol style="list-style-type: none"> <li>1. Check position of blackout drive/marker light switch.</li> <li>2. Ensure turn signal and emergency flasher circuit breaker number 6 is not tripped.</li> <li>3. Inspect turn signal and emergency flasher lights for damage and burned out lamps.</li> <li>4. Inspect wiring harness and connectors for damage, continuity, and proper voltage.</li> <li>5. Check accessory control lever switches and wiring for damage and continuity (WP 0199 00-42).</li> <li>6. Remove turn signal light relay numbers 310 and 311 and check for shorted or damaged relay.</li> <li>7. Remove flasher relays and check for shorted or damaged relay.</li> </ol>	<p>Place blackout drive/marker light switch in the OFF position.</p> <p>Reset circuit breaker as required (WP 0073 00).</p> <p>Replace burned out lamps (WP 0085 00).</p> <p>Repair or replace damaged wires or connectors (WP 0111 00).</p> <p>Replace damaged accessory control lever unit (WP 0112 00).</p> <p>Replace shorted or damaged relay (WP 0073 00).</p> <p>Replace shorted or damaged relay (WP 0073 00).</p>
<p><b>BLACKOUT DRIVE AND MARKER LIGHTS</b></p>		
<p><b>7. Blackout Drive and Marker Lights Do Not Operate When Switch is Turned On.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure that blackout lights circuit breaker numbers 16, 24, and 25 are not tripped.</li> <li>2. Inspect blackout drive and marker lights for damage.</li> <li>3. Check instrument panel rocker switch for damage and continuity (WP 0199 00-41).</li> <li>4. Inspect wiring harness and connectors for damage, continuity, and proper voltage (20-25V).</li> </ol>	<p>Reset circuit breakers as required (WP 0073 00).</p> <p>Replace damaged lights (WP 0086 00).</p> <p>Replace damaged rocker switch (WP 0072 00).</p> <p>Repair or replace damaged wires or connectors (WP 0111 00).</p>



Table 2. Electrical Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>HORN, BACKUP ALARM, AND BACKUP LIGHTS</b></p> <p><b>8. Horn Will Not Sound When Button is Pressed.</b></p> <p><b>9. Backup Alarm Will Not Sound When Truck is Placed In Reverse.</b></p> <p><b>10. Backup Lights Do Not Operate When Truck is Placed In Reverse.</b></p>	<p>1. Check position of blackout drive/marker light switch.</p> <p>2. Ensure that blackout light circuit breakers numbers 24 and 9 are not tripped.</p> <p>3. Inspect horn, wiring harness, relay 3016, and connectors for damage, continuity, and proper voltage (20-25V).</p> <p>4. Check accessory control lever switches and wiring for damage and continuity (WP 0199 00-40).</p> <p>1. Check position of blackout drive/marker light switch.</p> <p>2. Ensure that reverse alarm and light circuit breaker number 10 is not tripped.</p> <p>3. Inspect alarm, wiring harness, and connectors for damage, continuity, and proper voltage (24 volts).</p> <p>1. Check position of blackout drive/marker light switch.</p> <p>2. Ensure reverse alarm and backup light circuit breaker number 10 is not tripped.</p> <p>3. Inspect backup lights for damage or burned out lamps.</p> <p>4. Check backup light wiring harnesses and connectors for damage, continuity, and proper voltage (20-25V) (WP 0199 00-45).</p>	<p>Place blackout drive/marker light switch in OFF position.</p> <p>Reset circuit breaker(s) as required (WP 0073 00).</p> <p>a. Repair or replace damaged wires, relay or connectors (WP 0073 00 or WP 0111 00).</p> <p>b. Replace damaged horn (WP 0104 00).</p> <p>Replace damaged accessory control lever unit (WP 0112 00).</p> <p>Place blackout drive/marker light switch in OFF position.</p> <p>Reset circuit breaker as required (see WP 0073 00).</p> <p>a. Repair or replace damaged wires or connectors (WP 0111 00).</p> <p>b. Replace damaged alarm (WP 0105 00).</p> <p>Place blackout drive/marker light switch in OFF position.</p> <p>Reset circuit breaker as required (WP 0073 00).</p> <p>a. Replace burned out lamps (WP 0084 00).</p> <p>b. Replace damaged backup light (WP 0084 00).</p> <p>Repair or replace damaged wires or connectors (WP 0111 00).</p>

Table 2. Electrical Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>BOOM AND TOPHANDLER WORK LIGHTS</b></p> <p><b>11. Work Light(s) Do Not Operate When Switch is Turned On.</b></p>	<ol style="list-style-type: none"> <li>1. Check position of blackout drive/marker light switch.</li> <li>2. Ensure that work light circuit breaker numbers 12 and 17 are not tripped.</li> <li>3. Inspect work lights for damage or burned out lamps.</li> <li>4. Check work light wiring harnesses and connectors for damage, continuity, and proper voltage (WP 0199 00-46 and WP 0199 00-28).</li> <li>5. Check instrument panel rocker switches for damage and continuity (WP 0199 00-46).</li> <li>6. Remove work light relay number 3013 (RL4) and check for shorted or damaged relay.</li> </ol>	<p>Place blackout drive/marker light switch in OFF position.</p> <p>Reset circuit breakers as required (WP 0073 00).</p> <ol style="list-style-type: none"> <li>a. Replace burned out lamps (WP 0084 00).</li> <li>b. Replace damaged work light (WP 0084 00).</li> </ol> <p>Repair or replace damaged wires or connectors (WP 0111 00).</p> <p>Replace damaged rocker switch (WP 0072 00).</p> <p>Replace shorted or damaged relay (WP 0073 00).</p>
<p><b>BOOM INFRARED (IR) WORK LIGHTS</b></p> <p><b>12. IR Work Light(s) Do Not Operate When Switch is Turned On.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure that IR and work light circuit breaker numbers 16 and 12 are not tripped.</li> <li>2. Inspect IR lights for damage.</li> <li>3. Check IR light wiring harnesses and connectors for damage, continuity, and proper voltage (WP 0199 00-46).</li> <li>4. Remove IR and work light relay number 3013 (RL4) and check for shorted or damaged relay.</li> <li>5. Check instrument panel rocker switches for damage and continuity (WP 0199 00-46).</li> </ol>	<p>Reset circuit breakers as required (WP 0073 00).</p> <p>Replace damaged IR light (WP 0089 00).</p> <p>Repair or replace damaged wires or connectors (WP 0111 00).</p> <p>Replace shorted or damaged relay (WP 0073 00).</p> <p>Replace damaged rocker switch (WP 0072 00).</p>

Table 2. Electrical Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>WINDSHIELD WIPER MOTORS AND WASHER</b></p> <p><b>13. Front Windshield Wiper Motor Not Working.</b></p> <p><b>14. Rear Windshield Wiper Motor Not Working.</b></p> <p><b>15. Roof Windshield Wiper Motor Not Working.</b></p>	<p>1. Ensure that front windshield wiper circuit breaker numbers 6 and 9 are not tripped.</p> <p>2. Remove windshield wiper motor relay numbers 316 and 321-1 and check for shorted or damaged relay.</p> <p>3. Check accessory control lever switches and wiring for damage and continuity (WP 0199 00-38).</p> <p>4. Inspect windshield wiper motor wiring harnesses and connectors for damage, continuity, and proper voltage (WP 0199 00-38).</p> <p>1. Ensure that rear windshield wiper circuit breaker numbers 9 and 15 are not tripped.</p> <p>2. Remove rear windshield wiper motor relay numbers 316 and 321-2 and check for shorted or damaged relay.</p> <p>3. Check instrument panel rocker switch for damage and continuity (WP 0199 00-38).</p> <p>4. Inspect windshield wiper motor wiring harnesses and connectors for damage, continuity, and proper voltage (WP 0199 00-38).</p> <p>1. Ensure that roof windshield wiper circuit breaker numbers 9 and 15 are not tripped.</p> <p>2. Remove roof windshield wiper motor relay numbers 316, and 321-2 and check for shorted or damaged relay.</p>	<p>Reset circuit breakers as required (WP 0073 00).</p> <p>Replace shorted or damaged relay (WP 0073 00).</p> <p>Replace damaged accessory control lever unit (WP 0112 00).</p> <p>a. Repair or replace damaged wires or connectors (WP 0111 00).</p> <p>b. Replace wiper motor (WP 0156 00).</p> <p>Reset circuit breakers as required (WP 0073 00).</p> <p>Replace shorted or damaged relay (WP 0073 00).</p> <p>Replace damaged rocker switch (WP 0072 00).</p> <p>a. Repair or replace damaged wires or connectors (WP 0111 00).</p> <p>b. Replace wiper motor (WP 0156 00).</p> <p>Reset circuit breakers as required (WP 0073 00).</p> <p>Replace shorted or damaged relay (WP 0073 00).</p>

Table 2. Electrical Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>15. Roof Windshield Wiper Motor Not Working - Continued.</b></p>	<p>3. Check instrument panel rocker switch for damage and continuity (WP 0199 00-38).</p> <p>4. Inspect windshield wiper motor wiring harnesses and connectors for damage, continuity, and proper voltage (24V) (WP 0199 00-38).</p>	<p>Replace damaged rocker switch (WP 0072 00).</p> <p>a. Repair or replace damaged wires or connectors (WP 0111 00).</p> <p>b. Replace wiper motor (WP 0156 00).</p>
<p><b>16. Windshield Washer Not Working.</b></p>	<p>1. Ensure that windshield washer circuit breaker number 9 is not tripped.</p> <p>2. Inspect windshield washer motor wiring harnesses and connectors for damage, continuity, and proper voltage (24V) (WP 0199 00-40).</p> <p>3. Check accessory control lever switches and wiring for damage and continuity (WP 0199 00-40).</p>	<p>Reset circuit breakers as required (WP 0073 00).</p> <p>a. Repair or replace damaged wires or connectors (WP 0111 00).</p> <p>b. Replace washer motor (WP 0157 00).</p> <p>Replace damaged accessory control lever unit (WP 0112 00).</p>
<p><b>CAB INTERIOR LIGHTS AND 12-V UTILITY PLUG</b></p>		
<p><b>17. Cab Interior Light(s) Not Working.</b></p>	<p>1. Check position of blackout drive/marker light switch.</p> <p>2. Ensure that cab light circuit breaker number 2 is not tripped.</p> <p>3. Inspect cab lights for damage or burned out lamps.</p>	<p>Place blackout drive/marker light switch in OFF position.</p> <p>Reset circuit breakers as required (WP 0073 00).</p> <p>a. Replace burned out lamps (WP 0088 00).</p> <p>b. Replace damaged cab light (WP 0088 00).</p>
<p><b>18. 12-V Utility Plug Not Working.</b></p>	<p>1. Ensure that voltage converter unit circuit breaker number 14 is not tripped.</p> <p>2. Check 12/24V converter 5 amp fuse.</p> <p>3. Check voltage converter unit for proper voltage. Voltage should be 24V in and 12V out.</p>	<p>Reset circuit breaker as required (WP 0073 00).</p> <p>Replace 5 amp fuse (WP 0073 00).</p> <p>Replace voltage converter unit if voltage is not as specified (WP 0073 00).</p>

Table 2. Electrical Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>18. 12-V Utility Plug Not Working - Continued.</b></p>	<p>4. Inspect 12-V utility plug wiring harnesses and connectors for damage, continuity, and proper voltage (12V) (WP 0199 00-40).</p>	<p>Repair or replace damaged wires or connectors (WP 0111 00).</p>
<p><b>CAB HEATER/DEFROSTER, AIR CIRCULATION, AND AC SYSTEM</b></p>		
<p><b>19. Blower Motor Not Working.</b></p>	<p>1. Ensure that blower motor circuit breaker number 11 is not tripped.</p> <p>2. Check heater blower control switch for damage and continuity.</p> <p>3. Check air circulation blower control switch for damage and continuity.</p> <p>4. Disconnect blower motor wiring harness, located behind instrument panel lower panel, and check for proper voltage. Voltage should be 24V.</p>	<p>Reset circuit breaker as required (WP 0073 00).</p> <p>Replace damaged switch (WP 0072 00).</p> <p>Replace damaged switch (WP 0072 00).</p> <p>If voltage is not as specified, replace blower motor (WP 0159 00)</p>
<p><b>20. Heater/Defroster Producing Low or No Heat.</b></p>	<p>1. Ensure that engine is up to operating temperature.</p> <p>2. Check coolant level in recovery tank (TM 10-3930-675-10).</p> <p>3. Check heater/defroster temperature control switch for damage and continuity.</p>	<p>Refer to TM 10-3930-675-10.</p> <p>Add coolant as required (TM 10-3930-675-10).</p> <p>Replace damaged switch (WP 0072 00).</p>
<p><b>21. AC System Producing Low or No Cool Air.</b></p>	<p>1. Ensure that AC condenser circuit breaker number 1 is not tripped.</p> <p>2. Remove engine cover and inspect AC compressor drive belts for damage.</p> <p>3. Check AC temperature control switch for damage and continuity.</p>	<p>Reset circuit breaker as required (WP 0073 00).</p> <p>a. Replace and/or adjust belts as required (WP 0189 00).</p> <p>b. Notify DS Maintenance to service AC system.</p> <p>Replace damaged switch (WP 0072 00).</p>



Table 2. Electrical Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>23.Driver's ECS Display Screen Will Not Display - Continued.</p>	<p>7. Check voltage between connector X152 and ECS (795) pin 7 and 8. Voltage should be 24V.</p>	<p>a. If voltage is not present, repair or replace connectors between connector X152 and ECS connector pins 7 and 8 (WP 0111 00). b. If voltage is present, replace ECS (795) (WP 0080 00).</p>

Table 3. Brake System Troubleshooting Procedures (Non-Error Code).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. Braking is Poor or Nonexistent.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure that brake system accumulator shutoff valves are in closed position.</li> <li>2. Inspect brake pedals for damage and obstructions.</li> <li>3. Check hydraulic brake lines and hoses for damage and signs of leakage.</li> <li>4. Test operating pressure for brake system circuits 1 and 2 (WP 0186 00, test points no. 4 and 5). Operating pressure should be 2523 psi (174 bar) and with brake pedal depressed pressure should stabilize at 1450 psi (100 bar).</li> <li>5. Test accumulator pressure for brake system circuits 1 and 2 (WP 0186 00, test points no. 1 and 2). Accumulator pressure should be 2523 psi (174 bar).</li> </ol>	<p>Close shutoff valve as required (WP 0164 00).</p> <ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Repair or replace damaged brake pedal (WP 0130 00).</li> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0125 00).</li> <li>a. Replace brake charging valve (WP 0125 00).</li> <li>b. Replace service brake control valve (WP 0124 00).</li> <li>c. Notify DS Maintenance to replace boom and brake system pump.</li> <li>d. Notify DS Maintenance to perform service brake pad measurement checks.</li> </ol> <p>Notify DS Maintenance to service accumulators.</p>
<p><b>2. Parking Brake Will Not Release.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure that brake system accumulator shutoff valves are in closed position.</li> <li>2. Inspect parking brake control lever for damage and obstructions.</li> <li>3. Check hydraulic brake lines and hoses for damage and signs of leakage.</li> <li>4. Test accumulator pressure for brake system circuits 1 and 2 (WP 0186 00, test points no. 1 and 2). Accumulator pressure should be 2523 psi (174 bar).</li> </ol>	<p>Close shutoff valve as required (WP 0164 00).</p> <ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Repair or replace damaged parking brake control lever (WP 0122 00).</li> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0123 00).</li> </ol> <p>Notify DS Maintenance to service accumulators.</p>



Table 3. Brake System Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>2. Parking Brake Will Not Release - Continued.</b></p>	<p>5. Check parking brake control valve and release lever for damage and signs of leakage.</p>	<p>Replace damaged or leaking parking brake control valve assembly (WP 0122 00).</p>
<p><b>3. Parking Brake Will Not Engage.</b></p>	<p>1. Inspect front and rear parking brake assemblies and brake pads for wear and damage.</p> <p>2. Check parking brake pads for proper adjustment.</p> <p>3. Inspect parking brake control lever for obstructions and damage.</p> <p>4. Check hydraulic brake hoses and lines for damage and signs of leakage.</p>	<p>a. Replace worn parking brake pads (WP 0120 00).</p> <p>b. Notify DS maintenance if parking brake assembly is damaged.</p> <p>Adjust parking brake pad clearance (WP 0120 00).</p> <p>a. Remove any obstructions.</p> <p>b. Replace damaged parking brake control lever (WP 0122 00).</p> <p>a. Tighten loose connections.</p> <p>b. Replace damaged or leaking lines and hoses (WP 0123 00).</p>

Table 4. Steering System Troubleshooting Procedures (Non-Error Code).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Steering Control is Poor or Nonexistent.</b></p>	<ol style="list-style-type: none"> <li>1. Access maintenance ECS display and check for active steering system error codes (WP 0004 00).</li> <li>2. Ensure that steering system accumulator shutoff valve is in closed position.</li> <li>3. Inspect steering cylinders for obstructions, damage, and signs of leakage.</li> <li>4. Check hydraulic steering lines and hoses for damage and signs of leakage.</li> <li>5. Test operating pressure for both steering pumps (WP 0186 00, test points no. 6 and 7). Operating pressure should be 3045 psi (210 bar).</li> </ol>	<p>Perform troubleshooting procedures to clear diagnostic code(s) (WP 0005 00).</p> <p>Close shutoff valve as required (WP 0164 00).</p> <ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Replace damaged or leaking steering cylinder(s) (WP 0133 00).</li> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0132 00).</li> </ol> <p>Notify DS maintenance to adjust or replace tophandler and steering hydraulic pump assembly.</p>

Table 5. Operator's Cab Troubleshooting Procedures (Non-Error Code).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. Operator's Cab Will Not Lift or Lower.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure that auxiliary pump is operating properly (TM 10-3930-675-10).</li> <li>2. Inspect cab lift cylinders for obstructions and damage.</li> <li>3. Inspect lift frame slide rails for obstructions.</li> <li>4. Inspect cab transport control valve for damage and signs of leakage.</li> <li>5. Check hydraulic lines and hoses for damage and signs of leakage.</li> <li>6. Test cab system hydraulic pressure using auxiliary pump (WP 0186 00, test point no. 10). Pressure should be 1595 psi (110 bar).</li> </ol>	<ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Replace damaged lift cylinder(s) (WP 0171 00).</li> </ol> <p>Remove any obstructions and clean as required.</p> <p>Replace damaged or leaking cab transport control valve (WP 0168 00).</p> <ol style="list-style-type: none"> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0179 00).</li> </ol> <p>Replace auxiliary pump if pressure is not as specified (WP 0165 00).</p>
<p><b>2. Operator's Cab Will Not Move Left or Right.</b></p>	<ol style="list-style-type: none"> <li>1. Ensure that auxiliary pump is operating properly (TM 10-3930-675-10).</li> <li>2. Inspect cab sliding cylinder for obstructions and damage.</li> <li>3. Inspect slide rails and rollers for obstructions and damage.</li> <li>4. Inspect cab transport control valve for damage and signs of leakage.</li> <li>5. Check hydraulic lines and hoses for damage and signs of leakage.</li> </ol>	<ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Replace damaged sliding cylinder (WP 0172 00).</li> </ol> <ol style="list-style-type: none"> <li>a. Remove any obstructions and clean as required.</li> <li>b. Replace damaged slide rails or rollers (WP 0142 00).</li> </ol> <p>Replace damaged or leaking cab transport control valve (WP 0168 00).</p> <ol style="list-style-type: none"> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0179 00).</li> </ol>

Table 5. Operator's Cab Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>2. Operator's Cab Will Not Move Left or Right - Continued.</p>	<p>6. Test cab system hydraulic pressure using auxiliary pump (WP 0186 00, test point no. 10). Pressure should be 1595 psi (110 bar).</p>	<p>Replace auxiliary pump if pressure is not as specified (WP 0165 00).</p>

Table 6. Auxiliary Pump Troubleshooting Procedures (Non-Error Code).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Auxiliary Pump Not Working.</b></p>	<ol style="list-style-type: none"> <li>1. Remove circuit breaker panel cover and ensure that circuit breaker number F17 is not tripped.</li> <li>2. Check auxiliary pump auto-circuit breaker numbers F51-1, F51-2, and F40 for continuity.</li> <li>3. Remove relay numbers 350 and 350-1 and check for shorted or damaged relay.</li> <li>4. Access maintenance ECS display and check for active error codes (WP 0004 00).</li> <li>5. Inspect auxiliary pump for proper electrical connections and damage.</li> <li>6. Check hydraulic lines, hoses, and fittings for damage and signs of leakage.</li> <li>7. Test auxiliary pump pressure (WP 0186 00, test point no. 10). Pressure should be 1595 psi (110 bar).</li> </ol>	<p>Reset circuit breaker as required (WP 0073 00).</p> <p>Replace shorted or damaged circuit breakers (WP 0073 00).</p> <ol style="list-style-type: none"> <li>a. Replace shorted or damaged relay(s) (WP 0073 00).</li> <li>b. Replace auxiliary pump assembly (WP 0165 00).</li> </ol> <ol style="list-style-type: none"> <li>a. Connect any loose or missing connections.</li> <li>b. Replace damaged auxiliary pump (WP 0165 00).</li> </ol> <ol style="list-style-type: none"> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0179 00).</li> </ol> <p>Replace auxiliary pump if pressure is not as specified (WP 0165 00).</p>

Table 7. Boom System Troubleshooting Procedures (Non-Error Code).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. Boom Will Not Lift or Lower Properly.</b></p>	<ol style="list-style-type: none"> <li>1. Access maintenance ECS display and check for active hydraulic or electrical system error codes (WP 0004 00).</li> <li>2. Ensure that hydraulic oil level is within operating range (LO 10-3930-675-12).</li> <li>3. Inspect lift cylinders for obstructions, damage, and signs of leakage.</li> <li>4. Check lift cylinder hydraulic lines and hoses for damage and signs of leakage.</li> <li>5. Ensure that lift cylinder emergency and float valves are in closed position.</li> <li>6. Check cab position proximity switches for obstructions, damage, and proper adjustment.</li> <li>7. Test boom system operating pressure (WP 0186 00, test point no. 8). Operating pressure should be 3480 psi (240 bar).</li> <li>8. Check boom calibration settings (WP 0197 00).</li> </ol>	<p>Fill hydraulic oil as required (LO 10-3930-675-12).</p> <ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Notify DS Maintenance to replace damaged or leaking lift cylinders.</li> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0180 00).</li> </ol> <p>Close emergency and float valves as required (TM 10-3930-675-10).</p> <p>Clean, replace or adjust cab position proximity switches as required (WP 0075 00).</p> <ol style="list-style-type: none"> <li>a. Notify DS Maintenance to replace boom and brake system hydraulic pump if pressure is not as specified.</li> <li>b. Notify DS Maintenance to replace main control valve assembly.</li> </ol> <p>Calibrate boom as required (WP 0197 00).</p>
<p><b>2. Boom Will Not Extend or Retract Properly.</b></p>	<ol style="list-style-type: none"> <li>1. Access maintenance ECS display and check for active hydraulic or electrical system error codes (WP 0004 00).</li> <li>2. Ensure that hydraulic oil level is within operating range (LO 10-3930-675-12).</li> </ol>	<p>Perform troubleshooting procedures to clear diagnostic code(s) (WP 0005 00).</p> <p>Fill hydraulic oil as required (LO 10-3930-675-12).</p>
<p><b>NOTE</b> Extension cylinder leaks appear to be coming from inside boom assembly.</p>		
	<ol style="list-style-type: none"> <li>3. Inspect extension cylinder for damage and signs of leakage.</li> </ol>	<p>Notify SRA.</p>

Table 7. Boom System Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>2. Boom Will Not Extend or Retract Properly - Continued.</b></p>	<p>4. Check extension cylinder hydraulic lines and hoses for damage and signs of leakage.</p> <p>5. Check wear plates for excessive wear and damage.</p> <p>6. Test boom system operating pressure (WP 0186 00, test point no. 8). Operating pressure should be 3480 psi (240 bar).</p> <p>7. Check boom extension calibration settings (WP 0197 00).</p>	<p>a. Tighten loose connections. b. Replace damaged or leaking lines and hoses (WP 0180 00).</p> <p>Replace excessively worn or damaged wear plates (WP 0139 00).</p> <p>a. Notify DS Maintenance to replace boom and brake system hydraulic pump if pressure is not as specified. b. Notify DS Maintenance to replace boom control valve assembly.</p> <p>Calibrate boom extension as required (WP 0197 00).</p>
<p><b>3. Boom Folding Cylinders Not Working.</b></p>	<p>1. Inspect boom folding cylinders for damage and signs of leakage.</p> <p>2. Inspect boom folding control valves for damage and signs of leakage.</p> <p>3. Check boom folding cylinder hydraulic lines and hoses for damage and signs of leakage.</p> <p>4. Check cab position proximity switches for obstructions, damage, and proper adjustment.</p> <p>5. Test boom system operating pressure (WP 0186 00, test point no. 11). Operating pressure should be 3045 psi (210 bar).</p>	<p>Notify DS Maintenance to replace damaged or leaking boom folding cylinder(s).</p> <p>Replace damaged or leaking boom folding control valve(s) (WP 0170 00).</p> <p>a. Tighten loose connections. b. Replace damaged or leaking lines and hoses (WP 0180 00).</p> <p>Clean, replace or adjust cab position proximity switches as required (WP 0075 00).</p> <p>a. If operating pressure is as specified, replace over-center control valve (WP 0180 00). b. Notify DS Maintenance to replace boom and brake system hydraulic pump if pressure is not as specified.</p>

Table 7. Boom System Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>4. Boom Locking Pin Cylinders Not Working.</p>	<p style="text-align: center;"><b>NOTE</b></p> <p>If boom locking pin cylinders will not function, raise boom folding cylinders to release pressure on locking cylinder shafts.</p> <ol style="list-style-type: none"> <li>1. Inspect boom locking pin cylinders for damage and signs of leakage.</li> <li>2. Inspect boom folding control valve for damage and signs of leakage.</li> <li>3. Check boom locking pin cylinder hydraulic lines and hoses for damage and signs of leakage.</li> <li>4. Check cab position proximity switches for obstructions, damage, and proper adjustment.</li> <li>5. Test boom system operating pressure (WP 0186 00, test point no. 11). Operating pressure should be 3045 psi (210 bar).</li> </ol>	<p>Notify DS Maintenance to replace damaged or leaking boom locking pin cylinder(s).</p> <p>Replace damaged or leaking boom folding control valve (WP 0170 00).</p> <ol style="list-style-type: none"> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0180 00).</li> </ol> <p>Clean, replace or adjust cab position proximity switches as required (WP 0075 00).</p> <ol style="list-style-type: none"> <li>a. If operating pressure is as specified, replace over-center control valve (WP 0180 00).</li> <li>b. Notify DS Maintenance to replace boom and brake system hydraulic pump if pressure is not as specified.</li> </ol>



Table 8. Tophandler System Troubleshooting Procedures (Non-Error Code).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>1. Tophandler Will Not Tilt Forward or Rearward Properly.</b></p>	<ol style="list-style-type: none"> <li>1. Access maintenance ECS display and check for active hydraulic or electrical system error codes (WP 0004 00).</li> <li>2. Inspect tophandler tilt cylinders for obstructions, damage, and signs of leakage.</li> <li>3. Check tilt cylinder hydraulic lines and hoses for damage and signs of leakage.</li> <li>4. Test tophandler operating pressure (WP 0186 00, test point no. 11). Operating pressure should be 3045 psi (210 bar).</li> <li>5. Check tophandler tilt calibration settings (WP 0197 00).</li> </ol>	<ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Notify DS Maintenance to replace damaged or leaking tophandler tilt cylinder(s).</li> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0180 00).</li> </ol> <p>Notify DS Maintenance to replace and adjust tophandler and steering pump assembly if pressure is not as specified.</p> <p>Calibrate tophandler as required (WP 0197 00).</p>
<p><b>2. Tophandler Will Not Oscillate (Level) Properly.</b></p>	<ol style="list-style-type: none"> <li>1. Access maintenance ECS display and check for active hydraulic or electrical system error codes (WP 0004 00).</li> <li>2. Inspect tophandler leveling cylinders for obstructions, damage, and signs of leakage.</li> <li>3. Check tophandler leveling cylinder hydraulic lines and hoses for damage and signs of leakage.</li> <li>4. Inspect wear plates for excessive wear and damage.</li> <li>5. Test tophandler operating pressure (WP 0186 00, test point no. 11). Operating pressure should be 3045 psi (210 bar).</li> </ol>	<p>Perform troubleshooting procedures to clear diagnostic code(s) (WP 0005 00).</p> <ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Notify DS Maintenance to replace damaged or leaking leveling cylinder(s).</li> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0181 00).</li> </ol> <p>Replace excessively worn or damaged wear plates (WP 0140 00).</p> <p>Notify DS Maintenance to replace and adjust tophandler and steering hydraulic pump assembly if pressure is not as specified.</p>

Table 8. Tophandler System Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>3. Tophandler Will Not Sideshift Properly.</b></p>	<ol style="list-style-type: none"> <li>1. Access maintenance ECS display and check for active hydraulic or electrical system error codes (WP 0004 00).</li> <li>2. Inspect tophandler sideshifting cylinders for obstructions, damage, and signs of leakage.</li> <li>3. Check tophandler sideshifting cylinder hydraulic lines and hoses for damage and signs of leakage.</li> <li>4. Inspect wear plates for excessive wear and damage.</li> <li>5. Test tophandler operating pressure (WP 0186 00, test point no. 11). Operating pressure should be 3045 psi (210 bar).</li> </ol>	<ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Notify DS Maintenance to replace damaged or leaking sideshifting cylinder(s).</li> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0181 00).</li> </ol> <p>Replace excessively worn or damaged wear plates (WP 0140 00).</p> <p>Notify DS Maintenance to adjust or replace tophandler and steering hydraulic pump assembly if pressure is not as specified.</p>
<p><b>4. Tophandler Spreader Will Not Open or Close Properly.</b></p>	<ol style="list-style-type: none"> <li>1. Access maintenance ECS display and check for active hydraulic or electrical system error codes (WP 0004 00).</li> <li>2. Inspect tophandler spreader motor for damage and signs of leakage.</li> <li>3. Inspect spreader drive chain and sprockets for obstructions and damage.</li> <li>4. Check spreader motor hydraulic lines and hoses for damage and signs of leakage.</li> <li>5. Inspect wear plates for excessive wear and damage.</li> <li>6. Test tophandler operating pressure (WP 0186 00, test point no. 11). Operating pressure should be 3045 psi (210 bar).</li> </ol>	<p>Perform troubleshooting procedures to clear diagnostic code(s) (WP 0005 00).</p> <p>Replace damaged or leaking spreader motor (WP 0167 00).</p> <ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Notify SRA if spreader chain is damaged.</li> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0181 00).</li> </ol> <p>Replace excessively worn or damaged wear plates (WP 0140 00).</p> <p>Notify DS Maintenance to adjust or replace tophandler and steering hydraulic pump assembly if pressure is not as specified.</p>

Table 8. Tophandler System Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>5. Tophandler Will Not Rotate Left or Right Properly.</b></p>	<ol style="list-style-type: none"> <li>1. Access maintenance ECS display and check for active hydraulic or electrical system error codes (WP 0004 00).</li> <li>2. Inspect tophandler slewing motors for damage and signs of leakage.</li> <li>3. Check slewing motor hydraulic lines and hoses for damage and signs of leakage.</li> <li>4. Test tophandler operating pressure (WP 0186 00, test point no. 11). Operating pressure should be 3045 psi (210 bar).</li> </ol>	<p>Replace damaged or leaking slewing motor(s) (WP 0166 00).</p> <ol style="list-style-type: none"> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0181 00).</li> </ol> <p>Notify DS Maintenance to adjust or replace tophandler and steering hydraulic pump assembly if pressure is not as specified.</p>
<p><b>6. Tophandler Twistlocks Will Not Rotate Properly.</b></p>	<ol style="list-style-type: none"> <li>1. Access maintenance ECS display and check for active hydraulic or electrical system error codes (WP 0004 00).</li> <li>2. Inspect twistlock proximity switches, twistlocks, and control rods for obstructions and damage.</li> <li>3. Inspect tophandler twistlock cylinders for obstructions, damage, and signs of leakage.</li> <li>4. Check twistlock cylinder hydraulic lines and hoses and forklift quick disconnect fittings for damage and signs of leakage.</li> <li>5. Ensure that twistlock cylinder bypass valves are in closed position.</li> </ol>	<p>Perform troubleshooting procedures to clear diagnostic code(s) (WP 0005 00).</p> <ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Clean, replace or adjust twistlock proximity switches (WP 0074 00).</li> <li>c. Notify DS Maintenance to replace damaged twistlocks(s) and control rod(s).</li> </ol> <ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Replace damaged or leaking twistlock cylinder(s) (WP 0173 00).</li> </ol> <ol style="list-style-type: none"> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0181 00).</li> </ol> <p>Close bypass valves as required (WP 0192 00).</p>

Table 8. Tophandler System Troubleshooting Procedures (Non-Error Code) - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>6. Tophandler Twistlocks Will Not Rotate Properly - Continued.</p>	<p>6. Test tophandler operating pressure (WP 0186 00, test point no. 11). Operating pressure should be 3045 psi (210 bar).</p>	<p>a. If pressure is OK, replace twistlock cylinder (WP 0173 00).                      b. Notify DS Maintenance to replace tophandler and steering hydraulic pump assembly if pressure is not as specified.</p>

Table 9. Bogie Wheel System Troubleshooting Procedures (Non-Error Code).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Bogie Wheels Will Not Lift or Lower.</b></p>	<ol style="list-style-type: none"> <li>1. Inspect bogie wheel lift cylinders for obstructions, damage, and signs of leakage.</li> <li>2. Inspect bogie wheel slide rails for obstructions.</li> <li>3. Inspect bogie wheel folding control valve and float control valve (shutoff valve no. 5) for damage and signs of leakage.</li> <li>4. Check cab position proximity switches for obstructions, damage, and proper adjustment.</li> <li>5. Check bogie wheel lift cylinder hydraulic lines and hoses for damage and signs of leakage.</li> <li>6. Test bogie wheel system hydraulic pressure (WP 0186 00, test point no. 11). Pressure should be 3045 psi (210 bar).</li> </ol>	<ol style="list-style-type: none"> <li>a. Remove any obstructions.</li> <li>b. Notify DS Maintenance to replace damaged or leaking bogie wheel lift cylinder(s).</li> </ol> <p>Remove any obstructions and clean as required.</p> <p>Replace damaged or leaking control valve(s) (WP 0180 00 or WP 0170 00).</p> <p>Clean, replace or adjust cab position proximity switches as required (WP 0075 00).</p> <ol style="list-style-type: none"> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking lines and hoses (WP 0180 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If operating pressure is as specified, replace over-center control valve (WP 0180 00).</li> <li>b. Notify DS Maintenance to adjust or replace tophandler and steering hydraulic pump assembly if pressure is not as specified.</li> </ol>

Table 10. Forklift Kit Troubleshooting Procedures (Non-Error Code).

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Fork Functions Not Working.</b></p>	<ol style="list-style-type: none"> <li>1. Access maintenance ECS display and check for active hydraulic system error codes (WP 0004 00).</li> <li>2. Check forklift-to-tophandler hydraulic hoses and quick disconnects for damage and signs of leakage.</li> <li>3. Inspect forks and shaft sliding surfaces for obstructions and damage.</li> <li>4. Inspect fork shift cylinders and distribution valve for damage and signs of leakage.</li> <li>5. Test tophandler system operating pressure (WP 0186 00, test point no. 11). Operating pressure should be 3045 psi (210 bar).</li> </ol>	<ol style="list-style-type: none"> <li>a. Tighten loose connections.</li> <li>b. Replace damaged or leaking hoses (WP 0182 00).</li> </ol> <p>Remove any obstructions.</p> <ol style="list-style-type: none"> <li>a. Replace damaged or leaking distribution valve (WP 0182 00).</li> <li>b. Notify DS Maintenance to replace cylinder.</li> </ol> <p>Notify DS Maintenance to adjust or replace tophandler and steering hydraulic pump assembly if pressure is not as specified.</p>

END OF WORK PACKAGE

**THIS WORK PACKAGE COVERS**

Error Code 1311 - Injector Circuit Failure  
 Error Code 1312 - Injector Circuit Failure  
 Error Code 1313 - Injector Circuit Failure  
 Error Code 1314 - Injector Circuit Failure  
 Error Code 1315 - Injector Circuit Failure  
 Error Code 1321 - Injector Circuit Failure  
 Error Code 1322 - Injector Circuit Failure

Error Code 1323 - Injector Circuit Failure  
 Error Code 1324 - Injector Circuit Failure  
 Error Code 1325 - Injector Circuit Failure  
 Error Code 1331 - Injector Circuit Failure  
 Error Code 1332 - Injector Circuit Failure  
 Error Code 1951 - Injector Circuit Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

**Tools and Special Tools**

Test lead, female (Item 48, WP 0204 00)  
 Test lead, male (Item 51, WP 0204 00)

**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.



**WARNING**

Injector solenoids receive high voltage when engine is operating. To avoid personal injury or death from electrical shock, do not wear jewelry or damp clothing, and do not touch injector solenoids or solenoid wires when engine is operating.

**Table 1. Error Code 1311 - Injector Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1311 - Injector Circuit Failure</b></p> 	<p>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and from 15-pin connector at front of engine below rocker arm cover.</p> <p>a. Inspect actuator harness, actuator harness connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p>

Table 1. Error Code 1311 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1311 - Injector Circuit Failure - Continued</b></p>	<p>b. Check actuator harness, actuator harness connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>2. Place ignition switch to OFF position and disconnect actuator harness and sensor harness from engine ECU and actuator harness from 15-pin connector at front of engine below rocker arm cover. Perform the following resistance checks.</p> <p>a. Measure resistance from actuator harness connector pin 9 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 9 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p>

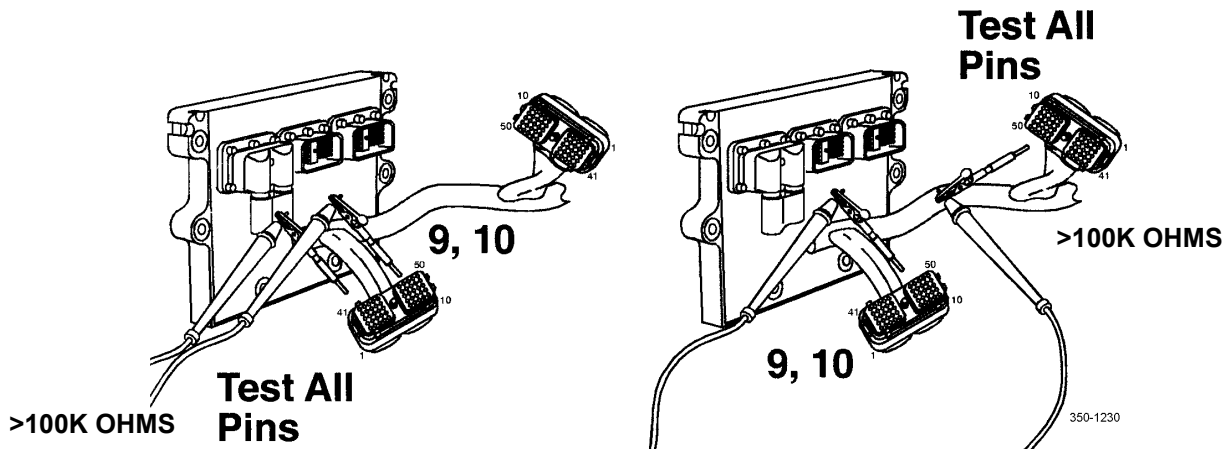




Table 1. Error Code 1311 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1311 - Injector Circuit Failure - Continued</b></p>	<p>c. Measure resistance from actuator harness connector pin 10 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 10 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p> <p>3. Place ignition switch to OFF position and disconnect actuator harness from engine ECU. Remove rocker arm cover (WP 0051 00). Disconnect internal actuator harness from 15-pin connector.</p> <p>a. Inspect actuator harness connector, engine ECU connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check actuator harness connector, engine ECU connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>4. Place ignition switch in OFF position and disconnect internal actuator harness from 15-pin connector and from no. 1 injector solenoid.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 1. Error Code 1311 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1311 - Injector Circuit Failure - Continued</b></p>	<p>a. Measure resistance from 15-pin connector pin 1 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from 15-pin connector pin 2 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>5. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid.</p> <p>6. Measure resistance from injector solenoid pin A to pin B. Resistance should be 0.5-1.5 ohms.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid and remove injector solenoid wires from solenoid.</p> <p>8. Measure resistance from post to post on solenoid. Resistance should be 0.5-1.5 ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is as specified, replace engine ECU (WP 0078 00).</p> <p>b. If resistance is not as specified, notify DS Maintenance to replace injector.</p> <p>If resistance is not as specified, notify DS Maintenance to replace injector.</p>



**WARNING**

Injector solenoids receive high voltage when engine is operating. To avoid personal injury or death from electrical shock, do not wear jewelry or damp clothing, and do not touch injector solenoids or solenoid wires when engine is operating.

**Table 2. Error Code 1312 - Injector Circuit Failure Troubleshooting Procedures.**


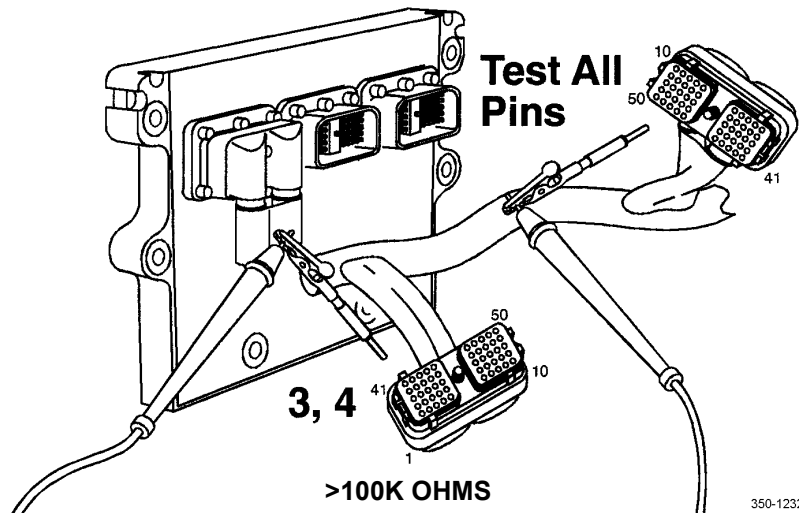
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1312 - Injector Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and from 15-pin connector at front of engine below rocker arm cover.                             <ol style="list-style-type: none"> <li>a. Inspect actuator harness, actuator harness connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check actuator harness, actuator harness connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch to OFF position and disconnect actuator harness and sensor harness from engine ECU and actuator harness from 15-pin connector at front of engine below rocker arm cover. Perform the following resistance checks.                             <ol style="list-style-type: none"> <li>a. Measure resistance from actuator harness connector pin 3 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</li> </ol> </li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <ol style="list-style-type: none"> <li>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</li> <li>b. If internal actuator harness requires replacement, notify SRA.</li> </ol>

Table 2. Error Code 1312 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1312 - Injector Circuit Failure - Continued</b></p>	<p>b. Measure resistance from actuator harness connector pin 3 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from actuator harness connector pin 4 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 4 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p>



3. Place ignition switch to OFF position and disconnect actuator harness from engine ECU. Remove rocker arm cover (WP 0051 00). Disconnect internal actuator harness from 15-pin connector.

Table 2. Error Code 1312 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1312 - Injector Circuit Failure - Continued</b></p>	<p>a. Inspect actuator harness connector, engine ECU connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check actuator harness connector, engine ECU connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>4. Place ignition switch in OFF position and disconnect internal actuator harness from 15-pin connector and from no. 5 injector solenoid.</p> <p>a. Measure resistance from 15-pin connector pin 9 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from 15-pin connector pin 10 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>5. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p>

Table 2. Error Code 1312 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1312 - Injector Circuit Failure - Continued</b></p>	<p>6. Measure resistance from injector solenoid pin A to pin B. Resistance should be 0.5-1.5 ohms.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid and remove injector solenoid wires from solenoid.</p> <p>8. Measure resistance from post to post on solenoid. Resistance should be 0.5-1.5 ohms.</p>	<p>a. If resistance is as specified, replace engine ECU (WP 0078 00).</p> <p>b. If resistance is not as specified, notify DS Maintenance to replace injector.</p> <p>If resistance is not as specified, notify DS Maintenance to replace injector.</p>



**WARNING**

Injector solenoids receive high voltage when engine is operating. To avoid personal injury or death from electrical shock, do not wear jewelry or damp clothing, and do not touch injector solenoids or solenoid wires when engine is operating.

Table 3. Error Code 1313 - Injector Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1313 - Injector Circuit Failure</b></p> 	<p>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and from 15-pin connector at front of engine below rocker arm cover.</p> <p>a. Inspect actuator harness, actuator harness connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p>

Table 3. Error Code 1313 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1313 - Injector Circuit Failure - Continued</b></p>	<p>b. Check actuator harness, actuator harness connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>2. Place ignition switch to OFF position and disconnect actuator harness and sensor harness from engine ECU and actuator harness from 15-pin connector at front of engine below rocker arm cover. Perform the following resistance checks.</p> <p>a. Measure resistance from actuator harness connector pin 6 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00). b. If internal actuator harness requires replacement, notify SRA.</p>

**Test All Pins**

**6, 16**

**>100K OHMS**

350-1234

Table 3. Error Code 1313 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1313 - Injector Circuit Failure - Continued</b></p>	<p>b. Measure resistance from actuator harness connector pin 6 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from actuator harness connector pin 16 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 16 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p> <p>3. Place ignition switch to OFF position and disconnect actuator harness from engine ECU. Remove rocker arm cover (WP 0051 00). Disconnect internal actuator harness from 15-pin connector.</p> <p>a. Inspect actuator harness connector, engine ECU connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check actuator harness connector, engine ECU connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>



Table 3. Error Code 1313 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1313 - Injector Circuit Failure - Continued</b></p>	<p>4. Place ignition switch in OFF position and disconnect internal actuator harness from 15-pin connector and from no. 3 injector solenoid.</p> <p>a. Measure resistance from 15-pin connector pin 5 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from 15-pin connector pin 6 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>5. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid.</p> <p>6. Measure resistance from injector solenoid pin A to pin B. Resistance should be 0.5-1.5 ohms.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid and remove injector solenoid wires from solenoid.</p> <p>8. Measure resistance from post to post on solenoid. Resistance should be 0.5-1.5 ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is as specified, replace engine ECU (WP 0078 00).</p> <p>b. If resistance is not as specified, notify DS Maintenance to replace injector.</p> <p>If resistance is not as specified, notify DS Maintenance to replace injector.</p>



**WARNING**

Injector solenoids receive high voltage when engine is operating. To avoid personal injury or death from electrical shock, do not wear jewelry or damp clothing, and do not touch injector solenoids or solenoid wires when engine is operating.

**Table 4. Error Code 1314 - Injector Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1312 - Injector Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and from 15-pin connector at front of engine below rocker arm cover.                             <ol style="list-style-type: none"> <li>a. Inspect actuator harness, actuator harness connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check actuator harness, actuator harness connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch to OFF position and disconnect actuator harness and sensor harness from engine ECU and actuator harness from 15-pin connector at front of engine below rocker arm cover. Perform the following resistance checks.                             <ol style="list-style-type: none"> <li>a. Measure resistance from actuator harness connector pin 2 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</li> </ol> </li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <ol style="list-style-type: none"> <li>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</li> <li>b. If internal actuator harness requires replacement, notify SRA.</li> </ol>

Table 4. Error Code 1314 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1314 - Injector Circuit Failure - Continued</b></p>	<p>b. Measure resistance from actuator harness connector pin 2 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from actuator harness connector pin 1 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 1 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p>

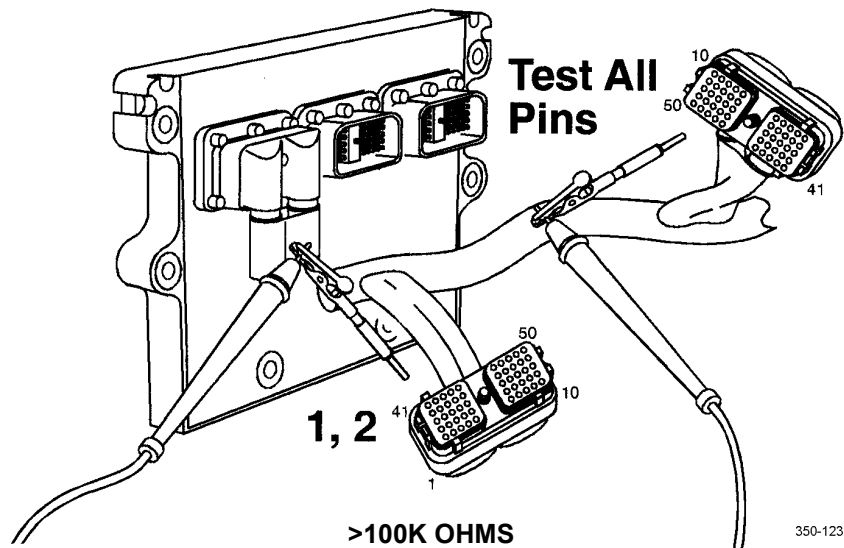


Table 4. Error Code 1314 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1314 - Injector Circuit Failure - Continued</b></p>	<p>3. Place ignition switch to OFF position and disconnect actuator harness from engine ECU. Remove rocker arm cover (WP 0051 00). Disconnect internal actuator harness from 15-pin connector.</p> <p>a. Inspect actuator harness connector, engine ECU connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check actuator harness connector, engine ECU connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>4. Place ignition switch in OFF position and disconnect internal actuator harness from 15-pin connector and from no. 6 injector solenoid.</p> <p>a. Measure resistance from 15-pin connector pin 11 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from 15-pin connector pin 12 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>5. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p>

Table 4. Error Code 1314 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1314 - Injector Circuit Failure - Continued</b></p>	<p>6. Measure resistance from injector solenoid pin A to pin B. Resistance should be 0.5-1.5 ohms.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid and remove injector solenoid wires from solenoid.</p> <p>8. Measure resistance from post to post on solenoid. Resistance should be 0.5-1.5 ohms.</p>	<p>a. If resistance is as specified, replace engine ECU (WP 0078 00).</p> <p>b. If resistance is not as specified, notify DS Maintenance to replace injector.</p> <p>If resistance is not as specified, notify DS Maintenance replace injector.</p>



**WARNING**

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Table 5. Error Code 1315 - Injector Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1315 - Injector Circuit Failure</b></p> 	<p>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and from 15-pin connector at front of engine below rocker arm cover.</p> <p>a. Inspect actuator harness, actuator harness connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p>

Table 5. Error Code 1315 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1315 - Injector Circuit Failure - Continued</b></p>	<p>b. Check actuator harness, actuator harness connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>2. Place ignition switch to OFF position and disconnect actuator harness and sensor harness from engine ECU and actuator harness from 15-pin connector at front of engine below rocker arm cover. Perform the following resistance checks.</p> <p>a. Measure resistance from actuator harness connector pin 7 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00). b. If internal actuator harness requires replacement, notify SRA.</p>

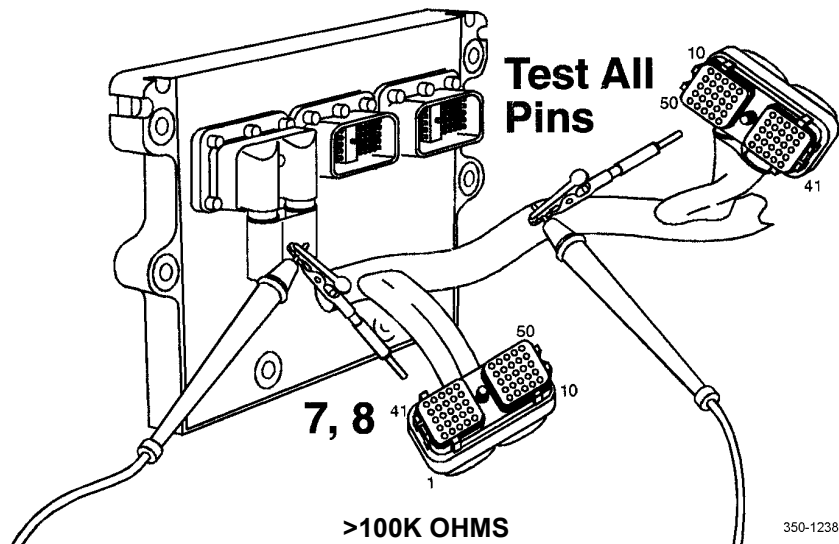


Table 5. Error Code 1315 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1315 - Injector Circuit Failure - Continued</b></p>	<p>b. Measure resistance from actuator harness connector pin 7 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from actuator harness connector pin 8 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 8 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p> <p>3. Place ignition switch to OFF position and disconnect actuator harness from engine ECU. Remove rocker arm cover (WP 0051 00). Disconnect internal actuator harness from 15-pin connector.</p> <p>a. Inspect actuator harness connector, engine ECU connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check actuator harness connector, engine ECU connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 5. Error Code 1315 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1315 - Injector Circuit Failure - Continued</b></p>	<p>4. Place ignition switch in OFF position and disconnect internal actuator harness from 15-pin connector and from no. 2 injector solenoid.</p> <p>a. Measure resistance from 15-pin connector pin 3 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from 15-pin connector pin 4 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>5. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid.</p> <p>6. Measure resistance from injector solenoid pin A to pin B. Resistance should be 0.5-1.5 ohms.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid and remove injector solenoid wires from solenoid.</p> <p>8. Measure resistance from post to post on solenoid. Resistance should be 0.5-1.5 ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is as specified, replace engine ECU (WP 0078 00).</p> <p>b. If resistance is not as specified, notify DS Maintenance to replace injector.</p> <p>If resistance is not as specified, notify DS Maintenance to replace injector.</p>





**WARNING**

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**Table 6. Error Code 1321 - Injector Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1321 - Injector Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and from 15-pin connector at front of engine below rocker arm cover.                             <ol style="list-style-type: none"> <li>a. Inspect actuator harness, actuator harness connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check actuator harness, actuator harness connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch to OFF position and disconnect actuator harness and sensor harness from engine ECU and actuator harness from 15-pin connector at front of engine below rocker arm cover. Perform the following resistance checks.                             <ol style="list-style-type: none"> <li>a. Measure resistance from actuator harness connector pin 26 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</li> </ol> </li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <ol style="list-style-type: none"> <li>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</li> <li>b. If internal actuator harness requires replacement, notify SRA.</li> </ol>

Table 6. Error Code 1321 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1321 - Injector Circuit Failure - Continued</b></p>	<p>b. Measure resistance from actuator harness connector pin 26 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from actuator harness connector pin 36 to all other pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 36 to all other pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p>

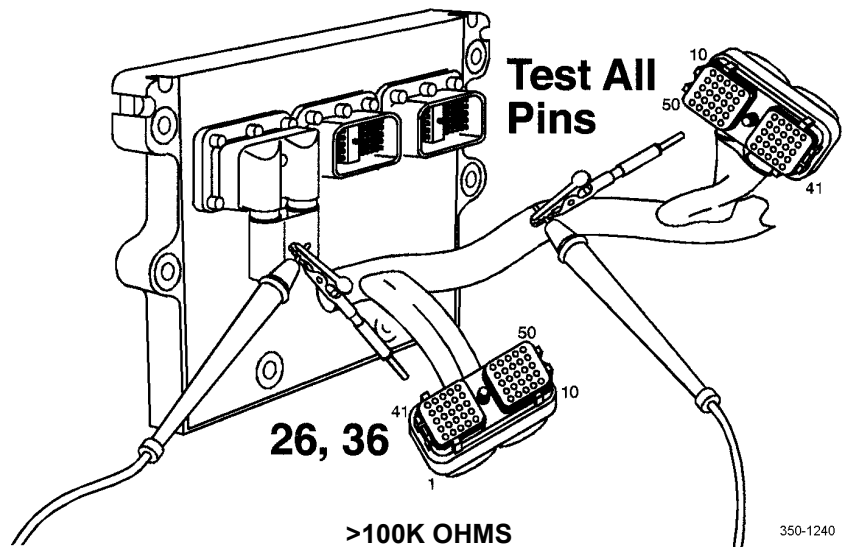


Table 6. Error Code 1321 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1321 - Injector Circuit Failure - Continued</b></p>	<p>3. Place ignition switch to OFF position and disconnect actuator harness from engine ECU. Remove rocker arm cover (WP 0051 00). Disconnect internal actuator harness from 15-pin connector.</p> <p>a. Inspect actuator harness connector, engine ECU connector, and 15-pin connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check actuator harness connector, engine ECU connector, and 15-pin connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>4. Place ignition switch in OFF position and disconnect internal actuator harness from 15-pin connector and from no. 4 injector solenoid.</p> <p>a. Measure resistance from 15-pin connector pin 7 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from 15-pin connector pin 8 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>5. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p>

Table 6. Error Code 1321 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1321 - Injector Circuit Failure - Continued</b></p>	<p>6. Measure resistance from injector solenoid pin A to pin B. Resistance should be 0.5-1.5 ohms.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect internal actuator harness from injector solenoid and remove injector solenoid wires from solenoid.</p> <p>8. Measure resistance from post to post on solenoid. Resistance should be 0.5-1.5 ohms.</p>	<p>a. If resistance is as specified, replace engine ECU (WP 0078 00).</p> <p>b. If resistance is not as specified, notify DS Maintenance to replace injector.</p> <p>If resistance is not as specified, notify DS Maintenance to replace injector.</p>



**WARNING**

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Table 7. Error Code 1322 - Injector Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1322 - Injector Circuit Failure</b></p> 	<p>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU.</p> <p>a. Inspect actuator harness and ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p>

Table 7. Error Code 1322 - Injector Circuit Failure Troubleshooting Procedures - Continued.

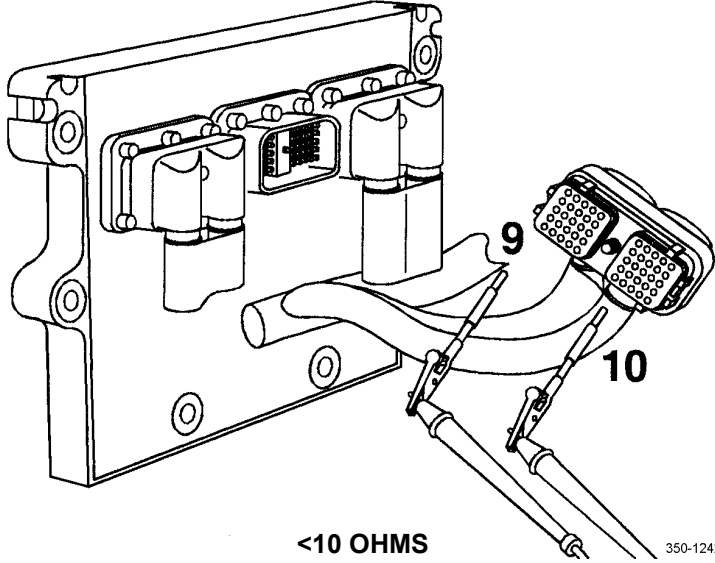
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1322 - Injector Circuit Failure - Continued</b></p>	<p>b. Check actuator harness and ECU connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>2. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Install jumper wire from pin 1 to pin 2 at 15-pin connector, actuator harness side.</p> <p>3. Measure resistance from actuator harness connector pin 9 to actuator harness connector pin 10. Resistance should be less than 10 ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>
<div style="text-align: center;">  <p>&lt;10 OHMS</p> <p>350-1242</p> </div>		

Table 7. Error Code 1322 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1322 - Injector Circuit Failure - Continued</b></p>	<p>4. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Disconnect sensor harness from ECU engine.</p> <p>a. Measure resistance from actuator harness connector pin 9 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 9 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from actuator harness connector pin 10 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>

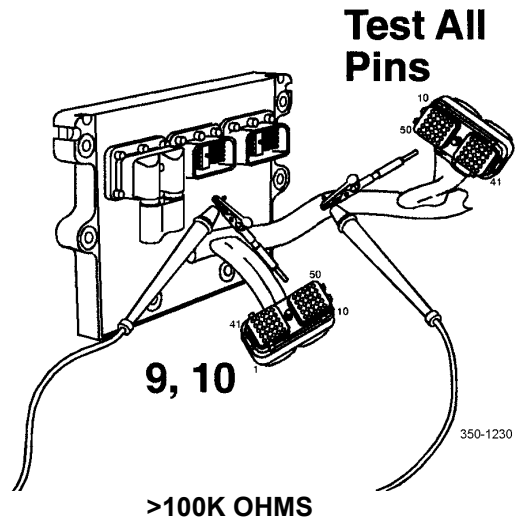
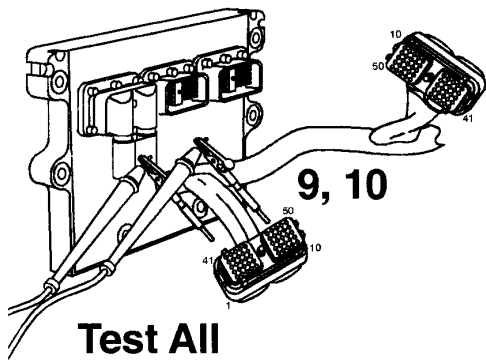
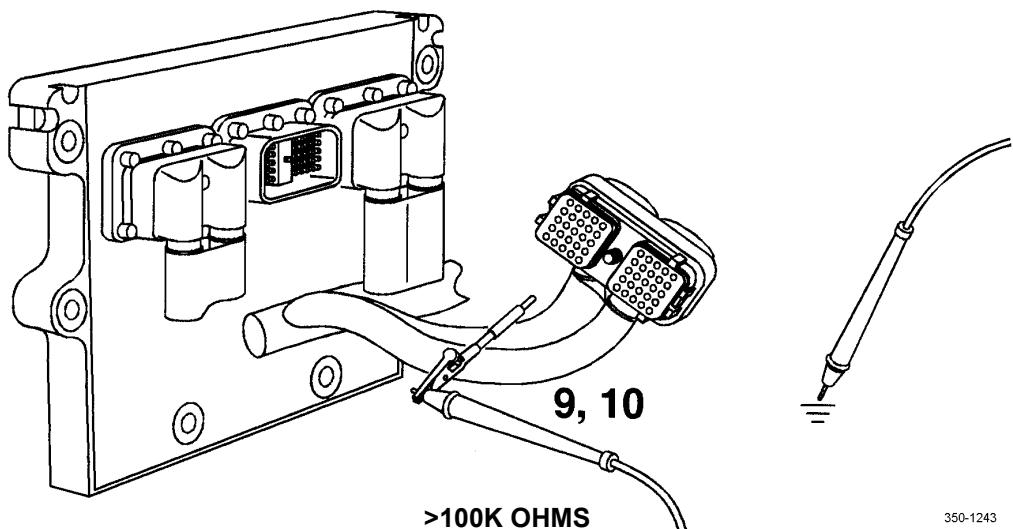


Table 7. Error Code 1322 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1322 - Injector Circuit Failure - Continued</b></p>	<p>d. Measure resistance from actuator harness connector pin 10 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</p> <p>5. Place ignition switch to OFF position and disconnect actuator harness 15-pin connector at front of engine below rocker arm cover. Disconnect actuator harness connector from engine ECU.</p> <p>a. Measure resistance from actuator harness connector pin 9 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 10 to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>



>100K OHMS

350-1243

Table 7. Error Code 1322 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1322 - Injector Circuit Failure - Continued</b></p>	<p>6. Place ignition switch to OFF position. Remove rocker arm cover (WP 0051 00). Disconnect injector solenoid connector from no. 1 injector solenoid and internal actuator harness from 15-pin connector.</p> <p>a. Inspect internal actuator harness and injector solenoid connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check internal actuator harness and injector solenoid connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect actuator harness from 15-pin connector and injector solenoid wires from no. 1 injector solenoid.</p> <p>a. Measure resistance from 15-pin connector pin 1 (or A) to each injector pigtail nut that connects the no. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p>



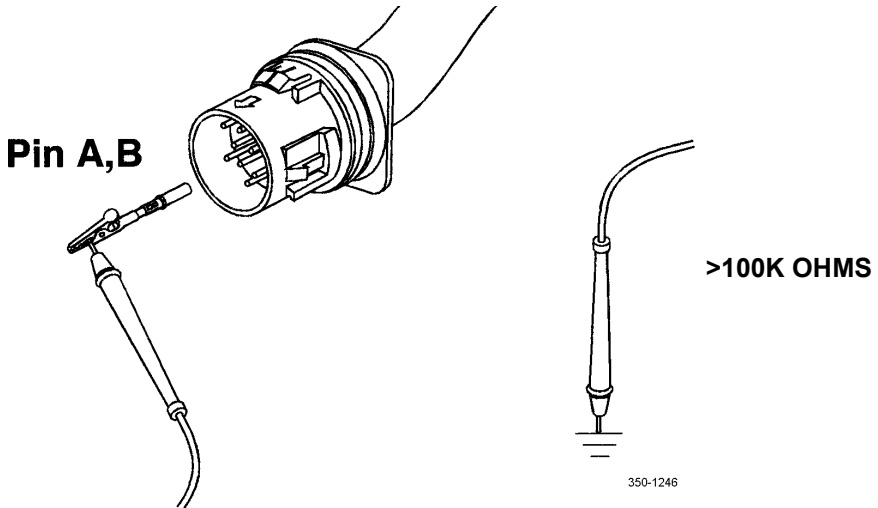
Table 7. Error Code 1322 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1322 - Injector Circuit Failure - Continued</b></p>	<p>b. Measure resistance from 15-pin connector pin 2 (or B) to each injector pigtail nut that connects the no. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p>	<p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>
<p>Pin A, B</p> <p>Test Both Nuts</p> <p>&lt; 10 OHMS</p> <p>350-1244</p>		
	<p>8. Place ignition switch to OFF position and disconnect internal actuator harness from injector solenoid connector and disconnect injector solenoid wires from solenoid.</p> <p>a. Measure resistance from pin A (or 1) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from pin B (or 2) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p>	<p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires.</p> <p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires.</p>

Table 7. Error Code 1322 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1322 - Injector Circuit Failure - Continued</b></p>	<p>9. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from 15-pin connector.</p> <p>a. Measure resistance from pin 1 (or A) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 2 (or B) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>
<p>10. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect injector solenoid connector on internal actuator harness from no. 1 injector solenoid.</p>		

Table 7. Error Code 1322 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1322 - Injector Circuit Failure - Continued</b></p>	<p>a. Measure resistance from pin 1 (or A) on solenoid connector to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 2 (or B) on solenoid connector to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>
 <p>The diagram illustrates the testing procedure. On the left, a solenoid connector is shown with a probe inserted into one of the pins, labeled 'Pin A,B'. On the right, a separate test setup shows a probe connected to a ground symbol, with the text '&gt;100K OHMS' next to it, indicating the expected resistance reading.</p>		
<p>11. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect no. 1 injector solenoid from internal actuator harness.</p> <p>12. Measure resistance from post to post on solenoid. Resistance should be 0.5-1.5 ohms.</p> <p>a. If resistance is as specified, replace engine ECU (WP 0078 00).</p> <p>b. If resistance is not as specified, notify DS Maintenance to replace injector.</p>		



**WARNING**

Injector solenoids receive high voltage when engine is operating. To avoid personal injury or death from electrical shock, do not wear jewelry or damp clothing, and do not touch injector solenoids or solenoid wires when engine is operating.

**Table 8. Error Code 1323 - Injector Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1323 - Injector Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU.                             <ol style="list-style-type: none"> <li>a. Inspect actuator harness and ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check actuator harness and ECU connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Install jumper wire from pin 9 to pin 10 at 15-pin connector, actuator harness side.</li> <li>3. Measure resistance from actuator harness connector pin 3 to pin 4. Resistance should be less than 10 ohms.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <ol style="list-style-type: none"> <li>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</li> <li>b. If engine harness requires replacement, notify SRA.</li> </ol>

Table 8. Error Code 1323 - Injector Circuit Failure Troubleshooting Procedures - Continued.

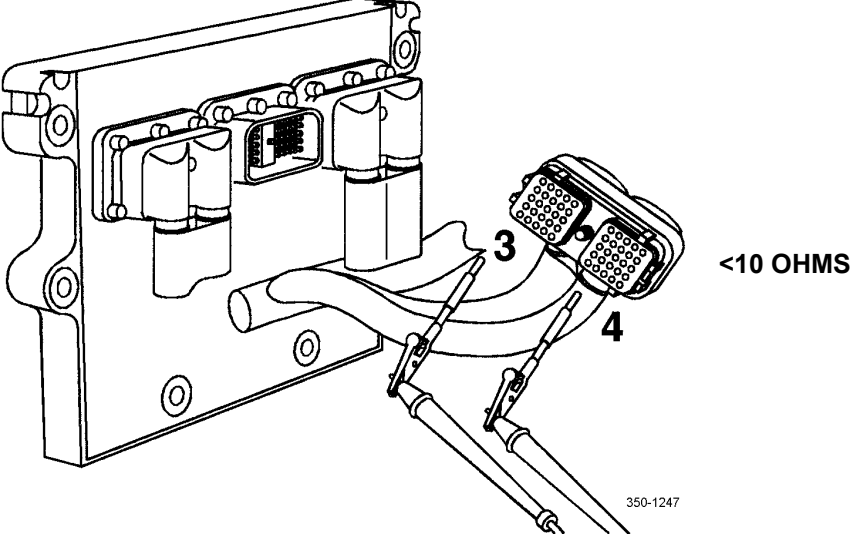
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1323 - Injector Circuit Failure - Continued</p>	 <p>4. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Disconnect sensor harness from engine ECU.</p> <p>a. Measure resistance from actuator harness connector pin 3 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 3 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>

Table 8. Error Code 1323 - Injector Circuit Failure Troubleshooting Procedures - Continued.

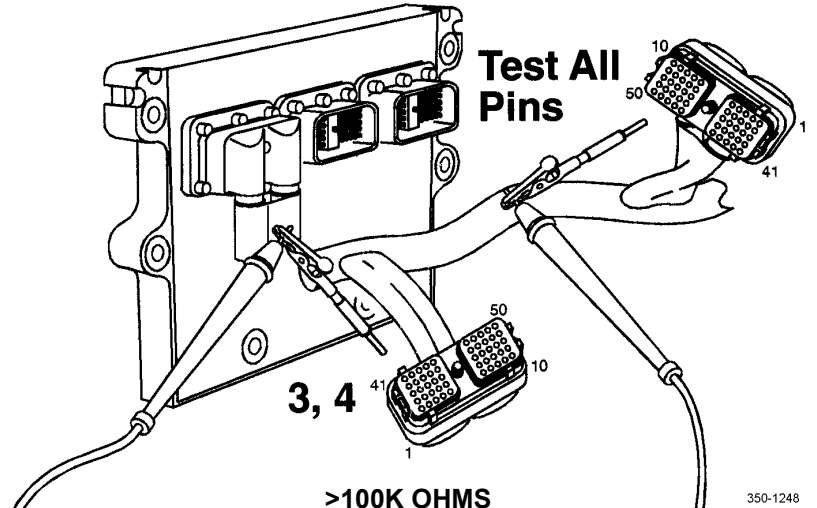
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1323 - Injector Circuit Failure - Continued</b></p>	<p>c. Measure resistance from actuator harness connector pin 4 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 4 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>
<div style="text-align: center;">  <p><b>Test All Pins</b></p> <p><b>&gt;100K OHMS</b></p> <p>350-1248</p> </div> <p>5. Place ignition switch in OFF position and disconnect actuator harness 15-pin connector at front of engine below rocker arm cover. Disconnect actuator harness connector from engine ECU.</p>		

Table 8. Error Code 1323 - Injector Circuit Failure Troubleshooting Procedures - Continued.

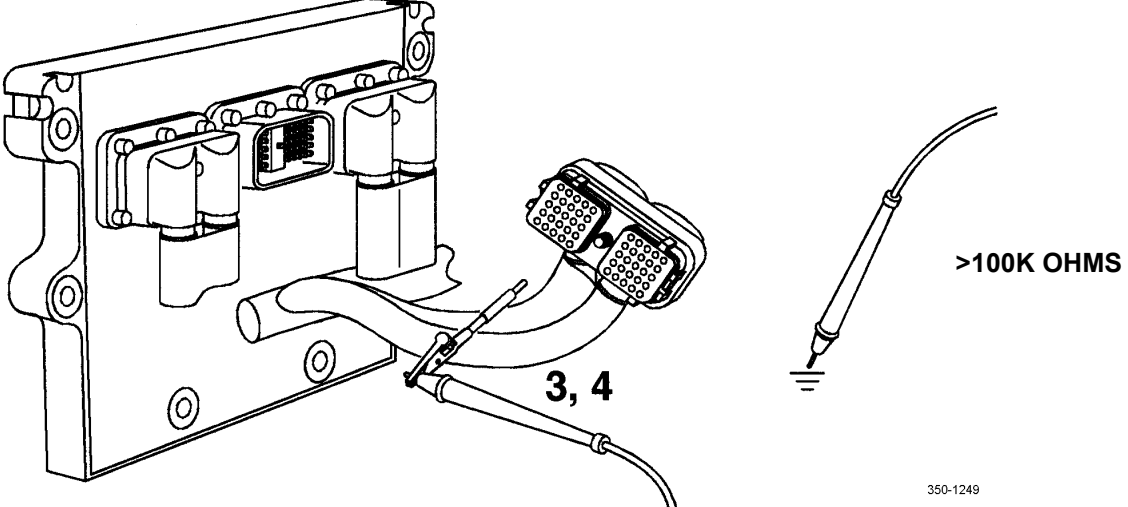
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1323 - Injector Circuit Failure - Continued</b></p> 	<p>a. Measure resistance from actuator harness connector pin 3 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 4 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>6. Place ignition switch to OFF position. Remove rocker arm cover (WP 0051 00). Disconnect injector solenoid connector from no. 5 injector solenoid and internal actuator harness from 15-pin connector.</p> <p>a. Inspect internal actuator harness and injector solenoid connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p>

Table 8. Error Code 1323 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1323 - Injector Circuit Failure - Continued</b></p>	<p>b. Check internal actuator harness and injector solenoid connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect actuator harness from 15-pin connector and injector solenoid wires from no. 5 injector solenoid.</p> <p>a. Measure resistance from 15-pin connector pin 1 (or A) to each injector pigtail nut that connects the no. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from 15-pin connector pin 2 (or B) to each injector pigtail nut that connects the no. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>



Table 8. Error Code 1323 - Injector Circuit Failure Troubleshooting Procedures - Continued.

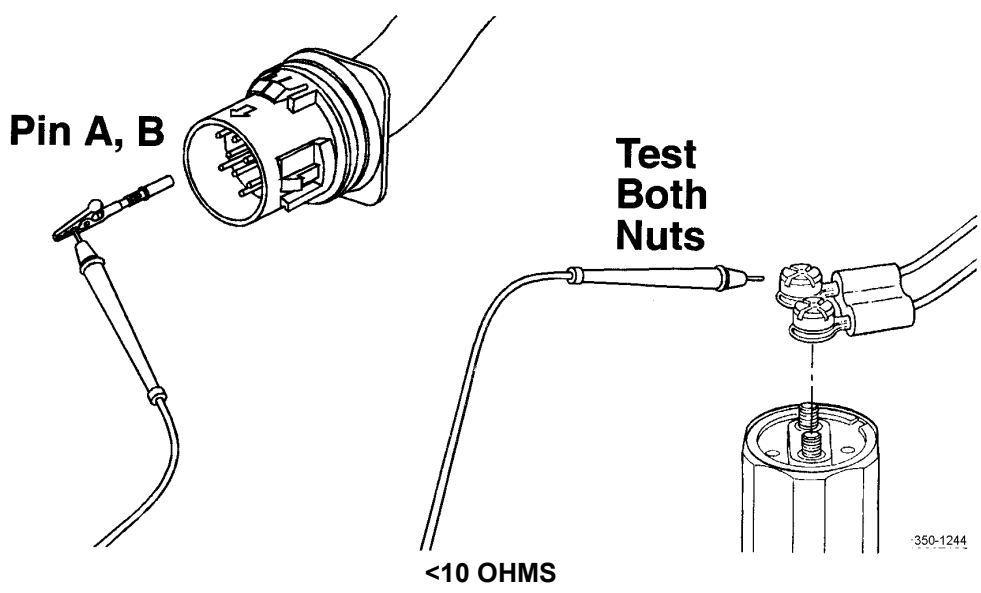
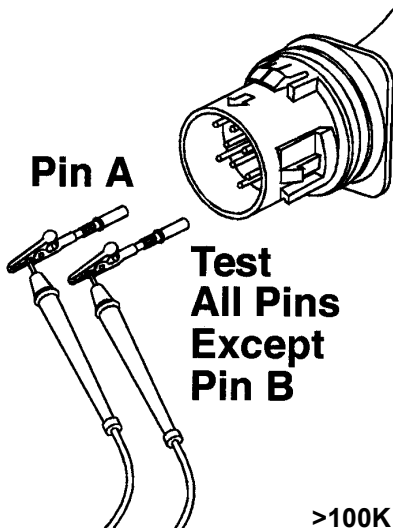
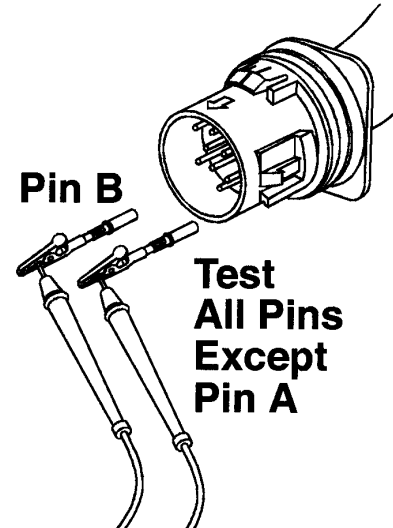
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1323 - Injector Circuit Failure - Continued</p> 	<p>8. Place ignition switch to OFF position and disconnect internal actuator harness from injector solenoid connector and disconnect injector solenoid wires from solenoid.</p> <p>a. Measure resistance from pin A (or 1) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from pin B (or 2) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p>	<p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires.</p> <p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires.</p>

Table 8. Error Code 1323 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1323 - Injector Circuit Failure - Continued</b></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>Pin A</b> <b>Test All Pins Except Pin B</b></p> </div> <div style="text-align: center;">  <p><b>Pin B</b> <b>Test All Pins Except Pin A</b></p> </div> </div> <p style="text-align: center;"><b>&gt;100K OHMS</b></p>	<p>9. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from 15-pin connector.</p> <p>a. Measure resistance from pin 1 (or A) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 2 (or B) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>
	<p>10. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect injector solenoid connector on internal actuator harness from no. 5 injector solenoid.</p>	

350-1245





**WARNING**

Injector solenoids receive high voltage when engine is operating. To avoid personal injury or death from electrical shock, do not wear jewelry or damp clothing, and do not touch injector solenoids or solenoid wires when engine is operating.

**Table 9. Error Code 1324 - Injector Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1324 - Injector Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU.                             <ol style="list-style-type: none"> <li>a. Inspect actuator harness and ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check actuator harness and ECU connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Install jumper wire from pin 5 to pin 6 at 15-pin connector, actuator harness side.</li> <li>3. Measure resistance from actuator harness connector pin 6 to pin 16. Resistance should be less than 10 ohms.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <ol style="list-style-type: none"> <li>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</li> <li>b. If engine harness requires replacement, notify SRA.</li> </ol>

Table 9. Error Code 1324 - Injector Circuit Failure Troubleshooting Procedures - Continued.

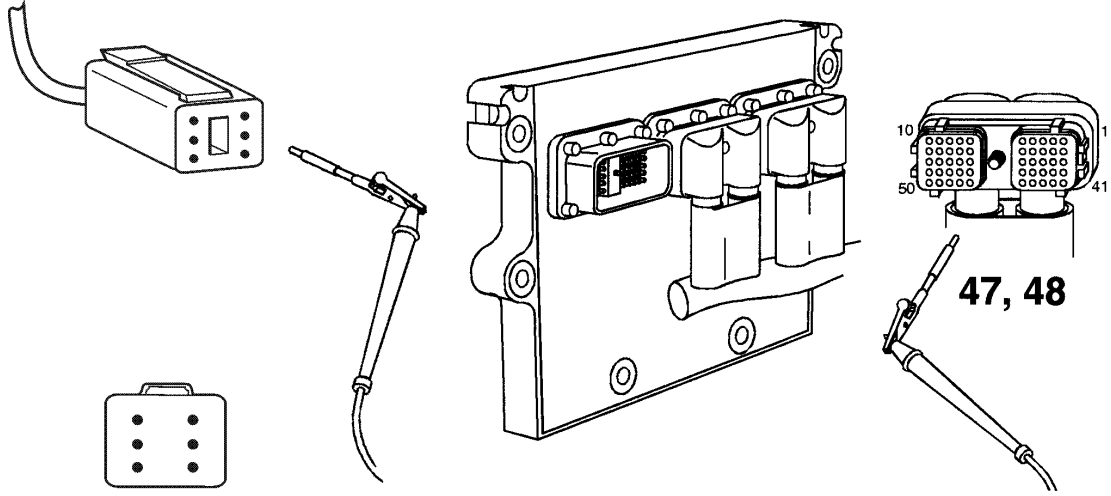
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1324 - Injector Circuit Failure - Continued</b></p>  <p><b>&lt;10 OHMS</b></p>	<p>4. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Disconnect sensor harness from engine ECU.</p> <p>a. Measure resistance from actuator harness connector pin 6 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 6 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00). b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00). b. If engine harness requires replacement, notify SRA.</p> <p>350-1250</p>

Table 9. Error Code 1324 - Injector Circuit Failure Troubleshooting Procedures - Continued.

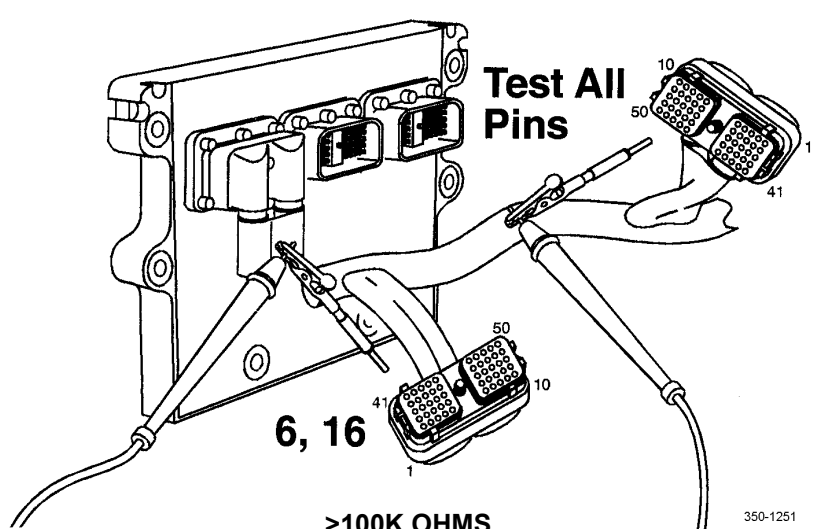
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1324 - Injector Circuit Failure - Continued</b></p>	<p>c. Measure resistance from actuator harness connector pin 16 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 16 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>
<div style="text-align: center;">  <p><b>Test All Pins</b></p> <p><b>6, 16</b></p> <p><b>&gt;100K OHMS</b></p> <p>350-1251</p> </div> <p>5. Place ignition switch in OFF position and disconnect actuator harness 15-pin connector at front of engine below rocker arm cover. Disconnect actuator harness connector from engine ECU.</p>		

Table 9. Error Code 1324 - Injector Circuit Failure Troubleshooting Procedures - Continued.

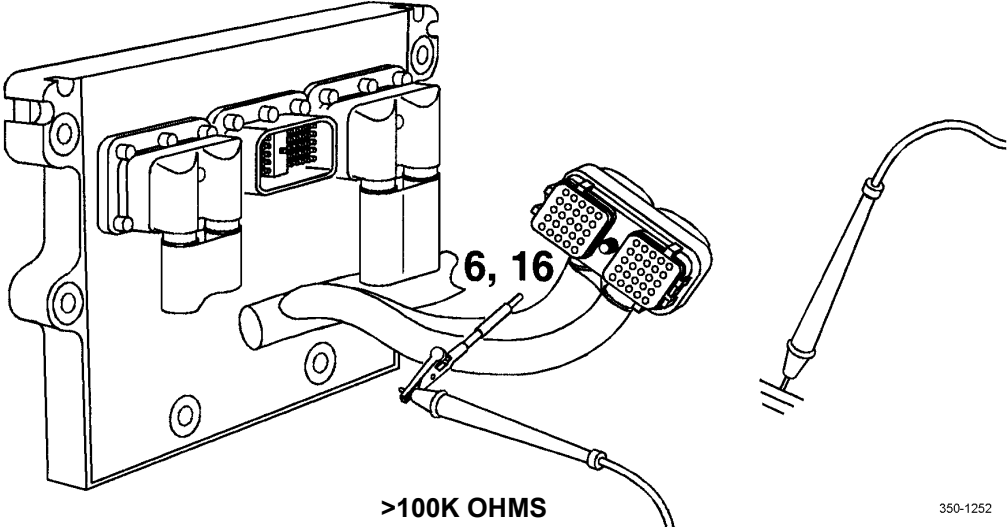
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1324 - Injector Circuit Failure - Continued</b></p> 	<p>a. Measure resistance from actuator harness connector pin 6 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 16 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>6. Place ignition switch to OFF position. Remove rocker arm cover (WP 0051 00). Disconnect injector solenoid connector from no. 3 injector solenoid and internal actuator harness from 15-pin connector.</p> <p>a. Inspect internal actuator harness and injector solenoid connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p>

Table 9. Error Code 1324 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1324 - Injector Circuit Failure - Continued</b></p>	<p>b. Check internal actuator harness and injector solenoid connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect actuator harness from 15-pin connector and injector solenoid wires from no. 3 injector solenoid.</p> <p>a. Measure resistance from 15-pin connector pin 1 (or A) to each injector pigtail nut that connects the no. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from 15-pin connector pin 2 (or B) to each injector pigtail nut that connects the no. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>



Table 9. Error Code 1324 - Injector Circuit Failure Troubleshooting Procedures - Continued.

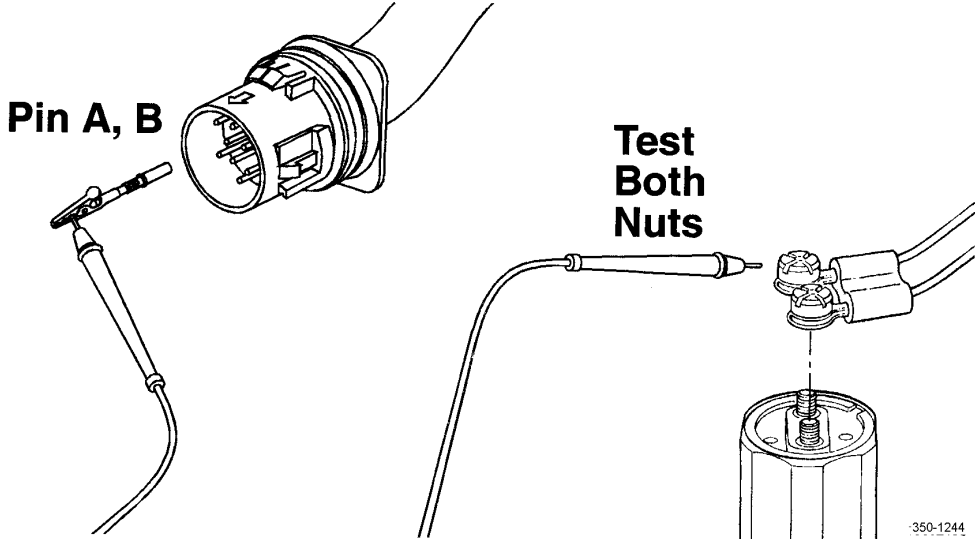
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1324 - Injector Circuit Failure - Continued</p>  <p>&lt;10 OHMS</p>	<p>8. Place ignition switch to OFF position and disconnect internal actuator harness from injector solenoid connector and disconnect injector solenoid wires from solenoid.</p> <p>a. Measure resistance from pin A (or 1) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from pin B (or 2) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p>	<p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires.</p> <p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires.</p>

Table 9. Error Code 1324 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1324 - Injector Circuit Failure - Continued</b></p>	<p>9. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from 15-pin connector.</p> <p>a. Measure resistance from pin 1 (or A) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 2 (or B) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>
<p>10. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect injector solenoid connector on internal actuator harness from no. 3 injector solenoid.</p>		

Table 9. Error Code 1324 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1324 - Injector Circuit Failure - Continued</b></p> <div style="text-align: center;"> <p>Pin A,B</p> <p>350-1246</p> </div> <p><b>&gt;100K OHMS</b></p>	<p>a. Measure resistance from pin 1 (or A) on solenoid connector to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 2 (or B) on solenoid connector to engine block ground. Resistance should be greater than 100k ohms.</p> <p>11. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect no. 3 injector solenoid from internal actuator harness.</p> <p>12. Measure resistance from post to post on solenoid. Resistance should be 0.5-1.5 ohms.</p>	<p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p> <p>a. If resistance is as specified, replace engine ECU (WP 0078 00).</p> <p>b. If resistance is not as specified, notify DS Maintenance to replace injector.</p>



**WARNING**

Injector solenoids receive high voltage when engine is operating. To avoid personal injury or death from electrical shock, do not wear jewelry or damp clothing, and do not touch injector solenoids or solenoid wires when engine is operating.

**Table 10. Error Code 1325 - Injector Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1325 - Injector Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU.                             <ol style="list-style-type: none"> <li>a. Inspect actuator harness and ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check actuator harness and ECU connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Install jumper wire from pin 11 to pin 12 at 15-pin connector, actuator harness side.</li> <li>3. Measure resistance from actuator harness connector pin 1 to pin 2. Resistance should be less than 10 ohms.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <ol style="list-style-type: none"> <li>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</li> <li>b. If engine harness requires replacement, notify SRA.</li> </ol>

Table 10. Error Code 1325 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1325 - Injector Circuit Failure - Continued</p> <div> </div>	<p>4. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Disconnect sensor harness from engine ECU.</p> <p>a. Measure resistance from actuator harness connector pin 1 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 1 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>

Table 10. Error Code 1325 - Injector Circuit Failure Troubleshooting Procedures - Continued.

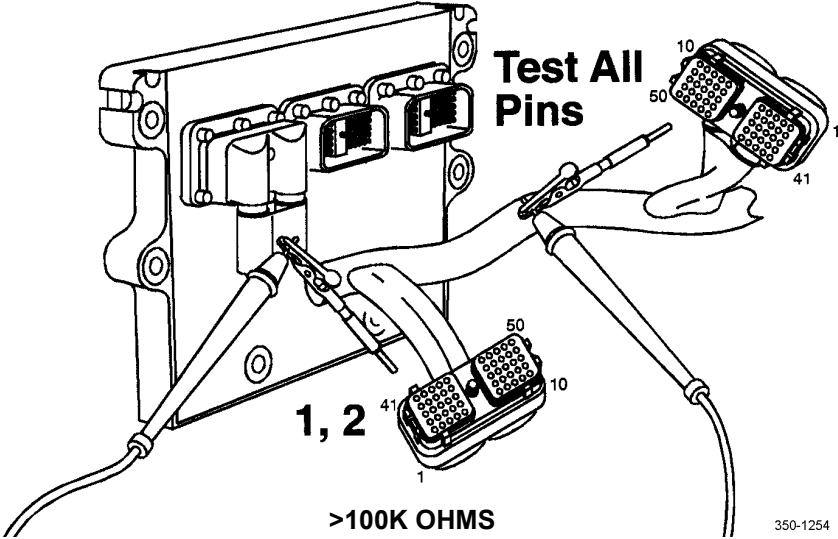
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1325 - Injector Circuit Failure - Continued</b></p>	<p>c. Measure resistance from actuator harness connector pin 2 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 2 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>
<div style="text-align: center;">  <p><b>Test All Pins</b></p> <p><b>&gt;100K OHMS</b></p> <p>350-1254</p> </div> <p>5. Place ignition switch in OFF position and disconnect actuator harness 15-pin connector at front of engine below rocker arm cover. Disconnect actuator harness connector from engine ECU.</p>		

Table 10. Error Code 1325 - Injector Circuit Failure Troubleshooting Procedures - Continued.

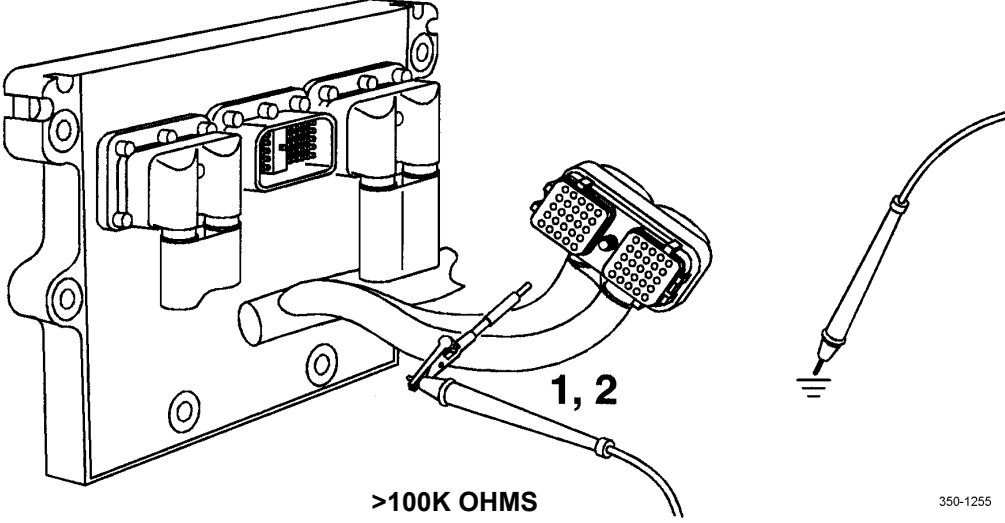
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1325 - Injector Circuit Failure - Continued</b></p> 	<p>a. Measure resistance from actuator harness connector pin 1 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 2 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>6. Place ignition switch to OFF position. Remove rocker arm cover (WP 0051 00). Disconnect injector solenoid connector from no. 6 injector solenoid and internal actuator harness from 15-pin connector.</p> <p>a. Inspect internal actuator harness and injector solenoid connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p>

Table 10. Error Code 1325 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1325 - Injector Circuit Failure - Continued</b></p>	<p>b. Check internal actuator harness and injector solenoid connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect actuator harness from 15-pin connector and injector solenoid wires from no. 6 injector solenoid.</p> <p>a. Measure resistance from 15-pin connector pin 1 (or A) to each injector pigtail nut that connects the No. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from 15-pin connector pin 2 (or B) to each injector pigtail nut that connects the No. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>



Table 10. Error Code 1325 - Injector Circuit Failure Troubleshooting Procedures - Continued.

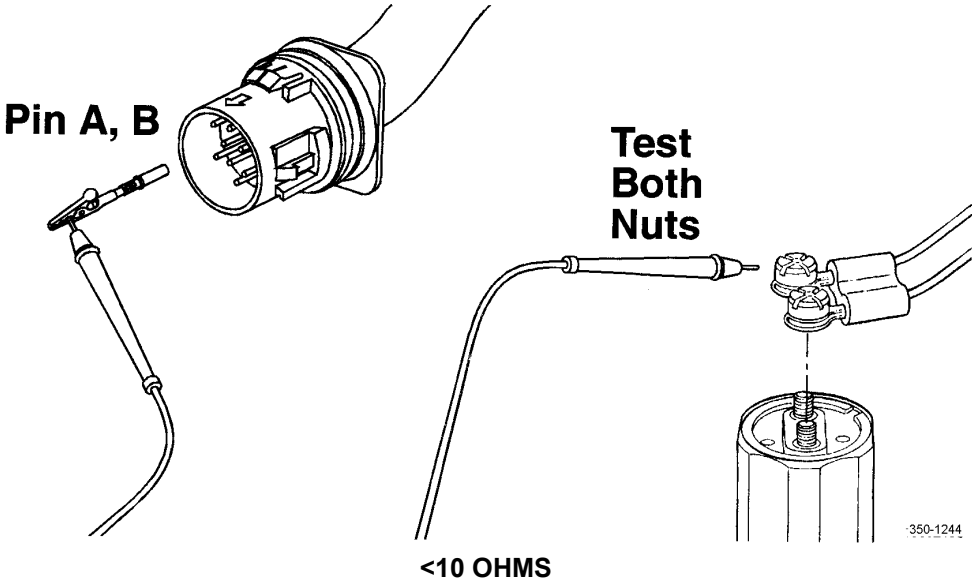
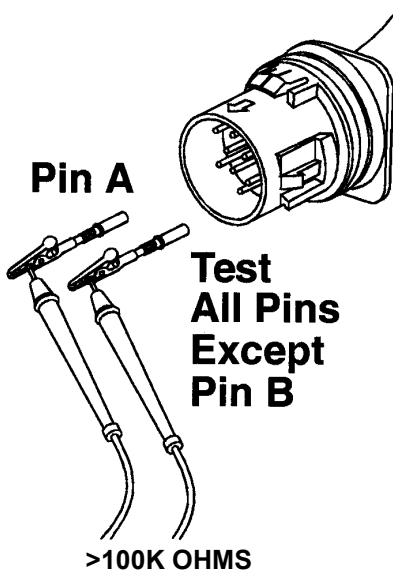
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1325 - Injector Circuit Failure - Continued</p>  <p>&lt;10 OHMS</p>	<p>8. Place ignition switch to OFF position and disconnect internal actuator harness from injector solenoid connector and disconnect injector solenoid wires from solenoid.</p> <p>a. Measure resistance from pin A (or 1) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from pin B (or 2) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p>	<p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires (WP 0111 00).</p> <p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires (WP 0111 00).</p>

Table 10. Error Code 1325 - Injector Circuit Failure Troubleshooting Procedures - Continued.

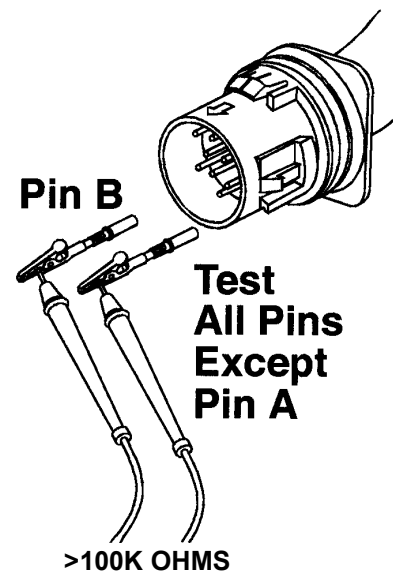
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1325 - Injector Circuit Failure - Continued</b></p>	<p>9. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from 15-pin connector.</p> <p>a. Measure resistance from pin 1 (or A) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 2 (or B) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>



**Pin A**

**Test All Pins Except Pin B**

**>100K OHMS**



**Pin B**

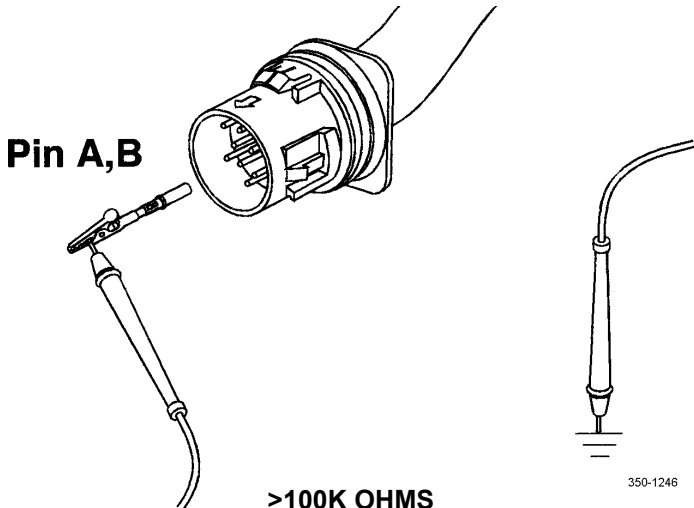
**Test All Pins Except Pin A**

**>100K OHMS**

10. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect injector solenoid connector on internal actuator harness from no. 6 injector solenoid.

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Table 10. Error Code 1325 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1325 - Injector Circuit Failure - Continued</b></p>	<p>a. Measure resistance from pin 1 (or A) on solenoid connector to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 2 (or B) on solenoid connector to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>
 <p>Pin A,B</p> <p>&gt;100K OHMS</p> <p>350-1246</p>		
	<p>11. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect no. 6 injector solenoid from internal actuator harness.</p> <p>12. Measure resistance from post to post on solenoid. Resistance should be 0.5-1.5 ohms.</p>	<p>a. If resistance is as specified, replace engine ECU (WP 0078 00).</p> <p>b. If resistance is not as specified, notify DS Maintenance to replace injector.</p>



**WARNING**

Injector solenoids receive high voltage when engine is operating. To avoid personal injury or death from electrical shock, do not wear jewelry or damp clothing, and do not touch injector solenoids or solenoid wires when engine is operating.

**Table 11. Error Code 1331 - Injector Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1331 - Injector Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU.                             <ol style="list-style-type: none"> <li>a. Inspect actuator harness and ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check actuator harness and ECU connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Install jumper wire from pin 3 to pin 4 at 15-pin connector, actuator harness side.</li> <li>3. Measure resistance from actuator harness connector pin 8 to pin 7. Resistance should be less than 10 ohms.</li> </ol>	<ol style="list-style-type: none"> <li>a. Clean and repair connector(s) as required (WP 0111 00).</li> <li>b. Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</li> <li>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</li> <li>b. If engine harness requires replacement, notify SRA.</li> </ol>

Table 11. Error Code 1331 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1331 - Injector Circuit Failure - Continued</p> <div> </div> <p><b>&lt;10 OHMS</b></p>	<p>4. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Disconnect sensor harness from engine ECU.</p> <p>a. Measure resistance from actuator harness connector pin 7 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 7 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>

Table 11. Error Code 1331 - Injector Circuit Failure Troubleshooting Procedures - Continued.

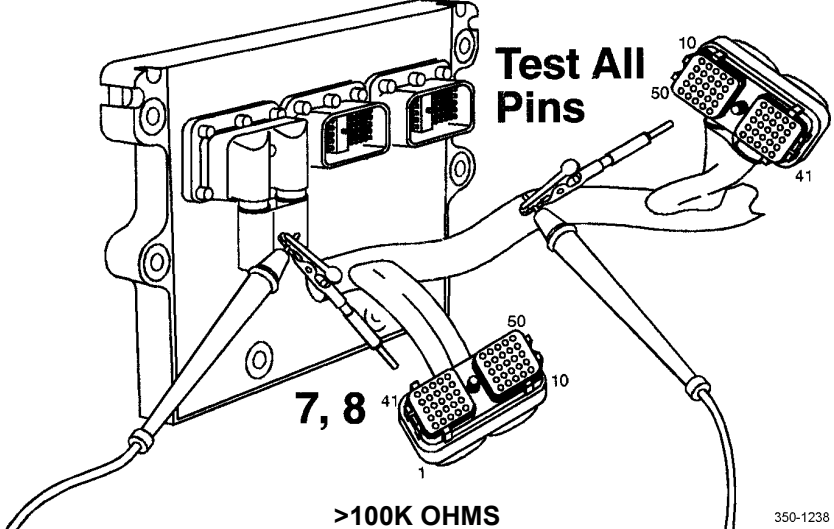
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1331 - Injector Circuit Failure - Continued</b></p>	<p>c. Measure resistance from actuator harness connector pin 8 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 8 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>
<div style="text-align: center;">  <p><b>Test All Pins</b></p> <p><b>&gt;100K OHMS</b></p> <p>350-1238</p> </div> <p>5. Place ignition switch in OFF position and disconnect actuator harness 15-pin connector at front of engine below rocker arm cover. Disconnect actuator harness connector from engine ECU.</p>		

Table 11. Error Code 1331 - Injector Circuit Failure Troubleshooting Procedures - Continued.

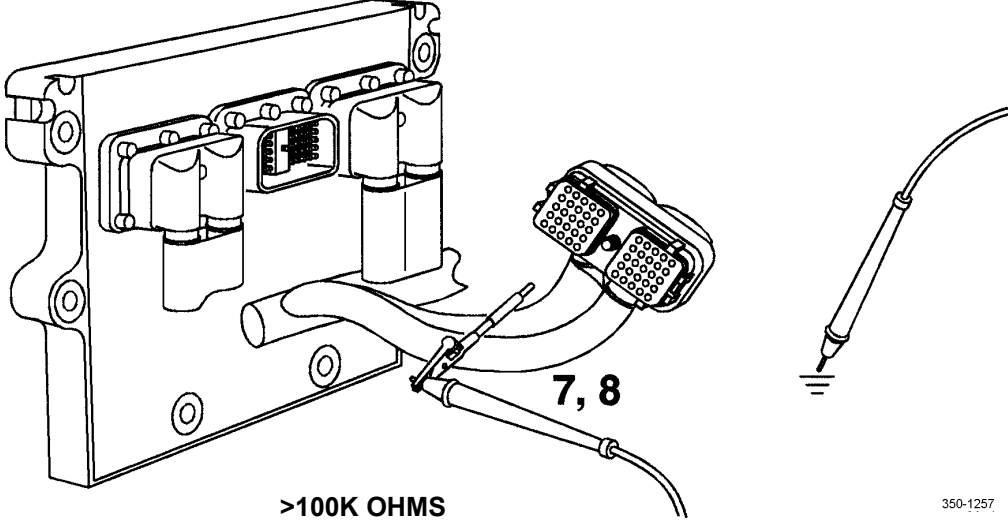
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1331 - Injector Circuit Failure - Continued</b></p>  <p style="text-align: center;"><b>&gt;100K OHMS</b></p>	<p>a. Measure resistance from actuator harness connector pin 7 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 8 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>6. Place ignition switch to OFF position. Remove rocker arm cover (WP 0051 00). Disconnect injector solenoid connector from no. 2 injector solenoid and internal actuator harness from 15-pin connector.</p> <p>a. Inspect internal actuator harness and injector solenoid connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p>

Table 11. Error Code 1331 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1331 - Injector Circuit Failure - Continued</b></p>	<p>b. Check internal actuator harness and injector solenoid connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect actuator harness from 15-pin connector and injector solenoid wires from no. 2 injector solenoid.</p> <p>a. Measure resistance from 15-pin connector pin 1 (or A) to each injector pigtail nut that connects the no. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from 15-pin connector pin 2 (or B) to each injector pigtail nut that connects the no. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>



Table 11. Error Code 1331 - Injector Circuit Failure Troubleshooting Procedures - Continued.

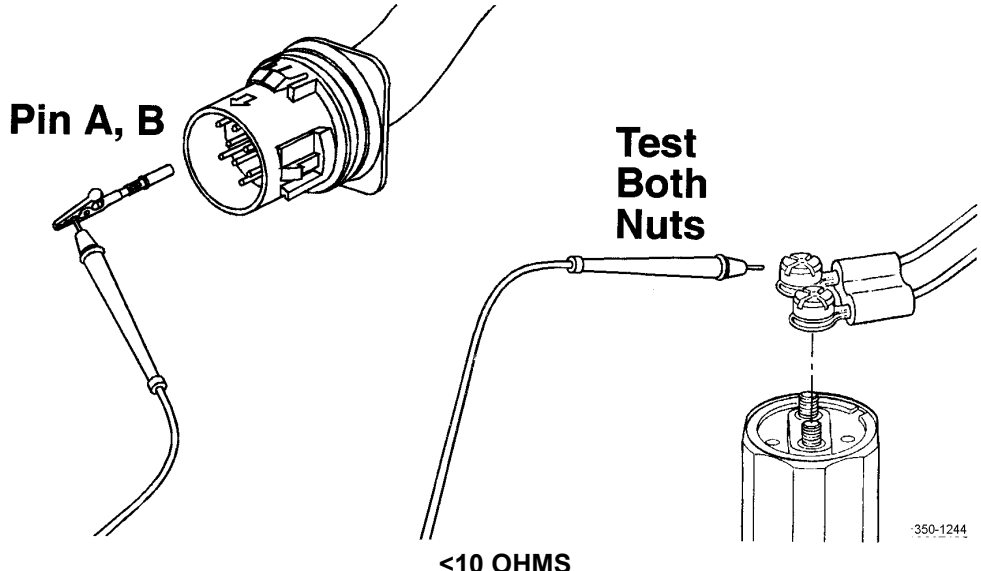
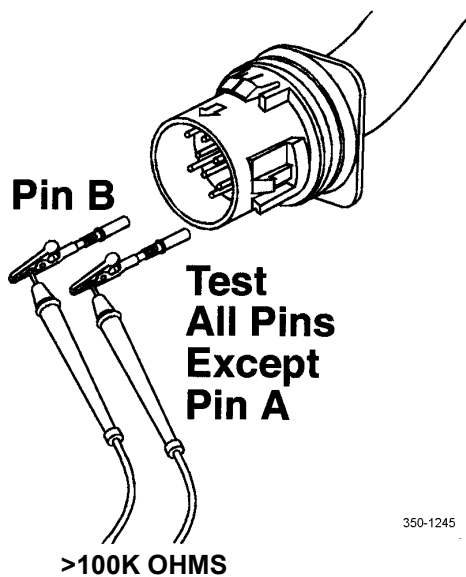
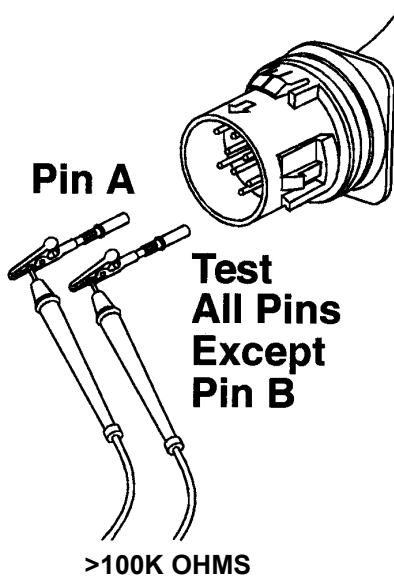
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1331 - Injector Circuit Failure - Continued</p> 	<p>8. Place ignition switch to OFF position and disconnect internal actuator harness from injector solenoid connector and disconnect injector solenoid wires from solenoid.</p> <p>a. Measure resistance from pin A (or 1) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from pin B (or 2) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p>	<p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires.</p> <p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires.</p>

Table 11. Error Code 1331 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1331 - Injector Circuit Failure - Continued</b></p>	<p>9. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from 15-pin connector.</p> <p>a. Measure resistance from pin 1 (or A) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 2 (or B) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>



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10. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect injector solenoid connector on internal actuator harness from no. 2 injector solenoid.





**WARNING**

Injector solenoids receive high voltage when engine is operating. To avoid personal injury or death from electrical shock, do not wear jewelry or damp clothing, and do not touch injector solenoids or solenoid wires when engine is operating.

**Table 12. Error Code 1332 - Injector Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1332 - Injector Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect actuator harness from engine ECU.                             <ol style="list-style-type: none"> <li>a. Inspect actuator harness and ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check actuator harness and ECU connector for dirt or moisture in or on the connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Install jumper wire from pin 7 to pin 8 at 15-pin connector, actuator harness side.</li> <li>3. Measure resistance from actuator harness connector pin 26 to pin 36. Resistance should be less than 10 ohms.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <ol style="list-style-type: none"> <li>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</li> <li>b. If engine harness requires replacement, notify SRA.</li> </ol>

Table 12. Error Code 1332 - Injector Circuit Failure Troubleshooting Procedures - Continued.

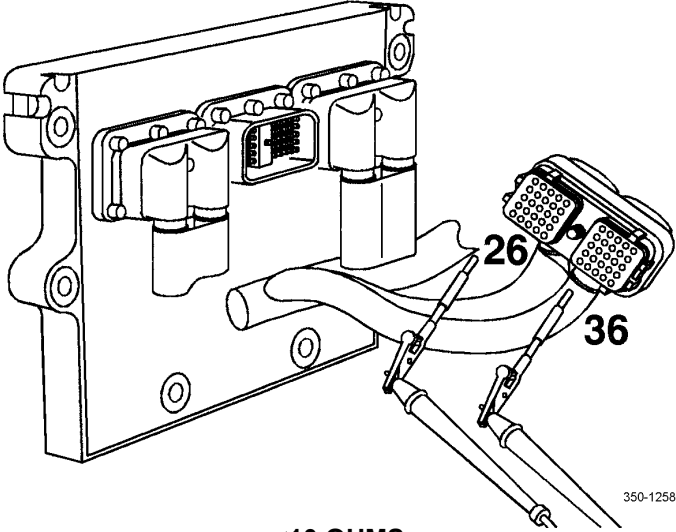
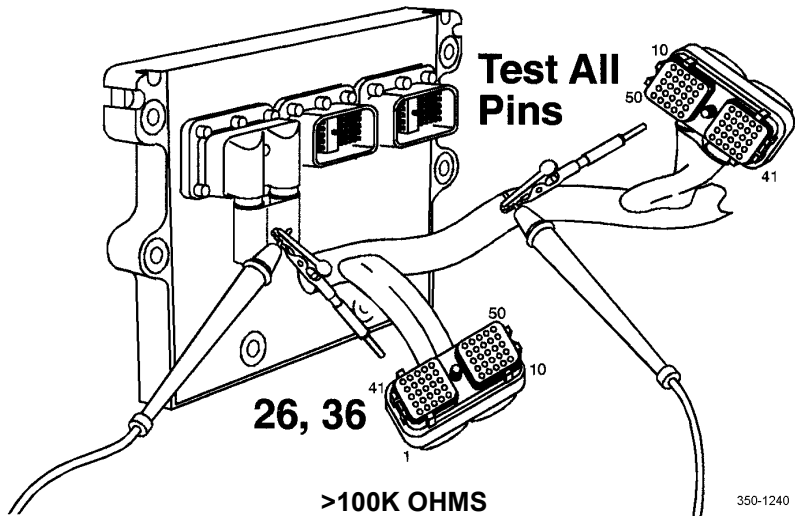
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1332 - Injector Circuit Failure - Continued</p>	 <p><b>&lt;10 OHMS</b></p> <ol style="list-style-type: none"> <li>4. Place ignition switch to OFF position and disconnect actuator harness from engine ECU and 15-pin connector at front of engine below rocker arm cover. Disconnect sensor harness from engine ECU.             <ol style="list-style-type: none"> <li>a. Measure resistance from actuator harness connector pin 26 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</li> <li>b. Measure resistance from actuator harness connector pin 26 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</li> <li>b. If engine harness requires replacement, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</li> <li>b. If engine harness requires replacement, notify SRA.</li> </ol>

Table 12. Error Code 1332 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1332 - Injector Circuit Failure - Continued</b></p>	<p>c. Measure resistance from actuator harness connector pin 36 to all pins in actuator harness connector. Resistance should be greater than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 36 to all pins in sensor harness connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>



5. Place ignition switch in OFF position and disconnect actuator harness 15-pin connector at front of engine below rocker arm cover. Disconnect actuator harness connector from engine ECU.

Table 12. Error Code 1332 - Injector Circuit Failure Troubleshooting Procedures - Continued.

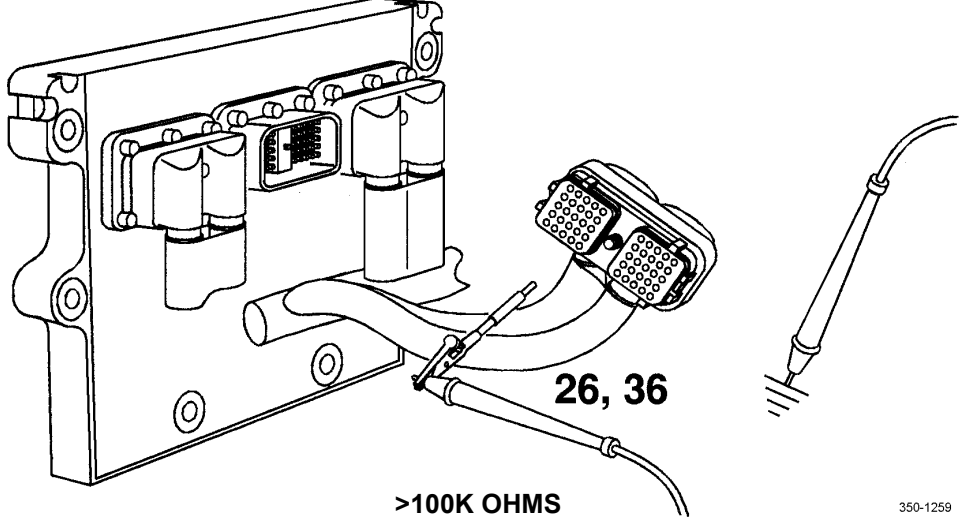
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1332 - Injector Circuit Failure - Continued</b></p>  <p style="text-align: center;"><b>&gt;100K OHMS</b></p>	<p>a. Measure resistance from actuator harness connector pin 26 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 36 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>6. Place ignition switch to OFF position. Remove rocker arm cover (WP 0051 00). Disconnect injector solenoid connector from no. 4 injector solenoid and internal actuator harness from 15-pin connector.</p> <p>a. Inspect internal actuator harness and injector solenoid connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p>

Table 12. Error Code 1332 - Injector Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1332 - Injector Circuit Failure - Continued</b></p>	<p>b. Check internal actuator harness and injector solenoid connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>7. Place ignition switch in OFF position and, with rocker arm cover removed, disconnect actuator harness from 15-pin connector and injector solenoid wires from no. 4 injector solenoid.</p> <p>a. Measure resistance from 15-pin connector pin 1 (or A) to each injector pigtail nut that connects the no. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from 15-pin connector pin 2 (or B) to each injector pigtail nut that connects the no. 1 injector (resistance to one of these nuts must be within specifications). Resistance should be less than 10 ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If internal actuator harness requires replacement, notify SRA.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>



Table 12. Error Code 1332 - Injector Circuit Failure Troubleshooting Procedures - Continued.

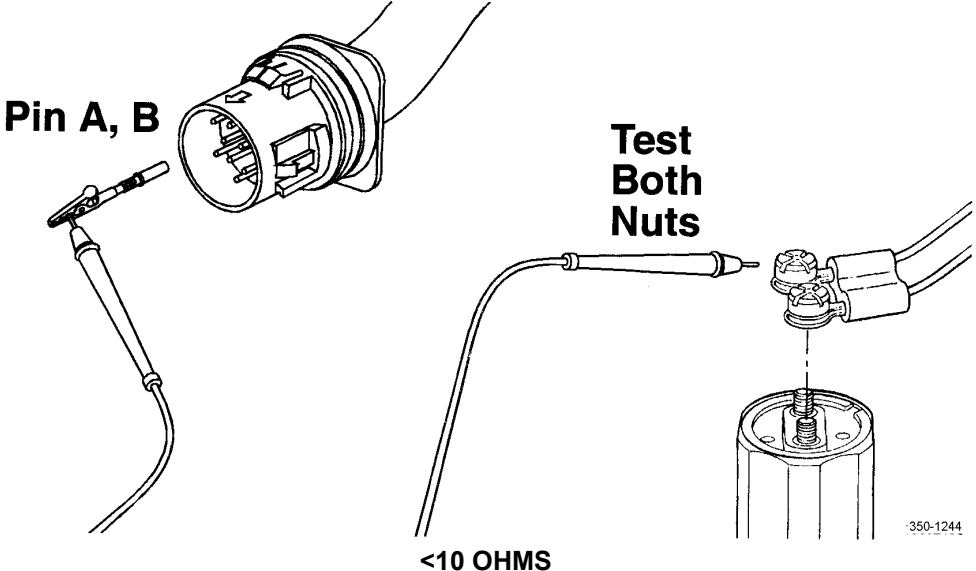
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1332 - Injector Circuit Failure - Continued</p> 	<p>8. Place ignition switch to OFF position and disconnect internal actuator harness from injector solenoid connector and disconnect injector solenoid wires from solenoid.</p> <p>a. Measure resistance from pin A (or 1) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from pin B (or 2) of injector solenoid connector to injector wire pigtail nut. Resistance should be less than 10 ohms.</p>	<p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires.</p> <p>a. If resistance is as specified, notify SRA to replace internal actuator harness.</p> <p>b. If resistance is not as specified, replace injector solenoid wires.</p>

Table 12. Error Code 1332 - Injector Circuit Failure Troubleshooting Procedures - Continued.

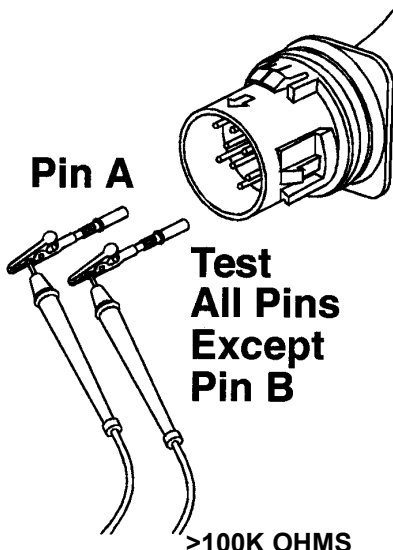
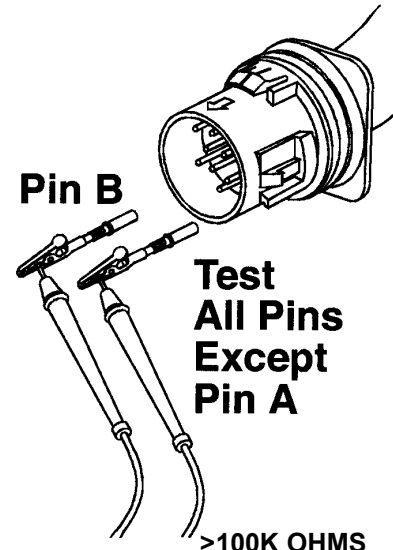
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1332 - Injector Circuit Failure - Continued</b></p>	<p>9. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect internal actuator harness from 15-pin connector.</p> <p>a. Measure resistance from pin 1 (or A) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 2 (or B) on internal harness side of actuator harness 15-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>Pin A</b></p> <p><b>Test All Pins Except Pin B</b></p> <p>&gt;100K OHMS</p> </div> <div style="text-align: center;">  <p><b>Pin B</b></p> <p><b>Test All Pins Except Pin A</b></p> <p>&gt;100K OHMS</p> </div> </div> <p style="text-align: right; font-size: small;">350-1245</p>		
<p>10. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect injector solenoid connector on internal actuator harness from no. 4 injector solenoid.</p>		

Table 12. Error Code 1332 - Injector Circuit Failure Troubleshooting Procedures - Continued.

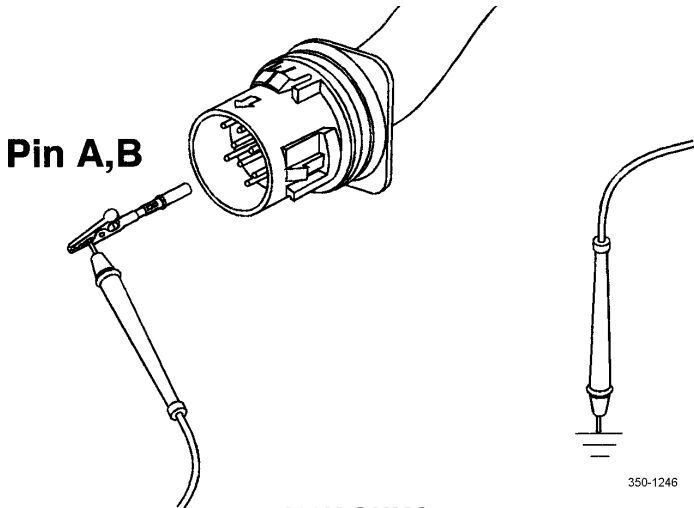

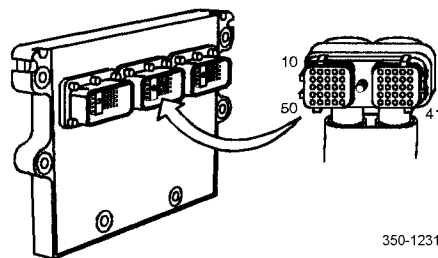
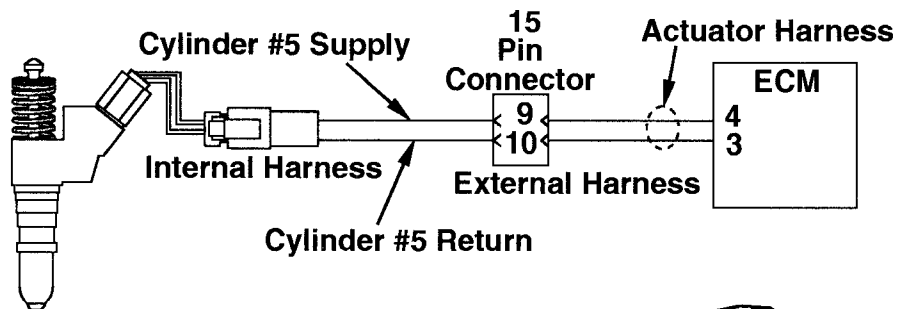
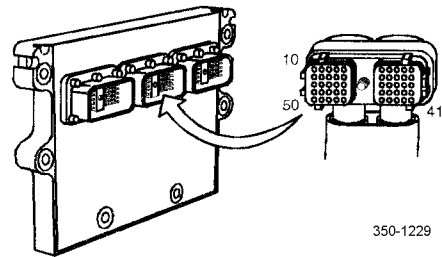
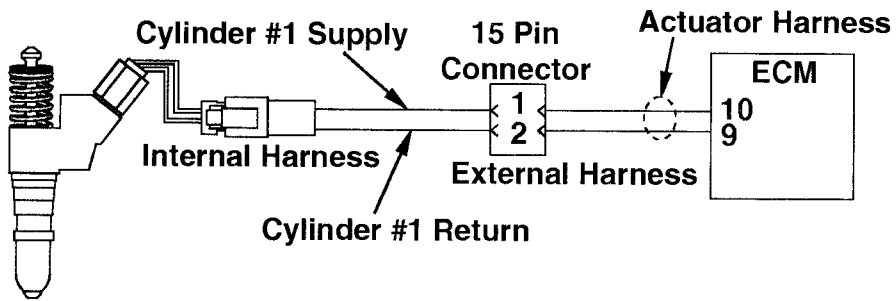
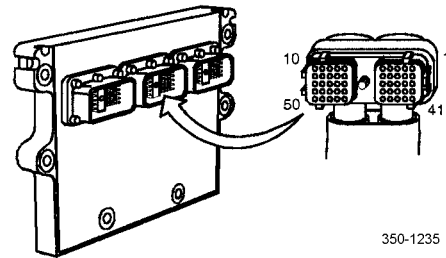
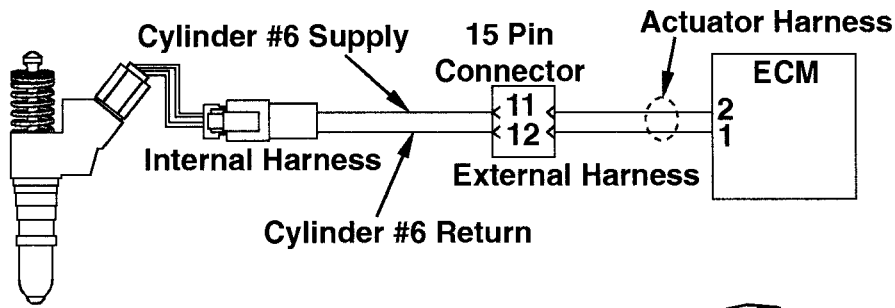
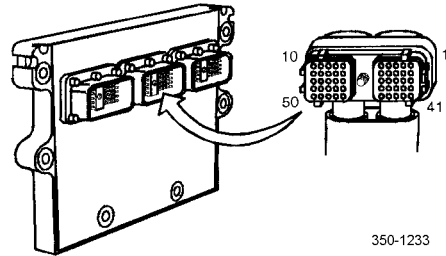
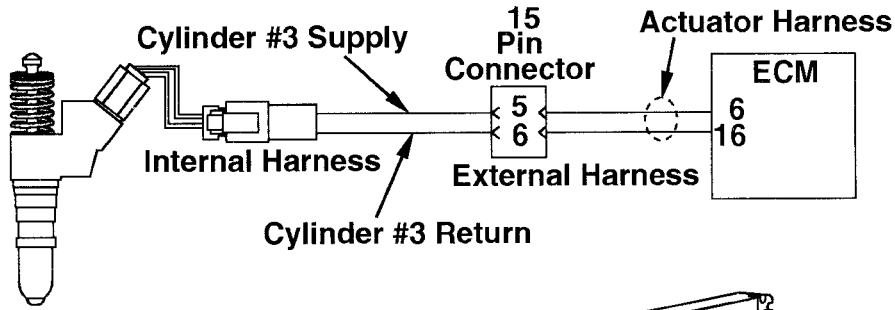
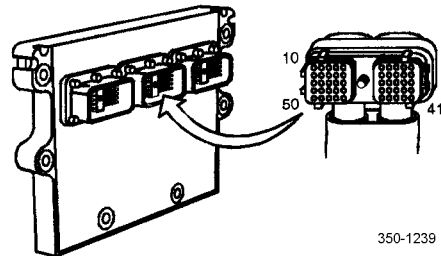
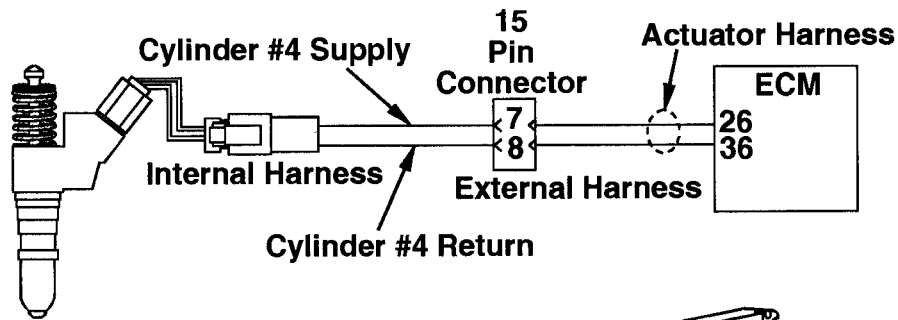
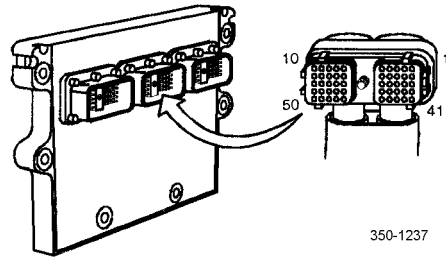
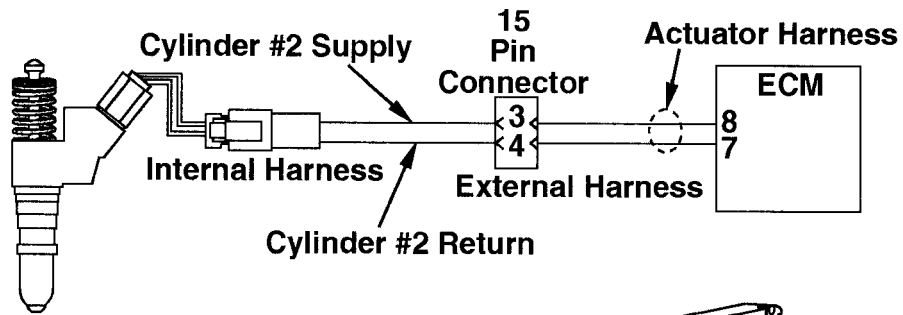
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1332 - Injector Circuit Failure - Continued</b></p>	<p>a. Measure resistance from pin 1 (or A) on solenoid connector to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 2 (or B) on solenoid connector to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p> <p>If resistance is not as specified, notify SRA to replace internal actuator harness.</p>
 <p>Pin A,B</p> <p>350-1246</p>		
<p><b>&gt;100K OHMS</b></p>		
	<p>11. Place ignition switch to OFF position and, with rocker arm cover removed, disconnect no. 4 injector solenoid from internal actuator harness.</p> <p>12. Measure resistance from post to post on solenoid. Resistance should be 0.5-1.5 ohms.</p>	<p>a. If resistance is as specified, replace engine ECU (WP 0078 00).</p> <p>b. If resistance is not as specified, notify DS Maintenance to replace injector.</p>

Table 13. Error Code 1951 - Injector Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1951 - Injector Circuit Failure</p> 	<p>Notify SRA.</p>	







END OF WORK PACKAGE

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**THIS WORK PACKAGE COVERS**

Error Code 1131 - Throttle Position Sensor Circuit Failure

Error Code 1132 - Throttle Position Sensor Circuit Failure

Error Code 1431 - Idle Validation Switch Circuit Failure

Error Code 1432 - Accelerator Pedal Circuit Failure

Error Code 1551 - Idle Validation Switch Circuit Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

**Tools and Special Tools**

Test lead, female (Item 48, WP 0204 00)

Test lead, female (Item 49, WP 0204 00)

Test lead, female (Item 50, WP 0204 00)

Test lead, male (Item 51, WP 0204 00)

**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

**Table 1. Error Code 1131 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1131 - Throttle Position Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect harness from throttle position sensor.</li> <li>a. Inspect harness connector and throttle position sensor connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check harness and throttle position sensor for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 1. Error Code 1131 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

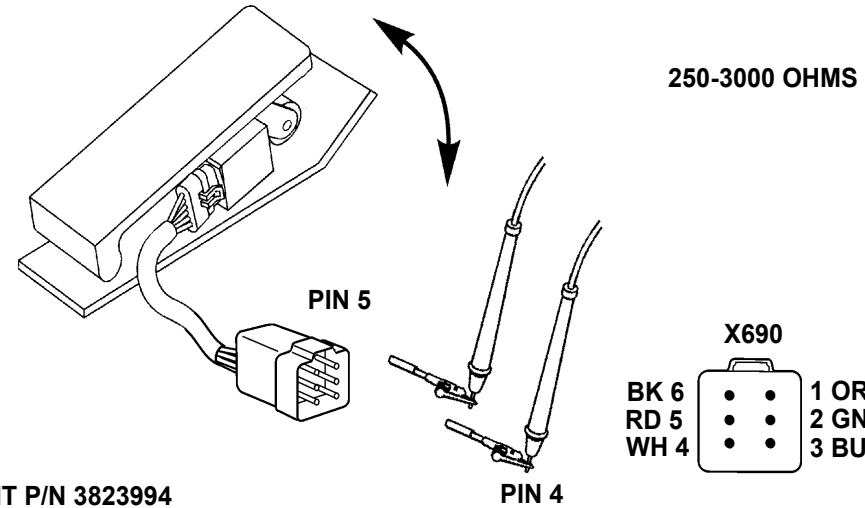
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1131 - Throttle Position Sensor Circuit Failure - Continued</b></p>  <p><b>USE TEST LEAD KIT P/N 3823994</b></p>	<p>2. Place ignition switch to OFF position and disconnect harness from throttle position sensor. Perform the following resistance checks.</p> <p>a. Measure resistance between pin 4 and pin 5 of throttle position sensor connector 690 (X690) when accelerator pedal is depressed and released. Resistance should be greater than 250-3000 ohms.</p> <p>b. Measure resistance between pin 5 and pin 6 of throttle position sensor connector 690 (X690) when accelerator pedal is depressed and released. Resistance should be 250-1500 ohms with pedal depressed and 3000 ohms with pedal released.</p> <p><b>NOTE</b></p> <p>The difference between resistance readings should be at least 1000 ohms.</p>	<p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p> <p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p>

Table 1. Error Code 1131 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

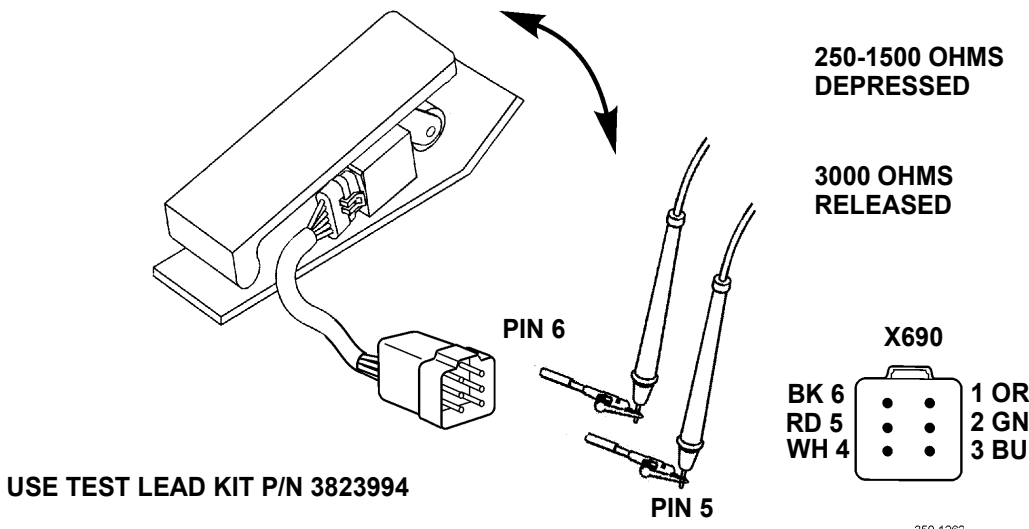
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION									
<p>Error Code 1131 - Throttle Position Sensor Circuit Failure - Continued</p>  <p>USE TEST LEAD KIT P/N 3823994</p>	<ol style="list-style-type: none"> <li>3. Place ignition switch to OFF position and disconnect harness connector from engine ECU.               <ol style="list-style-type: none"> <li>a. Inspect harness connector, bulkhead connector, and engine ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check harness connector, bulkhead connector, and engine ECU connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>4. Place ignition switch in OFF position. Disconnect OEM harness connector from ECU. Disconnect throttle position sensor.</li> </ol>	<p>250-1500 OHMS DEPRESSED</p> <p>3000 OHMS RELEASED</p> <p>X690</p> <table border="1"> <tr> <td>BK 6</td> <td>•</td> <td>1 OR</td> </tr> <tr> <td>RD 5</td> <td>•</td> <td>2 GN</td> </tr> <tr> <td>WH 4</td> <td>•</td> <td>3 BU</td> </tr> </table> <p>350-1262</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>	BK 6	•	1 OR	RD 5	•	2 GN	WH 4	•	3 BU
BK 6	•	1 OR									
RD 5	•	2 GN									
WH 4	•	3 BU									

Table 1. Error Code 1131 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

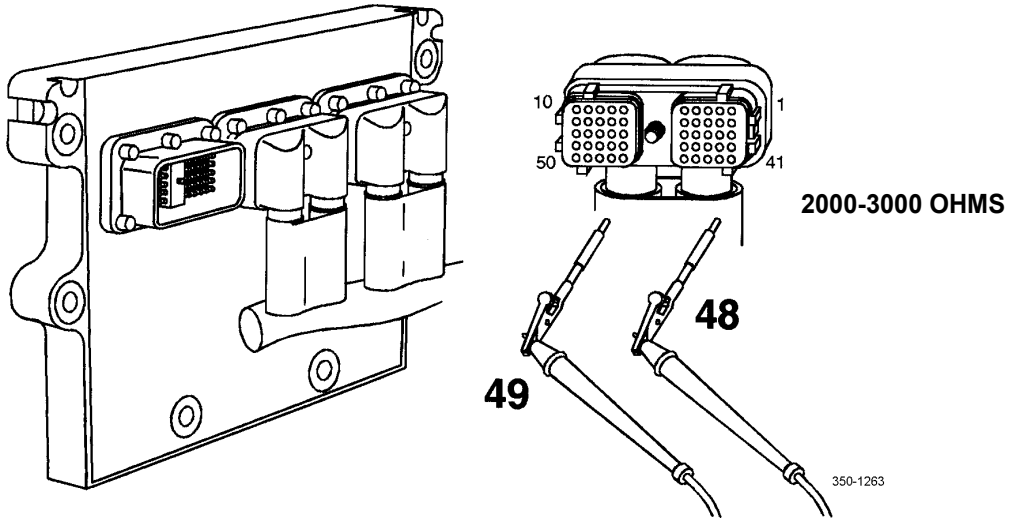
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1131 - Throttle Position Sensor Circuit Failure - Continued</b></p> <p><b>USE TEST LEAD KIT P/N 3822758</b></p> 	<p>5. Measure resistance between pin 48 and pin 49 on OEM harness when accelerator pedal is up or down. Resistance should be 2000-3000 ohms.</p> <p>6. Place ignition switch in OFF position, connect harness to throttle position sensor, and disconnect OEM harness connector from engine ECU.</p> <p>7. Measure resistance between pin 48 and pin 47 on harness when accelerator pedal is up or down. Resistance should be greater than 100k ohms.</p>	<p>If harness requires replacement, notify SRA.</p> <p>If harness requires replacement, notify SRA.</p>

Table 1. Error Code 1131 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

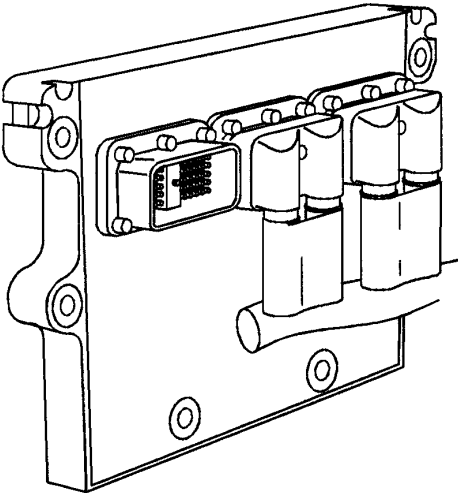
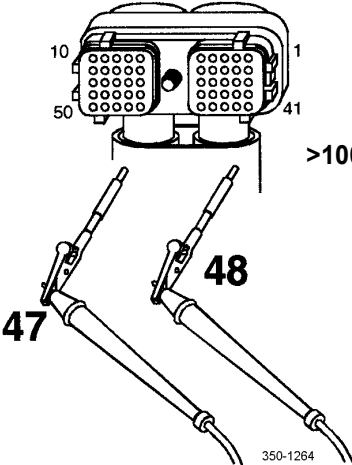
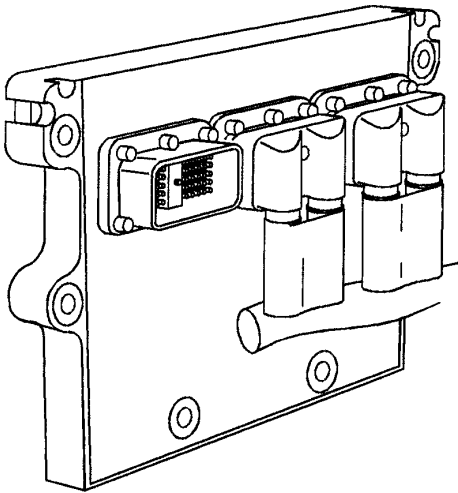
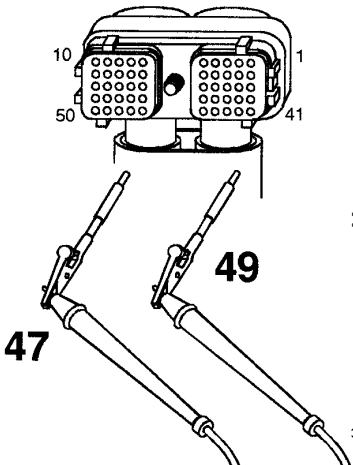
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1131 - Throttle Position Sensor Circuit Failure - Continued</p>  <p>USE TEST LEAD KIT P/N 3822758</p>	 <p>47 48</p> <p>350-1264</p> <p>10 50 1 41</p> <p>&gt;100K OHMS</p> <p>8. Place ignition switch in OFF position. Disconnect OEM harness connector from engine ECU. Disconnect throttle position sensor.</p> <p>9. Measure resistance between pin 47 and pin 49 on harness connector. Resistance should be greater than 100k ohms.</p>	<p>If harness requires replacement, notify SRA.</p>  <p>USE TEST LEAD KIT P/N 3822758</p>  <p>47 49</p> <p>350-1265</p> <p>10 50 1 41</p> <p>&gt;100K OHMS</p>

Table 1. Error Code 1131 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

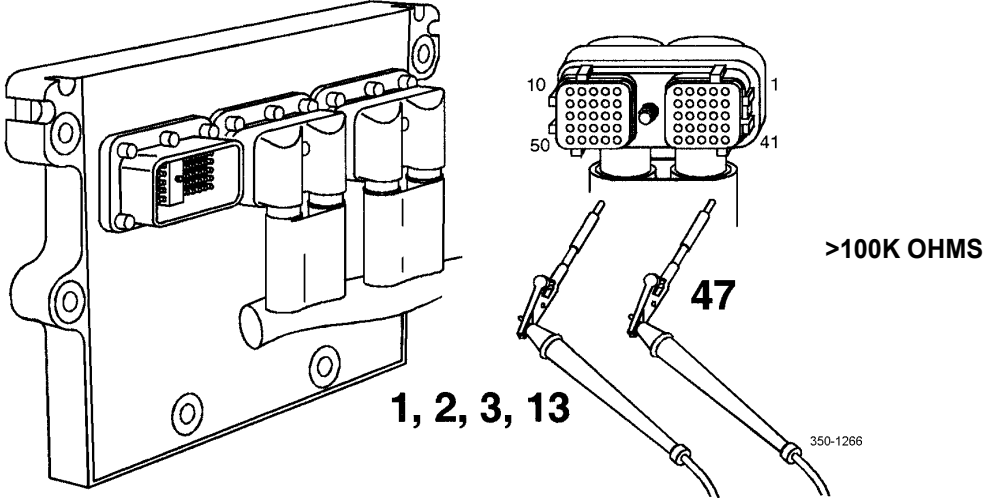
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1131 - Throttle Position Sensor Circuit Failure - Continued</b></p> <p><b>USE TEST LEAD KIT P/N 3822758</b></p> 	<p>10. Place ignition switch to OFF position and disconnect harness from throttle position sensor. Disconnect OEM harness connector from engine ECU.</p> <p>11. Measure resistance between pin 47 and pins 1, 2, 3, and 13 of harness connector. Resistance should be greater than 100k ohms.</p> <p>12. Place ignition switch in OFF position, disconnect harness from throttle position sensor and disconnect OEM harness connector from engine ECU.</p>	<p>If harness requires replacement, notify SRA.</p>

Table 1. Error Code 1131 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

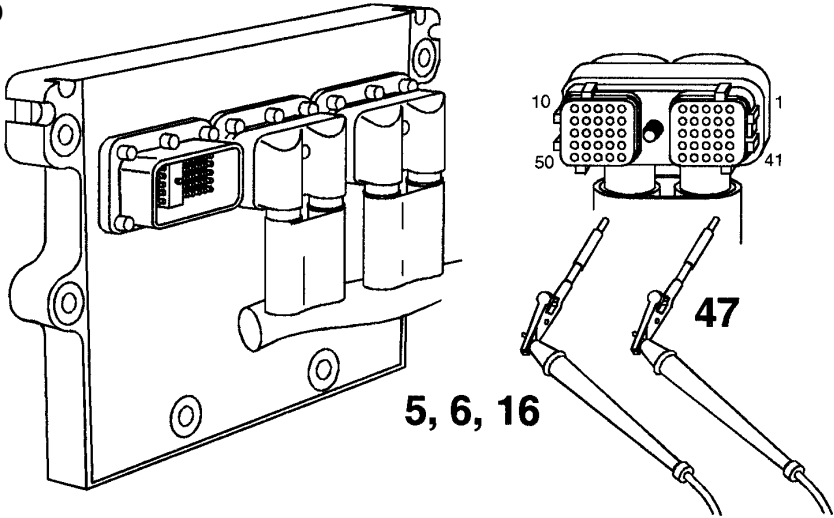
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1131 - Throttle Position Sensor Circuit Failure - Continued</b></p> <p><b>USE TEST LEAD KIT P/N 3822758</b></p> 	<p>13. Measure resistance between pin 47 and pins 5, 6, and 16 of harness connector. Resistance should be greater than 100k ohms.</p> <p>14. Place ignition switch to OFF position and disconnect harness from throttle position sensor and OEM harness connector from engine ECU.</p> <p>15. Measure resistance between pin 47 and all other pins in harness connector. Resistance should be greater than 100k ohms.</p>	<p>If harness requires replacement, notify SRA.</p> <p>If harness requires replacement, notify SRA.</p>

Table 1. Error Code 1131 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

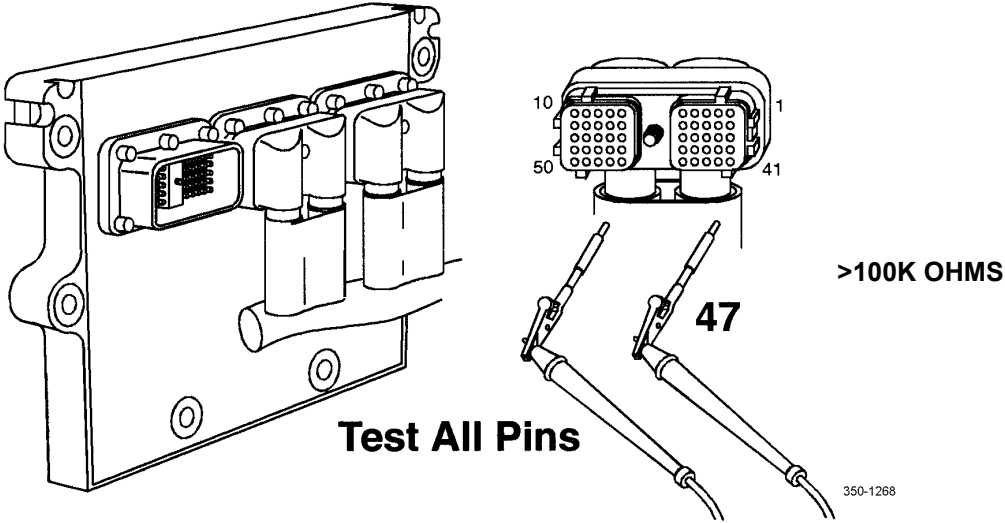

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1131 - Throttle Position Sensor Circuit Failure - Continued</p>  <p style="text-align: center;"><b>Test All Pins</b></p> <p style="text-align: right;"><b>&gt;100K OHMS</b></p> <p style="text-align: right; font-size: small;">350-1268</p>		



Table 2. Error Code 1132 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1132 - Throttle Position Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect harness from throttle position sensor.                             <ol style="list-style-type: none"> <li>a. Inspect harness connector and throttle position sensor connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check harness and throttle position sensor for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch to OFF position and disconnect harness from throttle position sensor. Perform the following resistance checks.                             <ol style="list-style-type: none"> <li>a. Measure resistance between throttle position sensor connector X690 pin 5 and pin 6 with pedal released. Resistance should be 2000-3000 ohms.</li> </ol> </li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p>

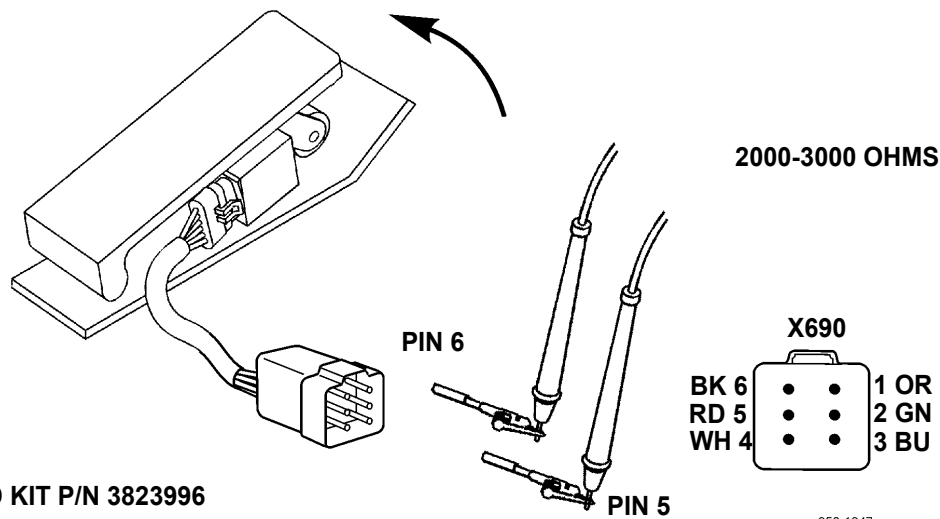


Table 2. Error Code 1132 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

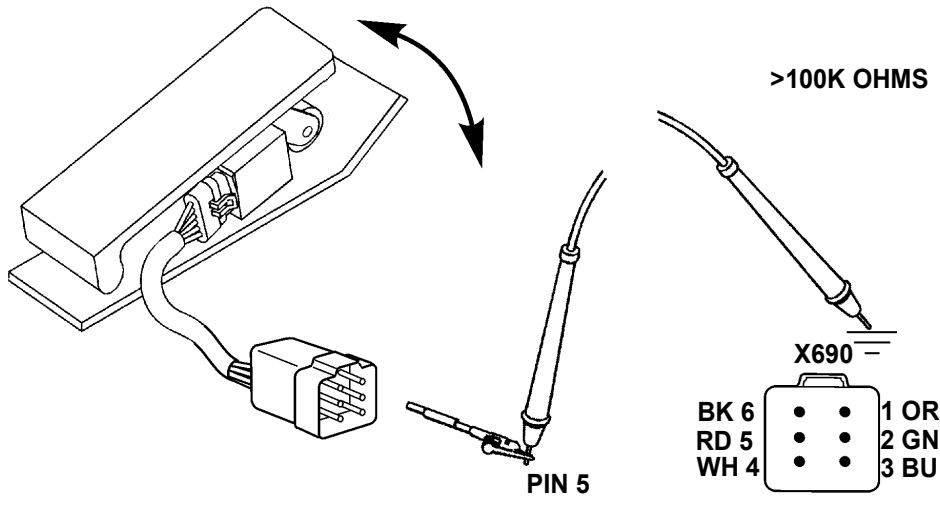
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1132 - Throttle Position Sensor Circuit Failure - Continued</b></p>  <p>USE TEST LEAD KIT P/N 3823996</p> <p>350-1348</p>	<p>b. Measure resistance between X690 pin 5 and ground with pedal depressed and released. Resistance should be greater than 100k ohms.</p> <p>3. Place ignition switch in OFF position and disconnect harness from throttle position sensor.</p> <p>4. Measure resistance from signal pin of throttle position sensor to chassis ground. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p> <p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p>

Table 2. Error Code 1132 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

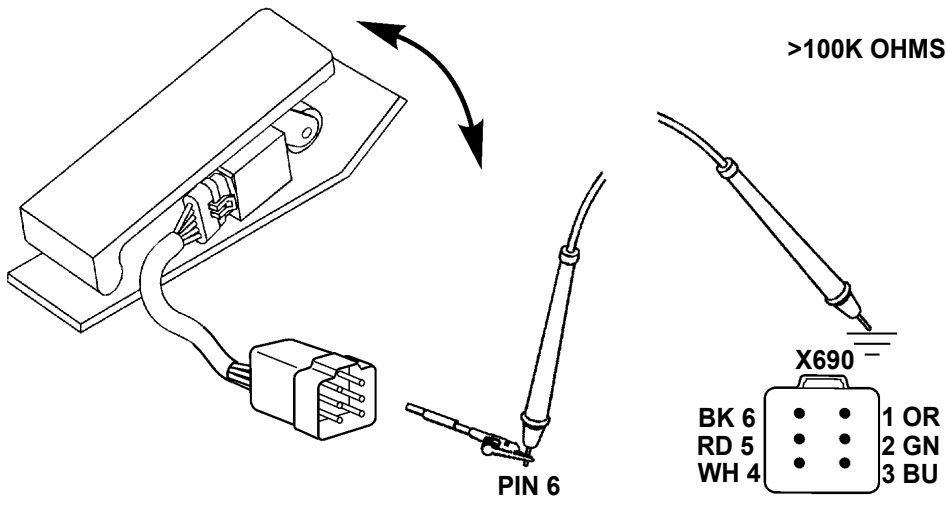
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1132 - Throttle Position Sensor Circuit Failure - Continued</p>  <p>USE TEST LEAD KIT P/N 3823996</p>	<p>5. Place ignition switch to OFF position and disconnect OEM harness from throttle position sensor and engine ECU OEM harness connector.</p> <p>a. Inspect harness connector and engine ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check harness and engine ECU for dirt or moisture in or on connector and for missing or damaged connector seals.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 2. Error Code 1132 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

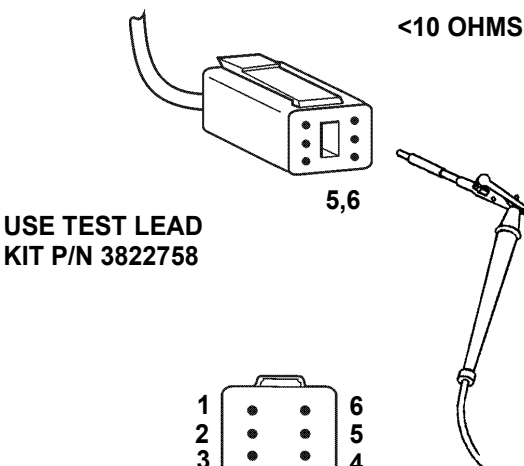
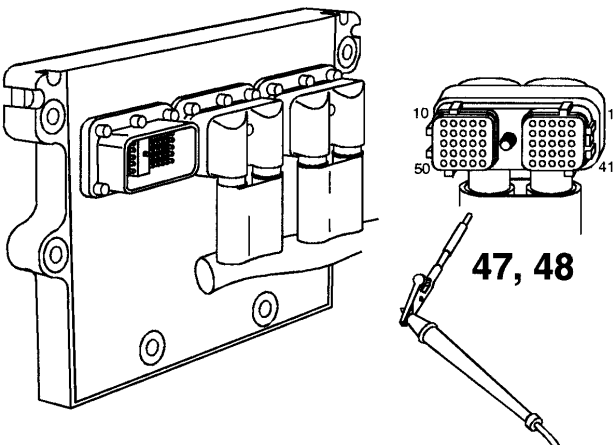
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1132 - Throttle Position Sensor Circuit Failure - Continued</b></p>  <p>USE TEST LEAD KIT P/N 3822758</p>	<p>6. Place ignition switch in OFF position and disconnect harness from throttle position sensor and disconnect harness connector from engine ECU.</p> <p>a. Measure resistance between pin 47 of OEM harness connector and pin 5 of throttle position sensor harness side connector. Resistance should be less than 10 ohms.</p>  <p>350-1250</p> <p>b. Measure resistance between pin 48 of OEM harness connector and pin 6 of throttle position sensor harness side connector. Resistance should be less than 10 ohms.</p> <p>7. Place ignition switch in OFF position and disconnect OEM harness from throttle position sensor and disconnect harness connector from engine ECU OEM harness connector.</p>	<p>If harness requires replacement, notify SRA.</p> <p>If harness requires replacement, notify SRA.</p>

Table 2. Error Code 1132 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

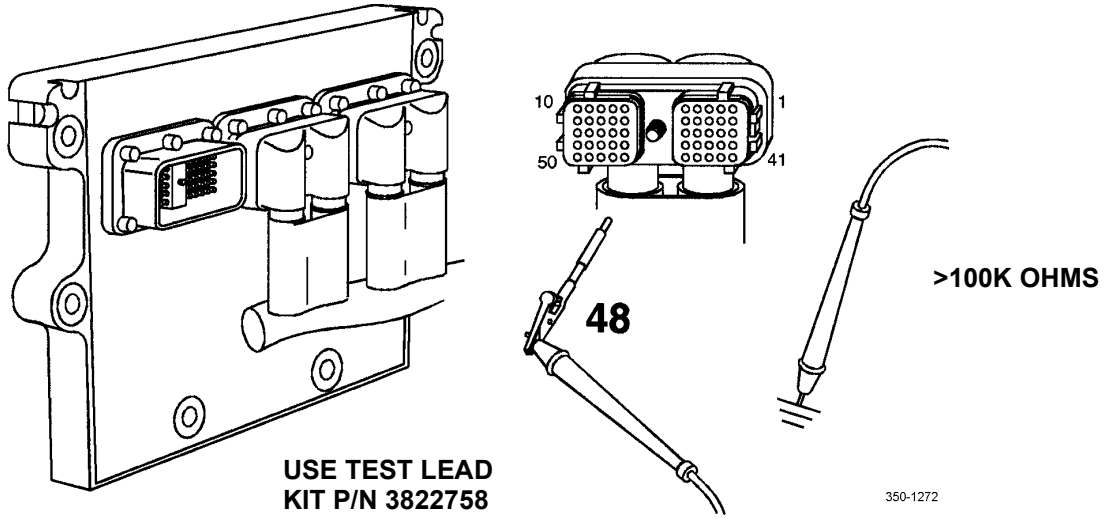
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1132 - Throttle Position Sensor Circuit Failure - Continued</b></p>  <p><b>USE TEST LEAD KIT P/N 3822758</b></p> <p>350-1272</p>	<p>8. Measure resistance between pin 48 of OEM harness connector to engine block ground. Resistance should be greater than 100k ohms.</p> <p>9. Place ignition switch in OFF position, disconnect harness connector from engine ECU, and disconnect harness from throttle position sensor.</p> <p>10. Measure resistance from pin 47 of OEM harness connector to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>If harness requires replacement, notify SRA.</p> <p>If harness requires replacement, notify SRA.</p>

Table 2. Error Code 1132 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

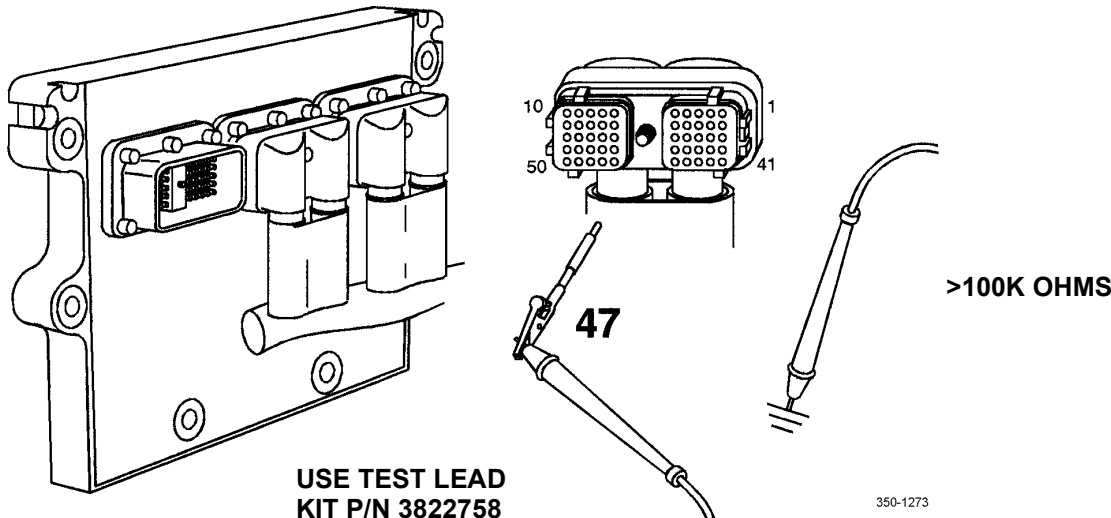
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1132 - Throttle Position Sensor Circuit Failure - Continued</p>  <p>USE TEST LEAD KIT P/N 3822758</p>	<p>11. Place ignition switch to OFF position and disconnect harness from throttle position sensor and disconnect harness connector from engine ECU.</p> <p>12. Measure resistance from pin 48 of harness connector to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If harness requires replacement, notify SRA.</p>

Table 2. Error Code 1132 - Throttle Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

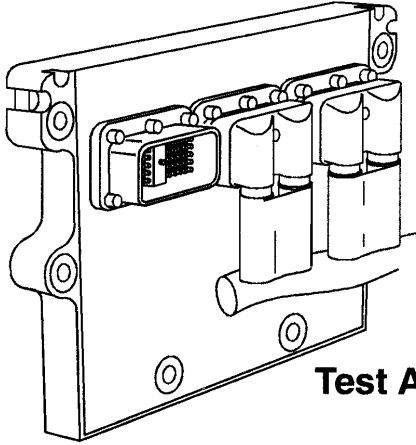
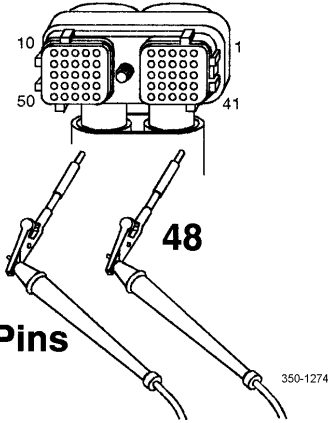
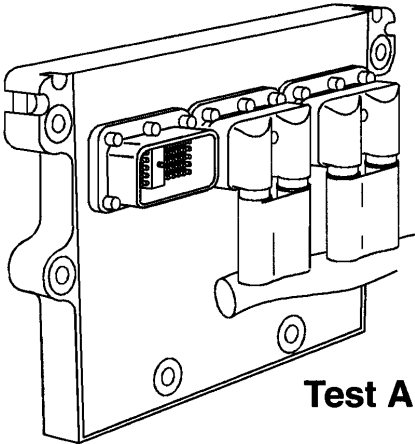
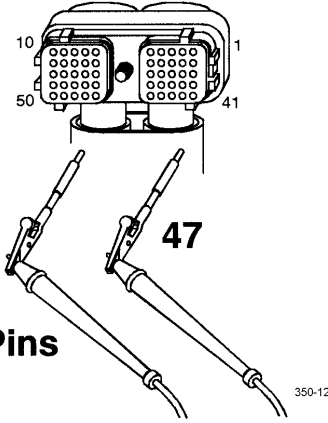
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1132 - Throttle Position Sensor Circuit Failure - Continued</p>  <p><b>Test All Pins</b></p>  <p><b>48</b></p> <p>350-1274</p> <p><b>&gt;100K OHMS</b></p> <p>13. Place ignition switch to OFF position and disconnect harness from throttle position sensor and disconnect OEM harness connector from engine ECU.</p> <p>14. Measure resistance between pin 47 and all other pins in harness connector. Resistance should be greater than 100k ohms.</p>  <p><b>Test All Pins</b></p>  <p><b>47</b></p> <p>350-1268</p> <p><b>&gt;100K OHMS</b></p>		<p>If harness requires replacement, notify SRA.</p>





Table 3. Error Code 1431 - Idle Validation Switch Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1431 - Idle Validation Switch Circuit Failure - Continued</b></p>	<p>b. Check harness and engine ECU for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>4. Place ignition switch to OFF position. Disconnect harness from sensor switch.</p> <p>a. Measure resistance between pin 1 and pin 3 of 690 connector (X690) with pedal released. Resistance should be less than 125 ohms.</p> <p>b. Measure resistance between pin 1 and pin 2 of 690 connector (X690) with pedal depressed. Resistance should be less than 125 ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p> <p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p>

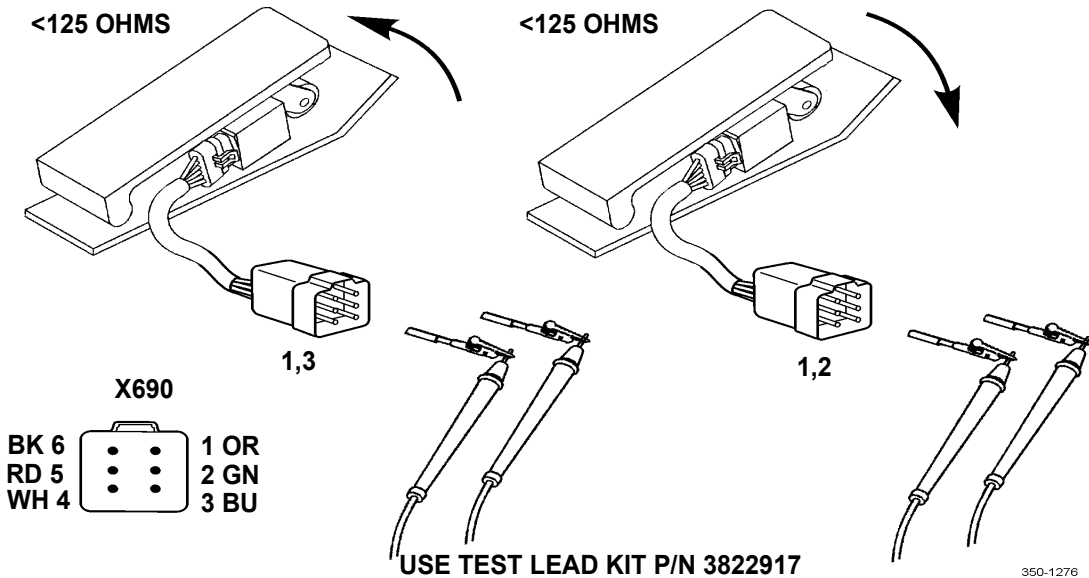


Table 3. Error Code 1431 - Idle Validation Switch Circuit Failure Troubleshooting Procedures - Continued.

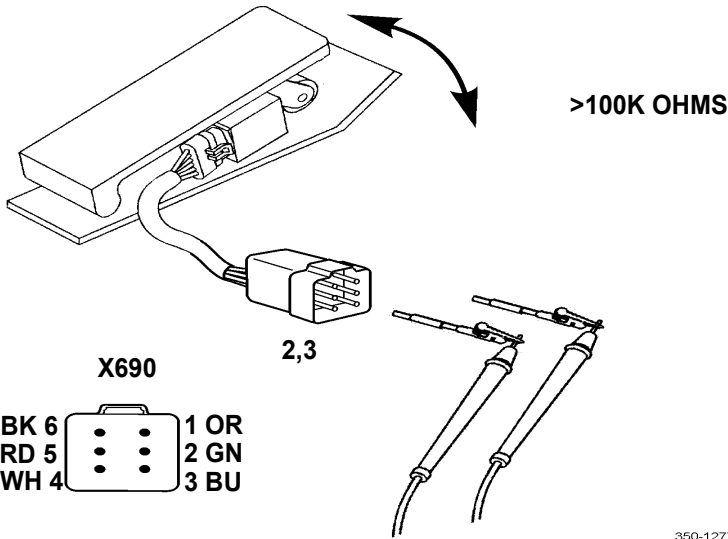
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1431 - Idle Validation Switch Circuit Failure - Continued</b></p> <p><b>USE TEST LEAD KIT P/N 3822917</b></p> 	<p>5. Place ignition switch in OFF position and disconnect harness from a sensor switch.</p> <p>6. Measure resistance between pin 2 and pin 3 of 690 connector (X690) with pedal released and depressed. Resistance should be greater than 100k ohms.</p> <p>7. Place ignition switch to OFF position and disconnect OEM harness connector from engine ECU.</p> <p>a. Inspect harness connector and engine ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check harness and engine ECU for dirt or moisture in or on connector and for missing or damaged connector seals.</p>	<p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 3. Error Code 1431 - Idle Validation Switch Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1431 - Idle Validation Switch Circuit Failure - Continued</b></p>	<p>8. Disconnect harness connector from engine ECU. Place ignition switch in ON position.</p> <p>a. Measure voltage from engine ECU OEM port connector pin 3 to engine block ground. Voltage should be 4.75-5.25V.</p>	<p>If voltage is not as specified, replace engine ECU (WP 0078 00).</p>
<p>USE TEST LEAD KIT P/N 3822917</p> <p>3, 13</p> <p>4.75-5.25V</p> <p>350-1278</p>		
	<p>b. Measure voltage from engine ECU OEM port connector pin 13 to engine block ground. Voltage should be 4.75-5.25V.</p> <p>9. Place ignition switch in OFF position, disconnect OEM harness connector from engine ECU, and connect harness to sensor switch.</p> <p>a. Measure resistance from OEM harness connector pin 3 to OEM harness connector pin 19 with accelerator pedal released. Resistance should be less than 125 ohms.</p>	<p>If voltage is not as specified, replace engine ECU (WP 0078 00).</p> <p>If harness requires replacement, notify SRA.</p>

Table 3. Error Code 1431 - Idle Validation Switch Circuit Failure Troubleshooting Procedures - Continued.

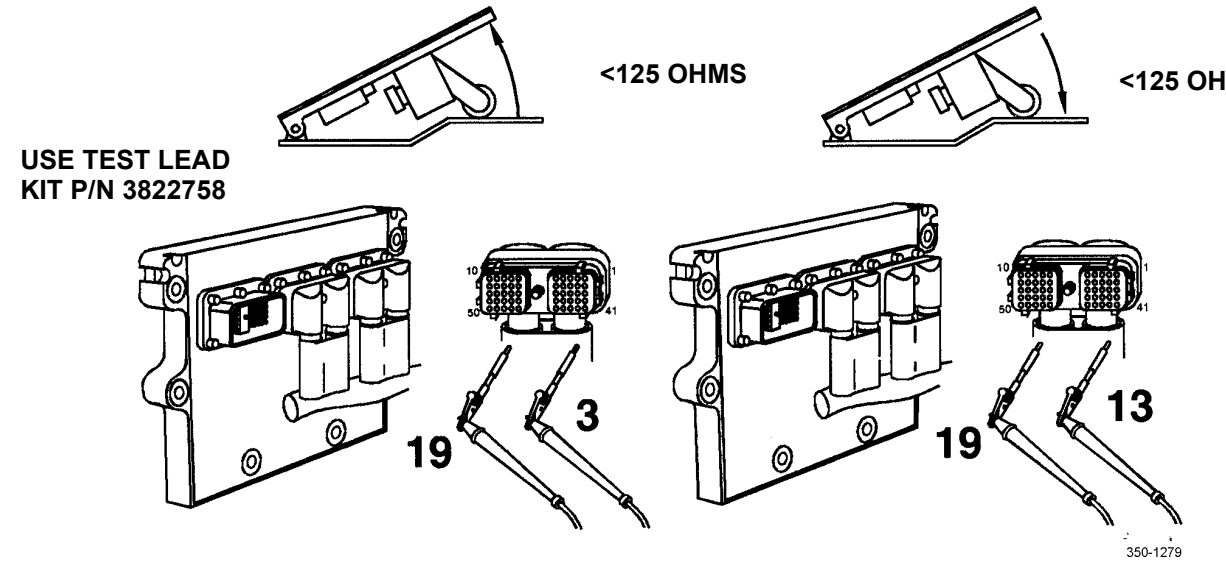
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1431 - Idle Validation Switch Circuit Failure - Continued</b></p>  <p>USE TEST LEAD KIT P/N 3822758</p>	<p>b. Measure resistance from OEM harness connector pin 13 to OEM harness connector pin 19 with accelerator pedal depressed. Resistance should be less than 125 ohms.</p> <p>10. Place ignition switch in OFF position, disconnect OEM harness connector from engine ECU, and disconnect harness from sensor switch.</p> <p>11. Place all cab switches to NEUTRAL or OFF position. Set service brake. Disconnect sensor harness connector from engine ECU.</p>	<p>If harness requires replacement, notify SRA.</p>



Table 4. Error Code 1432 - Accelerator Pedal Circuit Failure Troubleshooting Procedures.


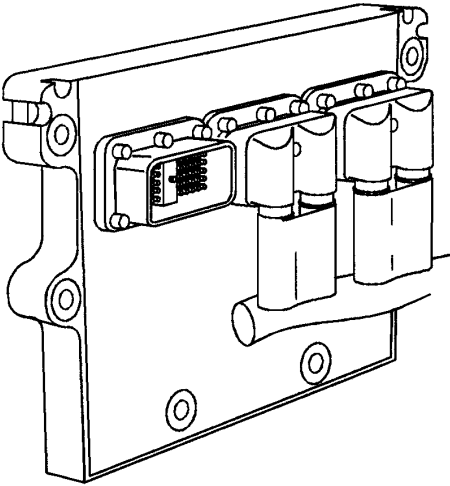
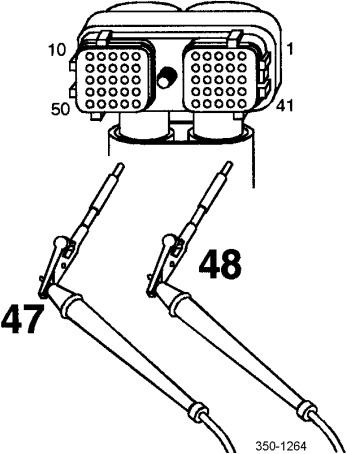
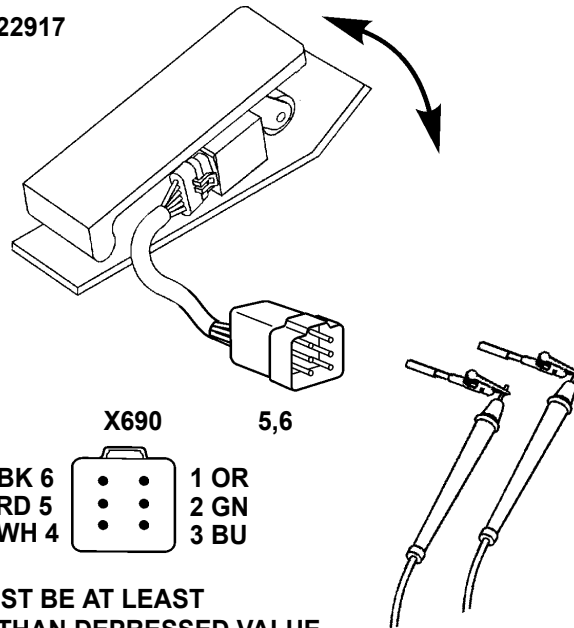
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1432 - Accelerator Pedal Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect OEM harness connector from engine ECU.                             <ol style="list-style-type: none"> <li>a. Inspect harness connector and engine ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check harness and engine ECU for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch to OFF position and disconnect OEM harness from engine ECU.                             <ol style="list-style-type: none"> <li>a. Measure resistance from OEM harness connector pin 47 to pin 48 with accelerator pedal in released position. Resistance should be 1500-3000 ohms.</li> </ol> </li> </ol> <p style="text-align: center;"><b>NOTE</b></p> <p style="text-align: center;">Released value must be at least 1000 ohms greater than depressed value.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If harness requires replacement, notify SRA.</p>
<p><b>1500-3000 OHMS RELEASED</b></p> <p><b>250-1500 OHMS DEPRESSED</b></p> 		<p style="text-align: right; font-size: small;">350-1264</p>

Table 4. Error Code 1432 - Accelerator Pedal Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1432 - Accelerator Pedal Circuit Failure - Continued</b></p>	<p>b. Measure resistance from harness connector pin 47 to pin 48 with accelerator pedal in depressed position. Resistance should be 250-1500 ohms.</p> <p>3. Place ignition switch in OFF position, disconnect harness from throttle position sensor, and disconnect OEM harness connector from engine ECU.</p> <p>a. Measure resistance from harness connector pin 5 to pin 6 on 690 connector (X690) of throttle position sensor, with accelerator pedal in released position. Resistance should be 1500-3000 ohms.</p> <p>b. Repeat above measurement with accelerator pedal in depressed position. Resistance should be 250-1500 ohms.</p>	<p>If harness requires replacement, notify SRA.</p> <p>If harness requires replacement, notify SRA.</p> <p>If harness requires replacement, notify SRA.</p>

USE TEST LEAD KIT P/N 3822917



**1500-3000 OHMS  
RELEASED**

**250-1500 OHMS  
DEPRESSED**

**NOTE: RELEASED VALUE MUST BE AT LEAST  
1000 OHMS GREATER THAN DEPRESSED VALUE**

350-1281

Table 4. Error Code 1432 - Accelerator Pedal Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1432 - Accelerator Pedal Circuit Failure - Continued</b></p>	<p>4. Place ignition switch in OFF position, disconnect harness from throttle position sensor, and disconnect OEM harness connector from engine ECU.</p> <p>a. Measure resistance from OEM harness connector pin 48 to pin 5 of 690 connector (X690) on harness side of throttle position sensor connector. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from OEM harness connector pin 47 to pin 6 of 690 connector (X690) on harness side of throttle position sensor connector. Resistance should be less than 10 ohms.</p>	<p>If harness requires replacement, notify SRA.</p> <p>If harness requires replacement, notify SRA.</p>

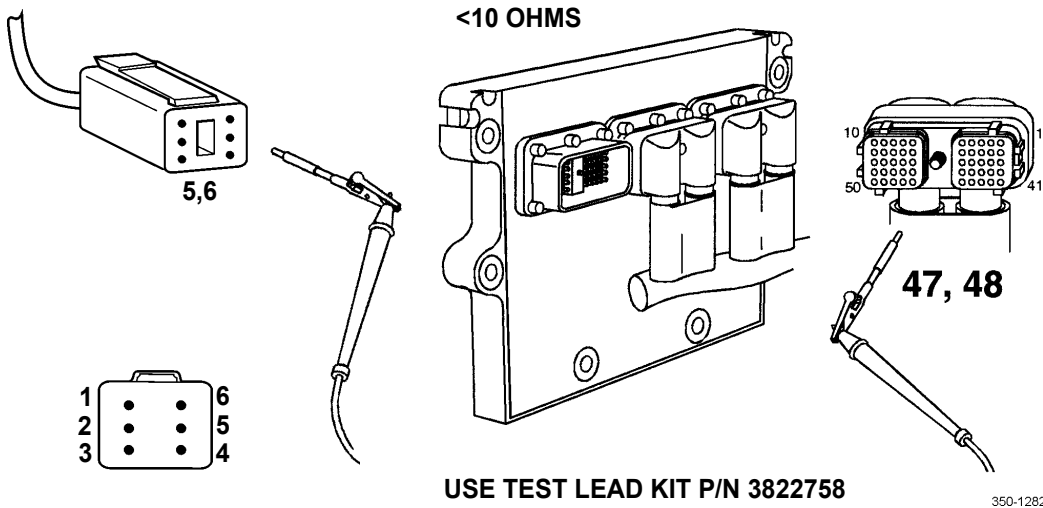




Table 4. Error Code 1432 - Accelerator Pedal Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1432 - Accelerator Pedal Circuit Failure - Continued</b></p>	<p>5. Place ignition switch in OFF position, disconnect harness from throttle position sensor, and disconnect OEM harness connector from engine ECU.</p> <p>a. Measure resistance from OEM harness connector pin 47 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from OEM harness connector pin 48 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from OEM harness connector pin 49 to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If harness requires replacement, notify SRA.</p> <p>If harness requires replacement, notify SRA.</p> <p>If harness requires replacement, notify SRA.</p>

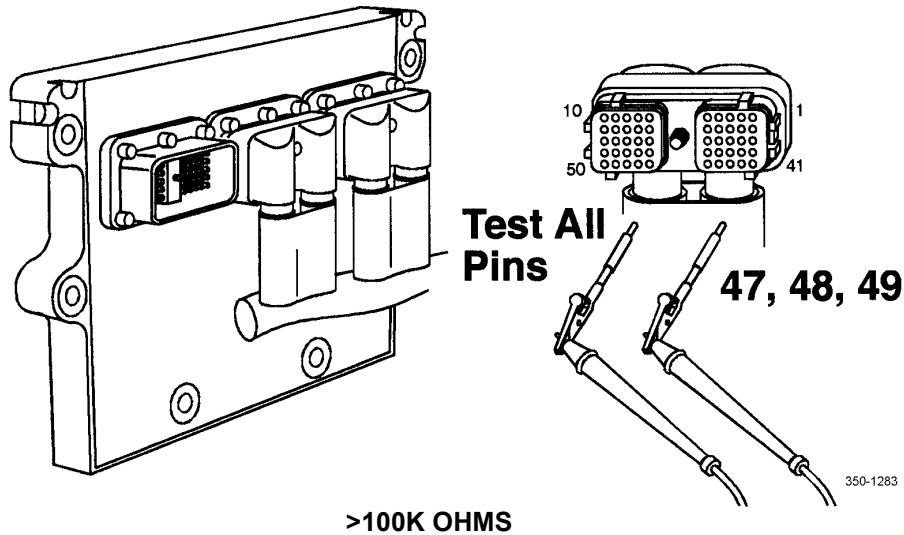

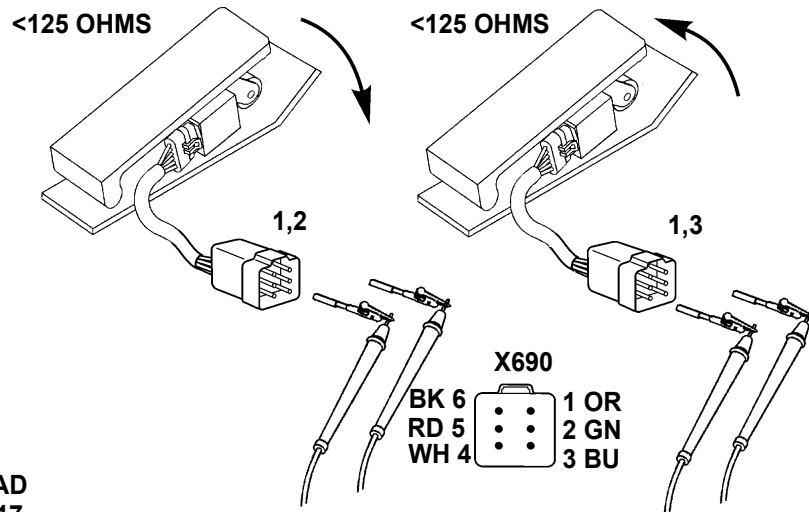


Table 5. Error Code 1551 - Idle Validation Switch Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1551 - Idle Validation Switch Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect harness from throttle position sensor 690 connector (X690).               <ol style="list-style-type: none"> <li>a. Inspect connector 690 for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check harness (X690) for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch to OFF position. Disconnect throttle position sensor 690 connector (X690).               <ol style="list-style-type: none"> <li>a. Measure resistance between pin 1 and pin 2 on switch side of 690 connector (X690) after slowly depressing pedal until fully depressed. Resistance should be less than 125 ohms.</li> <li>b. Measure resistance between pin 1 and pin 3 on switch side of 690 connector (X690) with pedal released. Resistance should be less than 125 ohms.</li> </ol> </li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p> <p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p>

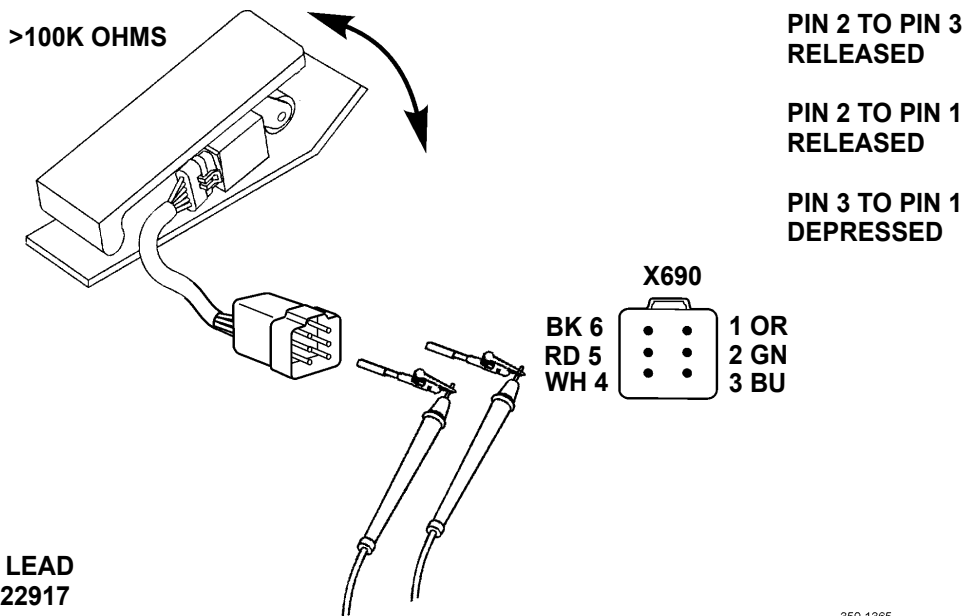


USE TEST LEAD  
KIT P/N 3822917

350-1384

Table 5. Error Code 1551 - Idle Validation Switch Circuit Failure Troubleshooting Procedures - Continued.

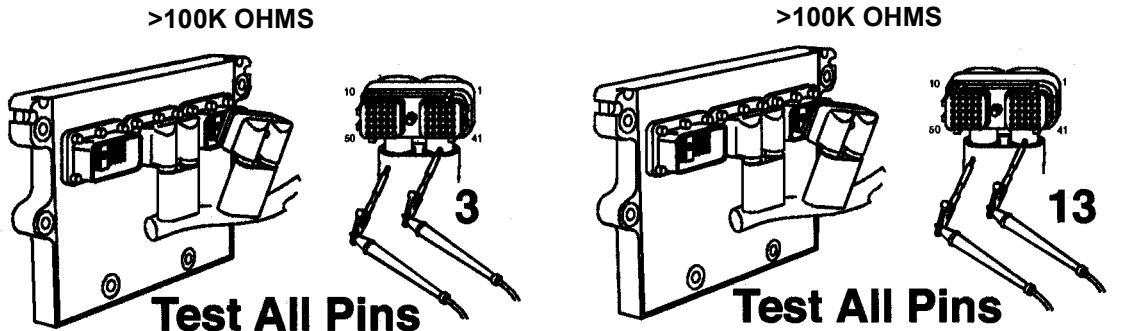
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1551 - Idle Validation Switch Circuit Failure - Continued</b></p>	<p>3. Place ignition switch in OFF position. Disconnect harness from throttle position sensor 690 connector (X690).</p> <p>a. With accelerator pedal released, measure resistance from pin 2 to pin 3 of 690 connector (X690) at switch side of connector. Resistance should be greater than 100k ohms.</p> <p>b. With accelerator pedal released, measure resistance from pin 2 to pin 1 of 690 connector (X690) at switch side of connector. Resistance should be greater than 100k ohms.</p> <p>c. With accelerator pedal depressed, measure resistance from pin 3 to pin 1 of 690 connector (X690) at switch side of connector. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p> <p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p> <p>If resistance is not as specified, replace throttle position sensor (WP 0061 00).</p>



350-1365

Table 5. Error Code 1551 - Idle Validation Switch Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1551 - Idle Validation Switch Circuit Failure - Continued</b></p>	<p>4. Place ignition switch to OFF position and disconnect OEM harness connector from engine ECU and disconnect harness from throttle position sensor 690 connector (X690).</p> <p>a. Inspect harness and engine ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check harness and engine ECU for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>5. Place ignition switch to OFF position. Disconnect OEM harness connector from engine ECU. Disconnect sensor harness connector from engine ECU.</p> <p>a. Measure resistance from pin 3 of harness connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 13 of harness connector to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If harness requires replacement, notify SRA.</p> <p>If harness requires replacement, notify SRA.</p>



USE TEST LEAD KIT P/N 3822758

350-1334

Table 5. Error Code 1551 - Idle Validation Switch Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1551 - Idle Validation Switch Circuit Failure - Continued</b></p>	<p>6. Place ignition switch in OFF position. Disconnect OEM harness from engine ECU. Disconnect throttle position sensor 690 connector (X690).</p> <p>a. Measure resistance from pin 3 of OEM harness connector to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 13 of OEM harness connector to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>If harness requires replacement, notify SRA.</p> <p>If harness requires replacement, notify SRA.</p>

**>100K OHMS**

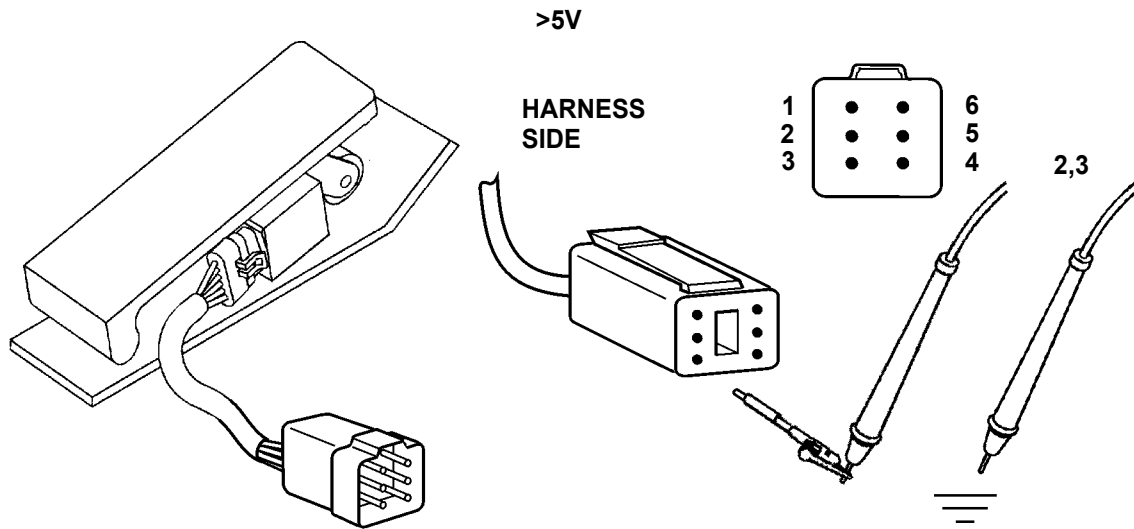
**3, 13**

**USE TEST LEAD  
KIT P/N 3822758**

350-1335

Table 5. Error Code 1551 - Idle Validation Switch Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1551 - Idle Validation Switch Circuit Failure - Continued</b></p>	<p>7. Disconnect 690 connector (X690) from harness. Place ignition switch to ON position.</p> <p>a. Measure voltage between pin 2 of 690 connector (X690) on harness side of connector to engine block ground. Voltage should be greater than 5V.</p> <p>b. Measure voltage between pin 3 of 690 connector (X690) on harness side of connector to engine block ground. Voltage should be greater than 5V.</p>	<p>If voltage is not as specified, replace engine ECU (WP 0078 00).</p> <p>If voltage is not as specified, replace engine ECU (WP 0078 00).</p>



USE TEST LEAD  
KIT P/N 3822758

350-1370

END OF WORK PACKAGE

THIS WORK PACKAGE COVERS

Error Code 166 - Cooling Fan Speed, Wiring Circuit Failure

Error Code 426 - Fording Level Switch, Input Read Incorrect

Error Code 167 - Cooling Fan Speed, Short Circuit Failure

INITIAL SETUP

References

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

ECS Electrical Servo (A34648.0200) (WP 0199 00-5)

NOTE

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

Table 1. Error Code 166 - Cooling Fan Speed, Wiring Circuit Failure Troubleshooting Procedures.

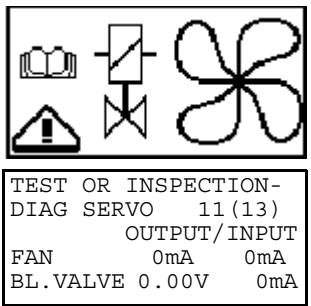
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION															
<p><b>Error Code 166 - Cooling Fan Speed, Wiring Circuit Failure</b></p>  <table border="1"> <tr> <td colspan="3">TEST OR INSPECTION-</td> </tr> <tr> <td>DIAG SERVO</td> <td>11</td> <td>(13)</td> </tr> <tr> <td colspan="3">OUTPUT/INPUT</td> </tr> <tr> <td>FAN</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>BL. VALVE</td> <td>0.00V</td> <td>0mA</td> </tr> </table>	TEST OR INSPECTION-			DIAG SERVO	11	(13)	OUTPUT/INPUT			FAN	0mA	0mA	BL. VALVE	0.00V	0mA	<ol style="list-style-type: none"> <li>1. Disconnect connector 6037 at fan control valve, turn ignition switch to ON position and perform voltage check.</li> <li>2. Check voltage between connector X158 pin 9 and pin 10.                         <ol style="list-style-type: none"> <li>a. If voltage is present, check continuity between connector 6037 pin 1 and connector X158 pin 9 and between connector 6037 pin 2 and connector X158 pin 10.</li> </ol> </li> </ol>	<p>If 20-25V is present at connector 6037, replace fan control valve (WP 0174 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>
TEST OR INSPECTION-																	
DIAG SERVO	11	(13)															
OUTPUT/INPUT																	
FAN	0mA	0mA															
BL. VALVE	0.00V	0mA															

Table 1. Error Code 166 - Cooling Fan Speed, Wiring Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 166 - Cooling Fan Speed, Wiring Circuit Failure - Continued</b></p>	<p>b. If voltage is not present, check continuity between ECU (790) connector 2 pin 13 and connector X158 pin 10, between ECU (790) connector 2 pin 10 and connector X159 pin 1, and between connector X159 pin 1 and connector X158 pin 9.</p> <p>3. Perform voltage check at connector block X154 pin 3.</p> <p>a. If 20-25V are present, check continuity between connector X154 pin 3 and ECU (790) connector 2 pin 9.</p> <p>b. If voltage is not present, check continuity between connector X154 pin 3 and emergency stop switch (250) pin 2.</p> <p>4. Enter "DIAG SERVO 11(13)" menu and check current of FAN OUTPUT. Current should be present.</p>	<p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>a. If current is not present, replace ECU (790) (WP 0079 00).</p> <p>b. If current is present, notify SRA.</p>



Table 2. Error Code 167 - Cooling Fan Speed, Short Circuit Failure Troubleshooting Procedures.

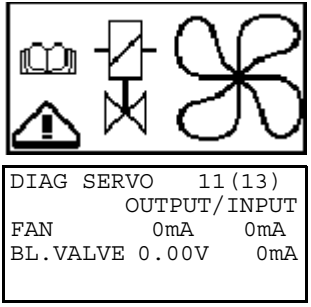
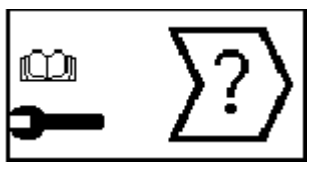
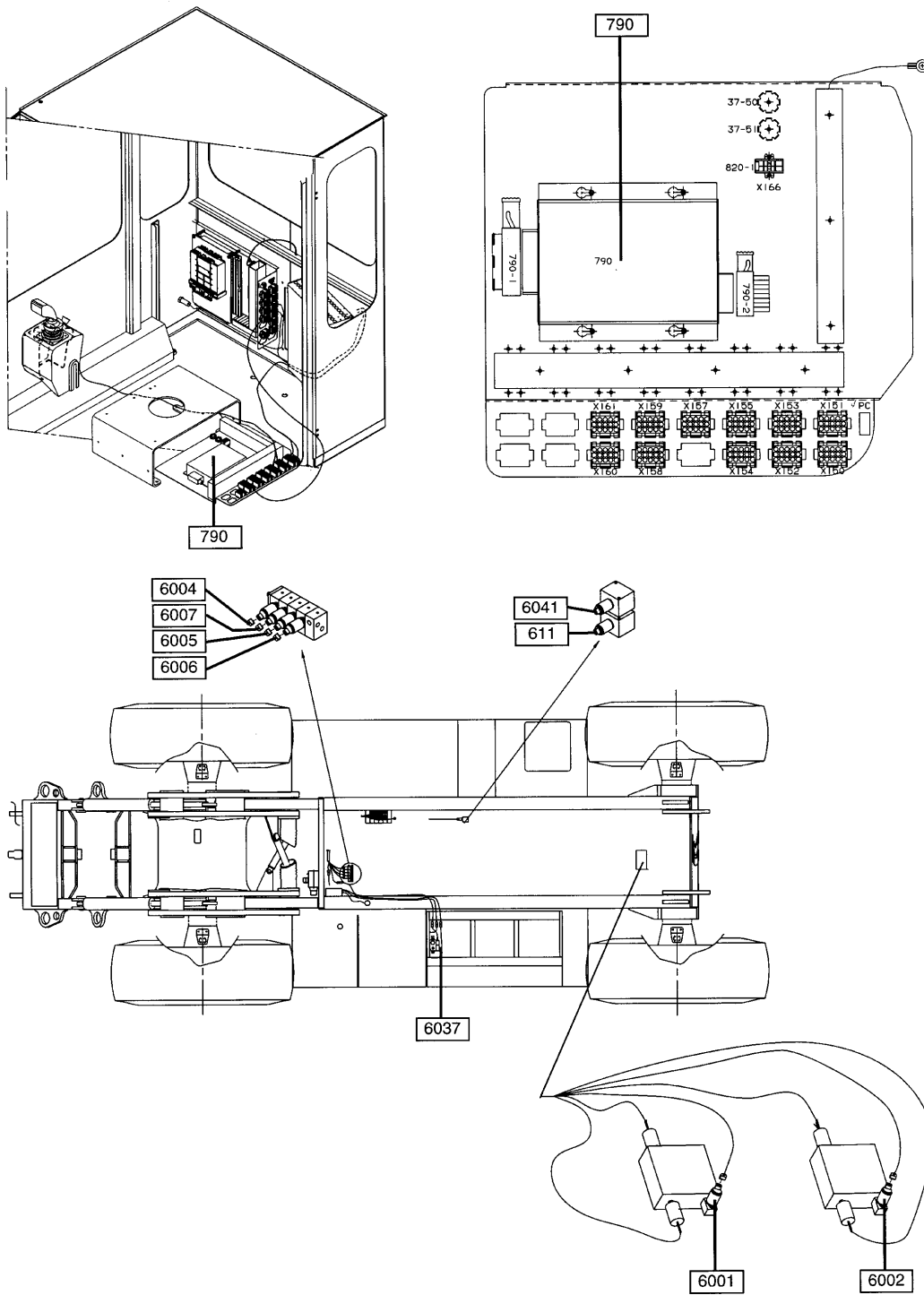
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<p><b>Error Code 167 - Cooling Fan Speed, Short Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG SERVO</td> <td>11 (13)</td> <td></td> </tr> <tr> <td></td> <td>OUTPUT/INPUT</td> <td></td> </tr> <tr> <td>FAN</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>BL. VALVE</td> <td>0.00V</td> <td>0mA</td> </tr> </table>	DIAG SERVO	11 (13)			OUTPUT/INPUT		FAN	0mA	0mA	BL. VALVE	0.00V	0mA	<ol style="list-style-type: none"> <li>1. Disconnect connector 6037 at fan control valve. Error code 166 will be displayed.</li> <li>2. Turn ignition switch to ON position and perform voltage check.</li> <li>3. Disconnect ECU (790) connector 2 and check continuity between connector pin 13 and connector X158 pin 10.</li> <li>4. Disconnect connector X158 and check continuity between connector 6037 pin 1 and pin 2 and between pin 1 and chassis and pin 2 and chassis.</li> <li>5. Disconnect ECU (790) connector 2 and check continuity between connector 6037 pin 1 and pin 2 and between connector 6037 pin 1 and chassis and pin 2 and chassis.</li> <li>6. Enter "DIAG SERVO 11(13)" menu and check current of FAN OUTPUT. Current should be present.</li> </ol>	<p>If 20-25V are present at connector 6037, replace fan control valve (WP 0174 00).</p> <ol style="list-style-type: none"> <li>a. If no continuity between pins, repair or replace connector (WP 0111 00).</li> <li>b. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <p>If continuity is present, notify SRA.</p> <ol style="list-style-type: none"> <li>a. If current is not present, replace ECU (790) (WP 0079 00).</li> <li>b. If current is present, notify SRA.</li> </ol>
DIAG SERVO	11 (13)													
	OUTPUT/INPUT													
FAN	0mA	0mA												
BL. VALVE	0.00V	0mA												

Table 3. Error Code 426 - Fording Level Switch, Input Read Incorrect Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 426 - Fording Level Switch, Input Read Incorrect</b></p> 	<ol style="list-style-type: none"> <li>1. Enter "DIAG EXTRA FUNCT" 4 (13) menu and check water level sensor setting. Enter "0" shut off and "1" to run cooling pump. Check if fording water level sensor is clogged or damaged.</li> <li>2. Check continuity between connector X195 pin 12 and connector X198 pin 8.</li> </ol>	<p>Clean and/or replace fording water level sensor (WP 0090 00).</p> <ol style="list-style-type: none"> <li>a. If no continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If problem continues, notify SRA.</li> </ol>



350-1035

END OF WORK PACKAGE

**OVERLOAD PROTECTION TROUBLESHOOTING**

**0010 00**

**THIS WORK PACKAGE COVERS**

Error Code 130 - Overload Protection System Failure

Error Code 131 - Boom Extension Sensor or Circuit Failure

Error Code 132 - Boom Angle Sensor or Circuit Failure

Error Code 133 - Left Lift Cylinder Pressure Sensor or Circuit Failure

Error Code 134 - Right Lift Cylinder Pressure Sensor or Circuit Failure

Error Code 135 - Left Lift Cylinder Piston Pressure Sensor or Circuit Failure

Error Code 136 - Right Lift Cylinder Piston Pressure Sensor or Circuit Failure

Error Code 210 - Tophandler Angle Sensor or Circuit Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

ECS Attachment (A34652.0200) (WP 0199 00-23)

ECS Electrical Servo (A34648.0200) (WP 0199 00-5)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

**Table 1. Error Code 130 - Overload Protection System Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 130 - Overload Protection System Failure</b></p> 	<p>Overload protection system is not working due to an earlier failure (error codes 131-136) on any component related to the overload protection system. Hydraulic speeds are limited and the error code will flash on the display every 5 seconds.</p>	<p>Troubleshoot original error codes 131-136.</p>

Table 2. Error Code 131 - Boom Extension Sensor or Circuit Failure Troubleshooting Procedures.

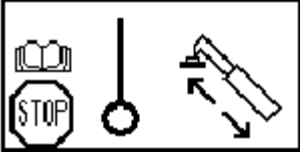
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 131 - Boom Extension Sensor or Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG SERVO</td> <td>1 (13)</td> </tr> <tr> <td>SYSTEM POWER</td> <td>24.00V</td> </tr> <tr> <td>POWER RI CAN</td> <td>24.00V</td> </tr> <tr> <td>POWER LE CAN</td> <td>24.00V</td> </tr> <tr> <td>10V REF OUT</td> <td>10.00V</td> </tr> </table>	DIAG SERVO	1 (13)	SYSTEM POWER	24.00V	POWER RI CAN	24.00V	POWER LE CAN	24.00V	10V REF OUT	10.00V	<ol style="list-style-type: none"> <li>1. Remove cover at rear of boom and inspect boom extension sensor and steel wire for damage. Ensure that steel wire easily pulls out and retracts.</li> <li>2. Remove cover from junction box X169, located on right side of boom and check voltage between pin 2 and pin 3. Voltage should be 10V.  If voltage is present, check voltage between junction box X169 pin 1 and pin 3. Voltage should be 0.3-9.5V depending on position of boom.</li> <li>3. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>4. Check ECU (790) connector 1 and ECU tray grounding leads for proper connection.</li> <li>5. Perform voltage check between connector X157 pin 2 and pin 3. Voltage should be 10V.             <ol style="list-style-type: none"> <li>a. If voltage is present, check continuity between connector X157 pin 2 and junction box X169 pin 2, between connector X157 pin 3 and junction box X169 pin 3, and between connector X157 pin 1 and junction box X169 pin 1.</li> </ol> </li> </ol>	<p>If voltage is not present, replace boom extension sensor (WP 0099 00).</p> <ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>
DIAG SERVO	1 (13)											
SYSTEM POWER	24.00V											
POWER RI CAN	24.00V											
POWER LE CAN	24.00V											
10V REF OUT	10.00V											

Table 2. Error Code 131 - Boom Extension Sensor or Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 131 - Boom Extension Sensor or Circuit Failure - Continued</b>	b. If voltage was present, enter the “DIAG SERVO 1 (13)” menu and check voltage of 10V REF OUT. Voltage should be 10V.	a. If voltage is not as specified, replace ECU (790) (WP 0079 00). b. If voltage is as specified, notify SRA.

Table 3. Error Code 132 - Boom Angle Sensor or Circuit Failure Troubleshooting Procedures.

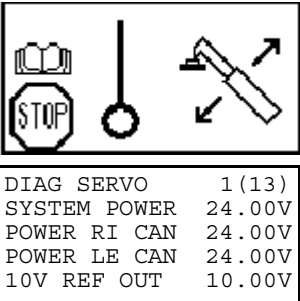
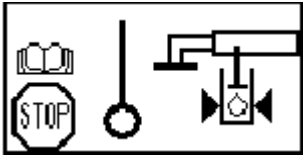
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 132 - Boom Angle Sensor or Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG SERVO</td> <td>1 (13)</td> </tr> <tr> <td>SYSTEM POWER</td> <td>24.00V</td> </tr> <tr> <td>POWER RI CAN</td> <td>24.00V</td> </tr> <tr> <td>POWER LE CAN</td> <td>24.00V</td> </tr> <tr> <td>10V REF OUT</td> <td>10.00V</td> </tr> </table>	DIAG SERVO	1 (13)	SYSTEM POWER	24.00V	POWER RI CAN	24.00V	POWER LE CAN	24.00V	10V REF OUT	10.00V	<ol style="list-style-type: none"> <li>Inspect boom angle sensor and boom angle sensor lever and bracket for damage and secure mounting.</li> <li>Remove cover from junction box X169, located on right side of boom and check voltage between pin 2 and pin 3. Voltage should be 10V.</li> </ol> <p>If voltage is present, check voltage between junction box X169 pin 4 and pin 3. Voltage should be 0.3-9.5V depending on position of boom.</p> <ol style="list-style-type: none"> <li>Remove ECU (790) cover from operator’s seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>Check ECU (790) connector 1, connector X157, and ECU tray grounding leads for proper connection.</li> </ol>	<p>If voltage is not present, replace boom angle sensor (WP 0098 00).</p> <ol style="list-style-type: none"> <li>Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol>
DIAG SERVO	1 (13)											
SYSTEM POWER	24.00V											
POWER RI CAN	24.00V											
POWER LE CAN	24.00V											
10V REF OUT	10.00V											

Table 3. Error Code 132 - Boom Angle Sensor or Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 132 - Boom Angle Sensor or Circuit Failure - Continued</b></p>	<p>5. Perform voltage check between connector X157 pin 2 and pin 3. Voltage should be 10V.</p> <p>a. If voltage is present, check continuity between connector X157 pin 2 and junction box X169 pin 2, between connector X157 pin 3 and junction box X169 pin 3, and between connector X157 pin 4 and junction box X169 pin 4.</p> <p>b. If voltage was present, enter the "DIAG SERVO 1 (13)" menu and check voltage of 10V REF OUT. Voltage should be 10V.</p>	<p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>a. If voltage is not as specified, replace ECU (790) (WP 0079 00).</p> <p>b. If voltage is as specified, notify SRA.</p>

Table 4. Error Code 133 - Left Lift Cylinder Pressure Sensor or Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 133 - Left Lift Cylinder Pressure Sensor or Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG SERVO</td> <td>1 (13)</td> </tr> <tr> <td>SYSTEM POWER</td> <td>24.00V</td> </tr> <tr> <td>POWER RI CAN</td> <td>24.00V</td> </tr> <tr> <td>POWER LE CAN</td> <td>24.00V</td> </tr> <tr> <td>10V REF OUT</td> <td>10.00V</td> </tr> </table>	DIAG SERVO	1 (13)	SYSTEM POWER	24.00V	POWER RI CAN	24.00V	POWER LE CAN	24.00V	10V REF OUT	10.00V	<p>1. Inspect left lift cylinder sensors and connectors for damage and secure mounting. Two sensors are located at locking valve at base of lift cylinder.</p>	
DIAG SERVO	1 (13)											
SYSTEM POWER	24.00V											
POWER RI CAN	24.00V											
POWER LE CAN	24.00V											
10V REF OUT	10.00V											

**Table 4. Error Code 133 - Left Lift Cylinder Pressure Sensor or Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 133 - Left Lift Cylinder Pressure Sensor or Circuit Failure - Continued</b></p>	<p>2. Remove cover from junction box X167, located at forward end of engine compartment. Start engine and check voltage between pin 16 and pin 17. Voltage should be 20-25V.</p> <p>If voltage is present, check voltage at junction box X167 pin 19. Voltage should be 0.3-10.8V depending on actual hydraulic pressure.</p> <p>3. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</p> <p>4. Check ECU (790) connector 1, connector X159, and ECU tray grounding leads for proper connection.</p> <p>5. Perform voltage check at connector X159 pin 3. Voltage should be 20-25V.</p> <p>6. If voltage is present in step 5, check continuity between connector X159 pin 3 and junction box X167 pin 16, between connector X159 pin 4 and junction box X167 pin 17, and between connector X159 pin 6 and junction box X167 pin 19.</p>	<p>If voltage is not present, replace left cylinder pressure sensor (WP 0101 00).</p> <p>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</p> <p>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>

Table 5. Error Code 134 - Right Lift Cylinder Pressure Sensor or Circuit Failure Troubleshooting Procedures.

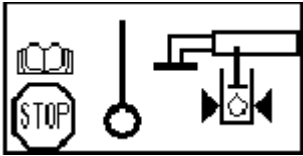
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 134 - Right Lift Cylinder Pressure Sensor or Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG SERVO</td> <td>1 (13)</td> </tr> <tr> <td>SYSTEM POWER</td> <td>24.00V</td> </tr> <tr> <td>POWER RI CAN</td> <td>24.00V</td> </tr> <tr> <td>POWER LE CAN</td> <td>24.00V</td> </tr> <tr> <td>10V REF OUT</td> <td>10.00V</td> </tr> </table>	DIAG SERVO	1 (13)	SYSTEM POWER	24.00V	POWER RI CAN	24.00V	POWER LE CAN	24.00V	10V REF OUT	10.00V	<ol style="list-style-type: none"> <li>1. Inspect right lift cylinder sensors and connectors for damage and secure mounting. Two sensors are located at locking valve at base of lift cylinder.</li> <li>2. Remove cover from junction box X167, located at forward end of engine compartment. Start engine and check voltage between pin 16 and pin 17. Voltage should be 20-25V.  If voltage is present, check voltage at junction box X167 pin 18. Voltage should be 0.3-10.8V depending on actual hydraulic pressure.</li> <li>3. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>4. Check ECU (790) connector 1, connector X159, and ECU tray grounding leads for proper connection.</li> <li>5. Perform voltage check at connector X159 pin 3. Voltage should be 20-25V.</li> </ol>	<p>If voltage is not present, replace right cylinder pressure sensor (WP 0101 00).</p> <ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol>
DIAG SERVO	1 (13)											
SYSTEM POWER	24.00V											
POWER RI CAN	24.00V											
POWER LE CAN	24.00V											
10V REF OUT	10.00V											



Table 5. Error Code 134 - Left Lift Cylinder Piston Pressure Sensor or Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 134 - Right Lift Cylinder Pressure Sensor or Circuit Failure - Continued</b></p>	<p>6. If voltage is present in step 5, check continuity between connector X159 pin 3 and junction box X167 pin 16, between connector X159 pin 4 and junction box X167 pin 17, and between connector X159 pin 5 and junction box X167 pin 18.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00). b. If problem persists, notify SRA.</p>

Table 6. Error Code 135 - Left Lift Cylinder Piston Pressure Sensor or Circuit Failure Troubleshooting Procedures.

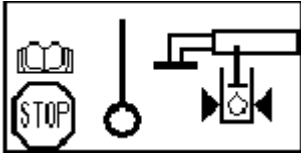
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 135 - Left Lift Cylinder Piston Pressure Sensor or Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG SERVO</td> <td>1(13)</td> </tr> <tr> <td>SYSTEM POWER</td> <td>24.00V</td> </tr> <tr> <td>POWER RI CAN</td> <td>24.00V</td> </tr> <tr> <td>POWER LE CAN</td> <td>24.00V</td> </tr> <tr> <td>10V REF OUT</td> <td>10.00V</td> </tr> </table>	DIAG SERVO	1(13)	SYSTEM POWER	24.00V	POWER RI CAN	24.00V	POWER LE CAN	24.00V	10V REF OUT	10.00V	<ol style="list-style-type: none"> <li>1. Inspect left lift cylinder sensors and connector for damage and secure mounting. Two sensors are located at locking valve at base of lift cylinder.</li> <li>2. Remove cover from junction box X167, located at forward end of engine compartment. Start engine and check voltage between pin 16 and pin 17. Voltage should be 20-25V.</li> </ol>	
DIAG SERVO	1(13)											
SYSTEM POWER	24.00V											
POWER RI CAN	24.00V											
POWER LE CAN	24.00V											
10V REF OUT	10.00V											

Table 6. Error Code 135 - Left Lift Cylinder Piston Pressure Sensor or Circuit Failure  
Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 135 - Left Lift Cylinder Piston Pressure Sensor or Circuit Failure - Continued</b></p>	<p>If voltage is present, check voltage at junction box X167 pin 21. Voltage should be 0.3-10.8V depending on actual hydraulic pressure.</p> <p>3. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</p> <p>4. Check ECU (790) connector 1, connector X159, and ECU tray grounding leads for proper connection.</p> <p>5. Perform voltage check at connector X159 pin 3. Voltage should be 20-25V.</p> <p>6. If voltage is present in step 5, check continuity between connector X159 pin 3 and junction box X167 pin 16, between connector X159 pin 4 and junction box X167 pin 17, and between connector X159 pin 8 and junction box X167 pin 20.</p>	<p>If voltage is not present, replace lift cylinder pressure sensor (WP 0101 00).</p> <p>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</p> <p>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If problem persists, notify SRA.</p>

Table 7. Error Code 136 - Right Lift Cylinder Piston Pressure Sensor or Circuit Failure Troubleshooting Procedures.

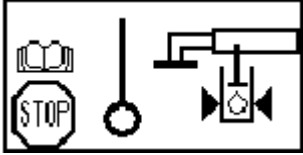

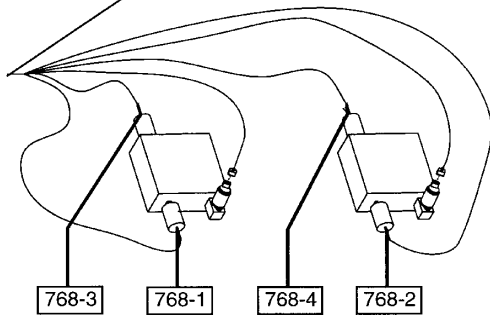
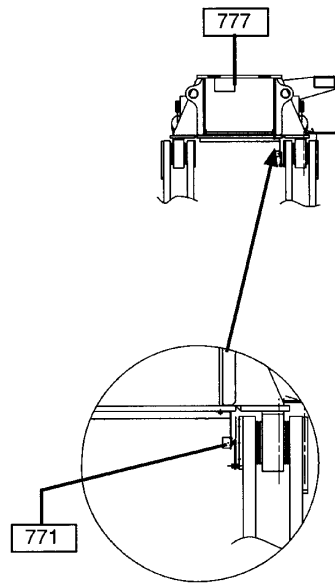
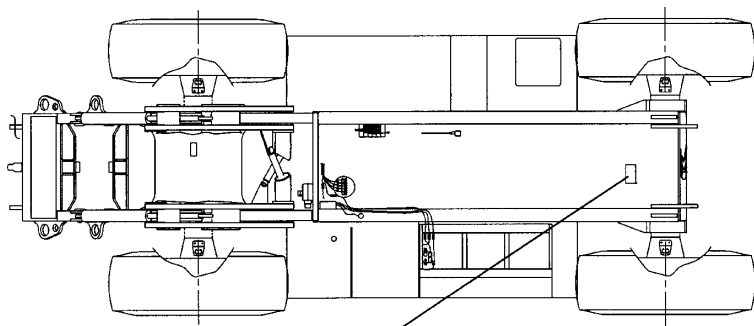
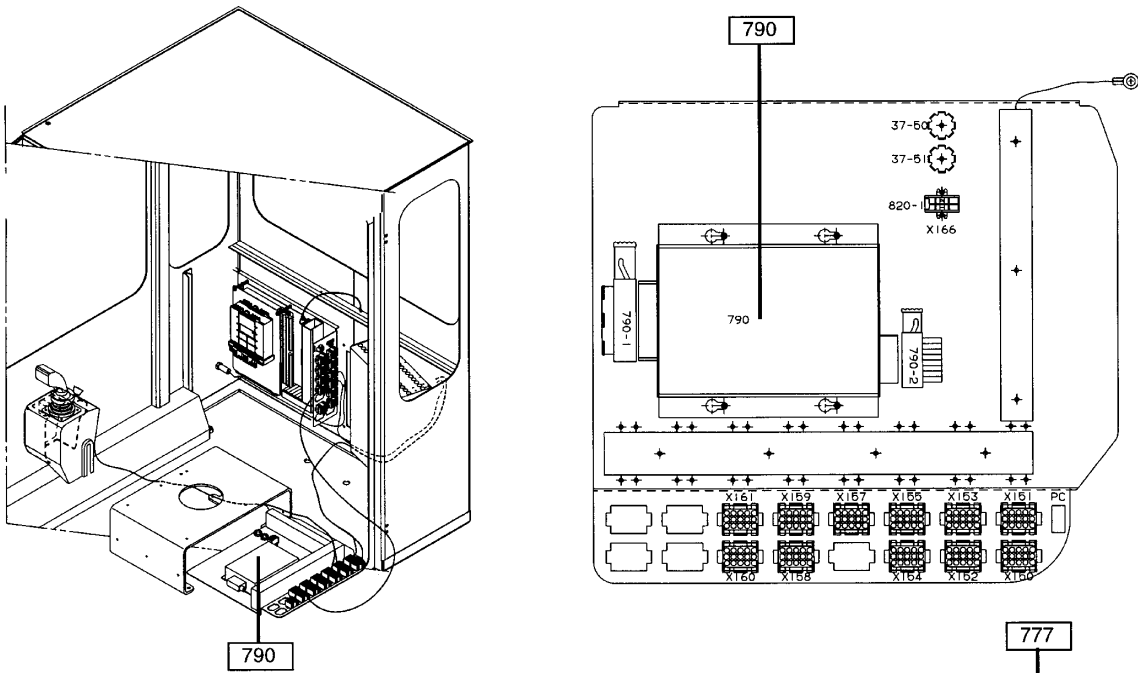
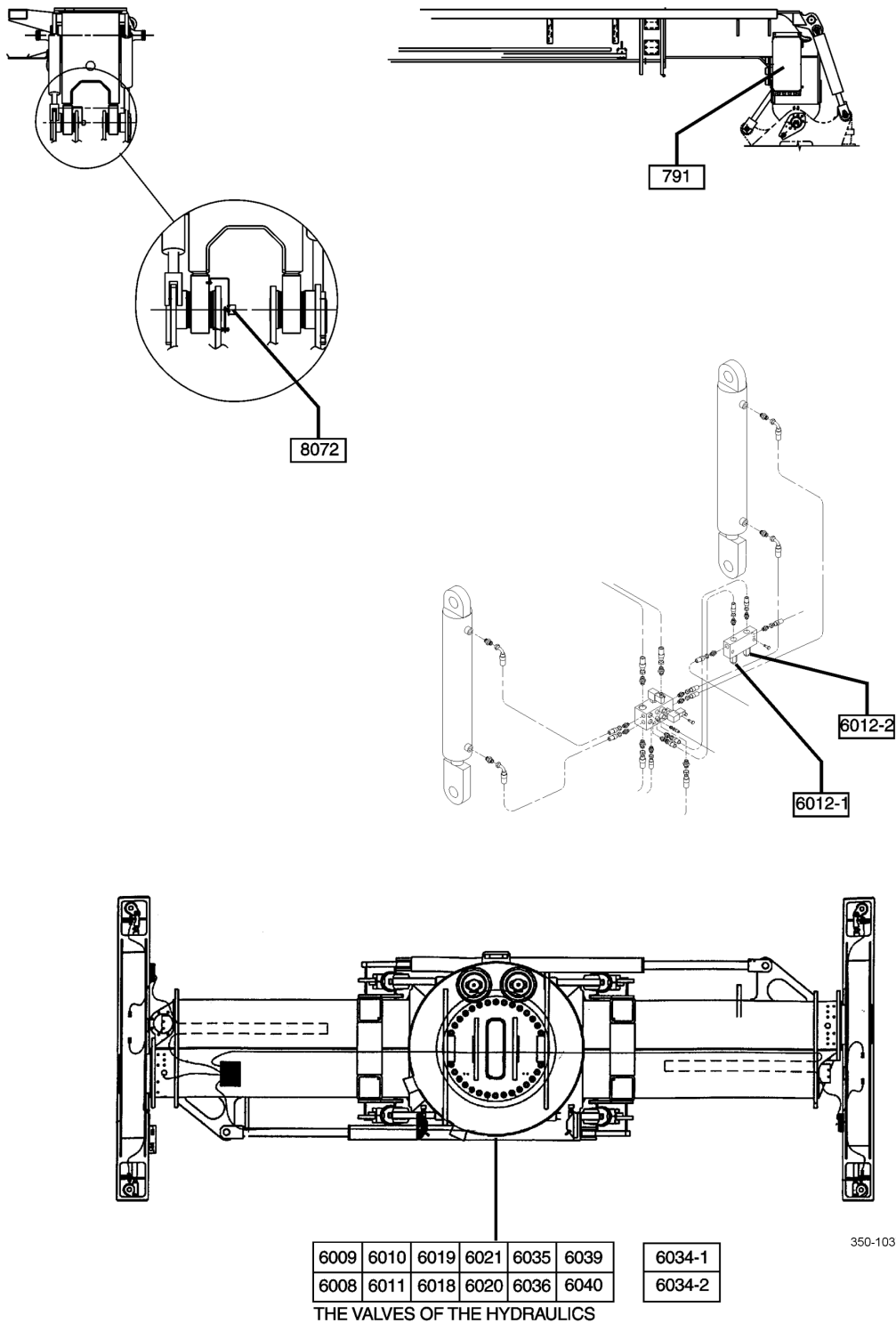
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 136 - Right Lift Cylinder Piston Pressure Sensor or Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG SERVO</td> <td>1(13)</td> </tr> <tr> <td>SYSTEM POWER</td> <td>24.00V</td> </tr> <tr> <td>POWER RI CAN</td> <td>24.00V</td> </tr> <tr> <td>POWER LE CAN</td> <td>24.00V</td> </tr> <tr> <td>10V REF OUT</td> <td>10.00V</td> </tr> </table>	DIAG SERVO	1(13)	SYSTEM POWER	24.00V	POWER RI CAN	24.00V	POWER LE CAN	24.00V	10V REF OUT	10.00V	<ol style="list-style-type: none"> <li>1. Inspect right lift cylinder sensors and connectors for damage and secure mounting. Two sensors are located at locking valve at base of lift cylinder.</li> <li>2. Remove cover from junction box X167, located at forward end of engine compartment. Start engine and check voltage between pin 16 and pin 17. Voltage should be 20-25V.  If voltage is present, check voltage at junction box X167 pin 21. Voltage should be 0.3-10.8V depending on actual hydraulic pressure.</li> <li>3. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>4. Check ECU (790) connector 1, connector X159, and ECU tray grounding leads for proper connection.</li> <li>5. Perform voltage check at connector X159 pin 3. Voltage should be 20-25V.</li> <li>6. If voltage is present in step 5, check continuity between connector X159 pin 3 and junction box X167 pin 16, between connector X159 pin 4 and junction box X167 pin 17, and between connector X159 pin 8 and junction box X167 pin 20.</li> </ol>	<p>If voltage is not present, replace lift cylinder pressure sensor (WP 0101 00).</p> <ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If problem persists, notify SRA.</li> </ol>
DIAG SERVO	1(13)											
SYSTEM POWER	24.00V											
POWER RI CAN	24.00V											
POWER LE CAN	24.00V											
10V REF OUT	10.00V											

Table 8. Error Code 210 - Tophandler Angle Sensor or Circuit Failure Troubleshooting Procedures

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 210 - Tophandler Angle Sensor or Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG TOP LIFT 1(16)</td> <td></td> </tr> <tr> <td>SYSTEM POWER</td> <td>24.00V</td> </tr> <tr> <td>POWER RI CAN</td> <td>24.00V</td> </tr> <tr> <td>POWER LE CAN</td> <td>24.00V</td> </tr> <tr> <td>10 V REF OUT</td> <td>10.00V</td> </tr> </table>	DIAG TOP LIFT 1(16)		SYSTEM POWER	24.00V	POWER RI CAN	24.00V	POWER LE CAN	24.00V	10 V REF OUT	10.00V	<ol style="list-style-type: none"> <li>1. Inspect tophandler angle sensor and lever and bracket for damage and secure mounting.</li> <li>2. Remove cover from tophandler junction box located on right side of boom and check voltage between connector X180 pin 10 and pin 12. Voltage should be 10V.  If voltage is present, check voltage between connector X180 pin 10 and pin 11. Voltage should be 0.3-9.5V depending on position of boom.</li> <li>3. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>4. Check ECU (790) connector 1, connector X159, and ECU tray grounding leads for proper connection.</li> <li>5. Enter "DIAG ATTACHMENT 1 (16)" menu and check voltage of 10V REF OUT. Voltage should be 10V.</li> </ol>	<p>If voltage is not present, replace tophandler angle sensor (WP 0100 00).</p> <ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <ol style="list-style-type: none"> <li>a. If voltage is not as specified, replace ECU (790) (WP 0079 00).</li> <li>b. If voltage is as specified, notify SRA.</li> </ol>
DIAG TOP LIFT 1(16)												
SYSTEM POWER	24.00V											
POWER RI CAN	24.00V											
POWER LE CAN	24.00V											
10 V REF OUT	10.00V											



350-1039



END OF WORK PACKAGE

**THIS WORK PACKAGE COVERS**

Error Code 205 - Memory Failure

Error Code 220 - Internal Communication Failure, Connector 2

Error Code 221 - Internal Communication Failure, Connector 2

Error Code 250 - Internal Communication Failure, Connector 3

Error Code 251 - Internal Communication Failure, Connector 3

**INITIAL SETUP**

**References**

TM 10-3930-675-10


Current Supply (A34738.0200) (WP 0199 00-31)

ECS Attachment (A34652.0200) (WP 0199 00-23)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

**Table 1. Error Code 205 - Memory Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 205 - Memory Failure</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>Replace ECU 791 if error code is still present (WP 0076 00).</p>

**Table 2. Error Code 220 - Internal Communication Failure, Connector 2 Troubleshooting Procedures.**

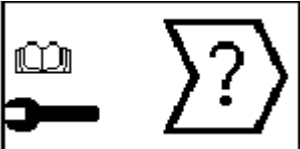
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 220 - Internal Communication Failure, Connector 2</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>Replace ECU 791 if error code is still present (WP 0076 00).</p>

Table 3. Error Code 221- Internal Communication Failure, Connector 2 Troubleshooting Procedures.

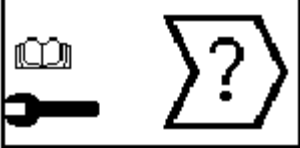
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 221 - Internal Communication Failure, Connector 2</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>Replace ECU 791 if error code is still present (WP 0076 00).</p>

Table 4. Error Code 250 - Internal Communication Failure, Connector 3 Troubleshooting Procedures.

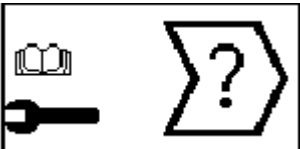
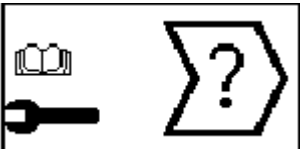
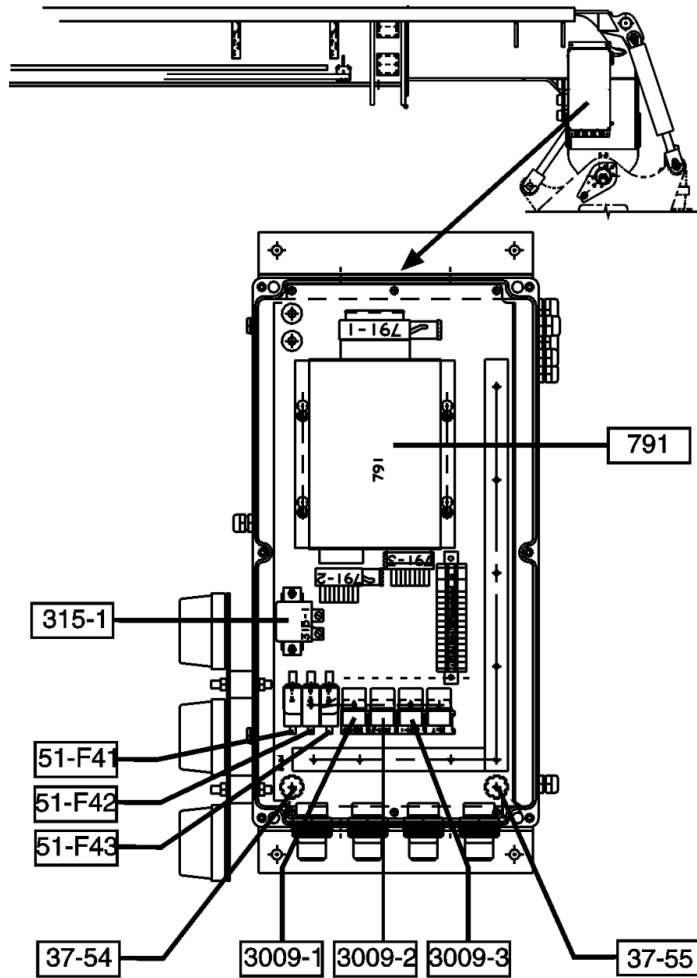
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 250 - Internal Communication Failure, Connector 3</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>Replace ECU 791 if error code is still present (WP 0076 00).</p>

Table 5. Error Code 251- Internal Communication Failure, Connector 3 Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 251 - Internal Communication Failure, Connector 3</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>Replace ECU 791 if error code is still present (WP 0076 00).</p>





350-1044

END OF WORK PACKAGE

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**ELECTRONIC CONTROL UNIT (ECU) INPUT VOLTAGE TROUBLESHOOTING**

**0012 00**

**THIS WORK PACKAGE COVERS**

Error Code 121 - Supply Voltage to Servo ECU (790) Failure

Error Code 122 - Supply Voltage to Servo ECU (790) Failure

Error Code 123 - 10V Reference Voltage for Servo ECU (790) Failure

Error Code 201 - Supply Voltage to Tophandler ECU (791) Failure

Error Code 202 - Supply Voltage to Tophandler ECU (791) Failure

Error Code 203 - 10V Reference Voltage for Tophandler ECU (791) Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

**References - Continued**


ECS Attachment (A34652.0200) (WP 0199 00-23)

ECS Electrical Servo (A34648.0200) (WP 0199 00-5)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

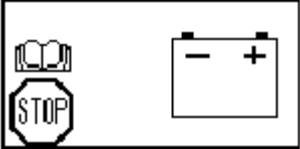
**Table 1. Error Code 121 - Supply Voltage to Servo ECU (790) Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 121 - Supply Voltage to Servo ECU (790) Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that emergency stop switch is not activated.</li> <li>2. Remove cab circuit breaker panel and ensure that circuit breakers F30 is not tripped.</li> <li>3. Check relay (315) for proper function.</li> <li>4. Check automatic circuit breaker F50-2 for proper function.</li> <li>5. Disconnect ECU (790) connector 1 from ECU and perform voltage check at connector pins 1 and pin 15.</li> </ol>	<p>Release emergency stop switch as required (TM 10-3930-675-10).</p> <p>Reset circuit breaker as required (WP 0073 00).</p> <p>Replace relay if shorted (WP 0073 00).</p> <p>Replace circuit breaker if shorted (WP 0073 00).</p> <p>If voltage is present, replace ECU (790) (WP 0079 00).</p>

**Table 1. Error Code 121 - Supply Voltage to Servo ECU (790) Failure  
Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 121 - Supply Voltage to Servo ECU (790) Failure - Continued</b></p>	<p>6. Check for voltage at connector X154 pin 4.</p> <p>7. Check for voltage at emergency stop switch pin 2 (wire 1544).</p> <p>8. Check for voltage at connector X154 pin 1.</p> <p>9. Check for voltage at connector X150 pin 1.</p> <p>10. Check for voltage at connector X30 pin 1.</p> <p>11. Check for voltage at circuit breaker F30.</p> <p>12. Check for voltage at relay 315 pin 87.</p> <p>13. Check for voltage at connector X80 pin 3.</p> <p>14. Check for voltage at automatic circuit breaker F50-2.</p>	<p>If voltage is present, notify SRA.</p> <p>If voltage is present, notify SRA to replace wire (1544).</p> <p>If voltage is present, notify SRA to replace wire (1541).</p> <p>If voltage is present, notify SRA to replace wire (1501).</p> <p>If voltage is present, notify SRA to replace wire (301).</p> <p>If voltage is present, notify SRA to replace wire (A301).</p> <p>If voltage is present, notify SRA to replace wire (A808A).</p> <p>If voltage is present, notify SRA to replace wire (A804).</p> <p>If voltage is present, notify SRA to replace wire (803).</p>

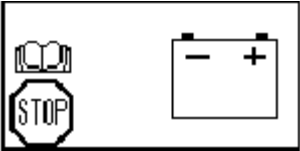
Table 2. Error Code 122 - Supply Voltage to Servo ECU (790) Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 122 - Supply Voltage to Servo ECU (790) Failure</b></p>  <pre> DIAG SERVO      1 (13) SYSTEM POWER    24.00V POWER RI CAN    24.00V POWER LE CAN    24.00V 10V REF OUT     10.00V                     </pre>	<ol style="list-style-type: none"> <li>1. Remove cab circuit breaker panel and ensure that circuit breaker F32 is not tripped.</li> <li>2. Check batteries for loose or damaged cables.</li> <li>3. Check relay 315 for proper function.</li> <li>4. Check automatic circuit breaker F50-2 for proper function.</li> <li>5. Disconnect ECU (790) connector 1 from ECU and perform voltage check at pin 7 and pin 8.</li> <li>6. Check for voltage at connector X30 pin 2.</li> <li>7. Check for voltage at circuit breaker F32.</li> <li>8. Check for voltage at relay 315 pin 87.</li> <li>9. Check for voltage at connector X80 pin 3.</li> <li>10. Check for voltage at automatic circuit breaker F50-2.</li> </ol>	<p>Reset circuit breaker as required (WP 0073 00).</p> <p>Tighten or replace battery cables (WP 0108 00).</p> <p>Replace relay if shorted (WP 0073 00).</p> <p>Replace circuit breaker if shorted (WP 0073 00).</p> <p>If voltage is present, replace ECU (790) (WP 0079 00).</p> <p>If voltage is present, notify SRA.</p> <p>If voltage is present, notify SRA to replace wire to (A302).</p> <p>If voltage is present, notify SRA to replace wire(s) (A808A, A808B, and/or A808C).</p> <p>If voltage is present, notify SRA to replace wire (A804).</p> <p>If voltage is present, notify SRA to replace wire (A803).</p>

**NOTE**

ECU (790) has detected a 10V reference voltage out of range (9.3-10.4V).

**Table 3. Error Code 123 - 10V Reference Voltage for Servo ECU (790) Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 123 - 10V Reference Voltage for Servo ECU (790) Failure</b></p>  <table border="1"> <tr> <td>DIAG SERVO</td> <td>1 (13)</td> </tr> <tr> <td>SYSTEM POWER</td> <td>24.00V</td> </tr> <tr> <td>POWER RI CAN</td> <td>24.00V</td> </tr> <tr> <td>POWER LE CAN</td> <td>24.00V</td> </tr> <tr> <td>10V REF OUT</td> <td>10.00V</td> </tr> </table>	DIAG SERVO	1 (13)	SYSTEM POWER	24.00V	POWER RI CAN	24.00V	POWER LE CAN	24.00V	10V REF OUT	10.00V	<ol style="list-style-type: none"> <li>1. Ensure that emergency stop switch is not activated.</li> <li>2. Remove cab circuit breaker panel cover and ensure that circuit breakers F30 and F32 are not tripped.</li> <li>3. Remove servo ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>4. Disconnect ECU (790) connectors X155 and X157.</li> <li>5. Enter "DIAG SERVO 1 (13)" menu and check voltage of 10V REF OUT. Voltage should be 9.3-10.4V.             <ol style="list-style-type: none"> <li>a. If voltage is correct, connect connector X155 and continue with troubleshooting procedure.</li> <li>b. If voltage is not as specified, check continuity between servo ECU (790) connector 1 in 26 and connector X155 pin 13 and between servo ECU (790) connector 1 pin 27 and connector X155 pin 12.</li> </ol> </li> </ol>	<p>Release emergency stop switch as required (TM 10-3930-675-10).</p> <p>Reset circuit breakers as required (WP 0073 00).</p> <p>a. If continuity is present, replace servo ECU (790) (WP 0079 00).</p> <p>b. If continuity is not present, notify SRA.</p>
DIAG SERVO	1 (13)											
SYSTEM POWER	24.00V											
POWER RI CAN	24.00V											
POWER LE CAN	24.00V											
10V REF OUT	10.00V											



**Table 3. Error Code 123 - 10V Reference Voltage for Servo ECU (790) Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 123 - 10V Reference Voltage for Servo ECU (790) Failure - Continued</b>	b. If voltage is not as specified, check continuity between connector X157 pin 2 and junction box X169 pin 2 and between connector X157 pin 3 and junction box X169 pin 3.	a. If continuity is not present, repair or replace connectors (WP 0111 00). b. If continuity is present, notify SRA.

**Table 4. Error Code 201 - Supply Voltage to Tophandler ECU (791) Failure Troubleshooting Procedures.**


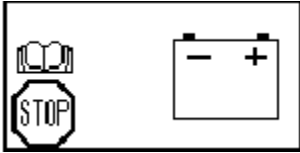
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 201 - Supply Voltage to Tophandler ECU (791) Failure</b></p>  <pre> DIAG TOP LIFT 1 (16) SYSTEM POWER 24.00V POWER RI CAN 24.00V POWER LE CAN 24.00V 10 V REF OUT 10.00V                     </pre>	<ol style="list-style-type: none"> <li>1. Ensure that emergency stop switch is not activated.</li> <li>2. Remove tophandler junction box cover and ensure that circuit breaker 51-F41 is not tripped.</li> <li>3. Remove and test four relays 3009-1, 3009-2, and 3009-3, and 315-1 (WP 0111 00).</li> <li>4. Test automatic circuit breaker F40 at tophandler junction box (WP 0111 00).</li> <li>5. Disconnect ECU (791) connector 1 and check voltage at pin 1 and pin 15.</li> <li>6. Check voltage at relay 3009-2 pin 87.</li> <li>7. Check voltage at relay 3009-1 pin 87.</li> <li>8. Check voltage at circuit breaker 51-F41.</li> <li>9. Check voltage at relay 315-1 in 87.</li> </ol>	<p>Release emergency stop switch (TM 10-3930-675-10) as required.</p> <p>Reset circuit breaker as required (WP 0076 00).</p> <p>Replace defective relays (WP 0076 00 and WP 0111 00).</p> <p>Replace circuit breaker if shorted (WP 0076 00).</p> <p>If voltage is present, replace ECU (791) (WP 0076 00).</p> <p>If voltage is present, notify SRA.</p> <p>If voltage is present, notify SRA to replace wire (A51E).</p> <p>If voltage is present, notify SRA to replace wire (A51B).</p> <p>If voltage is present, notify SRA to replace wire (A51J).</p>



Table 4. Error Code 201 - Supply Voltage to Tophandler ECU (791) Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Error Code 201 - Supply Voltage to Tophandler ECU (791) Failure - Continued	10. Check voltage at connector X186 pin 1 located in tophandler junction box.	If voltage is present, notify SRA to replace wire (A1861A).

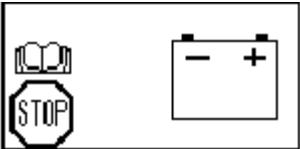
Table 5. Error Code 202 - Supply Voltage to Tophandler ECU (791) Failure Troubleshooting Procedures.

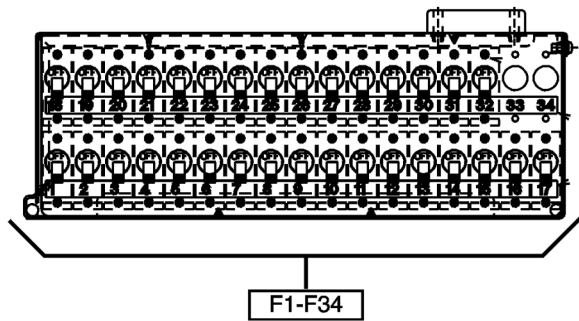
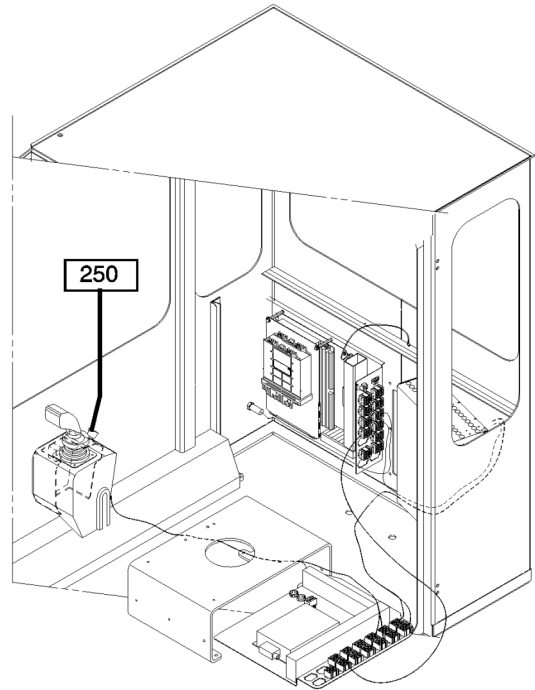
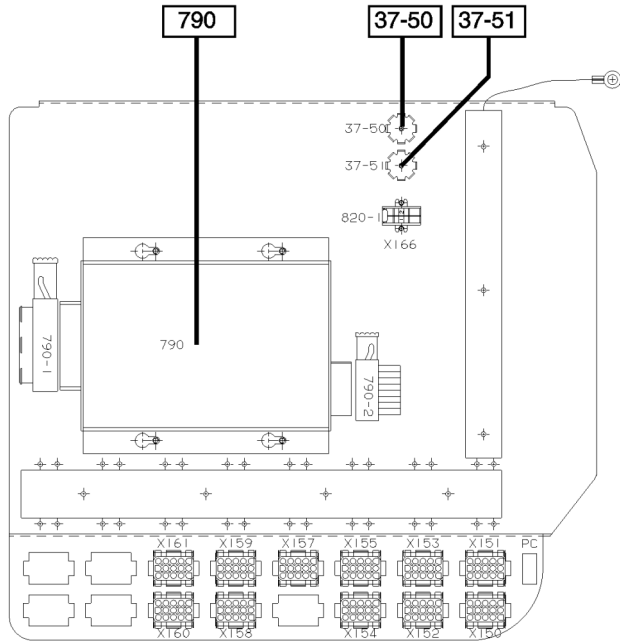
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 202 - Supply Voltage to Tophandler ECU (791) Failure</p>  <pre> DIAG TOP LIFT 1 (16) SYSTEM POWER 24.00V POWER RI CAN 24.00V POWER LE CAN 24.00V 10 V REF OUT 10.00V                     </pre>	<ol style="list-style-type: none"> <li>1. Remove tophandler junction box cover and ensure that circuit breaker 51-F41 is not tripped.</li> <li>2. Test relay 315-1 for proper operation (WP 0111 00).</li> <li>3. Disconnect ECU (790) connector 1 and check voltage at pin 7 and pin 8.</li> <li>4. Test automatic circuit breaker 51-F41 at tophandler junction box (WP 0111 00).</li> <li>5. Check voltage at circuit breaker 51-F41.</li> <li>6. Check voltage at relay 315-1 pin 87.</li> <li>7. Check voltage at connector X186 pin 1.</li> </ol>	<p>Reset circuit breaker as required (WP 0076 00).</p> <p>Replace relay if shorted (WP 0076 00).</p> <p>If voltage is present, replace ECU (790) (WP 0079 00).</p> <p>Replace circuit breaker if shorted (WP 0076 00).</p> <p>If voltage is present, notify SRA.</p> <p>If voltage is present, notify SRA to replace wire (A51J).</p> <p>If voltage is present, notify SRA to replace wire (A1861A).</p>

**NOTE**

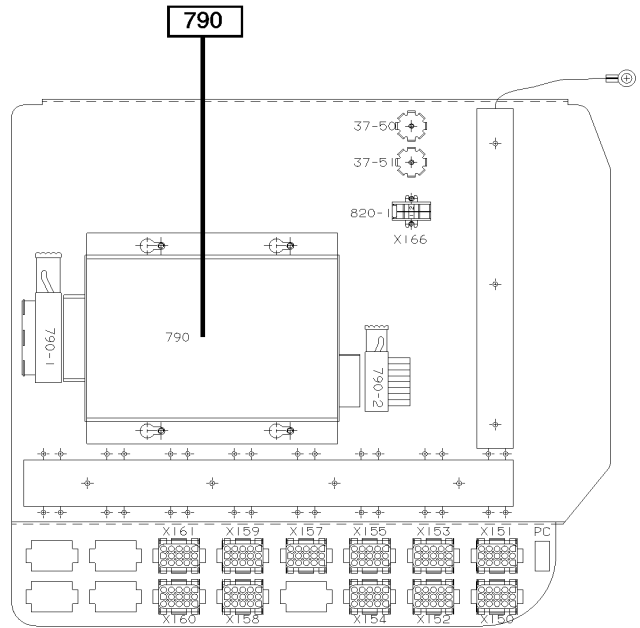
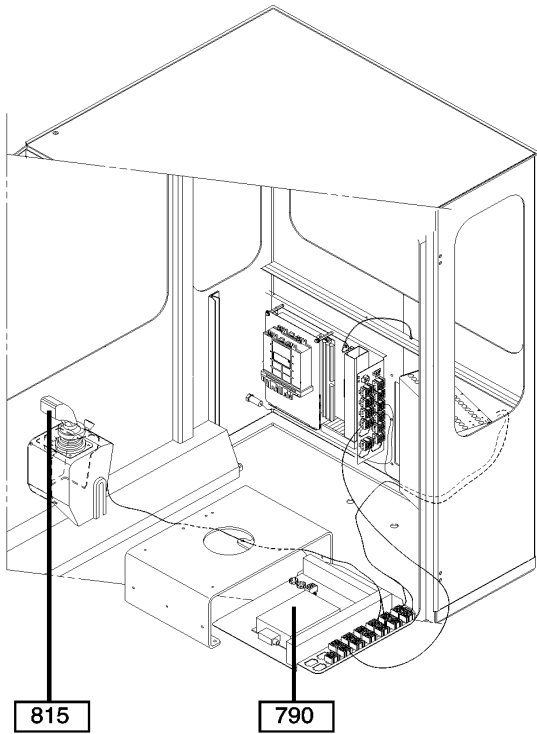
Tophandler ECU (791) has detected a 10V reference voltage out of range (9.3-10.4V).

**Table 6. Error Code 203 - 10V Reference Voltage for Tophandler ECU (791) Failure Troubleshooting Procedures.**

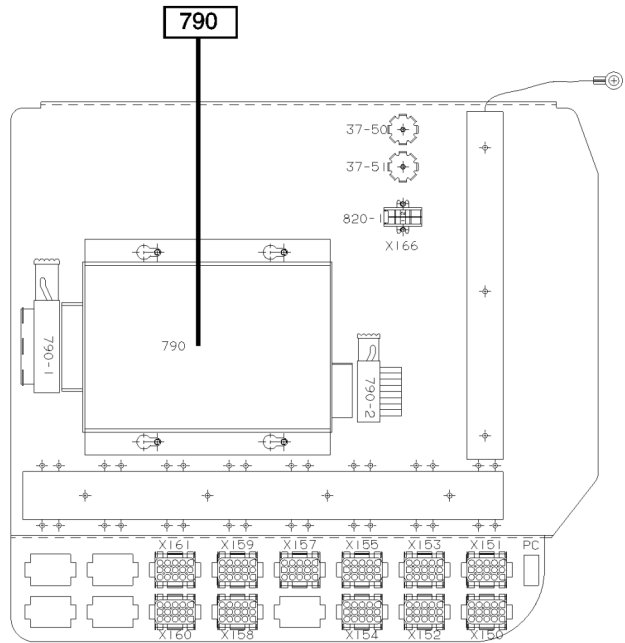
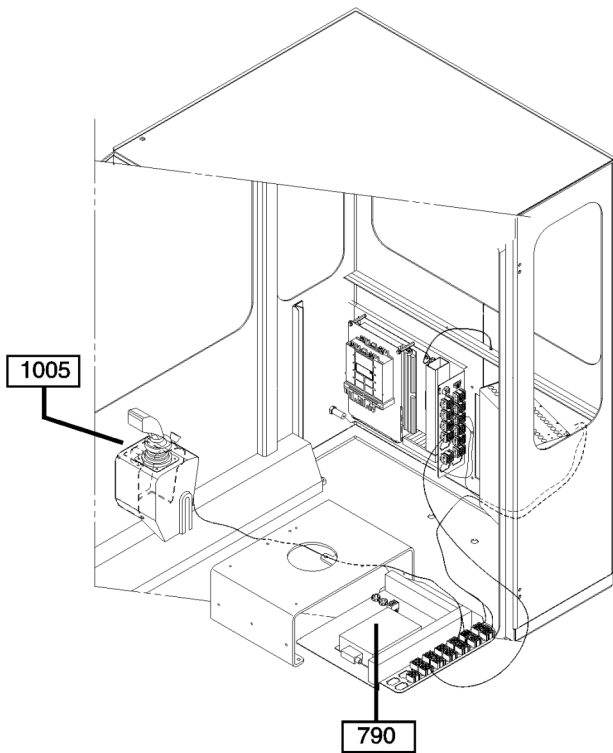
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 203 - 10V Reference Voltage for Tophandler ECU (791) Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that emergency stop switch is not activated.</li> <li>2. Remove tophandler junction box cover and ensure that circuit breaker 51-F41 is not tripped.</li> <li>3. Disconnect tophandler angle sensor at connector X180 pins 10 and 12.</li> <li>4. Enter the "DIAG Attachment 1 (16)" menu and check voltage of 10V REF OUT. Voltage should be 9.3-10.4V.</li> <li>5. Check wires to tophandler angle sensor.</li> </ol>	<p>Release emergency stop switch as required (TM 10-3930-675-10).</p> <p>Reset circuit breaker as required (WP 0076 000).</p> <p>If voltage is not as specified, notify SRA.</p> <p>Replace sensor if wires are damaged (WP 0100 00).</p>



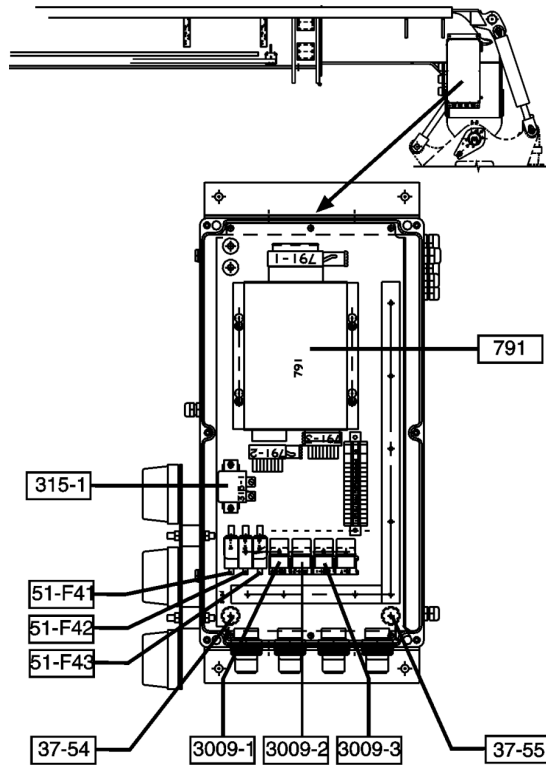
350-1042



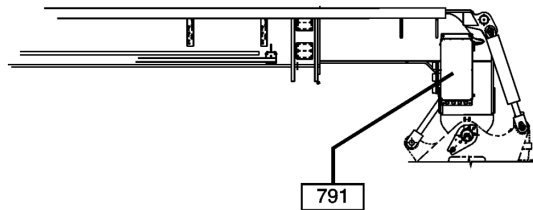
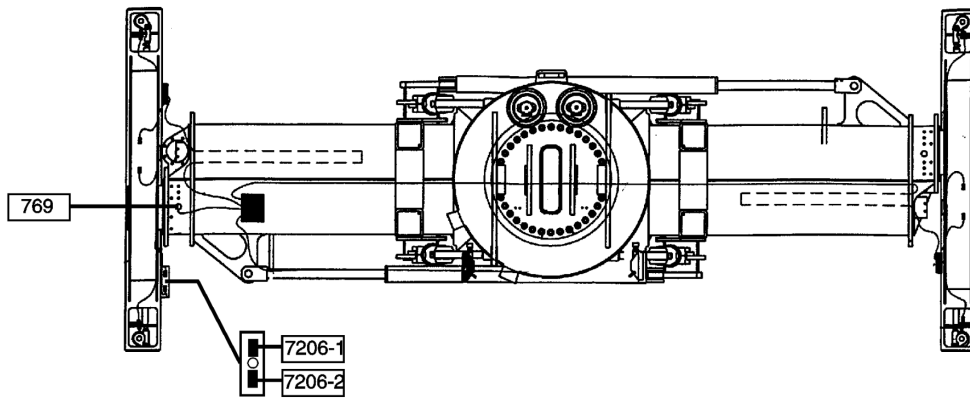
350-1034



350-1043



350-1044



350-1045

END OF WORK PACKAGE

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**THIS WORK PACKAGE COVERS**

- Error Code 105 - Communication Failure Between Display ECU (795) and Servo ECU (790)
- Error Code 106 - Communications Failure Between Display ECU (795) and Tophandler ECU (791)
- Error Code 107 - Cable Failure Between Tophandler ECU (791) and Display ECU (795)
- Error Code 108 - Cable Failure Between Tophandler ECU (791) and Servo ECU (790)
- Error Code 109 - Cable Failure Between Servo ECU (790) and Display ECU (795)
- Error Code 110 - Communication Failure Between Display ECU (795) and Steering ECU (792)
- Error Code 111 - Communication Failure Between Display ECU (795) and Transmission ECU (793)

- Error Code 112 - Communication Failure Between Display ECU (795) and Engine ECU (794)
- Error Code 345 - Communication Failure Between Steering ECU (792) and Display ECU (795)
- Error Code 346 - Communication Failure Between Steering ECU (792) and Transmission ECU (793)
- Error Code 684 - Communication Failure Between Transmission ECU (793) and Display ECU (795)
- Error Code 685 - Communication Failure Between Transmission ECU (793) and Steering ECU (792)
- Error Code 1285 - Engine Detects a Communication Failure on the J1939 Datalink
- Error Code 1286 - Engine Detects a Communication Failure on the J1939 Datalink

**INITIAL SETUP**

**References**

- TM 10-3930-675-10
- ECS Display/CAN-BUS (A34647.0200) (WP 0199 00-2)

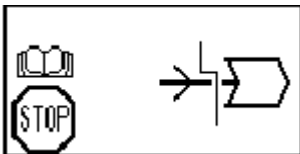
**Tools and Special Tools**

- Test lead, female (Item 50, WP 0204 00)
- Test lead, male (Item 51, WP 0204 00)

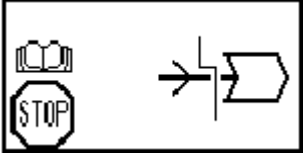
**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

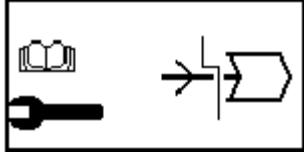
**Table 1. Error Code 105 - Communication Failure Between Display ECU (795) and Servo ECU (790) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 105 - Communication Failure Between Display ECU (795) and Servo ECU (790)</b></p> 	<p>Perform troubleshooting procedures for error codes 107, 108, and 109.</p>	

**Table 2. Error Code 106 - Communication Failure Between Display ECU (795) and Tophandler ECU (791) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 106 - Communication Failure Between Display ECU (795) and Tophandler ECU (791)</b></p> 	<p>Perform troubleshooting procedures for error codes 107, 108, and 109.</p>	

**Table 3. Error Code 107 - Cable Failure Between Tophandler ECU (791) and Display ECU (795) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 107 - Cable Failure Between Tophandler ECU (791) and Display ECU (795)</b></p> 	<ol style="list-style-type: none"> <li>1. Remove servo ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check connectors X152 and X161 for loose or missing connections.</li> </ol>	<p>Connect any loose or missing connections. Push ECU mounting tray in and install cover.</p>



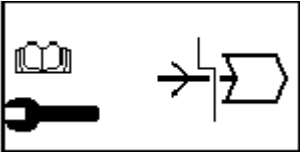
**Table 3. Error Code 107 - Cable Failure Between Tophandler ECU (791) and Display ECU (795) Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 107 - Cable Failure Between Tophandler ECU (791) and Display ECU (795) - Continued</b></p>	<ol style="list-style-type: none"> <li>3. Check that electrical wiring and connectors X180 and X185 along right side of boom are secure.</li> <li>4. Remove cover from tophandler junction box and ensure that tophandler ECU (791) connector 1 and junction box internal wires and connectors are secure (WP 0076 00).</li> <li>5. Check for continuity between connector X152 pins 1 and 2 and connector X161 pins 4 and 5.</li> <li>6. Check for continuity between connector X161 pins 4 and 5 and junction box X185 pins 4 and 5.</li> <li>7. Check for continuity between connector X185 pins 4 and 5 and connector X180 pins 4 and 5.</li> <li>8. Access display ECU (795) inside driver's control panel (WP 0080 00).</li> <li>9. Disconnect display ECU (795) connector and check for continuity between ECU connector pins 10 and 11 and connector X152 pins 1 and 2.</li> </ol>	<p>Connect any loose or missing connections.</p> <p>Connect any loose or missing connections. Install tophandler junction box cover (WP 0076 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>a. If continuity is present, reconnect display ECU (795) connector to driver's control panel.                      b. If continuity is not present, repair or replace connectors (WP 0111 00). Connect display ECU (795) connector to driver's control panel.</p>

**Table 3. Error Code 107 - Cable Failure Between Tophandler ECU (791) and Display ECU (795) Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 107 - Cable Failure Between Tophandler ECU (791) and Display ECU (795) - Continued</b>	10. Disconnect connector 1 from tophandler ECU (791) and check for continuity between ECU connector pins 2 and 3 and junction box X180 pins 4 and 5.	a. If continuity is present, reconnect ECU (790) connectors to driver's control panel. b. If continuity is not present, notify SRA.

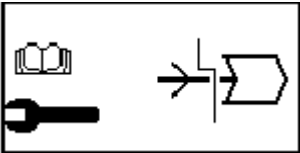
**Table 4. Error Code 108 - Cable Failure Between Tophandler ECU (791) and Servo ECU (790) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 108 - Cable Failure Between Tophandler ECU (791) and Servo ECU (790)</b>  	<ol style="list-style-type: none"> <li>1. Remove servo ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check connector X161 for loose or missing connections.</li> <li>3. Check that electrical wiring and connectors X180 and X185 along right side of boom are secure.</li> <li>4. Remove cover from tophandler junction box and ensure that tophandler ECU (791) connector 1 and junction box internal wires and connectors are secure (WP 0076 00).</li> </ol>	<p>Connect any loose or missing connections. Push ECU mounting tray in and install cover.</p> <p>Connect any loose or missing connections.</p> <p>Connect any loose or missing connections. Install tophandler junction box cover (WP 0076 00).</p>

**Table 4. Error Code 108 - Cable Failure Between Tophandler ECU (791) and Servo ECU (790) Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 108 - Cable Failure Between Tophandler ECU (791) and Servo ECU (790) - Continued</b></p>	<p>5. Check for continuity between connector X161 pins 1 and 2 and junction box X185 pins 1 and 2.</p> <p>6. Check for continuity between connector X185 pins 1 and 2 and connector X180 pins 1 and 2.</p> <p>7. Disconnect connector 1 from tophandler ECU (791) and check for continuity between ECU connector pins 4 and 5 and connector X180 pins 1 and 2.</p> <p>8. Disconnect connector 1 from servo ECU (790) and check for continuity between ECU connector pins 2 and 3 and connector X161 pins 1 and 2.</p>	<p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>a. If continuity is present, reconnect ECU (791) connector to driver's control panel. b. If continuity is not present, notify SRA.</p> <p>a. If continuity is present, reconnect ECU (790) connector to driver's control panel. b. If continuity is not present, notify SRA.</p>

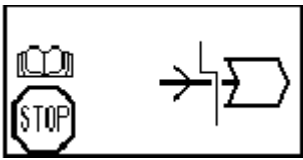
**Table 5. Error Code 109 - Cable Failure Between Servo ECU (790) and Display ECU (795) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 109 - Cable Failure Between Servo ECU (790) and Display ECU (795)</b></p> 	<p>1. Remove servo ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</p>	

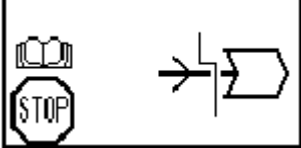
**Table 5. Error Code 109 - Cable Failure Between Servo ECU (790) and Display ECU (795) Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 109 - Cable Failure Between Servo ECU (790) and Display ECU (795) - Continued</b></p>	<p>2. Check connector X152 for loose or missing connections.</p> <p>3. Access display ECU (795) inside driver's control panel (WP 0080 00).</p> <p>4. Disconnect display ECU (795) connector and check for continuity between ECU connector pins 12 and 13 and connector X152 pins 5 and 4.</p> <p>5. Disconnect connector 1 from servo ECU (790) and check for continuity between ECU connector pins 4 and 5 and connector X152 pins 4 and 5.</p>	<p>Connect any loose or missing connections. Push ECU mounting tray in and install cover.</p> <p>a. If continuity is present, reconnect display ECU (795) connector to driver's control panel.</p> <p>b. If continuity is not present, repair or replace connectors (WP 0111 00). Connect display ECU (795) connector to driver's control panel.</p> <p>a. If continuity is present, reconnect ECU (790) connector to driver's control panel.</p> <p>b. If continuity is not present, notify SRA.</p>

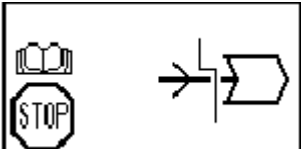
**Table 6. Error Code 110 - Communication Failure Between Display ECU (795) and Steering ECU (792) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 110 - Communication Failure Between Display ECU (795) and Steering ECU (792)</b></p> 		<p>Notify SRA.</p>

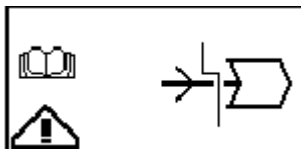
**Table 7. Error Code 111 - Communication Failure Between Display ECU (795) and Transmission ECU (793) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 111 - Communication Failure Between Display ECU (795) and Transmission ECU (793)</b></p> 		<p>Notify SRA.</p>

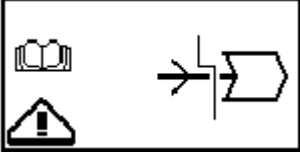
**Table 8. Error Code 112 - Communication Failure Between Display ECU (795) and Engine ECU (794) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 112 - Communication Failure Between Display ECU (795) and Engine ECU (794)</b></p> 		<p>Notify SRA.</p>

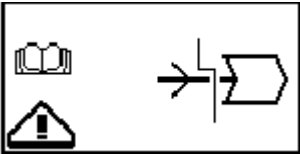
**Table 9. Error Code 345 - Communication Failure Between Steering ECU (792) and Display ECU (795) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 345 - Communication Failure Between Steering ECU (792) and Display ECU (795)</b></p> 		<p>Notify SRA.</p>

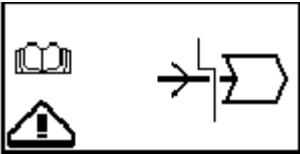
**Table 10. Error Code 346 - Communication Failure Between Steering ECU (792) and Transmission ECU (793) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 346 - Communication Failure Between Steering ECU (792) and Transmission ECU (793)</p> 		<p>Notify SRA.</p>


**Table 11. Error Code 684 - Communication Failure Between Transmission ECU (793) and Display ECU (795) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 684 - Communication Failure Between Transmission ECU (793) and Display ECU (795)</p> 		<p>Notify SRA.</p>


**Table 12. Error Code 685 - Communication Failure Between Transmission ECU (793) and Steering ECU (792) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 685 - Communication Failure Between Transmission ECU (793) and Steering ECU (792)</p> 		<p>Notify SRA.</p>

**Table 13. Error Code 1285 - Engine Detects a Communication Failure on the J1939 Datalink Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1285 - Engine Detects a Communication Failure on the J1939 Datalink</b></p> 		<p>Notify SRA.</p>

**Table 14. Error Code 1286 - Engine Detects a Communication Failure on the J1939 Datalink Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1286 - Engine Detects a Communication Failure on the J1939 Datalink</b></p> 		<p>Notify SRA.</p>

END OF WORK PACKAGE

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**STEERING ECU (792), TRANSMISSION ECU (793), AND ENGINE ECU (794) TROUBLESHOOTING 0014 00**

**THIS WORK PACKAGE COVERS**

Error Code 300 - Steering ECU (792) Hardware Failure  
 Error Code 841 - Transmission ECU (793) Memory Failure  
 Error Code 843 - Application Error Failure  
 Error Code 1111 - Engine ECU (794) Memory Failure

Error Code 1341 - Engine ECU (794) Loss of Data Failure  
 Error Code 1343 - Engine ECU (794) Internal Communication Failure  
 Error Code 1346 - Engine ECU (794) Software Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

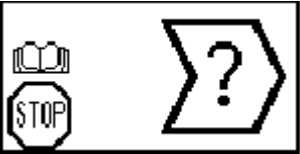
**Tools and Special Tools**

Test lead, male (Item 51, WP 0204 00)

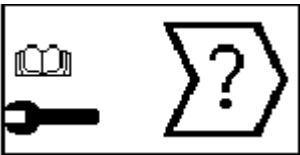
**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

**Table 1. Error Code 300 - Steering ECU (792) Hardware Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 300 - Steering ECU (792) Hardware Failure</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>Replace steering ECU (792) if error code is still present (WP 0079 00).</p>

**Table 2. Error Code 841 - Transmission ECU (793) Memory Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 841 - Transmission ECU (793) Memory Failure</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>Replace transmission ECU (793) if error code is still present (WP 0079 00).</p>

STEERING ECU (792), TRANSMISSION ECU (793), AND ENGINE ECU (794)  
TROUBLESHOOTING - CONTINUED

0014 00

Table 3. Error Code 843 - Application Error Failure Troubleshooting Procedures.

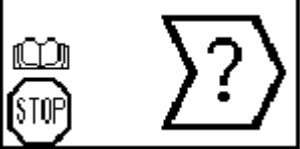
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 843 - Application Error Failure</p> 		Notify SRA.

Table 4. Error Code 1111 - Engine ECU (794) Memory Failure Troubleshooting Procedures.

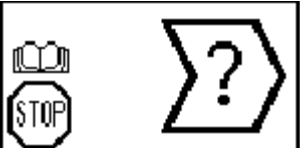
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1111 - Engine ECU (794) Memory Failure</p> 	Turn ignition switch to OFF position for 30 seconds and then back to ON position.	Replace engine ECU (794) if error code still appears (WP 0078 00).

Table 5. Error Code 1341 - Engine ECU (794) Loss of Data Failure Troubleshooting Procedures.

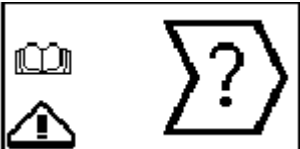
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1341 - Engine ECU (794) Loss of Data Failure</p> 	<p>1. Ensure that ignition switch is in OFF position. Disconnect OEM harness from engine ECU (794) and perform the following resistance checks:</p> <p>a. Measure resistance from OEM harness connector pin 7 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p>	<p>a. If resistance is not as specified, repair engine harness connectors (WP 0111 00).</p> <p>b. Notify SRA to replace engine harness.</p>

Table 5. Error Code 1341 - Engine ECU (794) Loss of Data Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1341 - Engine ECU (794) Loss of Data Failure - Continued</b></p>	<p>b. Measure resistance from OEM harness connector pin 8 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p> <p>c. Measure resistance from OEM harness connector pin 17 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p> <p>d. Measure resistance from OEM harness connector pin 18 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p> <p>e. Measure resistance from OEM harness connector pin 28 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p>	

USE TEST LEAD KIT P/N 3822758

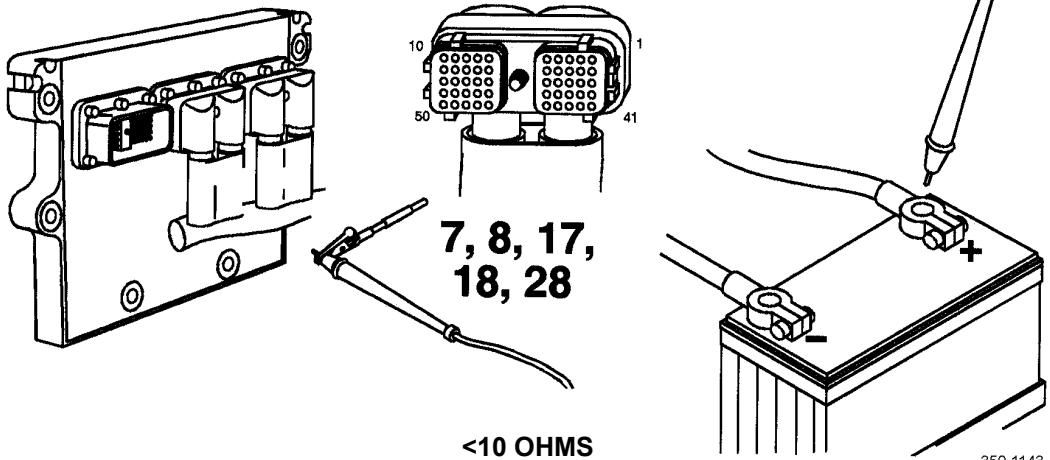
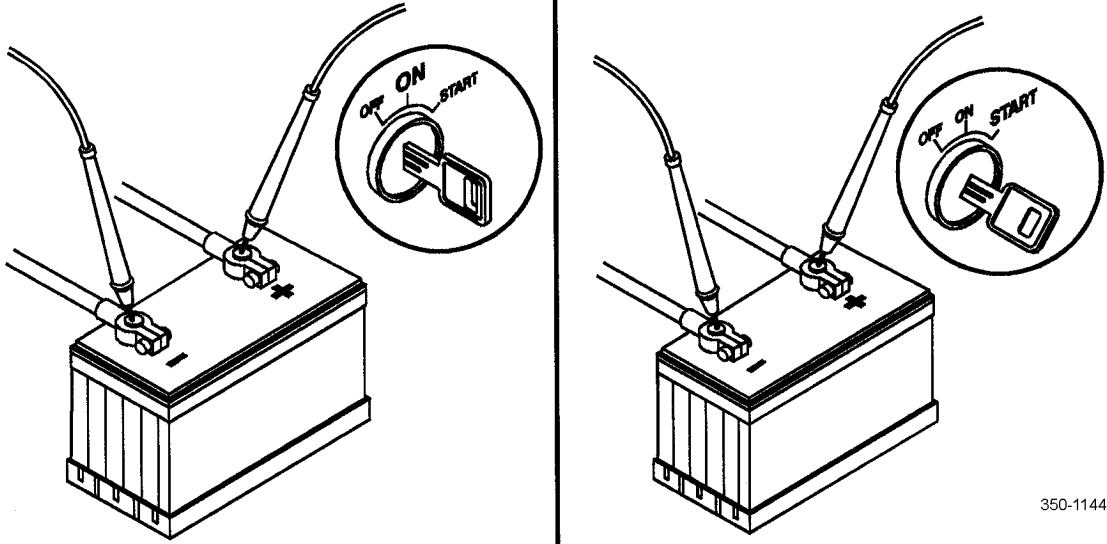


Table 5. Error Code 1341 - Engine ECU (794) Loss of Data Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION			
<p><b>Error Code 1341 - Engine ECU (794) Loss of Data Failure - Continued</b></p>	<p>2. Turn ignition switch to ON position and check battery voltage by placing positive (+) probe of multimeter on positive (+) battery terminal and touch negative (-) probe to negative (-) battery terminal while trying to start engine. Voltage should be at least (+)12V during normal conditions and at least (+)6V during cranking. Check each battery in the same way.</p>	<p>If voltage is not as required, charge or replace battery (WP 0107 00).</p>			
					
<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; border-right: 1px solid black; padding-right: 10px; vertical-align: top;"> <p>3. Turn ignition switch to OFF position and check battery terminals for secure connection.</p> <p>4. Check circuit breakers 51-F4 and 51-F5.</p> </td> <td style="width: 33%; border-right: 1px solid black; padding-right: 10px; vertical-align: top;"> <p>Clean terminals and tighten loose battery terminal connections.</p> <p>a. Reset circuit breakers, if tripped.</p> <p>b. If circuit breakers will not reset, notify SRA.</p> </td> <td style="width: 33%; padding-left: 10px; vertical-align: top;"> <p style="text-align: right;">350-1144</p> </td> </tr> </table>			<p>3. Turn ignition switch to OFF position and check battery terminals for secure connection.</p> <p>4. Check circuit breakers 51-F4 and 51-F5.</p>	<p>Clean terminals and tighten loose battery terminal connections.</p> <p>a. Reset circuit breakers, if tripped.</p> <p>b. If circuit breakers will not reset, notify SRA.</p>	<p style="text-align: right;">350-1144</p>
<p>3. Turn ignition switch to OFF position and check battery terminals for secure connection.</p> <p>4. Check circuit breakers 51-F4 and 51-F5.</p>	<p>Clean terminals and tighten loose battery terminal connections.</p> <p>a. Reset circuit breakers, if tripped.</p> <p>b. If circuit breakers will not reset, notify SRA.</p>	<p style="text-align: right;">350-1144</p>			

**STEERING ECU (792), TRANSMISSION ECU (793), AND ENGINE ECU (794)  
TROUBLESHOOTING - CONTINUED**

0014 00

**Table 6. Error Code 1343 - Engine ECU (794) Internal Communication Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1343 - Engine ECU (794) Internal Communication Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position and check all engine and vehicle power and ground connections for corrosion and loose connections.</li> <li>2. With ignition switch in OFF position, disconnect OEM harness from engine ECU (794). Disconnect positive (+) and negative (-) battery cables from battery.</li> <li>3. Check engine ECU (794) connectors for moisture.</li> <li>4. Check all power resistances:               <ol style="list-style-type: none"> <li>a. Measure resistance from engine harness connector pin 7 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> <li>b. Measure resistance from engine harness connector pin 8 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> <li>c. Measure resistance from engine harness connector pin 17 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> <li>d. Measure resistance from engine harness connector pin 18 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>a. Tighten loose connections.</li> <li>b. Repair or replace damaged connections (WP 0111 00).</li> </ol> <p>Dry connectors as required.</p> <ol style="list-style-type: none"> <li>a. If resistance is not as specified, repair engine harness connectors (WP 0111 00).</li> <li>b. Notify SRA to replace engine harness.</li> </ol>

Table 6. Error Code 1343 - Engine ECU (794) Internal Communication Failure  
Troubleshooting Procedures - Continued.

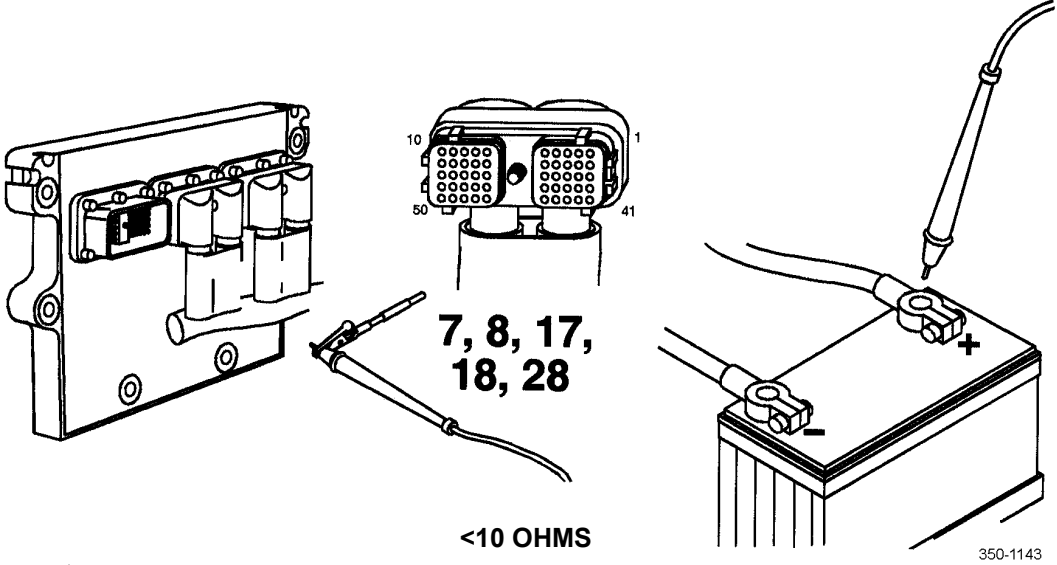
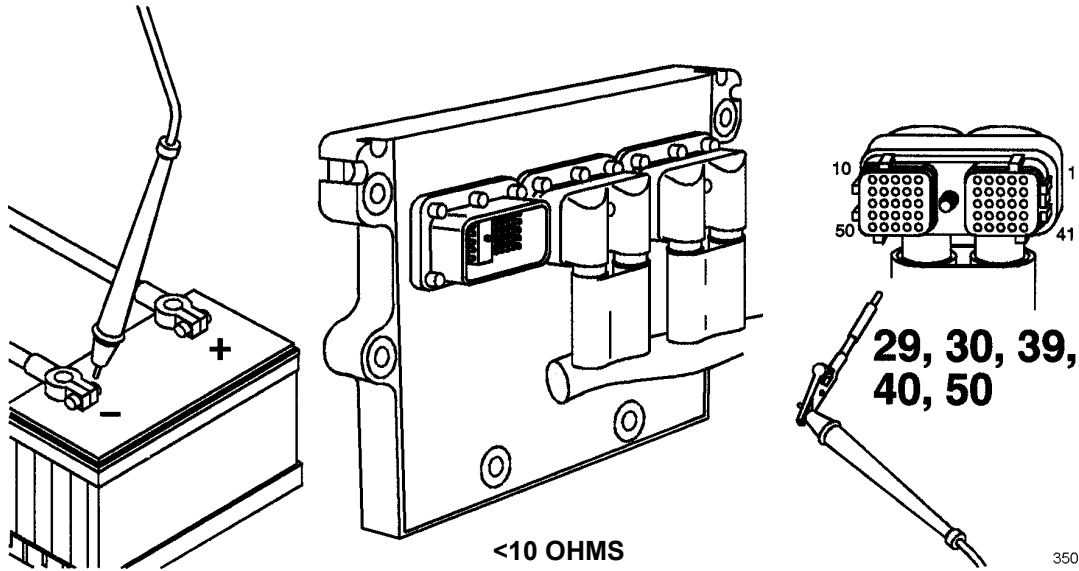
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1343 - Engine ECU (794) Internal Communication Failure - Continued</b></p> 	<p>e. Measure resistance from engine harness connector pin 28 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p> <p>5. Check all ground resistances:</p> <p>a. Measure resistance from engine harness connector pin 29 to negative (-) battery terminal. Resistance should be less than 10 ohms.</p>	<p>a. If resistance is not as specified, repair engine harness connectors (WP 0111 00).</p> <p>b. Notify SRA to replace engine harness.</p>

Table 6. Error Code 1343 - Engine ECU (794) Internal Communication Failure  
Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1343 - Engine ECU (794) Internal Communication Failure - Continued</b></p>  <p style="text-align: center;"><b>&lt;10 OHMS</b></p>	<p>b. Measure resistance from engine harness connector pin 30 to negative (-) battery terminal. Resistance should be less than 10 ohms.</p> <p>c. Measure resistance from engine harness connector pin 39 to negative (-) battery terminal. Resistance should be less than 10 ohms.</p> <p>d. Measure resistance from engine harness connector pin 40 to negative (-) battery terminal. Resistance should be less than 10 ohms.</p>	

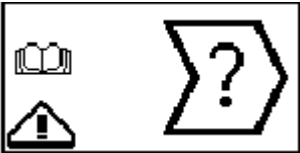
STEERING ECU (792), TRANSMISSION ECU (793), AND ENGINE ECU (794)  
TROUBLESHOOTING - CONTINUED

0014 00

Table 6. Error Code 1343 - Engine ECU (794) Internal Communication Failure  
Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 1343 - Engine ECU (794) Internal Communication Failure - Continued</b>	e. Measure resistance from engine harness connector pin 50 to negative (-) battery terminal. Resistance should be less than 10 ohms.	

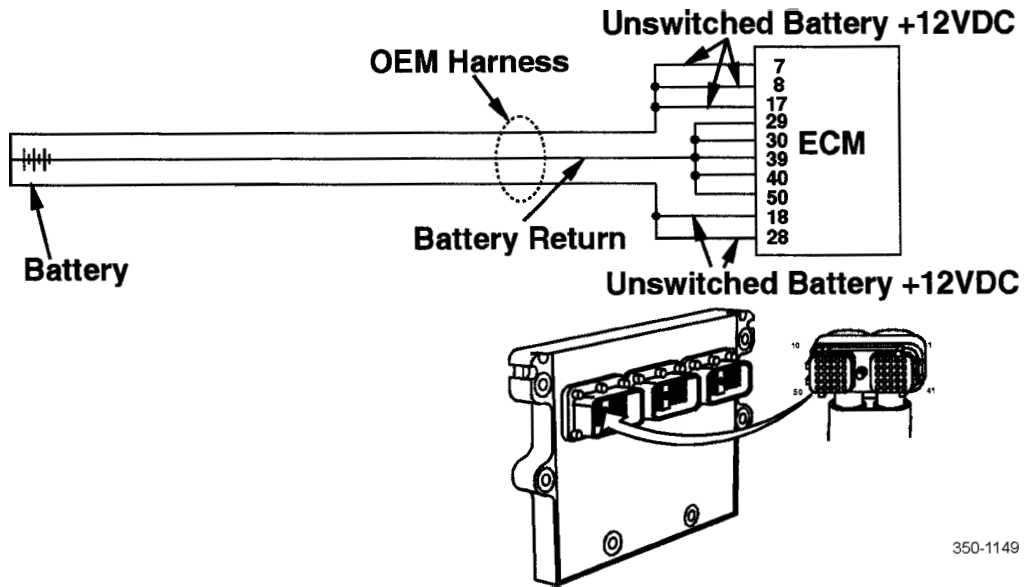
Table 7. Error Code 1346 - Engine ECU (794) Software Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 1346 - Engine ECU (794) Software Failure</b>  	Turn ignition switch to OFF position for 30 seconds and then back to ON position.	Replace engine ECU (794) if error code still appears (WP 0078 00).



STEERING ECU (792), TRANSMISSION ECU (793), AND ENGINE ECU (794)  
TROUBLESHOOTING - CONTINUED

0014 00



350-1149

END OF WORK PACKAGE

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**ELECTRONIC CONTROL UNIT (ECU) SUPPLY VOLTAGE TROUBLESHOOTING**

**0015 00**

**THIS WORK PACKAGE COVERS**

Error Code 451 - Voltage Supply Too High for Steering ECU (792)

Error Code 452 - Voltage Supply Too Low for Steering ECU (792)

Error Code 811 - Voltage Supply Too Low for Transmission ECU (793)

Error Code 812 - Voltage Supply Too High for Transmission ECU (793)

Error Code 813 - Voltage Failure at Transmission Gear-shift Valve Supply

Error Code 814 - Voltage Failure at Transmission Gear-shift Valve Supply

**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

**References - Continued**

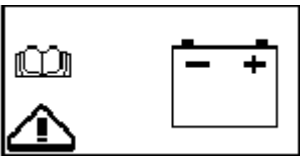
ECS Steering (A34651.0200) (WP 0199 00-16)

ECU Transmission (A34650.0200) (WP 0199 00-12)

**NOTE**

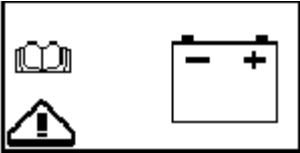
Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

**Table 1. Error Code 451 - Voltage Supply Too High for Steering ECU (792) Troubleshooting Procedures.**

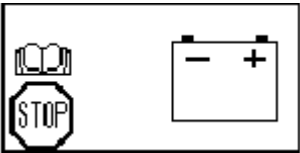
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 451 - Voltage Supply Too High for Steering ECU (792)</b></p> 	<p>Check output voltage from alternator.</p>	<p>If output voltage is greater than 33V, replace alternator (WP 0069 00).</p>

**ELECTRONIC CONTROL UNIT (ECU) SUPPLY VOLTAGE TROUBLESHOOTING - CONTINUED 0015 00**

**Table 2. Error Code 452 - Voltage Supply Too Low for Steering ECU (792) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 452 - Voltage Supply Too Low for Steering ECU (792)</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab circuit breaker panel and ensure that circuit breakers F26 and F29 are not tripped.</li> <li>2. Perform voltage check at slave receptacle. Input voltage should be 22-26V. If voltage is present, but below 18V, perform the following:                             <ol style="list-style-type: none"> <li>a. Check condition and voltage of batteries (WP 0025 00).</li> <li>b. Check condition of alternator and alternator drive belt (WP 0069 00 and WP 0070 00).</li> <li>c. Check charging rate of alternator at either slave receptacle, with lights on.</li> </ol> </li> <li>3. Check voltage at ECU (792) connector pin 1 and pin 5.</li> <li>4. Check voltage at connector X174 pin 14.</li> <li>5. Check voltage at connector X47 pin 8.</li> <li>6. Check voltage at connector X174 pin 3.</li> <li>7. Check voltage at connector X47 pin 3.</li> </ol>	<p>Reset circuit breaker(s) as required (WP 0073 00).</p> <ol style="list-style-type: none"> <li>a. Charge or replace batteries as required (WP 0107 00).</li> <li>b. Replace alternator or tighten or replace alternator drive belt (WP 0069 00 or WP 0070 00).</li> <li>c. If alternator is not charging properly, replace alternator (WP 0069 00).</li> </ol> <p>If voltage is present, notify SRA.</p> <p>If voltage is present, notify SRA to replace wire A17414.</p> <p>If voltage is present, notify SRA to replace wire 478.</p> <p>If voltage is present, notify SRA to replace wire A1743A.</p> <p>If voltage is present, notify SRA to replace wire 473.</p>

**Table 3. Error Code 811 - Voltage Supply Too Low for Transmission ECU (793) Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 811 - Voltage Supply Too Low for Transmission ECU (793)</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab circuit breaker panel and ensure that circuit breakers F27 and F28 are not tripped.</li> </ol>	<p>Reset circuit breaker(s) as required (WP 0073 00).</p>

**Table 3. Error Code 811 - Voltage Supply Too Low for Transmission ECU (793) Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 811 - Voltage Supply Too Low for Transmission ECU (793) - Continued</b></p>	<p>2. Perform voltage check. Voltage should be 22-26V. If voltage is present, but below 18V, perform the following:</p> <ul style="list-style-type: none"> <li>a. Check condition and voltage of batteries (WP 0025 00).</li> <li>b. Check condition of alternator and alternator drive belt (WP 0069 00 and WP 0070 00).</li> <li>c. Check charging rate of alternator at either slave receptacle, with lights on.</li> </ul> <p>3. Check voltage at connector 793 pin 23, connector 793 pin 45, and connector 793 pin 68.</p> <p>4. Check voltage at connector X174 pin 2.</p> <p>5. Check voltage at connector X47 pin 2.</p> <p>6. Check voltage at connector X174 pin 1.</p> <p>7. Check voltage at connector X47 pin 1.</p>	<ul style="list-style-type: none"> <li>a. Charge or replace batteries as required (WP 0107 00).</li> <li>b. Replace alternator or tighten or replace alternator drive belt (WP 0069 00 or WP 0070 00).</li> <li>c. If alternator is not charging properly, replace alternator (WP 0069 00).</li> </ul> <p>If voltage is present, replace ECU (793) (WP 0079 00).</p> <p>If voltage is present, notify SRA to replace wire A1742A.</p> <p>If voltage is present, notify SRA to replace wire 472.</p> <p>If voltage is present, notify SRA to replace wire A1741A and A1741B.</p> <p>If voltage is present, notify SRA to replace wire 471.</p>

**Table 4. Error Code 812 - Voltage Supply Too High for Transmission ECU (793) Troubleshooting Procedures.**

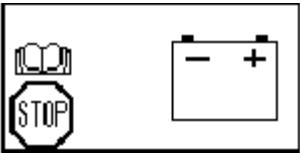
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 812 - Voltage Supply Too High for Transmission ECU (793)</b></p> 	<p>Check output voltage from alternator.</p>	<p>If output voltage is higher than 26V, replace alternator (WP 0069 00).</p>

Table 5. Error Code 813 - Voltage Failure at Transmission Gearshift Valve Supply Troubleshooting Procedures.

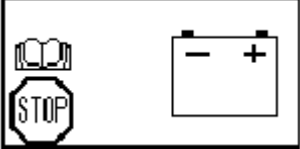
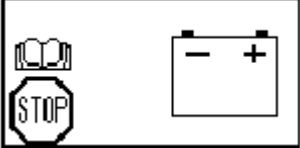
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 813 - Voltage Failure at Transmission Gearshift Valve Supply</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connection block X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827 for proper connection.</li> <li>5. Disconnect transmission connector 827, connector X172, and ECU (793) connector.</li> <li>6. Check continuity between connector 827 pin 7 and connector X172 pin 7, between connector 793 pin 12 and connector X172 pin 7, and between connector 793 pin 13 and connector X172 pin 7. Also check for continuity to chassis.</li> <li>7. Check voltage at connector X47 pins 1 and 2.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is present, notify SRA.</li> <li>b. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>c. If wiring harness must be replaced, notify SRA.</li> </ol> <p>If voltage is present, notify SRA to replace wire 473.</p>

Table 6. Error Code 814 - Voltage Failure at Transmission Gearshift Valve Supply Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 814 - Voltage Failure at Transmission Gearshift Valve Supply</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connection block X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827 for proper connection.</li> <li>5. Disconnect transmission connector 827, connector X172, and ECU (793) connector.</li> <li>6. Check continuity between connector 827 pin 7 and connector X172 pin 7, between connector 793 pin 12 and connector X172 pin 7, and between connector 793 pin 13 and connector X172 pin 7. Also check for continuity to chassis.</li> <li>7. Check voltage at connector X47 pins 1 and 2.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is present, notify SRA.</li> <li>b. If continuity is not present, repair or replace connectors (WP 0111 00). If wiring harness must be replaced, notify SRA.</li> </ol> <p>If voltage is present, notify SRA to replace wire 473.</p>

END OF WORK PACKAGE

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**THIS WORK PACKAGE COVERS**

Error Code 401 - Transmission Neutral Signal from Steering ECU (792) Failure

Error Code 404 - Short Circuit Failure of 2WD Steering Control Lamp

Error Code 405 - Short Circuit Failure of 4WD Steering Control Lamp

Error Code 406 - Short Circuit Failure of Crab Steering Control Lamp

Error Code 408 - Short Circuit Failure of Unlocked Twistlock Control Lamp

Error Code 409 - Short Circuit Failure of Locked Twistlock Control Lamp

Error Code 410 - Short Circuit Failure of Alinement Control Lamp

Error Code 412 - Short Circuit Failure of Ether Start Valve

Error Code 413 - Short Circuit Failure of Boom Folding Supply Valve

Error Code 416 - Steering Pressure Sensor Circuit Failure

Error Code 418 - 2WD Steering Selection Switch, Circuit Failure

Error Code 419 - 4WD Steering Selection Switch, Circuit Failure

Error Code 420 - Crab Steering Selection Switch, Circuit Failure

Error Code 422 - Cab in Transport Position Proximity Switch, Circuit Failure

Error Code 423 - Ether Start Kit Switch, Circuit Failure

Error Code 427 - Tophandler Work Light Switch, Circuit Failure

Error Code 450 - Temperature Inside Steering ECU (792) Above Critical Threshold [184°F (85°C)]

**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

Auxiliary Pump (A34746.0200) (WP 0199 00-47)

**References - Continued**

ECS Electrical Servo (A34648.0200) (WP 0199 00-5)

ECS Steering (A34651.0200) (WP 0199 00-16)

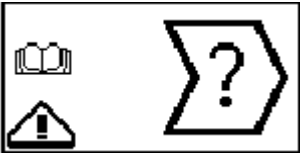
ECS Hydraulics (A34654.0200) (WP 0199 00-29)

ECS Attachment (A34652.0200) (WP 0199 00-23)

**NOTE**

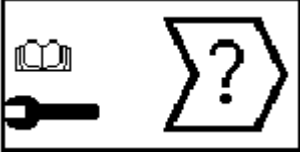
Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

**Table 1. Error Code 401 - Transmission Neutral Signal from Steering ECU (792) Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 401 - Transmission Neutral Signal from Steering ECU (792) Failure</b></p> 	<p>Check continuity between steering ECU (792) connector pin 71 and transmission ECU (793) connector pin 44.</p>	<p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p>

**INPUT AND OUTPUT SIGNALS FOR STEERING ECU (792) TROUBLESHOOTING - CONTINUED 0016 00**

**Table 2. Error Code 404 - Short Circuit Failure of 2WD Steering Control Lamp Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 404 - Short Circuit Failure of 2WD Steering Control Lamp</b></p> 	<ol style="list-style-type: none"> <li>1. Check voltage at connector X153 pin 1. Voltage should be 22-26V.</li> <li>2. Check voltage at connector X160 pin 1. Voltage should be 22-26V.</li> <li>3. Check voltage at connector X177 pin 1. Voltage should be 22-26V.</li> <li>4. Check voltage at steering ECU (792) connector pin 68. Voltage should be 22-26V.</li> </ol>	<p>If voltage is not as specified, notify SRA to replace wire 1531.</p> <p>If voltage is not as specified, notify SRA to replace wire A1531.</p> <p>If voltage is not as specified, notify SRA to replace wire 1601.</p> <ol style="list-style-type: none"> <li>a. If voltage is not as specified, notify SRA to replace wire A1771.</li> <li>b. If voltage is not present, replace steering ECU (792) (WP 0079 00).</li> </ol>

**Table 3. Error Code 405 - Short Circuit Failure of 4WD Steering Control Lamp Troubleshooting Procedures.**

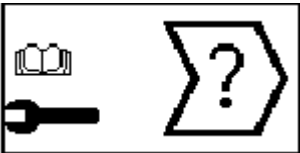
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 405 - Short Circuit Failure of 4WD Steering Control Lamp</b></p> 	<ol style="list-style-type: none"> <li>1. Check voltage at connector X153 pin 2. Voltage should be 22-26V.</li> <li>2. Check voltage at connector X160 pin 2. Voltage should be 22-26V.</li> <li>3. Check voltage at connector X177 pin 2. Voltage should be 22-26V.</li> <li>4. Check voltage at steering ECU (792) connector pin 67. Voltage should be 22-26V.</li> </ol>	<p>If voltage is not as specified, notify SRA to replace wire 1532.</p> <p>If voltage is not as specified, notify SRA to replace wire A1532.</p> <p>If voltage is not as specified, notify SRA to replace wire 1602.</p> <ol style="list-style-type: none"> <li>a. If voltage is not as specified, notify SRA to replace wire A1772.</li> <li>b. If voltage is not present, replace steering ECU (792) (WP 0079 00).</li> </ol>

Table 4. Error Code 406 - Short Circuit Failure of Crab Steering Control Lamp Troubleshooting Procedures.

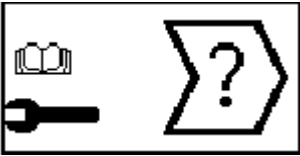
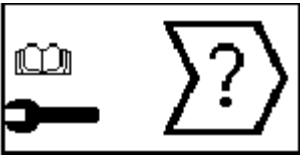
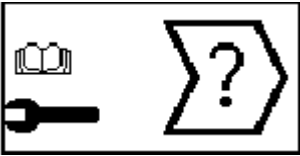
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 406 - Short Circuit Failure of Crab Steering Control Lamp</b></p> 	<ol style="list-style-type: none"> <li>1. Check voltage at connector X153 pin 3. Voltage should be 22-26V.</li> <li>2. Check voltage at connector X160 pin 3. Voltage should be 22-26V.</li> <li>3. Check voltage at connector X177 pin 3. Voltage should be 22-26V.</li> <li>4. Check voltage at steering ECU (792) connector pin 66. Voltage should be 22-26V.</li> </ol>	<p>If voltage is not as specified, notify SRA to replace wire 1533.</p> <p>If voltage is not as specified, notify SRA to replace wire A1533.</p> <p>If voltage is not as specified, notify SRA to replace wire 1603.</p> <ol style="list-style-type: none"> <li>a. If voltage is not as specified, notify SRA to replace wire A1773.</li> <li>b. If voltage is not present, replace steering ECU (792) (WP 0079 00).</li> </ol>

Table 5. Error Code 408 - Short Circuit Failure of Unlocked Twistlock Control Lamp Troubleshooting Procedures.

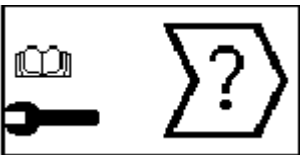
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 408 - Short Circuit Failure of Unlocked Twistlock Control Lamp</b></p> 	<ol style="list-style-type: none"> <li>1. Check voltage at connector X153 pin 4. Voltage should be 22-26V.</li> <li>2. Check voltage at connector X160 pin 4. Voltage should be 22-26V.</li> <li>3. Check voltage at connector X177 pin 4. Voltage should be 22-26V.</li> <li>4. Check voltage at steering ECU (792) connector pin 64. Voltage should be 22-26V.</li> </ol>	<p>If voltage is not as specified, notify SRA to replace wire 1534.</p> <p>If voltage is not as specified, notify SRA to replace wire A1534.</p> <p>If voltage is not as specified, notify SRA to replace wire 1604.</p> <ol style="list-style-type: none"> <li>a. If voltage is not as specified, notify SRA to replace wire A1774.</li> <li>b. If voltage is not present, replace steering ECU (792) (WP 0079 00).</li> </ol>

**INPUT AND OUTPUT SIGNALS FOR STEERING ECU (792) TROUBLESHOOTING - CONTINUED 0016 00**

**Table 6. Error Code 409 - Short Circuit Failure of Locked Twistlock Control Lamp Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 409 - Short Circuit Failure of Locked Twistlock Control Lamp</b></p> 	<ol style="list-style-type: none"> <li>1. Check voltage at connector X153 pin 6. Voltage should be 22-26V.</li> <li>2. Check voltage at connector X160 pin 6. Voltage should be 22-26V.</li> <li>3. Check voltage at connector X177 pin 6. Voltage should be 22-26V.</li> <li>4. Check voltage at steering ECU (792) connector pin 63. Voltage should be 22-26V.</li> </ol>	<p>If voltage is not as specified, notify SRA to replace wire 1536.</p> <p>If voltage is not as specified, notify SRA to replace wire A1536.</p> <p>If voltage is not as specified, notify SRA to replace wire 1606.</p> <ol style="list-style-type: none"> <li>a. If voltage is not as specified, notify SRA to replace wire A1776.</li> <li>b. If voltage is not present, replace steering ECU (792) (WP 0079 00).</li> </ol>

**Table 7. Error Code 410 - Short Circuit Failure of Alinement Control Lamp Troubleshooting Procedures.**

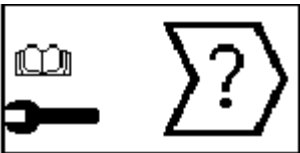
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 410 - Short Circuit Failure of Alinement Control Lamp</b></p> 	<ol style="list-style-type: none"> <li>1. Check voltage at connector X153 pin 5. Voltage should be 22-26V.</li> <li>2. Check voltage at connector X160 pin 5. Voltage should be 22-26V.</li> <li>3. Check voltage at connector X177 pin 5. Voltage should be 22-26V.</li> <li>4. Check voltage at steering ECU (792) connector pin 62. Voltage should be 22-26V.</li> </ol>	<p>If voltage is not as specified, notify SRA to replace wire 1535.</p> <p>If voltage is not as specified, notify SRA to replace wire A1535.</p> <p>If voltage is not as specified, notify SRA to replace wire 1605.</p> <ol style="list-style-type: none"> <li>a. If voltage is not as specified, notify SRA to replace wire A1775.</li> <li>b. If voltage is not present, replace steering ECU (792) (WP 0079 00).</li> </ol>

**INPUT AND OUTPUT SIGNALS FOR STEERING ECU (792) TROUBLESHOOTING - CONTINUED 0016 00**

**Table 8. Error Code 412 - Short Circuit Failure of Ether Start Valve Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 412 - Short Circuit Failure of Ether Start Valve</b></p> 	<ol style="list-style-type: none"> <li>1. Check voltage at connector X67 pin 3. Voltage should be 22-26V.</li> <li>2. Check voltage at connector X16 pin 2. Voltage should be 22-26V.</li> <li>3. Check voltage at connector X29 pin 4. Voltage should be 22-26V.</li> <li>4. Check voltage at connector X150 pin 8. Voltage should be 22-26V.</li> <li>5. Check voltage at connector X160 pin 11. Voltage should be 22-26V.</li> <li>6. Check voltage at connector X177 pin 11. Voltage should be 22-26V.</li> <li>7. Check voltage at steering ECU (792) connector pin 60. Voltage should be 22-26V.</li> </ol>	<p>If voltage is not as specified, notify SRA to replace wire 673.</p> <p>If voltage is not as specified, notify SRA to replace wire A162 and/or wire 162.</p> <p>If voltage is not as specified, notify SRA to replace wire A162A.</p> <p>If voltage is not as specified, notify SRA to replace wire 294.</p> <p>If voltage is not as specified, notify SRA to replace wire A1508.</p> <p>If voltage is not as specified, notify SRA to replace wire 16011.</p> <ol style="list-style-type: none"> <li>a. If voltage is not as specified, notify SRA to replace wire A1771.</li> <li>b. If voltage is not present, replace steering ECU (792) (WP 0079 00).</li> </ol>

**Table 9. Error Code 413 - Short Circuit Failure of Boom Folding Supply Valve Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 413 - Short Circuit Failure of Boom Folding Supply Valve</b></p> 	<ol style="list-style-type: none"> <li>1. Check voltage at steering connector X198 pin 9. Voltage should be 22-26V.</li> <li>2. Check voltage at steering connector X195 pin 8. Voltage should be 22-26V.</li> <li>3. Check voltage at steering ECU (792) connector pin 59. Voltage should be 22-26V.</li> </ol>	<p>If voltage is not as specified, notify SRA to replace wire and connector at valve 6043.</p> <p>If voltage is not as specified, notify SRA to replace wire between connector X195 and connector X198.</p> <ol style="list-style-type: none"> <li>a. If voltage is not as specified, notify SRA to replace wire A1958.</li> <li>b. If voltage is not present, replace steering ECU (792) (WP 0079 00).</li> </ol>

**INPUT AND OUTPUT SIGNALS FOR STEERING ECU (792) TROUBLESHOOTING - CONTINUED 0016 00**

**Table 10. Error Code 416 - Steering Pressure Sensor Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 416 - Steering Pressure Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check continuity between pressure sensor connector 245 pin B and connector X197 pin 4.</li> <li>2. Check continuity between connector X197 pin 4. and steering ECU (792) connector pin 49.</li> </ol>	<ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol>

**Table 11. Error Code 418 - 2WD Steering Selection Switch, Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 418 - 2WD Steering Selection Switch, Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check voltage at 2WD steering selection switch connector 136 pin 5. Voltage should be 22-26V.</li> <li>2. Check voltage at 2WD steering selection switch connector 136 pin 1. Voltage should be 22-26V with switch activated and 0V with switch not activated.</li> <li>3. Check continuity between 2WD steering selection switch connector 136 pin 1 and connector X153 pin 13.</li> <li>4. Check continuity between connector X153 pin 13 and connector X160 pin 13.</li> </ol>	<p>If voltage is not as specified, check wire 1529B for damage. Repair or replace connectors (WP 0111 00).</p> <p>If voltage is not as specified, replace 2WD steering selection switch (WP 0131 00 and WP 0072 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol>

**INPUT AND OUTPUT SIGNALS FOR STEERING ECU (792) TROUBLESHOOTING - CONTINUED 0016 00**

**Table 11. Error Code 418 - 2WD Steering Selection Switch, Circuit Failure Troubleshooting Procedures - Continued.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 418 - 2WD Steering Selection Switch, Circuit Failure - Continued</b></p> 	<p>5. Check continuity between connector X160 pin 13 and connector X177 pin 13.</p> <p>6. Check continuity between connector X177 pin 13 and steering ECU (792) connector pin 47.</p>	<p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p>

**Table 12. Error Code 419 - 4WD Steering Selection Switch, Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 419 - 4WD Steering Selection Switch, Circuit Failure</b></p> 	<p>1. Check voltage at 4WD steering selection switch connector 137 pin 5. Voltage should be 22-26V.</p> <p>2. Check voltage at 4WD steering selection switch connector 137 pin 1. Voltage should be 22-26V with switch activated and 0V with switch not activated.</p> <p>3. Check continuity between 4WD steering selection switch connector 137 pin 1 and connector X153 pin 14.</p> <p>4. Check continuity between connector X153 pin 14 and connector X160 pin 14.</p>	<p>If voltage is not as specified, check wires 1529B and 1529C for damage. Repair or replace connectors (WP 0111 00).</p> <p>If voltage is not as specified, replace 4WD steering selection switch (WP 0131 00 and WP 0072 00).</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p>

**INPUT AND OUTPUT SIGNALS FOR STEERING ECU (792) TROUBLESHOOTING - CONTINUED 0016 00**

**Table 12. Error Code 419 - 4WD Steering Selection Switch, Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 419 - 4WD Steering Selection Switch, Circuit Failure - Continued</b></p> 	<p>5. Check continuity between connector X160 pin 14 and connector X177 pin 14.</p> <p>6. Check continuity between connector X177 pin 14 and steering ECU (792) connector pin 46.</p>	<p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p>


**Table 13. Error Code 420 - Crab Steering Selection Switch, Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 420 - Crab Steering Selection Switch, Circuit Failure</b></p> 	<p>1. Check voltage at crab steering selection switch connector 138 pin 5. Voltage should be 22-26V.</p> <p>2. Check voltage at crab steering selection switch connector 138 pin 1. Voltage should be 22-26V with switch activated and 0V with switch not activated.</p> <p>3. Check continuity between crab steering selection switch connector 138 pin 1 and connector X153 pin 15.</p> <p>4. Check continuity between connector X153 pin 15 and connector X160 pin 15.</p>	<p>If voltage is not as specified, check wires 1529B, 1529C, and 1529D for damage. Repair or replace connectors (WP 0111 00).</p> <p>If voltage is not as specified, replace crab steering selection switch (WP 0131 00 and WP 0072 00).</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p>



**INPUT AND OUTPUT SIGNALS FOR STEERING ECU (792) TROUBLESHOOTING - CONTINUED 0016 00**

**Table 13. Error Code 420 - Crab Steering Selection Switch, Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 420 - Crab Steering Selection Switch, Circuit Failure - Continued</b></p> 	<p>5. Check continuity between connector X160 pin 15 and connector X177 pin 15.</p> <p>6. Check continuity between connector X177 pin 15 and steering ECU (792) connector pin 45.</p>	<p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p>

**Table 14. Error Code 422 - Cab in Transport Position Proximity Switch, Circuit Failure Troubleshooting Procedures.**

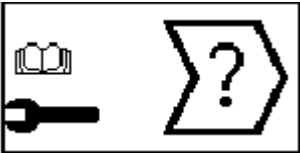
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 422 - Cab in Transport Position Proximity Switch, Circuit Failure</b></p> 	<p>1. Check voltage at connector X175 pin 1. Voltage should be 22-26V.</p> <p>2. Check continuity to chassis at connector X175 pin 3.</p> <p>3. Place a piece of metal close to proximity switch 7210. Check voltage at connector X175 pin 2.</p> <p>4. Check continuity between connector X175 pin 2 and steering ECU (792) connector pin 43.</p>	<p>If voltage is not as specified, check wires at connectors X174, X175, X195, and X197 for damage. Repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>a. If voltage is not present, replace proximity switch (WP 0075 00).</p> <p>b. If voltage is present, remove metal piece. Voltage should not be present. If voltage is present, replace proximity switch (WP 0075 00).</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, notify SRA.</p>

Table 15. Error Code 423 - Ether Start Kit Switch, Circuit Failure Troubleshooting Procedures.

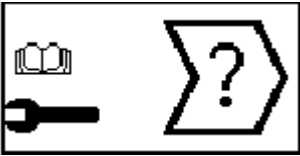
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 423 - Ether Start Kit Switch, Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check voltage at ether start switch connector 124 pin 5, located behind rocker switch on instrument panel. Voltage should be 22-26V.</li> <li>2. Check voltage at ether start switch connector 124 pin 1. Voltage should be 22-26V with switch activated and 0V with switch not activated.</li> <li>3. Check continuity between ether start switch connector 124 pin 1 and connector X67 pin 4.</li> <li>4. Check continuity between connector X67 pin 4 and connector X47 pin 9.</li> <li>5. Check continuity between connector X47 pin 9 and connector X174 pin 15.</li> <li>6. Check continuity between connector X174 pin 15 and steering ECU (792) connector pin 42.</li> </ol>	<p>If voltage is not as specified, check wires 671A and 671 for damage. Repair or replace connectors (WP 0111 00).</p> <p>If voltage is not as specified, replace ether start switch (WP 0072 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol>

Table 16. Error Code 427 - Tophandler Work Light Switch, Circuit Failure Troubleshooting Procedures.

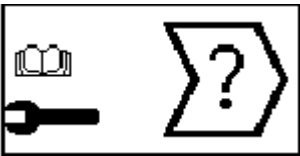

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 427 - Tophandler Work Light Switch, Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check for a tripped circuit breaker F-17 (WP 0073 00).</li> <li>2. Check voltage at tophandler work light switch connector 106-2 pin 5. Voltage should be 22-26V.</li> <li>3. Check voltage at tophandler work light switch connector 106-2 pin 1. Voltage should be 22-26V with switch activated and 0V with switch not activated.</li> <li>4. Check continuity between tophandler work light switch connector 106-2 pin 1 and connector X67 pin 9.</li> <li>5. Check continuity between connector X67 pin 9 and connector X46 pin 6.</li> <li>6. Check continuity between connector X46 pin 6 and connector X174 pin 11.</li> <li>7. Check continuity between connector X174 pin 11 and steering ECU (792) connector pin 102.</li> </ol>	<p>Reset circuit breaker.</p> <p>If voltage is not as specified, check wires A678 and 678 for damage. Repair or replace connectors (WP 0111 00).</p> <p>If voltage is not as specified, replace tophandler work light switch (WP 0072 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If problem persists, notify SRA.</li> </ol>

Table 17. Error Code 450 - Temperature Inside Steering ECU (792) Above Critical Threshold [184°F (85°C)] Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 450 - Temperature Inside Steering ECU (792) Above Critical Threshold [184°F (85°C)]</b></p> 	<ol style="list-style-type: none"> <li>1. Check if temperature at steering ECU (792) is extremely high.</li> <li>2. Place ignition switch in OFF position for a minimum of 30 seconds and then back in ON position.</li> </ol>	<p>If temperature is extremely high, allow ECU to cool down.</p> <p>Replace steering ECU (792) if error code is still present (WP 0079 00).</p>

END OF WORK PACKAGE

**THIS WORK PACKAGE COVERS**

Error Code 1187 - Sensor Voltage Supply Failure  
 Error Code 1227 - Sensor Voltage Supply Failure  
 Error Code 1254 - Sensor Voltage Supply Failure

Error Code 1287 - Sensor Voltage Supply Failure  
 Error Code 1352 - Sensor Voltage Supply Failure  
 Error Code 1443 - Throttle Voltage Supply Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

**Tools and Special Tools**

Test lead, female (Item 48, WP 0204 00)  
 Test lead, male (Item 51, WP 0204 00)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

**Table 1. Error Code 1187 - Sensor Voltage Supply Failure Troubleshooting Procedures.**

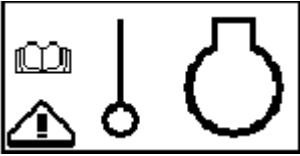
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1187 - Sensor Voltage Supply Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Disconnect sensor harness from oil pressure/temperature sensor (WP 0093 00).</li> <li>2. Place ignition switch to ON position.</li> </ol>	

Table 1. Error Code 1187 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

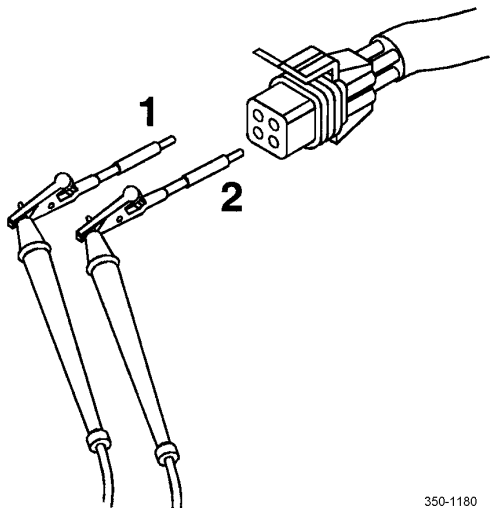
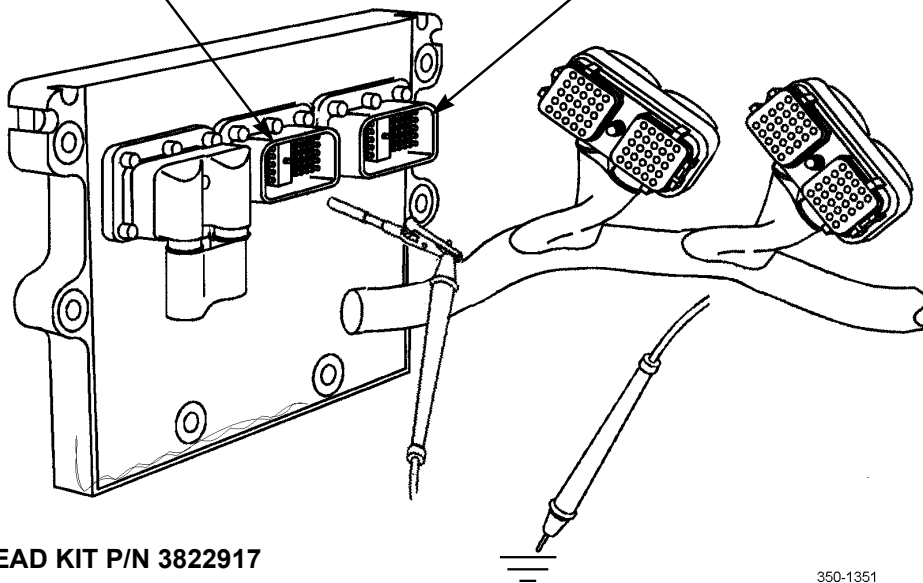
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1187 - Sensor Voltage Supply Failure - Continued</b></p>	<p>3. Measure voltage from oil pressure/temperature sensor connector pin A to pin B. Voltage should be less than 4.5V.</p>  <p style="text-align: right;"><b>&lt;4.5V</b></p> <p style="text-align: right;"><b>USE TEST LEAD KIT P/N 3822758</b></p> <p style="text-align: center; font-size: small;">350-1180</p> <p>4. Place ignition switch to OFF position and disconnect sensor harness connector from engine ECU.</p> <p>a. Inspect engine harness and sensor connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check engine harness and engine ECU connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p>	<p>If voltage is not as specified, replace oil pressure/temperature sensor (WP 0093 00).</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 1. Error Code 1187 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1187 - Sensor Voltage Supply Failure - Continued</b></p>	<p>5. Disconnect sensor harness and actuator harness from engine ECU. Place ignition switch to ON position.</p> <p>a. Measure voltage between engine ECU sensor port pin 18, pin 25, pin 45, and ground. Voltage should be 4.75-5.25V.</p> <p>b. Measure voltage between engine ECU actuator port pin 19 and pin 29 and ground. Voltage should be 4.75-5.25V.</p>	<p>If voltage is not as specified, replace engine ECU (WP 0078 00).</p> <p>If voltage is not as specified, replace engine ECU (WP 0078 00).</p>

**ACTUATOR PORT:  
PINS 19 AND 29 TO ENGINE  
BLOCK GROUND  
4.75-5.25V**

**SENSOR PORT:  
PINS 18,25,45 TO ENGINE  
BLOCK GROUND  
4.75-5.25V**



USE TEST LEAD KIT P/N 3822917

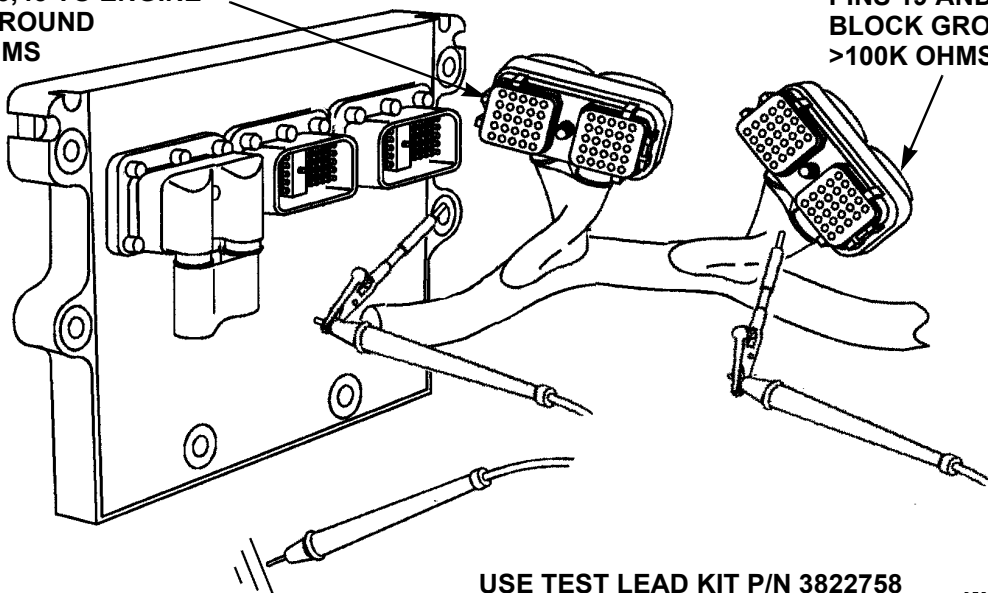
350-1351

Table 1. Error Code 1187 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1187 - Sensor Voltage Supply Failure - Continued</b></p>	<p>6. Place ignition switch to OFF position. Disconnect sensor harness and actuator harness from engine ECU.</p> <p>a. Measure resistance from sensor harness connector pins 18, 25, and 45 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pins 19 and 29 to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p>

**SENSOR HARNESS:  
PINS 18,25,45 TO ENGINE  
BLOCK GROUND  
>100K OHMS**

**ACTUATOR HARNESS:  
PINS 19 AND 29 TO ENGINE  
BLOCK GROUND  
>100K OHMS**



**USE TEST LEAD KIT P/N 3822758**

350-1352

<p>7. Place ignition switch to OFF position. Disconnect sensor harness and actuator harness from engine ECU. Disconnect oil pressure/temperature sensor and coolant level sensor jumpers.</p>
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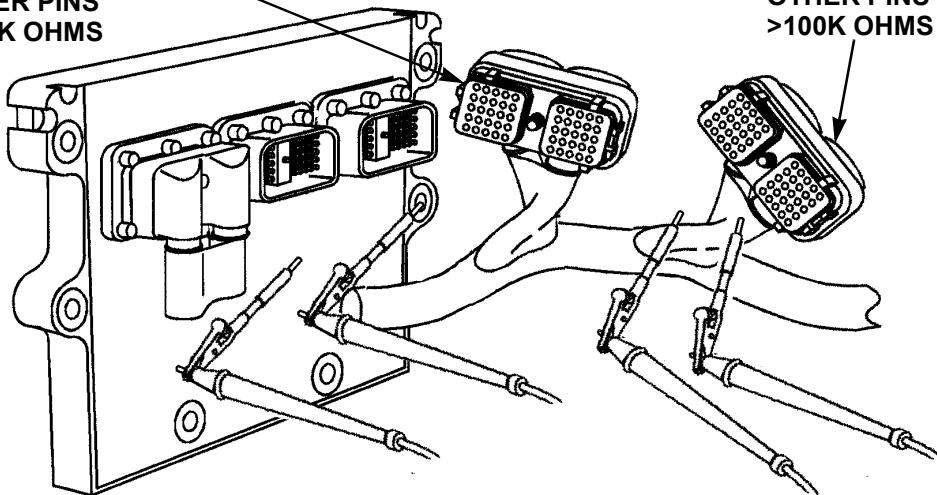


Table 1. Error Code 1187 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1187 - Sensor Voltage Supply Failure - Continued</b></p>	<p>a. Measure resistance from sensor harness connector pin 18 to all other pins in connector. Resistance should be more than 100k ohms.</p> <p>b. Measure resistance from sensor harness connector pin 25 to all other pins in connector. Resistance should be more than 100k ohms.</p> <p>c. Measure resistance from sensor harness connector pin 45 to all other pins in connector. Resistance should be more than 100k ohms.</p> <p>d. Measure resistance from actuator harness connector pin 19 to all other pins in connector. Resistance should be more than 100k ohms.</p> <p>e. Measure resistance from actuator harness connector pin 29 to all other pins in connector. Resistance should be more than 100k ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p>

**SENSOR HARNESS:  
PINS 18,25,45 TO ALL  
OTHER PINS  
>100K OHMS**

**ACTUATOR HARNESS:  
PINS 19 AND 29 TO ALL  
OTHER PINS  
>100K OHMS**



**USE TEST LEAD KIT P/N 3822758**

350-1353

Table 2. Error Code 1227 - Sensor Voltage Supply Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1227 - Sensor Voltage Supply Failure</b></p>	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect sensor harness connector from engine ECU.                             <ol style="list-style-type: none"> <li>a. Inspect engine harness and sensor connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check engine harness and engine ECU connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Disconnect sensor harness and actuator harness from engine ECU. Place ignition switch to ON position.                             <ol style="list-style-type: none"> <li>a. Measure supply voltage out of engine ECU sensor port at pins 18, 25, and 45 to ground. Voltage should be 4.75-5.25V.</li> </ol> </li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If voltage is not as specified, replace engine ECU (WP 0078 00).</p>

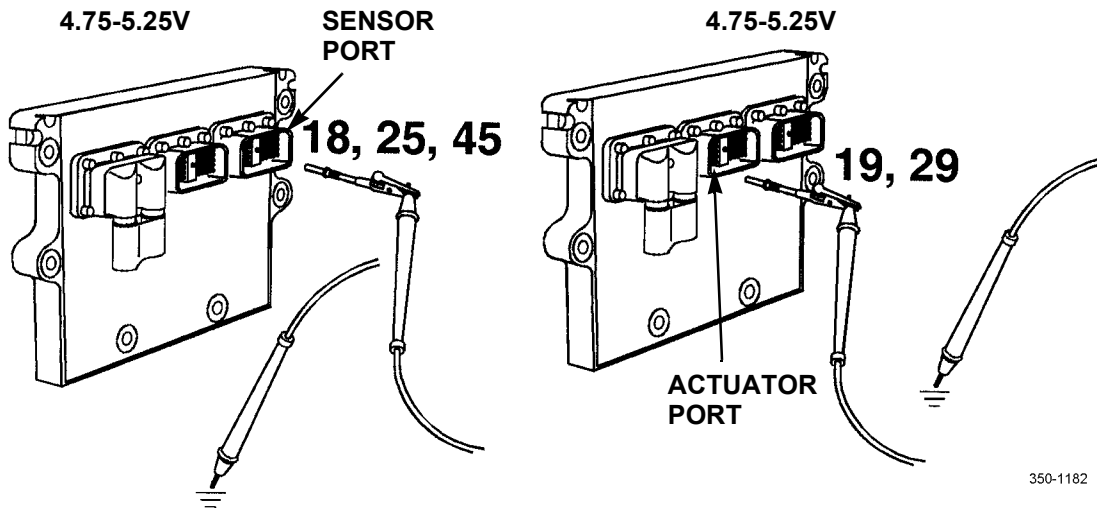
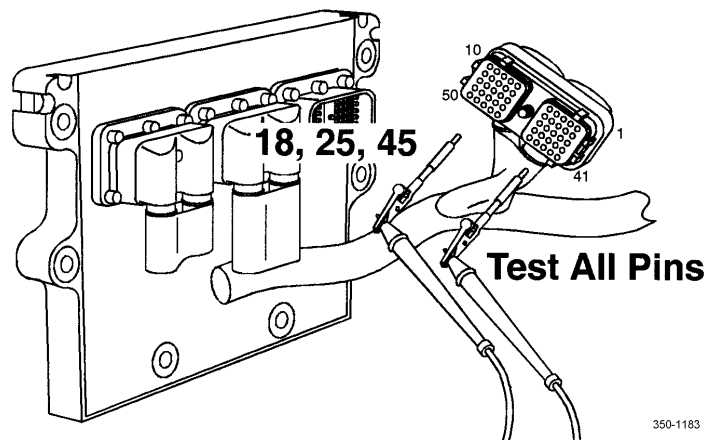


Table 2. Error Code 1227 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1227 - Sensor Voltage Supply Failure - Continued</b></p>	<p>b. Measure supply voltage out of engine ECU actuator port at pins 19 and 29 to ground. Voltage should be 4.75-5.25V.</p> <p>3. Place ignition switch to OFF position and disconnect sensor harness from engine ECU.</p> <p>a. Measure resistance from sensor harness connector pin 18 to all sensor harness connector pins. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from sensor harness connector pin 25 to all sensor harness connector pins. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from sensor harness connector pin 45 to all sensor harness connector pins. Resistance should be greater than 100k ohms.</p>	<p>If voltage is not as specified, replace engine ECU (WP 0078 00).</p> <p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p>

USE TEST LEAD  
KIT P/N 3822758



>100K OHMS

Table 2. Error Code 1227 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1227 - Sensor Voltage Supply Failure - Continued</b></p>	<p>4. Place ignition switch to OFF position and disconnect sensor harness and OEM harness connector from engine ECU.</p> <p>a. Measure resistance from sensor harness connector pin 18 to pin 7 of OEM harness connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from sensor harness connector pin 25 to pin 7 of OEM harness connector. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from sensor harness connector pin 45 to pin 7 of OEM harness connector. Resistance should be greater than 100k ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p>

USE TEST LEAD KIT P/N 3822758

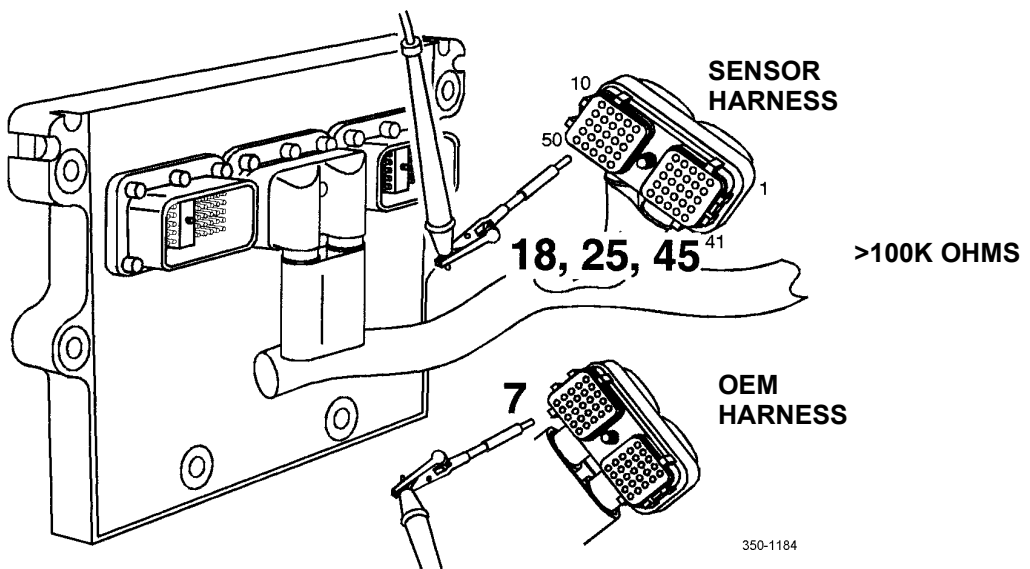


Table 2. Error Code 1227 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1227 - Sensor Voltage Supply Failure - Continued</b></p>	<p>5. If resistance was not as specified in step 4, turn ignition switch to OFF position and disconnect 31-pin OEM harness connector (round) and OEM harness from engine ECU.</p> <p>Measure resistance from 31-pin OEM harness connector pin 7 to OEM harness connector pin 7. Resistance should be greater than 100k ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p>

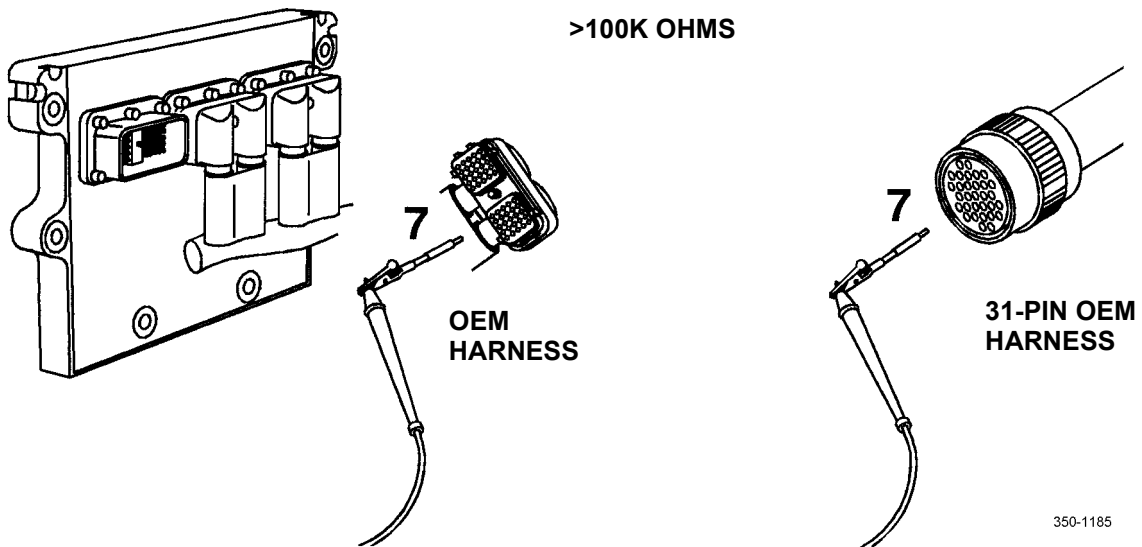


Table 2. Error Code 1227 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1227 - Sensor Voltage Supply Failure - Continued</b></p>	<p>6. Place ignition switch to OFF position and disconnect actuator harness connector from engine ECU.</p> <p>a. Inspect engine ECU and actuator harness connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check engine ECU and actuator harness connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>7. Place ignition switch to OFF position and disconnect sensor harness from engine ECU.</p> <p>a. Measure resistance from actuator harness pin 19 to all other pins in actuator harness. Resistance should be greater than 100k ohms.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If engine harness requires replacement, notify SRA.</p>

**USE TEST LEAD  
KIT P/N 3822758**

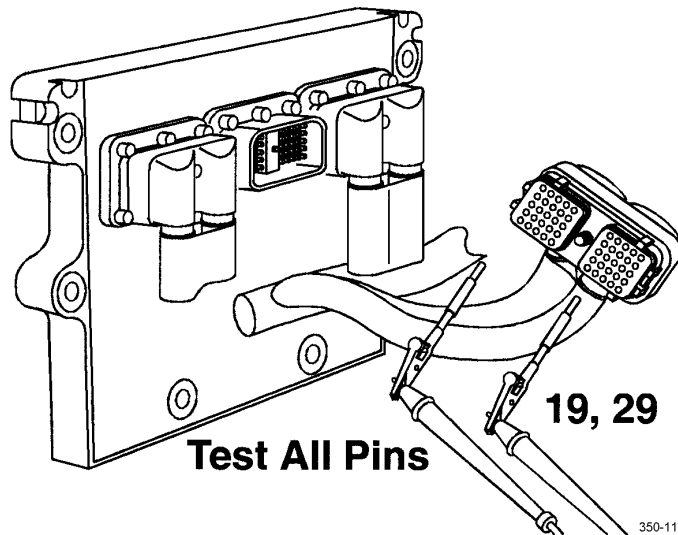


Table 2. Error Code 1227 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1227 - Sensor Voltage Supply Failure - Continued</b></p>	<p>b. Measure resistance from actuator harness pin 29 to all other pins in actuator harness. Resistance should be greater than 100k ohms.</p> <p>8. Place ignition switch to OFF position and disconnect actuator harness and OEM harness from engine ECU.</p> <p>a. Measure resistance from actuator harness connector pin 19 to OEM harness connector pin 7. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 29 to OEM harness connector pin 7. Resistance should be greater than 100k ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p>

USE TEST LEAD KIT P/N 3822758

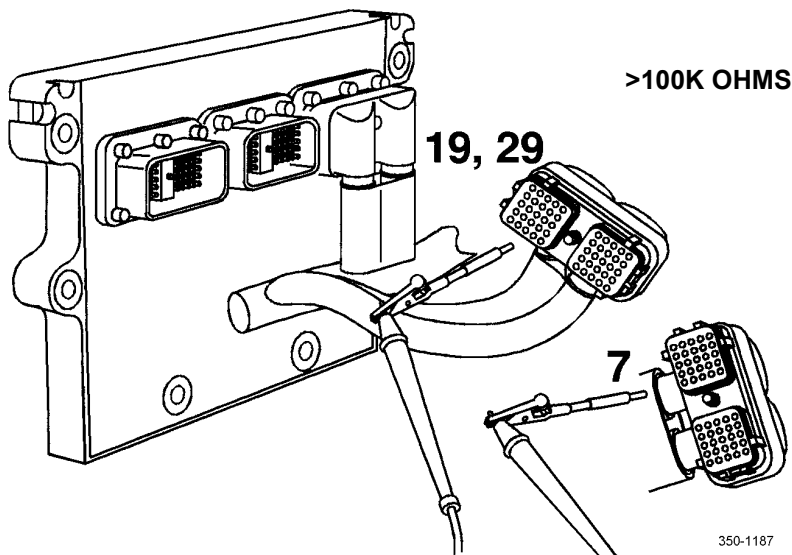


Table 2. Error Code 1227 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1227 - Sensor Voltage Supply Failure - Continued</b></p>	<p>9. Turn ignition key to OFF position and disconnect 31-pin OEM (round) harness connector and OEM harness from engine ECU.</p> <p>Measure resistance from 31-pin OEM harness connector pin 7 to OEM harness connector pin 14. Resistance should be greater than 100k ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p>

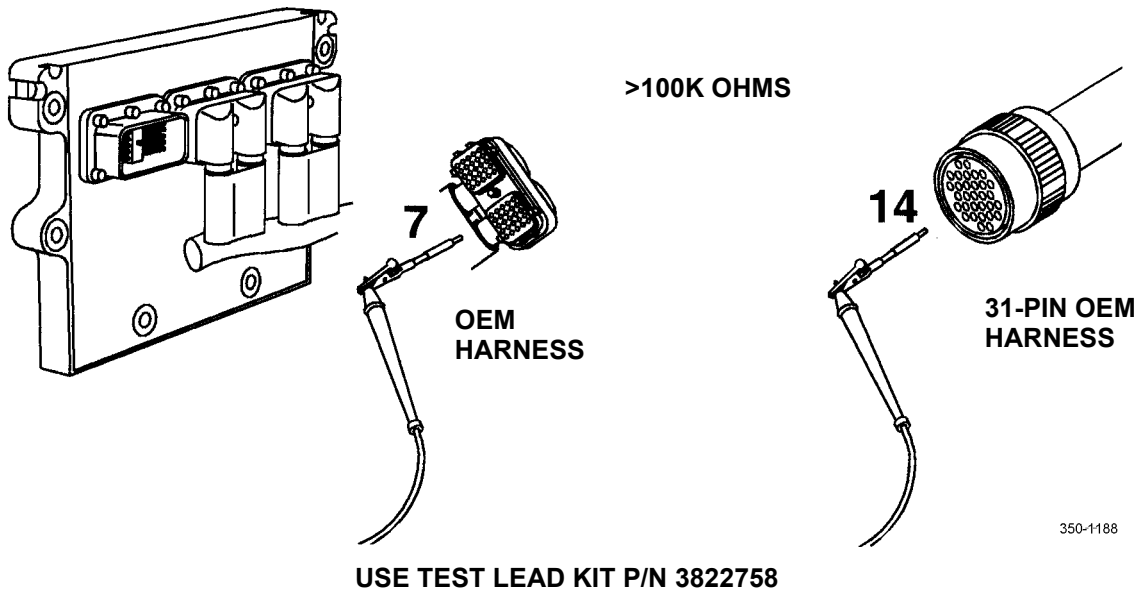
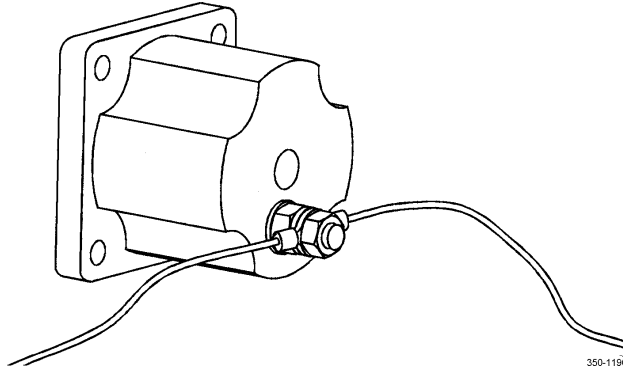




Table 3. Error Code 1254 - Sensor Voltage Supply Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Error Code 1254 - Sensor Voltage Supply Failure	1. Check fuel shutoff solenoid post for corrosion.	Clean solenoid post and wire terminal as required.



2. Disconnect actuator harness from fuel shutoff solenoid. Place ignition switch to ON position.

Measure voltage from fuel shutoff control wire connectors to engine block ground. Voltage should be greater than 6V.

If engine harness requires replacement, notify SRA.

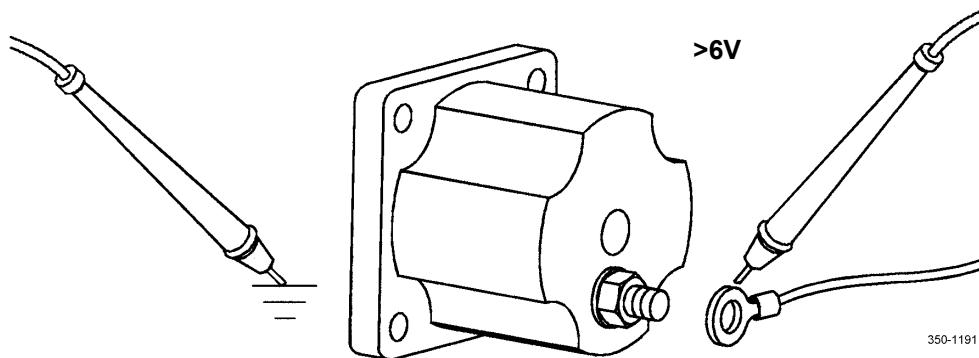


Table 3. Error Code 1254 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1254 - Sensor Voltage Supply Failure - Continued</b></p>	<p>3. Place ignition switch to OFF position and disconnect actuator harness from engine ECU.</p> <p>a. Inspect engine ECU and actuator harness connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check engine ECU and actuator harness connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>4. Place ignition switch to OFF position and disconnect actuator wire from fuel shutoff solenoid and disconnect actuator harness connector from engine ECU.</p> <p>Measure resistance from actuator harness pin 33 to fuel shutoff control wire. Resistance should be less than 10 ohms.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If engine harness requires replacement, notify SRA.</p>

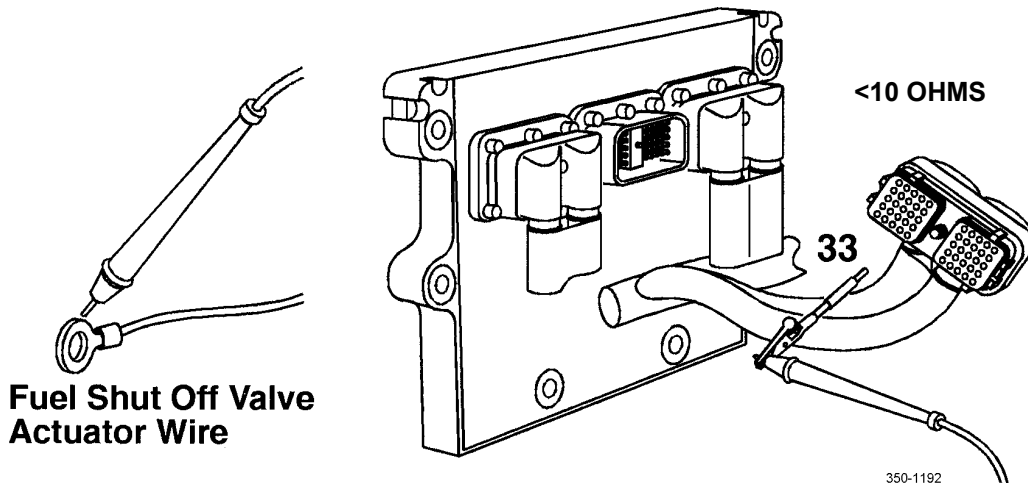


Table 3. Error Code 1254 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1254 - Sensor Voltage Supply Failure - Continued</b></p>	<p>5. Place ignition switch in OFF position. Disconnect actuator harness from engine ECU. Disconnect actuator wire from fuel shutoff valve.</p> <p>Measure resistance from pin 33 of actuator harness connector to all other pins in connector. Resistance should be more than 100K ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p>

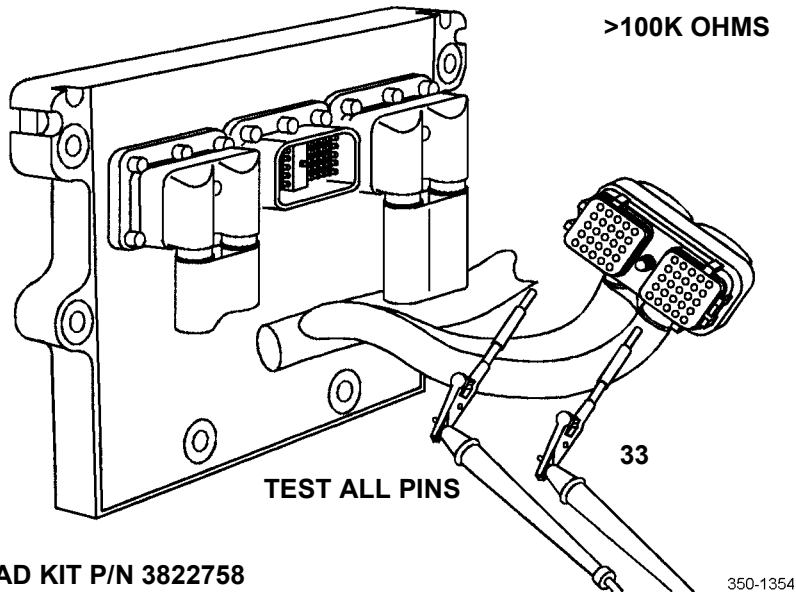
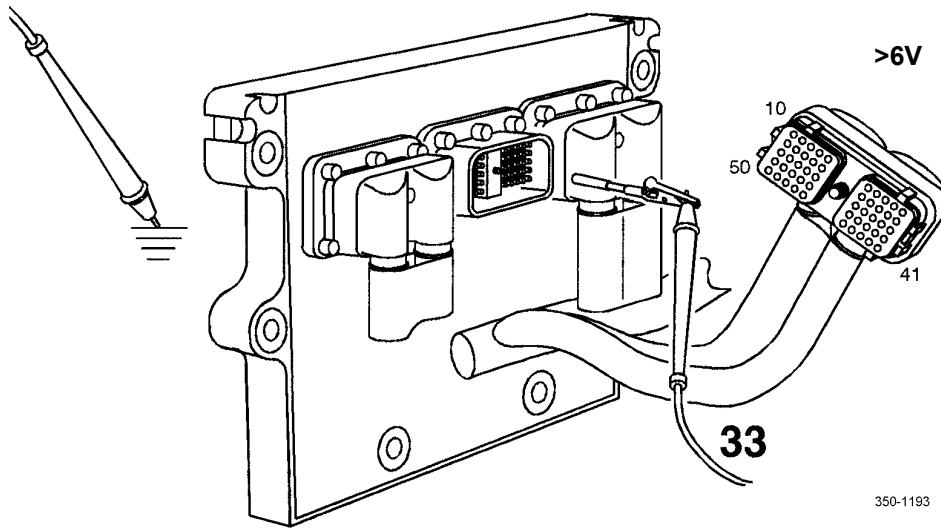


Table 3. Error Code 1254 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1254 - Sensor Voltage Supply Failure - Continued</b></p>	<p>6. Disconnect actuator harness from engine ECU. Place ignition switch in ON position.</p> <p>Measure voltage from engine ECU pin 33 to engine block ground. Voltage should be greater than 6V.</p>	<p>a. If engine harness requires replacement, notify SRA.                      b. If voltage is not as specified, replace engine ECU (WP 0078 00).</p>



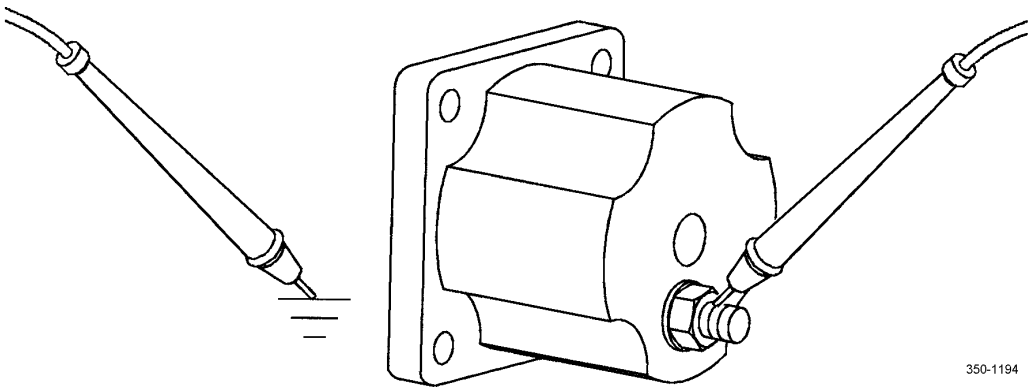
USE TEST LEAD KIT P/N 3822917

350-1193

Table 3. Error Code 1254 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1254 - Sensor Voltage Supply Failure - Continued</b></p>	<p>7. Place ignition switch to OFF position and disconnect actuator harness from fuel shutoff solenoid.</p> <p>8. Measure resistance from fuel shutoff solenoid to engine block ground. Resistance should be 7-8 ohms for 12V solenoids.</p>	<p>If resistance is not as specified, replace fuel shutoff solenoid (WP 0055 00).</p>

**12V = 7-8 OHMS**



350-1194

Table 4. Error Code 1287 - Sensor Voltage Supply Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1287 - Sensor Voltage Supply Failure</b></p> 		<p>Notify SRA.</p>

Table 5. Error Code 1352 - Sensor Voltage Supply Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1352 - Sensor Voltage Supply Failure</p>	<ol style="list-style-type: none"> <li>1. Disconnect sensor harness from intake manifold pressure sensor and place ignition switch in ON position.</li> <li>2. Measure voltage from intake manifold pressure connector pin A to pin B. Voltage should be less than 4.5V.</li> </ol>	<p>If voltage is not as specified, replace intake manifold pressure sensor (WP 0093 00).</p>

<4.5V

350-1196

Table 5. Error Code 1352 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1352 - Sensor Voltage Supply Failure - Continued</b></p>	<ol style="list-style-type: none"> <li>3. Disconnect sensor harness from ambient air pressure sensor and place ignition switch in ON position.</li> <li>4. Measure voltage from ambient air pressure connector pin A to pin B. Voltage should be less than 4.5V.</li> <li>5. Place ignition switch to OFF position and disconnect sensor harness from engine ECU.                             <ol style="list-style-type: none"> <li>a. Inspect engine ECU and sensor harness connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> </ol> </li> </ol>	<p>If voltage is not as specified, replace ambient air pressure sensor (WP 0093 00).</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p>

Table 5. Error Code 1352 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

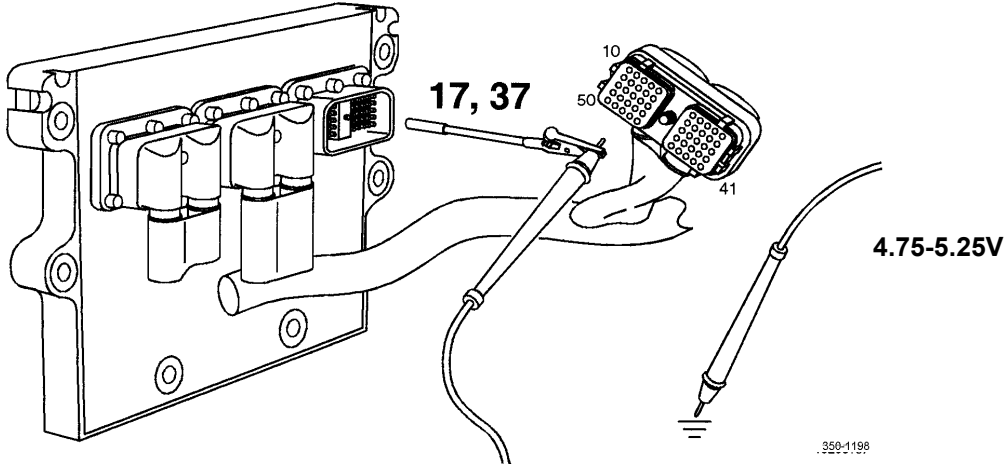
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1352 - Sensor Voltage Supply Failure - Continued</b></p>	<p>b. Check engine ECU and sensor harness connector for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>6. Disconnect sensor harness from engine ECU and place ignition switch in ON position.</p> <p>7. Measure voltage from engine ECU connector pins 17 and 37 to ground. Voltage should be 4.75-5.25V.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If voltage is not as specified, replace engine ECU (WP 0078 00).</p>
 <p style="text-align: right; margin-right: 50px;">4.75-5.25V</p> <p style="text-align: right; margin-right: 50px;"><small>.350-1198</small></p>		
	<p>8. Place ignition switch to OFF position and disconnect sensor harness from engine ECU, ambient air pressure sensor, and intake manifold pressure sensor.</p> <p>9. Measure resistance from sensor harness pins 17 and 37 to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p>



Table 5. Error Code 1352 - Sensor Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1352 - Sensor Voltage Supply Failure - Continued</b></p>	<p>10. Place ignition switch to OFF position and disconnect sensor harness from engine ECU, ambient air pressure sensor, and intake manifold pressure sensor.</p> <p>a. Measure resistance from sensor harness pin 17 to all other pins in sensor harness. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from sensor harness pin 37 to all other pins in sensor harness. Resistance should be greater than 100k ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p>

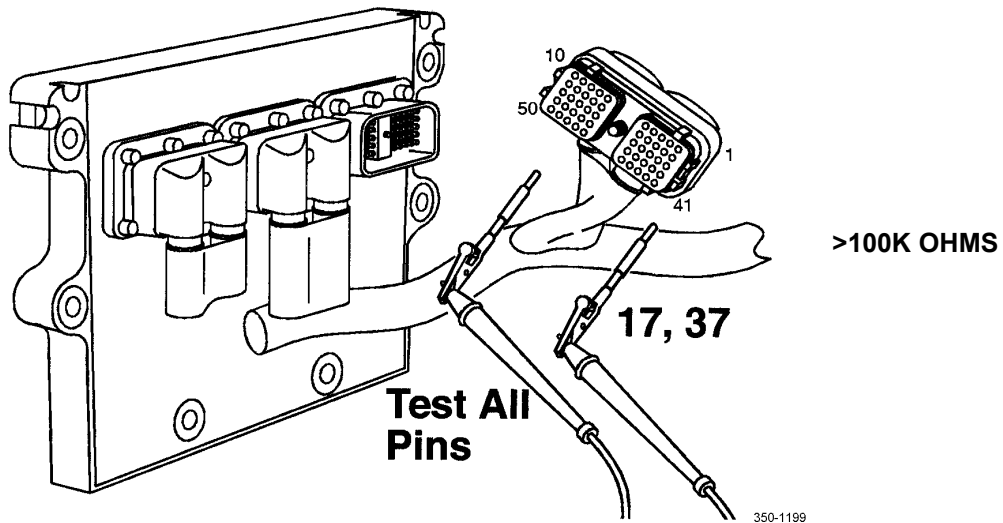
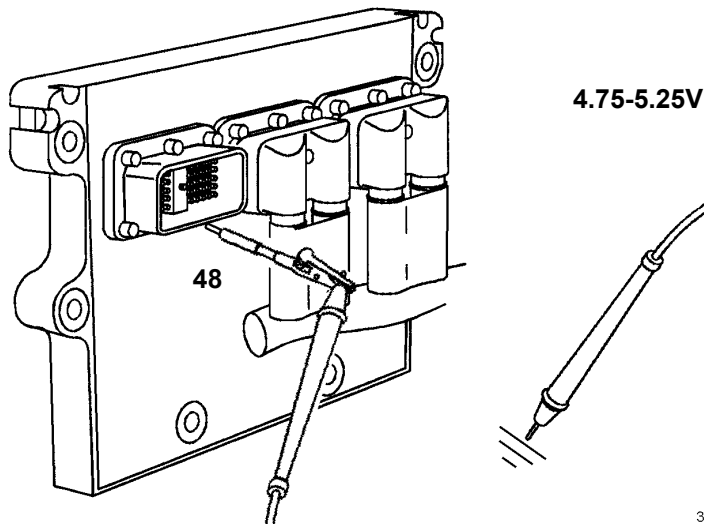


Table 6. Error Code 1443 - Throttle Voltage Supply Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1443 - Throttle Voltage Supply Failure</b></p>	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position. Disconnect OEM harness connector from engine ECU.                             <ol style="list-style-type: none"> <li>a. Inspect engine harness and sensor connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check engine harness and engine ECU connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> <li>2. Disconnect OEM harness connector from engine ECU. Place ignition switch in ON position.</li> <li>3. Measure supply voltage from ECU OEM port pin 48 to engine block ground. Voltage should be 4.75-5.25V.</li> </ol>	<p>Remove any extra wires and connect to (+) 12V supply.</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <ol style="list-style-type: none"> <li>a. If voltage is not as specified replace engine ECU (WP 0078 00).</li> <li>b. If voltage is as specified, proceed with the following steps.</li> </ol>

**USE TEST LEAD KIT P/N 3822917**



350-1355

Table 6. Error Code 1443 - Throttle Voltage Supply Failure Troubleshooting Procedures - Continued.

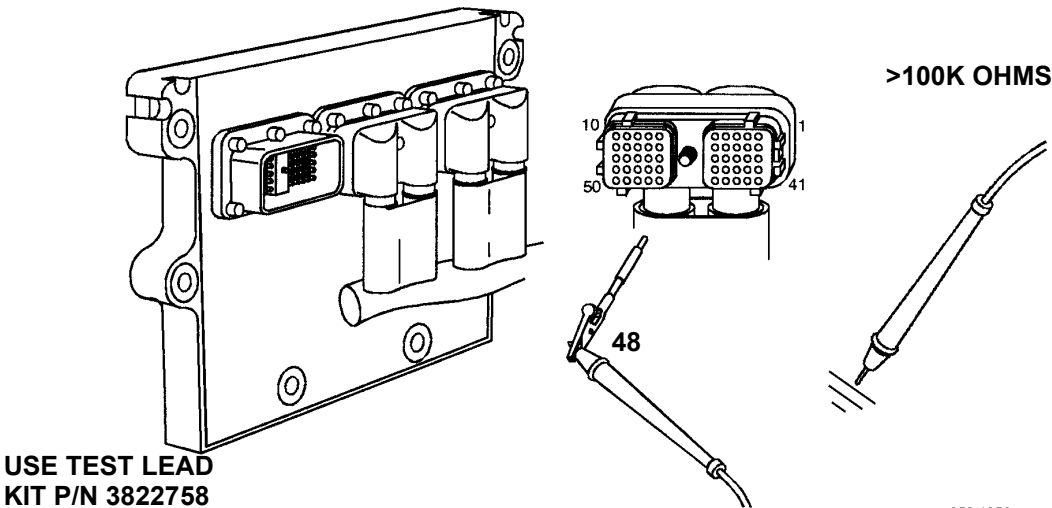
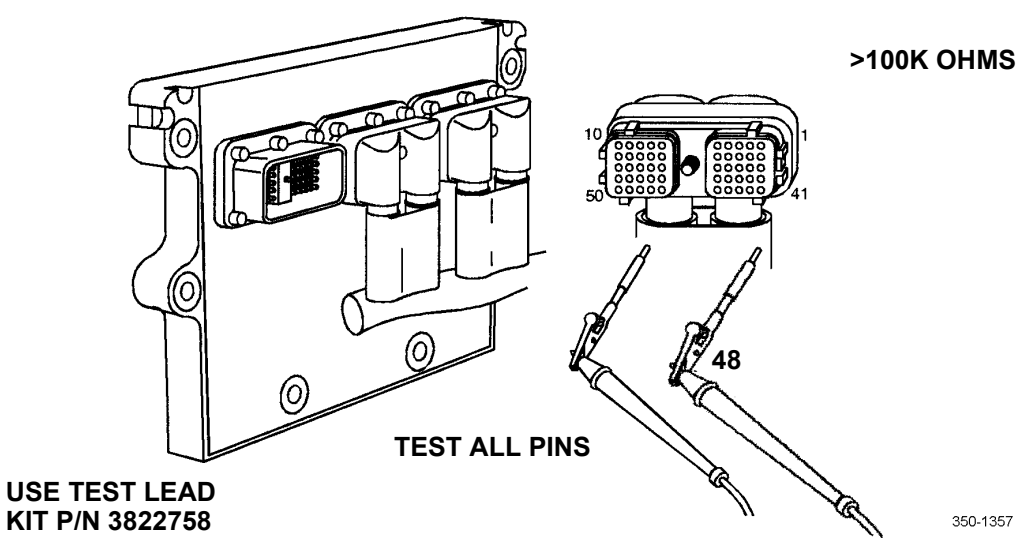
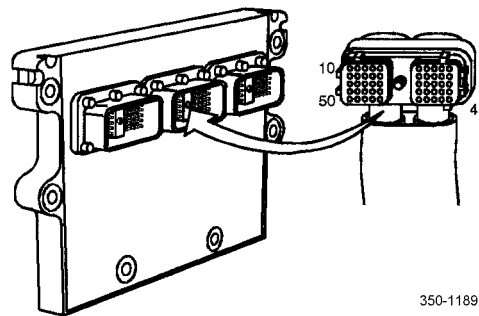
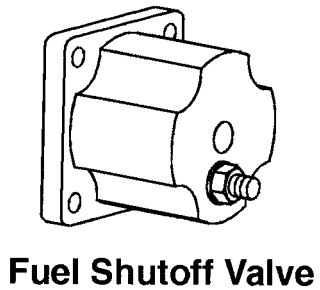
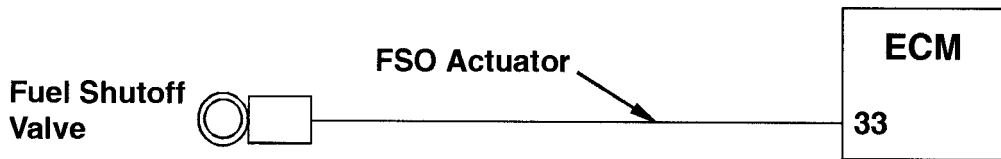
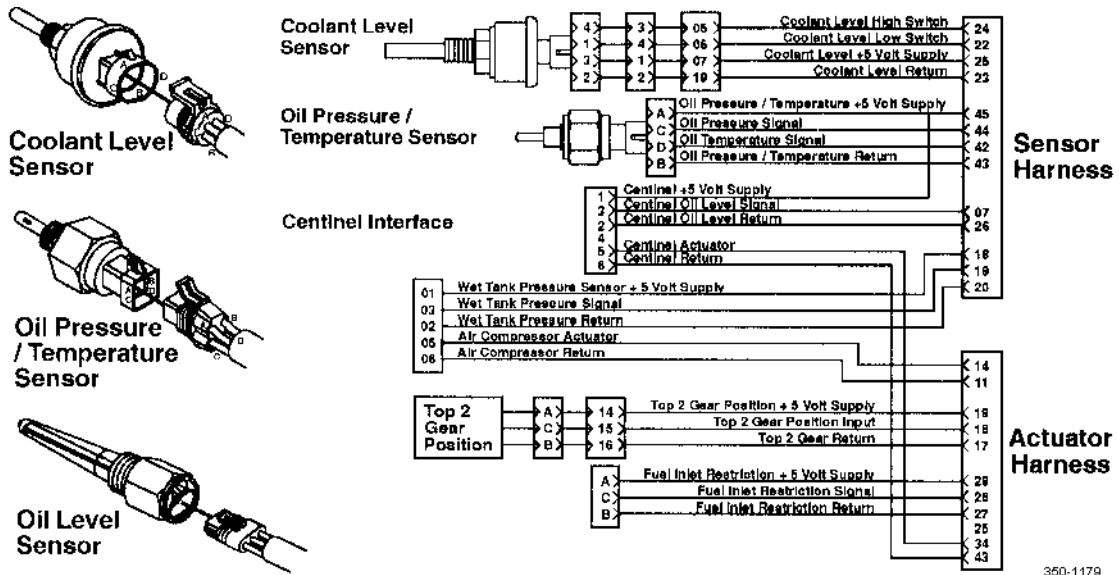
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1443 - Throttle Voltage Supply Failure - Continued</b></p>  <p>USE TEST LEAD KIT P/N 3822758</p> <p>&gt;100K OHMS</p> <p>350-1356</p>	<p>4. Measure resistance from OEM connector harness pin 48 to engine block ground. Resistance should be greater than 100K ohms.</p>	<p>If resistance is not as specified, notify SRA.</p>

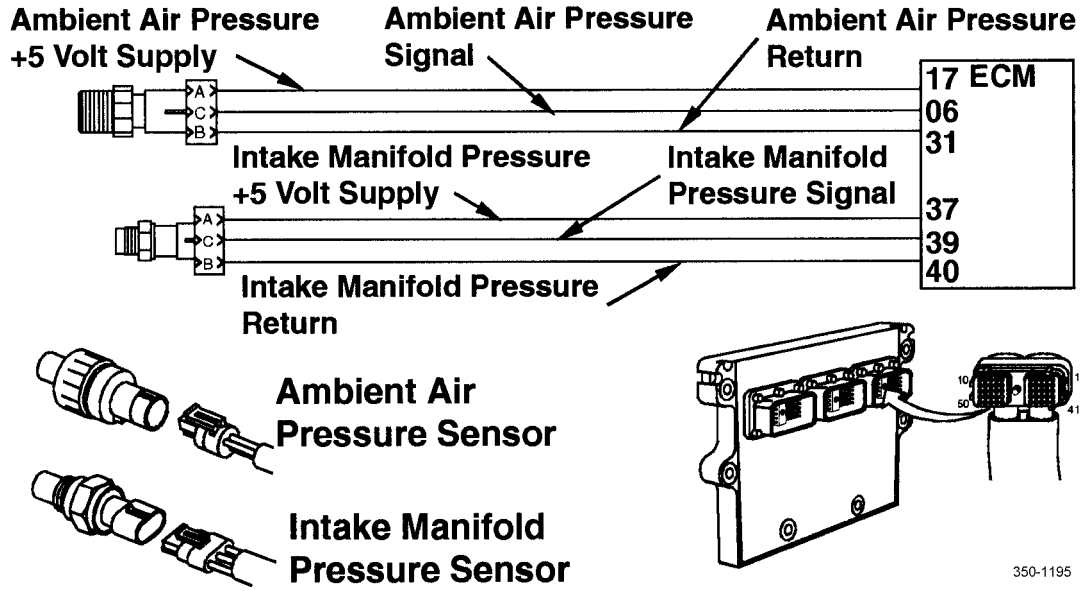
Table 6. Error Code 1443 - Throttle Voltage Supply Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1443 - Throttle Voltage Supply Failure - Continued</b></p>  <p>USE TEST LEAD KIT P/N 3822758</p> <p>TEST ALL PINS</p> <p>&gt;100K OHMS</p> <p>350-1357</p>	<p>5. Measure resistance from OEM harness connector pin 48 to all other pins in connector. Resistance should be greater than 100K ohms.</p>	<p>If resistance is not as specified, notify SRA.</p>

**NOTE**

The RTCH does not have a coolant level or oil level sensor.





END OF WORK PACKAGE

**THIS WORK PACKAGE COVERS**

Error Code 1115 - Engine Position Sensor Circuit Failure

Error Code 1234 - Engine Overspeed Failure

Error Code 1121 - Engine Position Sensor Circuit Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

**Tools and Special Tools**

Test lead, female (Item 50, WP 0204 00)

Test lead, male (Item 51, WP 0204 00)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

**Table 1. Error Code 1115 - Engine Position Sensor Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1115 - Engine Position Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect engine harness from engine position sensor (WP 0093 00).</li> <li>2. Inspect engine harness and engine position sensor connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</li> <li>3. Check engine harness and engine position sensor for dirt or moisture in or on connectors and for missing or damaged connector seals.</li> <li>4. Check for short circuit to ground:                         <ol style="list-style-type: none"> <li>a. Measure resistance from engine position sensor connector pin A to engine block ground. Resistance should be greater than 100k ohms.</li> </ol> </li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If resistance is not as specified, replace engine position sensor (WP 0093 00).</p>

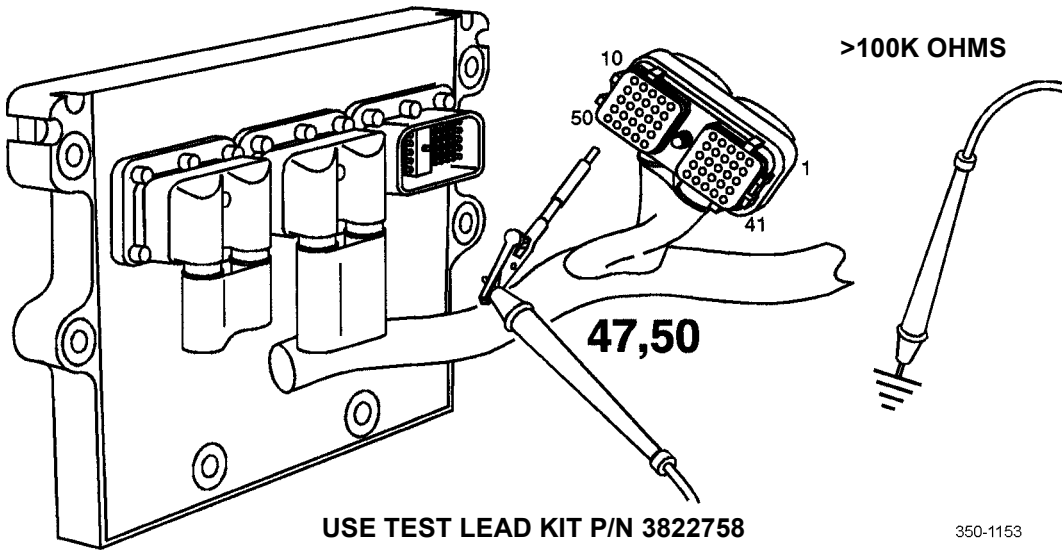
Table 1. Error Code 1115 - Engine Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1115 - Engine Position Sensor Circuit Failure - Continued</b></p>	<p>b. Measure resistance from engine position sensor connector pin B to engine block ground. Resistance should be greater than 100k ohms.</p> <p>5. Inspect engine position sensor for damage, including metal debris on end of sensor, damage to end of sensor caused by camshaft gear or flywheel ring gear, oil leakage or insulation problems such as swelling, and damaged electrical potting in sensing end of sensor.</p> <p>6. Check resistance of engine position sensor:</p> <p>a. Measure resistance from pin A to pin D of engine position sensor. Resistance should be 1000-2000 ohms.</p> <p>b. Measure resistance from pin B to pin C of engine position sensor. Resistance should be 1000-2000 ohms.</p> <p>7. Check for a short circuit between coils by measuring resistance from pin A to pin B of engine position sensor. Resistance should be greater than 100k ohms.</p> <p>8. Disconnect sensor harness from engine ECU (794).</p> <p>9. Inspect engine harness and engine ECU connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p>	<p>Replace damaged engine position sensor (WP 0093 00).</p> <p>If resistance is not as specified, replace engine position sensor (WP 0093 00).</p> <p>If resistance is not as specified, replace engine position sensor (WP 0093 00).</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p>



Table 1. Error Code 1115 - Engine Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1115 - Engine Position Sensor Circuit Failure - Continued</b></p>	<p>10. Check engine harness and engine ECU for dirt or moisture in or on connectors and for missing or damaged connector seals.</p> <p>11. Check for short circuit to ground:</p> <p>a. Measure resistance from engine harness connector pin 47 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from engine harness connector pin 50 to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If engine harness requires replacement, notify SRA.</p>

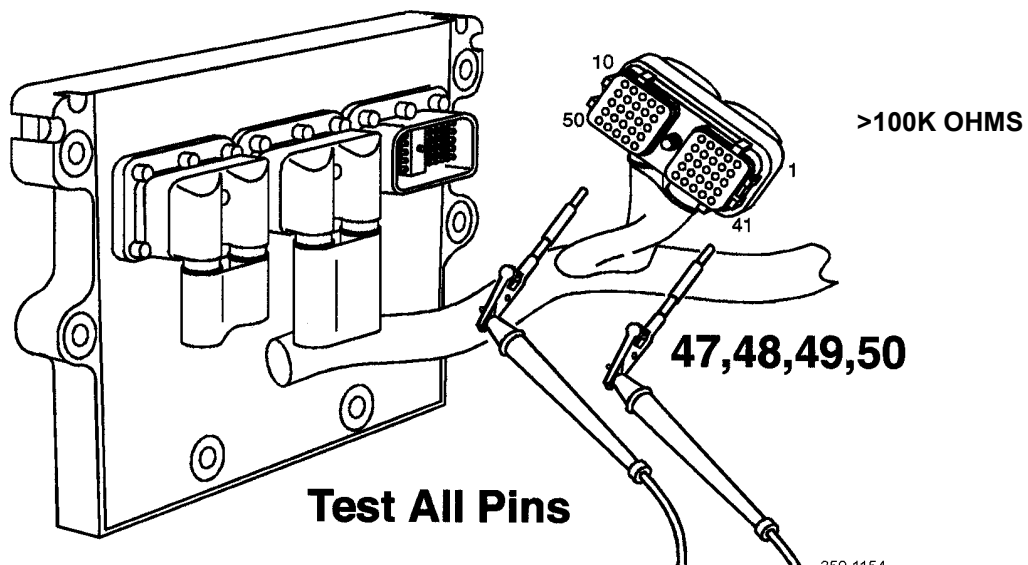


**USE TEST LEAD KIT P/N 3822758**

350-1153

Table 1. Error Code 1115 - Engine Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1115 - Engine Position Sensor Circuit Failure - Continued</b></p>	<p>12. Check for short circuit from pin to pin:</p> <ul style="list-style-type: none"> <li>a. Measure resistance from pin 47 of engine harness connector to all other pins. Resistance should be greater than 100k ohms.</li> <li>b. Measure resistance from pin 48 of engine harness connector to all other pins. Resistance should be greater than 100k ohms.</li> <li>c. Measure resistance from pin 49 of engine harness connector to all other pins. Resistance should be greater than 100k ohms.</li> <li>d. Measure resistance from pin 50 of engine harness connector to all other pins. Resistance should be greater than 100k ohms.</li> </ul>	<p>If resistance is not as specified, notify SRA to replace harness.</p>



USE TEST LEAD KIT P/N 3822758

Table 1. Error Code 1115 - Engine Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1115 - Engine Position Sensor Circuit Failure - Continued</b></p>	<p>13.Reconnect sensor harness to engine position sensor. Check for open circuit:</p> <p>a. Measure resistance from pin 49 to pin 50 of engine harness connector. Resistance should be 1000-2000 ohms.</p> <p>b. Measure resistance from pin 47 to pin 48 of engine harness connector. Resistance should be 1000-2000 ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p>

Table 2. Error Code 1121 - Engine Position Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1121 - Engine Position Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect engine harness from engine position sensor (WP 0093 00).</li> <li>2. Inspect engine harness and engine position sensor connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</li> <li>3. Check engine harness and engine position sensor for dirt or moisture in or on connectors and for missing or damaged connector seals.</li> <li>4. Check for short circuit to ground:             <ol style="list-style-type: none"> <li>a. Measure resistance from engine position sensor connector pin A to engine block ground. Resistance should be greater than 100k ohms.</li> </ol> </li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If resistance is not as specified, replace engine position sensor (WP 0093 00).</p>

Table 2. Error Code 1121 - Engine Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1121 - Engine Position Sensor Circuit Failure - Continued</b></p>	<p>b. Measure resistance from engine position sensor connector pin B to engine block ground. Resistance should be greater than 100k ohms.</p> <p>5. Inspect engine position sensor for damage, including metal debris on end of sensor, damage to end of sensor caused by camshaft gear or flywheel ring gear, oil leakage or insulation problems such as swelling, and damaged electrical potting in sensing end of sensor.</p> <p>6. Check resistance of engine position sensor:</p> <p>a. Measure resistance from pin A to pin D of engine position sensor. Resistance should be 1000-2000 ohms.</p> <p>b. Measure resistance from pin B to pin C of engine position sensor. Resistance should be 1000-2000 ohms.</p> <p>7. Check for a short circuit between coils by measuring resistance from pin A to pin B of engine position sensor. Resistance should be greater than 100k ohms.</p> <p>8. Disconnect sensor harness from engine ECU (794).</p> <p>9. Inspect engine harness and engine ECU connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p>	<p>Replace damaged engine position sensor (WP 0093 00).</p> <p>If resistance is not as specified, replace engine position sensor (WP 0093 00).</p> <p>If resistance is not as specified, replace engine position sensor (WP 0093 00).</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p>

Table 2. Error Code 1121 - Engine Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1121 - Engine Position Sensor Circuit Failure - Continued</b></p>	<p>10. Check engine harness and engine ECU for dirt or moisture in or on connectors and for missing or damaged connector seals.</p> <p>11. Check for short circuit to ground:</p> <p>a. Measure resistance from engine harness connector pin 47 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from engine harness connector pin 50 to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If engine harness requires replacement, notify SRA.</p>

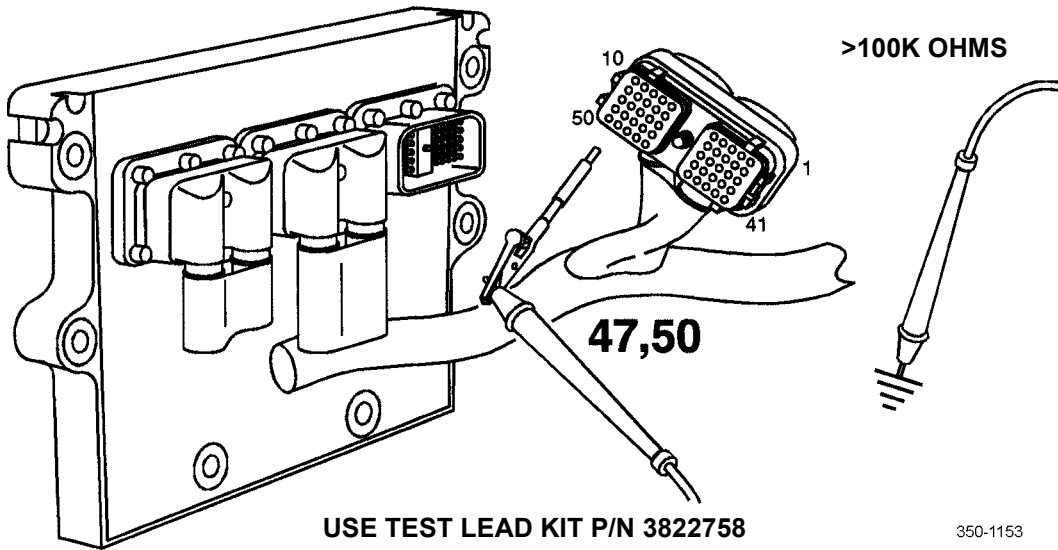
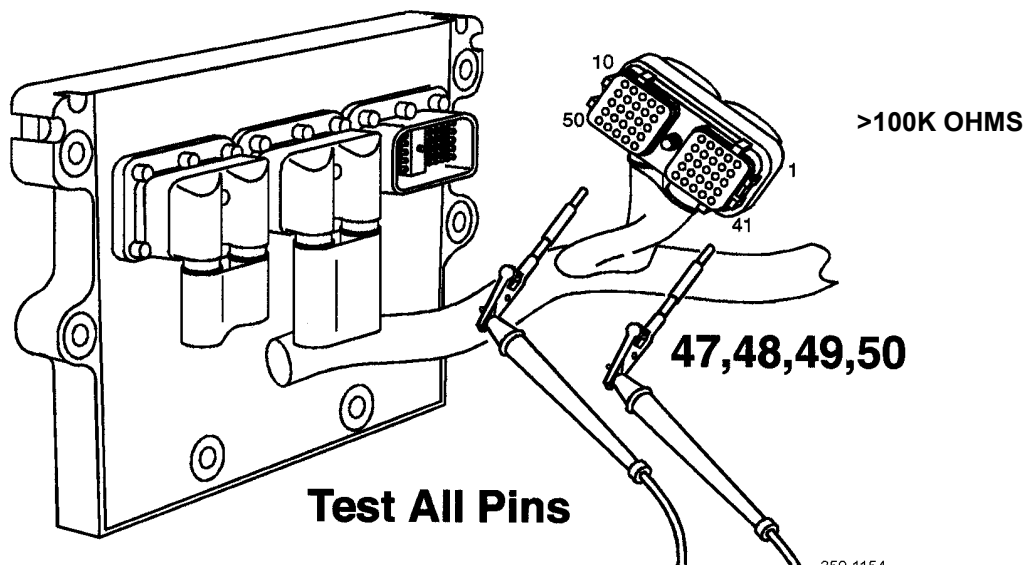


Table 2. Error Code 1121 - Engine Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1121 - Engine Position Sensor Circuit Failure - Continued</b></p>	<p>12. Check for short circuit from pin to pin:</p> <ul style="list-style-type: none"> <li>a. Measure resistance from pin 47 of engine harness connector to all other pins. Resistance should be greater than 100k ohms.</li> <li>b. Measure resistance from pin 48 of engine harness connector to all other pins. Resistance should be greater than 100k ohms.</li> <li>c. Measure resistance from pin 49 of engine harness connector to all other pins. Resistance should be greater than 100k ohms.</li> <li>d. Measure resistance from pin 50 of engine harness connector to all other pins. Resistance should be greater than 100k ohms.</li> </ul>	<p>If resistance is not as specified, notify SRA to replace harness.</p>




USE TEST LEAD KIT P/N 3822758

350-1154

Table 2. Error Code 1121 - Engine Position Sensor Circuit Failure Troubleshooting Procedures - Continued.

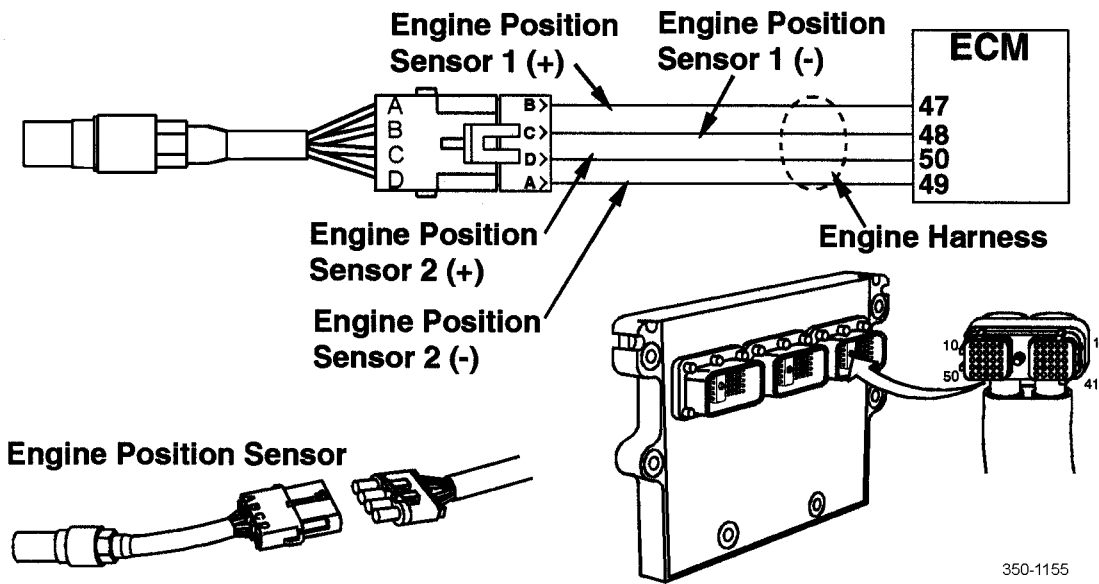
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1121 - Engine Position Sensor Circuit Failure - Continued</p>	<p>13.Reconnect sensor harness to engine position sensor. Check for open circuit:</p> <ul style="list-style-type: none"> <li>a. Measure resistance from pin 49 to pin 50 of engine harness connector. Resistance should be 1000-2000 ohms.</li> <li>b. Measure resistance from pin 47 to pin 48 of engine harness connector. Resistance should be 1000-2000 ohms.</li> </ul>	<p>If engine harness requires replacement, notify SRA.</p>

Table 3. Error Code 1234 - Engine Overspeed Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1234 - Engine Overspeed Failure</p> 		<p>Notify SRA.</p>

**NOTE**

Engine position sensor is located on left side of engine, above A/C compressor.



350-1155

END OF WORK PACKAGE



**THIS WORK PACKAGE COVERS**

Error Code 1135 - Oil Pressure Sensor Circuit Failure  
 Error Code 1141 - Oil Pressure Sensor Circuit Failure  
 Error Code 1143 - Oil Pressure Sensor Circuit Failure

Error Code 1415 - Oil Pressure Sensor Circuit Failure  
 Error Code 1435 - Oil Pressure Sensor Circuit Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

**Tools and Special Tools**

Cable, breakout (Item 46, WP 0204 00)  
 Test lead, female (Item 48, WP 0204 00)  
 Test lead, male (Item 51, WP 0204 00)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

**Table 1. Error Code 1135 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1135 - Oil Pressure Sensor Circuit Failure</b></p> 	<p>1. Ensure that ignition switch is in OFF position. Disconnect engine harness from oil pressure/temperature sensor (WP 0093 00).</p> <p>a. Inspect engine harness and oil pressure/temperature sensor connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check engine harness and oil pressure/temperature sensor for dirt or moisture in or on connectors and for missing or damaged connector seals.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 1. Error Code 1135 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

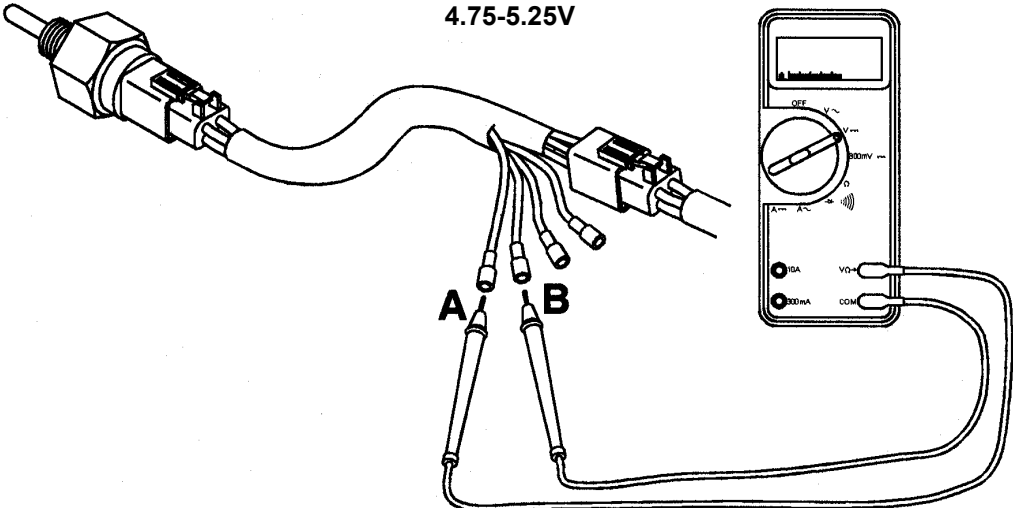
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1135 - Oil Pressure Sensor Circuit Failure - Continued</b></p>	<p>2. Install breakout cable between sensor and engine harness connector. Place ignition switch in ON position.</p> <p>3. Measure supply voltage from pin A (or RED) to pin B (or BLACK) of breakout cable. Voltage should be 4.75-5.25V.</p>	<p>If voltage is not as specified, proceed to step 4.</p>
 <p>4.75-5.25V</p> <p>350-1299</p>		
	<p>4. Disconnect sensor harness connector from engine ECU. Place ignition switch in ON position.</p>	

Table 1. Error Code 1135 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

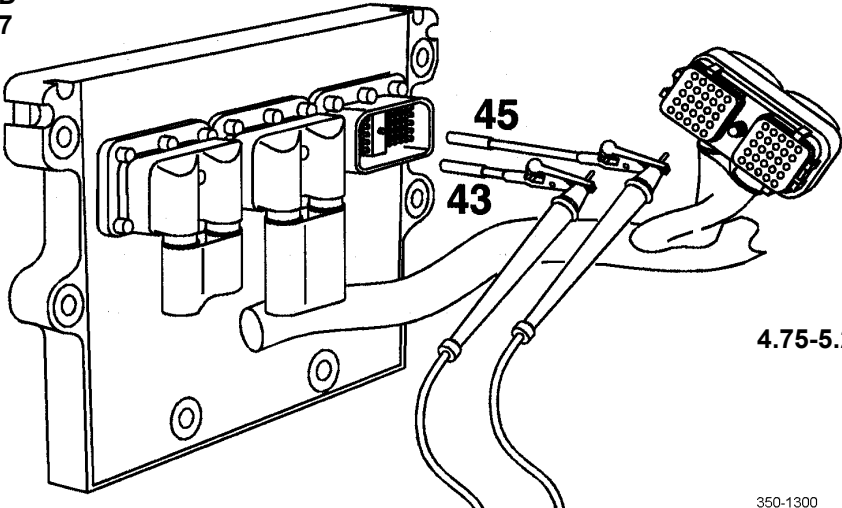
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1135 - Oil Pressure Sensor Circuit Failure - Continued</b></p> <p><b>USE TEST LEAD KIT P/N 3822917</b></p>  <p style="text-align: right;">4.75-5.25V</p> <p style="text-align: right;">350-1300</p>	<p>5. Measure voltage at ECU from pin 45 to pin 43 of ECU sensor port. Voltage should be 4.75-5.25V.</p> <p>6. Install breakout cable between sensor and engine harness connector. Place ignition switch in ON position.</p>	<p>a. If voltage is as specified, proceed to step 6.</p> <p>b. If voltage is not as specified, replace engine ECU (WP 0078 00).</p>

Table 1. Error Code 1135 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

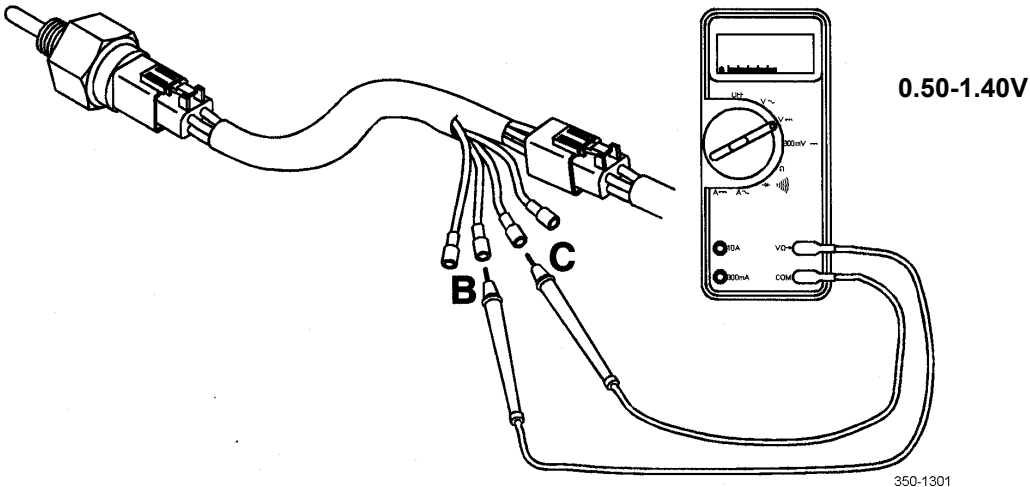
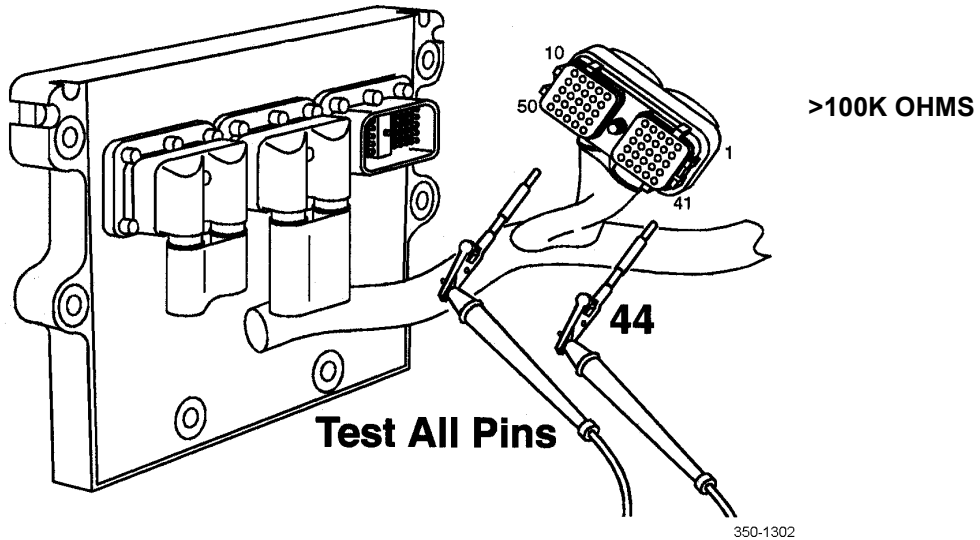
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1135 - Oil Pressure Sensor Circuit Failure - Continued</b></p>	<p>7. Measure supply voltage from pin C (or YELLOW) to pin B (or BLACK) of breakout cable. Voltage should be 0.50-1.40V.</p>  <p style="text-align: right;">0.50-1.40V</p> <p style="text-align: right; font-size: small;">350-1301</p>	<p>If voltage is not as specified, proceed with the following steps.</p>
	<p>8. Ensure that ignition switch is in OFF position. Disconnect sensor harness from engine ECU.</p> <p>a. Inspect sensor harness and engine ECU connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check sensor harness and engine ECU for dirt or moisture in or on connectors and for missing or damaged connector seals.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 1. Error Code 1135 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1135 - Oil Pressure Sensor Circuit Failure - Continued</b></p>	<p>9. Place ignition switch in OFF position and disconnect sensor harness from engine ECU.</p> <p>10. Measure resistance from pin 44 of sensor harness connector to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p>



11. Place ignition switch in OFF position. Disconnect sensor harness from engine ECU and disconnect engine harness from oil pressure/temperature sensor.

Table 1. Error Code 1135 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1135 - Oil Pressure Sensor Circuit Failure - Continued</b></p>	<p>12. Measure resistance from pin 43 of sensor harness connector to pin B (or 2) on harness side of oil pressure/temperature sensor connector. Resistance should be less than 10 ohms.</p>	<p>a. If resistance is as specified, replace oil pressure/temperature sensor (WP 0093 00).                      b. If resistance is not as specified, repair or replace connectors (WP 0111 00).                      c. If engine harness requires replacement, notify SRA.</p>

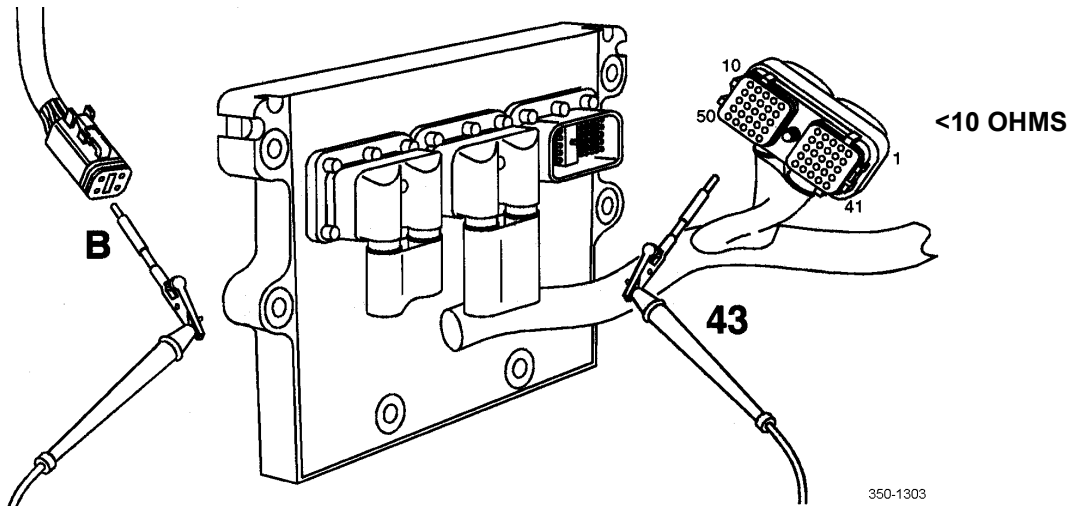

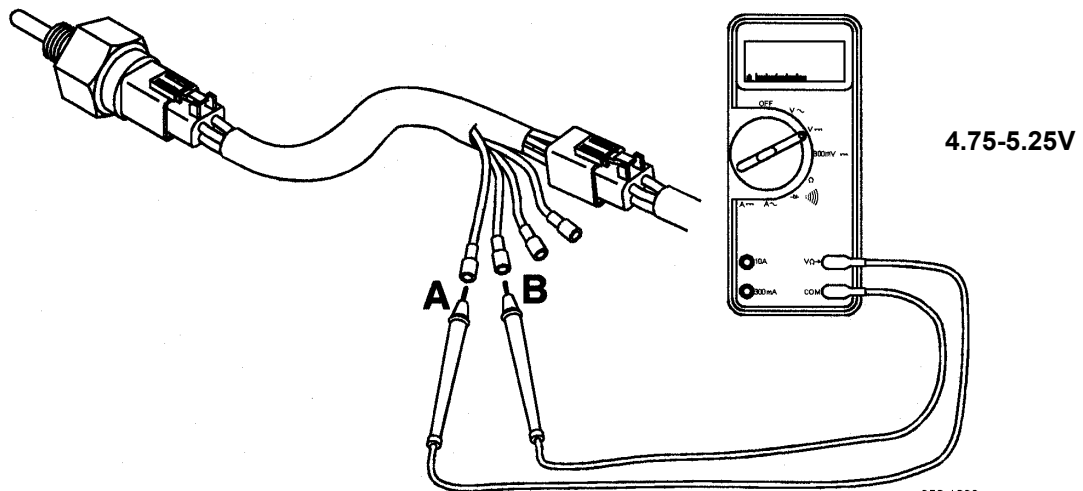


Table 2. Error Code 1141 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1141 - Oil Pressure Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect engine harness from oil pressure/temperature sensor (WP 0093 00).                             <ol style="list-style-type: none"> <li>a. Inspect engine harness and oil pressure/temperature sensor connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</li> <li>b. Check engine harness and oil pressure/temperature sensor for dirt or moisture in or on the connectors and for missing or damaged connector seals.</li> </ol> </li> <li>2. Install breakout cable between sensor and engine harness connector. Place ignition switch in ON position.</li> <li>3. Measure supply voltage from pin A (or RED) to pin B (or BLACK) of breakout cable. Voltage should be 4.75-5.25V.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If voltage is not as specified, proceed with the following steps.</p>



350-1299





Table 2. Error Code 1141 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

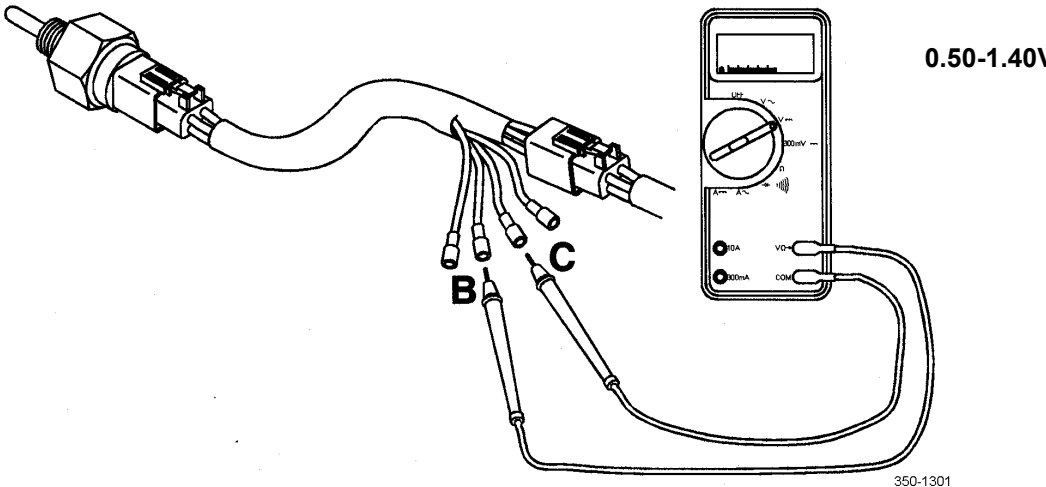
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1141 - Oil Pressure Sensor Circuit Failure - Continued</b></p>	<p>7. Measure supply voltage from pin C (or YELLOW) to pin B (or BLACK) of breakout cable. Voltage should be 0.50-1.40V.</p>  <p style="text-align: right;"><b>0.50-1.40V</b></p> <p style="text-align: right;"><small>350-1301</small></p>	<p>If voltage is not as specified, proceed with the following steps.</p>
	<p>8. Ensure that ignition switch is in OFF position. Disconnect engine harness from oil pressure/temperature sensor and disconnect sensor harness from engine ECU.</p>	

Table 2. Error Code 1141 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

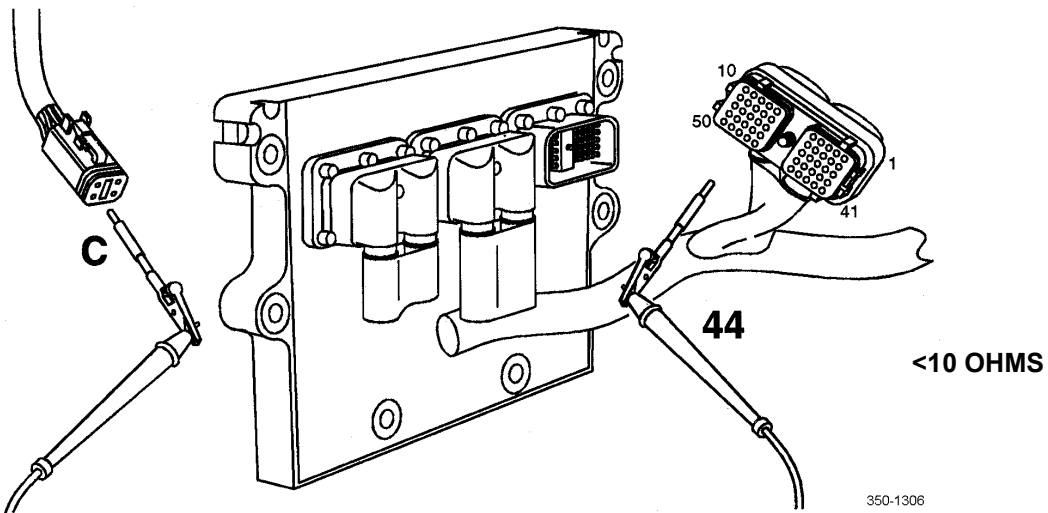
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1141 - Oil Pressure Sensor Circuit Failure - Continued</b></p> <div style="text-align: center;"> <p>USE TEST LEAD KIT P/N 3822758</p> <p>&gt;100K OHMS</p> <p>350-1305</p> </div>	<p>9. Measure resistance from pin 44 (or pressure signal) of sensor harness connector to chassis ground. Resistance should be greater than 100k ohms.</p> <p>10. Ensure that ignition switch is in OFF position. Disconnect engine harness from oil pressure/temperature sensor and disconnect sensor harness from engine ECU.</p> <p>11. Measure resistance from pin 44 (or pressure signal) of sensor harness connector to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to replace engine harness.</p> <p>a. If resistance is as specified, replace oil pressure/temperature sensor (WP 0093 00).</p> <p>b. If resistance is not as specified, notify SRA to replace engine harness.</p>

Table 2. Error Code 1141 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1141 - Oil Pressure Sensor Circuit Failure - Continued</p> <div style="text-align: center;"> <p><b>Test All Pins</b></p> <p><b>USE TEST LEAD KIT P/N 3822758</b></p> <p>350-1302</p> </div>	<p>12. Ensure that ignition switch is in OFF position. Disconnect sensor harness from engine ECU.</p> <p>a. Inspect sensor harness and engine ECU connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check sensor harness and engine ECU for dirt or moisture in or on connectors and for missing or damaged connector seals.</p>	<p>&gt;100K OHMS</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 2. Error Code 1141 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1141 - Oil Pressure Sensor Circuit Failure - Continued</b></p>	<p>13. Place ignition switch in OFF position. Disconnect engine harness from oil pressure/temperature sensor and disconnect sensor harness from engine ECU.</p> <p>14. Measure resistance from pin 44 (or pressure signal) of sensor harness connector to pin C (or 3) of oil pressure/temperature sensor connector on harness side. Resistance should be less than 10 ohms.</p>	<p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>



15. Disconnect sensor harness connector from engine ECU. Place ignition switch in ON position.

Table 2. Error Code 1141 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

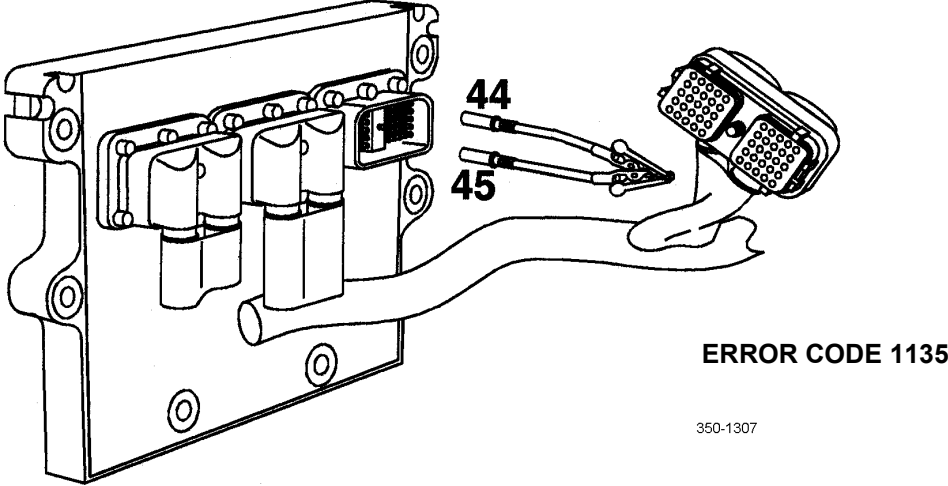
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1141 - Oil Pressure Sensor Circuit Failure - Continued</b></p> 	<p>16. Install a jumper wire between engine ECU sensor port pins 44 and 45, with 5V supply applied. Error code 1135 should be displayed.</p>	<p>If error code 135 was not displayed, replace engine ECU (WP 0078 00).</p>

Table 3. Error Code 1143 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1143 - Oil Pressure Sensor Circuit Failure</b></p> 		<p>Notify SRA.</p>

Table 4. Error Code 1415 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures.



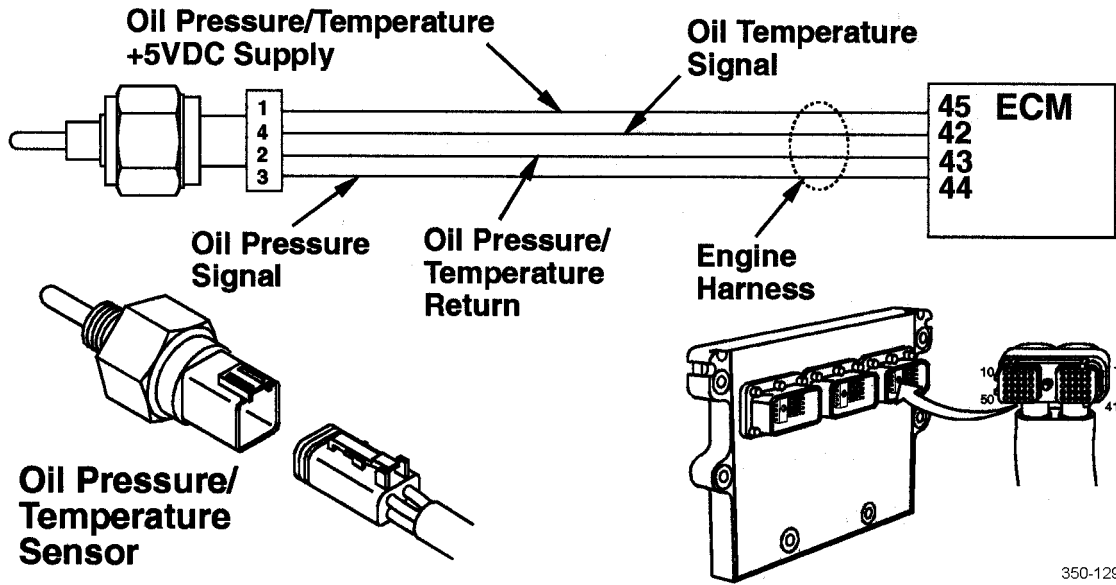
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1415 - Oil Pressure Sensor Circuit Failure</p> 		<p>Notify SRA.</p>

Table 5. Error Code 1435 - Oil Pressure Sensor Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1435 - Oil Pressure Sensor Circuit Failure</p> 		<p>Notify SRA.</p>

**NOTE**

Oil pressure/temperature sensor is located on left side of engine, at rear of A/C compressor.



END OF WORK PACKAGE

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**ENGINE TEMPERATURE SENSORS AND CIRCUITS TROUBLESHOOTING**

**0020 00**

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**THIS WORK PACKAGE COVERS**

Error Code 1144 - Coolant Temperature Sensor Circuit Failure

Error Code 1145 - Coolant Temperature Sensor Circuit Failure

Error Code 1151 - Coolant Temperature Sensor Circuit Failure

Error Code 1153 - Intake Air Temperature Sensor Circuit Failure

Error Code 1154 - Intake Air Temperature Sensor Circuit Failure

Error Code 1155 - Intake Air Temperature Sensor Circuit Failure

Error Code 1212 - Oil Temperature Sensor Circuit Failure

Error Code 1213 - Oil Temperature Sensor Circuit Failure

Error Code 1214 - Oil Temperature Sensor Circuit Failure

Error Code 1697 - ECU Internal Temperature Sensor Circuit Failure

Error Code 1698 - ECU Internal Temperature Sensor Circuit Failure

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**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

**Tools and Special Tools**

Cable, test (Item 47, WP 0204 00)

Test lead, female (Item 48, WP 0204 00)

Test lead, male (Item 51, WP 0204 00)



**WARNING**

DO NOT remove cooling system radiator cap when engine is hot. Allow engine to cool down. Failure to follow this warning may cause serious burns.

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

Table 1. Error Code 1144 - Coolant Temperature Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1144 - Coolant Temperature Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect sensor harness from coolant temperature sensor (WP 0093 00).</li> <li>a. Inspect coolant temperature sensor and sensor harness connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</li> <li>b. Check coolant temperature sensor and sensor harness for dirt or moisture in or on connectors and for missing or damaged connector seals.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 1. Error Code 1144 - Coolant Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

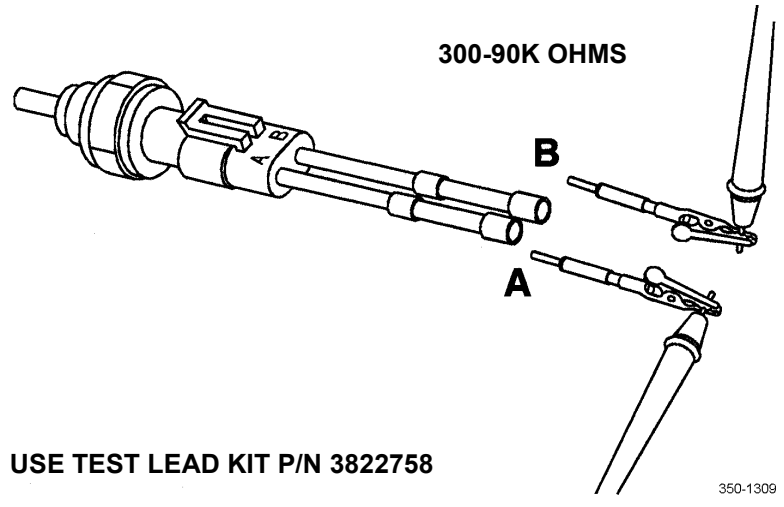
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1144 - Coolant Temperature Sensor Circuit Failure - Continued</b></p>	<p>2. Place ignition switch in OFF position and disconnect engine harness from coolant temperature sensor.</p> <p>3. Measure resistance from pin A (or 1) to pin B (or 2) of coolant temperature sensor. Resistance should be 300-90k ohms.</p> <div style="text-align: center;"> <p><b>300-90K OHMS</b></p>  <p><b>USE TEST LEAD KIT P/N 3822758</b></p> <p><small>350-1309</small></p> </div> <p>4. Ensure that ignition switch is in OFF position. Disconnect sensor harness connector from engine ECU.</p> <p>a. Inspect engine ECU and sensor harness connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check engine ECU and sensor harness for dirt or moisture in or on connectors and for missing or damaged connector seals.</p>	<p>If resistance is not as specified, replace coolant temperature sensor (WP 0093 00).</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 1. Error Code 1144 - Coolant Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

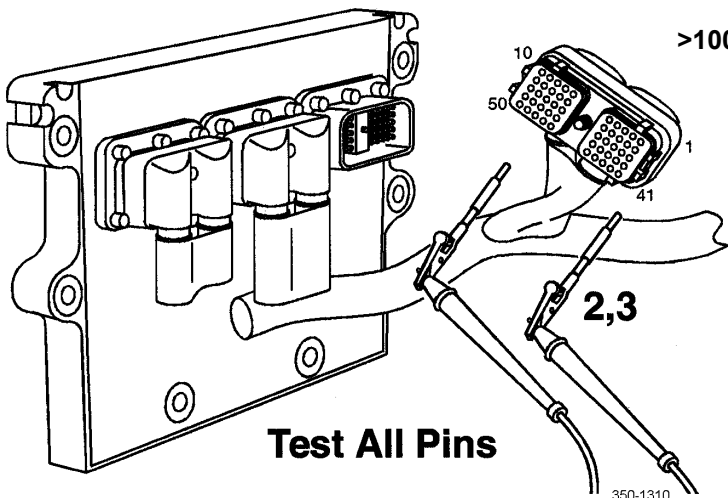
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1144 - Coolant Temperature Sensor Circuit Failure - Continued</b></p>	<p>5. Place ignition switch in OFF position. Disconnect engine harness from coolant temperature sensor and disconnect sensor harness connector from engine ECU. Perform the following resistance checks:</p> <ul style="list-style-type: none"> <li>a. Measure resistance from pin 2 of sensor harness connector to all other pins. Resistance should be greater than 100k ohms.</li> <li>b. Measure resistance from pin 3 of sensor harness connector to all other pins. Resistance should be greater than 100k ohms.</li> </ul>	<p>If engine harness requires replacement, notify SRA.</p>
 <p><b>Test All Pins</b></p> <p>350-1310</p>		
	<p>6. Place ignition switch to OFF position. Disconnect engine harness from coolant temperature sensor and disconnect sensor harness from engine ECU. Perform the following resistance checks:</p>	<p>If engine harness requires replacement, notify SRA.</p>

Table 1. Error Code 1144 - Coolant Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1144 - Coolant Temperature Sensor Circuit Failure - Continued</b></p>	<p>a. Measure resistance from pin 2 of sensor harness connector to pin B (or 2) of coolant temperature sensor connector. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from pin 3 of sensor harness connector to pin A (or 1) of coolant temperature sensor connector. Resistance should be less than 10 ohms.</p>	

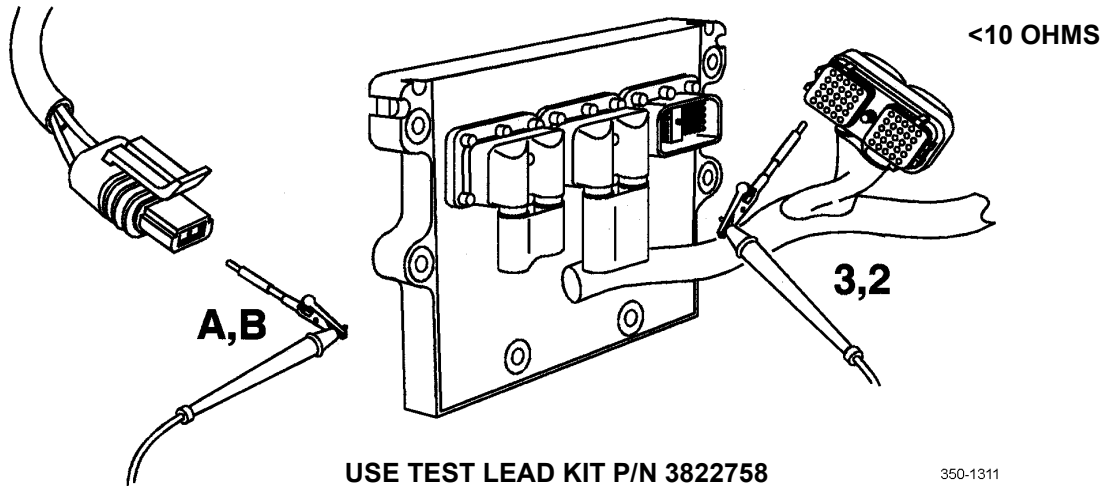

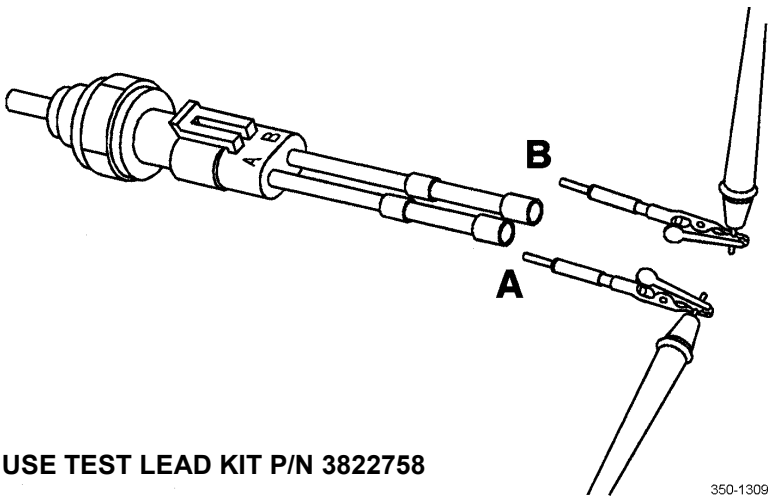


Table 2. Error Code 1145 - Coolant Temperature Sensor Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1145 - Coolant Temperature Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect sensor harness from coolant temperature sensor (WP 0093 00).                             <ol style="list-style-type: none"> <li>a. Inspect coolant temperature sensor and sensor harness connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</li> <li>b. Check coolant temperature sensor and sensor harness for dirt or moisture in or on connectors and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch in OFF position and disconnect engine harness from coolant temperature sensor.</li> <li>3. Measure resistance from pin A (or 1) to pin B (or 2) of coolant temperature sensor. Resistance should be 300-90k ohms.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If resistance is not as specified, replace coolant temperature sensor (WP 0093 00).</p>



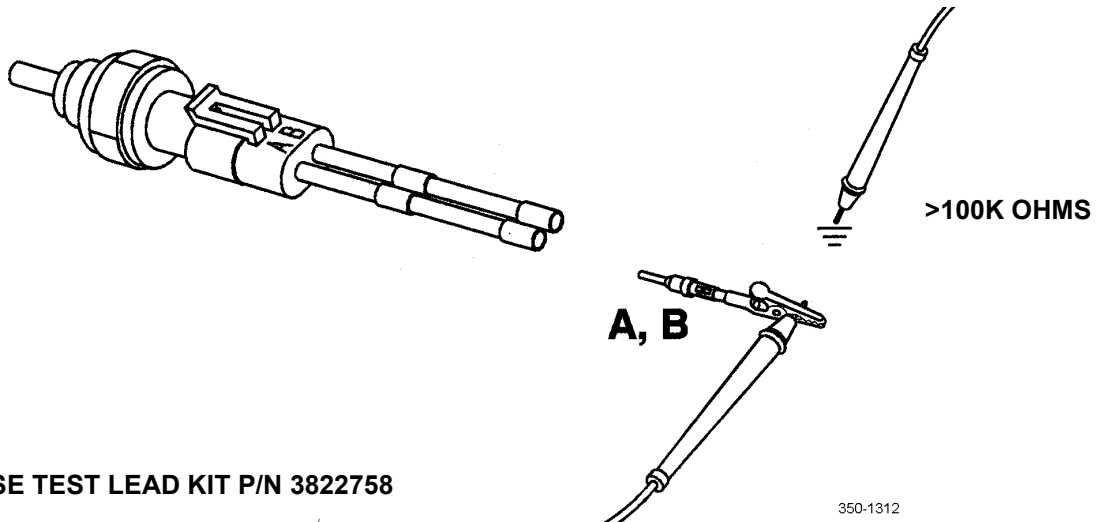
**300-90K OHMS**

**USE TEST LEAD KIT P/N 3822758**

350-1309

Table 2. Error Code 1145 - Coolant Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

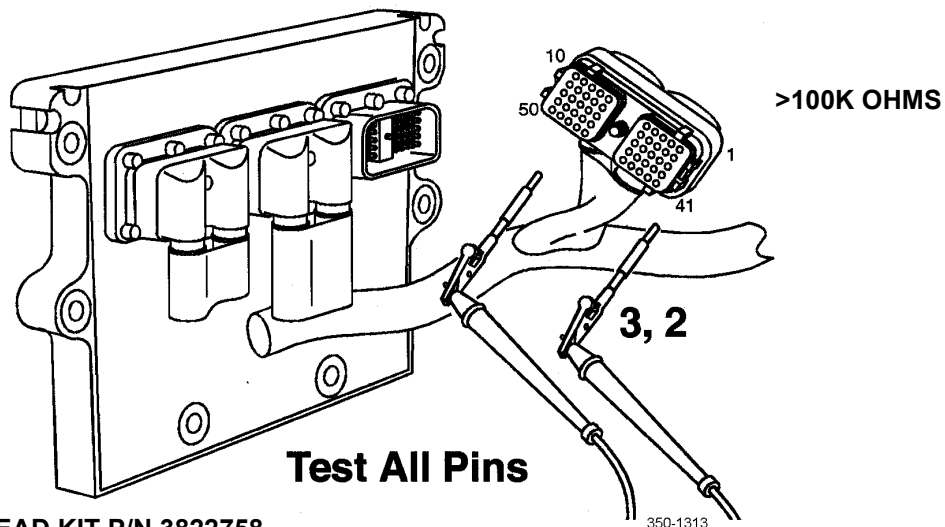
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1145 - Coolant Temperature Sensor Circuit Failure - Continued</b></p>	<p>4. Place ignition switch in OFF position and disconnect engine harness from coolant temperature sensor. Perform the following resistance checks:</p> <ul style="list-style-type: none"> <li>a. Measure resistance from pin A (or 1) of coolant temperature sensor to engine block ground. Resistance should be greater than 100k ohms.</li> <li>b. Measure resistance from pin B (or 2) of coolant temperature sensor to engine block ground. Resistance should be greater than 100k ohms.</li> </ul>	<p>If resistance is not as specified, replace coolant temperature sensor (WP 0093 00).</p>



- 5. Place ignition switch to OFF position. Disconnect sensor harness from engine ECU.
- 6. Ensure that ignition switch is in OFF position. Disconnect sensor harness from coolant temperature sensor.

Table 2. Error Code 1145 - Coolant Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1145 - Coolant Temperature Sensor Circuit Failure - Continued</b></p>	<p>a. Inspect sensor harness and engine ECU connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check sensor harness and engine ECU for dirt or moisture in or on connectors and for missing or damaged connector seals.</p> <p>7. Place ignition switch in OFF position. Disconnect engine harness from coolant temperature sensor and disconnect sensor harness connector from engine ECU. Perform the following resistance checks:</p> <p>a. Measure resistance from pin 2 of sensor harness connector to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If engine harness requires replacement, notify SRA.</p>

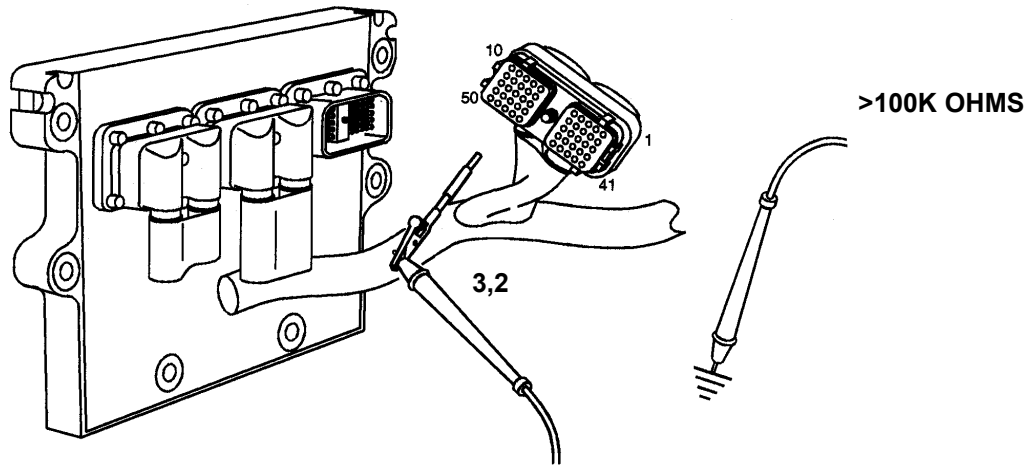


USE TEST LEAD KIT P/N 3822758



Table 2. Error Code 1145 - Coolant Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1145 - Coolant Temperature Sensor Circuit Failure - Continued</b></p>	<p>b. Measure resistance from pin 3 of sensor harness connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>8. Place ignition switch in OFF position. Disconnect engine harness from coolant temperature sensor and disconnect sensor harness connector from engine ECU. Perform the following resistance checks:</p> <p>a. Measure resistance from pin 2 of sensor harness connector to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 3 of sensor harness connector to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p>



USE TEST LEAD KIT P/N 3822758

350-1358

Table 3. Error Code 1151 - Coolant Temperature Sensor Circuit Failure Troubleshooting Procedures.



MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1151 - Coolant Temperature Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check coolant level (TM 10-3930-675-10).</li> <li>2. Check radiator top and side grille for mud, snow or obstructions.</li> <li>3. Check for loose coolant hoses and clamps.</li> <li>4. Enter "DIAG EXTRA FUNCT" 4 (13) menu and check water level sensor setting. Enter "0" shut off and "1" to run cooling fan. Check if fording water level sensor is clogged or damaged.</li> </ol>	<p>Add coolant as required (TM 10-3930-675-10).</p> <p>Clear obstructions.</p> <p>Tighten or replace as required (WP 0064 00).</p> <ol style="list-style-type: none"> <li>a. Clean and/or replace fording water level sensor (WP 0090 00).</li> <li>b. If problem continues, notify SRA.</li> </ol>

Table 4. Error Code 1153 - Intake Air Temperature Sensor Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1153 - Intake Air Temperature Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect sensor harness from intake manifold temperature sensor.             <ol style="list-style-type: none"> <li>a. Inspect intake manifold temperature sensor and sensor harness connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</li> <li>b. Check intake manifold temperature sensor and sensor harness for dirt or moisture in or on connectors and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch in OFF position and disconnect sensor harness from intake manifold temperature sensor.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

**Table 4. Error Code 1153 - Intake Air Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.**

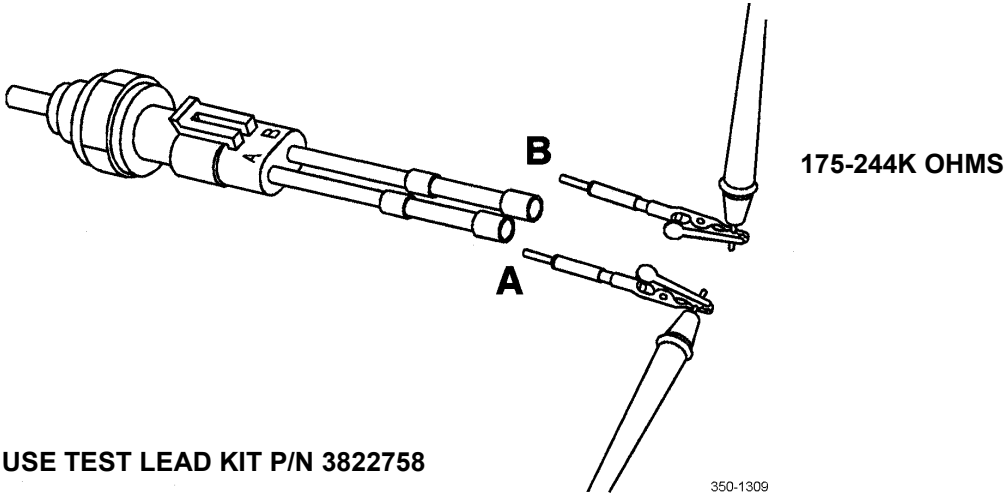
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1153 - Intake Air Temperature Sensor Circuit Failure - Continued</b></p>	<p>3. Measure resistance from pin A to pin B of coolant temperature sensor. Resistance should be 175-244k ohms.</p>  <p>USE TEST LEAD KIT P/N 3822758</p> <p>350-1309</p>	<p>If resistance is not as specified, replace coolant temperature sensor (WP 0093 00).</p>
	<p>4. Place ignition switch in OFF position and disconnect sensor harness from engine ECU.</p> <p>a. Inspect sensor harness and engine ECU connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check sensor harness and engine ECU for dirt or moisture in or on connectors and for missing or damaged connector seals.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 4. Error Code 1153 - Intake Air Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

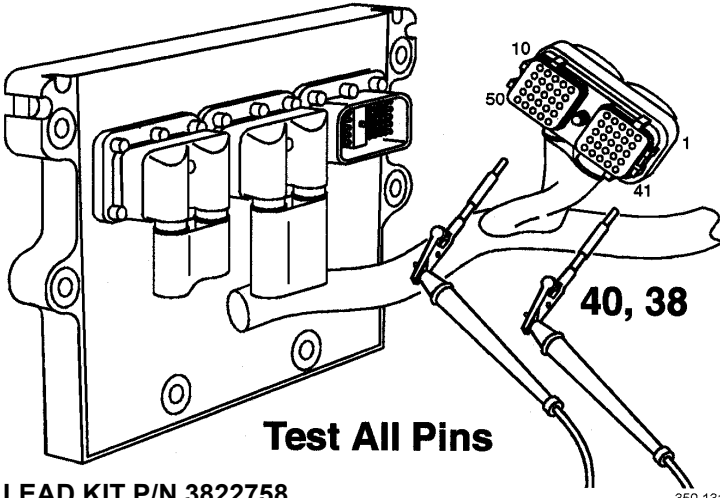
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1153 - Intake Air Temperature Sensor Circuit Failure - Continued</b></p>	<p>5. Place ignition switch in OFF position. Disconnect engine harness from intake air temperature sensor and disconnect sensor harness from engine ECU. Perform the following resistance checks:</p> <ul style="list-style-type: none"> <li>a. Measure resistance from pin 38 of sensor harness connector to all other pins in sensor harness. Resistance should be more than 100k ohms.</li> <li>b. Measure resistance from pin 40 of sensor harness connector to all other pins in sensor harness. Resistance should be more than 100k ohms.</li> </ul>	<p>If engine harness requires replacement, notify SRA.</p>
 <p><b>Test All Pins</b></p> <p>USE TEST LEAD KIT P/N 3822758</p> <p>350-1316</p>		
	<p>6. Place ignition switch in OFF position. Disconnect engine harness from intake air temperature sensor and disconnect sensor harness from engine ECU. Perform the following resistance checks:</p>	<p>If engine harness requires replacement, notify SRA.</p>

Table 4. Error Code 1153 - Intake Air Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1153 - Intake Air Temperature Sensor Circuit Failure - Continued</p>	<p>a. Measure resistance from pin 40 of sensor harness connector to pin 1 (or A) of intake air temperature sensor connector, harness side. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from pin 38 of sensor harness connector to pin 2 (or B) of intake air temperature sensor connector, harness side. Resistance should be less than 10 ohms.</p>	

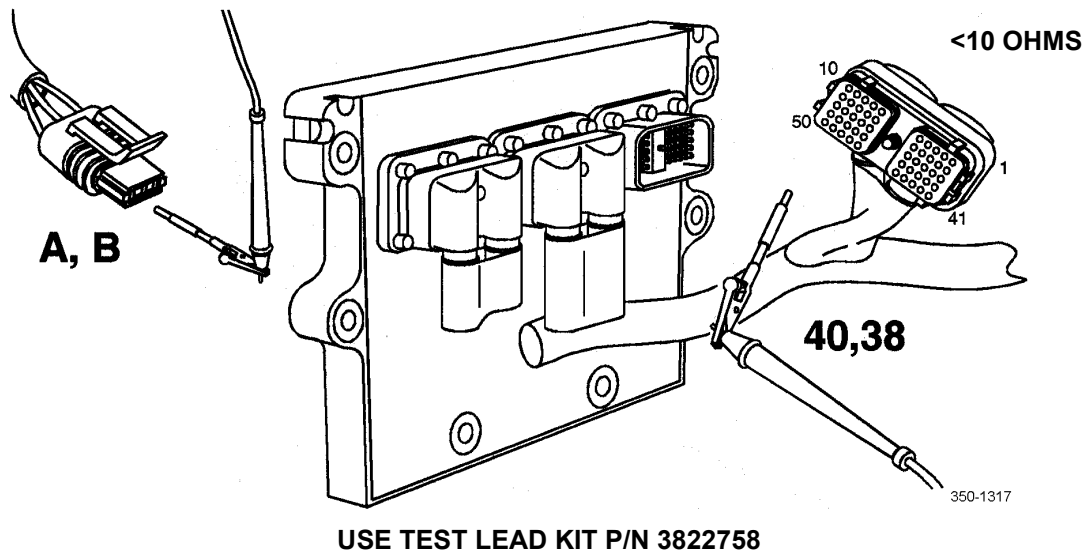
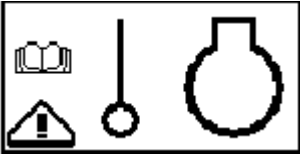


Table 5. Error Code 1154 - Intake Air Temperature Sensor Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1154 - Intake Air Temperature Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect sensor harness from intake air temperature sensor.                             <ol style="list-style-type: none"> <li>a. Inspect intake air temperature sensor and sensor harness connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</li> <li>b. Check intake air temperature sensor and sensor harness for dirt or moisture in or on connectors and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch in OFF position and disconnect sensor harness from intake air temperature sensor.</li> <li>3. Measure resistance from pin A (or 1) to pin B (or 2) of intake air temperature sensor. Resistance should be 175-244k ohms.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If resistance is not as specified, replace intake air temperature sensor (WP 0093 00).</p>

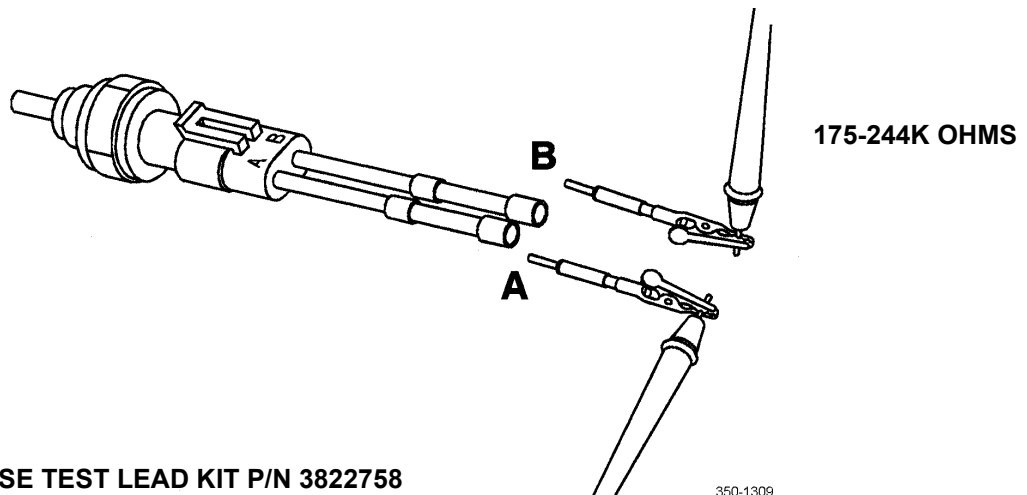


Table 5. Error Code 1154 - Intake Air Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

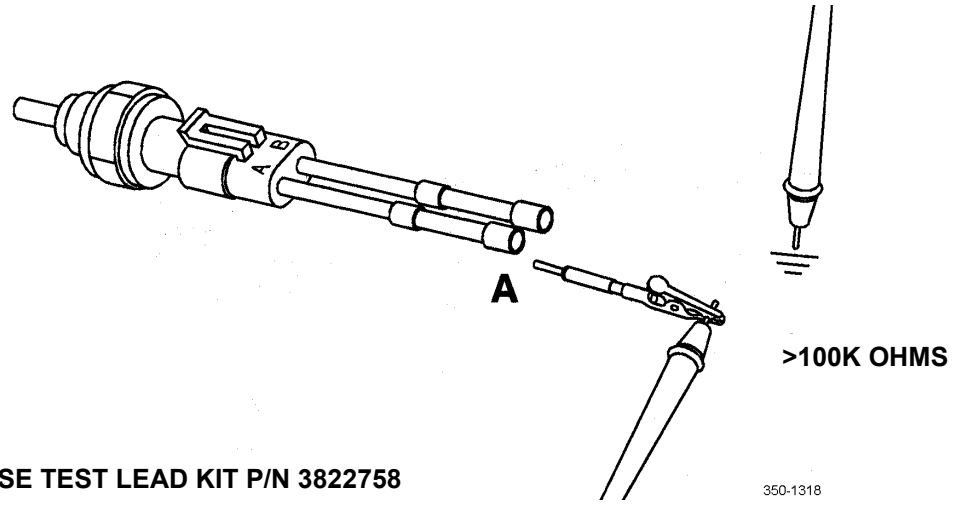
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1154 - Intake Air Temperature Sensor Circuit Failure - Continued</b></p>	<p>4. Place ignition switch in OFF position and disconnect sensor harness from intake air temperature sensor.</p> <p>5. Measure resistance from pin A of intake air temperature sensor to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, replace intake air temperature sensor (WP 0093 00).</p>
 <p><b>USE TEST LEAD KIT P/N 3822758</b></p>		
	<p>6. Place ignition switch in OFF position and disconnect sensor harness from engine ECU.</p> <p>a. Inspect sensor harness and engine ECU connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check sensor harness and engine ECU for dirt or moisture in or on connectors and for missing or damaged connector seals.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 5. Error Code 1154 - Intake Air Temperature Sensor Circuit Failure  
 Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1154 - Intake Air Temperature Sensor Circuit Failure - Continued</b></p>	<p>7. Place ignition switch in OFF position. Disconnect sensor harness from intake air temperature sensor and disconnect sensor harness from engine ECU. Perform the following resistance checks:</p> <ul style="list-style-type: none"> <li>a. Measure resistance from pin 40 of sensor harness connector to all other pins in sensor harness. Resistance should be greater than 100k ohms.</li> <li>b. Measure resistance from pin 38 of sensor harness connector to all other pins in sensor harness. Resistance should be greater than 100k ohms.</li> </ul>	<p>If engine harness requires replacement, notify SRA.</p>

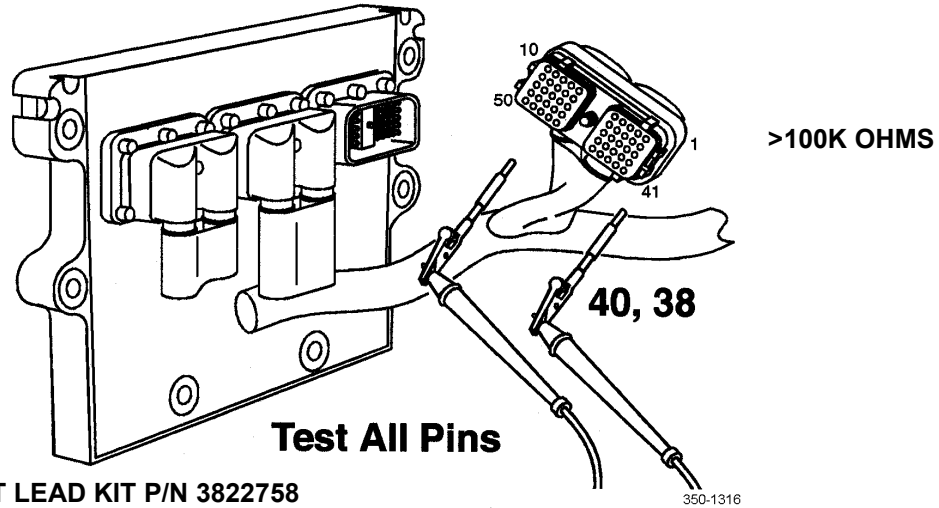
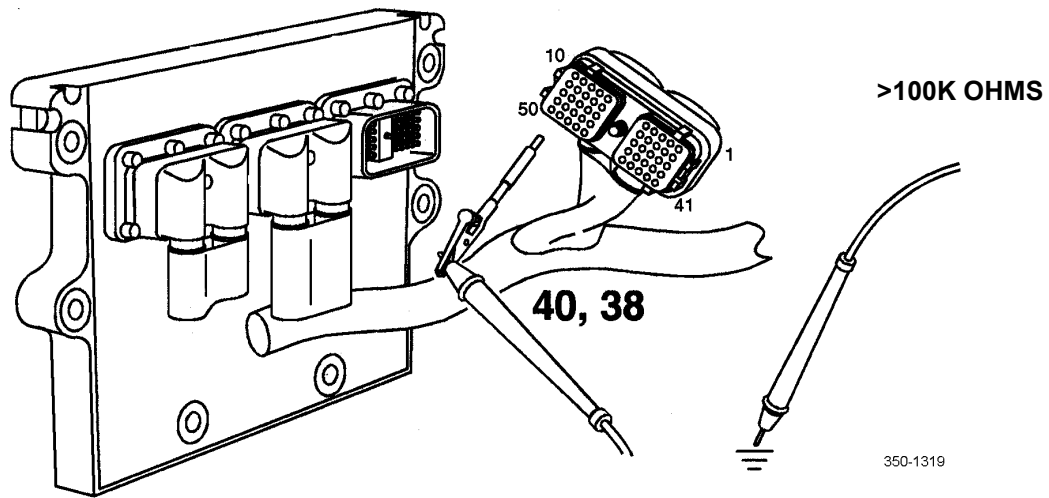




Table 5. Error Code 1154 - Intake Air Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1154 - Intake Air Temperature Sensor Circuit Failure - Continued</b></p>	<p>8. Place ignition switch in OFF position. Disconnect sensor harness from intake air temperature sensor and disconnect sensor harness from engine ECU. Perform the following resistance checks:</p> <ul style="list-style-type: none"> <li>a. Measure resistance from pin 40 of sensor harness connector to engine block ground. Resistance should be greater than 100k ohms.</li> <li>b. Measure resistance from pin 38 of sensor harness connector to engine block ground. Resistance should be greater than 100k ohms.</li> </ul>	<p>If engine harness requires replacement, notify SRA.</p>



USE TEST LEAD KIT P/N 3822758

Table 6. Error Code 1155 - Intake Air Temperature Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1155 - Intake Air Temperature Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check coolant level (TM 10-3930-675-10).</li> <li>2. Check radiator top and side grille for mud, snow or obstructions.</li> <li>3. Check for loose coolant hoses and clamps.</li> <li>4. Enter "DIAG EXTRA FUNCT" 4 (13) menu and check water level sensor setting. Enter "0" shut off and "1" to run cooling fan. Check if fording water level sensor is clogged or damaged.</li> </ol>	<p>Add coolant as required (TM 10-3930-675-10).</p> <p>Clear obstructions.</p> <p>Tighten or replace as required (WP 0064 00).</p> <ol style="list-style-type: none"> <li>a. Clean and/or replace fording water level sensor (WP 0090 00).</li> <li>b. If problem continues, notify SRA.</li> </ol>

Table 7. Error Code 1212 - Oil Temperature Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1212 - Oil Temperature Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect engine harness from oil pressure/temperature sensor (WP 0093 00). <ol style="list-style-type: none"> <li>a. Inspect oil pressure/temperature sensor and engine harness connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</li> <li>b. Check oil pressure/temperature sensor and engine harness for dirt or moisture in or on connectors and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch in OFF position and disconnect engine harness from oil pressure/temperature sensor.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 7. Error Code 1212 - Oil Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1212 - Oil Temperature Sensor Circuit Failure - Continued</b></p> <div> <p>USE TEST LEAD KIT P/N 3822917</p> <p>350-1320</p> <p>300-90K OHMS</p> </div>	<p>3. Measure resistance from pin 4 (or D) to pin 2 (or B) of oil pressure/temperature sensor. Resistance should be 300-90k ohms.</p> <p>4. Place ignition switch in OFF position and disconnect sensor harness from engine ECU.</p> <p>a. Inspect sensor harness and engine ECU connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check sensor harness and engine ECU for dirt or moisture in or on connectors and for missing or damaged connector seals.</p>	<p>If resistance is not as specified, replace oil pressure/temperature sensor (WP 0093 00).</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 7. Error Code 1212 - Oil Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

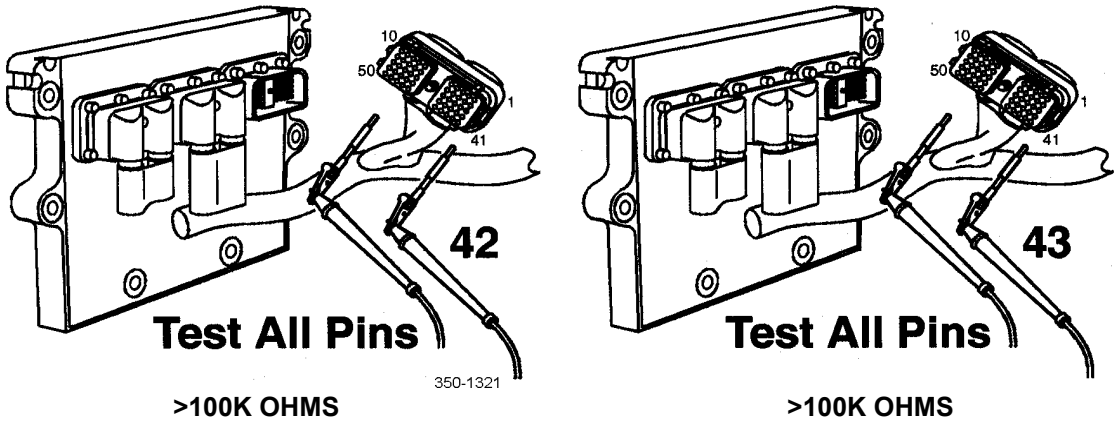
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1212 - Oil Temperature Sensor Circuit Failure - Continued</b></p>	<p>5. Place ignition switch in OFF position. Disconnect engine harness from oil pressure/temperature sensor and disconnect sensor harness from engine ECU. Perform the following resistance checks:</p> <ul style="list-style-type: none"> <li>a. Measure resistance from pin 42 of sensor harness connector to all other pins in sensor harness. Resistance should be more than 100k ohms.</li> <li>b. Measure resistance from pin 43 of sensor harness connector to all other pins in sensor harness. Resistance should be more than 100k ohms.</li> </ul>	<p>If engine harness requires replacement, notify SRA.</p>
 <p><b>Test All Pins</b> <b>&gt;100K OHMS</b></p> <p><b>Test All Pins</b> <b>&gt;100K OHMS</b></p> <p>USE TEST LEAD KIT P/N 3822758</p>		
	<p>6. Place ignition switch in OFF position. Disconnect engine harness from oil pressure/temperature sensor and disconnect sensor harness from engine ECU. Perform the following resistance checks:</p>	<p>If engine harness requires replacement, notify SRA.</p>

Table 7. Error Code 1212 - Oil Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1212 - Oil Temperature Sensor Circuit Failure - Continued</b></p>	<p>a. Measure resistance from pin 42 of sensor harness connector to pin 4 (or D) of oil pressure/temperature sensor connector, harness side. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from pin 43 of sensor harness connector to pin 2 (or B) of oil pressure/temperature sensor connector, harness side. Resistance should be less than 10 ohms.</p>	

USE TEST LEAD KIT P/N 3822758

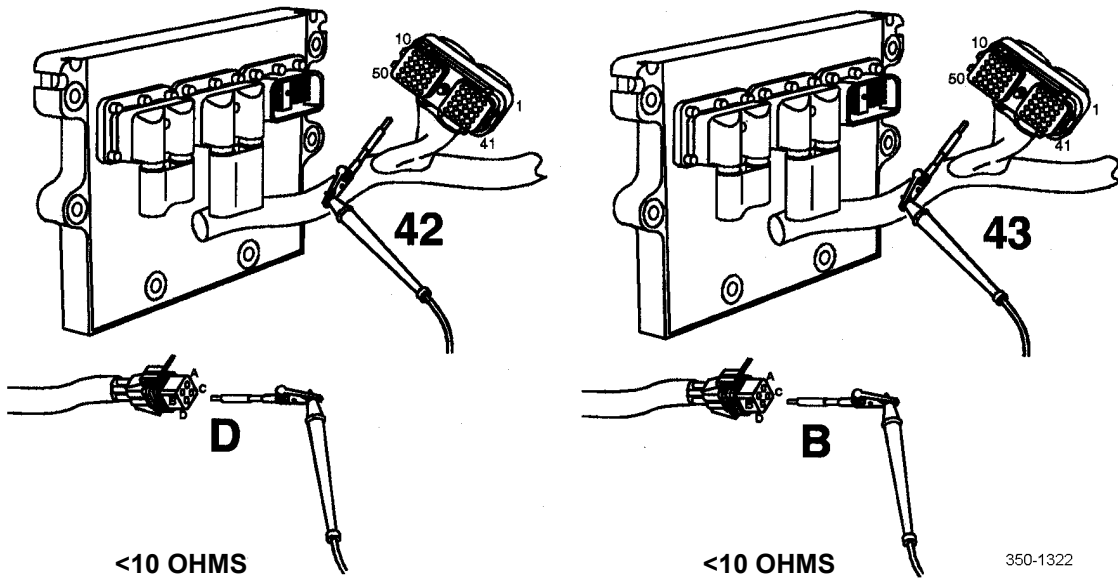

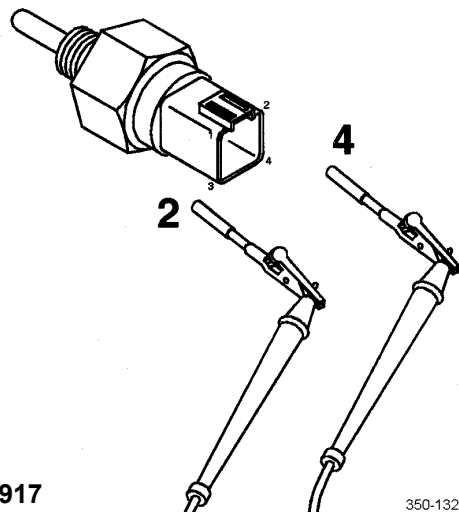


Table 8. Error Code 1213 - Oil Temperature Sensor Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1213 - Oil Temperature Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect engine harness from oil pressure/temperature sensor (WP 0093 00).                             <ol style="list-style-type: none"> <li>a. Inspect oil temperature sensor and engine harness connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</li> <li>b. Check oil temperature sensor and engine harness for dirt or moisture in or on the connectors and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch in OFF position and disconnect engine harness from oil pressure/temperature sensor.</li> <li>3. Measure resistance from pin 4 (or D) to pin 2 (or B) of oil pressure/temperature sensor. Resistance should be 300-90k ohms.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If resistance is not as specified, replace oil pressure/temperature sensor (WP 0093 00).</p>



USE TEST LEAD KIT P/N 3822917

350-1320

Table 8. Error Code 1213 - Oil Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

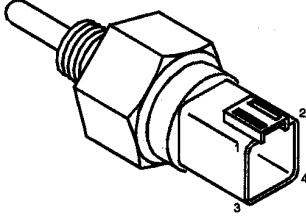
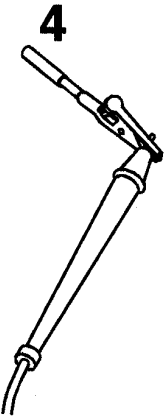
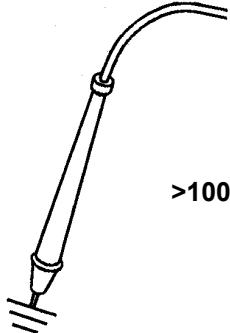
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1213 - Oil Temperature Sensor Circuit Failure - Continued</b></p>    <p><b>USE TEST LEAD KIT P/N 3822917</b></p> <p>350-1323</p>	<p>4. Place ignition switch in OFF position and disconnect engine harness from oil pressure/temperature sensor.</p> <p>5. Measure resistance from pin 4 (or D) of oil pressure/temperature sensor to engine block ground. Resistance should be greater than 100k ohms.</p> <p>6. Place ignition switch in OFF position. Disconnect engine harness from oil pressure/temperature sensor and disconnect sensor harness connector from engine ECU. Perform the following resistance checks:</p>	<p>If resistance is not as specified, replace oil pressure/temperature sensor (WP 0093 00).</p> <p>If engine harness requires replacement, notify SRA.</p>

Table 8. Error Code 1213 - Oil Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1213 - Oil Temperature Sensor Circuit Failure - Continued</b></p>	<p>a. Measure resistance from pin 42 of sensor harness connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 43 of sensor harness connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p style="text-align: center;"><b>USE TEST LEAD KIT P/N 3822758</b></p> <div style="display: flex; justify-content: space-around;"> <div> <p style="text-align: center;"><b>Test All Pins</b> &gt;100K OHMS</p> </div> <div> <p style="text-align: center;"><b>Test All Pins</b> &gt;100K OHMS</p> </div> </div>	<p>7. Place ignition switch in OFF position. Disconnect engine harness from oil pressure/temperature sensor and disconnect sensor harness connector from engine ECU. Perform the following resistance checks:</p> <p>If engine harness requires replacement, notify SRA.</p>



Table 8. Error Code 1213 - Oil Temperature Sensor Circuit Failure Troubleshooting Procedures - Continued.

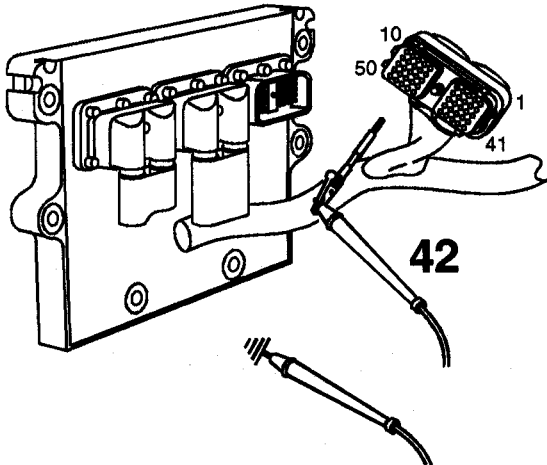
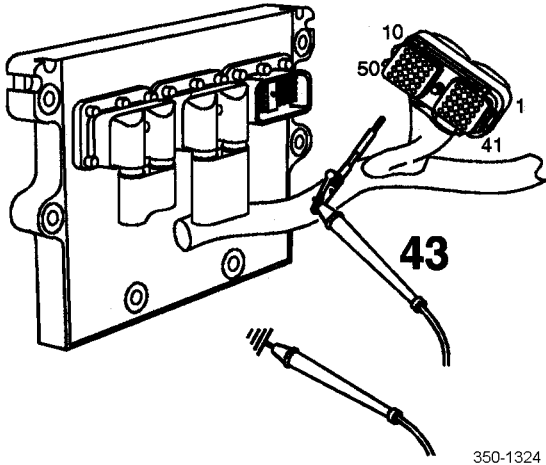
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1213 - Oil Temperature Sensor Circuit Failure - Continued</b></p>	<p>a. Measure resistance from pin 42 of sensor harness connector to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from pin 43 of sensor harness connector to engine block ground. Resistance should be greater than 100k ohms.</p> <p style="text-align: center;"><b>USE TEST LEAD KIT P/N 3822758</b></p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p><b>&gt;100K OHMS</b></p> </div> <div style="text-align: center;">  <p><b>&gt;100K OHMS</b></p> </div> </div> <p style="text-align: right; font-size: small;">350-1324</p>	

Table 9. Error Code 1214 - Oil Temperature Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1214 - Oil Temperature Sensor Circuit Failure</p> 	<ol style="list-style-type: none"> <li>1. Check coolant level (TM 10-3930-675-10).</li> <li>2. Check radiator top and side grille for mud, snow or obstructions.</li> <li>3. Check for loose coolant hoses and clamps.</li> <li>4. Enter "DIAG EXTRA FUNCT" 4 (13) menu and check water level sensor setting. Enter "0" shut off and "1" to run cooling fan. Check if fording water level sensor is clogged or damaged.</li> </ol>	<p>Add coolant as required (TM 10-3930-675-10).</p> <p>Clear obstructions.</p> <p>Tighten or replace as required (WP 0064 00).</p> <ol style="list-style-type: none"> <li>a. Clean and/or replace fording water level sensor (WP 0090 00).</li> <li>b. If problem continues, notify SRA.</li> </ol>

Table 10. Error Code 1697 - ECU Internal Temperature Sensor Circuit Failure Troubleshooting Procedures.



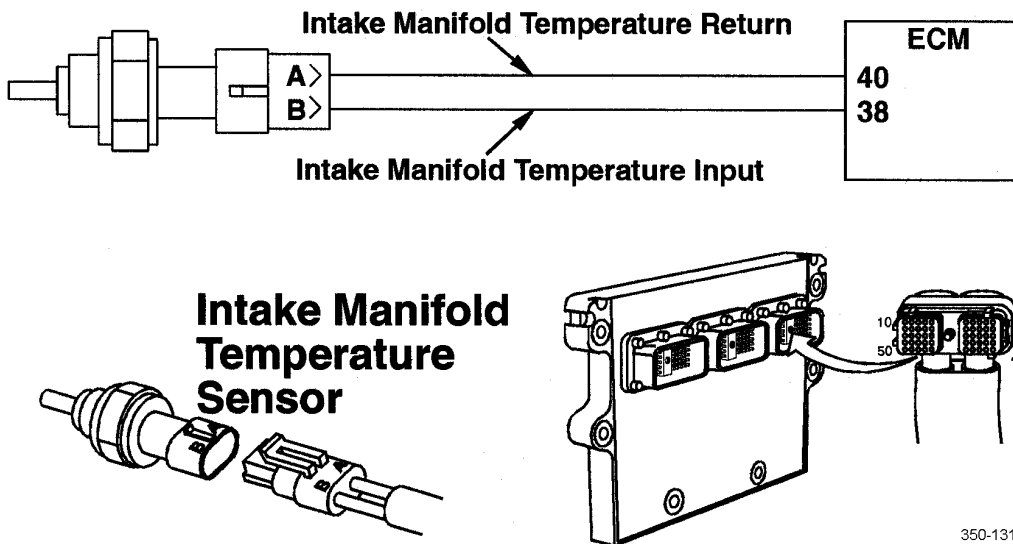
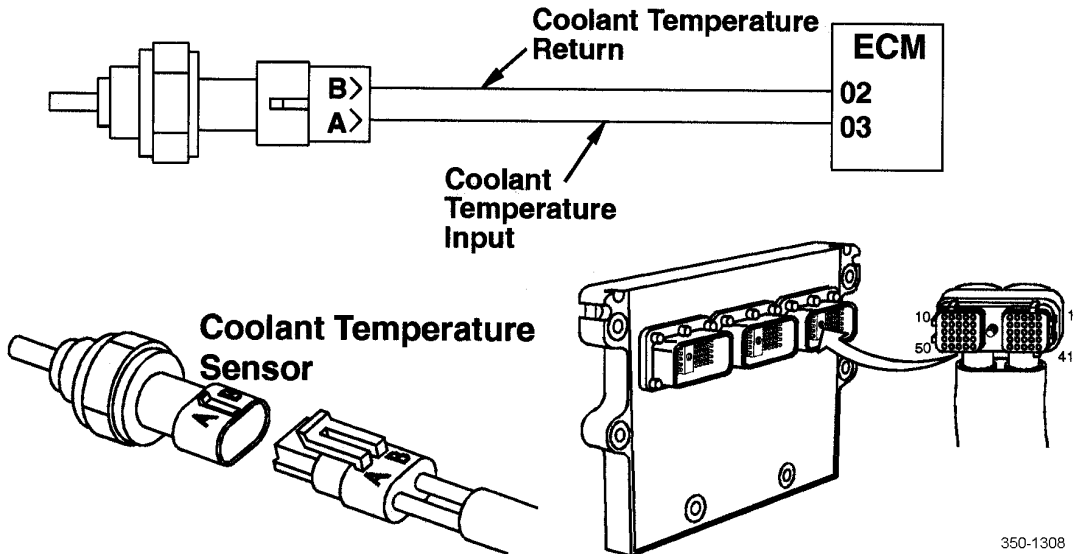
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1697 - ECU Internal Temperature Sensor Circuit Failure</p> 		<p>Notify SRA.</p>

Table 11. Error Code 1698 - ECU Internal Temperature Sensor Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1698 - ECU Internal Temperature Sensor Circuit Failure</p> 		<p>Notify SRA.</p>

**NOTE**

Location of engine sensors is illustrated in WP 0093 00.



END OF WORK PACKAGE

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**THIS WORK PACKAGE COVERS**

Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit

Error Code 1295 - Ambient Air Pressure Sensor Circuit Failure

Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit

**INITIAL SETUP**

**References**

TM 10-3930-675-10

**Tools and Special Tools**

Cable, breakout (Item 43, WP 0204 00)


Test lead, female (Item 48, WP 0204 00)

Test lead, male (Item 51, WP 0204 00)

**NOTE**

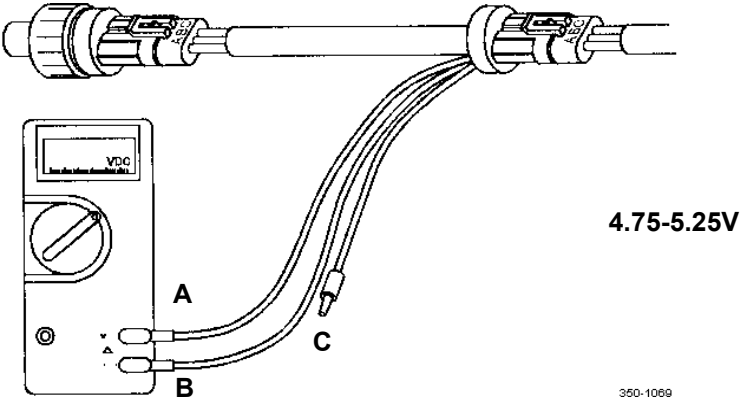
- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.
- Ambient air pressure sensor is mounted to bracket on left side of engine, to right-rear of engine ECU.

**Table 1. Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position and disconnect engine harness from ambient air pressure sensor.</li> <li>2. Inspect ambient air pressure sensor and sensor harness connectors for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>3. Check ambient air pressure sensor and sensor harness for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

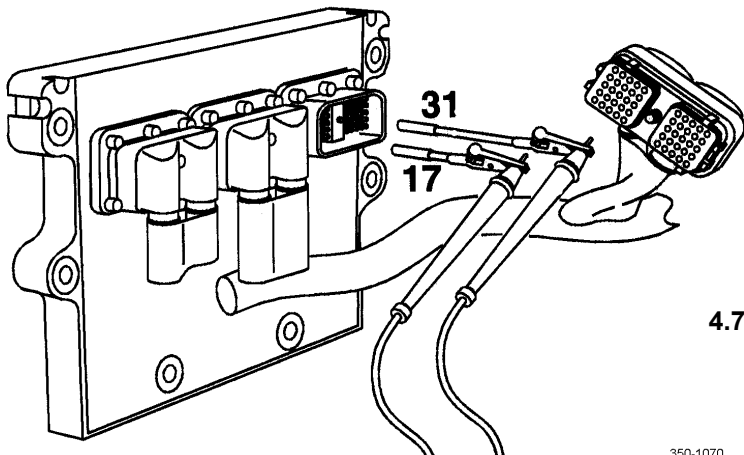
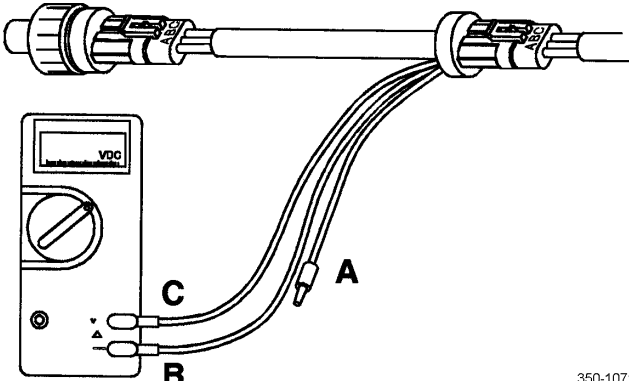
ENGINE AMBIENT AIR PRESSURE SENSOR AND CIRCUITS TROUBLESHOOTING - CONTINUED 0021 00

Table 1. Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit - Continued</b></p>	<p>4. Install breakout cable between sensor and sensor harness connector. Place ignition switch to ON and measure supply voltage from pin A to pin B of breakout cable. Voltage should be 4.75-5.25V.</p>  <p style="text-align: right;"><b>4.75-5.25V</b></p> <p style="text-align: right;"><small>350-1099</small></p>	<p>If voltage is not as specified, proceed with the following steps.</p>
	<p>5. Disconnect sensor harness connector from ECU and place ignition switch in ON position. Measure voltage at ECU sensor port from pin 17 to pin 31 of ECU sensor port. Voltage should be 4.75-5.25V.</p>	<p>a. If engine harness requires replacement, notify SRA.                  b. If voltage is not as specified, replace engine ECU (WP 0078 00).</p>

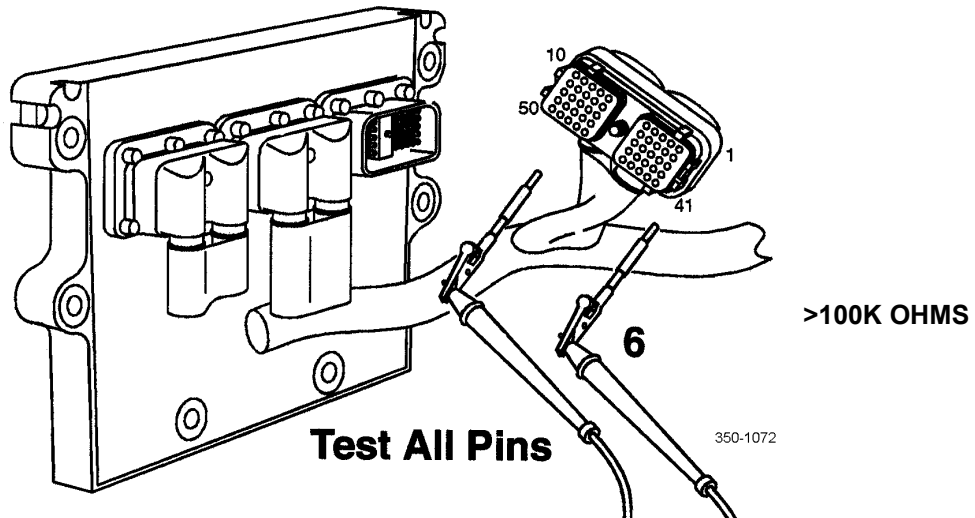
ENGINE AMBIENT AIR PRESSURE SENSOR AND CIRCUITS TROUBLESHOOTING - CONTINUED 0021 00

Table 1. Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<p>Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit - Continued</p> <p>USE TEST LEAD KIT P/N 3822917</p>  <p style="text-align: right;">4.75-5.25V</p> <p style="text-align: right;">350-1070</p>	<p>6. Install breakout cable between sensor and sensor harness connector and place ignition switch in ON position. Measure signal voltage from pin C to pin B of breakout cable. Voltage should be as follows:</p> <table border="1"> <thead> <tr> <th colspan="2">Altitude (Ft.) vs. Voltage</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>= 3.4-4.5V</td> </tr> <tr> <td>3K</td> <td>= 2.8-3.8V</td> </tr> <tr> <td>6K</td> <td>= 2.2-3.2V</td> </tr> <tr> <td>9K</td> <td>= 1.7-2.7V</td> </tr> <tr> <td>12K</td> <td>= 1.2-2.2V</td> </tr> </tbody> </table>	Altitude (Ft.) vs. Voltage		0	= 3.4-4.5V	3K	= 2.8-3.8V	6K	= 2.2-3.2V	9K	= 1.7-2.7V	12K	= 1.2-2.2V	<p>If voltage is not as specified, proceed with the following steps.</p>  <p style="text-align: right;">350-1071</p>
Altitude (Ft.) vs. Voltage														
0	= 3.4-4.5V													
3K	= 2.8-3.8V													
6K	= 2.2-3.2V													
9K	= 1.7-2.7V													
12K	= 1.2-2.2V													

**Table 1. Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit - Continued</b></p>	<p>7. Place ignition switch to OFF position and disconnect sensor harness connector from ECU.</p> <p>8. Inspect sensor harness and ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>9. Check sensor harness and ECU for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>10. Place ignition switch in OFF position and disconnect sensor harness connector from ECU.</p> <p>11. Measure resistance from pin 6 of sensor harness connector to all other pins in the connector. Resistance should be greater than 100k ohms.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If engine harness requires replacement, notify SRA.</p>

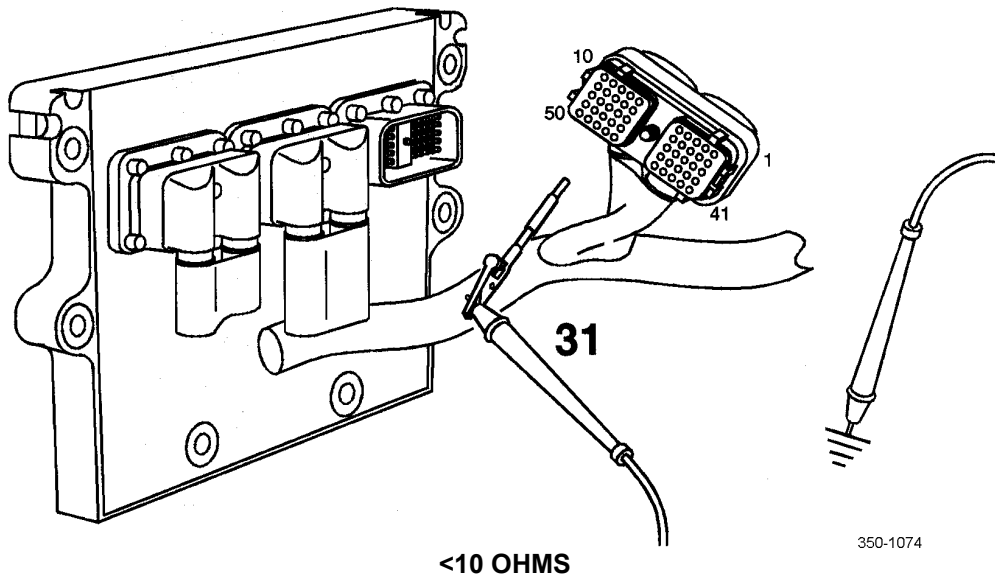




ENGINE AMBIENT AIR PRESSURE SENSOR AND CIRCUITS TROUBLESHOOTING - CONTINUED 0021 00


Table 1. Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1221 - High Voltage Detected at Ambient Air Pressure Sensor Circuit - Continued</b></p>	<p>12. Place ignition switch in OFF position and disconnect sensor harness connector from ECU and disconnect engine harness from ambient air pressure sensor.</p> <p>13. Check for open circuit in return wire by measuring resistance from pin 31 of sensor harness connector to engine block ground. Resistance should be less than 10 ohms.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>a. If resistance is as specified, replace ambient air pressure sensor (WP 0093 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>



ENGINE AMBIENT AIR PRESSURE SENSOR AND CIRCUITS TROUBLESHOOTING - CONTINUED 0021 00

Table 2. Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position and disconnect engine harness from ambient air pressure sensor.</li> <li>2. Inspect ambient air pressure sensor and sensor harness connectors for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>3. Check ambient air pressure sensor and sensor harness for dirt or moisture in or on connector and for missing or damaged connector seals.</li> <li>4. Install breakout cable between sensor and sensor harness connector. Place ignition switch to ON and measure supply voltage from pin A to pin B of breakout cable. Voltage should be 4.75-5.25V.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If voltage is not as specified, proceed with the following steps.</p>

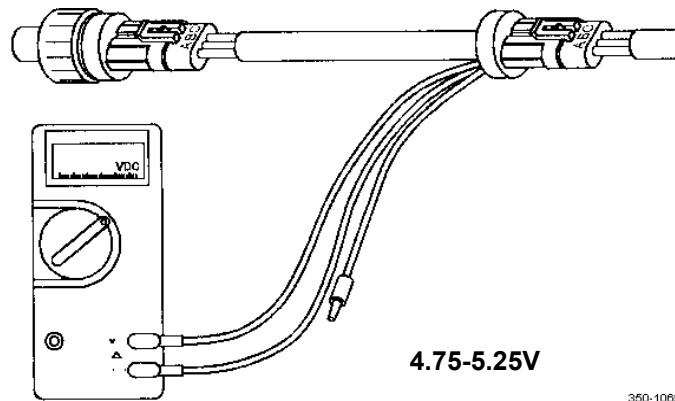




Table 2. Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit Troubleshooting Procedures - Continued.

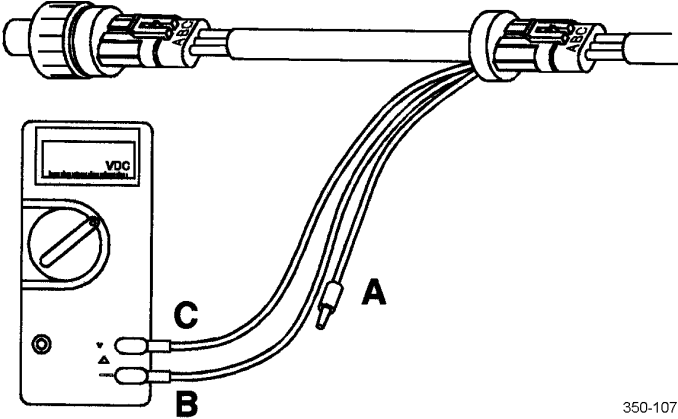
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit - Continued</b></p>	<p>6. Install breakout cable between sensor and sensor harness connector and place ignition switch in ON position. Measure signal voltage from pin C to pin B of breakout cable. Voltage should be as follows:</p> <p style="text-align: center;"><u>Altitude (Ft.) vs. Voltage</u></p> <p style="text-align: center;">0 = 3.4-4.5V                      3K = 2.8-3.8V                      6K = 2.2-3.2V                      9K = 1.7-2.7V                      12K = 1.2-2.2V</p>  <p style="text-align: right;">350-1071</p>	<p>If voltage is not as specified, proceed with the following steps.</p>
	<p>7. Place ignition switch to OFF position and disconnect ambient air pressure sensor from engine harness. Disconnect sensor harness connector from ECU.</p> <p>8. Measure resistance from pin 6 of sensor harness connector to chassis ground. Measurement should be greater than 100k ohms.</p>	<p>If measurement is not as specified, notify SRA to replace engine harness.</p>

Table 2. Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit Troubleshooting Procedures - Continued.

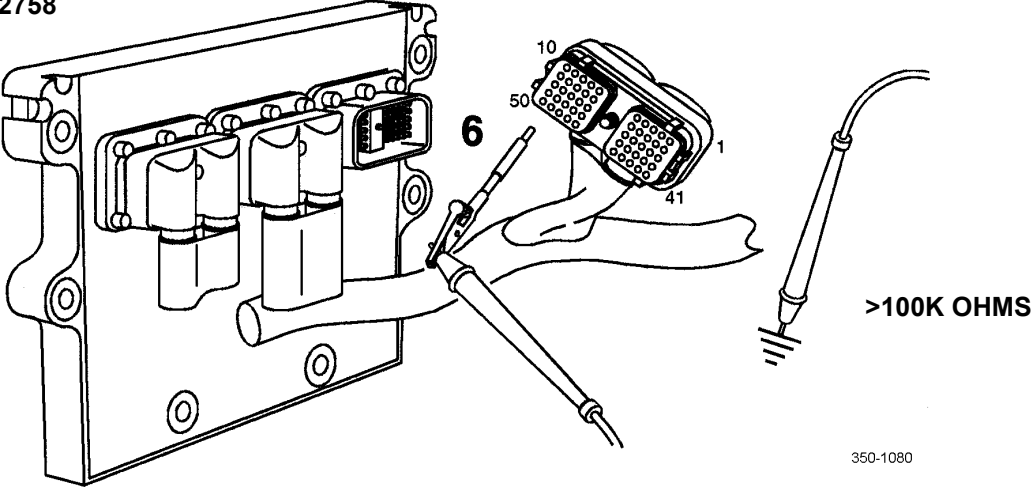
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit - Continued</p> <p><b>USE TEST LEAD KIT P/N 3822758</b></p> 	<p>9. Place ignition switch in OFF position. Disconnect engine harness from ambient air pressure sensor and disconnect sensor harness connector from engine ECU.</p>	

Table 2. Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit Troubleshooting Procedures - Continued.

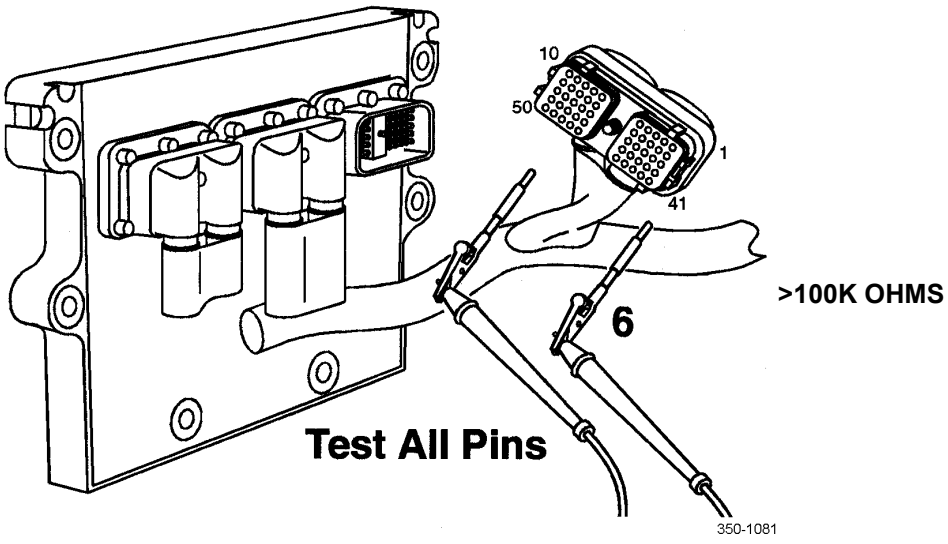
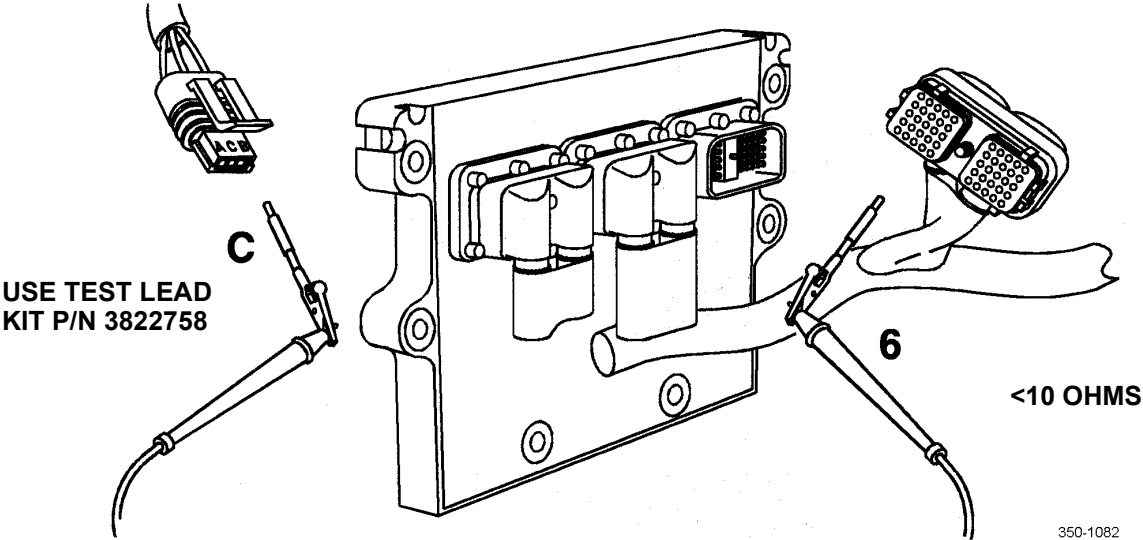
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit - Continued</b></p> <p><b>USE TEST LEAD KIT P/N 3822758</b></p> 	<p>10. Measure resistance from pin 6 of sensor harness connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>11. Place ignition switch in OFF position. Disconnect sensor harness connector from ECU.</p> <p>12. Inspect sensor harness and ECU connectors for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>13. Check sensor harness and ECU for dirt or moisture in or on connector and for missing or damaged connector seals.</p>	<p>a. If resistance is as specified, replace ambient air pressure sensor (WP 0093 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 2. Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit - Continued</p> 	<p>14. Place ignition switch to OFF position. Disconnect ambient air pressure sensor. Disconnect ECU sensor harness connector. Measure resistance from sensor harness connector pin 6 to ambient air pressure sensor signal pin C. Measurement should be less than 10 ohms.</p> <p>15. Disconnect sensor harness connector from ECU and place ignition switch to ON position.</p>	<p>If engine harness requires replacement, notify SRA.</p>

ENGINE AMBIENT AIR PRESSURE SENSOR AND CIRCUITS TROUBLESHOOTING - CONTINUED 0021 00

Table 2. Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit Troubleshooting Procedures - Continued.

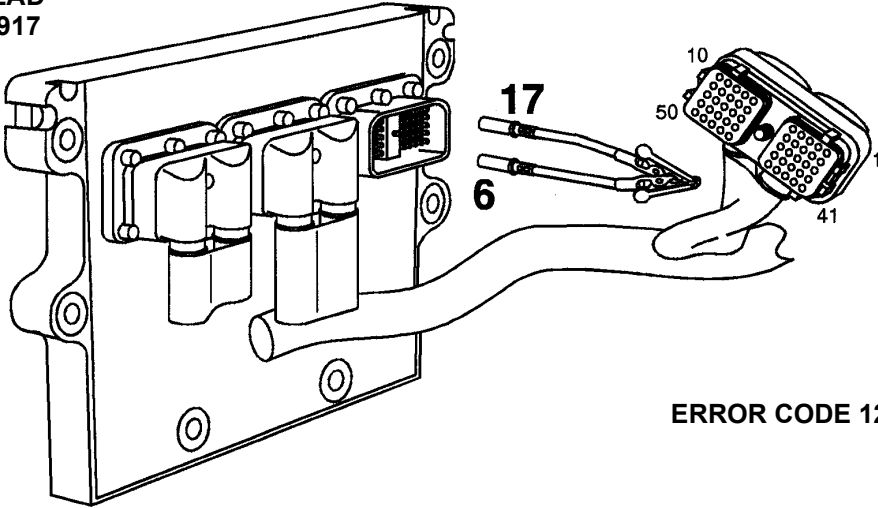

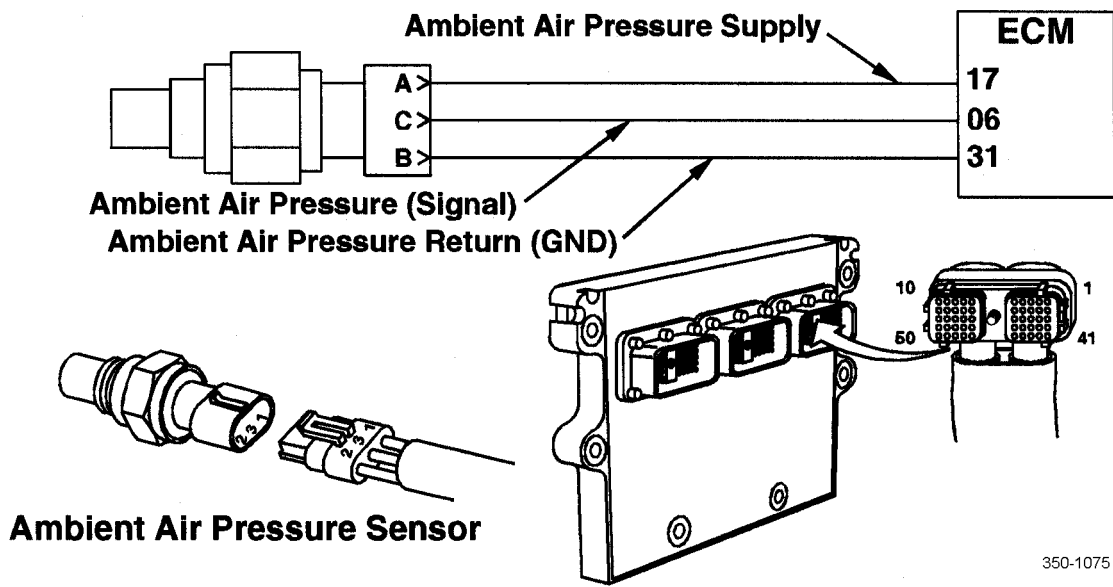
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1222 - Low Voltage Detected at Ambient Air Pressure Sensor Circuit - Continued</b></p> <p><b>USE TEST LEAD KIT P/N 3822917</b></p> 	<p>16. Install jumper wire between ECU sensor port pin 6 and pin 17. Check error code display. Error code 1221 should be displayed.</p>	<p>If error code 1222 is displayed, replace engine ECU (WP 0078 00).</p>

Table 3. Error Code 1295 - Ambient Air Pressure Sensor Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1295 - Ambient Air Pressure Sensor Circuit Failure</b></p> 		<p>Notify SRA.</p>





END OF WORK PACKAGE

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**THIS WORK PACKAGE COVERS**

Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure

Error Code 1419 - Intake Manifold Pressure Sensor Circuit Failure

Error Code 1123 - Intake Manifold Pressure Sensor Circuit Failure

Error Code 1433 - Intake Manifold Pressure Sensor Circuit Failure

**INITIAL SETUP**

**References**

- TM 10-3930-675-10
- ECS Engine (A34649.0200) (WP 0199 00-10)

**Tools and Special Tools**

- Cable, breakout (Item 43, WP 0204 00)
- Test lead, female (Item 48, WP 0204 00)
- Test lead, male (Item 51, WP 0204 00)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

**Table 1. Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect engine harness from intake manifold pressure sensor (WP 0093 00).</li> <li>2. Inspect engine harness and sensor connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>3. Check engine harness and sensor connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> <li>4. Disconnect all pressure and temperature sensors from engine harness. Disconnect coolant level sensor jumper wires no. 5 and 6 from 31-pin OEM connector, located on left side of engine to rear of ECU. Install breakout cable. Place ignition switch in ON position.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 1. Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure - Continued</b></p>	<p>5. Check intake manifold pressure sensor supply voltage. Check voltage between lead A and B of breakout cable. Voltage should be 4.75-5.25V. If voltage is not as specified, perform the following steps:</p> <div> <p style="text-align: right;">4.75-5.25V</p> <p style="text-align: right;">350-1069</p> </div> <p>a. Disconnect all pressure and temperature sensors from sensor harness. Disconnect coolant level sensor jumper wires no. 5 and 6 from 31-pin OEM connector. Place ignition switch to ON position. Install breakout cable but do not connect to sensor.</p> <p>b. Check intake manifold pressure sensor supply voltage. Check voltage between lead A and B of breakout cable. Voltage should be 4.75-5.25V.</p>	<p>If voltage is as specified, replace intake manifold pressure sensor (WP 0093 00).</p>

Table 1. Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

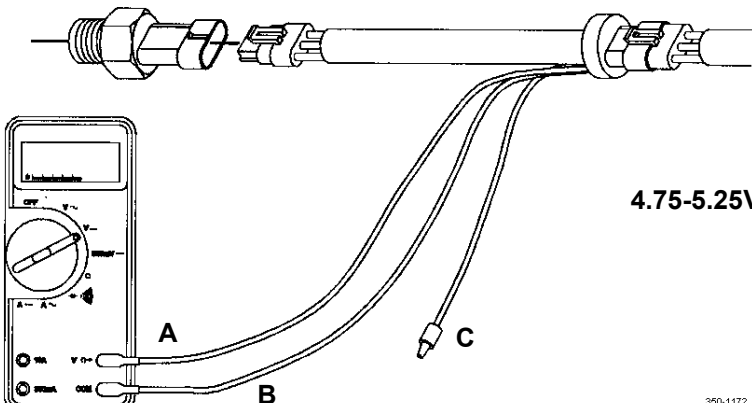
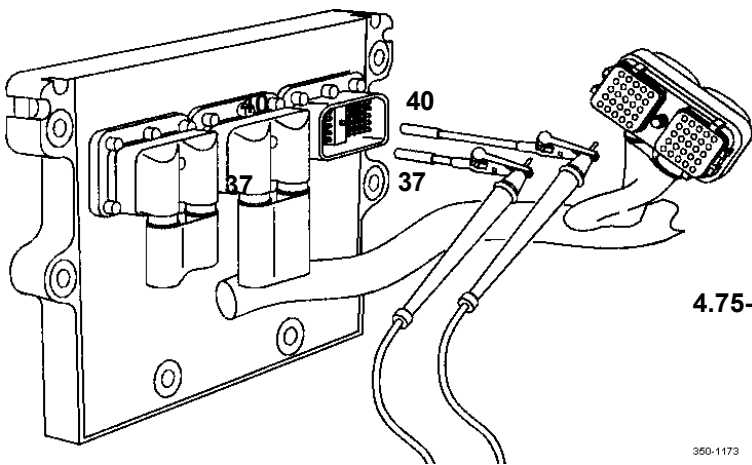
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure - Continued</p>  <p style="text-align: right;"><b>4.75-5.25V</b></p> <p style="text-align: right;"><small>350-1172</small></p>	<p>c. Disconnect sensor harness connector from engine ECU and place ignition switch to ON position.</p> <p>d. Measure voltage from ECU sensor port connector pin 40 to connector pin 37. Voltage should be 4.75-5.25V.</p>	<p>a. If voltage is as specified, replace intake manifold pressure sensor (WP 0093 00).</p> <p>b. If voltage is not as specified, replace engine ECU (WP 0078 00).</p>
<p><b>USE TEST LEAD KIT P/N 3822917</b></p>	 <p style="text-align: right;"><b>4.75-5.25V</b></p> <p style="text-align: right;"><small>350-1173</small></p>	

Table 1. Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

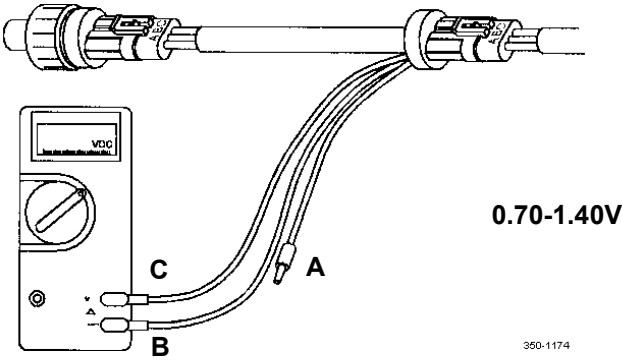
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure - Continued</b></p>	<p>6. Disconnect all sensors from sensor harness except intake manifold pressure sensor. Reconnect sensor harness connector to ECU.</p> <p>7. Disconnect coolant level sensor jumper wires. Install breakout cable. Place ignition switch in ON position.</p> <p>8. Check intake manifold pressure sensor signal voltage. Check voltage between leads C and B of breakout cable. Voltage should be 0.70-1.40V</p>  <p>390-1174</p> <p>9. Place ignition switch in OFF position, disconnect sensor harness from engine ECU, and disconnect all sensors and coolant level jumper wires no. 5 and 6. Disconnect intake manifold pressure sensor.</p> <p>a. Measure resistance from sensor harness connector pin 40 to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If voltage is not as specified, proceed to following steps.</p> <p>If engine harness requires replacement, notify SRA.</p>

Table 1. Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure - Continued</b></p>	<p>b. Measure resistance from sensor harness connector pin 39 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from sensor harness connector pin 37 to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p>

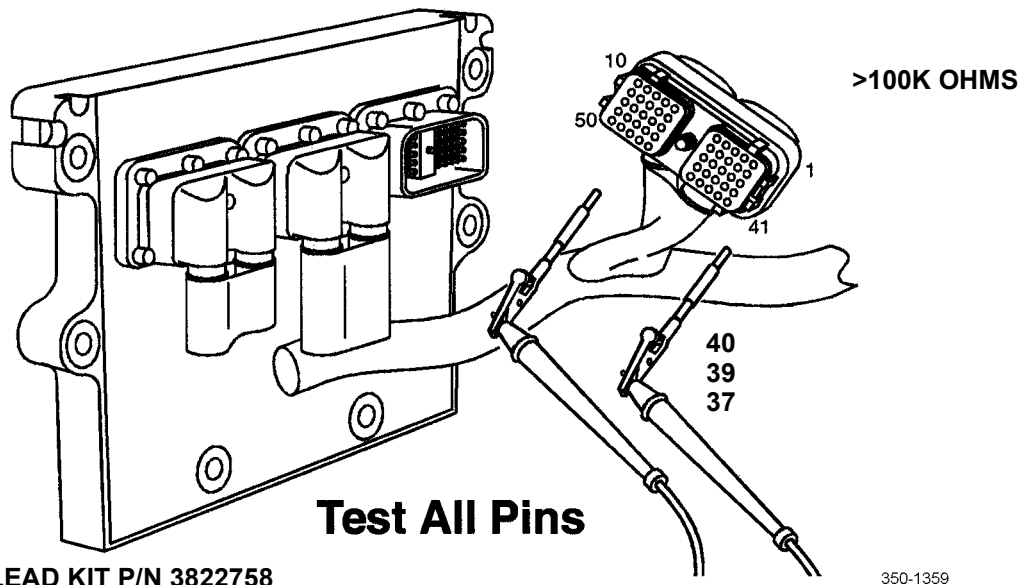
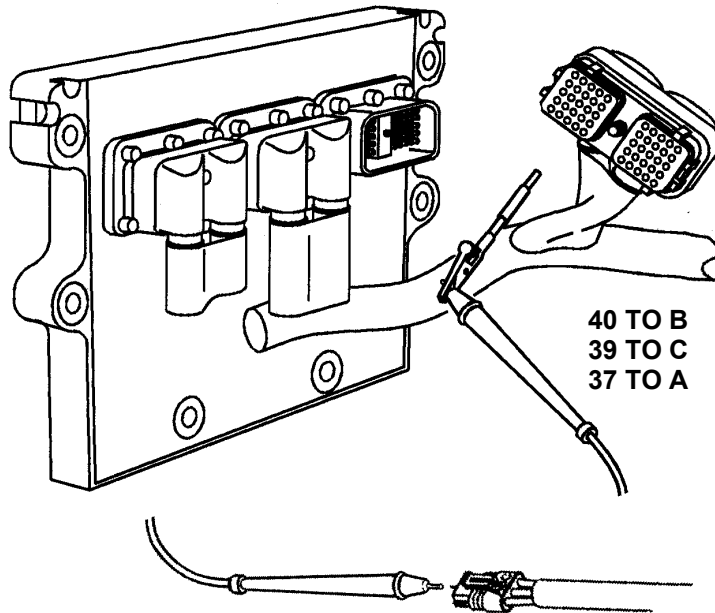


Table 1. Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure - Continued</b></p>	<p>10. Check for resistance in sensor harness.</p> <p>a. Measure resistance from sensor harness connector pin 37 to sensor connector pin A. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from sensor harness connector pin 40 to sensor connector pin B. Resistance should be less than 10 ohms.</p> <p>c. Measure resistance from sensor harness connector pin 39 to sensor connector pin C. Resistance should be less than 10 ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p> <p>If engine harness requires replacement, notify SRA.</p>



<10 OHMS

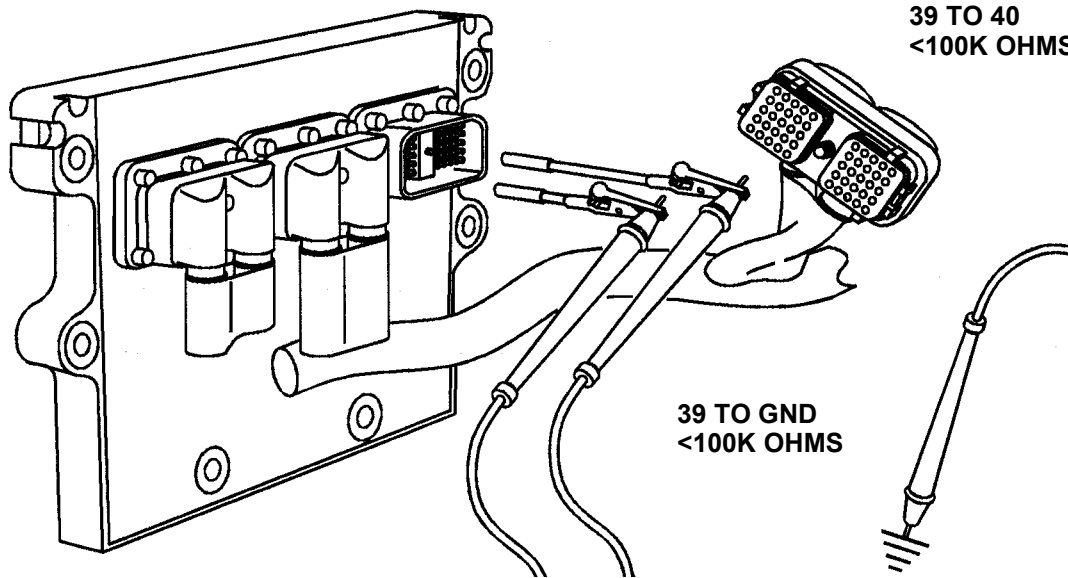
USE TEST LEAD KIT P/N 3822758

350-1360



Table 1. Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1122 - Intake Manifold Pressure Sensor Circuit Failure - Continued</b></p>	<p>11. Place ignition switch to OFF position and disconnect sensor harness connector from engine ECU.</p> <p>a. Measure resistance from pin 39 to pin 40 at sensor port of ECU.</p> <p>b. Measure resistance from pin 39 of ECU sensor port to engine block ground.</p>	<p>a. If resistance is less than 100k ohms, replace intake manifold pressure sensor (WP 0093 00).</p> <p>b. If resistance is greater than 100k ohms, replace engine ECU (WP 0078 00).</p> <p>If resistance is greater than 100k ohms, replace engine ECU (WP 0078 00).</p>



USE TEST LEAD KIT P/N 3822917

350-1361

Table 2. Error Code 1123 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures.


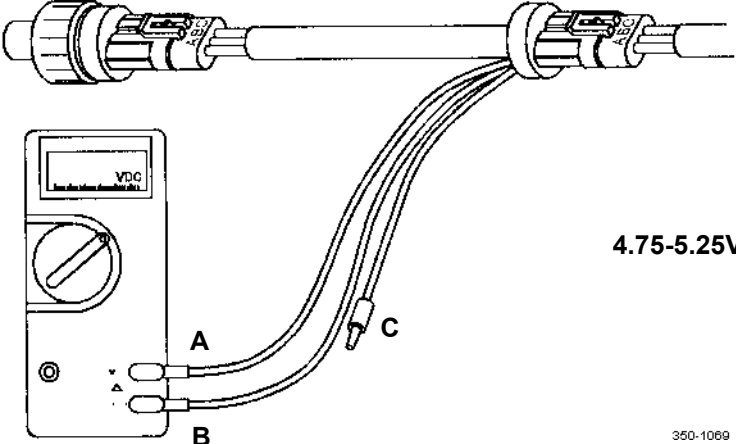
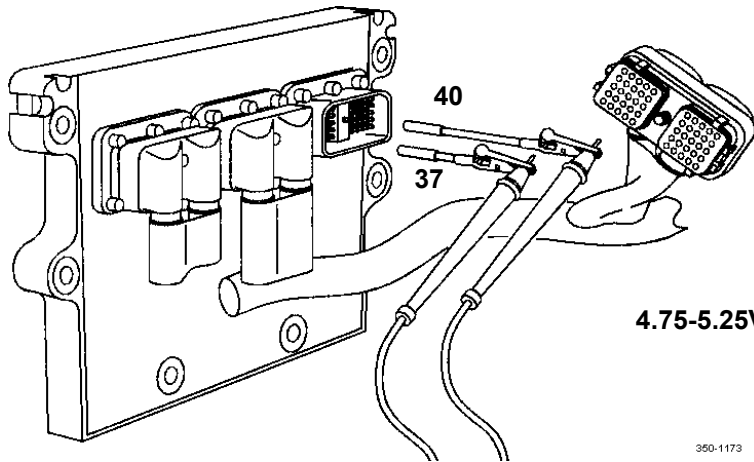
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1123 - Intake Manifold Pressure Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect engine harness from intake manifold pressure sensor (WP 0093 00).</li> <li>2. Inspect engine harness and sensor connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>3. Check engine harness and sensor connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> <li>4. Install breakout cable. Place ignition switch in ON position. Check intake manifold pressure sensor supply voltage. Check voltage between lead A and B of breakout cable. Voltage should be 4.75-5.25V.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If voltage is not as specified, proceed.</p>
 <p style="text-align: right;"><b>4.75-5.25V</b></p> <p style="text-align: right;"><small>350-1069</small></p>		

Table 2. Error Code 1123 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1123 - Intake Manifold Pressure Sensor Circuit Failure - Continued</b></p>	<p>5. Disconnect sensor harness connector from engine ECU and place ignition switch to ON position.</p> <p>6. Measure voltage from ECU sensor port connector pin 40 to connector pin 37. Voltage should be 4.75-5.25V.</p>	<p>If voltage is not as specified, proceed with the following steps.</p> <p>a. If engine harness requires replacement, notify SRA.</p> <p>b. If voltage is not as specified, replace engine ECU (WP 0078 00).</p>

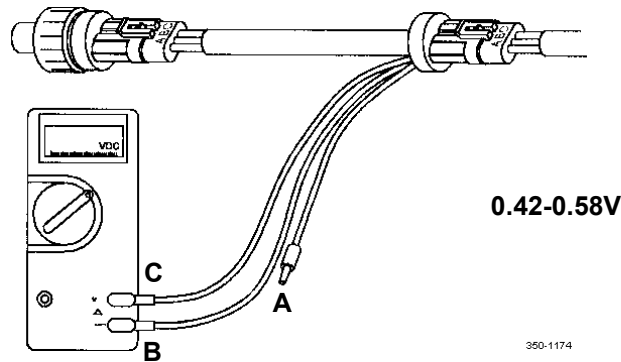
USE TEST LEAD  
KIT P/N 3822758



350-1173

Table 2. Error Code 1123 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Error Code 1123 - Intake Manifold Pressure Sensor Circuit Failure - Continued	7. Install breakout cable. Place ignition switch to ON position and check intake manifold pressure sensor signal voltage. Check voltage between lead B and C of breakout cable. Voltage should be 0.42-0.58V.	If voltage is not as specified, proceed with the following steps.



8. Place ignition switch to OFF position. Disconnect intake manifold pressure sensor from engine harness and disconnect sensor harness from engine ECU.
- a. Measure resistance from sensor harness connector pin 39 to chassis ground. Resistance should be more than 100k ohms.

If resistance is not as specified, notify SRA.

**USE TEST LEAD  
KIT P/N 3822758**

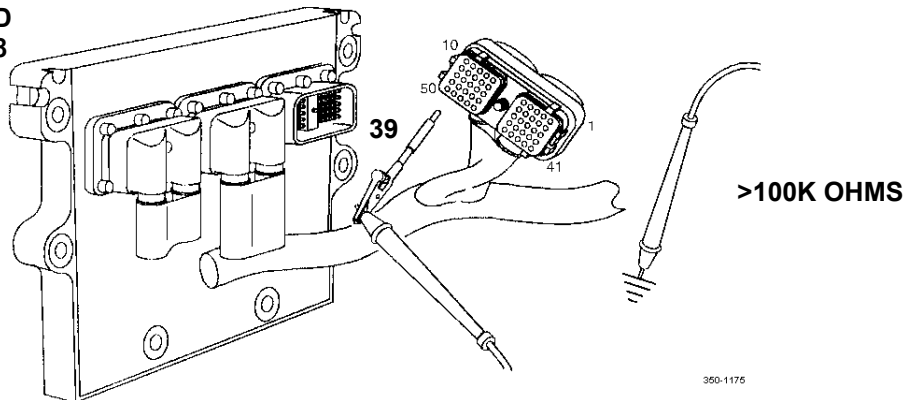




Table 2. Error Code 1123 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

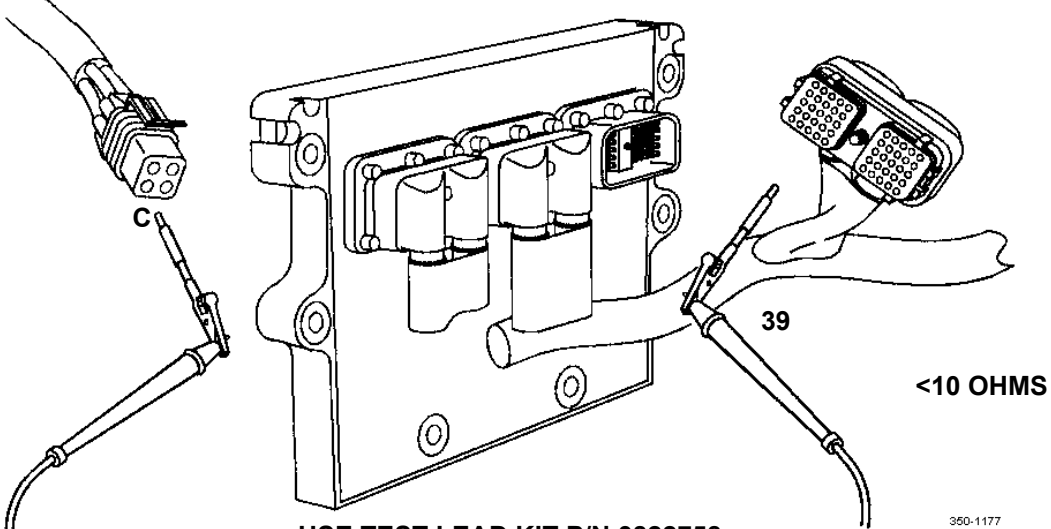
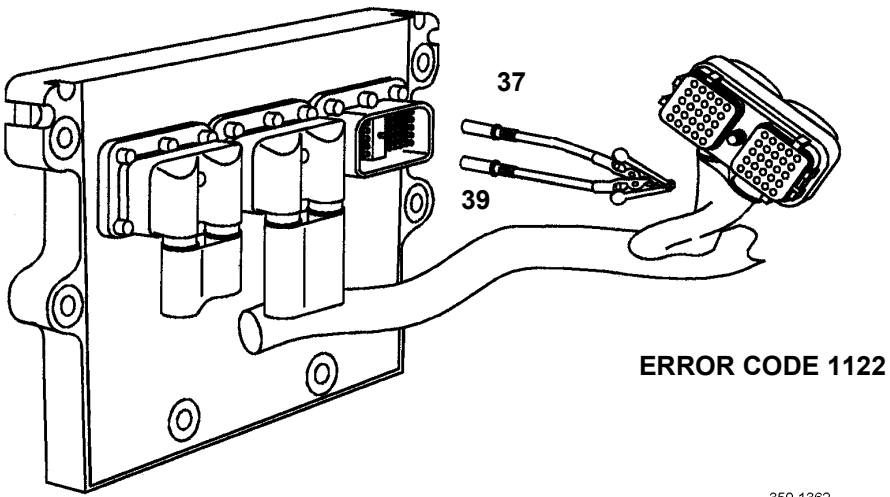
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1123 - Intake Manifold Pressure Sensor Circuit Failure - Continued</b></p>  <p><b>USE TEST LEAD KIT P/N 3822758</b></p>	<p>11. Disconnect sensor harness connector from engine ECU. Place ignition switch in ON position. Install jumper wire between ECU sensor port pin 37 and 39. Error code 1122 should be displayed.</p>  <p><b>ERROR CODE 1122</b></p>	<p>If error code 1122 is not displayed, replace engine ECU (WP 0078 00).</p>

Table 3. Error Code 1419 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1419 - Intake Manifold Pressure Sensor Circuit Failure</p> 		<p>Notify SRA.</p>

Table 4. Error Code 1433 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1433 - Intake Manifold Pressure Sensor Circuit Failure</p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position. Disconnect engine harness from intake manifold pressure sensor (WP 0093 00).</li> <li>2. Inspect engine harness and sensor connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>3. Check engine harness and sensor connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> <li>4. Place ignition switch to OFF position and disconnect sensor harness connector from engine ECU.</li> <li>5. Inspect engine harness and sensor connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>6. Check engine harness and engine ECU connector for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 4. Error Code 1433 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

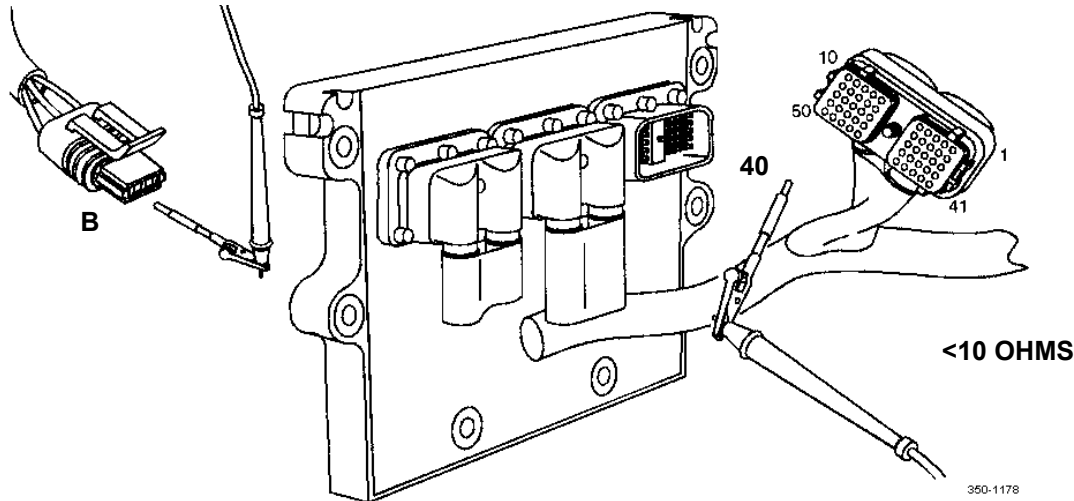
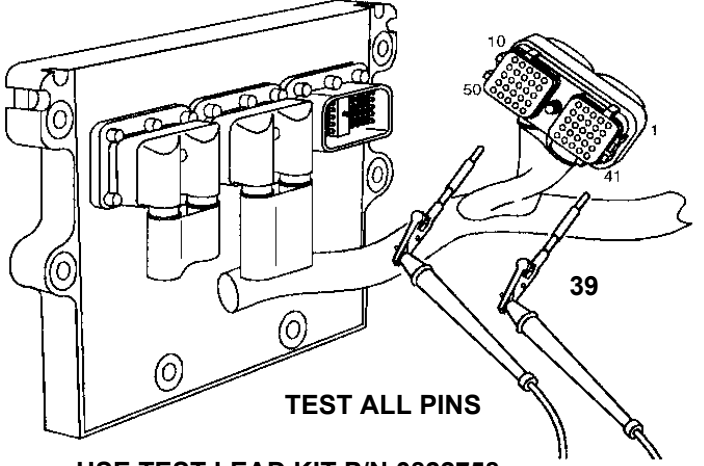
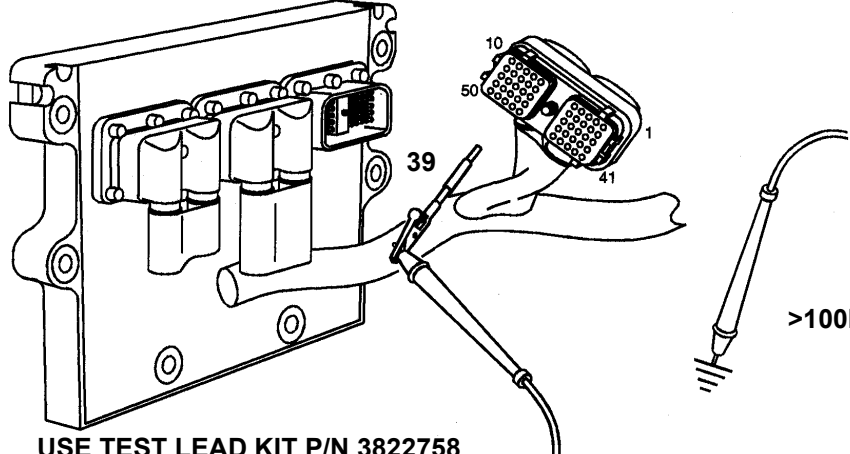
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1433 - Intake Manifold Pressure Sensor Circuit Failure - Continued</b></p>  <p style="text-align: center;"><b>USE TEST LEAD KIT P/N 3822758</b></p>	<p>7. Place ignition switch to OFF position. Disconnect sensor harness from intake manifold pressure sensor, and disconnect sensor harness from engine ECU.</p> <p>8. Measure resistance from sensor harness connector pin 40 to intake manifold pressure sensor connector pin 2. Resistance should be less than 10 ohms.</p>	<p>If engine harness requires replacement, notify SRA.</p>
	<p>9. Place ignition switch to OFF position. Disconnect sensor harness from intake manifold pressure sensor and from engine ECU. Measure resistance from sensor harness connector pin 39 to all other pins in connector. Resistance should be more than 100k ohms.</p>	<p>a. If resistance is as specified, replace intake manifold pressure sensor (WP 0093 00).</p> <p>b. If resistance is not as specified, notify SRA.</p>

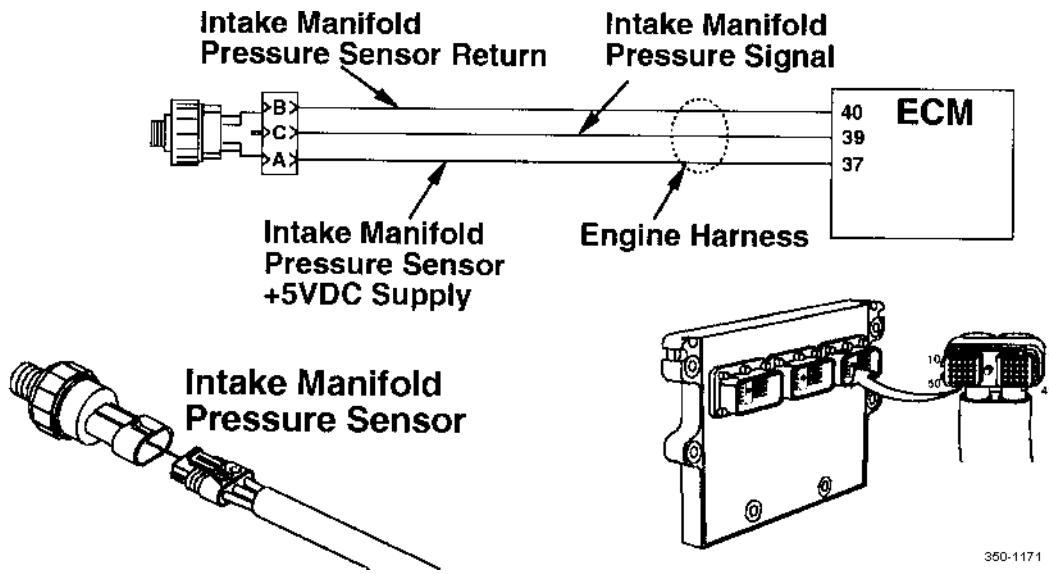


Table 4. Error Code 1433 - Intake Manifold Pressure Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1433 - Intake Manifold Pressure Sensor Circuit Failure - Continued</p>  <p><b>TEST ALL PINS</b></p> <p><b>USE TEST LEAD KIT P/N 3822758</b></p> <p><b>&gt;100K OHMS</b></p>	<p>10. Place ignition switch to OFF position. Disconnect sensor harness from intake manifold pressure sensor and from engine ECU.</p> <p>11. Measure resistance from pin 39 in sensor harness to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is as specified, replace intake manifold pressure sensor (WP 0093 00).</p> <p>b. If resistance is not as specified, notify SRA.</p>  <p><b>USE TEST LEAD KIT P/N 3822758</b></p> <p><b>&gt;100K OHMS</b></p>

**NOTE**

Intake manifold pressure sensor is located on top right side of engine under air intake tube.



END OF WORK PACKAGE

**THIS WORK PACKAGE COVERS**

Error Code 1255 - Fuel Shutoff Solenoid Supply Circuit Failure

Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure

Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

**Tools and Special Tools**

- Cable, breakout (Item 44, WP 0204 00)
- Cable, breakout (Item 45, WP 0204 00)
- Test lead, female (Item 48, WP 0204 00)
- Test lead, male (Item 51, WP 0204 00)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

**Table 1. Error Code 1255 - Fuel Shutoff Solenoid Supply Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1255 - Fuel Shutoff Solenoid Supply Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect actuator harness connector from engine ECU.</li> <li>a. Inspect harness connector and engine ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check harness and engine ECU for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 1. Error Code 1255 - Fuel Shutoff Solenoid Supply Circuit Failure Troubleshooting Procedures - Continued.

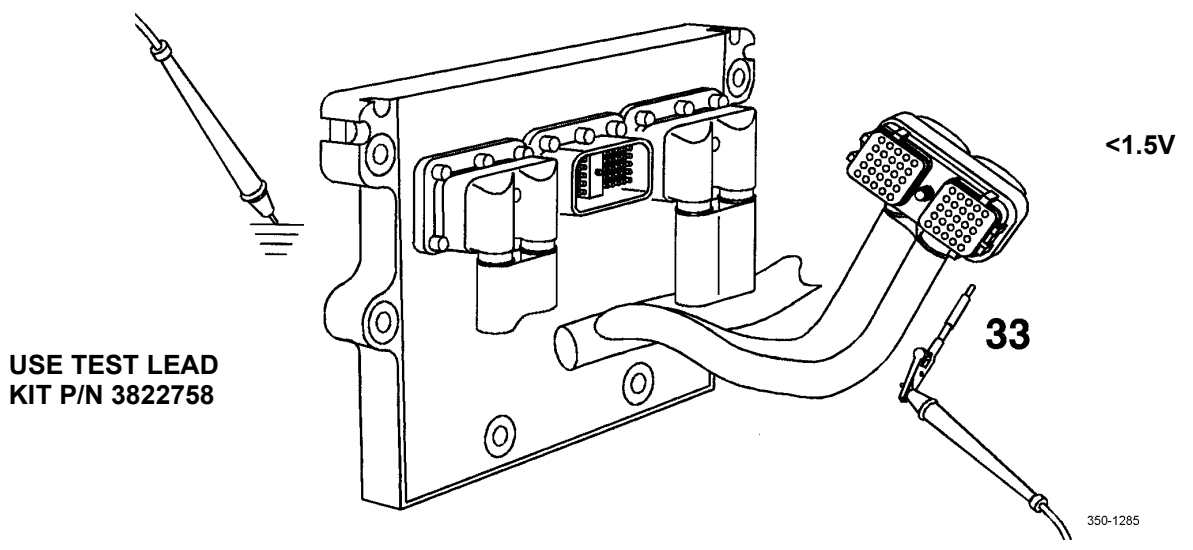
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1255 - Fuel Shutoff Solenoid Supply Circuit Failure - Continued</b></p>  <p>USE TEST LEAD KIT P/N 3822758</p>	<ol style="list-style-type: none"> <li>2. Disconnect actuator harness connector from engine ECU. Place ignition switch in ON position.</li> <li>3. Measure voltage from actuator harness connector pin 33 to engine block ground. Voltage should be less than 1.5V.</li> </ol> <ol style="list-style-type: none"> <li>4. Place ignition switch in OFF position, disconnect actuator harness connector from engine ECU, and disconnect actuator wire from fuel shutoff solenoid.</li> <li>5. Measure resistance from actuator harness connector pin 33 to all other pins in connector. Resistance should be greater than 100k ohms.</li> </ol>	<p>If voltage is not as specified, proceed with the following steps.</p> <p>If resistance is not as specified, notify SRA to replace engine harness.</p>

Table 1. Error Code 1255 - Fuel Shutoff Solenoid Supply Circuit Failure Troubleshooting Procedures - Continued.

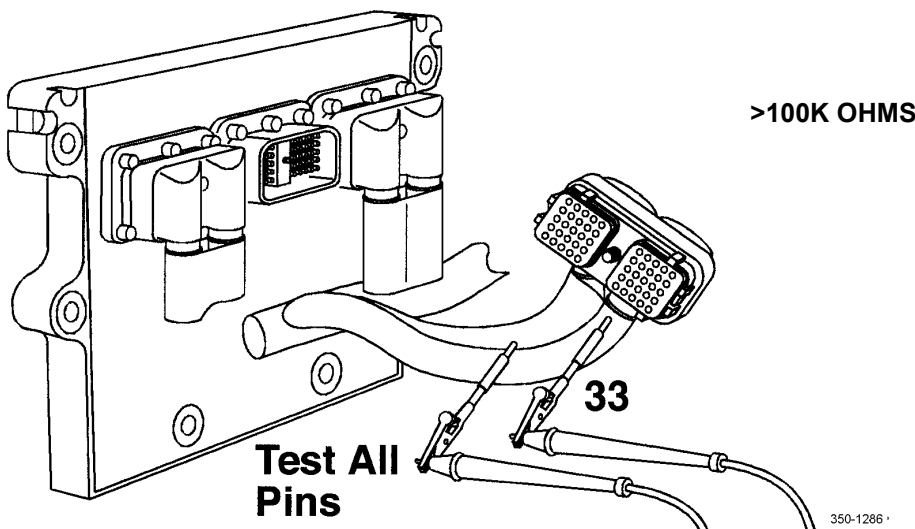
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1255 - Fuel Shutoff Solenoid Supply Circuit Failure - Continued</p> 		

Table 2. Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure</p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch to OFF position and disconnect fuel inlet restriction sensor from engine harness (WP 0093 00).             <ol style="list-style-type: none"> <li>a. Inspect fuel inlet restriction sensor connector and engine harness connector for dirty, corroded, bent, broken, pushed back, and extended pins.</li> <li>b. Check fuel inlet restriction sensor and engine harness for dirt or moisture in or on connector and for missing or damaged connector seals.</li> </ol> </li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 2. Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</b></p>	<p>2. Install breakout cable P/N 3824775 between sensor and harness connector. Place ignition switch in ON position.</p> <p>3. Measure supply voltage at pin 1 or A (red) and pin 2 or B (black). Voltage should be 4.75-5.25V.</p>	<p>a. If voltage is as specified, repair or replace connectors (WP 0111 00).                      b. If engine harness requires replacement, notify SRA.                      c. If voltage is not as specified, replace engine ECU (WP 0078 00).</p>
	<p>4. Disconnect actuator harness connector from engine ECU. Turn ignition switch to ON position and measure voltage from engine ECU pin 29 to pin 27 at actuator port of ECU. Voltage should be 4.75-5.25V.</p>	<p>a. If voltage is as specified, repair or replace connectors (WP 0111 00).                      b. If engine harness requires replacement, notify SRA.                      c. If voltage is not as specified, replace engine ECU (WP 0078 00).</p>

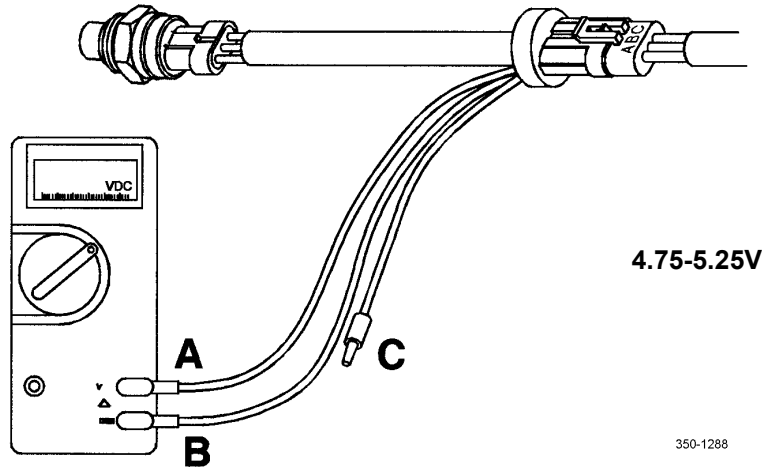


Table 2. Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

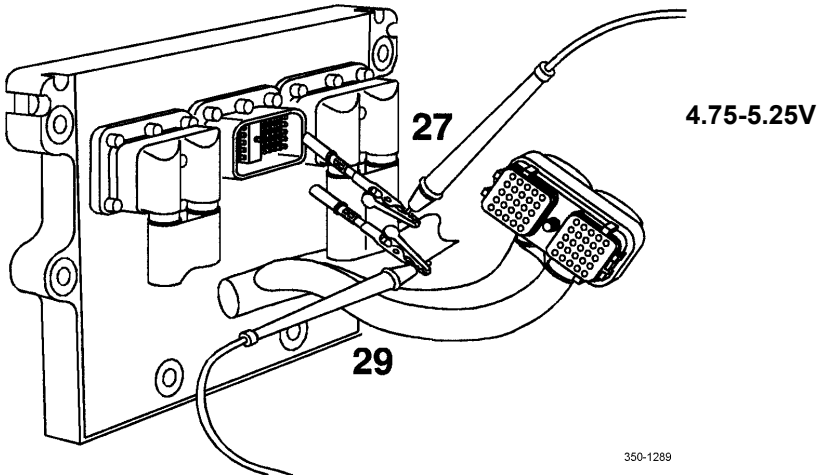
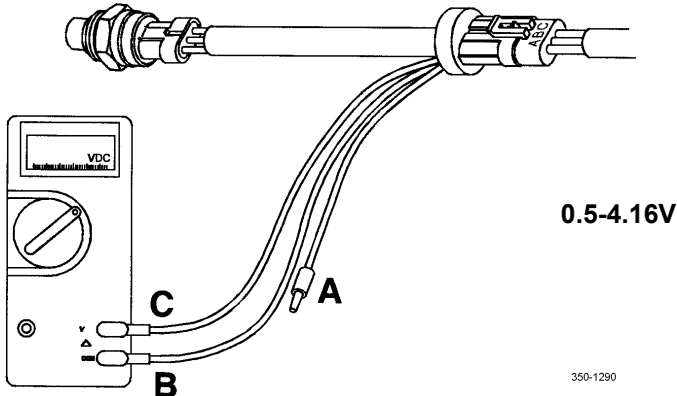
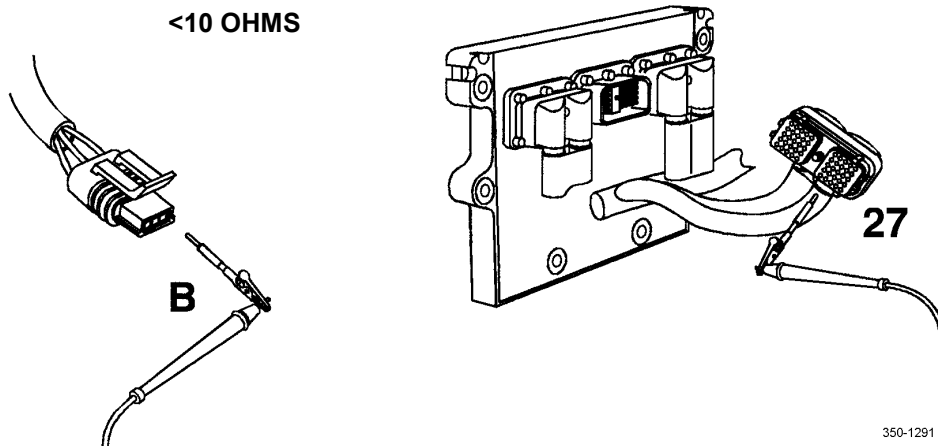
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</p>  <p style="text-align: right;">4.75-5.25V</p>	<p>5. Install breakout cable P/N 3824775 between sensor and harness connector. Place ignition switch in ON position.</p> <p>6. Measure signal voltage at pin 3 or C and pin 2 or B. Voltage should be 0.5-4.16V.</p>	<p>a. If voltage is as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>c. If voltage is not as specified, replace engine ECU (WP 0078 00).</p>  <p style="text-align: right;">0.5-4.16V</p>

Table 2. Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</b></p>	<p>7. Place ignition switch to OFF position and disconnect actuator harness connector from engine ECU.</p> <p>a. Inspect harness connector and engine ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check harness and engine ECU for dirt or moisture in or on connector and for missing or damaged connector seals.</p> <p>8. Place ignition switch in OFF position, disconnect actuator harness connector from engine ECU, and disconnect fuel inlet restriction sensor from engine harness.</p> <p>9. Measure resistance from actuator harness connector pin 27 to pin B (or 2) of 3 pin connector at sensor. Resistance should be less than 10 ohms.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>



350-1291



Table 2. Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</b></p>	<p>10. Place ignition switch in OFF position, disconnect actuator harness connector from engine ECU, and disconnect fuel inlet restriction sensor from engine harness.</p> <p>a. Measure resistance from actuator harness connector pin 27 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 28 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from actuator harness connector pin 29 to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>

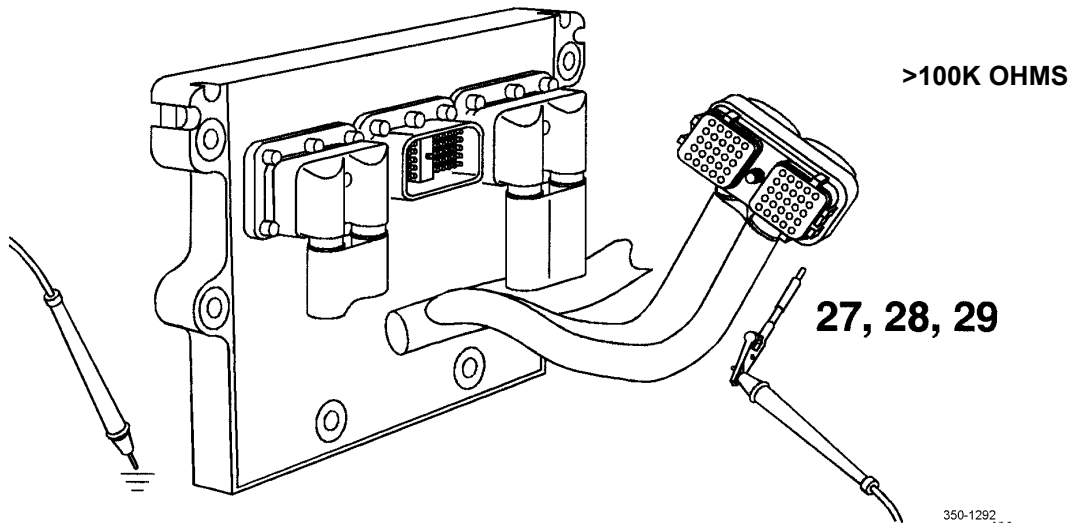
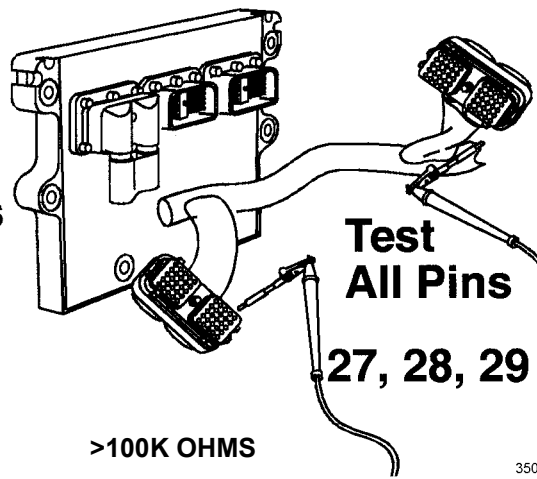
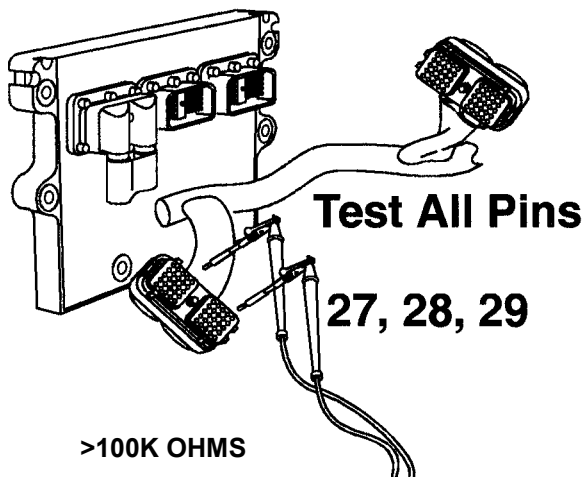


Table 2. Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</b></p>	<p>11. Place ignition switch in OFF position, disconnect actuator harness connector and sensor harness connector from engine ECU, and disconnect fuel inlet restriction sensor from engine harness.</p> <p>a. Measure resistance from actuator harness connector pin 27 to all other pins in actuator connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 27 to all other pins in sensor connector. Resistance should be greater than 100k ohms.</p> <p>c. Measure resistance from actuator harness connector pin 28 to all other pins in actuator connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is as specified, replace fuel inlet restriction sensor (WP 0093 00).</p> <p>b. If resistance is not as specified, notify SRA to replace engine harness.</p> <p>a. If resistance is as specified, replace fuel inlet restriction sensor (WP 0093 00).</p> <p>b. If resistance is not as specified, notify SRA to replace engine harness.</p> <p>a. If resistance is as specified, replace fuel inlet restriction sensor (WP 0093 00).</p> <p>b. If resistance is not as specified, notify SRA to replace engine harness.</p>



350-1293

Table 2. Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1581 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</b></p>	<p>d. Measure resistance from actuator harness connector pin 28 to all other pins in sensor connector. Resistance should be greater than 100k ohms.</p> <p>e. Measure resistance from actuator harness connector pin 29 to all other pins in actuator connector. Resistance should be greater than 100k ohms.</p> <p>f. Measure resistance from actuator harness connector pin 29 to all other pins in sensor connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is as specified, replace fuel inlet restriction sensor (WP 0093 00).</p> <p>b. If resistance is not as specified, notify SRA to replace engine harness.</p> <p>a. If resistance is as specified, replace fuel inlet restriction sensor (WP 0093 00).</p> <p>b. If resistance is not as specified, notify SRA to replace engine harness.</p> <p>a. If resistance is as specified, replace fuel inlet restriction sensor (WP 0093 00).</p> <p>b. If resistance is not as specified, notify SRA to replace engine harness.</p>

Table 3. Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure</b></p> 	<p>1. Place ignition switch to OFF position and disconnect fuel inlet restriction sensor from engine harness (WP 0093 00).</p> <p>a. Inspect fuel inlet restriction sensor connector and engine harness connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check fuel inlet restriction sensor and engine harness for dirt or moisture in or on connector and for missing or damaged connector seals.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 3. Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</b></p>	<p>2. Install breakout cable P/N 3824776 between sensor and harness connector. Place ignition switch in ON position.</p> <p>3. Measure supply voltage at pin 1 or A (red) and pin 2 or B (black). Voltage should be 4.75-5.25V.</p>	<p>a. If voltage is as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>c. If voltage is not as specified, replace engine ECU (WP 0078 00).</p>
	<p>4. Disconnect actuator harness connector from engine ECU. Place ignition switch in ON position and measure voltage from engine ECU pin 29 to pin 27 at actuator port of ECU. Voltage should be 4.75-5.25V.</p>	<p>a. If voltage is as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>c. If voltage is not as specified, replace engine ECU (WP 0078 00).</p>

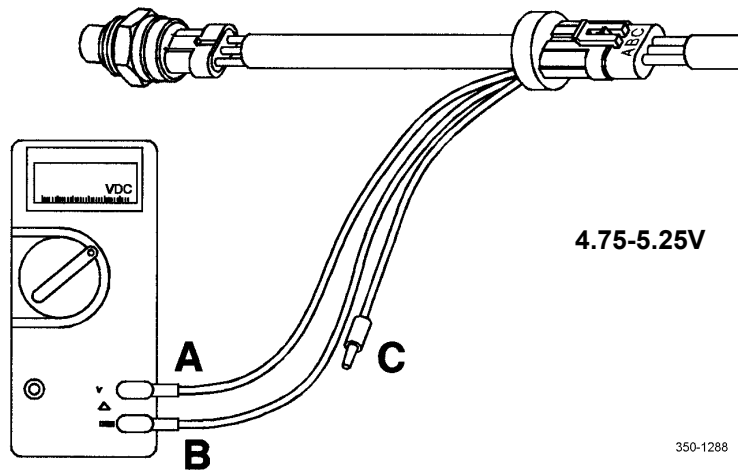


Table 3. Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

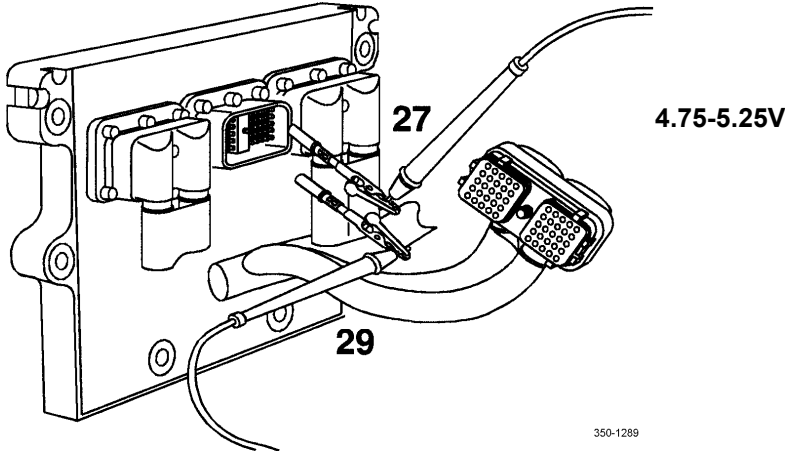
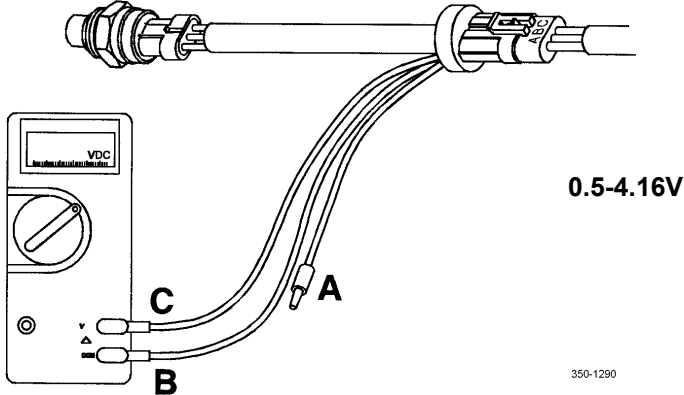
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</p>	 <p>350-1289</p> <p>4.75-5.25V</p> <p>27</p> <p>29</p> <ol style="list-style-type: none"> <li>5. Install breakout cable P/N 3824776 between sensor and harness connector. Place ignition switch in ON position.</li> <li>6. Measure signal voltage at pin 3 or C and pin 2 or B. Voltage should be 0.5-4.16V.</li> </ol>	<ol style="list-style-type: none"> <li>a. If voltage is as specified, repair or replace connectors (WP 0111 00).</li> <li>b. If engine harness requires replacement, notify SRA.</li> <li>c. If voltage is not as specified, replace engine ECU (WP 0078 00).</li> </ol>
	 <p>350-1290</p> <p>0.5-4.16V</p> <p>C</p> <p>A</p> <p>B</p>	

Table 3. Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</b></p>	<p>7. Place ignition switch to OFF position, disconnect actuator harness connector from engine ECU, and disconnect fuel inlet restriction sensor from engine harness.</p> <p>a. Measure resistance from actuator harness connector pin 28 to engine block ground. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 29 to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>If voltage is not as specified, notify SRA to replace engine harness.</p> <p>If voltage is not as specified, notify SRA to replace engine harness.</p>

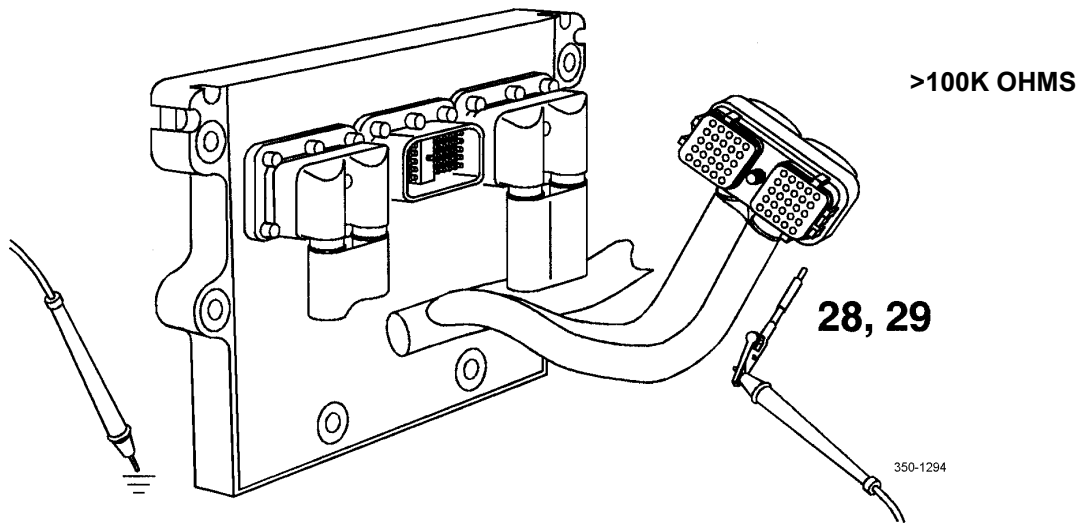


Table 3. Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</b></p>	<p>8. Place ignition switch to OFF position, disconnect actuator harness connector from engine ECU, and disconnect fuel inlet restriction sensor from engine harness.</p> <p>a. Measure resistance from actuator harness connector pin 28 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>b. Measure resistance from actuator harness connector pin 29 to all other pins in connector. Resistance should be greater than 100k ohms.</p>	<p>a. If resistance is as specified, replace fuel inlet restriction sensor (WP 0093 00).</p> <p>b. If resistance is not as specified, notify SRA to replace engine harness.</p> <p>a. If resistance is as specified, replace fuel inlet restriction sensor (WP 0093 00).</p> <p>b. If resistance is not as specified, notify SRA to replace engine harness.</p>

>100K OHMS

28, 29

Test all Pins

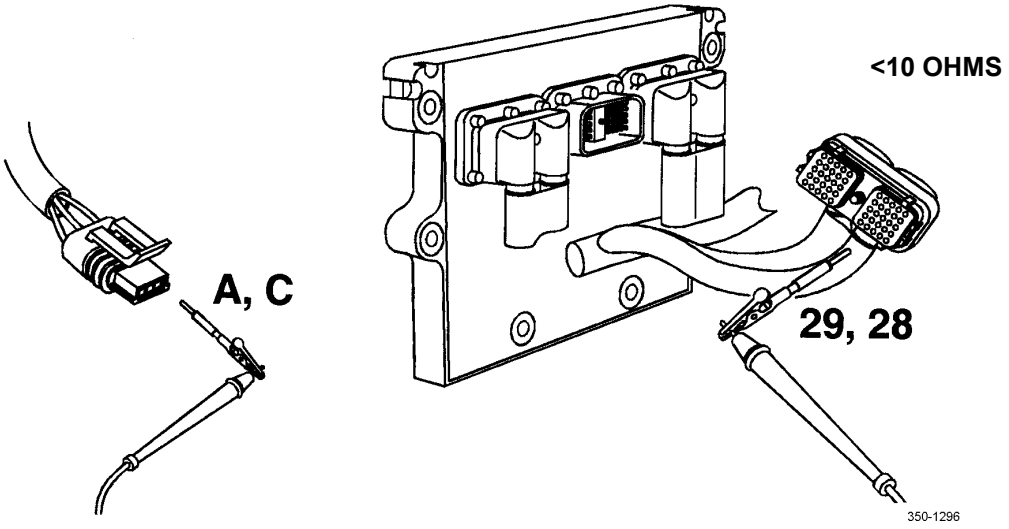
350-1295

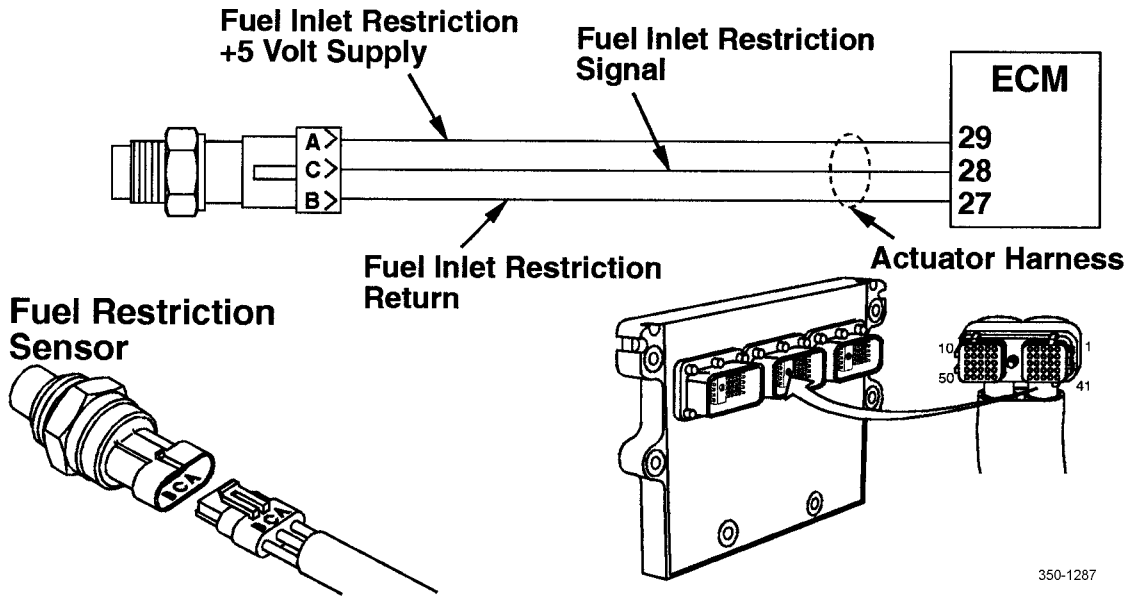
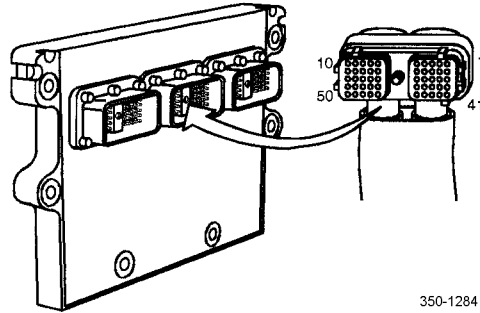
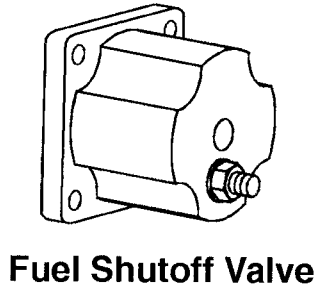
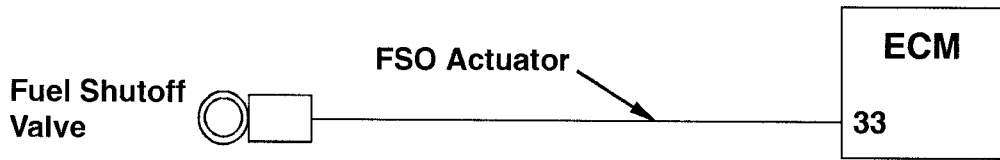
Table 3. Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</b></p>	<p>9. Place ignition switch to OFF position and disconnect actuator harness connector from engine ECU.</p> <p>a. Inspect harness connector and engine ECU connector for dirty, corroded, bent, broken, pushed back, and extended pins.</p> <p>b. Check harness and engine ECU for dirt or moisture in or on the connector and for missing or damaged connector seals.</p> <p>10. Place ignition switch in OFF position, disconnect actuator harness connector from engine ECU, and disconnect fuel inlet restriction sensor from engine harness.</p> <p>a. Measure resistance from actuator harness connector pin 29 to pin A (or 1) of 3 pin connector. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from actuator harness connector pin 28 to pin C (or 3) of 3 pin connector. Resistance should be less than 10 ohms.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p> <p>a. If resistance is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If engine harness requires replacement, notify SRA.</p>



Table 3. Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1582 - Fuel Inlet Restriction Sensor Circuit Failure - Continued</p> 		



END OF WORK PACKAGE

**THIS WORK PACKAGE COVERS**

Error Code 1583 - Fuel Inlet Restriction Sensor Circuit Failure

**INITIAL SETUP**

**References**


TM 10-3930-675-10

ECS Engine (A34649.0200) (WP 0199 00-10)

**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

**Table 1. Error Code 1583 - Fuel Inlet Restriction Sensor Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1583 - Fuel Inlet Restriction Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that ignition switch is in OFF position.</li> <li>2. Inspect metal fuel lines for sharp bends that may cause a pressure restriction.</li> <li>3. Inspect fuel hoses for separation of inner lining from center of hose.</li> </ol>	<p>Replace damaged fuel line(s) (WP 0059 00).</p> <p>Replace damaged fuel hose(s) (WP 0059 00).</p>

**END OF WORK PACKAGE**

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**THIS WORK PACKAGE COVERS**

Error Code 1434 - Unswitched Battery Supply Circuit Failure

Error Code 1441 - Unswitched Battery Supply Circuit Failure

Error Code 1442 - Unswitched Battery Supply Circuit Failure

Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure

Error Code 1596 - Voltage Monitor, High Voltage Failure

Error Code 1597 - Voltage Monitor, Low Voltage Failure

Error Code 1598 - Voltage Monitor, Very Low Voltage Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

**Tools and Special Tools**

Test lead, male (Item 51, WP 0204 00)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

**Table 1. Error Code 1434 - Unswitched Battery Supply Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1434 - Unswitched Battery Supply Circuit Failure</b></p> 	<p>1. Ensure that ignition switch is in OFF position. Disconnect OEM harness from engine ECU (794) and disconnect positive and negative terminals from battery. Perform the following resistance checks:</p> <p>a. Measure resistance from OEM harness connector pin 18 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p>	<p>If resistance is not as specified, notify SRA to repair or replace engine harness.</p>

Table 1. Error Code 1434 - Unswitched Battery Supply Circuit Failure Troubleshooting Procedures - Continued.

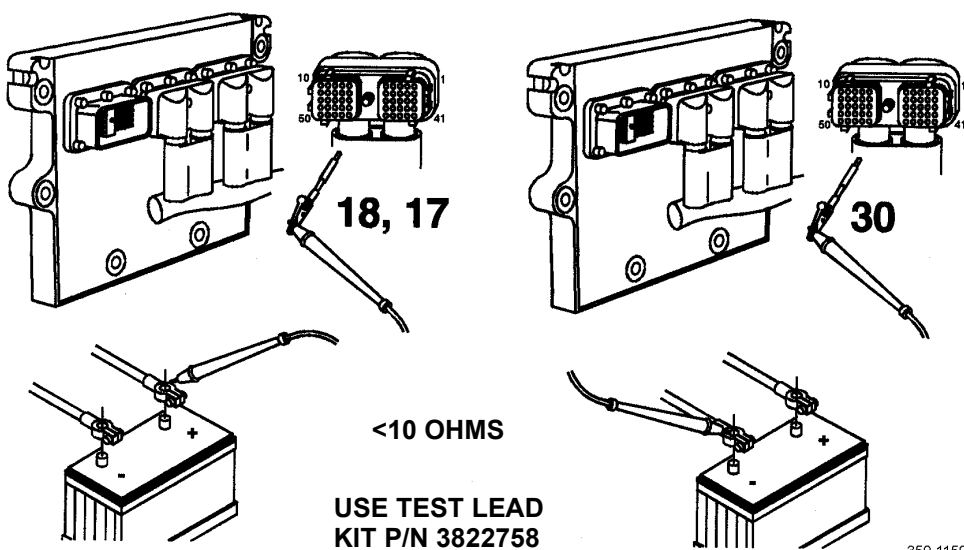
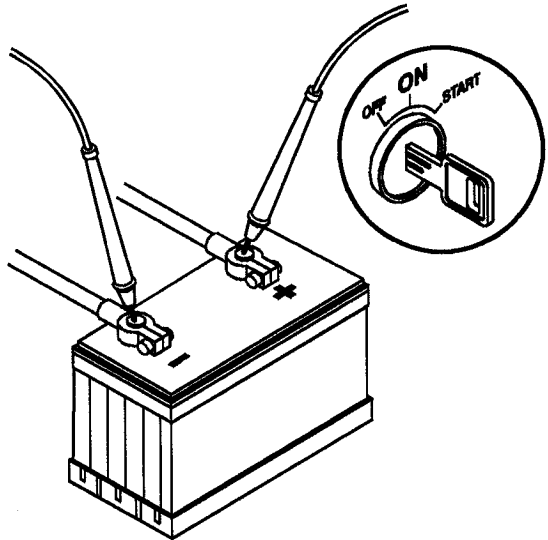
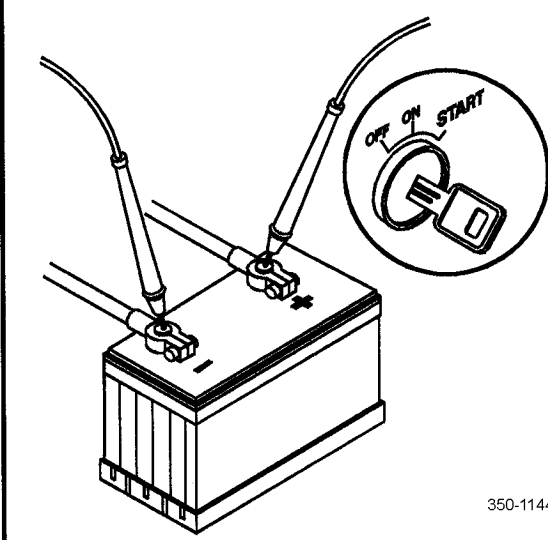
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1434 - Unswitched Battery Supply Circuit Failure - Continued</b></p>  <p style="text-align: center;"><b>&lt;10 OHMS</b></p> <p style="text-align: center;"><b>USE TEST LEAD KIT P/N 3822758</b></p> <p style="text-align: right; font-size: small;">350-1159</p>	<p>b. Measure resistance from OEM harness connector pin 17 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p> <p>c. Measure resistance from OEM harness connector pin 30 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p>	

Table 1. Error Code 1434 - Unswitched Battery Supply Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1434 - Unswitched Battery Supply Circuit Failure - Continued</b></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p><b>+12V = ON</b></p> </div> <div style="text-align: center;">  <p><b>&gt;6V = START</b></p> </div> </div>	<p>2. Turn ignition switch to ON position and check battery voltage by placing positive (+) probe of multimeter on positive (+) battery terminal and touch negative (-) probe to negative (-) battery terminal while trying to start engine. Voltage should be at least (+)12V during normal conditions and at least (+)6V during cranking. Check each battery the same way.</p> <p>3. Turn ignition switch to OFF position and check battery terminals for secure connection.</p> <p>4. Check circuit breakers 51-F4 and 51-F5.</p>	<p>If voltage is not as required, charge or replace battery (WP 0107 00).</p> <p>Clean terminals and tighten loose battery terminal connections.</p> <p>a. Reset circuit breakers if tripped. b. If circuit breakers will not reset, notify SRA.</p>

350-1144

Table 1. Error Code 1434 - Unswitched Battery Supply Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1434 - Unswitched Battery Supply Circuit Failure - Continued</b></p>	<p>5. Ensure that ignition switch is in OFF position and disconnect OEM harness connector from engine ECU (794).</p> <p>a. Inspect harness and engine ECU (794) connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check harness and engine ECU (794) for dirt or moisture in or on connectors and for missing or damaged connector seals.</p> <p>6. Place ignition in OFF position and disconnect OEM harness connector from engine ECU (794). Perform the following voltage checks.</p> <p>a. Measure voltage from OEM harness connector pin 7 to pin 29. Voltage should be 24-30V.</p> <p>b. Measure voltage from OEM harness connector pin 8 to pin 30. Voltage should be 24-30V.</p>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If voltage is not as specified, notify SRA to repair or replace engine harness.</p>



Table 1. Error Code 1434 - Unswitched Battery Supply Circuit Failure Troubleshooting Procedures - Continued.

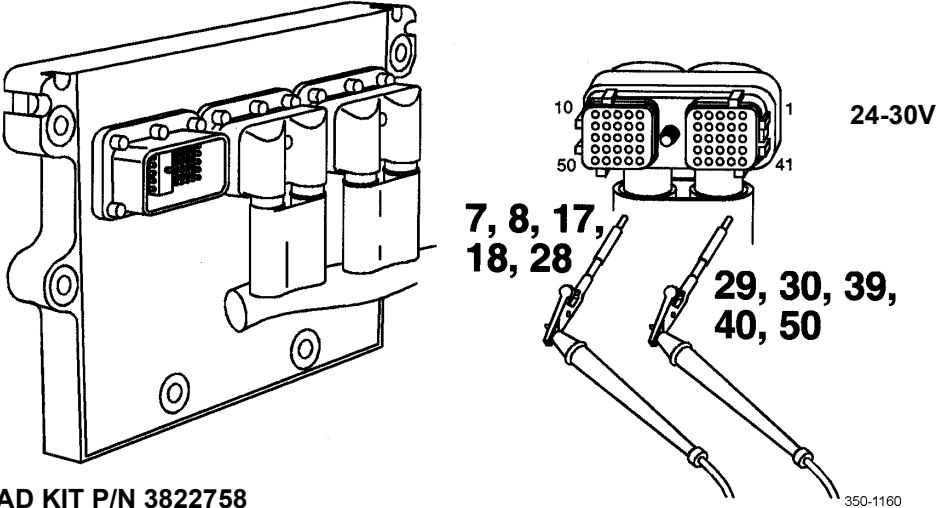
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1434 - Unswitched Battery Supply Circuit Failure - Continued</p>  <p>USE TEST LEAD KIT P/N 3822758</p>	<p>c. Measure voltage from OEM harness connector pin 17 to pin 39. Voltage should be 24-30V.</p> <p>d. Measure voltage from OEM harness connector pin 18 to pin 40. Voltage should be 24-30V.</p> <p>e. Measure voltage from OEM harness connector pin 28 to pin 50. Voltage should be 24-30V.</p> <p>7. Place ignition switch in OFF position, disconnect OEM harness connector from engine ECU (794), and disconnect positive (+) and negative (-) terminals from battery. Perform the following resistance checks. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to repair or replace engine harness.</p>



Table 2. Error Code 1441 - Unswitched Battery Supply Circuit Failure Troubleshooting Procedures.

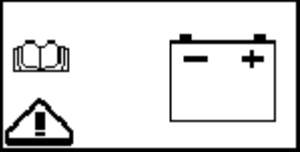
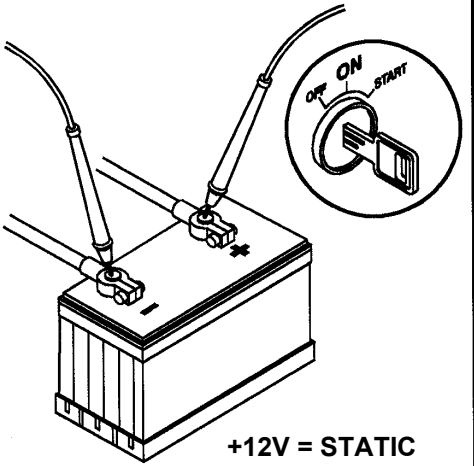
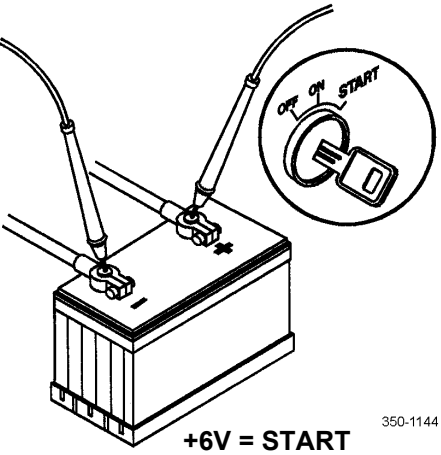
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1441 - Unswitched Battery Supply Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check battery cable connections for loose connections and corrosion.</li> <li>2. Turn ignition switch to OFF position and measure battery voltage from positive (+) terminal to negative (-) terminal. Voltage should be at least 12V for each battery in system.</li> <li>3. Turn ignition switch to OFF position and measure battery voltage from positive (+) terminal to negative (-) terminal. Voltage should be +12V. Check voltage while trying to start engine. Voltage should be at least +6V during cranking. Check each battery in the same way.</li> </ol>	<p>Tighten battery connections and clean battery terminals as required.</p> <p>If voltage is not as required, charge or replace battery (WP 0107 00).</p> <p>If voltage is not as required, charge or replace battery (WP 0107 00).</p>
 <p style="text-align: center;"><b>+12V = STATIC</b></p>	<ol style="list-style-type: none"> <li>4. Check circuit breakers 51-F4 and 51-F5.</li> </ol>	 <p style="text-align: center;"><b>+6V = START</b></p> <p style="text-align: right;">350-1144</p> <ol style="list-style-type: none"> <li>a. Reset circuit breakers if tripped.</li> <li>b. If circuit breakers will not reset, notify SRA.</li> </ol>

Table 2. Error Code 1441 - Unswitched Battery Supply Circuit Failure Troubleshooting Procedures - Continued.

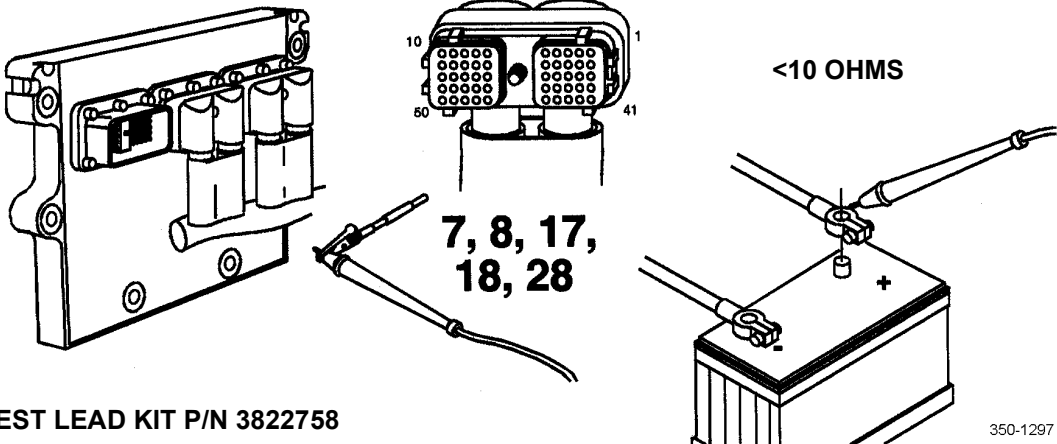
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1441 - Unswitched Battery Supply Circuit Failure - Continued</b></p>  <p><b>USE TEST LEAD KIT P/N 3822758</b></p>	<p>5. Ensure that ignition switch is in OFF position. Disconnect OEM harness from engine ECU (794) and disconnect positive terminal from battery. Perform the following resistance checks:</p> <ul style="list-style-type: none"> <li>a. Measure resistance from OEM harness connector pin 7 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> <li>b. Measure resistance from OEM harness connector pin 8 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> <li>c. Measure resistance from OEM harness connector pin 17 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> <li>d. Measure resistance from OEM harness connector pin 18 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> </ul>	<p>If resistance is not as specified, notify SRA to repair or replace engine harness.</p>

Table 2. Error Code 1441 - Unswitched Battery Supply Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1441 - Unswitched Battery Supply Circuit Failure - Continued</b></p>	<p>e. Measure resistance from OEM harness connector pin 28 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p> <p>6. Place ignition switch in OFF position, disconnect OEM harness connector from engine ECU (794), and disconnect positive (+) terminal from battery. Perform the following resistance checks. Resistance should be greater than 100k ohms.</p> <p>a. Measure resistance from OEM harness connector pin 7 to all other pins in connector <b>except</b> pins 8, 17, 18, and 28.</p> <p>b. Measure resistance from OEM harness connector pin 8 to all other pins in connector <b>except</b> pins 7, 17, 18, and 28.</p> <p>c. Measure resistance from OEM harness connector pin 17 to all other pins in connector <b>except</b> pins 7, 8, 18, and 28.</p> <p>d. Measure resistance from OEM harness connector pin 18 to all other pins in connector <b>except</b> pins 7, 8, 17, and 28.</p>	<p>If resistance is not as specified, notify SRA to repair or replace engine harness.</p>

Table 2. Error Code 1441 - Unswitched Battery Supply Circuit Failure Troubleshooting Procedures - Continued.

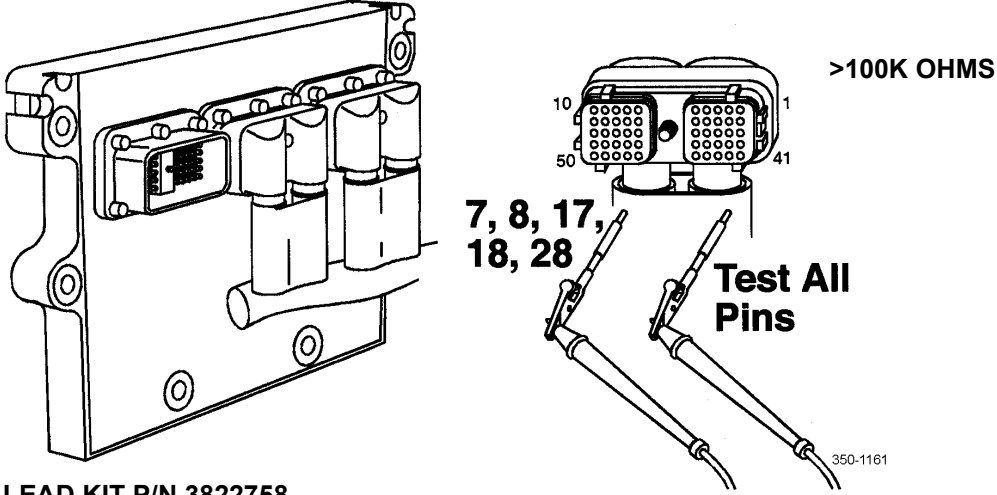
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1441 - Unswitched Battery Supply Circuit Failure - Continued</b></p>  <p><b>USE TEST LEAD KIT P/N 3822758</b></p>	<p>e. Measure resistance from OEM harness connector pin 28 to all other pins in connector <b>except</b> pins 7, 8, 17, and 18.</p>	

Table 3. Error Code 1442 - Unswitched Battery Supply Circuit Failure Troubleshooting Procedures.

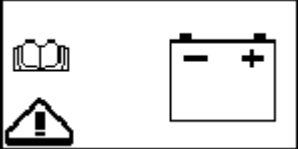
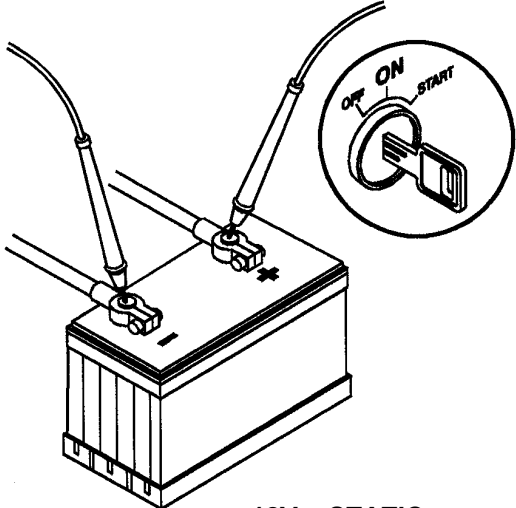
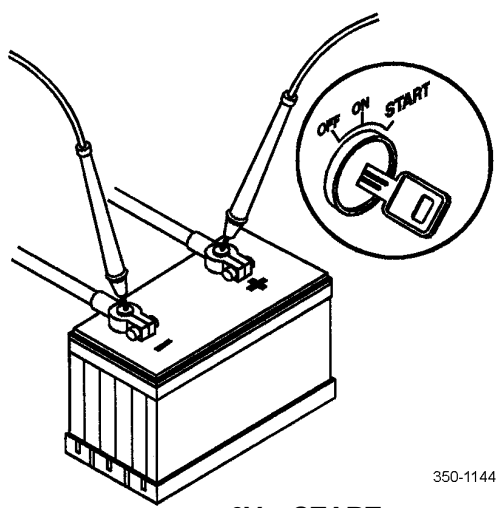

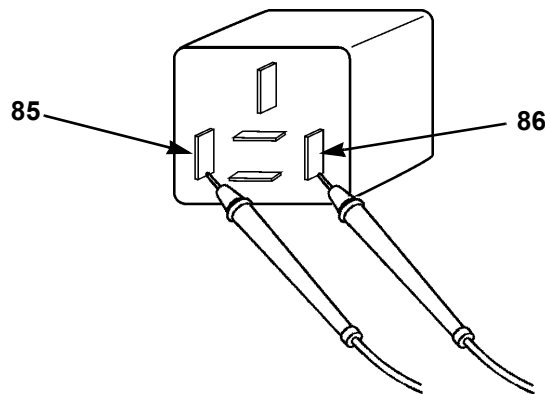
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1442 - Unswitched Battery Supply Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Turn ignition switch to OFF position and measure battery voltage from positive (+) terminal to negative (-) terminal. Voltage should be at least 12V. Check each battery in system.</li> <li>2. Turn ignition switch to OFF position and measure battery voltage from positive (+) terminal to negative (-) terminal. Voltage should be +12V. Check voltage while trying to start engine. Voltage should be at least +6V during cranking. Check each battery in system.</li> </ol>	<p>If voltage is not as required, charge or replace battery (WP 0107 00).</p> <p>If voltage is not as required, charge or replace battery (WP 0107 00).</p>
 <p style="text-align: center;"><b>+12V = STATIC</b></p>	 <p style="text-align: center;"><b>+6V = START</b></p>	<p style="text-align: right;">350-1144</p> <ol style="list-style-type: none"> <li>3. Start engine and check battery voltage. Voltage should be higher than voltage check with engine off (static).</li> </ol> <p>Replace alternator if damaged or not operating properly (WP 0069 00).</p>

Table 4. Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch in OFF position and turn off master battery switch.               <ol style="list-style-type: none"> <li>a. Remove cab left rear wall panel and access cab distribution box and remove circuit breaker box assembly. Open rear cover to access relay assembly.</li> <li>b. Inspect starter lockout relay 330-1 and relay harness connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</li> <li>c. Check starter lockout relay 330-1 and relay harness for dirt or moisture in or on connectors and for missing or damaged connector seals.</li> </ol> </li> <li>2. Place ignition switch in OFF position. Turn master battery switch OFF.               <ol style="list-style-type: none"> <li>a. Locate and remove 330-1 relay from relay socket.</li> <li>b. Measure resistance between terminals 85 and 86 on relay. Resistance should be 280-350 ohms.</li> </ol> </li> </ol>	<p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <ol style="list-style-type: none"> <li>a. If resistance is not as specified, replace relay (WP 0073 00).</li> <li>b. If resistance is as specified, notify SRA.</li> </ol>

330-1 RELAY



350-1366



**Table 4. Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure - Continued</b></p>	<p>3. Remove XK12 connector from relay board. Check resistance between XK12 connector pin 5 and X16 pin 1. Resistance should be less than 10 ohms.</p> <p>4. Disconnect 31-pin harness connector on left side of engine to rear of engine ECU. Measure resistance from pin 20 of 31-pin connector to X16 pin 1. Resistance should be less than 10 ohms.</p> <p>5. Ensure that ignition switch is in OFF position. Disconnect actuator harness connector from engine ECU (794).</p> <p>a. Inspect actuator harness and engine ECU connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check actuator harness and engine ECU for dirt or moisture in or on the connectors and for missing or damaged connector seals.</p> <p>6. Place ignition switch in OFF position, disconnect actuator harness from 31-pin connector, and disconnect actuator harness connector from engine ECU (794).</p>	<p>If resistance is not as specified, notify SRA.</p> <p>If resistance is not as specified, notify SRA.</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 4. Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure Troubleshooting Procedures - Continued.

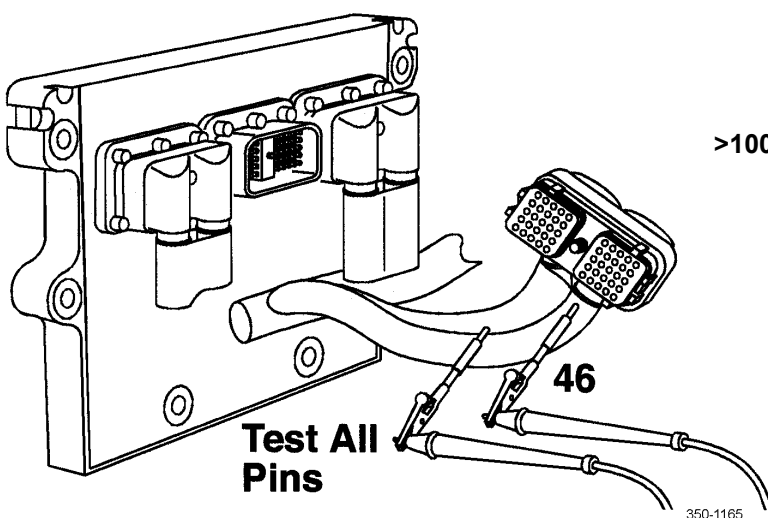
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure - Continued</b></p> <p><b>USE TEST LEAD KIT P/N 3822758</b></p> 	<p>7. Measure resistance from actuator harness connector pin 46 to all other pins in connector. Resistance should be greater than 100k ohms.</p> <p>8. Place ignition switch in OFF position, disconnect actuator harness from 31-pin connector, and disconnect actuator harness connector from engine ECU (794). Measure resistance from actuator harness connector pin 46 to engine block ground. Resistance should be greater than 100k ohms</p>	<p>If resistance is not as specified, notify SRA to repair or replace engine harness.</p> <p>If resistance is not as specified, notify SRA to repair or replace engine harness.</p>

Table 4. Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure Troubleshooting Procedures - Continued.

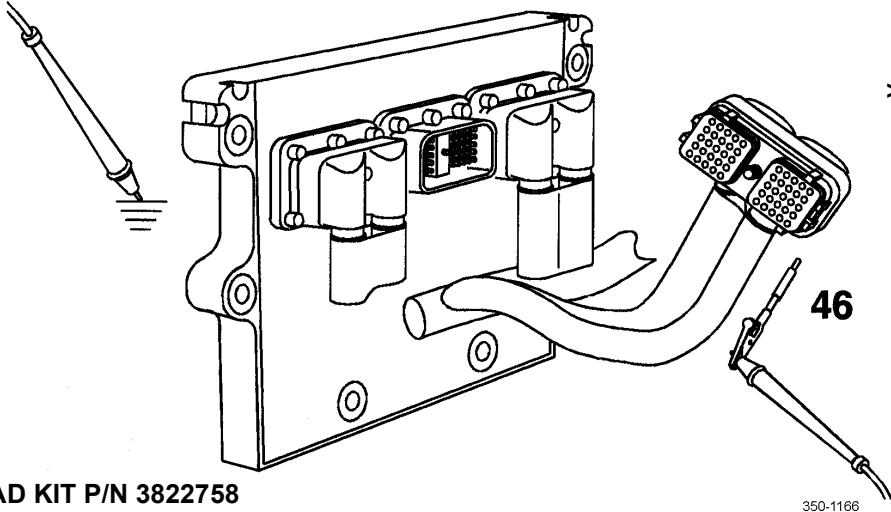
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure - Continued</p>  <p>USE TEST LEAD KIT P/N 3822758</p> <p>350-1166</p>	<p>9. Ensure that ignition switch is in OFF position. Disconnect actuator harness connector from 31-pin connector.</p> <p>a. Inspect actuator harness and 31-pin connectors for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check actuator harness and 31-pin connector for dirt or moisture in or on connectors and for missing or damaged connector seals.</p>	<p>&gt;100K OHMS</p> <p>Clean and repair connector(s) as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 4. Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure - Continued</b></p>	<p>10.Ensure that ignition switch is in OFF position. Disconnect actuator harness connector from 31-pin connector and disconnect XK12 connector from relay board.</p> <p>11.Measure resistance from pin 20 on harness side of 31-pin connector to all other pins in connector. Resistance should be greater than 100k ohms.</p> <div> <p style="text-align: center;"><b>Test All Pins</b></p> <p style="text-align: right;"><b>&gt;100K OHMS</b></p> <p style="text-align: center;"><b>20</b></p> <p>USE TEST LEAD KIT P/N 3822758</p> <p style="text-align: right;">350-1167</p> </div> <p>12.Ensure that ignition switch is in OFF position. Disconnect actuator harness connector from 31-pin connector and disconnect XK12 connector from relay board.</p>	<p>If resistance is not as specified, notify SRA to repair or replace engine harness.</p>

Table 4. Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure Troubleshooting Procedures - Continued.

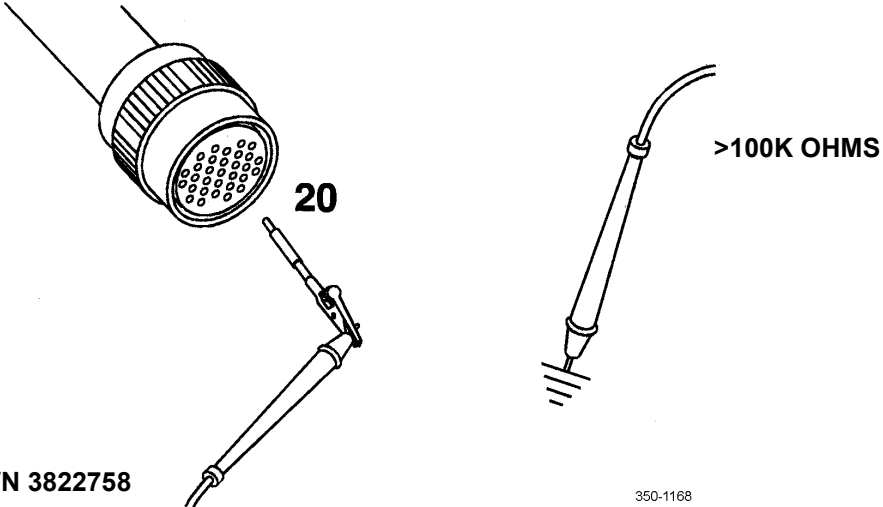
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1474 - Starter Solenoid Lockout Relay Driver Circuit Failure - Continued</b></p>  <p>USE TEST LEAD KIT P/N 3822758</p> <p>350-1168</p>	<p>13. Measure resistance from pin 20 on harness side of 31-pin connector to engine block ground. Resistance should be greater than 100k ohms.</p>	<p>If resistance is not as specified, notify SRA to repair or replace engine harness.</p>

Table 5. Error Code 1596 - Voltage Monitor, High Voltage Failure Troubleshooting Procedures.

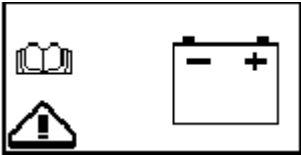
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1596 - Voltage Monitor, High Voltage Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check battery and alternator cable connections for loose connections and corrosion.</li> <li>2. Turn ignition switch to OFF position and measure battery voltage from positive (+) terminal to negative (-) terminal. Voltage should be at least 12V. Check each battery in system</li> </ol>	<p>Tighten battery connections and clean battery terminals as required.</p> <p>If voltage is not as required, charge or replace battery (WP 0107 00).</p>

Table 5. Error Code 1596 - Voltage Monitor, High Voltage Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1596 - Voltage Monitor, High Voltage Failure - Continued</b></p>	<p>3. Turn ignition switch to OFF position and measure battery voltage from positive (+) terminal to negative (-) terminal. Voltage should be +12V. Check voltage while trying to start engine. Voltage should be at least +6V during cranking. Check each battery in system.</p>	<p>If voltage is not as required, charge or replace battery (WP 0107 00).</p>
	<p>4. Place ignition switch in OFF position and install ammeter between alternator and battery. Perform the following to check charging rate of alternator.</p> <ol style="list-style-type: none"> <li>Check battery voltage at slave receptacle with engine off.</li> <li>Start engine and recheck voltage. Voltage should be slightly higher than voltage checked with engine off.</li> <li>Turn on lights. Check amperage reading on ammeter with engine on. Ammeter should have a positive (more or less) reading depending on charge of batteries.</li> </ol>	<p>If alternator is not charging properly, replace alternator (WP 0069 00).</p>

Table 5. Error Code 1596 - Voltage Monitor, High Voltage Failure Troubleshooting Procedures - Continued.

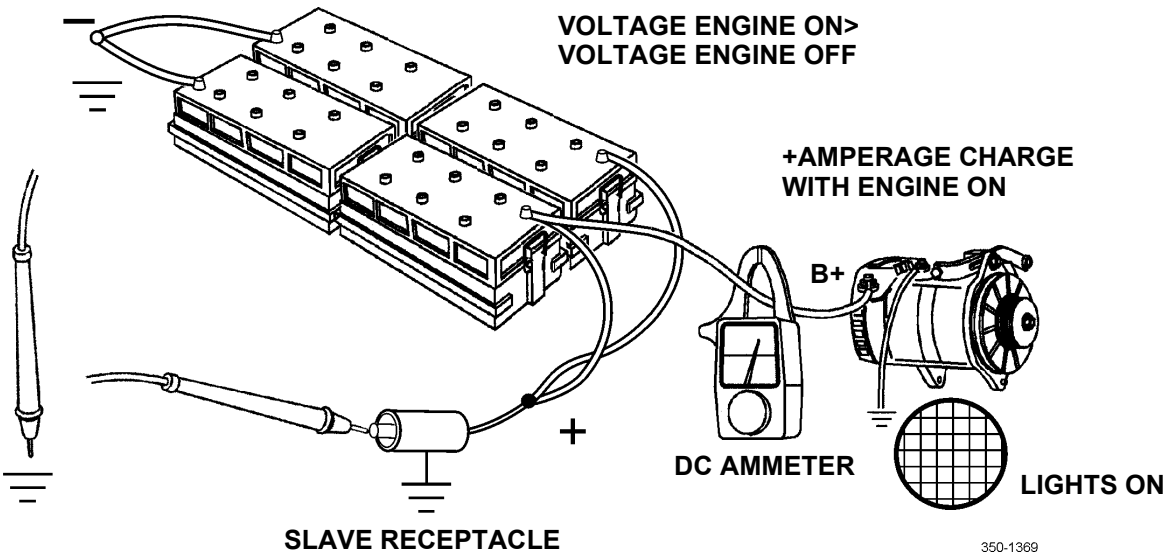
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1596 - Voltage Monitor, High Voltage Failure - Continued</p> 		

Table 6. Error Code 1597 - Voltage Monitor, Low Voltage Failure Troubleshooting Procedures.

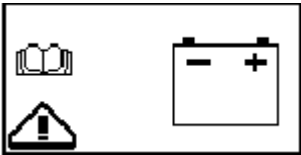
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1597 - Voltage Monitor, Low Voltage Failure</p> 	<ol style="list-style-type: none"> <li>1. Check battery and alternator cable connections for loose connections and corrosion.</li> <li>2. Turn ignition switch to OFF position and measure battery voltage from positive (+) terminal to negative (-) terminal. Voltage should be at least 12V. Check each battery in system.</li> </ol>	<p>Tighten battery connections and clean battery terminals as required.</p> <p>If voltage is not as required, charge or replace battery (WP 0107 00).</p>

Table 6. Error Code 1597 - Voltage Monitor, Low Voltage Failure Troubleshooting Procedures.

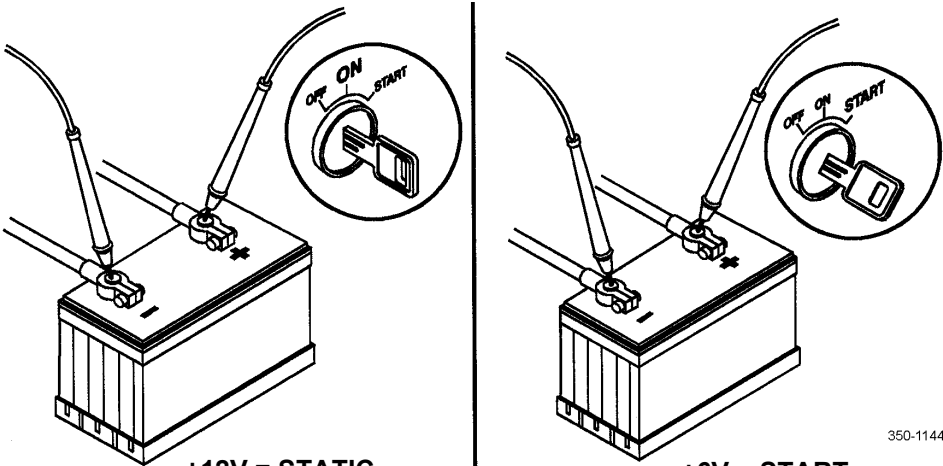
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1597 - Voltage Monitor, Low Voltage Failure - Continued</b></p>	<p>3. Turn ignition switch to OFF position and measure battery voltage from positive (+) terminal to negative (-) terminal. Voltage should be +12V. Check voltage while trying to start engine. Voltage should be at least +6V during cranking. Check each battery in system.</p>	<p>If voltage is not as required, charge or replace battery (WP 0107 00).</p>
 <p style="text-align: right; margin-right: 100px;">350-1144</p>		
	<p>4. Place ignition switch in OFF position and install ammeter between alternator and battery. Perform the following to check charging rate of alternator.</p> <ol style="list-style-type: none"> <li>a. Check battery voltage at slave receptacle with engine off.</li> <li>b. Start engine and recheck voltage. Voltage should be slightly higher than voltage checked with engine off.</li> <li>c. Turn on lights. Check amperage reading on ammeter with engine on. Ammeter should have a positive (more or less) reading depending on charge of batteries.</li> </ol>	<p>If alternator is not charging properly, replace alternator (WP 0069 00).</p>



Table 6. Error Code 1597 - Voltage Monitor, Low Voltage Failure Troubleshooting Procedures - Continued.

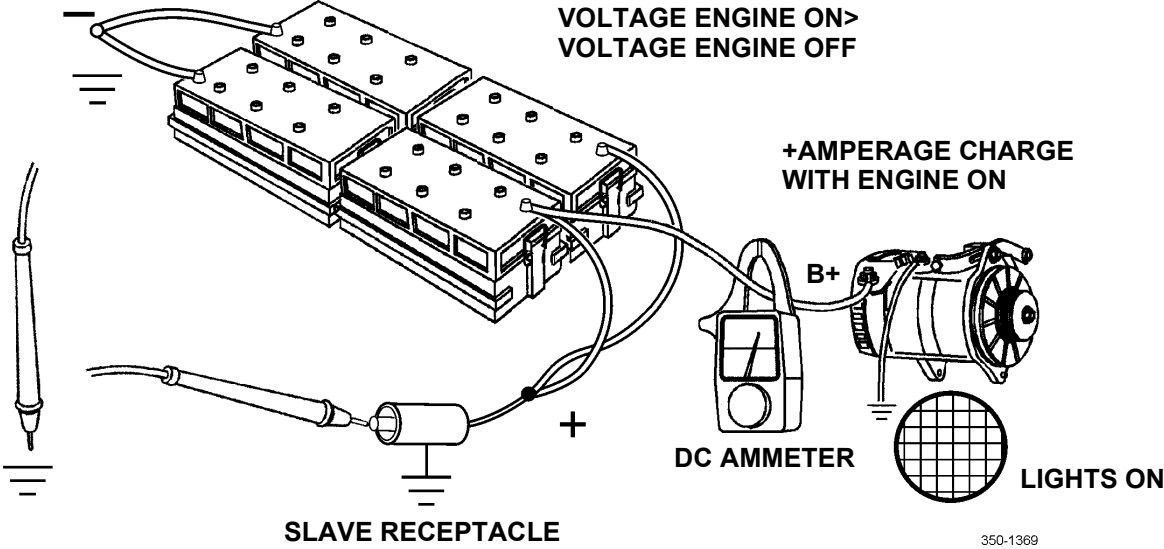
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1597 - Voltage Monitor, Low Voltage Failure - Continued</p> 	<p>5. Ensure that ignition switch is in OFF position. Disconnect OEM harness from engine ECU.</p> <p>a. Inspect battery power connector on both battery side and harness side for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check battery power connector on both the battery side and harness side for dirt or moisture in or on the connectors and for missing or damaged connector seals.</p>	<p>Clean and repair connector as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p>

Table 6. Error Code 1597 - Voltage Monitor, Low Voltage Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1597 - Voltage Monitor, Low Voltage Failure - Continued</b></p>	<p>6. Place ignition switch in OFF position and disconnect OEM harness from engine ECU (794). Perform the following resistance checks.</p> <ul style="list-style-type: none"> <li>a. Measure resistance from harness connector pin 7 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> <li>b. Measure resistance from harness connector pin 8 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> <li>c. Measure resistance from harness connector pin 17 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> <li>d. Measure resistance from harness connector pin 18 to positive (+) battery terminal. Resistance should be less than 10 ohms.</li> </ul>	<p>If resistance is not as specified, replace battery cables (WP 0108 00).</p>

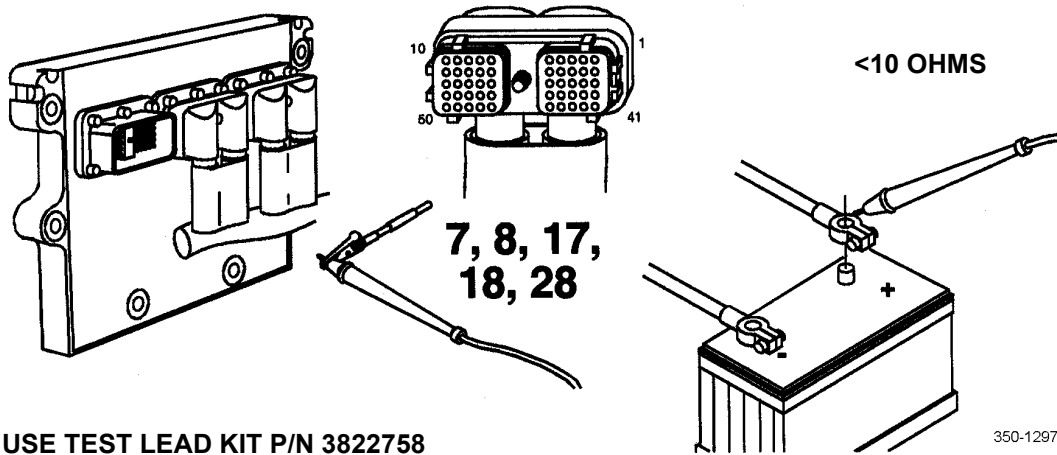


Table 6. Error Code 1597 - Voltage Monitor, Low Voltage Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1597 - Voltage Monitor, Low Voltage Failure - Continued</b></p>	<p>e. Measure resistance from harness connector pin 28 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p> <p>7. Place ignition switch in OFF position. Disconnect OEM harness connector from engine ECU (794). Turn off circuit breakers 51-F4 and 51-F5. Perform the following resistance checks.</p> <p>a. Measure resistance from harness connector pin 7 to all other pins in OEM connector.</p> <p>b. Measure resistance from harness connector pin 8 to all other pins in OEM connector.</p> <p>c. Measure resistance from harness connector pin 17 to all other pins in OEM connector.</p>	<p>c. If resistance is not as specified, notify SRA to repair or replace harness.</p>

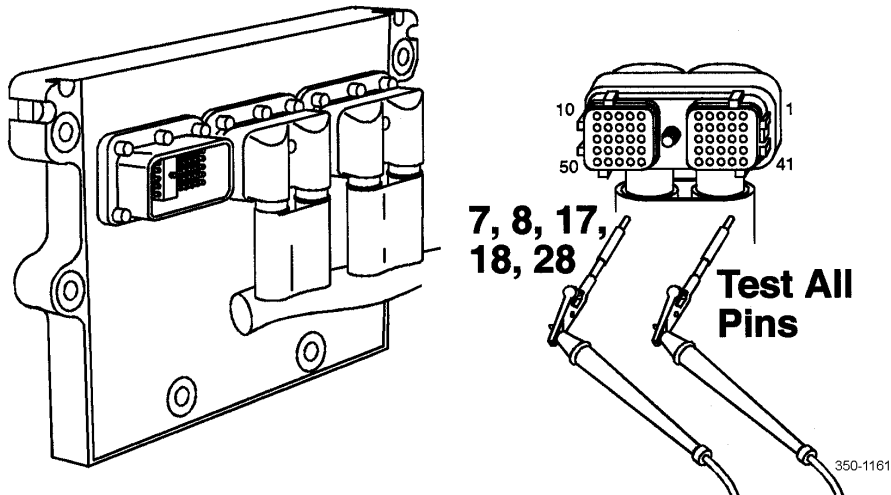


Table 6. Error Code 1597 - Voltage Monitor, Low Voltage Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1597 - Voltage Monitor, Low Voltage Failure - Continued</b></p>	<p>d. Measure resistance from harness connector pin 18 to all other pins in OEM connector.</p> <p>e. Measure resistance from harness connector pin 28 to all other pins in OEM connector.</p>	

Table 7. Error Code 1598 - Voltage Monitor, Very Low Voltage Failure Troubleshooting Procedures.

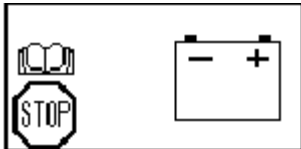
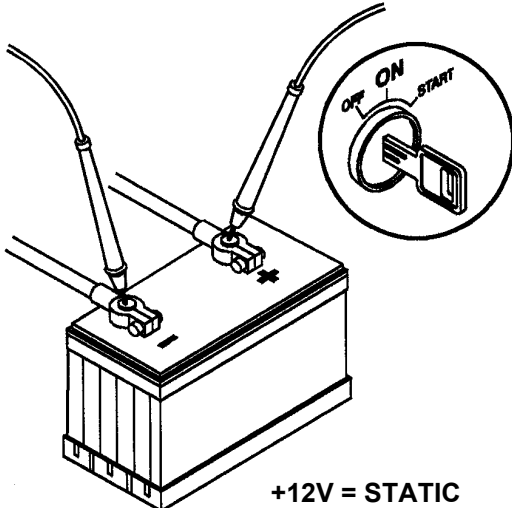
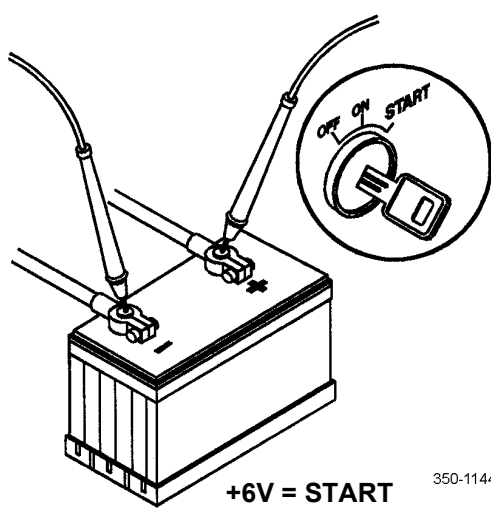
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1598 - Voltage Monitor, Very Low Voltage Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check battery and alternator cable connections for loose connections and corrosion.</li> <li>2. Turn ignition switch to OFF position and measure battery voltage from positive (+) terminal to negative (-) terminal. Voltage should be at least 12V. Check each battery in system.</li> </ol>	<p>Tighten battery connections and clean battery terminals as required.</p> <p>If voltage is not as required, charge or replace battery (WP 0107 00).</p>
 <p style="text-align: center;"><b>+12V = STATIC</b></p>		
 <p style="text-align: center;"><b>+6V = START</b></p> <p style="text-align: right;">350-1144</p>		

Table 7. Error Code 1598 - Voltage Monitor, Very Low Voltage Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1598 - Voltage Monitor, Very Low Voltage Failure - Continued</b></p>	<p>3. Turn ignition switch to OFF position and measure battery voltage from positive (+) terminal to negative (-) terminal. Voltage should be +12V. Check voltage while trying to start engine. Voltage should be at least +6V during cranking. Check each battery in same way.</p> <p>4. Place ignition switch in OFF position. Install an ammeter between alternator and battery. Perform the following steps to check charging rate of alternator:</p> <ul style="list-style-type: none"> <li>a. Check battery voltage at slave receptacle with engine off.</li> <li>b. Start engine and recheck voltage. Voltage should be slightly higher than voltage checked with engine off.</li> <li>c. Turn on lights. Check amperage reading on ammeter with engine on. Ammeter should have a positive (more or less) reading depending on charge of batteries.</li> </ul>	<p>If voltage is not as specified, service or replace battery (WP 0107 00).</p> <p>If alternator is not charging properly, replace alternator (WP 0069 00).</p>

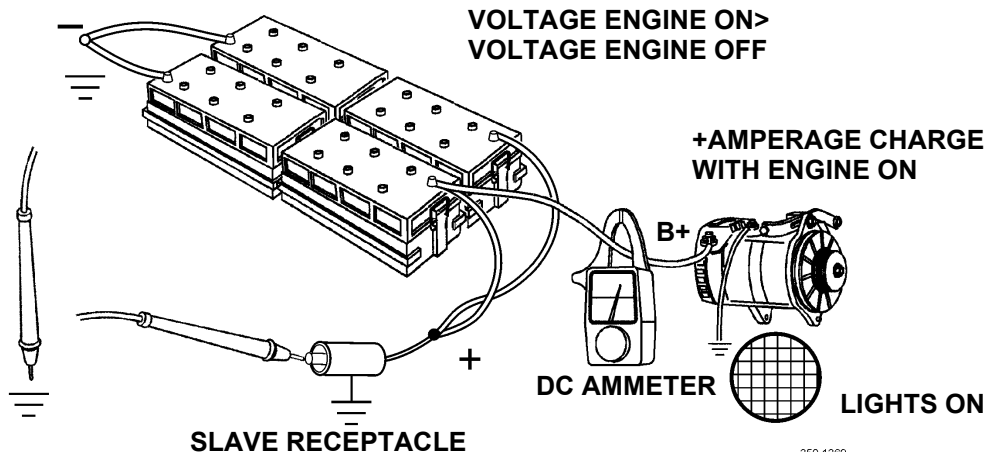


Table 7. Error Code 1598 - Voltage Monitor, Very Low Voltage Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1598 - Voltage Monitor, Very Low Voltage Failure - Continued</b></p>	<p>5. Ensure that ignition switch is in OFF position. Turn off circuit breakers 51-F4 and 51-F5. Disconnect OEM harness from engine ECU.</p> <p>a. Inspect OEM harness connector on ECU side and harness side for dirty, corroded, bent, broken, and pushed back or extended pins.</p> <p>b. Check for dirt or moisture in or on connectors and for missing or damaged connector seals.</p> <p>6. Place ignition switch in OFF position and disconnect OEM harness from engine ECU (794). Perform the following resistance checks.</p> <p>a. Measure resistance from harness connector pin 7 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p> <p>b. Measure resistance from harness connector pin 8 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p> <p>c. Measure resistance from harness connector pin 17 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p>	<p>Clean and repair connector as required (WP 0111 00).</p> <p>Remove dirt and moisture from connector. Replace missing or damaged connector seals (WP 0111 00).</p> <p>If resistance is not as specified, replace battery cables (WP 0108 00).</p>

Table 7. Error Code 1598 - Voltage Monitor, Very Low Voltage Failure Troubleshooting Procedures - Continued.

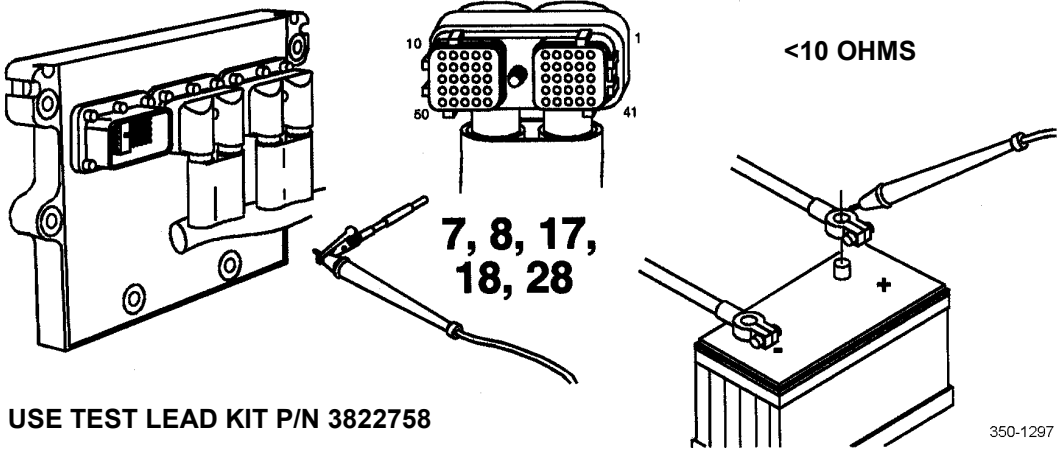
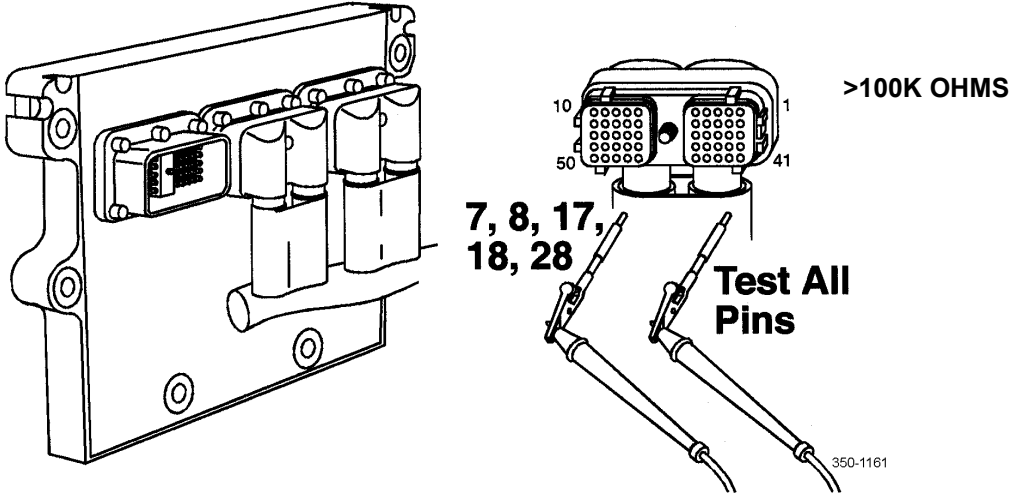
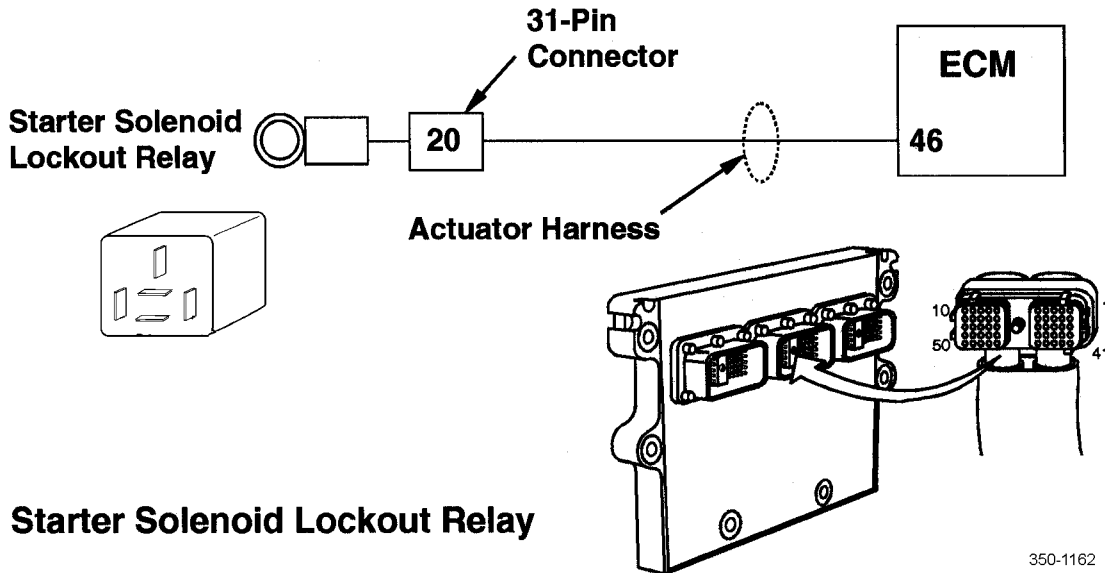
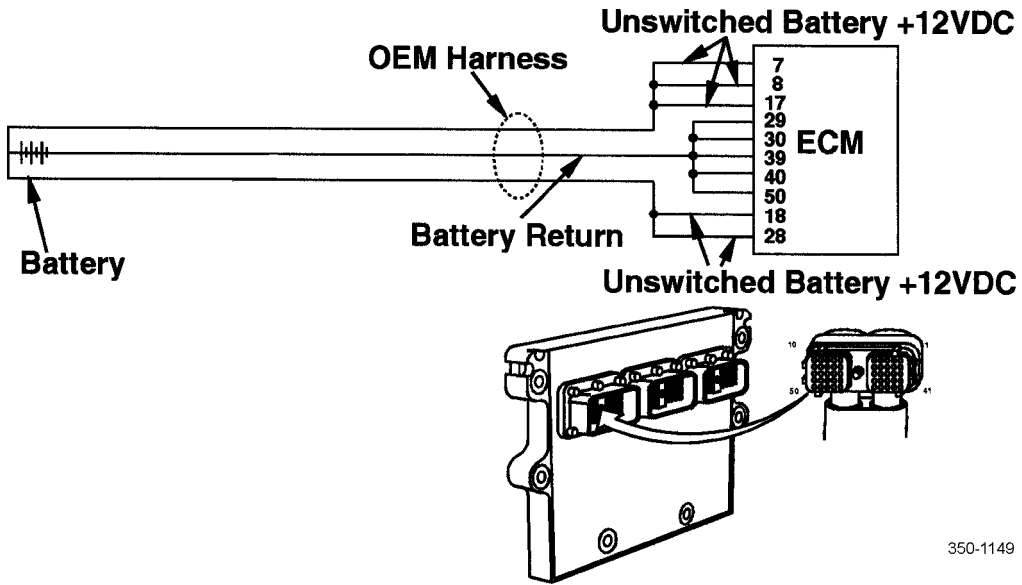
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1598 - Voltage Monitor, Very Low Voltage Failure - Continued</b></p>  <p><b>USE TEST LEAD KIT P/N 3822758</b></p>	<p>d. Measure resistance from harness connector pin 18 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p> <p>e. Measure resistance from harness connector pin 28 to positive (+) battery terminal. Resistance should be less than 10 ohms.</p> <p>7. Place ignition switch in OFF position. Disconnect OEM harness connector from engine ECU (794). Turn off circuit breakers 51-F4 and 51-F5. Perform the following resistance checks. Resistance should be greater than 100k ohms.</p> <p>a. Measure resistance from harness connector pin 7 to all other pins in connector.</p> <p>b. Measure resistance from harness connector pin 8 to all other pins in connector.</p>	<p>a. If resistance is not as specified, repair connectors (WP 0111 00).</p> <p>b. If harness cannot be repaired, notify SRA to replace harness.</p>

Table 7. Error Code 1598 - Voltage Monitor, Very Low Voltage Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 1598 - Voltage Monitor, Very Low Voltage Failure - Continued</p>  <p><b>NOTE: PINS 7, 8, 17, 18, and 28 SHOULD HAVE CONTINUITY BETWEEN THEM</b></p>	<ul style="list-style-type: none"> <li>c. Measure resistance from harness connector pin 17 to all other pins in connector.</li> <li>d. Measure resistance from harness connector pin 18 to all other pins in connector.</li> <li>e. Measure resistance from harness connector pin 28 to all other pins in connector.</li> </ul>	





END OF WORK PACKAGE

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**THIS WORK PACKAGE COVERS**

Error Code 637 - Transmission Sump Temperature Sensor Failure, Open Circuit or Short Circuit to Battery

Error Code 638 - Transmission Sump Temperature Sensor Failure, Short Circuit to Chassis

Error Code 639 - Converter Output Temperature Sensor Failure, Open Circuit or Short Circuit to Battery

Error Code 640 - Converter Output Temperature Sensor Failure, Short Circuit to Chassis

Error Code 783 - Sump Temperature Critical Threshold [212°F (100°C)] Failure

Error Code 795 - Converter Output Temperature Critical Threshold [248°F (120°C)] Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10  
 LO 10-3930-675-12  
 ECU Transmission (A34650.0200) (WP 0199 00-12)


**Equipment Condition**

Cab moved to transport position (TM 10-3930-675-10)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

**Table 1. Error Code 637 - Transmission Sump Temperature Sensor Failure, Open Circuit or Short Circuit to Battery Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 637 - Transmission Sump Temperature Sensor Failure, Open Circuit or Short Circuit to Battery</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p>

**Table 1. Error Code 637 - Transmission Sump Temperature Sensor Failure, Open Circuit or Short Circuit to Battery Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 637 - Transmission Sump Temperature Sensor Failure, Open Circuit or Short Circuit to Battery - Continued</b></p>	<p>4. Check transmission electrical harness connector 827 located on top of transmission for proper connection.</p> <p>5. Check continuity between connector 827 pin 8 and connector X172 pin 8 and between connector 827 pin 9 and connector X172 pin 9.</p> <p>6. Disconnect transmission ECU connector.</p> <p>7. Check continuity between transmission ECU connector pin 39 and connector X172 pin 8 and between transmission ECU connector pin 46 and connector X172 pin 9.</p>	<p>Connect loose or disconnected connectors.</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>c. If continuity is present, notify SRA.</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>c. If continuity is present, notify SRA.</p>

**Table 2. Error Code 638 - Transmission Sump Temperature Sensor Failure, Short Circuit to Chassis Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 638 - Transmission Sump Temperature Sensor Failure, Short Circuit to Chassis</b></p> 	<p>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</p> <p>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</p> <p>3. Move operator's cab to transport position and remove transmission access covers (WP 0135 00).</p>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p>

Table 2. Error Code 638 - Transmission Sump Temperature Sensor Failure, Short Circuit to Chassis Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 638 - Transmission Sump Temperature Sensor Failure, Short Circuit to Chassis - Continued</b></p>	<ol style="list-style-type: none"> <li>4. Check transmission electrical harness connector 827 located on top of transmission for proper connection.</li> <li>5. Disconnect connector 827, connector X172, and connector on transmission ECU.</li> <li>6. Check continuity to chassis at connector 827 pin 8, connector X172 pin 8, connector 827 pin 9, and connector X172 pin 9.</li> </ol>	<p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> <li>c. If continuity is not present, notify SRA.</li> </ol>

Table 3. Error Code 639 - Converter Output Temperature Sensor Failure, Open Circuit or Short Circuit to Battery Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 639 - Converter Output Temperature Sensor Failure, Open Circuit or Short Circuit to Battery</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 766 located on top right side of transmission for proper connection.</li> <li>5. Check continuity between connector 766 pin 1 and connector X172 pin 12 and between connector 766 pin 2 and connector X172 pin 13.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol>

Table 3. Error Code 639 - Converter Output Temperature Sensor Failure, Open Circuit or Short Circuit to Battery Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 639 - Converter Output Temperature Sensor Failure, Open Circuit or Short Circuit to Battery - Continued</b></p>	<p>6. Disconnect transmission temperature sensor connector from transmission ECU.</p> <p>7. Check continuity between transmission ECU connector pin 49 and connector X172 pin 12 and between transmission ECU connector pin 46 and connector X172 pin 3.</p> <p>8. Disconnect transmission sensor connector from transmission sensor.</p> <p>9. Perform internal resistance check of temperature sensor. Resistance should be 800-1500 ohms.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>If resistance is not as specified, replace temperature sensor (WP 0095 00).</p>

Table 4. Error Code 640 - Converter Output Temperature Sensor Failure, Short Circuit to Chassis Troubleshooting Procedures.



MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 640 - Converter Output Temperature Sensor Failure, Short Circuit to Chassis</b></p> 	<p>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</p> <p>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</p> <p>3. Move operator's cab to transport position and remove transmission access covers (WP 0135 00).</p> <p>4. Check transmission electrical harness connector 766 located on top right side of transmission for proper connection.</p>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p>

Table 4. Error Code 640 - Converter Output Temperature Sensor Failure, Short Circuit to Chassis Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 640 - Converter Output Temperature Sensor Failure, Short Circuit to Chassis - Continued</b>	5. Disconnect connector 766, connector X172, and connector on transmission ECU.  6. Check continuity to chassis at connector 766 pin 1, connector X172 pin 12, connector 766 pin 2, and connector X172 pin 13.  7. Perform internal resistance check on temperature sensor. Resistance should be 800-1500 ohm.  8. Perform continuity check between temperature sensor pin 1 and pin 2 and chassis.	a. If continuity is present, repair or replace connectors (WP 0111 00). b. If wiring harness must be replaced, notify SRA.  If resistance is not as specified, replace temperature sensor (WP 0095 00).  If continuity is present, replace temperature sensor (WP 0095 00).


Table 5. Error Code 783 - Sump Temperature Critical Threshold [212°F (100°C)] Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 783 - Sump Temperature Critical Threshold [212°F (100°C)] Failure</b>  	1. Allow engine and transmission to cool.  2. Check coolant level (TM 10-3930-675-10).  3. Check radiator top and side grille for mud, snow or obstructions.  4. Check loose coolant hoses and clamps.  5. With engine idling, transmission selector lever in N (Neutral) position, parking brake applied, and engine at operating temperature, check transmission fluid level (TM 10-3930-675-10).	Add coolant as required (TM 10-3930-675-10).  Clear obstructions.  Tighten or replace as required (WP 0064 00 and WP 0113 00).  Add transmission fluid as required (LO 10-3930-675-12).

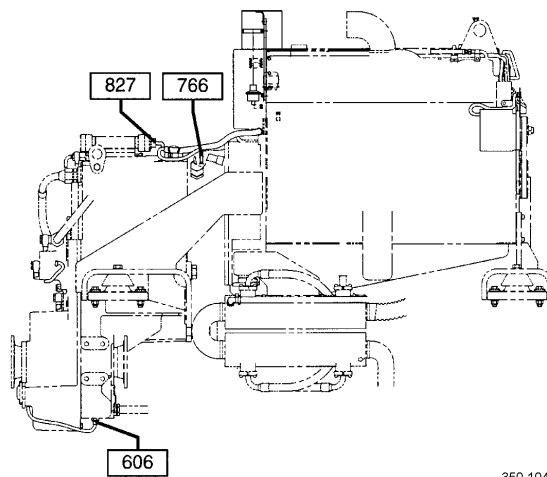
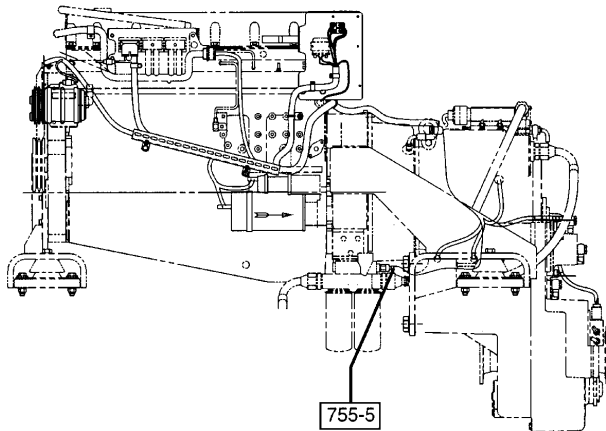
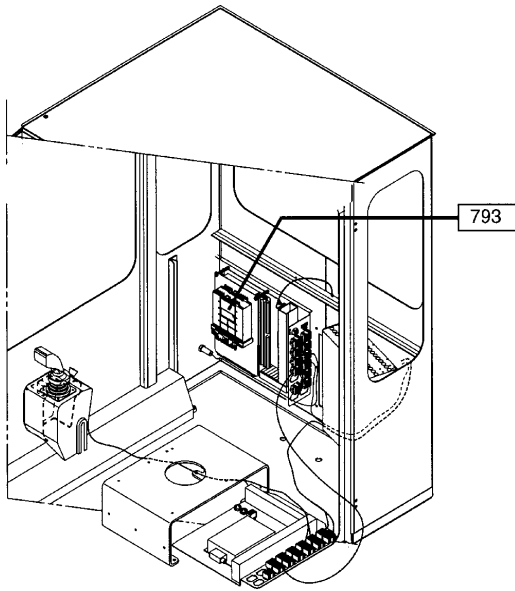
**Table 5. Error Code 783 - Sump Temperature Critical Threshold [212°F (100°C)] Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 783 - Sump Temperature Critical Threshold [212°F (100°C)] Failure - Continued</b>	6. Enter “DIAG EXTRA FUNCT” 4 (13) menu and check water level sensor setting. Enter “1” shut off and “0” to run cooling fan. Check if fording water level sensor is clogged or damaged.	a. Clean and/or replace fording water level sensor (WP 0090 00). a. If problem continues, notify SRA.

**Table 6. Error Code 795 - Converter Output Temperature Critical Threshold [248°F (120°C) ] Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 795 - Converter Output Temperature Critical Threshold [248°F (120°C)] Failure</b>  	<ol style="list-style-type: none"> <li>1. Allow engine and transmission to cool.</li> <li>2. Check coolant level (TM 10-3930-675-10).</li> <li>3. Check radiator top and side grille for mud, snow or obstructions.</li> <li>4. Check loose coolant hoses and clamps.</li> <li>5. With engine idling, transmission selector lever in N (Neutral) position, parking brake applied, and engine at operating temperature, check transmission fluid level (TM 10-3930-675-10).</li> <li>6. Enter “DIAG EXTRA FUNCT” 4 (13) menu and check water level sensor setting. Enter “1” shut off and “0” to run cooling fan. Check if fording water level sensor is clogged or damaged.</li> </ol>	<p>Add coolant as required (TM 10-3930-675-10).</p> <p>Clear obstructions.</p> <p>Tighten or replace as required (WP 0064 00 and WP 0113 00).</p> <p>Add transmission fluid as required (LO 10-3930-675-12).</p> <p>a. Clean and/or replace fording water level sensor (WP 0090 00).                      a. If problem continues, notify SRA.</p>





350-1041

END OF WORK PACKAGE

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**TRANSMISSION SPEED SENSORS TROUBLESHOOTING**

**0027 00**

**THIS WORK PACKAGE COVERS**

Error Code 649 - Engine Speed Sensor Failure, Open Circuit or Short Circuit to Battery

Error Code 650 - Engine Speed Sensor Failure, Short Circuit to Chassis

Error Code 651 - Engine Speed Sensor Failure, Logical Error

Error Code 652 - Turbine Speed Sensor Failure, Open Circuit or Short Circuit to Battery

Error Code 653 - Turbine Speed Sensor Failure, Short Circuit to Chassis

Error Code 654 - Turbine Speed Sensor Failure, Logical Error

Error Code 655 - Internal Speed Sensor Failure, Open Circuit or Short Circuit to Battery

Error Code 656 - Internal Speed Sensor Failure, Short Circuit to Chassis

Error Code 657 - Internal Speed Sensor Failure, Logical Error

Error Code 658 - Output Speed Sensor Failure, Open Circuit or Short Circuit to Battery

Error Code 659 - Output Speed Sensor Failure, Short Circuit to Chassis

Error Code 660 - Output Speed Sensor Failure, Logical Error

Error Code 662 - Output Speed Sensor Failure, Logical Speed Error

**INITIAL SETUP**

**References**


TM 10-3930-675-10

ECU Transmission (A34650.0200) (WP 0199 00-12)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

**Table 1. Error Code 649 - Engine Speed Sensor Failure, Open Circuit or Short Circuit to Battery Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 649 - Engine Speed Sensor Failure, Open Circuit or Short Circuit to Battery</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connection block X173 for proper connections.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p>

**Table 1. Error Code 649 - Engine Speed Sensor Failure, Open Circuit or Short Circuit to Battery Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 649 - Engine Speed Sensor Failure, Open Circuit or Short Circuit to Battery - Continued</b></p>	<ol style="list-style-type: none"> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 761 located on right side of transmission at engine speed sensor for proper connection.</li> <li>5. Check continuity between connector 761 pin 1 and connector X173 pin 4 and between connector 761 pin 2 and connector X173 pin 5.</li> <li>6. Disconnect connector on transmission ECU connector.</li> <li>7. Check continuity between transmission ECU connector pin 19 and connector X173 pin 4 and between transmission ECU connector pin 3 and connector X173 pin 5.</li> <li>8. If continuity was present in either steps 5 or 7, disconnect transmission speed sensor connector 761 and perform an internal resistance check of engine speed sensor. Resistance should be 1050 +/- 100 ohms.</li> </ol>	<p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <p>If resistance is not as specified, replace engine speed sensor (WP 0095 00).</p>

Table 2. Error Code 650 - Engine Speed Sensor Failure, Short Circuit to Chassis Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 650 - Engine Speed Sensor Failure, Short Circuit to Chassis</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connection block X173 for proper connections.</li> <li>3. Move operator's cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 761 at engine speed sensor for proper connection.</li> <li>5. Disconnect connector 761, connector X173, and transmission ECU connector.</li> <li>6. Check continuity to chassis at between connector 761 pin 1, connector X173 pin 4, connector 761 pin 2, and connector X173 pin 5.</li> <li>7. Disconnect engine speed sensor connector 761.</li> <li>8. Perform an internal resistance check of engine speed sensor. Resistance should be 1050 +/- 100 ohms.</li> <li>9. Perform continuity check between engine speed sensor pin 1 and pin 2 and chassis.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <p>If resistance is not as specified, replace engine speed sensor (WP 0095 00).</p> <p>If continuity is present, replace engine speed sensor (WP 0095 00).</p>

Table 3. Error Code 651 - Engine Speed Sensor Failure, Logical Error Troubleshooting Procedures.



MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 651 - Engine Speed Sensor Failure, Logical Error</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>If error code is still present, perform troubleshooting procedures for error code 649.</p>


Table 4. Error Code 652 - Turbine Speed Sensor Failure, Open Circuit or Short Circuit to Battery Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 652 - Turbine Speed Sensor Failure, Open Circuit or Short Circuit to Battery</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X173 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 751 for proper connection at turbine speed sensor.</li> <li>5. Check continuity between connector 751 pin 7 and connector X173 pin 6 and between connector 751 pin 8 and connector X173 pin 7.</li> <li>6. Disconnect transmission temperature sensor connector from transmission ECU.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol>

**Table 4. Error Code 652 - Turbine Speed Sensor Failure, Open Circuit or Short Circuit to Battery Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 652 - Turbine Speed Sensor Failure, Open Circuit or Short Circuit to Battery - Continued</b></p>	<p>7. Check continuity between transmission ECU connector pin 41 and connector X173 pin 6 and between transmission ECU connector pin 3 and connector X173 pin 5.</p> <p>8. Disconnect transmission turbine speed sensor connector 751 and perform internal resistance check of engine speed sensor. Resistance should be 1050 +/- 100 ohms.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>If resistance is not as specified, replace turbine speed sensor (WP 0095 00).</p>

**Table 5. Error Code 653 - Turbine Speed Sensor Failure, Short Circuit to Chassis Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 653 - Turbine Speed Sensor Failure, Short Circuit to Chassis</b></p> 	<p>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</p> <p>2. Remove cab rear wall center panel cover and check connector X173 for proper connections.</p> <p>3. Move operator's cab to transport position and remove transmission access covers (WP 0135 00).</p> <p>4. Check transmission electrical harness connector 751 for proper connection at turbine speed sensor.</p>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p>

**ERROR CODE 653 - TURBINE SPEED SENSOR FAILURE, SHORT CIRCUIT TO CHASSIS - CONTINUED**

**Table 5. Error Code 653 - Turbine Speed Sensor Failure, Short Circuit to Chassis Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 653 - Turbine Speed Sensor Failure, Short Circuit to Chassis - Continued</b></p>	<p>5. Disconnect connector 751, connector X173, and connector on transmission ECU.</p> <p>6. Check for continuity to chassis at connector 751 pin 7, connector X173 pin 6, connector 751 pin 8, and connector X173 pin 7.</p> <p>7. Perform internal resistance check on turbine speed sensor. Resistance should be 1050 +/- 100 ohms.</p> <p>8. Perform continuity check between turbine speed sensor pin 1 and pin 2 and chassis.</p>	<p>a. If continuity is present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>If resistance is not as specified, replace turbine speed sensor (WP 0095 00).</p> <p>If continuity is present, replace turbine speed sensor (WP 0095 00).</p>

**Table 6. Error Code 654 - Turbine Speed Sensor Failure, Logical Error Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 654 - Turbine Speed Sensor Failure, Logical Error</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>If error code is still present, perform troubleshooting procedures for error code 652.</p>



Table 7. Error Code 655 - Internal Speed Sensor Failure, Open Circuit or Short Circuit to Battery Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 655 - Internal Speed Sensor Failure, Open Circuit or Short Circuit to Battery</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X173 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 752 for proper connection at internal speed sensor.</li> <li>5. Check continuity between connector 752 pin 1 and connector X173 pin 8 and between connector 752 pin 2 and connector X173 pin 9.</li> <li>6. Disconnect connector from transmission ECU.</li> <li>7. Check continuity between transmission ECU connector pin 42 and connector X173 pin 8 and between transmission ECU connector pin 3 and connector X173 pin 5.</li> <li>8. Disconnect transmission internal speed sensor connector 752 and perform internal resistance check of internal speed sensor. Resistance should be 1050 +/- 100 ohms.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <p>If resistance is not as specified, replace internal speed sensor (WP 0095 00).</p>

Table 8. Error Code 656 - Internal Speed Sensor Failure, Short Circuit to Chassis Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 656 - Internal Speed Sensor Failure, Short Circuit to Chassis</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X173 for proper connections.</li> <li>3. Move operator's cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 752 for proper connection at internal speed sensor.</li> <li>5. Disconnect connector 752, connector X173, and connector on transmission ECU.</li> <li>6. Check for continuity to chassis at connector 752 pin 1, connector X173 pin 8, connector 752 pin 2, and connector X173 pin 9.</li> <li>7. Perform internal resistance check on internal speed sensor. Resistance should be 1050 +/- 100 ohms.</li> <li>8. Perform continuity check between internal speed sensor pin 1 and pin 2 and chassis.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <p>If resistance is not as specified, replace internal speed sensor (WP 0095 00).</p> <p>If continuity is present, replace internal speed sensor (WP 0095 00).</p>

Table 9. Error Code 657 - Internal Speed Sensor Failure, Logical Error Troubleshooting Procedures.



MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 657 - Internal Speed Sensor Failure, Logical Error</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>If error code is still present, perform troubleshooting procedures for error code 655.</p>


Table 10. Error Code 658 - Output Speed Sensor Failure, Open Circuit or Short Circuit to Battery Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 658 - Output Speed Sensor Failure, Open Circuit or Short Circuit to Battery</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X173 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 760 for proper connection at output speed sensor.</li> <li>5. Check continuity between connector 760 pin 1 and connector X173 pin 1 and between connector 760 pin 2 and connector X173 pin 2.</li> <li>6. Disconnect connector from transmission ECU.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol>

**Table 10. Error Code 658 - Output Speed Sensor Failure, Open Circuit or Short Circuit to Battery Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 658 - Output Speed Sensor Failure, Open Circuit or Short Circuit to Battery - Continued</b></p>	<p>7. Check continuity between transmission ECU connector pin 4 and connector X173 pin 1 and between transmission ECU connector pin 62 and connector X173 pin 2.</p> <p>8. Check voltage at connector 760 pin 3, connector X173 pin 3, and connector X174 pin 2. Voltage should be 20-25V.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>a. If voltage is as specified, replace output speed sensor (WP 0095 00).</p> <p>b. If voltage is not as specified, repair or replace connectors (WP 0111 00).</p> <p>c. If wiring harness must be replaced, notify SRA.</p>


**Table 11. Error Code 659 - Output Speed Sensor Failure, Short Circuit to Chassis Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 659 - Output Speed Sensor Failure, Short Circuit to Chassis</b></p> 	<p>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</p> <p>2. Remove cab rear wall center panel cover and check connector X173 for proper connections.</p> <p>3. Move operator's cab to transport position and remove transmission access covers (WP 0135 00).</p> <p>4. Check transmission electrical harness connector 760 for proper connection at output speed sensor.</p>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p>


**Table 11. Error Code 659 - Output Speed Sensor Failure, Short Circuit to Chassis Troubleshooting Procedures - Continued.**

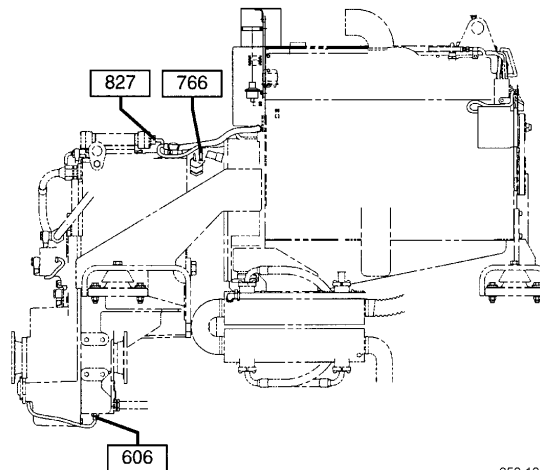
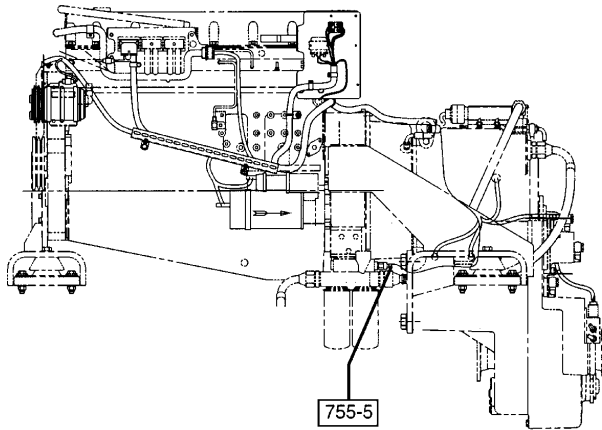
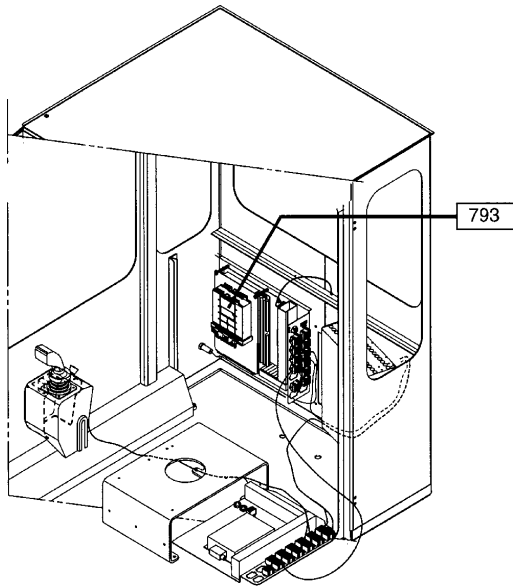
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 659 - Output Speed Sensor Failure, Short Circuit to Chassis - Continued</b></p>	<p>5. Disconnect connector 760, connector X173, and connector on transmission ECU.</p> <p>6. Check for continuity to chassis at connector 760 pin 1, connector X173 pin 1, connector 760 pin 2, and connector X173 pin 2.</p>	<p>a. If continuity is present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>c. If continuity is not present, replace output speed sensor (WP 0095 00).</p>

**Table 12. Error Code 660 - Output Speed Sensor Failure, Logical Error Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 660 - Output Speed Sensor Failure, Logical Error</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>If error code is still present, perform troubleshooting procedures for error code 658.</p>

**Table 13. Error Code 662 - Output Speed Sensor Failure, Logical Speed Error Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 662 - Output Speed Sensor Failure, Logical Speed Error</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>If error code is still present, perform troubleshooting procedures for error code 652, error code 655, and/or error code 658.</p>



350-1041

END OF WORK PACKAGE

**THIS WORK PACKAGE COVERS**

- Error Code 713 - Clutch K1 Short Circuit to Battery Failure
- Error Code 714 - Clutch K1 Short Circuit to Chassis Failure
- Error Code 715 - Clutch K1 Open Circuit Failure
- Error Code 716 - Clutch K2 Short Circuit to Battery Failure
- Error Code 717 - Clutch K2 Short Circuit to Chassis Failure
- Error Code 718 - Clutch K2 Open Circuit Failure
- Error Code 719 - Clutch K3 Short Circuit to Battery Failure
- Error Code 720 - Clutch K3 Short Circuit to Chassis Failure
- Error Code 721 - Clutch K3 Open Circuit Failure

- Error Code 729 - Clutch K4 Short Circuit to Battery Failure
- Error Code 730 - Clutch K4 Short Circuit to Chassis Failure
- Error Code 731 - Clutch K4 Open Circuit Failure
- Error Code 732 - Clutch KV Short Circuit to Battery Failure
- Error Code 733 - Clutch KV Short Circuit to Chassis Failure
- Error Code 734 - Clutch KV Open Circuit Failure
- Error Code 735 - Clutch KR Short Circuit to Battery Failure
- Error Code 736 - Clutch KR Short Circuit to Chassis Failure
- Error Code 737 - Clutch KR Open Circuit Failure

**INITIAL SETUP**

**References**

- TM 10-3930-675-10
- ECU Transmission (A34650.0200) (WP 0199 00-12)

**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

**Table 1. Error Code 713 - Clutch K1 Short Circuit to Battery Failure Troubleshooting Procedures.**

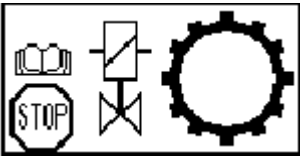
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 713 - Clutch K1 Short Circuit to Battery Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p>

Table 1. Error Code 713 - Clutch K1 Short Circuit to Battery Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 713 - Clutch K1 Short Circuit to Battery Failure - Continued</b></p>	<p>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</p> <p>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</p> <p>5. Perform continuity checks between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> </ul> <p>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> </ul>	<p>Connect loose or disconnected connectors.</p> <ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul> <ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>



Table 1. Error Code 713 - Clutch K1 Short Circuit to Battery Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 713 - Clutch K1 Short Circuit to Battery Failure - Continued</b></p>	<ul style="list-style-type: none"> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> <li>d. ECU 793 connector pin 55 and connector X172 pin 4.</li> <li>e. ECU 793 connector pin 9 and connector X172 pin 5.</li> <li>f. ECU 793 connector pin 51 and connector X172 pin 6.</li> <li>g. ECU 793 connector pin 12 and connector X172 pin 7.</li> </ul> <p>7. Notify SRA.</p>	

Table 2. Error Code 714 - Clutch K1 Short Circuit to Chassis Failure Troubleshooting Procedures.

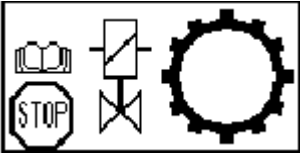
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 714 - Clutch K1 Short Circuit to Chassis Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p>

Table 2. Error Code 714 - Clutch K1 Short Circuit to Chassis Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 714 - Clutch K1 Short Circuit to Chassis Failure - Continued</b></p>	<p>5. Disconnect connector 827, connector X172, and transmission ECU (793) connector and check for continuity to chassis at all pins from connector 827 pin 1 thru pin 4 and at all pins from connector X172 pin 1 thru pin 7.</p>	<p>a. If continuity is present, repair or replace connectors (WP 0111 00).                      b. If wiring harness must be replaced, notify SRA.                      c. If continuity is not present, notify SRA.</p>

Table 3. Error Code 715 - Clutch K1 Open Circuit Failure Troubleshooting Procedures.

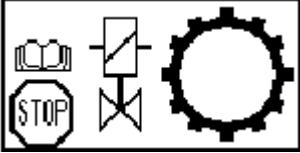
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 715 - Clutch K1 Open Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> <li>5. Perform continuity checks between the following connectors and pins:                             <ol style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> </ol> </li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).                      b. If wiring harness must be replaced, notify SRA.</p>

Table 3. Error Code 715 - Clutch K1 Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 715 - Clutch K1 Open Circuit Failure - Continued</b></p>	<ul style="list-style-type: none"> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> </ul> <p>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> <li>d. ECU 793 connector pin 55 and connector X172 pin 4.</li> <li>e. ECU 793 connector pin 9 and connector X172 pin 5.</li> <li>f. ECU 793 connector pin 51 and connector X172 pin 6.</li> <li>g. ECU 793 connector pin 12 and connector X172 pin 7.</li> </ul>	<ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>

Table 4. Error Code 716 - Clutch K2 Short Circuit to Battery Failure Troubleshooting Procedures.

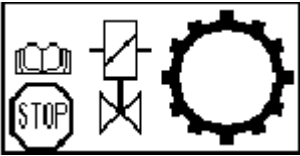
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 716 - Clutch K2 Short Circuit to Battery Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> <li>5. Perform continuity checks between the following connectors and pins:               <ol style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> </ol> </li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol>

Table 4. Error Code 716 - Clutch K2 Short Circuit to Battery Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 716 - Clutch K2 Short Circuit to Battery - Continued</b></p>	<p>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> <li>d. ECU 793 connector pin 55 and connector X172 pin 4.</li> <li>e. ECU 793 connector pin 9 and connector X172 pin 5.</li> <li>f. ECU 793 connector pin 51 and connector X172 pin 6.</li> <li>g. ECU 793 connector pin 12 and connector X172 pin 7.</li> </ul> <p>7. Notify SRA.</p>	<ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>

Table 5. Error Code 717 - Clutch K2 Short Circuit to Chassis Failure Troubleshooting Procedures.

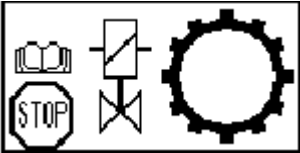
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 717 - Clutch K2 Short Circuit to Chassis Failure</b></p> 	<ul style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> </ul>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p>

Table 5. Error Code 717 - Clutch K2 Short Circuit to Chassis Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 717 - Clutch K2 Short Circuit to Chassis Failure - Continued</b></p>	<ol style="list-style-type: none"> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> <li>5. Disconnect connector 827, connector X172, and transmission ECU (793) connector and check for continuity to chassis at all pins from connector 827 pin 1 thru pin 4 and at all pins from connector X172 pin 1 thru pin 7.</li> </ol>	<p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> <li>c. If continuity is not present, notify SRA.</li> </ol>

Table 6. Error Code 718 - Clutch K2 Open Circuit Failure Troubleshooting Procedures.

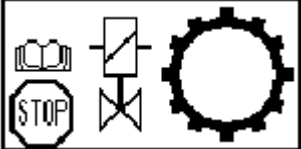
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 718 - Clutch K2 Open Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p>

Table 6. Error Code 718 - Clutch K2 Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 718 - Clutch K2 Open Circuit Failure - Continued</b></p>	<p>5. Perform continuity checks between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> </ul> <p>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> <li>d. ECU 793 connector pin 55 and connector X172 pin 4.</li> <li>e. ECU 793 connector pin 9 and connector X172 pin 5.</li> <li>f. ECU 793 connector pin 51 and connector X172 pin 6.</li> </ul>	<ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul> <ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>

Table 6. Error Code 718 - Clutch K2 Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
Error Code 718 - Clutch K2 Open Circuit Failure - Continued	g. ECU 793 connector pin 12 and connector X172 pin 7.	

Table 7. Error Code 719 - Clutch K3 Open Circuit to Battery Failure Troubleshooting Procedures.

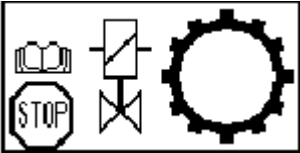
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 719 - Clutch K3 Open Circuit to Battery Failure</p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> <li>5. Perform continuity checks between the following connectors and pins:                             <ol style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> </ol> </li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol>



Table 7. Error Code 719 - Clutch K3 Open Circuit to Battery Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 719 - Clutch K3 Open Circuit to Battery - Continued</b></p>	<ul style="list-style-type: none"> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> <li>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:                             <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> <li>d. ECU 793 connector pin 55 and connector X172 pin 4.</li> <li>e. ECU 793 connector pin 9 and connector X172 pin 5.</li> <li>f. ECU 793 connector pin 51 and connector X172 pin 6.</li> <li>g. ECU 793 connector pin 12 and connector X172 pin 7.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>

Table 8. Error Code 720 - Clutch K3 Short Circuit to Chassis Failure Troubleshooting Procedures.

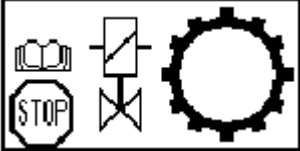
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 720 - Clutch K3 Short Circuit to Chassis Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> <li>5. Disconnect connector 827, connector X172, and transmission ECU (793) connector and check for continuity to chassis at all pins from connector 827 pin 1 thru pin 4 and at all pins from connector X172 pin 1 thru pin 7.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> <li>c. If continuity is not present, notify SRA.</li> </ol>

Table 9. Error Code 721- Clutch K3 Open Circuit Failure Troubleshooting Procedures.

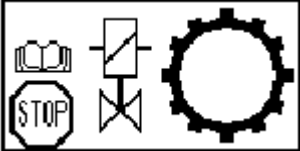
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 721 - Clutch K3 Open Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p>

Table 9. Error Code 721 - Clutch K3 Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 721 - Clutch K3 Open Circuit Failure - Continued</b></p>	<p>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</p> <p>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</p> <p>5. Perform continuity checks between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> </ul> <p>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> </ul>	<p>Connect loose or disconnected connectors.</p> <ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul> <ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>

Table 9. Error Code 721 - Clutch K3 Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 721 - Clutch K3 Open Circuit Failure - Continued</b></p>	<p>d. ECU 793 connector pin 55 and connector X172 pin 4.</p> <p>e. ECU 793 connector pin 9 and connector X172 pin 5.</p> <p>f. ECU 793 connector pin 51 and connector X172 pin 6.</p> <p>g. ECU 793 connector pin 12 and connector X172 pin 7.</p>	

Table 10. Error Code 729 - Clutch K4 Short Circuit to Battery Failure Troubleshooting Procedures.

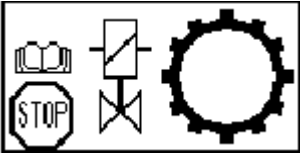
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 729 - Clutch K4 Short Circuit to Battery Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> <li>5. Perform continuity checks between the following connectors and pins:                             <ol style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> </ol> </li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol>

Table 10. Error Code 729 - Clutch K4 Short Circuit to Battery Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 729 - Clutch K4 Short Circuit to Battery - Continued</b></p>	<ul style="list-style-type: none"> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> </ul> <p>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> <li>d. ECU 793 connector pin 55 and connector X172 pin 4.</li> <li>e. ECU 793 connector pin 9 and connector X172 pin 5.</li> <li>f. ECU 793 connector pin 51 and connector X172 pin 6.</li> <li>g. ECU 793 connector pin 12 and connector X172 pin 7.</li> </ul>	<ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>

Table 11. Error Code 730 - Clutch K4 Short Circuit to Chassis Failure Troubleshooting Procedures.

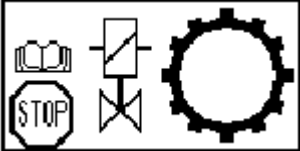
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 730 - Clutch K4 Short Circuit to Chassis Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> <li>5. Disconnect connector 827, connector X172, and transmission ECU (793) connector and check for continuity to chassis at all pins from connector 827 pin 1 thru pin 4 and at all pins from connector X172 pin 1 thru pin 7.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> <li>c. If continuity is not present, notify SRA.</li> </ol>

Table 12. Error Code 731- Clutch K4 Open Circuit Failure Troubleshooting Procedures.

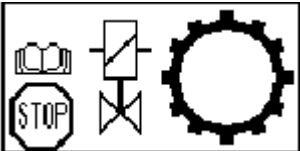
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 731 - Clutch K4 Open Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p>

Table 12. Error Code 731 - Clutch K4 Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 731 - Clutch K4 Open Circuit Failure - Continued</b></p>	<p>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</p> <p>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</p> <p>5. Perform continuity checks between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> </ul> <p>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> </ul>	<p>Connect loose or disconnected connectors.</p> <ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul> <ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>

Table 12. Error Code 731 - Clutch K4 Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 731 - Clutch K4 Open Circuit Failure - Continued</b>	d. ECU 793 connector pin 55 and connector X172 pin 4.  e. ECU 793 connector pin 9 and connector X172 pin 5.  f. ECU 793 connector pin 51 and connector X172 pin 6.  g. ECU 793 connector pin 12 and connector X172 pin 7.	

Table 13. Error Code 732 - Clutch KV Short Circuit to Battery Failure Troubleshooting Procedures.

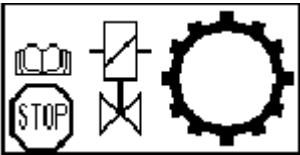
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 732 - Clutch KV Short Circuit to Battery Failure</b>  	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> <li>5. Perform continuity checks between the following connectors and pins:                             <ol style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> </ol> </li> </ol>	Connect loose or disconnected connector.  Connect loose or disconnected connectors.  Connect loose or disconnected connectors.  <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol>



Table 13. Error Code 732 - Clutch KV Short Circuit to Battery Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 732 - Clutch KV Short Circuit to Battery - Continued</b></p>	<ul style="list-style-type: none"> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> </ul> <p>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> <li>d. ECU 793 connector pin 55 and connector X172 pin 4.</li> <li>e. ECU 793 connector pin 9 and connector X172 pin 5.</li> <li>f. ECU 793 connector pin 51 and connector X172 pin 6.</li> <li>g. ECU 793 connector pin 12 and connector X172 pin 7.</li> </ul>	<ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>

Table 14. Error Code 733 - Clutch KV Short Circuit to Chassis Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 733 - Clutch KV Short Circuit to Chassis Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> <li>5. Disconnect connector 827, connector X172, and transmission ECU (793) connector and check for continuity to chassis at all pins from connector 827 pin 1 thru pin 4 and at all pins from connector X172 pin 1 thru pin 7.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> <li>c. If continuity is not present, notify SRA.</li> </ol>

Table 15. Error Code 734 - Clutch KV Open Circuit Failure Troubleshooting Procedures.

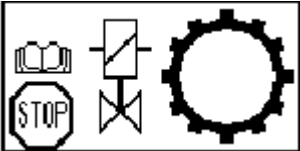
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 734 - Clutch KV Open Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p>

Table 15. Error Code 734 - Clutch KV Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 734 - Clutch KV Open Circuit Failure - Continued</b></p>	<p>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</p> <p>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</p> <p>5. Perform continuity checks between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> </ul> <p>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> </ul>	<p>Connect loose or disconnected connectors.</p> <ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul> <ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>

Table 15. Error Code 734 - Clutch KV Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 734 - Clutch KV Open Circuit Failure - Continued</b></p>	<p>d. ECU 793 connector pin 55 and connector X172 pin 4.</p> <p>e. ECU 793 connector pin 9 and connector X172 pin 5.</p> <p>f. ECU 793 connector pin 51 and connector X172 pin 6.</p> <p>g. ECU 793 connector pin 12 and connector X172 pin 7.</p>	

Table 16. Error Code 735 - Clutch KR Short Circuit to Battery Failure Troubleshooting Procedures.

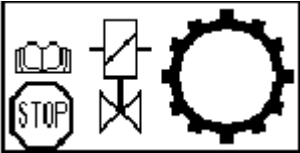
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 735 - Clutch KR Short Circuit to Battery Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> <li>5. Perform continuity checks between the following connectors and pins:                             <ol style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> </ol> </li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol>

Table 16. Error Code 735 - Clutch KR Short Circuit to Battery Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 735 - Clutch KR Short Circuit to Battery - Continued</b></p>	<ul style="list-style-type: none"> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> </ul> <p>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> <li>d. ECU 793 connector pin 55 and connector X172 pin 4.</li> <li>e. ECU 793 connector pin 9 and connector X172 pin 5.</li> <li>f. ECU 793 connector pin 51 and connector X172 pin 6.</li> <li>g. ECU 793 connector pin 12 and connector X172 pin 7.</li> </ul>	<ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>

Table 17. Error Code 736 - Clutch KR Short Circuit to Chassis Failure Troubleshooting Procedures.

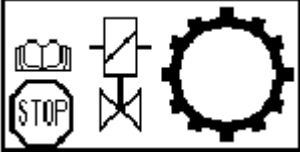
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 736 - Clutch KR Short Circuit to Chassis Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> <li>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</li> <li>5. Disconnect connector 827, connector X172, and transmission ECU (793) connector and check for continuity to chassis at all pins from connector 827 pin 1 thru pin 4 and at all pins from connector X172 pin 1 thru pin 7.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connectors.</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> <li>c. If continuity is not present, notify SRA.</li> </ol>

Table 18. Error Code 737 - Clutch KR Open Circuit Failure Troubleshooting Procedures.

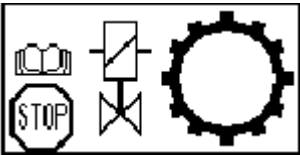
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 737 - Clutch KR Open Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connector X172 for proper connections.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p>

Table 18. Error Code 737 - Clutch KR Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 737 - Clutch KR Open Circuit Failure - Continued</b></p>	<p>3. Move cab to transport position and remove transmission access covers (WP 0135 00).</p> <p>4. Check transmission electrical harness connector 827, located on top of transmission, for proper connection.</p> <p>5. Perform continuity checks between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. connector 827 pin 1 and connector X172 pin 1.</li> <li>b. connector 827 pin 2 and connector X172 pin 2.</li> <li>c. connector 827 pin 3 and connector X172 pin 3.</li> <li>d. connector 827 pin 4 and connector X172 pin 4.</li> <li>e. connector 827 pin 5 and connector X172 pin 5.</li> <li>f. connector 827 pin 6 and connector X172 pin 6.</li> <li>g. connector 827 pin 7 and connector X172 pin 7.</li> </ul> <p>6. Disconnect transmission ECU (793) connector and check continuity between the following connectors and pins:</p> <ul style="list-style-type: none"> <li>a. ECU 793 connector pin 10 and connector X172 pin 1.</li> <li>b. ECU 793 connector pin 56 and connector X172 pin 2.</li> <li>c. ECU 793 connector pin 32 and connector X172 pin 3.</li> </ul>	<p>Connect loose or disconnected connectors.</p> <ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul> <ul style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ul>

Table 18. Error Code 737 - Clutch KR Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 737 - Clutch KR Open Circuit Failure - Continued</b></p>	<ul style="list-style-type: none"> <li>d. ECU 793 connector pin 55 and connector X172 pin 4.</li> <li>e. ECU 793 connector pin 9 and connector X172 pin 5.</li> <li>f. ECU 793 connector pin 51 and connector X172 pin 6.</li> <li>g. ECU 793 connector pin 12 and connector X172 pin 7.</li> </ul>	

END OF WORK PACKAGE



**THIS WORK PACKAGE COVERS**

- Error Code 618 - Signal From Gear Selector Not Correct
- Error Code 622 - Feedback Signal From 2WD/4WD Switch Not Correct
- Error Code 746 - Backup Alarm Control Circuit, Short Circuit Failure
- Error Code 747 - Backup Alarm Control Circuit, Open Circuit Failure

- Error Code 761 - 2WD/4WD Connection Valve Circuit, Short Circuit to Chassis Failure
- Error Code 762 - 2WD/4WD Connection Valve Circuit, Short Circuit to Battery Failure
- Error Code 763 - 2WD/4WD Connection Valve Circuit, Open Circuit Failure

**INITIAL SETUP**

**References**

- TM 10-3930-675-10
- ECU Transmission (A34650.0200) (WP 0199 00-12)
- Shifting (A34739.0200) (WP 0199 00-35)

**References - Continued**

- ECS Electrical Servo (A34648.0200) (WP 0199 00-5)
- Lights (A34744.0200) (WP 0199 00-41)

**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

**Table 1. Error Code 618 - Signal From Gear Selector Not Correct Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 618 - Signal From Gear Selector Not Correct</b></p> 	<ol style="list-style-type: none"> <li>1. Place ignition switch in OFF position for 30 seconds and then back to ON position.</li> <li>2. Disconnect ECU (793) connector and transmission control lever 160 connector XS1, located at base of steering column.</li> <li>3. Check continuity between connector XS1 pin 8 and ECU connector pin 43. Check for continuity to chassis.</li> <li>4. Check continuity between connector XS1 pin 7 and ECU connector pin 67. Check for continuity to chassis.</li> </ol>	<ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> </ol>

Table 1. Error Code 618 - Signal From Gear Selector Not Correct Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 618 - Signal From Gear Selector Not Correct - Continued</b></p>	<p>5. Check continuity between connector XS1 pin 6 and ECU connector pin 64. Check for continuity to chassis.</p> <p>6. Check continuity between connector XS1 pin 1 and ECU connector pin 65. Check for continuity to chassis.</p> <p>7. Check continuity between connector XS1 pin 2 and ECU connector pin 63. Check for continuity to chassis.</p> <p>8. Check voltage at connector XS1 pin 4. Voltage should be 22-26V.</p>	<p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>If voltage is not as specified, replace transmission control lever (160) (WP 0112 00).</p>

Table 2. Error Code 622 - Feedback Signal From 2WD/4WD Switch Not Correct Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 622 - Feedback Signal From 2WD/4WD Switch Not Correct</b></p> 	<p>1. When shifting from 2WD to 4WD or vice versa, engage forward drive and immediately return to neutral.</p> <p>2. Place ignition switch in OFF position for 30 seconds and then back to ON position.</p> <p>3. Check sensor 7207, located on the transmission, for damage and secure mounting.</p>	<p>If error code is still present, go to step 3.</p>

Table 2. Error Code 622 - Feedback Signal From 2WD/4WD Switch Not Correct Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 622 - Feedback Signal From 2WD/4WD Switch Not Correct - Continued</b></p>	<p>4. Disconnect ECU (793) connector and connector 7207 located at sensor on bottom of transmission.</p> <p>5. Check voltage at connector 7207 pin 1. Voltage should be 22-26V.</p> <p>6. Check continuity between connector 7207 pin 2 and ECU connector pin 29. Check continuity to chassis.</p>	<p>a. If voltage is not as specified, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify SRA.</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. Replace sensor 7207 (WP 0095 00).</p>

Table 3. Error Code 746 - Backup Alarm Control Circuit, Short Circuit Failure Troubleshooting Procedures.



MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 746 - Backup Alarm Control Circuit, Short Circuit Failure</b></p> 	<p>1. Place gear selector in N (Neutral) position (TM 10-3930-675-10).</p> <p>2. Ensure that backup alarm circuit breaker number 10 is not tripped.</p> <p>3. Remove cab transmission and steering ECU panel cover and disconnect transmission ECU (793) connector (WP 0079 00).</p> <p>4. Check voltage at transmission ECU (793) connector pin 7.</p>	<p>Reset circuit breaker as required (WP 0073 00).</p> <p>a. If 22-26V are present, replace reversing light relay (305) (WP 0073 00).</p> <p>b. If 0V is present, replace transmission ECU (793) (WP 0079 00).</p>

Table 4. Error Code 747 - Backup Alarm Control Circuit, Open Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 747 - Backup Alarm Control Circuit, Open Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Place gear selector in N (Neutral) position (TM 10-3930-675-10).</li> <li>2. Remove cab circuit breaker panel cover and ensure that circuit breaker F10 is not tripped.</li> <li>3. Open cab distribution box to access relay circuit board.</li> <li>4. Check voltage at connector XK5 pin 7.</li> <li>5. Check voltage at connector XK5 pin 2.</li> <li>6. Check voltage at relay 305 pin 86.</li> <li>7. Remove cab transmission and steering ECU panel cover and disconnect transmission ECU (793) connector (WP 0079 00).</li> <li>8. Check continuity between ECU (793) connector pin 7 and connector X177 pin 10.</li> <li>9. Check continuity between connector X177 pin 10 and connector X160 pin 10.</li> <li>10. Check continuity between connector X160 pin 10 and connector X150 pin 7.</li> </ol>	<p>Reset circuit breaker as required (WP 0073 00).</p> <p>If voltage is not present, notify SRA to repair or replace wire A57.</p> <p>If voltage is not present, replace transmission ECU (WP 0079 00).</p> <p>If voltage is not present, replace transmission ECU (WP 0079 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>

**Table 4. Error Code 747 - Backup Alarm Control Circuit, Open Circuit Failure Troubleshooting Procedure - Continued**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 747 - Backup Alarm Control Circuit, Open Circuit Failure - Continued</b></p>	<p>11. Check continuity between connector X150 pin 7 and connector X29 pin 3.</p> <p>12. Check continuity between connector X29 pin 3 and connector XK5 pin 5.</p> <p>13. Check continuity between connector XK5 pin 5 and connector relay 305 pin 85.</p> <p>14. Check continuity between connector X160 pin 10 and connector X150 pin 7.</p>	<p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>a. Replace relay 305 (WP 0073 00).</p> <p>b. If continuity is not present, replace transmission ECU (WP 0079 00).</p> <p>c. If wiring harness must be replaced, notify SRA.</p> <p>If continuity is not present, repair or replace connectors A1507 (WP 0111 00).</p>

**Table 5. Error Code 761 - 2WD/4WD Connection Valve Circuit, Short Circuit to Chassis Failure Troubleshooting Procedures.**

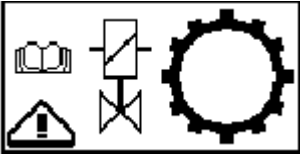
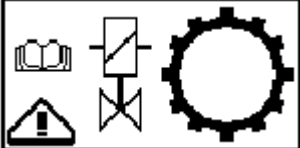
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 761 - 2WD/4WD Connection Valve Circuit, Short Circuit to Chassis Failure</b></p> 	<p>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</p> <p>2. Remove cab rear wall center panel cover and check connection block X172 for proper connections.</p> <p>3. Move operator's cab to transport position and remove transmission access covers (WP 0135 00).</p> <p>4. Check transmission electrical harness connector 606, located on lower right side of transmission, for proper connection.</p>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connector.</p>


Table 5. Error Code 761 - 2WD/4WD Connection Valve Circuit, Short Circuit to Chassis Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 761 - 2WD/4WD Connection Valve Circuit, Short Circuit to Chassis Failure - Continued</b></p>	<p>5. Disconnect connector 606, connector X172, and connector on transmission ECU (793).</p> <p>6. Check continuity to chassis at connector 606 pin 1 and 2.</p> <p>7. Check for continuity to chassis at connector X172 pin 14 and pin 15.</p>	<p>a. If continuity is present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>a. If continuity is present, repair or replace connectors (WP 0111 00).</p> <p>b. Replace solenoid 606 at 2WD/4WD shift valve (WP 0169 00).</p> <p>c. If wiring harness must be replaced, notify SRA.</p>

Table 6. Error Code 762 - 2WD/4WD Connection Valve Circuit, Short Circuit to Battery Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 762 - 2WD/4WD Connection Valve Circuit, Short Circuit to Battery Failure</b></p> 	<p>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</p> <p>2. Remove cab rear wall center panel cover and check connection block X172 for proper connections.</p> <p>3. Move operator's cab to transport position and remove transmission access covers (WP 0135 00).</p> <p>4. Check transmission electrical harness connector 606, located on lower right side of transmission, for proper connection at 2WD/4WD shift valve.</p>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connector.</p>

**Table 6. Error Code 762 - 2WD/4WD Connection Valve Circuit, Short Circuit to Battery Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 762 - 2WD/4WD Connection Valve Circuit, Short Circuit to Battery Failure</b></p> 	<ol style="list-style-type: none"> <li>5. Check continuity between connector 606, located on lower right side of transmission, pin 1 and connector X172 pin 14 and between connector 606 pin 2 and connector X172 pin 15.</li> <li>6. Disconnect connector on transmission ECU (793). Check continuity between ECU (793) pin 11 and connector X172 pin 14 and between ECU (793) pin 53 and connector X172 pin 15.</li> </ol>	<ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. Replace solenoid 606 at 2WD/4WD shift valve (WP 0169 00).</li> <li>c. If wiring harness must be replaced, notify SRA.</li> </ol>

**Table 7. Error Code 763 - 2WD/4WD Connection Valve Circuit, Open Circuit Failure Troubleshooting Procedures.**

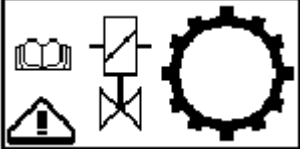
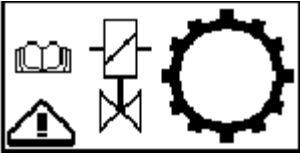
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 763 - 2WD/4WD Connection Valve Circuit, Open Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Remove cab transmission and steering ECU panel cover and check transmission ECU connector for proper connection (WP 0079 00).</li> <li>2. Remove cab rear wall center panel cover and check connection block X172 for proper connections.</li> <li>3. Move operator's cab to transport position and remove transmission access covers (WP 0135 00).</li> <li>4. Check transmission electrical harness connector 606, located on lower right side of transmission, for proper connection at 2WD/4WD shift valve.</li> </ol>	<p>Connect loose or disconnected connector.</p> <p>Connect loose or disconnected connectors.</p> <p>Connect loose or disconnected connector.</p>

Table 8. Error Code 763 - 2WD/4WD Connection Valve Circuit, Open Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 763 - 2WD/4WD Connection Valve Circuit, Open Circuit Failure</b></p> 	<p>5. Check continuity between connector 606 pin 1 and connector X172 pin 14 and between connector 606 pin 2 and connector X172 pin 15.</p> <p>6. Disconnect connector on transmission ECU (793). Check continuity between ECU (793) pin 11 and connector X172 pin 14 and between ECU (793) pin 53 and connector X172 pin 15.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. Replace solenoid 606 at 2WD/4WD shift valve (WP 0169 00).</p> <p>c. If wiring harness must be replaced, notify SRA.</p>

END OF WORK PACKAGE



**INTERNAL TRANSMISSION CLUTCH SLIPPAGE FAILURE TROUBLESHOOTING**

**0030 00**

**THIS WORK PACKAGE COVERS**

Error Code 777 - Internal Transmission Failure at Clutch K1

Error Code 778 - Internal Transmission Failure at Clutch K2

Error Code 779 - Internal Transmission Failure at Clutch K3

Error Code 780 - Internal Transmission Failure at Clutch K4

Error Code 781 - Internal Transmission Failure at Clutch KV

Error Code 782 - Internal Transmission Failure at Clutch KR

Error Code 845 - Clutch Failure Detected During Calibration

Error Code 846 - Clutch Adjustment Data Lost

**INITIAL SETUP**

**References**


TM 10-3930-675-10

ECU Transmission (A34648.0200) (WP 0199 00-12)


**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

**Table 1. Error Code 777 - Internal Transmission Failure at Clutch K1 Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 777 - Internal Transmission Failure at Clutch K1</b></p> 		<p>Notify SRA.</p>

**Table 2. Error Code 778 - Internal Transmission Failure at Clutch K2 Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 778 - Internal Transmission Failure at Clutch K2</b></p> 		<p>Notify SRA.</p>

**INTERNAL TRANSMISSION CLUTCH SLIPPAGE FAILURE TROUBLESHOOTING - CONTINUED 0030 00**


**Table 3. Error Code 779 - Internal Transmission Failure at Clutch K3 Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 779 - Internal Transmission Failure at Clutch K3</b></p> 		<p>Notify SRA.</p>

**Table 4. Error Code 780 - Internal Transmission Failure at Clutch K4 Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 780 - Internal Transmission Failure at Clutch K4</b></p> 		<p>Notify SRA.</p>

**Table 5. Error Code 781 - Internal Transmission Failure at Clutch KV Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 781 - Internal Transmission Failure at Clutch KV</b></p> 		<p>Notify SRA.</p>

**INTERNAL TRANSMISSION CLUTCH SLIPPAGE FAILURE TROUBLESHOOTING - CONTINUED 0030 00**


**Table 6. Error Code 782 - Internal Transmission Failure at Clutch KR Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 782 - Internal Transmission Failure at Clutch KR</p> 		<p>Notify SRA.</p>

**Table 7. Error Code 845 - Clutch Failure Detected During Calibration Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code Error Code 845 - Clutch Failure Detected During Calibration</p> 		<p>Notify SRA.</p>

**Table 8. Error Code 846 - Clutch Adjustment Data Lost Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code Error Code 846 - Clutch Adjustment Data Lost</p> 	<p>Calibrate transmission (WP 0195 00).</p>	<p>Notify SRA if calibration does not correct problem.</p>

**END OF WORK PACKAGE**

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**BRAKE SYSTEM TROUBLESHOOTING**

**0031 00**

**THIS WORK PACKAGE COVERS**

Error Code 118 - Brake System Pressure, Circuit 1 and Circuit 2 Failure

Error Code 120 - Brake System Pressure, Circuit 2 Failure

Error Code 119 - Brake System Pressure, Circuit 1 Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

**References - Continued**

Sender (A34740.0200) (WP 0199 00-36)

Brake System (WP 0199 00-51)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

**Table 1. Error Code 118 - Brake System Pressure, Circuit 1 and Circuit 2 Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 118 - Brake System Pressure, Circuit 1 and Circuit 2 Failure</b></p> 	<p>Perform troubleshooting procedures for error codes 119 and 120.</p>	

Table 2. Error Code 119 - Brake System Pressure, Circuit 1 Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION						
<p><b>Error Code 119 - Brake System Pressure, Circuit 1 Failure</b></p>  <table border="1"> <tr> <td>EXTRA FUNCT.</td> <td>7 (13)</td> </tr> <tr> <td>BRAKE CIRCUIT 1</td> <td>0</td> </tr> <tr> <td>BRAKE CIRCUIT 2</td> <td>0</td> </tr> </table>	EXTRA FUNCT.	7 (13)	BRAKE CIRCUIT 1	0	BRAKE CIRCUIT 2	0	<ol style="list-style-type: none"> <li>1. Check if accumulator evacuation valves are open (WP 0164 00).</li> <li>2. Check hydraulic accumulator pressure at test point 1 (WP 0186 00).</li> <li>3. Remove cab circuit breaker panel cover and ensure that circuit breaker F3 is not tripped.</li> <li>4. Remove panel in front of brake pedals and check brake pressure switch 204-1 for damage and loose connections.</li> <li>5. Check continuity between brake pressure switch 204-1 pin 1 and pin 4.</li> <li>6. Remove cab circuit breaker panel cover, open electrical panel, and locate connector X26.</li> <li>7. Remove servo ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>8. Disconnect servo ECU (790) connector 1.</li> </ol>	<p>Close accumulator evacuation valves.</p> <p>If pressure is not present, perform troubleshooting procedures "Braking is Poor or Nonexistent" (WP 0006 00).</p> <p>Reset circuit breaker as required (WP 0073 00).</p> <ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections.</li> <li>b. Replace brake pressure switch if damaged (WP 0097 00).</li> </ol> <p>If continuity is not present when brake pressure is present, replace brake pressure switch (WP 0097 00).</p>
EXTRA FUNCT.	7 (13)							
BRAKE CIRCUIT 1	0							
BRAKE CIRCUIT 2	0							

Table 2. Error Code 119 - Brake System Pressure, Circuit 1 Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 119 - Brake System Pressure, Circuit 1 Failure - Continued</b>	9. Perform voltage checks at the following pins: a. X26 pin 6 b. X18 pin 1 c. brake pressure switch 204-1 pin 1 d. brake pressure switch 204-1 pin 4 e. X18 pin 2 f. X29 pin 5 g. X150 pin 9 h. servo ECU (790) connector 1 pin 40	a. When voltage is no longer present, inspect wire between pin where voltage stops and previous pin and replace or repair connectors (WP 0111 00). b. Replace ECU (790) (WP 0079 00). c. If wiring harness must be replaced, notify SRA.

Table 3. Error Code 120 - Brake System Pressure, Circuit 2 Failure Troubleshooting Procedures.


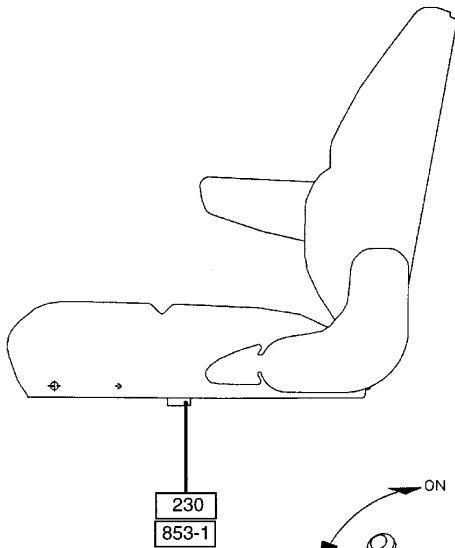
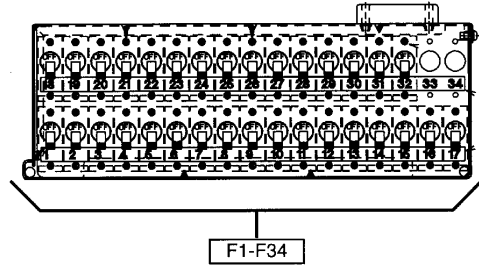
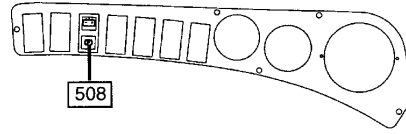
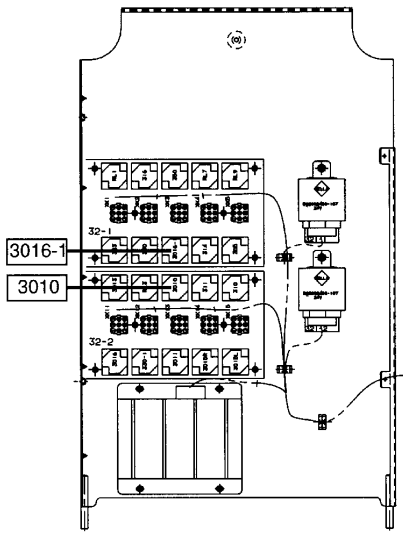
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION						
<b>Error Code 120 - Brake System Pressure, Circuit 2 Failure</b>    <table border="1"> <tr> <td>EXTRA FUNCT.</td> <td>7 (13)</td> </tr> <tr> <td>BRAKE CIRCUIT 1</td> <td>0</td> </tr> <tr> <td>BRAKE CIRCUIT 2</td> <td>0</td> </tr> </table>	EXTRA FUNCT.	7 (13)	BRAKE CIRCUIT 1	0	BRAKE CIRCUIT 2	0	1. Check if accumulator evacuation valves are open (WP 0164 00). 2. Check hydraulic accumulator pressure at test point 2 (WP 0186 00). 3. Remove cab circuit breaker panel cover and ensure that circuit breaker F3 is not tripped. 4. Remove panel in front of brake pedals and check brake pressure switch 204-2 for damage and loose connections. 5. Check continuity between brake pressure switch 204-1 pin 1 and pin 4.	Close accumulator evacuation valves.  If pressure is not present, perform troubleshooting procedures "Braking is Poor or Nonexistent" (WP 0006 00).  Reset circuit breaker as required (WP 0073 00).  a. Connect any loose or disconnected connections. b. Replace brake pressure switch if damaged (WP 0097 00).  If continuity is not present when brake pressure is present, replace brake pressure switch (WP 0097 00).
EXTRA FUNCT.	7 (13)							
BRAKE CIRCUIT 1	0							
BRAKE CIRCUIT 2	0							

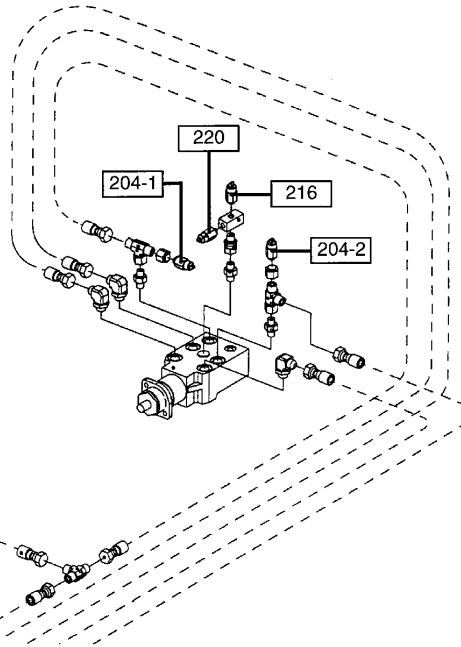
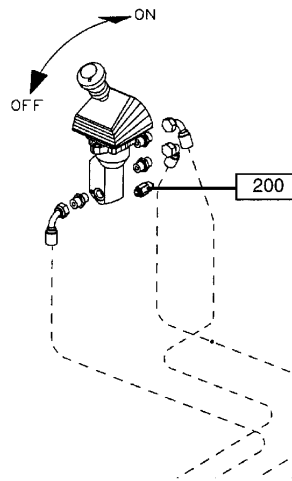
Table 3. Error Code 120 - Brake System Pressure, Circuit 2 Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 120 - Brake System Pressure, Circuit 2 Failure - Continued</b></p>	<p>6. Remove cab circuit breaker panel cover, open electrical panel, and locate connector X26.</p> <p>7. Remove servo ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</p> <p>8. Disconnect servo ECU (790) connector 1. Ensure that brake pressure is present.</p> <p>9. Perform voltage checks at the following pins:</p> <ul style="list-style-type: none"> <li>a. X26 pin 6</li> <li>b. X18 pin 1</li> <li>c. brake pressure switch 204-1 pin 1</li> <li>d. brake pressure switch 204-1 pin 4</li> <li>e. X18 pin 2</li> <li>f. X29 pin 5</li> <li>g. X150 pin 9</li> <li>h. servo ECU (790) connector 1 pin 40</li> </ul>	<ul style="list-style-type: none"> <li>a. When voltage is no longer present, inspect wire between pin where voltage stops and previous pin and replace or repair connectors (WP 0111 00).</li> <li>b. Replace ECU (790) (WP 0079 00).</li> <li>c. If wiring harness must be replaced, notify SRA.</li> </ul>





NO.	EARTH CONNECTIONS
37-1	EARTH CONN. DISTR. UNIT
37-2	EARTH CONN. CAB ROOF
37-3	EARTH CONN. FRAME BATTERY
37-4	EARTH CONN. ENGINE
37-5	EARTH COMPUTERS
37-6	EARTH LIGHTS LEFT REAR
37-7	EARTH LIGHTS RIGHT REAR
37-8	EARTH LIGHTS LEFT FRONT
37-9	EARTH LIGHTS RIGHT FRONT
37-10	EARTH CAB FLOOR AC
37-50, 51	EARTH ELSERVO
37-52	EARTH STEERING ECS
37-54, 55	EARTH DISTR. UNIT ATTACHMENT
37-60	EARTH CAB FLOOR



350-1050

END OF WORK PACKAGE

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**THIS WORK PACKAGE COVERS**

Error Code 191 - Temperature in Front Axle Above Critical Threshold

Error Code 192 - Temperature in Rear Axle Above Critical Threshold

Error Code 414 - Bypass Valve Short Circuit Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

ECS Steering (A34651.0200) (WP 0199 00-16)

ECS Electrical Servo (A34648.0200) (WP 0199 00-5)




**WARNING**

Use caution when checking wheel and hub for extreme heat. Failure to do so may cause serious burns.

**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.


**Table 1. Error Code 191 - Temperature in Front Axle Above Critical Threshold Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 191 - Temperature in Front Axle Above Critical Threshold</b></p> 	<p>1. Enter “EXTRA FUNCT. 12 (13)” diagnostic menu and check temperature of WHEEL END FRONT HUB.</p> <p>a. If menu shows 155:</p> <p>(1) Check temperature sensor 762-1 and connector at left front wheel for damage.</p> <p>(2) Disconnect ECU (790) connector 1 and check continuity between connector 762-1 pin 1 and pin 2 and between connector 762-1 pin 1 and pin 2 and chassis.</p>	<p>a. Replace temperature sensor if damaged (WP 0092 00).</p> <p>b. Replace connector if damaged (WP 0111 00).</p> <p>a. If continuity is not present, replace temperature sensor (WP 0092 00).</p> <p>b. If continuity is present, notify SRA to replace wire between connectors 762-1, X168, X156, and ECU (790) connector 1 (WP 0111 00).</p>

**Table 1. Error Code 191 - Temperature in Front Axle Above Critical Threshold  
Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 191 - Temperature in Front Axle Above Critical Threshold - Continued</b></p>	<p>b. If menu shows 95-120, check if front wheel end hubs are extremely warm.</p> <p>2. Enter "EXTRA FUNCT. 12 (13)" diagnostic menu and check temperature of BRAKE COOLING. If menu shows a value of 1:</p> <p>a. Check voltage at valve connector 6049-1. Voltage should be 20-25V.</p> <p>b. Check voltage between connector X168 pin 3 and pin 4, between connector X168 pin 3 and pin 4, and between connector X156 pin 4 and connector X160 pin 12 (20-25V).</p> <p>3. Enter "EXTRA FUNCT. 11 (13)" diagnostic menu and check value of HYD SPEED FAN. If menu shows a value of 0, press "+" to increase value to 30.</p> <p>4. Enter "EXTRA FUNCT. 12 (13)" diagnostic menu and check value of BRAKE COOLING.</p>	<p>If wheel ends are not extremely warm, replace wheel temperature sensor (762-1) (WP 0092 00).</p> <p>If voltage is not present, notify SRA to repair or replace wire.</p> <p>If voltage is not present, notify SRA to repair or replace wire.</p> <p>a. If cooling fan is running, replace bypass valve (WP 0174 00).</p> <p>b. Notify DS Maintenance to replace cooling fan hydraulic pump.</p> <p>If menu shows a value of 0, replace ECU (790) (WP 0079 00).</p>

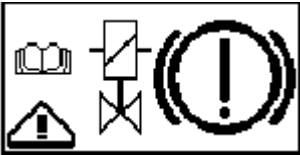
Table 2. Error Code 192 - Temperature in Rear Axle Above Critical Threshold Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 192 - Temperature in Rear Axle Above Critical Threshold</p> 	<p>1. Enter "EXTRA FUNCT. 12 (13)" diagnostic menu and check temperature of WHEEL END REAR HUB.</p> <p>a. If menu shows 155:</p> <p>(1) Check temperature sensor 762-2 and connector at left rear wheel for damage.</p> <p>(2) Disconnect ECU (790) connector 1 and check continuity between connector 762-2 pin 1 and pin 2 and between connector 762-2 pin 1 and pin 2 and chassis.</p> <p>b. If menu shows 95-120, check if rear wheel ends are extremely warm.</p> <p>2. Enter "EXTRA FUNCT. 12 (13)" diagnostic menu and check temperature of BRAKE COOLING. If menu shows a value of 1:</p> <p>a. Check voltage at valve connector 6049-2. Voltage should be 20-25V.</p> <p>b. Check voltage between connector X168 pin 3 and pin 4, between connector X156 pin 3 and pin 4, and between connector X156 pin 4 and connector X160 pin 12 (20-25V).</p>	<p>a. Replace temperature sensor if damaged (WP 0092 00).</p> <p>b. Replace connector if damaged (WP 0111 00).</p> <p>a. If continuity is not present, replace temperature sensor (WP 0092 00).</p> <p>b. If continuity is present, notify SRA to replace wire between connectors 762-2, X168, X156, and ECU (790) connector 1 (WP 0111 00).</p> <p>If wheel ends are not extremely warm, replace wheel temperature sensor (762-2) (WP 0092 00).</p> <p>If voltage is not present, notify SRA to repair or replace wire.</p> <p>If voltage is not present, notify SRA to repair or replace wire.</p>

**Table 2. Error Code 192 - Temperature in Rear Axle Above Critical Threshold Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 192 - Temperature in Rear Axle Above Critical Threshold - Continued</b></p>	<p>3. Enter “EXTRA FUNCT. 11 (13)” diagnostic menu and check value of HYD SPEED FAN. If menu shows a value of 0, press “+” to increase value to 30.</p> <p>4. Discharge brake system by opening drain valves (WP 0164 00). Close valves and start engine (TM 10-3930-675-10).</p> <p>5. Enter “EXTRA FUNCT. 12 (13)” diagnostic menu and check value of BRAKE COOLING.</p>	<p>a. If brake system will charge (error codes 118, 119, and 120 will not be displayed), replace bypass valve (WP 0174 00).</p> <p>b. If error code 118 is displayed, notify DS Maintenance to replace cooling fan hydraulic pump.</p> <p>If menu shows a value of 0, replace ECU (790) (WP 0079 00).</p>

**Table 3. Error Code 414 - Bypass Valve Short Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 414 - Bypass Valve Short Circuit Failure</b></p> 	<p>Check continuity between the following connectors:</p> <p>a. connector X177 pin 12 and connector X160 pin 12.</p> <p>b. connector X156 pin 4 and connector X168 pin 4.</p> <p>c. connector 6049-1 pin 1 and connector 6049-2 pin 1 (located behind cab between boom supports).</p>	<p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, contact SRA.</p>

END OF WORK PACKAGE

**STEERING VALVE CIRCUIT TROUBLESHOOTING**

**0033 00**

**THIS WORK PACKAGE COVERS**

- Error Code 325 - Right-Front Wheel Valve Solenoid, Broken Circuit Failure
- Error Code 326 - Right-Rear Wheel Valve Solenoid, Broken Circuit Failure
- Error Code 327 - Left-Rear Wheel Valve Solenoid, Broken Circuit Failure
- Error Code 328 - Left-Front Wheel Valve Solenoid, Broken Circuit Failure
- Error Code 329 - Right-Front Wheel Valve Solenoid, Short Circuit Failure
- Error Code 330 - Right-Rear Wheel Valve Solenoid, Short Circuit Failure
- Error Code 331 - Left-Rear Wheel Valve Solenoid, Short Circuit Failure

- Error Code 332 - Left-Front Wheel Valve Solenoid, Short Circuit Failure
- Error Code 340 - Hydraulic Steering Pressure Below Critical Threshold [1450 psi (100 bar)]
- Error Code 341 - Steering Wheel Signal Not Consistent
- Error Code 342 - One Steering Wheel Signal is Interrupted
- Error Code 343 - One Steering Wheel Signal is Interrupted
- Error Code 344 - Both Steering Wheel Signals are Interrupted
- Error Code 347 - No Steering Mode Selected

**INITIAL SETUP**

**Equipment Condition**

Cab moved to transport position (TM 10-3930-675-10)

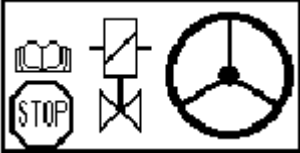
**References**

TM 10-3930-675-10  
ECS Steering (A34651.0200) (WP 0199 00-16)

**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.


**Table 1. Error Code 325 - Right-Front Wheel Valve Solenoid, Broken Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 325 - Right-Front Wheel Valve Solenoid, Broken Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check right-front steering solenoid and wire, located at steering control valve, for damage.</li> <li>2. Check for continuity between the following connectors and chassis:</li> </ol>	<p>Replace solenoid with wire lead if damaged (WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6026 (WP 0169 00).</li> </ol>

**Table 1. Error Code 325 - Right-Front Wheel Valve Solenoid, Broken Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 325 - Right-Front Wheel Valve Solenoid, Broken Circuit Failure - Continued</b></p>	<ul style="list-style-type: none"> <li>a. ECU (792) connector pin 8, connector X196 pin 1, and connector 6026 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 27, connector X196 pin 2, and connector 6026 pin 2</li> <li>3. Check for continuity between the following connectors and chassis:                             <ul style="list-style-type: none"> <li>a. ECU (792) connector pin 10, connector X196 pin 3, and connector 6027 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 28, connector X196 pin 4, and connector 6027 pin 2</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6027 (WP 0169 00).</li> </ul>

**Table 2. Error Code 326 - Right-Rear Wheel Valve Solenoid, Broken Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 326 - Right-Rear Wheel Valve Solenoid, Broken Circuit Failure</b></p> 	<p>1. Check right-rear steering solenoid and wire, located at steering control valve, for damage.</p>	<p>Replace solenoid or wire if damaged (WP 0111 00 or WP 0169 00).</p>



**Table 2. Error Code 326 - Right-Rear Wheel Valve Solenoid, Broken Circuit Failure  
Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 326 - Right-Rear Wheel Valve Solenoid, Broken Circuit Failure - Continued</b></p>	<p>2. Check for continuity between the following connectors and chassis:</p> <p>a. ECU (792) connector pin 11, connector X196 pin 9, and connector 6030 pin 1 (located under cab on frame rail)</p> <p>b. ECU (792) connector pin 9, connector X196 pin 10, and connector 6030 pin 2</p> <p>3. Check for continuity between the following connectors and chassis:</p> <p>a. ECU (792) connector pin 13, connector X196 pin 11, and connector 6031 pin 1 (located under cab on frame rail)</p> <p>b. ECU (792) connector pin 12, connector X196 pin 12, and connector 6031 pin 2</p>	<p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, replace steering solenoid 6030 (WP 0169 00).</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, replace steering solenoid 6031 (WP 0169 00).</p>

Table 3. Error Code 327 - Left-Rear Wheel Valve Solenoid, Broken Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 327 - Left-Rear Wheel Valve Solenoid, Broken Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check left-rear steering solenoid and wire, located at steering control valve, for damage.</li> <li>2. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 14, connector X196 pin 13, and connector 6032 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 15, connector X196 pin 14, and connector 6030 pin 2</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 16, connector X197 pin 1, and connector 6033 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 18, connector X197 pin 2, and connector 6032 pin 2</li> </ol> </li> </ol>	<p>Replace solenoid or wire if damaged (WP 0111 00 and WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6032 (WP 0169 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6033 (WP 0169 00).</li> </ol>

Table 4. Error Code 328 - Left-Front Wheel Valve Solenoid, Broken Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 328 - Left-Front Wheel Valve Solenoid, Broken Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check left-front steering solenoid and wire, located at steering control valve, for damage.</li> <li>2. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 17, connector X196 pin 5, and connector 6028 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 20, connector X196 pin 6, and connector 6028 pin 2</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 19, connector X196 pin 7, and connector 6029 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 22, connector X196 pin 8, and connector 6029 pin 2</li> </ol> </li> </ol>	<p>Replace solenoid or wire if damaged (WP 0111 00 or WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6028 (WP 0169 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6029 (WP 0169 00).</li> </ol>

Table 5. Error Code 329 - Right-Front Wheel Valve Solenoid, Short Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 329 - Right-Front Wheel Valve Solenoid, Short Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check right-front steering solenoid and wire, located at steering control valve, for damage.</li> <li>2. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 8, connector X196 pin 1, and connector 6026 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 27, connector X196 pin 2, and connector 6026 pin 2</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 10, connector X196 pin 3, and connector 6027 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 28, connector X196 pin 4, and connector 6027 pin 2</li> </ol> </li> </ol>	<p>Replace solenoid or wire if damaged (WP 0111 00 or WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6026 (WP 0169 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6027 (WP 0169 00).</li> </ol>

Table 6. Error Code 330 - Right-Rear Wheel Valve Solenoid, Short Circuit Failure Troubleshooting Procedures.

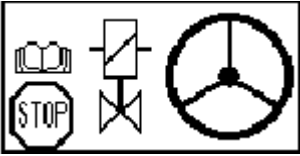
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 330 - Right-Rear Wheel Valve Solenoid, Short Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check right-rear steering solenoid and wire, located at steering control valve, for damage.</li> <li>2. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 11, connector X196 pin 9, and connector 6030 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 9, connector X196 pin 10, and connector 6030 pin 2</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 13, connector X196 pin 11, and connector 6031 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 12, connector X196 pin 12, and connector 6031 pin 2</li> </ol> </li> </ol>	<p>Replace solenoid or wire if damaged (WP 0111 00 or WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6030 (WP 0169 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6031 (WP 0169 00).</li> </ol>

Table 7. Error Code 331 - Left-Rear Wheel Valve Solenoid, Short Circuit Failure Troubleshooting Procedures.

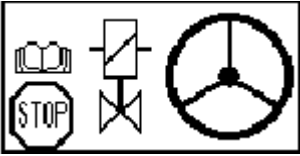
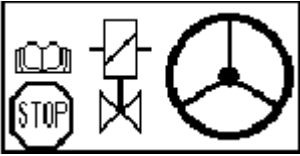
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 331 - Left-Rear Wheel Valve Solenoid, Short Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check left-rear steering solenoid and wire, located at steering control valve, for damage.</li> <li>2. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 14, connector X196 pin 13, and connector 6032 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 15, connector X196 pin 14, and connector 6032 pin 2</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 16, connector X197 pin 1, and connector 6033 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 18, connector X197 pin 2, and connector 6033 pin 2</li> </ol> </li> </ol>	<p>Replace solenoid or wire if damaged (WP 0111 00 or WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6032 (WP 0169 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6033 (WP 0169 00).</li> </ol>

Table 8. Error Code 332 - Left-Front Wheel Valve Solenoid, Short Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 332 - Left-Front Wheel Valve Solenoid, Short Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check left-front steering solenoid and wire, located at steering control valve, for damage.</li> <li>2. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 17, connector X196 pin 5, and connector 6028 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 20, connector X196 pin 6, and connector 6028 pin 2</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. ECU (792) connector pin 19, connector X196 pin 7, and connector 6029 pin 1 (located under cab on frame rail)</li> <li>b. ECU (792) connector pin 22, connector X196 pin 8, and connector 6029 pin 2</li> </ol> </li> </ol>	<p>Replace solenoid or wire if damaged (WP 0111 00 or WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6028 (WP 0169 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering solenoid 6029 (WP 0169 00).</li> </ol>

**Table 9. Error Code 340 - Hydraulic Steering Pressure Below Critical Threshold [1450 psi (100 Bar)] Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 340 - Hydraulic Steering Pressure Below Critical Threshold [1450 psi (100 Bar)]</b></p> 	<ol style="list-style-type: none"> <li>1. Ensure that steering accumulator evacuation valve is closed.</li> <li>2. Check steering pressure at test point 3 (WP 0186 00).</li> </ol>	<p>Close steering accumulator evacuation valve as required (WP 0164 00).</p> <ol style="list-style-type: none"> <li>a. If no pressure or low stabilized pressure, notify DS Maintenance to replace tophandler and steering pump assembly.</li> <li>b. If pressure is unstable or drops when turning, notify DS Maintenance to check nitrogen pressure and charge steering accumulator as required.</li> </ol>



Table 10. Error Code 341 - Steering Wheel Signal Not Consistent Troubleshooting Procedures.


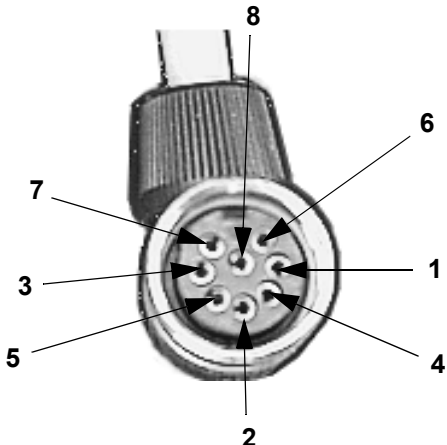
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 341 - Steering Wheel Signal Not Consistent</b></p>   <p><b>CONNECTOR 770</b></p>	<ol style="list-style-type: none"> <li>1. Check steering column sensor for damage.</li> <li>2. Disconnect connector at steering column sensor 770, located at base of steering column, and connector X176.</li> <li>3. Check for continuity between the following connectors:               <ol style="list-style-type: none"> <li>a. connector 770 pin 2, connector X176 pin 2, and ECU (792) connector pin 40</li> <li>b. connector 770 pin 3, connector X176 pin 3, and ECU (792) connector pin 113</li> <li>c. connector 770 pin 4, connector X176 pin 4, and ECU (792) connector pin 96</li> <li>d. connector 770 pin 5, connector X176 pin 5, and ECU (792) connector pin 41</li> <li>e. connector 770 pin 6, connector X176 pin 6, and ECU (792) connector pin 38</li> <li>f. connector 770 pin 7, connector X176 pin 7, and ECU (792) connector pin 132</li> <li>g. connector 770 pin 8, connector X176 pin 8, and ECU (792) connector pin 97</li> </ol> </li> </ol>	<p>Replace steering column sensor if damaged (WP 0134 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering column sensor 770 (WP 0134 00).</li> </ol>

Table 11. Error Code 342 - One Steering Wheel Signal is Interrupted Troubleshooting Procedures.


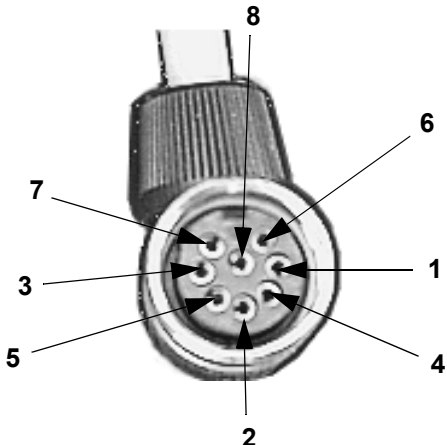
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 342 - One Steering Wheel Signal is Interrupted</b></p>   <p><b>CONNECTOR 770</b></p>	<ol style="list-style-type: none"> <li>1. Check steering column sensor for damage.</li> <li>2. Disconnect connector at steering column sensor 770, located at base of steering column, and connector X176.</li> <li>3. Check for continuity between the following connectors:                             <ol style="list-style-type: none"> <li>a. connector 770 pin 2, connector X176 pin 2, and ECU (792) connector pin 40</li> <li>b. connector 770 pin 3, connector X176 pin 3, and ECU (792) connector pin 113</li> <li>c. connector 770 pin 4, connector X176 pin 4, and ECU (792) connector pin 96</li> <li>d. connector 770 pin 5, connector X176 pin 5, and ECU (792) connector pin 41</li> <li>e. connector 770 pin 6, connector X176 pin 6, and ECU (792) connector pin 38</li> <li>f. connector 770 pin 7, connector X176 pin 7, and ECU (792) connector pin 132</li> <li>g. connector 770 pin 8, connector X176 pin 8, and ECU (792) connector pin 97</li> </ol> </li> </ol>	<p>Replace steering column sensor if damaged (WP 0134 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering column sensor 770 (WP 0134 00).</li> </ol>

Table 12. Error Code 343 - One Steering Wheel Signal is Interrupted Troubleshooting Procedures.


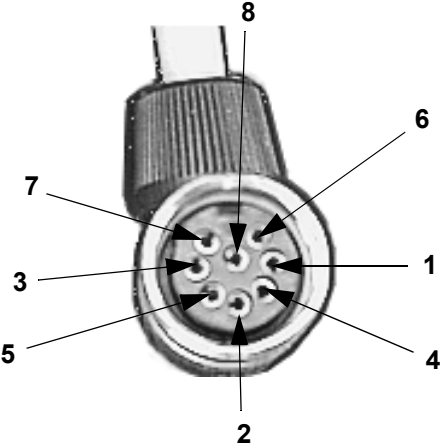
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 343 - One Steering Wheel Signal is Interrupted</b></p>   <p><b>CONNECTOR 770</b></p>	<ol style="list-style-type: none"> <li>1. Check steering column sensor for damage.</li> <li>2. Disconnect connector at steering column sensor 770, located at base of steering column, and connector X176.</li> <li>3. Check for continuity between the following connectors:               <ol style="list-style-type: none"> <li>a. connector 770 pin 2, connector X176 pin 2, and ECU (792) connector pin 40</li> <li>b. connector 770 pin 3, connector X176 pin 3, and ECU (792) connector pin 113</li> <li>c. connector 770 pin 4, connector X176 pin 4, and ECU (792) connector pin 96</li> <li>d. connector 770 pin 5, connector X176 pin 5, and ECU (792) connector pin 41</li> <li>e. connector 770 pin 6, connector X176 pin 6, and ECU (792) connector pin 38</li> <li>f. connector 770 pin 7, connector X176 pin 7, and ECU (792) connector pin 132</li> <li>g. connector 770 pin 8, connector X176 pin 8, and ECU (792) connector pin 97</li> </ol> </li> </ol>	<p>Replace steering column sensor if damaged (WP 0134 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering column sensor 770 (WP 0134 00).</li> </ol>

Table 13. Error Code 344 - Both Steering Wheel Signals are Interrupted Troubleshooting Procedures.


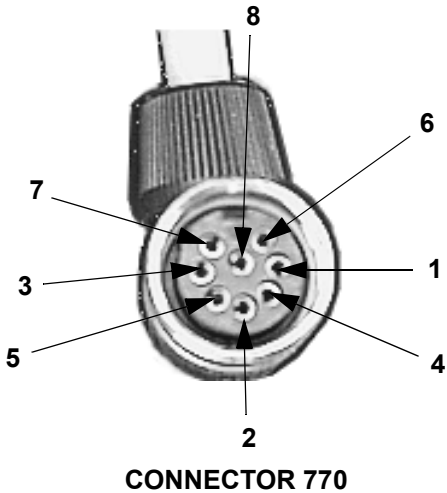
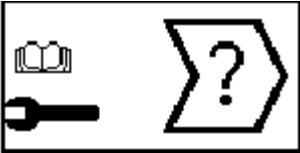
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 344 - Both Steering Wheel Signals are Interrupted</b></p>   <p><b>CONNECTOR 770</b></p>	<ol style="list-style-type: none"> <li>1. Check steering column sensor for damage.</li> <li>2. Disconnect connector at steering column sensor 770, located at base of steering column, and connector X176.</li> <li>3. Check for continuity between the following connectors:                             <ol style="list-style-type: none"> <li>a. connector 770 pin 2, connector X176 pin 2, and ECU (792) connector pin 40</li> <li>b. connector 770 pin 3, connector X176 pin 3, and ECU (792) connector pin 113</li> <li>c. connector 770 pin 4, connector X176 pin 4, and ECU (792) connector pin 96</li> <li>d. connector 770 pin 5, connector X176 pin 5, and ECU (792) connector pin 41</li> <li>e. connector 770 pin 6, connector X176 pin 6, and ECU (792) connector pin 38</li> <li>f. connector 770 pin 7, connector X176 pin 7, and ECU (792) connector pin 132</li> <li>g. connector 770 pin 8, connector X176 pin 8, and ECU (792) connector pin 97</li> </ol> </li> </ol>	<p>Replace steering column sensor if damaged (WP 0134 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace steering column sensor 770 (WP 0134 00).</li> </ol>

Table 14. Error Code 347 - No Steering Mode Selected Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 347 - No Steering Mode Selected</p> 		<p>Select a steering mode (TM 10-3930-675-10).</p>

END OF WORK PACKAGE

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**THIS WORK PACKAGE COVERS**

Error Code 317 - Right-Front Wheel Angle Cannot Reach Set Point Value

Error Code 318 - Right-Rear Wheel Angle Cannot Reach Set Point Value

Error Code 319 - Left-Rear Wheel Angle Cannot Reach Set Point Value

Error Code 320 - Left-Front Wheel Angle Cannot Reach Set Point Value

Error Code 321 - Right-Front Wheel is Not Calibrated Correctly

Error Code 322 - Right-Rear Wheel is Not Calibrated Correctly

Error Code 323 - Left-Rear Wheel is Not Calibrated Correctly

Error Code 324 - Left-Front Wheel is Not Calibrated Correctly

**INITIAL SETUP**

**References**

TM 10-3930-675-10

**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

**Table 1. Error Code 317 - Right-Front Wheel Angle Cannot Reach Set Point Value Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 317 - Right-Front Wheel Angle Cannot Reach Set Point Value</b></p> 	<ol style="list-style-type: none"> <li>1. Check wheel for obstruction that will not allow wheel to reach set point value.</li> <li>2. Check hydraulic pressure at test points no. 3, 6, and 7 (WP 0186 00). Pressure should be 3045 psi (210 bar).</li> </ol>	<p>Remove any obstruction(s).</p> <ol style="list-style-type: none"> <li>a. If hydraulic pressure is not as specified, notify DS Maintenance to replace tophandler and steering pump assembly.</li> <li>b. If hydraulic pressure is as specified, notify DS Maintenance to replace steering control valve.</li> </ol>

Table 2. Error Code 318 - Right-Rear Wheel Angle Cannot Reach Set Point Value Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 318 - Right-Rear Wheel Angle Cannot Reach Set Point Value</b></p> 	<ol style="list-style-type: none"> <li>1. Check wheel for obstruction that will not allow wheel to reach set point value.</li> <li>2. Check hydraulic pressure at test points no. 3, 6, and 7 (WP 0186 00). Pressure should be 3045 psi (210 bar).</li> </ol>	<p>Remove any obstruction(s).</p> <ol style="list-style-type: none"> <li>a. If hydraulic pressure is not as specified, notify DS Maintenance to replace tophandler and steering pump assembly.</li> <li>b. If hydraulic pressure is as specified, notify DS Maintenance to replace steering control valve.</li> </ol>

Table 3. Error Code 319 - Left-Rear Wheel Angle Cannot Reach Set Point Value Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 319 - Left-Rear Wheel Angle Cannot Reach Set Point Value</b></p> 	<ol style="list-style-type: none"> <li>1. Check wheel for obstruction that will not allow wheel to reach set point value.</li> <li>2. Check hydraulic pressure at test points no. 3, 6, and 7 (WP 0186 00). Pressure should be 3045 psi (210 bar).</li> </ol>	<p>Remove any obstruction(s).</p> <ol style="list-style-type: none"> <li>a. If hydraulic pressure is not as specified, notify DS Maintenance to replace tophandler and steering pump assembly.</li> <li>b. If hydraulic pressure is as specified, notify DS Maintenance to replace steering control valve.</li> </ol>



Table 4. Error Code 320 - Left-Front Wheel Angle Cannot Reach Set Point Value Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 320 - Left-Front Wheel Angle Cannot Reach Set Point Value</b></p> 	<ol style="list-style-type: none"> <li>1. Check wheel for obstruction that will not allow wheel to reach set point value.</li> <li>2. Check hydraulic pressure at test points no. 3, 6, and 7 (WP 0186 00). Pressure should be 3045 psi (210 bar).</li> </ol>	<p>Remove any obstruction(s).</p> <ol style="list-style-type: none"> <li>a. If hydraulic pressure is not as specified, notify DS Maintenance to replace tophandler and steering pump assembly.</li> <li>b. If hydraulic pressure is as specified, notify DS Maintenance to replace steering control valve.</li> </ol>

Table 5. Error Code 321 - Right-Front Wheel is Not Calibrated Correctly Troubleshooting Procedures.




MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 321 - Right-Front Wheel is Not Calibrated Correctly</b></p> 		<p>Calibrate steering (WP 0196 00).</p>

Table 6. Error Code 322 - Right-Rear Wheel is Not Calibrated Correctly Troubleshooting Procedures.

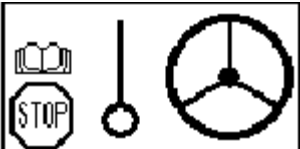
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 322 - Right-Rear Wheel is Not Calibrated Correctly</b></p> 		<p>Calibrate steering (WP 0196 00).</p>

**INTERNAL TRANSMISSION CLUTCH SLIPPAGE FAILURE TROUBLESHOOTING - CONTINUED 0034 00**

**Table 7. Error 323 - Left-Rear Wheel is Not Calibrated Correctly Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 323 - Left-Rear Wheel is Not Calibrated Correctly</p> 		<p>Calibrate steering (WP 0196 00).</p>

**Table 8. Error 324 - Left-Front Wheel is Not Calibrated Correctly Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p>Error Code 324 - Left-Front Wheel is Not Calibrated Correctly</p> 		<p>Calibrate steering (WP 0196 00).</p>

**END OF WORK PACKAGE**

**THIS WORK PACKAGE COVERS**

Error Code 301 - Right-Front Wheel Sensor Circuit Failure  
 Error Code 302 - Right-Rear Wheel Sensor Circuit Failure  
 Error Code 303 - Left-Rear Wheel Sensor Circuit Failure  
 Error Code 304 - Left-Front Wheel Sensor Circuit Failure  
 Error Code 305 - Right-Front Wheel Sensor Circuit Failure  
 Error Code 306 - Right-Rear Wheel Sensor Circuit Failure  
 Error Code 307 - Left-Rear Wheel Sensor Circuit Failure  
 Error Code 308 - Left-Front Wheel Sensor Circuit Failure

Error Code 309 - Right-Front Wheel Sensor Circuit Failure  
 Error Code 310 - Right-Rear Wheel Sensor Circuit Failure  
 Error Code 311 - Left-Rear Wheel Sensor Circuit Failure  
 Error Code 312 - Left-Front Wheel Sensor Circuit Failure  
 Error Code 313 - Right-Front Wheel Sensor Circuit Failure  
 Error Code 314 - Right-Rear Wheel Sensor Circuit Failure  
 Error Code 315 - Left-Rear Wheel Sensor Circuit Failure  
 Error Code 316 - Left-Front Wheel Sensor Circuit Failure

**INITIAL SETUP**

**References**

- TM 10-3930-675-10
- ECS Steering (A34651.0200) (WP 0199 00-16)

**NOTE**

Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.

**Table 1. Error Code 301 - Right-Front Wheel Sensor Circuit Failure Troubleshooting Procedures.**


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 301 - Right-Front Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check right-front wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:</li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 1. Error Code 301 - Right-Front Wheel Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 301 - Right-Front Wheel Sensor Circuit Failure - Continued</b></p>	<p>a. connector X167 pin 1, connector X171 pin 1, and ECU (792) connector pin 86.</p> <p>b. connector X167 pin 2, connector X171 pin 2, and ECU (792) connector pin 37.</p> <p>c. connector X167 pin 3, connector X171 pin 3, and ECU (792) connector pin 90.</p>	

Table 2. Error Code 302 - Right-Rear Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 302 - Right-Rear Wheel Sensor Circuit Failure</b></p> 	<p>1. Check right-rear wheel sensor and wire for damage.</p> <p>2. Check for continuity between the following connectors and chassis:</p> <p>a. connector X192 pin 1, connector X170 pin 1, and ECU (792) connector pin 87.</p> <p>b. connector X192 pin 2, connector X170 pin 2, and ECU (792) connector pin 36.</p> <p>c. connector X192 pin 3, connector X170 pin 3, and ECU (792) connector pin 92.</p>	<p>Replace sensor if damaged (WP 0103 00).</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, replace wheel sensor (WP 0103 00).</p>

Table 3. Error Code 303 - Left-Rear Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 303 - Left-Rear Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check left-rear wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. connector X192 pin 8, connector X170 pin 9, and ECU (792) connector pin 88.</li> <li>b. connector X192 pin 9, connector X170 pin 10, and ECU (792) connector pin 35.</li> <li>c. connector X192 pin 10, connector X170 pin 11, connector X170 pin 14, and ECU (792) connector pin 94.</li> </ol> </li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 4. Error Code 304 - Left-Front Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 304 - Left-Front Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check left-front wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. connector X167 pin 8, connector X171 pin 9, and ECU (792) connector pin 89.</li> </ol> </li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 4. Error Code 304 - Left-Front Wheel Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 304 - Left-Front Wheel Sensor Circuit Failure - Continued</b></p>	<p>b. connector X167 pin 9, connector X171 pin 10, and ECU (792) connector pin 34.</p> <p>c. connector X167 pin 10, connector X171 pin 11, connector X171 pin 14, and ECU (792) connector pin 95.</p>	

Table 5. Error Code 305 - Right-Front Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 305 - Right-Front Wheel Sensor Circuit Failure</b></p> 	<p>1. Check right-front wheel sensor and wire for damage.</p> <p>2. Check for continuity between the following connectors and chassis:</p> <p>a. connector X167 pin 4, connector X171 pin 4, and ECU (792) connector pin 138.</p> <p>b. connector X167 pin 5, connector X171 pin 5, and ECU (792) connector pin 33.</p> <p>c. connector X167 pin 6, connector X171 pin 6, and ECU (792) connector pin 91.</p>	<p>Replace sensor if damaged (WP 0103 00).</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, replace wheel sensor (WP 0103 00).</p>

Table 6. Error Code 306 - Right-Rear Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 306 - Right-Rear Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check right-rear wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. connector X192 pin 4, connector X170 pin 4, and ECU (792) connector pin 139.</li> <li>b. connector X192 pin 5, connector X170 pin 5, and ECU (792) connector pin 32.</li> <li>c. connector X192 pin 6, connector X170 pin 6, and ECU (792) connector pin 93.</li> </ol> </li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 7. Error Code 307 - Left-Rear Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 307 - Left-Rear Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check left-rear wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:</li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 7. Error Code 307 - Left-Rear Wheel Sensor Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 307 - Left-Rear Wheel Sensor Circuit Failure - Continued</b></p>	<p>a. connector X192 pin 11, connector X170 pin 12, and ECU (792) connector pin 140.</p> <p>b. connector X192 pin 12, connector X170 pin 13, and ECU (792) connector pin 31.</p> <p>c. connector X192 pin 13, connector X170 pin 14, connector X171 pin 14, and ECU (792) connector pin 95.</p>	

Table 8. Error Code 308 - Left-Front Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 308 - Left-Front Wheel Sensor Circuit Failure</b></p> 	<p>1. Check left-front wheel sensor and wire for damage.</p> <p>2. Check for continuity between the following connectors and chassis:</p> <p>a. connector X167 pin 11, connector X171 pin 12, and ECU (792) connector pin 141.</p> <p>b. connector X167 pin 12, connector X171 pin 13, and ECU (792) connector pin 30.</p> <p>c. connector X167 pin 13, connector X171 pin 14, and ECU (792) connector pin 95.</p>	<p>Replace sensor if damaged (WP 0103 00).</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. If continuity is present, replace wheel sensor (WP 0103 00).</p>



Table 9. Error Code 309 - Right-Front Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 309 - Right-Front Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check right-front wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. connector X167 pin 1, connector X171 pin 1, and ECU (792) connector pin 86.</li> <li>b. connector X167 pin 2, connector X171 pin 2, and ECU (792) connector pin 37.</li> <li>c. connector X167 pin 3, connector X171 pin 3, and ECU (792) connector pin 90.</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. connector X167 pin 4, connector X171 pin 4, and ECU (792) connector pin 138.</li> <li>b. connector X167 pin 5, connector X171 pin 5, and ECU (792) connector pin 33.</li> <li>c. connector X167 pin 6, connector X171 pin 6, and ECU (792) connector pin 91.</li> </ol> </li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 10. Error Code 310 - Right-Rear Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 310 - Right-Rear Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check right-rear wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. connector X192 pin 1, connector X170 pin 1, and ECU (792) connector pin 87.</li> <li>b. connector X192 pin 2, connector X170 pin 2, and ECU (792) connector pin 36.</li> <li>c. connector X192 pin 3, connector X170 pin 3, and ECU (792) connector pin 92.</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. connector X192 pin 4, connector X170 pin 4, and ECU (792) connector pin 139.</li> <li>b. connector X192 pin 5, connector X170 pin 5, and ECU (792) connector pin 32.</li> <li>c. connector X192 pin 6, connector X170 pin 6, and ECU (792) connector pin 93.</li> </ol> </li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 11. Error Code 311 - Left-Rear Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST or INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 311 - Left-Rear Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check left-rear wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. connector X192 pin 8, connector X170 pin 9, and ECU (792) connector pin 88.</li> <li>b. connector X192 pin 9, connector X170 pin 10, and ECU (792) connector pin 35.</li> <li>c. connector X192 pin 10, connector X170 pin 11, connector X170 pin 14, and ECU (792) connector pin 94.</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. connector X192 pin 11, connector X170 pin 12, and ECU (792) connector pin 140.</li> <li>b. connector X192 pin 12, connector X170 pin 13, and ECU (792) connector pin 31.</li> <li>c. connector X192 pin 13, connector X170 pin 14, and ECU (792) connector pin 94.</li> </ol> </li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 12. Error Code 312 - Left-Front Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 312 - Left-Front Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check left-front wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. connector X167 pin 8, connector X171 pin 9, and ECU (792) connector pin 89.</li> <li>b. connector X167 pin 9, connector X171 pin 10, and ECU (792) connector pin 34.</li> <li>c. connector X167 pin 10, connector X171 pin 11, connector X171 pin 14, and ECU (792) connector pin 95.</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. connector X167 pin 11, connector X171 pin 12, and ECU (792) connector pin 141.</li> <li>b. connector X167 pin 12, connector X171 pin 13, and ECU (792) connector pin 30.</li> <li>c. connector X167 pin 13, connector X171 pin 14, and ECU (792) connector pin 95.</li> </ol> </li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 13. Error Code 313 - Right-Front Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 313 - Right-Front Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check right-front wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. connector X167 pin 1, connector X171 pin 1, and ECU (792) connector pin 86.</li> <li>b. connector X167 pin 2, connector X171 pin 2, and ECU (792) connector pin 37.</li> <li>c. connector X167 pin 3, connector X171 pin 3, connector X171 pin 14, and ECU (792) connector pin 90.</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. connector X167 pin 4, connector X171 pin 4, and ECU (792) connector pin 138.</li> <li>b. connector X167 pin 5, connector X171 pin 5, and ECU (792) connector pin 33.</li> <li>c. connector X167 pin 6, connector X171 pin 6, and ECU (792) connector pin 91.</li> </ol> </li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 14. Error Code 314 - Right-Rear Wheel Sensor Circuit Failure Troubleshooting Procedures.


MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 314 - Right-Rear Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check right-rear wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. connector X192 pin 1, connector X170 pin 1, and ECU (792) connector pin 87.</li> <li>b. connector X192 pin 2, connector X170 pin 2, and ECU (792) connector pin 36.</li> <li>c. connector X192 pin 3, connector X170 pin 3, connector X170 pin 14, and ECU (792) connector pin 94.</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. connector X192 pin 4, connector X170 pin 4, and ECU (792) connector pin 139.</li> <li>b. connector X192 pin 5, connector X170 pin 5, and ECU (792) connector pin 32.</li> <li>c. connector X192 pin 6, connector X170 pin 6, and ECU (792) connector pin 93.</li> </ol> </li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 15. Error Code 315 - Left-Rear Wheel Sensor Circuit Failure Troubleshooting Procedures.



MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 315 - Left-Rear Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check left-rear wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. connector X192 pin 8, connector X170 pin 9, and ECU (792) connector pin 88.</li> <li>b. connector X192 pin 9, connector X170 pin 10, and ECU (792) connector pin 35.</li> <li>c. connector X192 pin 10, connector X170 pin 11, connector X170 pin 14, and ECU (792) connector pin 94.</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:               <ol style="list-style-type: none"> <li>a. connector X192 pin 11, connector X170 pin 12, and ECU (792) connector pin 140.</li> <li>b. connector X192 pin 12, connector X170 pin 13, and ECU (792) connector pin 31.</li> <li>c. connector X192 pin 13, connector X170 pin 14, and ECU (792) connector pin 94.</li> </ol> </li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

Table 16. Error Code 316 - Left-Front Wheel Sensor Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 316 - Left-Front Wheel Sensor Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check left-front wheel sensor and wire for damage.</li> <li>2. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. connector X167 pin 8, connector X171 pin 9, and ECU (792) connector pin 89.</li> <li>b. connector X167 pin 9, connector X171 pin 10, and ECU (792) connector pin 34.</li> <li>c. connector X167 pin 10, connector X171 pin 11, connector X171 pin 14, and ECU (792) connector pin 95.</li> </ol> </li> <li>3. Check for continuity between the following connectors and chassis:                             <ol style="list-style-type: none"> <li>a. connector X167 pin 11, connector X171 pin 12, and ECU (792) connector pin 141.</li> <li>b. connector X167 pin 12, connector X171 pin 13, and ECU (792) connector pin 30.</li> <li>c. connector X167 pin 13, connector X171 pin 14, and ECU (792) connector pin 95.</li> </ol> </li> </ol>	<p>Replace sensor if damaged (WP 0103 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, replace wheel sensor (WP 0103 00).</li> </ol>

END OF WORK PACKAGE



**HYDRAULIC SERVO SYSTEM ELECTRONIC CONTROL UNIT (ECU) (790) TROUBLESHOOTING 0036 00**

**THIS WORK PACKAGE COVERS**

Error Code 125 - Memory Failure

Error Code 142 - Internal Communication Failure

Error Code 141 - Internal Communication Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

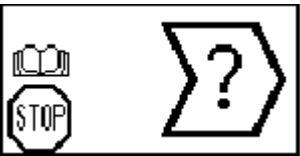
Current Supply (A34738.0200) (WP 0199 00-31)

ECS Electrical Servo (A34648.0200) (WP 0199 00-5)

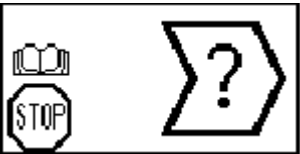
**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

**Table 1. Error Code 125 - Memory Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 125 - Memory Failure</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>Replace ECU (790) if error code is still present (WP 0079 00).</p>

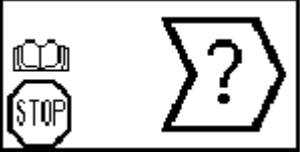
**Table 2. Error Code 141 - Internal Communication Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 141 - Internal Communication Failure</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>Replace ECU (790) if error code is still present (WP 0079 00).</p>

**HYDRAULIC SERVO SYSTEM ELECTRONIC CONTROL UNIT (ECU) (790)  
TROUBLESHOOTING - CONTINUED**

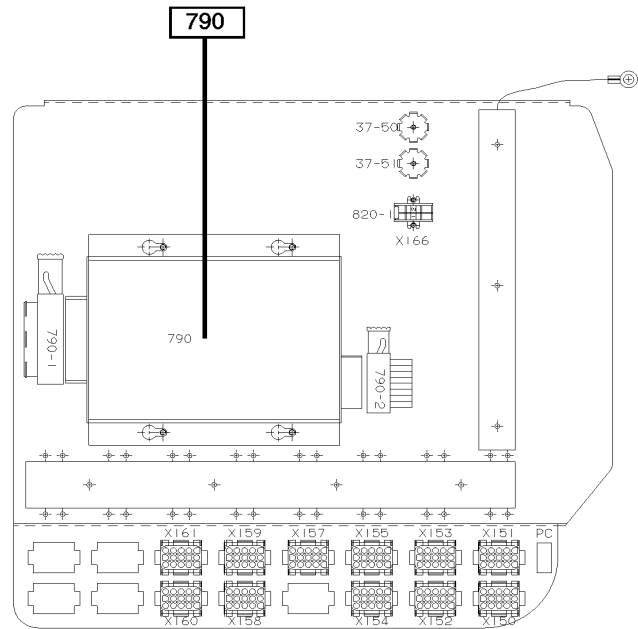
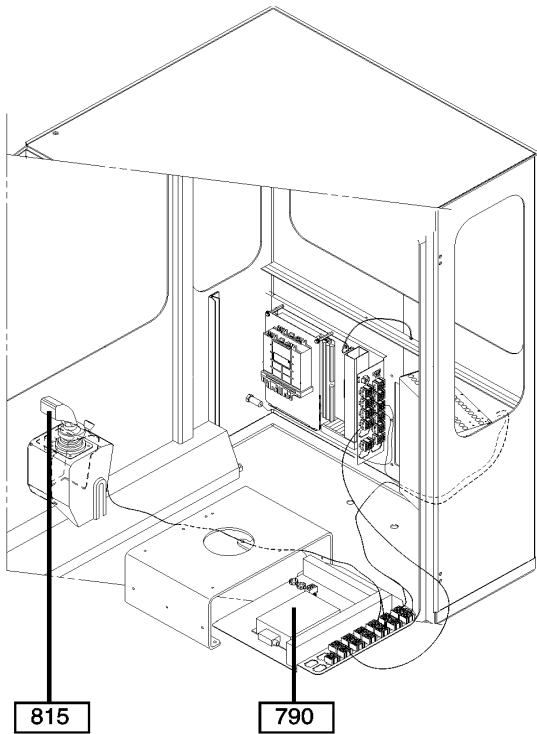
**0036 00**

**Table 3. Error Code 142 - Internal Communication Failure Troubleshooting Procedures.**

<b>MALFUNCTION</b>	<b>TEST OR INSPECTION</b>	<b>CORRECTIVE ACTION</b>
<p><b>Error Code 142 - Internal Communication Failure</b></p> 	<p>Place ignition switch in OFF position for 30 seconds and then back in ON position.</p>	<p>Replace ECU (790) if error code is still present (WP 0079 00).</p>

**HYDRAULIC SERVO SYSTEM ELECTRONIC CONTROL UNIT (ECU) (790)  
TROUBLESHOOTING - CONTINUED**

0036 00



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**END OF WORK PACKAGE**

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**AUXILIARY PUMP TROUBLESHOOTING**

**0037 00**

**THIS WORK PACKAGE COVERS**

Error Code 169 - Tophandler Emergency Function Supply Valve, Open or Short Circuit Failure

Error Code 417 - Auxiliary Pump, Input from Switch Failure

Error Code 411 - Auxiliary Pump, Control Current Short Circuit Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

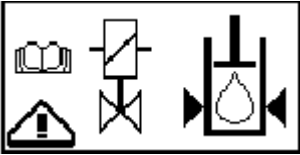
ECS Electrical Servo (A34648.0200) (WP 0199 00-5)

Auxiliary Pump (A34746.0200) (WP 0199 00-47)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

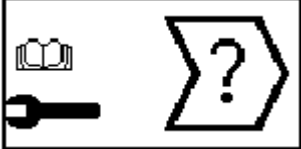
**Table 1. Error Code 169 - Tophandler Emergency Function Supply Valve, Open or Short Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 169 - Tophandler Emergency Function Supply Valve, Open or Short Circuit Failure</b></p>  <pre> DIAG SERVO 12 (13) VALVES OUTPUT/INPUT ATTACH. 0.00V 0mA PUMP OFF 0.00V 0mA                     </pre>	<ol style="list-style-type: none"> <li>1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check ECU (790) connector 2 and tray grounding leads for proper connections.</li> <li>3. Disconnect electrical connector from tophandler supply valve solenoid 6041, located under cab on frame rail, and perform voltage check.</li> </ol>	<ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <ol style="list-style-type: none"> <li>a. If 20-25V is present at connector 6041, replace tophandler supply valve solenoid (WP 0169 00).</li> <li>b. If no voltage is present, continue troubleshooting.</li> </ol>

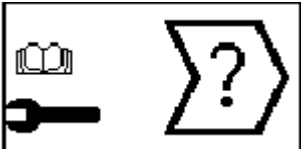
**Table 1. Error Code 169 - Tophandler Emergency Function Supply Valve, Open or Short Circuit Failure Troubleshooting Procedures - Continued.**

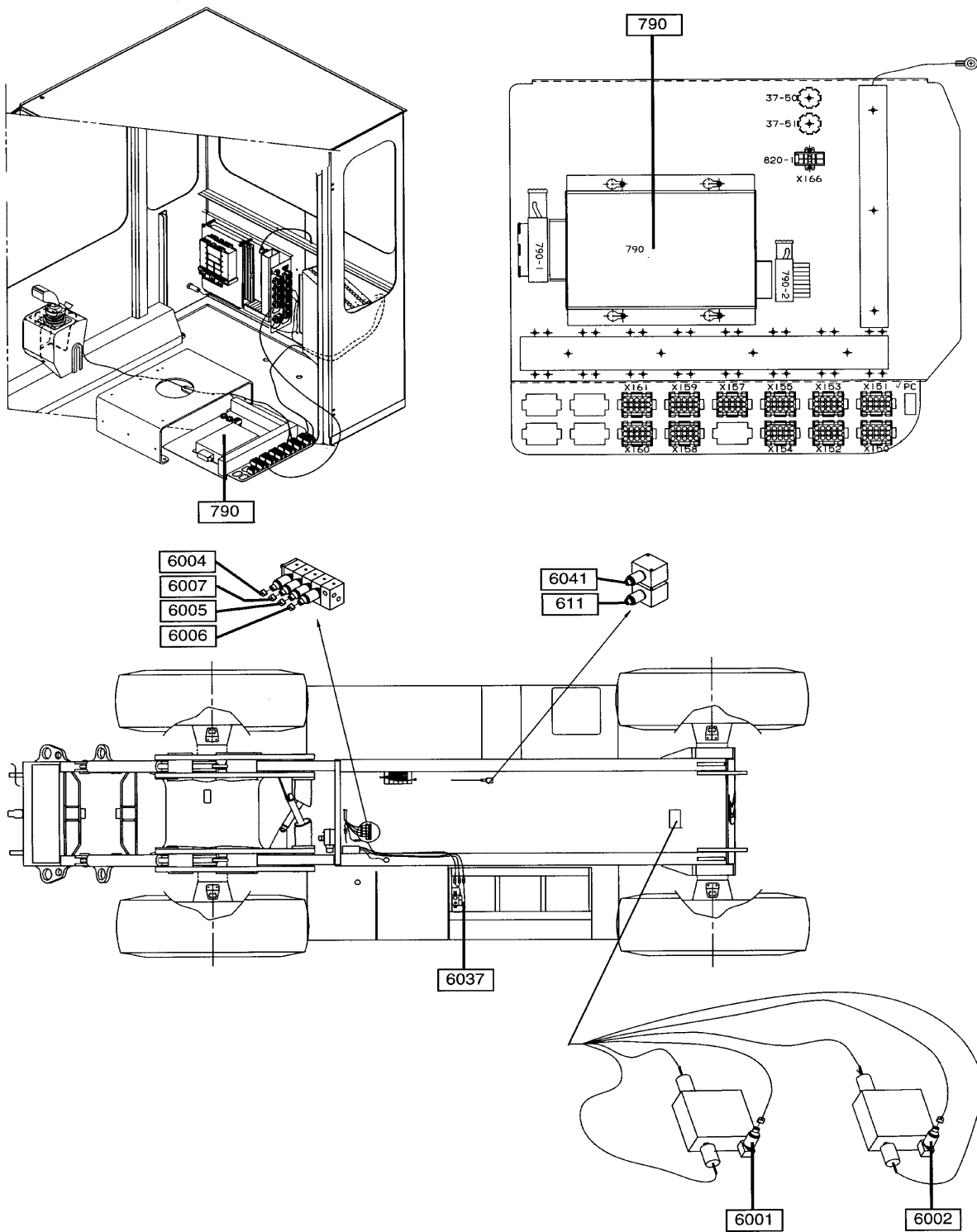
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 169 - Tophandler Emergency Function Supply Valve, Open or Short Circuit Failure - Continued</b></p>	<p>4. Check continuity between connector X158 pin 11 and solenoid 6041 connector pin 1 and between connector X158 pin 12 and solenoid 6041 connector pin 2.</p> <p>5. Disconnect connector X158. Check continuity between ECU (790) connector 2 pin 14 and connector X158 pin 12. Check continuity between ECU (790) connector 2 pin 10 and connector X159 pin 1 and between connector X159 pin 1 and connector X158 pin 11.</p> <p>6. Disconnect connector X158. Check continuity between ECU (790) connector 2 pin 14 and connector X158 pin 12. Check continuity between ECU (790) connector 2 pin 10 and connector X159 pin 1 and between connector X159 pin 1 and connector X158 pin 11.</p> <p>7. Enter “DIAG SERVO 12 (13)” menu and check voltage of ATTACH. OUTPUT. Voltage should be present with auxiliary pump activated and any tophandler function activated.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>If voltage is not as specified, replace ECU (790) (WP 0079 00).</p>

**Table 2. Error Code 411 - Auxiliary Pump, Control Current Short Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 411 - Auxiliary Pump, Control Current Short Circuit Failure</b></p> 	<p>Check continuity between connector X174 pin 5 and connector X46 pin 9 and connector XK3 pin 8 and pin 5.</p>	<p>a. If continuity between pins, repair or replace connectors (WP 0111 00).                      b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).                      c. If continuity is present, notify SRA.</p>

**Table 3. Error Code 417 - Auxiliary Pump, Input from Switch Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 417 - Auxiliary Pump, Input from Switch Failure</b></p> 	<p>Check continuity between connector X174 pin 4 and connector X47 pin 4 and connector X67 pin 2 and emergency pump switch 122 pin 1.</p>	<p>a. If continuity between pins, repair or replace connectors (WP 0111 00).                      b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).                      c. If continuity is present, notify SRA.</p>



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END OF WORK PACKAGE



**THIS WORK PACKAGE COVERS**

Error Code 172 - Hydraulic Piston Pump Cut-Off, Open or Short Circuit Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

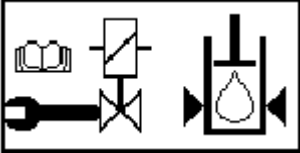
Current Supply (A34738.0200) (WP 0199 00-31)

ECS Electrical Servo (A34648.0200) (WP 0199 00-5)

**NOTE**

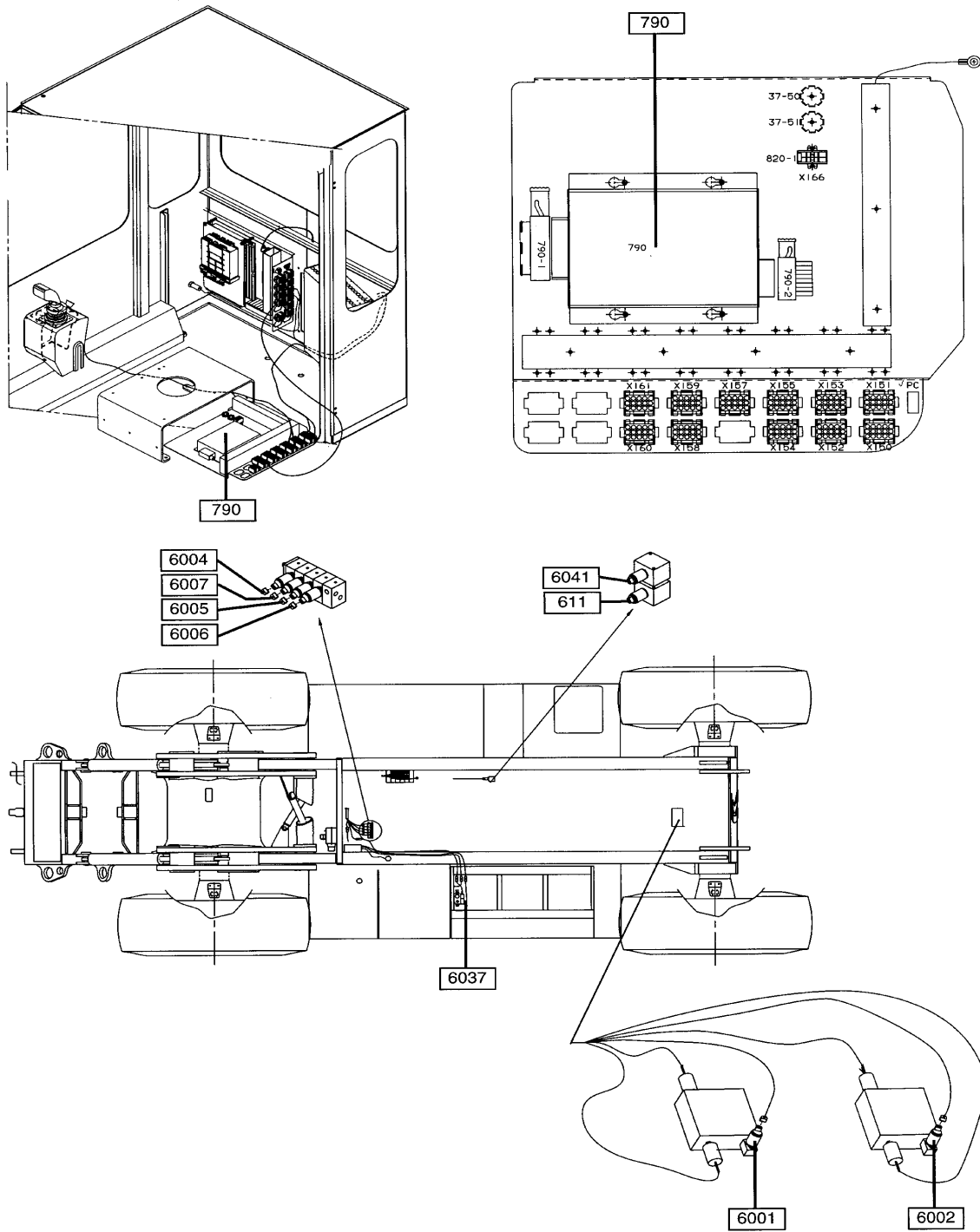
- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

**Table 1. Error Code 172 - Hydraulic Piston Pump Cut-Off, Open or Short Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 172 - Hydraulic Piston Pump Cut-Off, Open or Short Circuit Failure</b></p>  <div style="border: 1px solid black; padding: 5px;"> <p>TEST OR INSPECTION- EXTRA FUNCT. 2 (13)</p> <p>CUT-OFF THE 0 HYDRAULIC PUMP</p> </div>	<ol style="list-style-type: none"> <li>1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check ECU (790) connector 2 and ECU tray grounding leads for proper connection.</li> <li>3. Access "EXTRA FUNC. 2 (13)" menu and test pump cutoff function.</li> <li>4. Disconnect electrical connector from pump cut-off valve solenoid 611 and perform voltage check at connector 611.</li> </ol>	<ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <ol style="list-style-type: none"> <li>a. If cutoff function does not work, proceed to step 4.</li> <li>b. If cutoff function works, proceed to step 10.</li> </ol> <p>If 20-25V are present at connector 611, replace pump cut-off valve solenoid (WP 0169 00).</p>

**Table 1. Error Code 172 - Hydraulic Piston Pump Cut-Off, Open or Short Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 172 - Hydraulic Piston Pump Cut-Off, Open or Short Circuit Failure - Continued</b></p>	<p>5. If voltage was not present in step 3, check continuity between connector X158 pin 13 and solenoid 611 connector pin 1 and between connector X158 pin 14 and solenoid (611) connector pin 2.</p> <p>6. Disconnect connector X158 located under driver's seat.</p> <p>7. Check continuity between connector 611 pin 1 and pin 2 and between connector 611 pin 1 and pin 2 and chassis.</p> <p>8. Check continuity between ECU (790) connector 2 pin 6 and connector X158 pin 14 and between ECU (790) connector 2 pin 10 and connector X159 pin 1.</p> <p>9. Check continuity between connector X159 pin 1 and connector X158 pin 13.</p> <p>10. Enter "DIAG SERVO 12(13)" menu and check PUMP OFF OUTPUT voltage. Voltage should be present with override switch activated more than 2 seconds.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>a. If continuity is present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>If voltage is not as specified, replace ECU (790) (WP 0079 00).</p>



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END OF WORK PACKAGE

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**THIS WORK PACKAGE COVERS**

Error Code 1 - Boom Hydraulic System Sensor Indicating Clogged Filter  
 Error Code 2 - Steering Hydraulic System Sensor Indicating Clogged Filter  
 Error Code 3 - Tophandler Hydraulic System Sensor Indicating Clogged Filter  
 Error Code 4 - Hydraulic Reservoir Return Sensor Indicating Clogged Filter  
 Error Code 432 - Boom Hydraulic System Filter Sensor, Broken Circuit Failure

Error Code 433 - Steering Hydraulic System Filter Sensor, Broken Circuit Failure  
 Error Code 434 - Tophandler Hydraulic System Filter Sensor, Broken Circuit Failure  
 Error Code 435 - Hydraulic Reservoir Return System Filter Sensor, Broken Circuit Failure  
 Error Code 786 - Transmission Hydraulic System Filter Sensor Indicating Clogged Filter

**INITIAL SETUP**

**References**

TM 10-3930-675-10  
 ECS Hydraulics (A34654.0200) (WP 0199 00-29)

**Equipment Condition**

Cab moved to transport position (TM 10-3930-675-10)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

**Table 1. Error Code 1 - Boom Hydraulic System Sensor Indicating Clogged Filter Troubleshooting Procedures.**

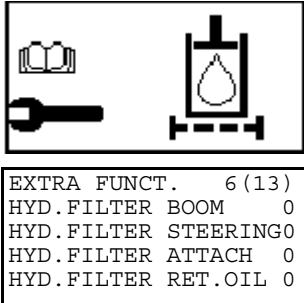
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 1 - Boom Hydraulic System Sensor Indicating Clogged Filter</b></p>  <p>EXTRA FUNCT. 6(13)                      HYD. FILTER BOOM 0                      HYD. FILTER STEERING 0                      HYD. FILTER ATTACH 0                      HYD. FILTER RET.OIL 0</p>		<p>Replace filters (WP 0183 00).</p>

Table 2. Error Code 2 - Steering Hydraulic System Sensor Indicating Clogged Filter Troubleshooting Procedures.

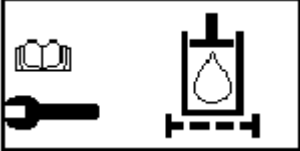
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 2 - Steering Hydraulic System Sensor Indicating Clogged Filter</b></p>  <table border="1"> <tr> <td>EXTRA FUNCT.</td> <td>6 (13)</td> </tr> <tr> <td>HYD.FILTER BOOM</td> <td>0</td> </tr> <tr> <td>HYD.FILTER STEERING</td> <td>0</td> </tr> <tr> <td>HYD.FILTER ATTACH</td> <td>0</td> </tr> <tr> <td>HYD.FILTER RET.OIL</td> <td>0</td> </tr> </table>	EXTRA FUNCT.	6 (13)	HYD.FILTER BOOM	0	HYD.FILTER STEERING	0	HYD.FILTER ATTACH	0	HYD.FILTER RET.OIL	0		<p>Replace filters (WP 0183 00).</p>
EXTRA FUNCT.	6 (13)											
HYD.FILTER BOOM	0											
HYD.FILTER STEERING	0											
HYD.FILTER ATTACH	0											
HYD.FILTER RET.OIL	0											

Table 3. Error Code 3 - Tophandler Hydraulic System Sensor Indicating Clogged Filter Troubleshooting Procedures.

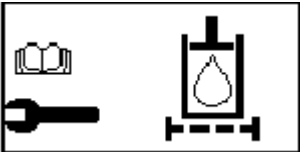
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 3 - Tophandler Hydraulic System Sensor Indicating Clogged Filter</b></p>  <table border="1"> <tr> <td>EXTRA FUNCT.</td> <td>6 (13)</td> </tr> <tr> <td>HYD.FILTER BOOM</td> <td>0</td> </tr> <tr> <td>HYD.FILTER STEERING</td> <td>0</td> </tr> <tr> <td>HYD.FILTER ATTACH</td> <td>0</td> </tr> <tr> <td>HYD.FILTER RET.OIL</td> <td>0</td> </tr> </table>	EXTRA FUNCT.	6 (13)	HYD.FILTER BOOM	0	HYD.FILTER STEERING	0	HYD.FILTER ATTACH	0	HYD.FILTER RET.OIL	0		<p>Replace filters (WP 0183 00).</p>
EXTRA FUNCT.	6 (13)											
HYD.FILTER BOOM	0											
HYD.FILTER STEERING	0											
HYD.FILTER ATTACH	0											
HYD.FILTER RET.OIL	0											

Table 4. Error Code 4 - Hydraulic Reservoir Return Sensor Indicating Clogged Filter Troubleshooting Procedures.

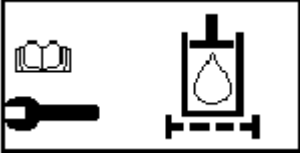
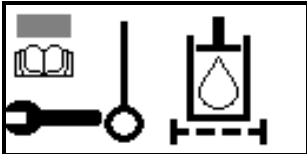
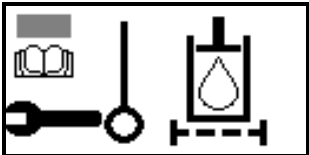
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 4 - Hydraulic Reservoir Return Sensor Indicating Clogged Filter</b></p>  <table border="1"> <tr> <td>EXTRA FUNCT.</td> <td>6 (13)</td> </tr> <tr> <td>HYD. FILTER BOOM</td> <td>0</td> </tr> <tr> <td>HYD. FILTER STEERING</td> <td>0</td> </tr> <tr> <td>HYD. FILTER ATTACH</td> <td>0</td> </tr> <tr> <td>HYD. FILTER RET.OIL</td> <td>0</td> </tr> </table>	EXTRA FUNCT.	6 (13)	HYD. FILTER BOOM	0	HYD. FILTER STEERING	0	HYD. FILTER ATTACH	0	HYD. FILTER RET.OIL	0		<p>Replace filters (WP 0183 00).</p>
EXTRA FUNCT.	6 (13)											
HYD. FILTER BOOM	0											
HYD. FILTER STEERING	0											
HYD. FILTER ATTACH	0											
HYD. FILTER RET.OIL	0											

Table 5. Error Code 432 - Boom Hydraulic System Filter Sensor, Broken Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 432 - Boom Hydraulic System Filter Sensor, Broken Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Inspect sensor 755-1 and wires between sensor and junction box X198 for damage.</li> <li>2. Check continuity between junction box X198 pin 4 and connector X195 pin 1.</li> <li>3. Check continuity between junction box X198 pin 1 and connector X195 pin 9.</li> <li>4. Check continuity between connector X195 pin 1 and ECU (792) connector pin X154.</li> </ol>	<p>If wires or sensor are damaged, replace sensor (WP 0102 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol>

**Table 6. Error Code 433 - Steering Hydraulic System Filter Sensor, Broken Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 433 - Steering Hydraulic System Filter Sensor, Broken Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Inspect sensor 755-2 and wires between sensor and junction box X198 for damage.</li> <li>2. Check continuity between junction box X198 pin 5 and connector X195 pin 2.</li> <li>3. Check continuity between junction box X198 pin 1 and connector X195 pin 9.</li> <li>4. Check continuity between connector X195 pin 2 and ECU (792) connector pin X153.</li> </ol>	<p>If wires or sensor are damaged, replace sensor (WP 0102 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol>



**Table 7. Error Code 434 - Tophandler Hydraulic System Filter Sensor, Broken Circuit Failure Troubleshooting Procedures.**

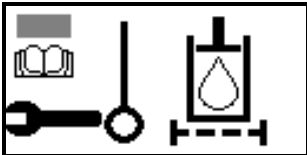
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 434 - Tophandler Hydraulic System Filter Sensor, Broken Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Inspect sensor 755-3 and wires between sensor and junction box X198 for damage.</li> <li>2. Check continuity between junction box X198 pin 6 and connector X195 pin 3.</li> <li>3. Check continuity between junction box X198 pin 1 and connector X195 pin 9.</li> <li>4. Check continuity between connector X195 pin 3 and ECU (792) connector pin X152.</li> </ol>	<p>If wires or sensor are damaged, replace sensor (WP 0102 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol>

Table 8. Error Code 435 - Hydraulic Reservoir Return System Filter Sensor, Broken Circuit Failure Troubleshooting Procedures.

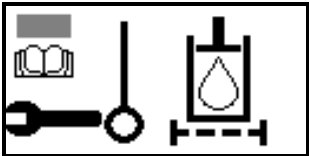
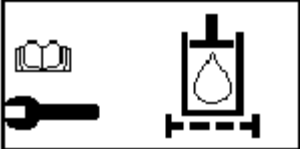
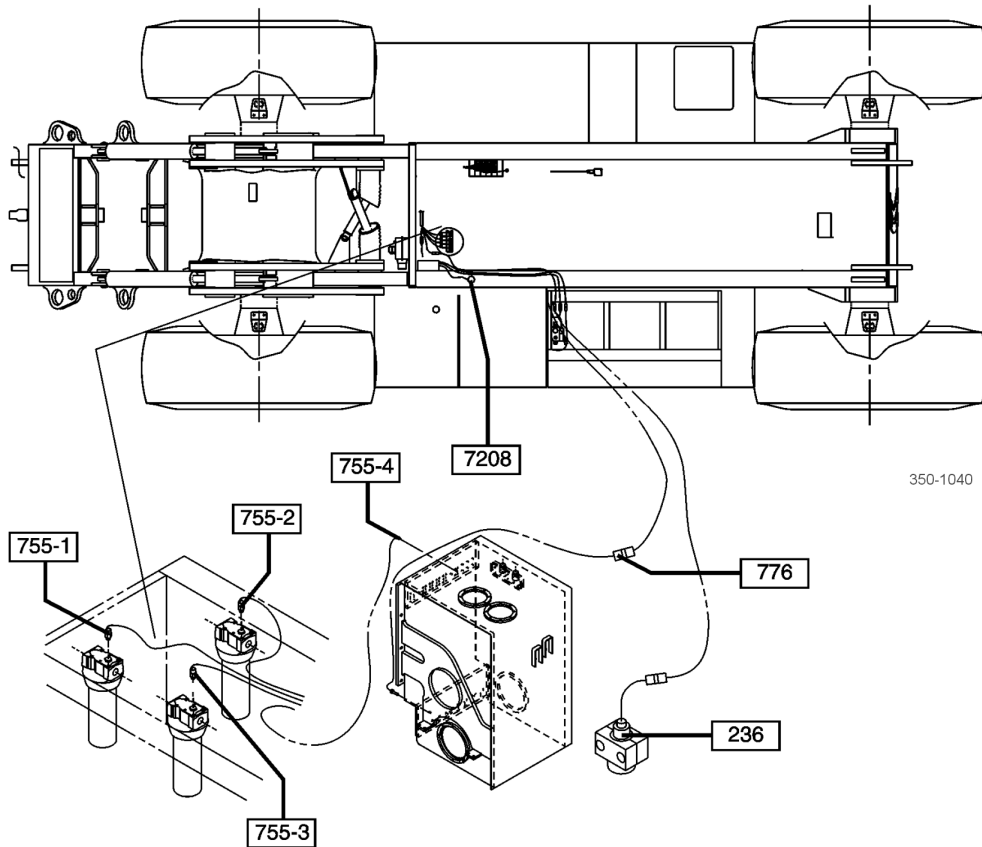
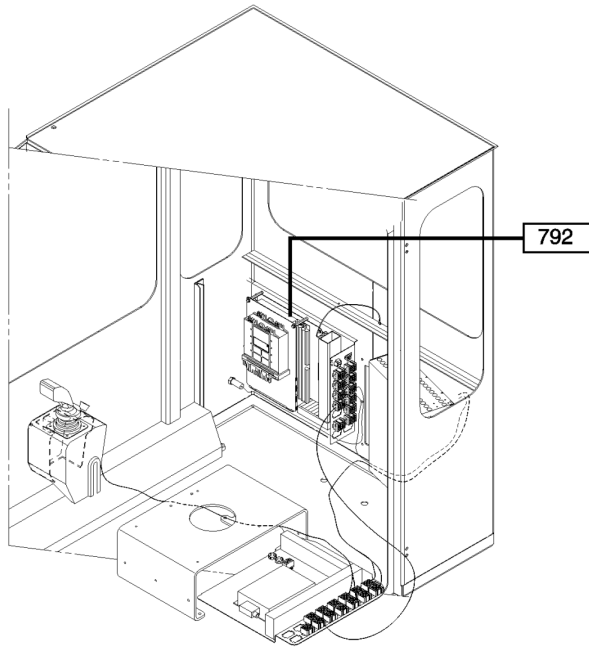
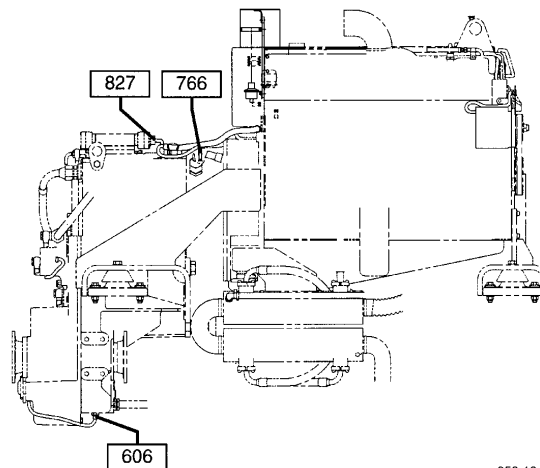
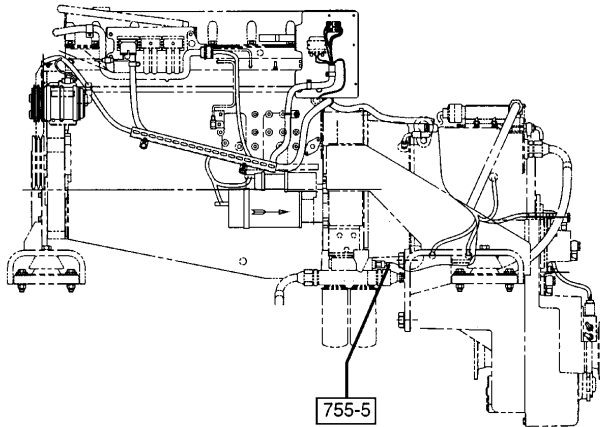
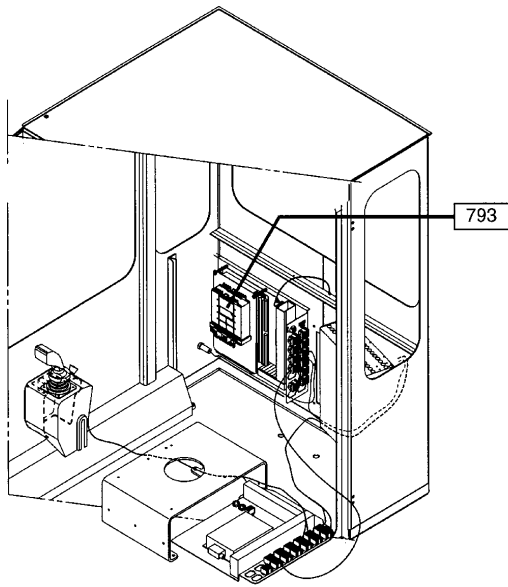
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 435 - Hydraulic Reservoir Return System Filter Sensor, Broken Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Inspect sensor 755-4 and wires between sensor and junction box X198 for damage.</li> <li>2. Check continuity between junction box X198 pin 7 and connector X195 pin 4.</li> <li>3. Check continuity between junction box X198 pin 1 and connector X195 pin 9.</li> <li>4. Check continuity between connector X195 pin 4 and ECU (792) connector pin X151.</li> </ol>	<p>If wires or sensor are damaged, replace sensor (WP 0101 00).</p> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol> <ol style="list-style-type: none"> <li>a. If continuity between pins, repair or replace connectors (WP 0111 00).</li> <li>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</li> <li>c. If continuity is present, notify SRA.</li> </ol>

Table 9. Error Code 786 - Transmission Hydraulic System Sensor Indicating Clogged Filter Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION										
<p><b>Error Code 786 - Transmission Hydraulic System Sensor Indicating Clogged Filter</b></p>  <table border="1"> <tr> <td>EXTRA FUNCT.</td> <td>6 (13)</td> </tr> <tr> <td>HYD. FILTER BOOM</td> <td>0</td> </tr> <tr> <td>HYD. FILTER STEERING</td> <td>0</td> </tr> <tr> <td>HYD. FILTER ATTACH</td> <td>0</td> </tr> <tr> <td>HYD. FILTER RET. OIL</td> <td>0</td> </tr> </table>	EXTRA FUNCT.	6 (13)	HYD. FILTER BOOM	0	HYD. FILTER STEERING	0	HYD. FILTER ATTACH	0	HYD. FILTER RET. OIL	0		<p>Replace filters (WP 0115 00).</p>
EXTRA FUNCT.	6 (13)											
HYD. FILTER BOOM	0											
HYD. FILTER STEERING	0											
HYD. FILTER ATTACH	0											
HYD. FILTER RET. OIL	0											





350-1041

END OF WORK PACKAGE

**BOOM LIFTING/LOWERING TROUBLESHOOTING**

**0040 00**

**THIS WORK PACKAGE COVERS**

- Error Code 126 - Joystick-to-ECU (790) Failure
- Error Code 130 - Overload Protection System Failure
- Error Code 151 - Lift Cylinder Locking Valve, Wiring Circuit Failure
- Error Code 152 - Lift Cylinder Locking Valve, Component Failure
- Error Code 154 - Lift Cylinder Boom Up Valve, Wiring Circuit Failure

- Error Code 155 - Lift Cylinder Boom Up Valve, Component Failure
- Error Code 157 - Lift Cylinder Boom Down Valve, Wiring Circuit Failure
- Error Code 158 - Lift Cylinder Boom Down Valve, Component Failure

**INITIAL SETUP**

**References**

- TM 10-3930-675-10
- Current Supply (A34738.0200) (WP 0199 00-31)
- ECS Electrical Servo (A34648.0200) (WP 0199 00-5)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

**Table 1. Error Code 126 - Joystick-to-ECU (790) Failure Troubleshooting Procedures.**

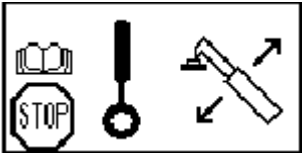
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION						
<p><b>Error Code 126 - Joystick-to-ECU (790) Failure</b></p>  <table border="1"> <tr> <td>DIAG SERVO</td> <td>5 (13)</td> </tr> <tr> <td>LIFT/LOWER</td> <td>5.00V</td> </tr> <tr> <td>BOOM IN/OUT</td> <td>5.00V</td> </tr> </table>	DIAG SERVO	5 (13)	LIFT/LOWER	5.00V	BOOM IN/OUT	5.00V	<ol style="list-style-type: none"> <li>1. Enter “DIAG SERVO 5 (13)” menu and check LIFT/LOWER voltage. If voltage is out of range, perform the following steps:                             <ol style="list-style-type: none"> <li>a. Remove ECU (790) cover from operator’s seat base and slide ECU mounting tray out (WP 0079 00).</li> </ol> </li> </ol>	
DIAG SERVO	5 (13)							
LIFT/LOWER	5.00V							
BOOM IN/OUT	5.00V							

Table 1. Error Code 126 - Joystick-to-ECU (790) Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 126 - Joystick-to-ECU (790) Failure - Continued</b></p>	<p>b. Check ECU (790) connector 1 and tray grounding leads for proper connections.</p> <p>c. Check voltage between connector X155 pin 1 and pin 13.</p> <p>d. If voltage in step c was not the same as on the “DIAG SERVO 5 (13)” menu, check continuity between ECU (790) connector 1 pin 9 and connector X155 pin 1 and between ECU (790) connector 1 pin 26 and connector X155 pin 13.</p> <p>e. Remove joystick cover and disconnect connector from joystick.</p> <p>f. Check continuity between joystick connector pin 9 and connector X155 pin 12 and between connector X155 pin 12 and connector X155 pin 14.</p> <p>g. Check continuity between connector X155 pin 14 and ECU (790) connector 1 pin 27 and between joystick connector pin 10 and connector X155 pin 13.</p> <p>h. Check continuity between joystick connector pin 8 and connector X155 pin 1.</p>	<p>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</p> <p>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>

Table 1. Error Code 126 - Joystick-to-ECU (790) Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 126 - Joystick-to-ECU (790) Failure - Continued</b></p>	<ul style="list-style-type: none"> <li>i. Check resistance of joystick potentiometer: at joystick pin 9 to joystick pin 10 should be 1.1-1.4k ohms; joystick pin 9 to joystick pin 8 should be 1.7-2.0k ohms; joystick pin 8 to joystick pin 10 should be 1.7-2.0k ohms.</li> <li>2. Enter “DIAG SERVO 5 (13)” menu and check voltage of LIFT/LOWER. If voltage reads 5V, perform the following steps.                             <ul style="list-style-type: none"> <li>a. Slowly move joystick forward and backward and observe voltage on menu. Voltage should be 1-10V.</li> <li>b. Remove ECU (790) cover from operator’s seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>c. Remove joystick cover.</li> <li>d. Check ECU (790) connector 1 and tray grounding leads and joystick connector X155 for proper connections.</li> </ul> </li> </ul>	<p>If resistance is not as specified, replace joystick (WP 0081 00).</p> <p>If voltage suddenly goes out of range when joystick is moved, replace joystick (WP 0081 00).</p> <ul style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ul>

Table 2. Error Code 130 - Overload Protection System Failure Troubleshooting Procedures.


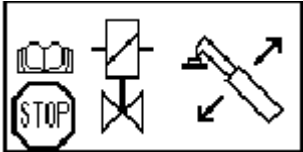
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 130 - Overload Protection System Failure</b></p> 	<p>Overload protection system failure occurs due to an earlier failure (error codes 131-136) on any component related to the overload protection system. Hydraulic speeds are limited and the error code will flash on the display every 5 seconds.</p>	<p>Perform troubleshooting procedures for the original error code (error codes 131-136).</p>

Table 3. Error Code 151 - Lift Cylinder Locking Valve, Wiring Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 151 - Lift Cylinder Locking Valve, Wiring Circuit Failure</b></p>  <div style="border: 1px solid black; padding: 5px;"> <p>DIAG SERVO 11(13)                  OUTPUT/INPUT                  FAN 0mA 0mA                  BL. VALVE 0.00V 0mA</p> </div>	<ol style="list-style-type: none"> <li>1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check ECU (790) connector 2 and tray grounding leads for proper connection.</li> <li>3. Disconnect electrical leads 6001 from right lift cylinder locking valve solenoid and perform voltage check. Voltage should be 0V with joystick in neutral position and 20-25V with joystick activated to lower boom.</li> </ol>	<p>Release emergency stop switch (TM 10-3930-675-10) as required.</p> <ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <p>If voltage is as specified, replace lift cylinder locking valve solenoid (WP 0169 00).</p>



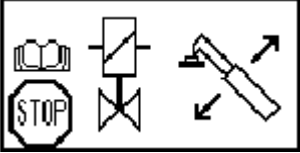
**Table 3. Error Code 151 - Lift Cylinder Locking Valve, Wiring Circuit Failure  
Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 151 - Lift Cylinder Locking Valve, Wiring Circuit Failure - Continued</b></p>	<p>4. Disconnect electrical leads 6002 from left lift cylinder locking valve solenoid and perform voltage check. Voltage should be 0V with joystick in neutral position and 20-25V with joystick activated to lower boom.</p> <p>5. Remove engine cover and forward junction box X167 cover.</p> <p>6. Perform voltage check between junction box X167 pin 14 and pin 15. Voltage should be 0V with joystick in neutral position and 20-25V with joystick activated to lower boom.</p> <p>7. Perform voltage check between connector X159 pin 2 and pin 1. Voltage should be 0V with joystick in neutral position and 20-25V with joystick activated to lower boom.</p> <p>8. Check continuity between ECU (790) connector 2 pin 10 and connector X159 pin 1 and between ECU (790) connector 2 pin 3 and connector X159 pin 2.</p> <p>9. Perform voltage check at connector X154 pin 3.</p> <p>a. If 20-25V is present, check continuity between connector X154 pin 3 and ECU (790) connector 2 pin 9.</p> <p>b. If voltage is not present, check continuity between connector X154 pin 3 and emergency stop switch 250 pin 2.</p>	<p>If voltage is as specified, replace lift cylinder locking valve solenoid (WP 0169 00).</p> <p>a. If voltage is as specified, repair or replace connectors at junction box X167 (WP 0111 00).</p> <p>b. Replace locking valve solenoids (6001 and 6002) if voltage is as specified (WP 0169 00).</p> <p>If voltage is as specified, repair or replace connectors and connectors between junction box (X167) and connector (X159) (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>

**Table 3. Error Code 151 - Lift Cylinder Locking Valve, Wiring Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 151 - Lift Cylinder Locking Valve, Wiring Circuit Failure - Continued</b>	10. Enter "DIAG SERVO 11 (13)" menu and check BL. VALVE voltage. Voltage should be 20-25V with joystick activated to lower boom.	If voltage is not as specified, replace ECU (790) (WP 0079 00).

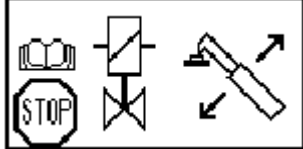
**Table 4. Error Code 152 - Lift Cylinder Locking Valve, Component Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<p><b>Error Code 152 - Lift Cylinder Locking Valve, Component Failure</b></p>  <table border="1"> <tr> <td>DIAG SERVO</td> <td>11 (13)</td> <td></td> </tr> <tr> <td></td> <td>OUTPUT/INPUT</td> <td></td> </tr> <tr> <td>FAN</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>BL. VALVE</td> <td>0.00V</td> <td>0mA</td> </tr> </table>	DIAG SERVO	11 (13)			OUTPUT/INPUT		FAN	0mA	0mA	BL. VALVE	0.00V	0mA	<ol style="list-style-type: none"> <li>1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check ECU (790) connector 2 and tray grounding leads for proper connection.</li> <li>3. Disconnect electrical leads 6001 from right lift cylinder locking valve solenoid and perform voltage check. Voltage should be 0V with joystick in neutral position and 20-25V with joystick activated to lower boom.</li> </ol>	<ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <p>If voltage is as specified, replace lift cylinder locking valve solenoid (WP 0169 00).</p>
DIAG SERVO	11 (13)													
	OUTPUT/INPUT													
FAN	0mA	0mA												
BL. VALVE	0.00V	0mA												

**Table 4. Error Code 152 - Lift Cylinder Locking Valve, Component Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 152 - Lift Cylinder Locking Valve, Component Failure - Continued</b></p>	<p>4. Remove engine cover and forward junction box X167 cover.</p> <p>5. Ensure that ignition switch is in OFF position. Disconnect electrical leads from junction box X167 pin 14 and pin 15. Check wires from 6001 and 6002 to junction box X167 for damage and continuity. Check for continuity to chassis and continuity between black and gray wires.</p> <p>6. Connect wires at junction box X167.</p> <p>7. Disconnect connector X159 and check continuity between pin 1 and pin 2 on lower connector part. Check continuity between pin 1 and chassis and pin 2 and chassis.</p> <p>8. Check continuity between ECU (790) connector 2 pin 10 and connector X159 pin 1. Check continuity between ECU (790) connector 2 pin 3 and connector X159 pin 2.</p> <p>9. Enter "DIAG SERVO 11 (13)" menu and check voltage of BL.VALVE. Voltage should be 20-25V with joystick activated to lower boom.</p>	<p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>c. Replace locking valve solenoids (6001 and 6002) if voltage is as specified (WP 0169 00).</p> <p>If continuity is present, repair or replace cable from connector X159 to junction box X167 (WP 0111 00).</p> <p>a. If continuity between pins, repair or replace connectors (WP 0111 00).</p> <p>b. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>If voltage is not as specified, replace ECU (790) (WP 0079 00).</p>

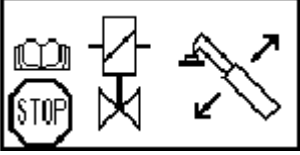
Table 5. Error Code 154 - Lift Cylinder Boom Up Valve, Wiring Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<p><b>Error Code 154 - Lift Cylinder Boom Up Valve, Wiring Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG</td> <td>SERVO</td> <td>9 (13)</td> </tr> <tr> <td></td> <td>OUTPUT/INPUT</td> <td></td> </tr> <tr> <td>LIFT</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>LOWER</td> <td>0mA</td> <td>0mA</td> </tr> </table>	DIAG	SERVO	9 (13)		OUTPUT/INPUT		LIFT	0mA	0mA	LOWER	0mA	0mA	<ol style="list-style-type: none"> <li>1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check ECU (790) connector 2 and tray grounding leads for proper connection.</li> <li>3. Check voltage between connector X158 pin 1 and pin 2. If voltage is not present, check continuity between: ECU (790) connector 2 pin 11 and connector X158 pin 2; between ECU (790) connector 2 pin 10 and connector X159 pin 1; and between connector X159 pin 1 and connector X158 pin 1.</li> <li>4. Perform voltage check at connector X154 pin 3.             <ol style="list-style-type: none"> <li>a. If 20-25V is present, check continuity between connector X154 pin 3 and ECU (790) connector 2 pin 9.</li> <li>b. If voltage is not present, check continuity between connector X154 pin 3 and emergency stop switch (250) pin 2.</li> </ol> </li> <li>5. Move operator's cab to transport position and remove transmission access covers (WP 0135 00).</li> </ol>	<ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>
DIAG	SERVO	9 (13)												
	OUTPUT/INPUT													
LIFT	0mA	0mA												
LOWER	0mA	0mA												

**Table 5. Error Code 154 - Lift Cylinder Boom Up Valve, Wiring Circuit Failure  
Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 154 - Lift Cylinder Boom Up Valve, Wiring Circuit Failure - Continued</b></p>	<p>6. Disconnect electrical connector from boom up solenoid 6005 and perform voltage check.</p> <p>a. Confirm 20-25V are present at connector 6005.</p> <p>b. If voltage is not present, check continuity between connector X158 pin 1 and solenoid 6005 connector pin 1 and between connector X158 pin 2 and solenoid 6005 connector pin 2.</p> <p>7. Enter “DIAG SERVO 9 (13)” menu and check current of OUTPUT LIFT. Current should be present with joystick activated to raise boom.</p>	<p>If 20-25V are present at connector 6005, replace boom up solenoid (WP 0169 00).</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>If voltage is not as specified, replace ECU (790) (WP 0079 00).</p>

Table 6. Error Code 155 - Lift Cylinder Boom Up Valve, Component Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<p><b>Error Code 155 - Lift Cylinder Boom Up Valve, Component Failure</b></p>  <table border="1"> <tr> <td>DIAG</td> <td>SERVO</td> <td>9 (13)</td> </tr> <tr> <td></td> <td>OUTPUT/INPUT</td> <td></td> </tr> <tr> <td>LIFT</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>LOWER</td> <td>0mA</td> <td>0mA</td> </tr> </table>	DIAG	SERVO	9 (13)		OUTPUT/INPUT		LIFT	0mA	0mA	LOWER	0mA	0mA	<ol style="list-style-type: none"> <li>1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check ECU (790) connector 2 and tray grounding leads for proper connection.</li> <li>3. Move operator's cab to transport position and remove transmission rear access cover (WP 0135 00).</li> <li>4. Disconnect electrical connector 6005 from boom up solenoid. Error code 154 will now show. Perform voltage check at connector 6005.</li> <li>5. Ensure that ignition switch is in OFF position. Disconnect connector X158 located under driver's seat.</li> <li>6. Check continuity between connector 6005 pin 1 and pin 2. Check continuity between connector 6005 pin 1 and chassis and connector 6005 pin 2 and chassis.</li> <li>7. Check continuity between connector X158 pin 2 and ECU (790) connector 2 pin 11. Check continuity between ECU (790) connector 2 pin 10 and connector X159 pin 1.</li> </ol>	<ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <p>If 20-25V is present at connector 6005, replace boom up solenoid (WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>
DIAG	SERVO	9 (13)												
	OUTPUT/INPUT													
LIFT	0mA	0mA												
LOWER	0mA	0mA												

**Table 6. Error Code 155 - Lift Cylinder Boom Up Valve, Component Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 155 - Lift Cylinder Boom Up Valve, Component Failure - Continued</b>	8. Check continuity between connector X159 pin 1 and connector X158 pin 1.  9. Enter "DIAG SERVO 9 (13)" menu and check current of OUTPUT LIFT. Current should be present with joystick activated to raise boom.	If continuity is not present, repair or replace connectors (WP 0111 00).  If current is not present, replace ECU (790) (WP 0079 00).

**Table 7. Error Code 157 - Lift Cylinder Boom Down Valve, Wiring Circuit Failure Troubleshooting Procedures.**

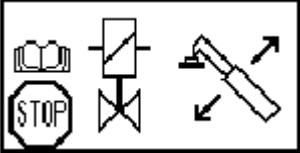
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<b>Error Code 157 - Lift Cylinder Boom Down Valve, Wiring Circuit Failure</b>   <table border="1"> <tr> <td>DIAG SERVO</td> <td>9 (13)</td> <td></td> </tr> <tr> <td></td> <td>OUTPUT/INPUT</td> <td></td> </tr> <tr> <td>LIFT</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>LOWER</td> <td>0mA</td> <td>0mA</td> </tr> </table>	DIAG SERVO	9 (13)			OUTPUT/INPUT		LIFT	0mA	0mA	LOWER	0mA	0mA	1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).  2. Check ECU (790) connector 2 and tray grounding leads for proper connection.  3. Perform voltage check between connector X158 pin 3 and pin 4. If voltage is not present, perform the following continuity checks:  a. Check continuity between ECU (790) connector 2 pin 4 and connector X158 pin 4 and between ECU (790) connector 2 pin 10 and connector X159 pin 1.	a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.  b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.  If continuity is not present, repair or replace connectors (WP 0111 00).
DIAG SERVO	9 (13)													
	OUTPUT/INPUT													
LIFT	0mA	0mA												
LOWER	0mA	0mA												

Table 7. Error Code 157 - Lift Cylinder Boom Down Valve, Wiring Circuit Failure  
 Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 157 - Lift Cylinder Boom Down Valve, Wiring Circuit Failure - Continued</b></p>	<p>b. Check continuity between connector X159 pin 1 and connector X158 pin 3.</p> <p>4. Perform voltage check at connector block X154 pin 3.</p> <p>a. If 20-25V is present, check continuity between connector X154 pin 3 and ECU (790) connector 2 pin 9.</p> <p>b. If no voltage is present, check continuity between connector X154 pin 3 and emergency stop switch 250 pin 2.</p> <p>5. Move operator's cab to transport position and remove transmission rear access cover (WP 0135 00).</p> <p>6. Disconnect electrical connector from boom down solenoid 6004 and perform voltage check. If voltage is not present, perform the following continuity checks.</p> <p>    Check continuity between connector X158 pin 3 and solenoid 6004 connector pin 1 and between connector X158 pin 4 and solenoid 6004 connector pin 2.</p> <p>7. Enter "DIAG SERVO 9 (13)" menu and check current of OUTPUT LOWER. Current should be present with joystick activated to lower boom.</p>	<p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6004, replace boom down solenoid (WP 0169 00).</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>If current is not present, replace ECU (790) (WP 0079 00).</p>



Table 8. Error Code 158 - Lift Cylinder Boom Down Valve, Component Failure Troubleshooting Procedures.

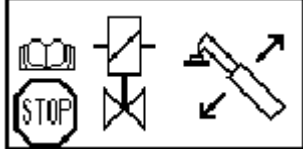
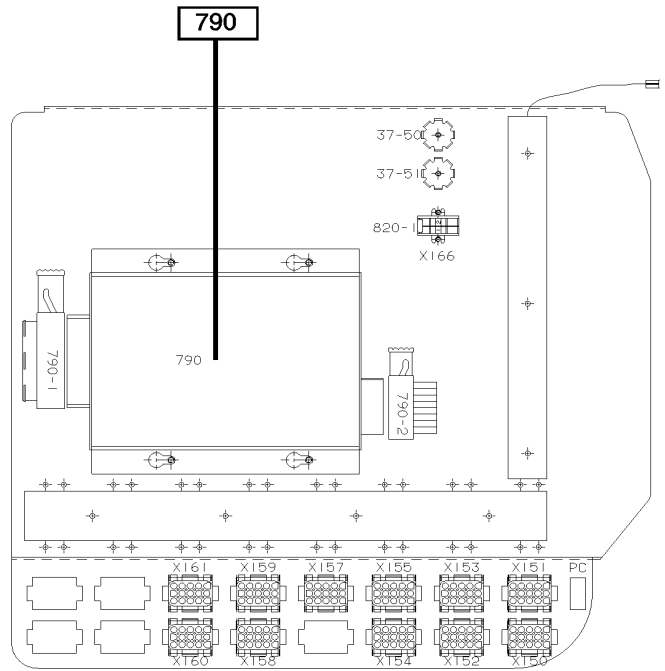
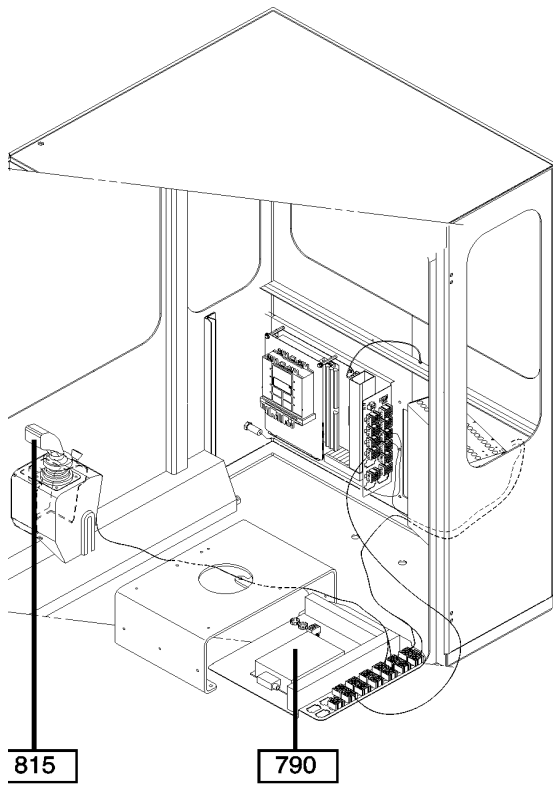
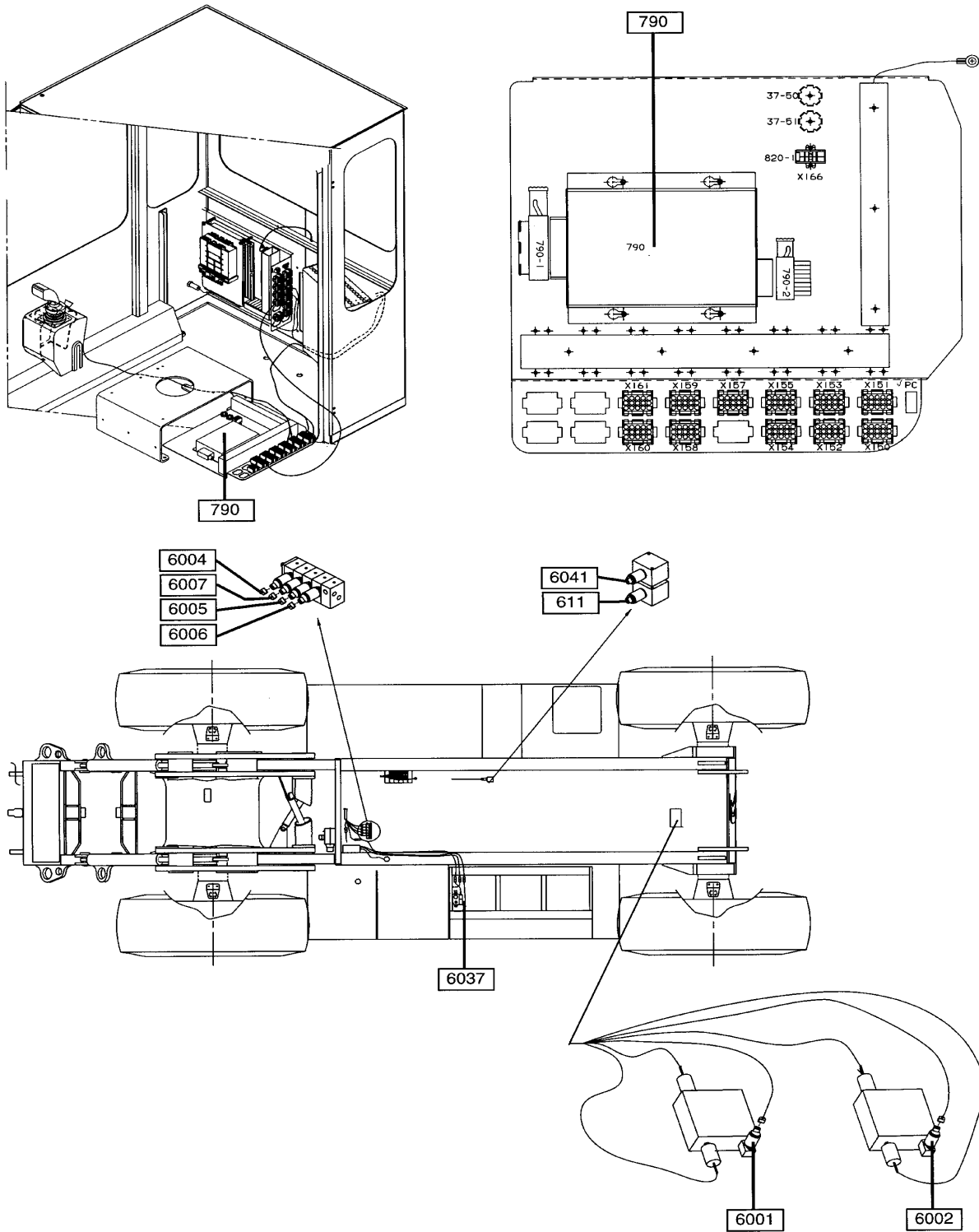
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<p><b>Error Code 158 - Lift Cylinder Boom Down Valve, Component Failure</b></p>  <table border="1"> <tr> <td>DIAG</td> <td>SERVO</td> <td>9 (13)</td> </tr> <tr> <td colspan="3">OUTPUT/INPUT</td> </tr> <tr> <td>LIFT</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>LOWER</td> <td>0mA</td> <td>0mA</td> </tr> </table>	DIAG	SERVO	9 (13)	OUTPUT/INPUT			LIFT	0mA	0mA	LOWER	0mA	0mA	<ol style="list-style-type: none"> <li>1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check ECU (790) connector 2 and tray grounding leads for proper connection.</li> <li>3. Move operator's cab to transport position and remove transmission rear access cover (WP 0135 00).</li> <li>4. Disconnect electrical connector from boom down solenoid 6004. Error code 157 will now show. Perform voltage check at solenoid 6004 connector.</li> <li>5. Ensure that ignition switch is in OFF position. Disconnect connector X158 located under driver's seat.</li> <li>6. Check continuity between connector 6004 pin 1 and pin 2 and between connector 6004 pin 1 and chassis and connector 6005 pin 2 and chassis.</li> <li>7. Check continuity between connector X158 pin 4 and ECU (790) connector 2 pin 4 and between ECU (790) connector 2 pin 10 and connector X159 pin 1.</li> </ol>	<ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <p>If 20-25V is present at solenoid 6004 connector, replace boom down solenoid (WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>
DIAG	SERVO	9 (13)												
OUTPUT/INPUT														
LIFT	0mA	0mA												
LOWER	0mA	0mA												

Table 8. Error Code 158 - Lift Cylinder Boom Down Valve, Component Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 158 - Lift Cylinder Boom Down Valve, Component Failure - Continued</b></p>	<p>8. Check continuity between connector X159 pin 1 and connector X158 pin 3.</p> <p>9. Enter "DIAG SERVO 9 (13)" menu and check current of OUTPUT LOWER. Current should be present with joystick activated to lower boom.</p>	<p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If current is not present, replace ECU (790) (WP 0079 00).</p>



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END OF WORK PACKAGE

**THIS WORK PACKAGE COVERS**

Error Code 127 - Joystick-to-ECU (790) Failure

Error Code 130 - Overload Protection System Failure

Error Code 160 - Extension Cylinder Boom IN Control, Wiring Circuit Failure

Error Code 161 - Extension Cylinder Boom IN Control, Component Failure

Error Code 163 - Extension Cylinder Boom OUT Control, Wiring Circuit Failure

Error Code 164 - Extension Cylinder Boom OUT Control, Component Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

ECS Electrical Servo (A34648.0200) (WP 0199 00-5)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

**Table 1. Error Code 127 - Joystick-to-ECU (790) Failure Troubleshooting Procedures.**

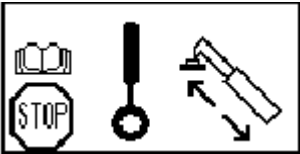
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION						
<p><b>Error Code 127 - Joystick-to-ECU (790) Failure</b></p>  <table border="1"> <tr> <td>DIAG SERVO</td> <td>5 (13)</td> </tr> <tr> <td>LIFT/LOWER</td> <td>5.00V</td> </tr> <tr> <td>BOOM IN/OUT</td> <td>5.00V</td> </tr> </table>	DIAG SERVO	5 (13)	LIFT/LOWER	5.00V	BOOM IN/OUT	5.00V	<p>1. Enter “DIAG SERVO 5 (13)” menu and check BOOM IN/OUT voltage. If voltage is out of range, perform the following steps:</p> <p>a. Remove ECU (790) cover from operator’s seat base and slide ECU mounting tray out (WP 0079 00).</p>	
DIAG SERVO	5 (13)							
LIFT/LOWER	5.00V							
BOOM IN/OUT	5.00V							

Table 1. Error Code 127 - Joystick-to-ECU (790) Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 127 - Joystick-to-ECU (790) Failure - Continued</b></p>	<p>b. Check ECU (790) connector 1 and tray grounding leads for proper connections.</p> <p>c. Check voltage between connector X155 pin 2 and pin 13.</p> <p>d. If voltage in step c was not the same as in the “DIAG SERVO 5 (13)” menu, check continuity between ECU (790) connector 1 pin 10 and connector X155 pin 2 and between ECU (790) connector 1 pin 26 and connector X155 pin 13.</p> <p>e. Remove joystick cover and disconnect connector from joystick.</p> <p>f. Check continuity between joystick connector pin 9 and connector X155 pin 12 and between connector X155 pin 12 and connector X155 pin 14.</p> <p>g. Check continuity between connector X155 pin 14 and ECU (790) connector 1 pin 27 and between joystick connector pin 10 and connector X155 pin 13.</p> <p>h. Check continuity between joystick connector pin 4 and connector X155 pin 2.</p>	<p>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</p> <p>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>

Table 1. Error Code 127 - Joystick-to-ECU (790) Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 127 - Joystick-to-ECU (790) Failure - Continued</b></p>	<ul style="list-style-type: none"> <li>i. Check resistance of joystick potentiometer: joystick pin 9 to joystick pin 10 should be 1.1-1.4k ohms; joystick pin 9 to joystick pin 4 should be 1.7-2.0k ohms; joystick pin 4 to joystick pin 10 should be 1.7-2.0k ohms.</li> <li>j. Replace ECU (790) (WP 0079 00).</li> <li>2. Enter "DIAG SERVO 5 (13)" menu and check voltage of BOOM IN/OUT. If voltage reads 5V, perform the following steps.                             <ul style="list-style-type: none"> <li>a. Slowly move joystick right and left and observe voltage on menu. Voltage should be 1-9V.</li> <li>b. Remove ECU (computer 790) cover from operator's seat base and slide ECU mounting tray out.</li> <li>c. Remove joystick cover.</li> <li>d. Check ECU (790) connector 1 and tray grounding leads and joystick connector X155 for proper connections.</li> </ul> </li> </ul>	<p>If resistance is not as specified, replace joystick (WP 0081 00).</p> <p>If voltage suddenly goes out of range when joystick is moved, replace joystick (WP 0081 00).</p> <ul style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ul>

Table 2. Error Code 130 - Overload Protection System Failure Troubleshooting Procedures.


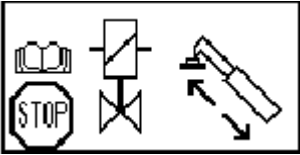
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 130 - Overload Protection System Failure</b></p> 	<p>Overload protection system failure occurs due to an earlier failure (error codes 131-136) on any component related to the overload protection system. Hydraulic speeds are limited and the error code will flash on the display every 5 seconds.</p>	<p>Perform troubleshooting procedures for the original error code (error codes 131-136).</p>

Table 3. Error Code 160 - Extension Cylinder Boom IN Control, Wiring Circuit Failure Troubleshooting Procedures.

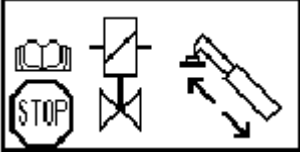
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION																
<p><b>Error Code 160 - Extension Cylinder Boom IN Control, Wiring Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG</td> <td>SERVO</td> <td>10 (13)</td> <td></td> </tr> <tr> <td></td> <td></td> <td>OUTPUT/INPUT</td> <td></td> </tr> <tr> <td>BOOM IN</td> <td>0mA</td> <td>0mA</td> <td></td> </tr> <tr> <td>BOOM OUT</td> <td>0mA</td> <td>0mA</td> <td></td> </tr> </table>	DIAG	SERVO	10 (13)				OUTPUT/INPUT		BOOM IN	0mA	0mA		BOOM OUT	0mA	0mA		<ol style="list-style-type: none"> <li>1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check ECU (790) connector 2 and tray grounding leads for proper connection.</li> <li>3. Check voltage (20-25V) between connector X158 pin 5 and pin 6. If voltage is not present, check continuity between: ECU (790) connector 2 pin 12 and connector X158 pin 6; between ECU (790) connector 2 pin 10 and connector X159 pin 1; and between connector X159 pin 1 and connector X158 pin 5.</li> </ol>	<ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>
DIAG	SERVO	10 (13)																
		OUTPUT/INPUT																
BOOM IN	0mA	0mA																
BOOM OUT	0mA	0mA																



**Table 3. Error Code 160 - Extension Cylinder Boom IN Control, Wiring Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 160 - Extension Cylinder Boom IN Control, Wiring Circuit Failure - Continued</b></p>	<p>4. Perform voltage check at connector X154 pin 3.</p> <p>a. If 20-25V is present, check continuity between connector X154 pin 3 and ECU (790) connector 2 pin 9.</p> <p>b. If voltage is not present, check continuity between connector X154 pin 3 and emergency stop switch 250 pin 2.</p> <p>5. Move operator's cab to transport position and remove transmission rear access cover (WP 0135 00).</p> <p>6. Disconnect electrical connector from boom in solenoid 6007 and perform voltage check.</p> <p>a. Confirm 20-25V are present at connector 6007.</p> <p>b. If voltage is not present, check continuity between connector X158 pin 5 and solenoid 6007 connector pin 1 and between connector X158 pin 6 and solenoid 6007 connector pin 2.</p> <p>7. Enter "DIAG SERVO 10 (13)" menu and check current of BOOM IN. Current should be present with joystick activated to move boom in.</p>	<p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If 20-25V are present at connector 6007, replace boom in solenoid (WP 0169 00).</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>If voltage is not as specified, replace ECU (790) (WP 0079 00).</p>

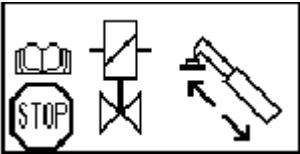
Table 4. Error Code 161 - Extension Cylinder Boom IN Control, Component Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION																
<p><b>Error Code 161 - Extension Cylinder Boom IN Control, Component Failure</b></p>  <table border="1"> <tr> <td>DIAG</td> <td>SERVO</td> <td>10 (13)</td> <td></td> </tr> <tr> <td></td> <td></td> <td>OUTPUT/INPUT</td> <td></td> </tr> <tr> <td>BOOM IN</td> <td>0mA</td> <td>0mA</td> <td></td> </tr> <tr> <td>BOOM OUT</td> <td>0mA</td> <td>0mA</td> <td></td> </tr> </table>	DIAG	SERVO	10 (13)				OUTPUT/INPUT		BOOM IN	0mA	0mA		BOOM OUT	0mA	0mA		<ol style="list-style-type: none"> <li>1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check ECU (790) connector 2 and tray grounding leads for proper connection.</li> <li>3. Move operator's cab to transport position and remove transmission rear access cover (WP 0135 00).</li> <li>4. Disconnect electrical connector 6007 from boom in solenoid. Error code 160 will now show. Perform voltage check at connector 6007.</li> <li>5. Ensure that ignition switch is in OFF position. Disconnect connector X158 located under driver's seat.</li> <li>6. Check continuity between connector 6007 pin 1 and pin 2. Check continuity between connector 6005 pin 1 and chassis and connector 6005 pin 2 and chassis.</li> <li>7. Check continuity between connector X158 pin 6 and ECU (790) connector 2 pin 12. Check continuity between ECU (790) connector 2 pin 10 and connector X159 pin 1.</li> </ol>	<ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <p>If 20-25V is present at connector 6005, replace boom in solenoid (WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>
DIAG	SERVO	10 (13)																
		OUTPUT/INPUT																
BOOM IN	0mA	0mA																
BOOM OUT	0mA	0mA																

**Table 4. Error Code 161 - Extension Cylinder Boom IN Control, Component Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 161 - Extension Cylinder Boom IN Control, Component Failure - Continued</b>	8. Check continuity between connector X159 pin 1 and connector X158 pin 5.  9. Enter "DIAG SERVO 10 (13)" menu and check current of OUTPUT BOOM IN. Current should be present with joystick activated to move boom in.	If continuity is not present, repair or replace connectors (WP 0111 00).  If current is not present, replace ECU (790) (WP 0079 00).

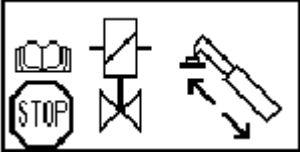
**Table 5. Error Code 163 - Extension Cylinder Boom OUT Control, Wiring Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<b>Error Code 163 - Extension Cylinder Boom OUT Control, Wiring Circuit Failure</b>   <table border="1"> <tr> <td>DIAG SERVO</td> <td>10 (13)</td> <td></td> </tr> <tr> <td>OUTPUT</td> <td></td> <td>INPUT</td> </tr> <tr> <td>BOOM IN</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>BOOM OUT</td> <td>0mA</td> <td>0mA</td> </tr> </table>	DIAG SERVO	10 (13)		OUTPUT		INPUT	BOOM IN	0mA	0mA	BOOM OUT	0mA	0mA	1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).  2. Check ECU (790) connector 2 and tray grounding leads for proper connection.  3. Check voltage (20-25V) between connector X158 pin 7 and pin 8. If voltage is not present, perform the following continuity checks. <ul style="list-style-type: none"> <li>a. Check continuity between ECU (790) connector 2 pin 5 and connector X158 pin 8 and between ECU (790) connector 2 pin 10 and connector X159 pin 1.</li> </ul>	<ul style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ul> If continuity is not present, repair or replace connectors (WP 0111 00).
DIAG SERVO	10 (13)													
OUTPUT		INPUT												
BOOM IN	0mA	0mA												
BOOM OUT	0mA	0mA												

**Table 5. Error Code 163 - Extension Cylinder Boom OUT Control, Wiring Circuit Failure Troubleshooting Procedures - Continued.**

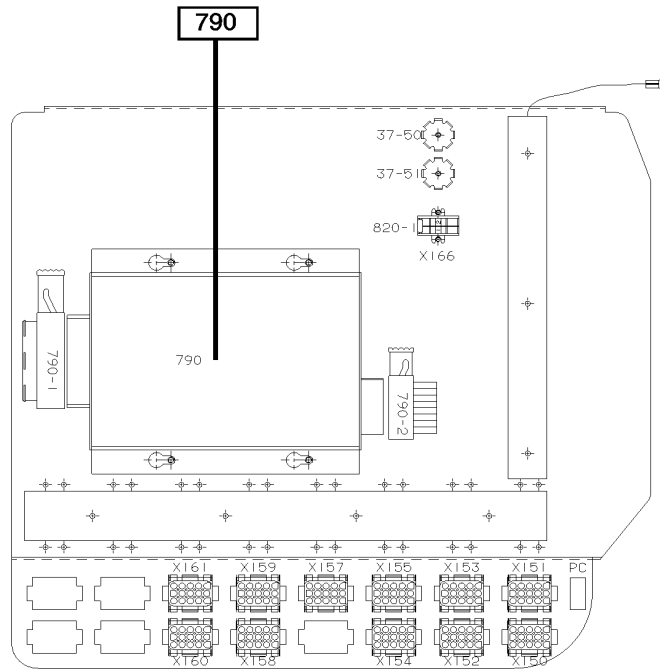
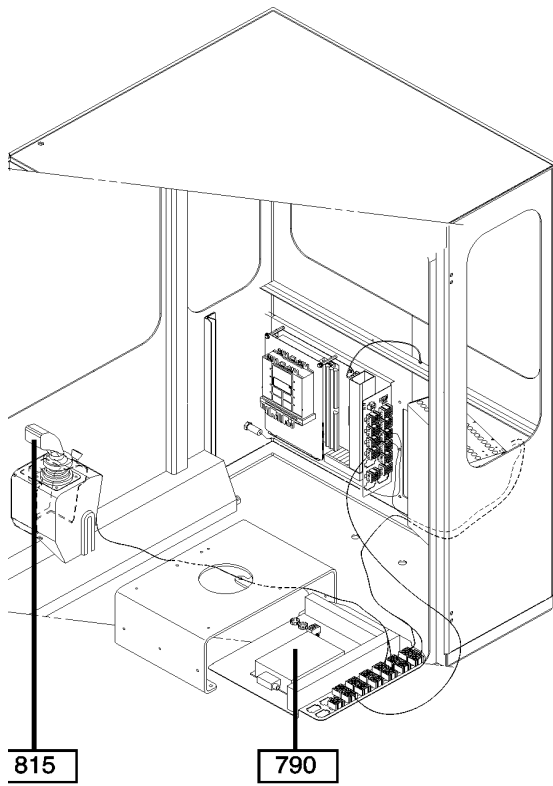
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 163 - Extension Cylinder Boom OUT Control, Wiring Circuit Failure - Continued</b></p>	<p>b. Check continuity between connector X159 pin 1 and connector X158 pin 7.</p> <p>4. Perform voltage check at connector block X154 pin 3.</p> <p>a. If 20-25V is present, check continuity between connector X154 pin 3 and ECU (790) connector 2 pin 9.</p> <p>b. If no voltage is present, check continuity between connector X154 pin 3 and emergency stop switch 250 pin 2.</p> <p>5. Move operator's cab to transport position and remove transmission rear access cover (WP 0135 00).</p> <p>6. Disconnect electrical connector from boom out solenoid 6006 and perform voltage check. If voltage is not present, perform the following continuity checks.</p> <p>    Check continuity between connector X158 pin 7 and solenoid 6006 connector pin 1 and between connector X158 pin 8 and solenoid 6006 connector pin 2.</p> <p>7. Enter "DIAG SERVO 10 (13)" menu and check current of OUTPUT BOOM OUT. Current should be present with joystick activated to move boom out.</p>	<p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6006, replace boom out solenoid (WP 0169 00).</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify SRA.</p> <p>If current is not present, replace ECU (790) (WP 0079 00).</p>

**Table 6. Error Code 164 - Extension Cylinder Boom OUT Control, Component Failure Troubleshooting Procedures.**

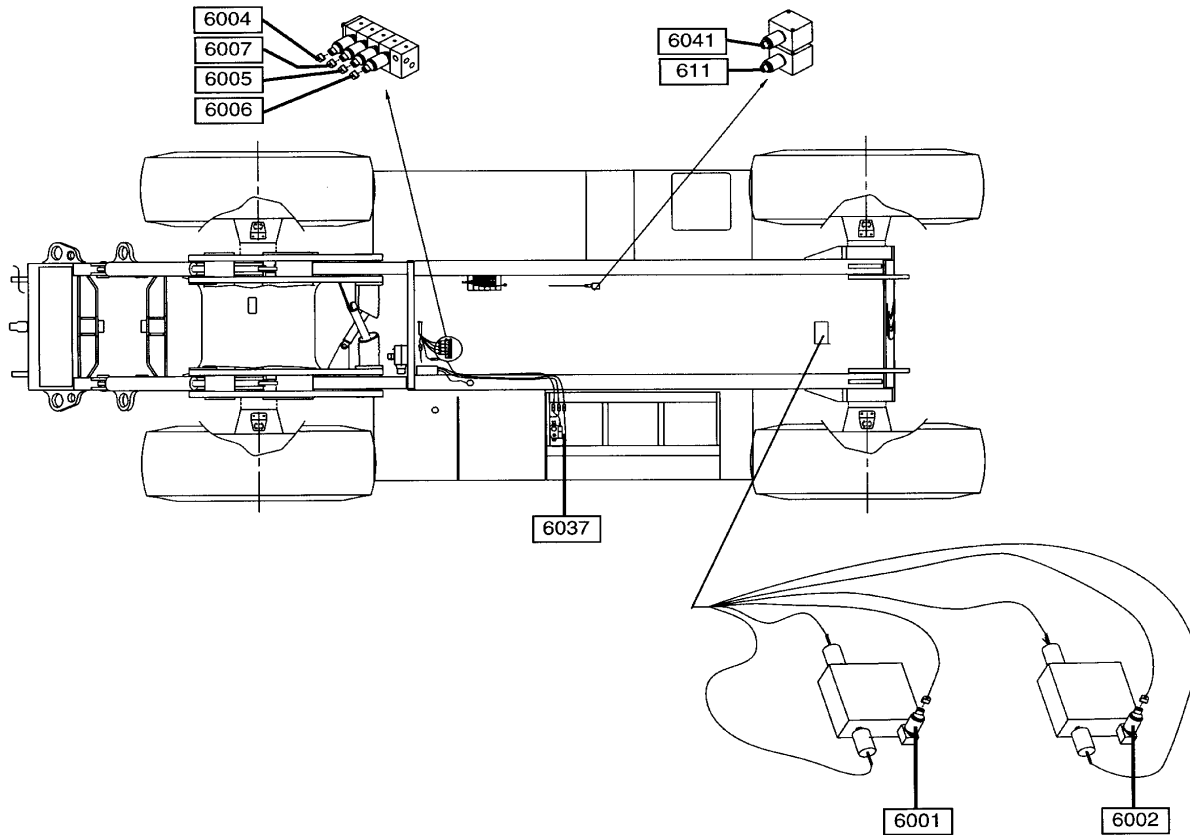
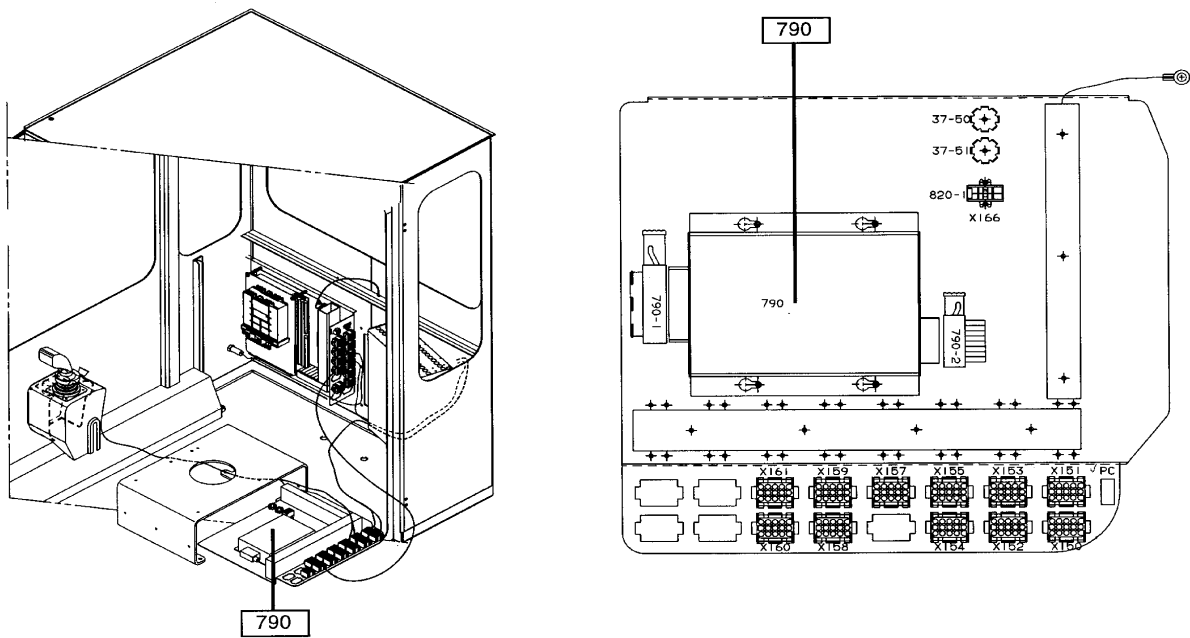
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION																
<p><b>Error Code 164 - Extension Cylinder Boom OUT Control, Component Failure</b></p>  <table border="1"> <tr> <td>DIAG</td> <td>SERVO</td> <td>10 (13)</td> <td></td> </tr> <tr> <td></td> <td></td> <td>OUTPUT/INPUT</td> <td></td> </tr> <tr> <td>BOOM IN</td> <td>0mA</td> <td>0mA</td> <td></td> </tr> <tr> <td>BOOM OUT</td> <td>0mA</td> <td>0mA</td> <td></td> </tr> </table>	DIAG	SERVO	10 (13)				OUTPUT/INPUT		BOOM IN	0mA	0mA		BOOM OUT	0mA	0mA		<ol style="list-style-type: none"> <li>1. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>2. Check ECU (790) connector 2 and tray grounding leads for proper connection.</li> <li>3. Move operator's cab to transport position and remove transmission rear access cover (WP 0135 00).</li> <li>4. Disconnect electrical connector from boom out solenoid 6006. Error code 163 will now show. Perform voltage check at solenoid 6006 connector.</li> <li>5. Ensure that ignition switch is in OFF position. Disconnect connector X158 located under driver's seat.</li> <li>6. Check continuity between connector 6006 pin 1 and pin 2 and between connector 6004 pin 1 and chassis and connector 6005 pin 2 and chassis.</li> <li>7. Check continuity between connector X158 pin 8 and ECU (790) connector 2 pin 5 and between ECU (790) connector 2 pin 10 and connector X159 pin 1.</li> </ol>	<ol style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ol> <p>If 20-25V is present at solenoid 6006 connector, replace boom out solenoid (WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity is present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness must be replaced, notify SRA.</li> </ol> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>
DIAG	SERVO	10 (13)																
		OUTPUT/INPUT																
BOOM IN	0mA	0mA																
BOOM OUT	0mA	0mA																

**Table 6. Error Code 164- Extension Cylinder Boom OUT Cable, Component Failure  
Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 164 - Extension Cylinder Boom OUT Control, Component Failure - Continued</b></p>	<p>8. Check continuity between connector X159 pin 1 and connector X158 pin 7.</p> <p>9. Enter “DIAG SERVO 10 (13)” menu and check current of OUTPUT BOOM OUT. Current should be present with joystick activated to move boom out.</p>	<p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If current is not present, replace ECU (790) (WP 0079 00).</p>



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END OF WORK PACKAGE



**THIS WORK PACKAGE COVERS**

Error Code 128 - Joystick-to-ECU (790) Failure

Error Code 130 - Overload Protection System Failure

Error Code 255 - Tophandler Clockwise Slewing, Wiring Circuit Failure

Error Code 256 - Tophandler Clockwise Slewing, Component Failure

Error Code 258 - Tophandler Counterclockwise Slewing, Wiring Circuit Failure

Error Code 259 - Tophandler Counterclockwise Slewing, Component Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

ECS Electrical Servo (A34648.0200) (WP 0199 00-5)

ECS Attachment (A34652.0200) (WP 0199 00-23)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

**Table 1. Error Code 128 - Joystick-to-ECU (790) Failure Troubleshooting Procedures.**

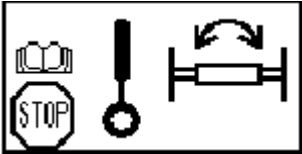
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 128 - Joystick-to-ECU (790) Failure</b></p> 	<p>1. Enter “DIAG SERVO 6 (13)” menu and check SLEW CW/CCW voltage. If voltage is out of range, perform the following steps:</p> <p>a. Remove ECU (790) cover from operator’s seat base and slide ECU mounting tray out (WP 0079 00).</p>	

Table 1. Error Code 128 - Joystick-to-ECU (790) Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 128 - Joystick-to-ECU (790) Failure - Continued</b></p>	<p>b. Check ECU (790) connector 1 and tray grounding leads for proper connections.</p> <p>c. Check voltage (20-25V) between connector X155 pin 3 and pin 13.</p> <p>d. If voltage in step c was not the same as on the “DIAG SERVO 6 (13)” menu, check continuity between ECU (790) connector 1 pin 11 and connector X155 pin 3 and between ECU (790) connector 1 pin 26 and connector X155 pin 13.</p> <p>e. Remove joystick cover and disconnect connector from joystick.</p> <p>f. Check continuity between joystick connector pin 9 and connector X155 pin 12 and between connector X155 pin 12 and connector X155 pin 14.</p> <p>g. Check continuity between connector X155 pin 14 and ECU (790) connector 1 pin 27 and between joystick connector pin 10 and connector X155 pin 13.</p> <p>h. Check continuity between joystick connector pin 11 and connector X155 pin 3.</p>	<p>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</p> <p>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>

Table 1. Error Code 128 - Joystick-to-ECU (790) Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 128 - Joystick-to-ECU (790) Failure - Continued</b></p>	<ul style="list-style-type: none"> <li>i. Check resistance of joystick potentiometer: joystick pin 9 to joystick pin 10 should be 1.1-1.4k ohms; joystick pin 9 to joystick pin 11 should be 1.6-1.9k ohms; joystick pin 11 to joystick pin 10 should be 1.6-1.9k ohms.</li> <li>j. Replace ECU (790) (WP 0079 00).</li> </ul> <p>2. Enter "DIAG SERVO 6 (13)" menu and check voltage of SLEW CW/CCW. If voltage reads 5V, perform the following steps:</p> <ul style="list-style-type: none"> <li>a. Slowly activate slewing function and move the joystick right and left. Observe voltage on menu. Voltage should be 1-9V.</li> <li>b. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>c. Remove joystick cover.</li> <li>d. Check ECU (790) connector 1, tray grounding leads, and joystick connector X155 for proper connections.</li> </ul>	<p>If resistance is not as specified, replace joystick (WP 0081 00).</p> <p>If voltage suddenly goes out of range when joystick is moved, replace joystick (WP 0081 00).</p> <ul style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ul>

Table 2. Error Code 130 - Overload Protection System Failure Troubleshooting Procedures.


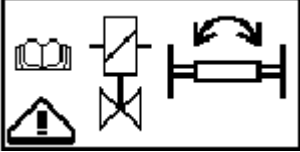
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 130 - Overload Protection System Failure</b></p> 	<p>Overload protection system failure occurs due to an earlier failure (error codes 131-136) on any component related to the overload protection system. Hydraulic speeds are limited and the error code will flash on the display every 5 seconds.</p>	<p>Perform troubleshooting procedures for the original error code (error codes 131-136).</p>

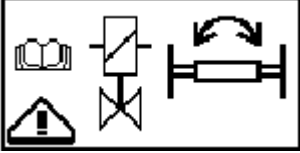
Table 3. Error Code 255 - Tophandler Clockwise Slewing, Wiring Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 255 - Tophandler Clockwise Slewing, Wiring Circuit Failure</b></p>  <div style="border: 1px solid black; padding: 5px;"> <p>DIAG TOP LIFT 12 (16)                      OUTPUT/INPUT                      SLEW CW 0mA 0mA                      SLEW CCW 0mA 0mA</p> </div>	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6008 from tophandler clockwise slewing solenoid. Place ignition switch to ON position and perform voltage check.</li> <li>3. Disconnect connector X188 from tophandler junction box at end of boom. Place ignition switch to ON position and perform voltage check at connector X188 pin A and pin B.                             <ol style="list-style-type: none"> <li>a. If 20-25V is present, check continuity between connector X188 pin A and connector 6008 pin 1; between connector X188 pin B and connector 6008 pin 2; and between connector X188 pin B and ECU (791) connector 3 pin 3.</li> </ol> </li> </ol>	<p>Repair or replace damaged wires (WP 0111 00).</p> <p>If 20-25V is present at connector 6008, replace clockwise slewing solenoid (WP 0169 00).</p> <p>If voltage is not present, repair or replace connectors (WP 0111 00).</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness requires replacement, notify DS Maintenance.</li> </ol>

**Table 3. Error Code 255 - Tophandler Clockwise Slewing, Wiring Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 255 - Tophandler Clockwise Slewing, Wiring Circuit Failure - Continued</b>	b. If voltage is not present, enter “DIAG ATTACHMENT 12 (16)” menu and check current of SLEW CW OUTPUT. Current should be present with joystick activated to slew clockwise.	a. If current is not present, replace ECU (791) (WP 0076 00). b. If current is present, notify SRA.

**Table 4. Error Code 256 - Tophandler Clockwise Slewing, Component Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION						
<p><b>Error Code 256 - Tophandler Clockwise Slewing, Component Failure</b></p>  <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>DIAG TOP LIFT 12 (16) OUTPUT/INPUT</p> <table border="0"> <tr> <td>SLEW CW</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>SLEW CCW</td> <td>0mA</td> <td>0mA</td> </tr> </table> </div>	SLEW CW	0mA	0mA	SLEW CCW	0mA	0mA	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6008 from tophandler clockwise slewing solenoid. Place ignition switch to ON position. Error code 255 will be displayed. Perform voltage check.</li> <li>3. Disconnect connector X188 from tophandler junction box at end of boom. Place ignition switch to OFF position and check continuity between connector 6008 pin 1 and pin 2 and between connector 6008 pin 1 and pin 2 and chassis.</li> </ol>	<p>Repair or replace damaged wires (WP 0111 00).</p> <p>If 20-25V is present at connector 6008, replace clockwise slewing solenoid (WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness requires replacement, notify DS Maintenance.</li> </ol>
SLEW CW	0mA	0mA						
SLEW CCW	0mA	0mA						

**Table 4. Error Code 256 - Tophandler Clockwise Slewing, Component Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 256 - Tophandler Clockwise Slewing, Component Failure - Continued</b>	4. Enter the “DIAG ATTACHMENT 12 (16)” menu and check current of SLEW CW OUTPUT. Current should be present with joystick activated to slew clockwise.	a. If current is not present, replace ECU (791) (WP 0076 00). b. If current is present, notify SRA.

**Table 5. Error Code 258 - Tophandler Counterclockwise Slewing, Wiring Circuit Failure Troubleshooting Procedures.**

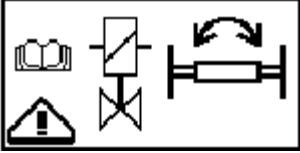
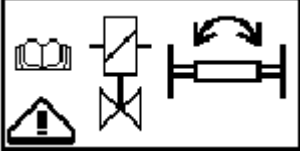
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION						
<p><b>Error Code 258 - Tophandler Counterclockwise Slewing, Wiring Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG TOP LIFT 12 (16)</td> <td>OUTPUT/INPUT</td> </tr> <tr> <td>SLEW CW</td> <td>0mA 0mA</td> </tr> <tr> <td>SLEW CCW</td> <td>0mA 0mA</td> </tr> </table>	DIAG TOP LIFT 12 (16)	OUTPUT/INPUT	SLEW CW	0mA 0mA	SLEW CCW	0mA 0mA	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6009 from tophandler counterclockwise slewing solenoid. Place ignition switch to ON position and perform voltage check.</li> <li>3. Disconnect connector X188 from tophandler junction box at end of boom. Place ignition switch to ON position and perform voltage check between connector X188 pin C and pin D.                     <ol style="list-style-type: none"> <li>a. If 20-25V is present, check continuity between connector X188 pin C and connector 6008 pin 1; between connector X188 pin D and connector 6008 pin 2; and between connector X188 pin D and ECU (791) connector 3 pin 11.</li> </ol> </li> </ol>	<p>Repair or replace damaged wires (WP 0111 00).</p> <p>If 20-25V is present at connector 6009, replace counterclockwise slewing solenoid (WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness requires replacement, notify DS Maintenance.</li> </ol>
DIAG TOP LIFT 12 (16)	OUTPUT/INPUT							
SLEW CW	0mA 0mA							
SLEW CCW	0mA 0mA							

Table 5. Error Code 258 - Tophandler Counterclockwise Slewing, Wiring Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 258 - Tophandler Counterclockwise Slewing, Wiring Circuit Failure - Continued</b>	b. If voltage is not present, enter "DIAG ATTACHMENT 12 (16)" menu and check current of SLEW CCW OUTPUT. Current should be present with joystick activated to slew counterclockwise.	a. If current is not present, replace ECU (791) (WP 0076 00). b. If current is present, notify SRA.

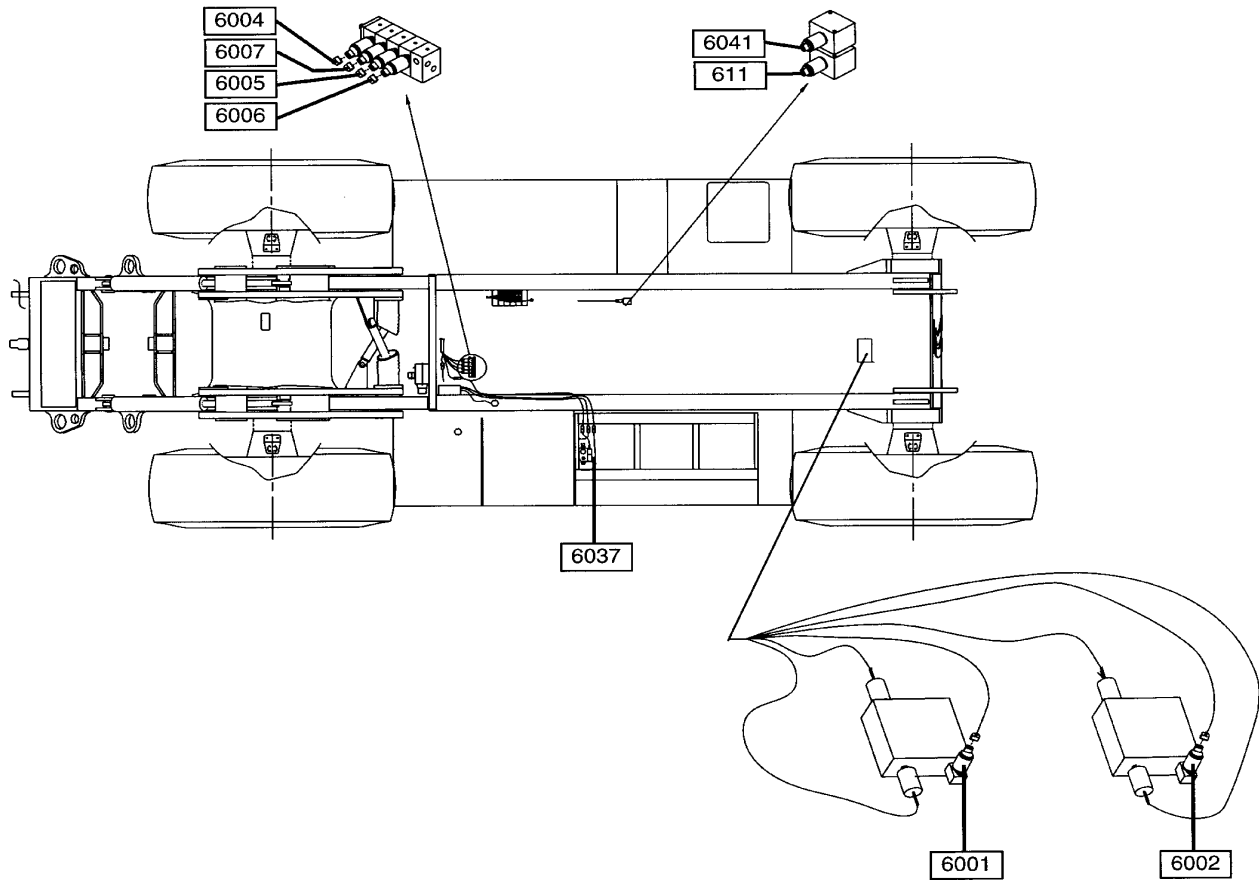
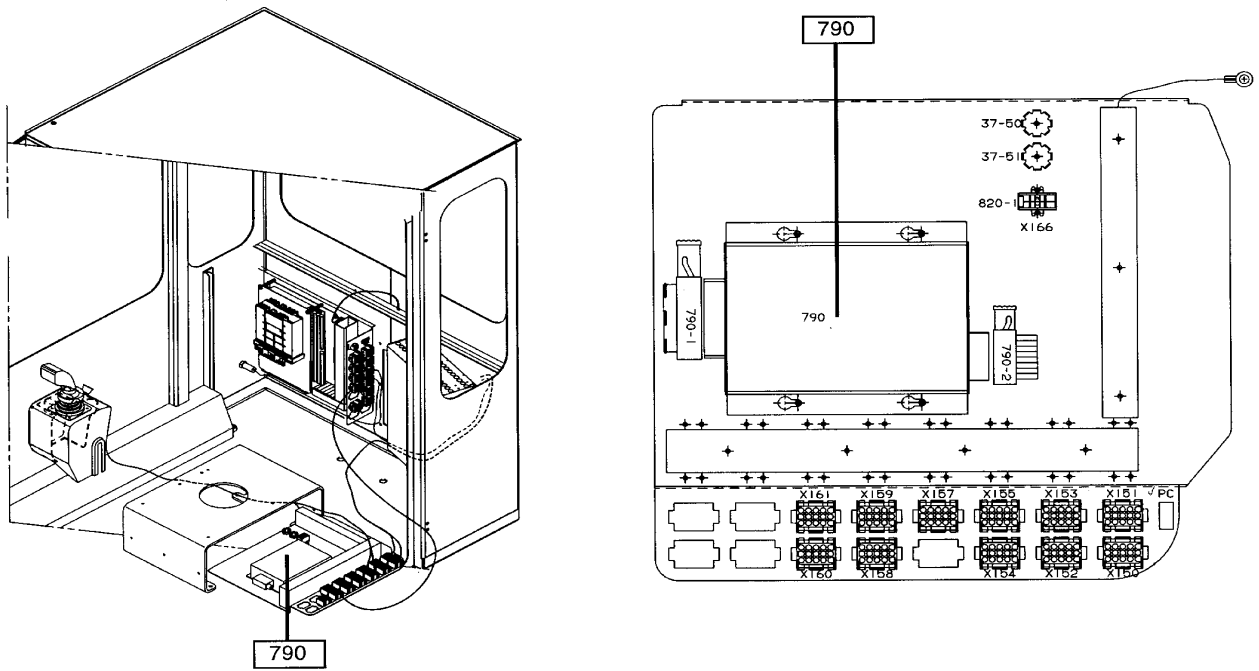
Table 6. Error Code 259 - Tophandler Counterclockwise Slewing, Component Failure Troubleshooting Procedures.

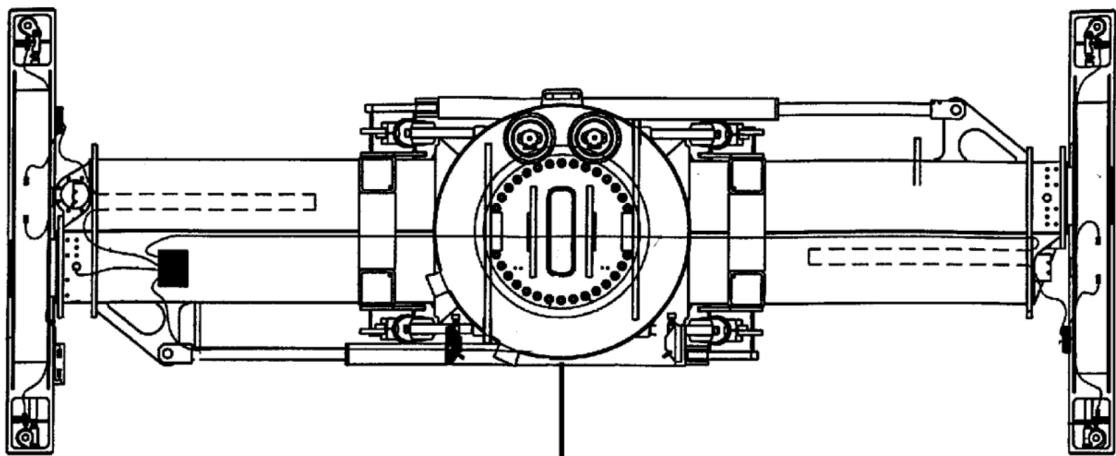
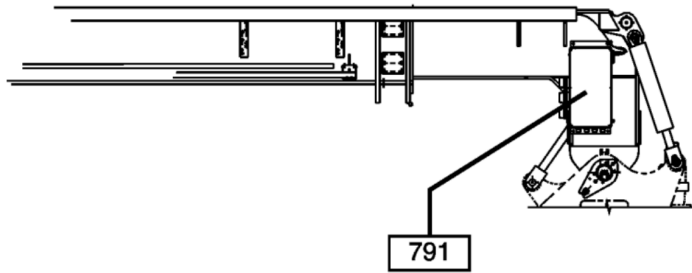
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION						
<p><b>Error Code 259 - Tophandler Counterclockwise Slewing, Component Failure</b></p>  <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>DIAG TOP LIFT 12 (16) OUTPUT/INPUT</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">SLEW CW</td> <td style="width: 25%;">0mA</td> <td style="width: 25%;">0mA</td> </tr> <tr> <td>SLEW CCW</td> <td>0mA</td> <td>0mA</td> </tr> </table> </div>	SLEW CW	0mA	0mA	SLEW CCW	0mA	0mA	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6009 from tophandler counterclockwise slewing solenoid. Place ignition switch to ON position. Error code 258 will be displayed. Perform voltage check.</li> <li>3. Disconnect connector X188 from tophandler junction box at end of boom. Place ignition switch to OFF position and check continuity between connector 6009 pin 1 and pin 2 and between connector 6009 pin 1 and pin 2 and chassis.</li> </ol>	<p>Repair or replace damaged wires (WP 0111 00).</p> <p>If 20-25V is present at connector 6009, replace counterclockwise slewing solenoid (WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness requires replacement, notify DS Maintenance.</li> </ol>
SLEW CW	0mA	0mA						
SLEW CCW	0mA	0mA						

**Table 6. Error Code 259 - Tophandler Counterclockwise Slewing, Component Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 259 - Tophandler Counterclockwise Slewing, Component Failure - Continued</b></p>	<p>4. Enter “DIAG ATTACHMENT 12 (16)” menu and check current of SLEW CCW OUTPUT. Current should be present with joystick activated to slew counterclockwise.</p>	<p>a. If current is not present, replace ECU (791) (WP 0076 00).                      b. If current is present, notify SRA.</p>







350-1036

6009	6010	6019	6021	6035	6039	6034-1
6008	6011	6018	6020	6036	6040	6034-2

THE VALVES OF THE HYDRAULICS

END OF WORK PACKAGE

**THIS WORK PACKAGE COVERS**

Error Code 129 - Joystick-to-ECU (790) Failure

Error Code 130 - Overload Protection System Failure

Error Code 237 - Tophandler Tilt Locking Control, Wiring Circuit Failure

Error Code 261 - Tophandler Tilt OUT Control, Wiring Circuit Failure

Error Code 262 - Tophandler Tilt OUT Control, Component Failure

Error Code 264 - Tophandler Tilt IN Control, Wiring Circuit Failure

Error Code 265 - Tophandler Tilt IN Control, Component Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

ECS Electrical Servo (A34648.0200) (WP 0199 00-5)

ECS Attachment (A34652.0200) (WP 0199 00-23)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

**Table 1. Error Code 129 - Joystick-to-ECU (790) Failure Troubleshooting Procedures.**

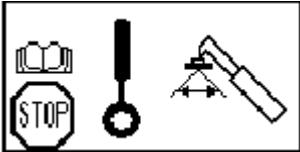
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 129 - Joystick-to-ECU (790) Failure</b></p> 	<p>1. Enter “DIAG SERVO 6 (13)” menu and check TILT IN/OUT voltage. If voltage is out of range, perform the following steps:</p> <p>a. Remove ECU (790) cover from operator’s seat base and slide ECU mounting tray out (WP 0079 00).</p>	

Table 1. Error Code 129 - Joystick-to-ECU (790) Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 129 - Joystick-to-ECU (790) Failure - Continued</b></p>	<p>b. Check ECU (790) connector 1 and tray grounding leads for proper connections.</p> <p>c. Check voltage between connector X155 pin 4 and pin 13.</p> <p>d. If voltage in step c was not the same as on “DIAG SERVO 6 (13)” menu, check continuity between ECU (790) connector 1 pin 12 and connector X155 pin 4 and between ECU (790) connector 1 pin 26 and connector X155 pin 13.</p> <p>e. Remove joystick cover and disconnect connector from joystick.</p> <p>f. Check continuity between joystick connector pin 9 and connector X155 pin 12 and between connector X155 pin 12 and connector X155 pin 14.</p> <p>g. Check continuity between connector X155 pin 14 and ECU (790) connector 1 pin 27 and between joystick connector pin 10 and connector X155 pin 13.</p> <p>h. Check continuity between joystick connector pin 1 and connector X155 pin 4.</p>	<p>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</p> <p>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>

Table 1. Error Code 129 - Joystick-to-ECU (790) Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 129 - Joystick-to-ECU (790) Failure - Continued</b></p>	<ul style="list-style-type: none"> <li>i. Check resistance of joystick potentiometer: joystick pin 9 to joystick pin 10 should be 1.1-1.4k ohms; joystick pin 9 to joystick pin 1 should be 1.6-1.9k ohms; joystick pin 1 to joystick pin 10 should be 1.6-1.9k ohms.</li> <li>2. Enter "DIAG SERVO 6 (13)" menu and check voltage of TILT IN/OUT. If voltage reads 5V, perform the following steps:                             <ul style="list-style-type: none"> <li>a. Slowly activate tilt function in and out on joystick. Observe voltage on menu. Voltage should be 1-9V.</li> <li>b. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out (WP 0079 00).</li> <li>c. Remove joystick cover.</li> <li>d. Check ECU (790) connector 1, tray grounding leads, and joystick connector X155 for proper connections.</li> </ul> </li> </ul>	<p>If resistance is not as specified, replace joystick (WP 0081 00).</p> <p>If voltage suddenly goes out of range when joystick is moved, replace joystick (WP 0081 00).</p> <ul style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ul>

Table 2. Error Code 130 - Overload Protection System Failure Troubleshooting Procedures.


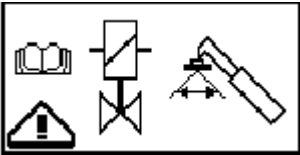
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 130 - Overload Protection System Failure</b></p> 	<p>Overload protection system failure occurs due to an earlier failure (error codes 131-136) on any component related to the overload protection system. Hydraulic speeds are limited and the error code will flash on the display every 5 seconds.</p>	<p>Perform troubleshooting procedures for the original error code (error codes 131-136).</p>

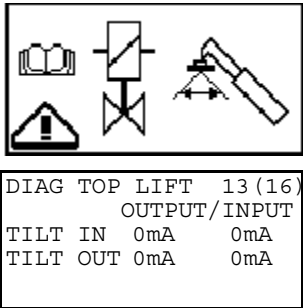
Table 3. Error Code 237 - Tophandler Tilt Locking Control, Wiring Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 237 - Tophandler Tilt Locking Control, Wiring Circuit Failure</b></p>  <div style="border: 1px solid black; padding: 5px;"> <p>DIAG TOP LIFT 15 (16)                      ACTIVE OUTPUT/INPUT                      OSC. 24.00V 900mA                      TILT 24.00V 900mA</p> </div>	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler junction box to tilt locking valve at front of boom for obvious damage.</li> <li>2. Disconnect electrical connectors 6012-1 and 6012-2 from tilt locking valve solenoids. Place ignition switch to ON position and deactivate "tilt locked" switch on joystick. Perform voltage check.                         <ol style="list-style-type: none"> <li>a. Confirm 20-25V are present at connectors 6012-1 and 6012-2.</li> </ol> </li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V are present, replace tilt locking valve solenoids (WP 0169 00).</p>

**Table 3. Error Code 237 - Tophandler Tilt Locking Control, Wiring Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 237 - Tophandler Tilt Locking Control, Wiring Circuit Failure</b></p>	<p>b. If voltage is not present, enter “DIAG ATTACHMENT 15 (16)” menu and check voltage of TILT OUTPUT. Voltage should change from 0 to 24V and vice versa if “tilt locked” switch is activated/deactivated.</p>	<p>a. If voltage is not as specified, replace ECU (791) (WP 0076 00). b. If voltage is not changing, notify SRA.</p>

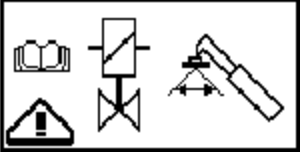
**Table 4. Error Code 261 - Tophandler Tilt OUT Control, Wiring Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION								
<p><b>Error Code 261 - Tophandler Tilt OUT Control, Wiring Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG TOP LIFT</td> <td>13 (16)</td> </tr> <tr> <td></td> <td>OUTPUT/INPUT</td> </tr> <tr> <td>TILT IN</td> <td>0mA 0mA</td> </tr> <tr> <td>TILT OUT</td> <td>0mA 0mA</td> </tr> </table>	DIAG TOP LIFT	13 (16)		OUTPUT/INPUT	TILT IN	0mA 0mA	TILT OUT	0mA 0mA	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6010 from tophandler tilt OUT solenoid. Place ignition switch to ON position and perform voltage check.</li> <li>3. Disconnect connector X188 from tophandler junction box on boom. Place ignition switch to ON position and perform voltage check between connector X188 pin E and pin F.             <ol style="list-style-type: none"> <li>a. If 20-25V is present, check continuity between connector X188 pin E and connector 6010 pin 1; between connector X188 pin F and connector 6010 pin 2; and between connector X188 pin F and ECU (791) connector 3 pin 4.</li> </ol> </li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6010, replace tilt OUT solenoid (WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness requires replacement, notify DS Maintenance.</li> </ol>
DIAG TOP LIFT	13 (16)									
	OUTPUT/INPUT									
TILT IN	0mA 0mA									
TILT OUT	0mA 0mA									

**Table 4. Error Code 261 - Tophandler Tilt OUT Control, Wiring Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 261 - Tophandler Tilt OUT Control, Wiring Circuit Failure</b>	b. If voltage is not present, enter "DIAG ATTACHMENT 13 (16)" menu and check current of TILT OUT OUTPUT. Current should be present with joystick activated to tilt tophandler out.	a. If current is not present, replace ECU (791) (WP 0076 00). b. If current is present, notify SRA.

**Table 5. Error Code 262 - Tophandler Tilt OUT Control, Component Failure Troubleshooting Procedures.**

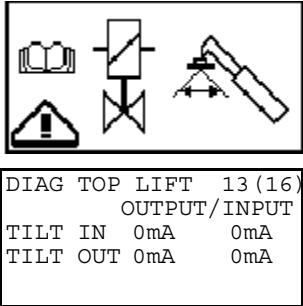
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 262 - Tophandler Tilt OUT Control, Component Failure</b></p>  <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>DIAG TOP LIFT 13 (16)                      OUTPUT/INPUT                      TILT IN 0mA 0mA                      TILT OUT 0mA 0mA</p> </div>	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6010 from tophandler tilt OUT solenoid. Place ignition switch to ON position. Error code 261 will be displayed. Perform voltage check.</li> <li>3. Disconnect connector X188 from tophandler junction box at end of boom. Place ignition switch to OFF position and check continuity between connector 6010 pin 1 and pin 2 and between connector 6010 pin 1 and pin 2 and chassis.</li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6010, replace tilt OUT solenoid (WP 0169 00).</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00).                      b. If wiring harness requires replacement, notify DS Maintenance.</p>



**Table 5. Error Code 262 - Tophandler Tilt OUT Control, Component Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 262 - Tophandler Tilt OUT Control, Component Failure - Continued</b>	4. Enter “DIAG ATTACHMENT 13 (16)” menu and check current of TILT OUT OUTPUT. Current should be present with joystick activated to tilt tophandler out.	a. If current is not present, replace ECU (791) (WP 0076 00). b. If current is present, notify SRA.

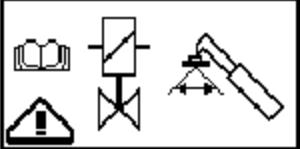
**Table 6. Error Code 264 - Tophandler Tilt IN Control, Wiring Circuit Failure Troubleshooting Procedures.**

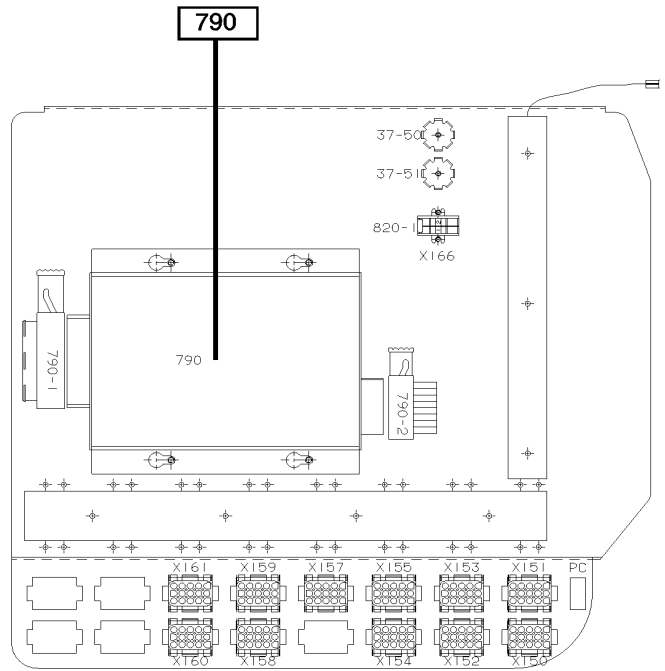
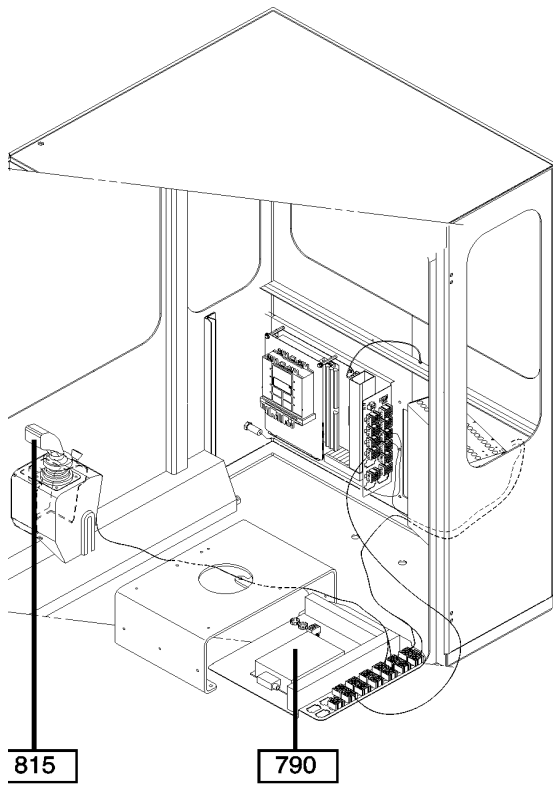
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 264 - Tophandler Tilt IN Control, Wiring Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6011 from tophandler tilt IN solenoid. Place ignition switch to ON position and perform voltage check.</li> <li>3. Disconnect connector X188 from tophandler junction box at end of boom. Place ignition switch to ON position and perform voltage check between connector X188 pin G and pin H.                             <ol style="list-style-type: none"> <li>a. If 20-25V is present, check continuity between connector X188 pin G and connector 6011 pin 1; between connector X188 pin H and connector 6011 pin 2; and between connector X188 pin H and ECU (791) connector 3 pin 12.</li> </ol> </li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6011, replace tilt IN solenoid (WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness requires replacement, notify DS Maintenance.</li> </ol>

**Table 6. Error Code 264 - Tophandler Tilt IN Control, Wiring Circuit Failure Troubleshooting Procedures - Continued.**

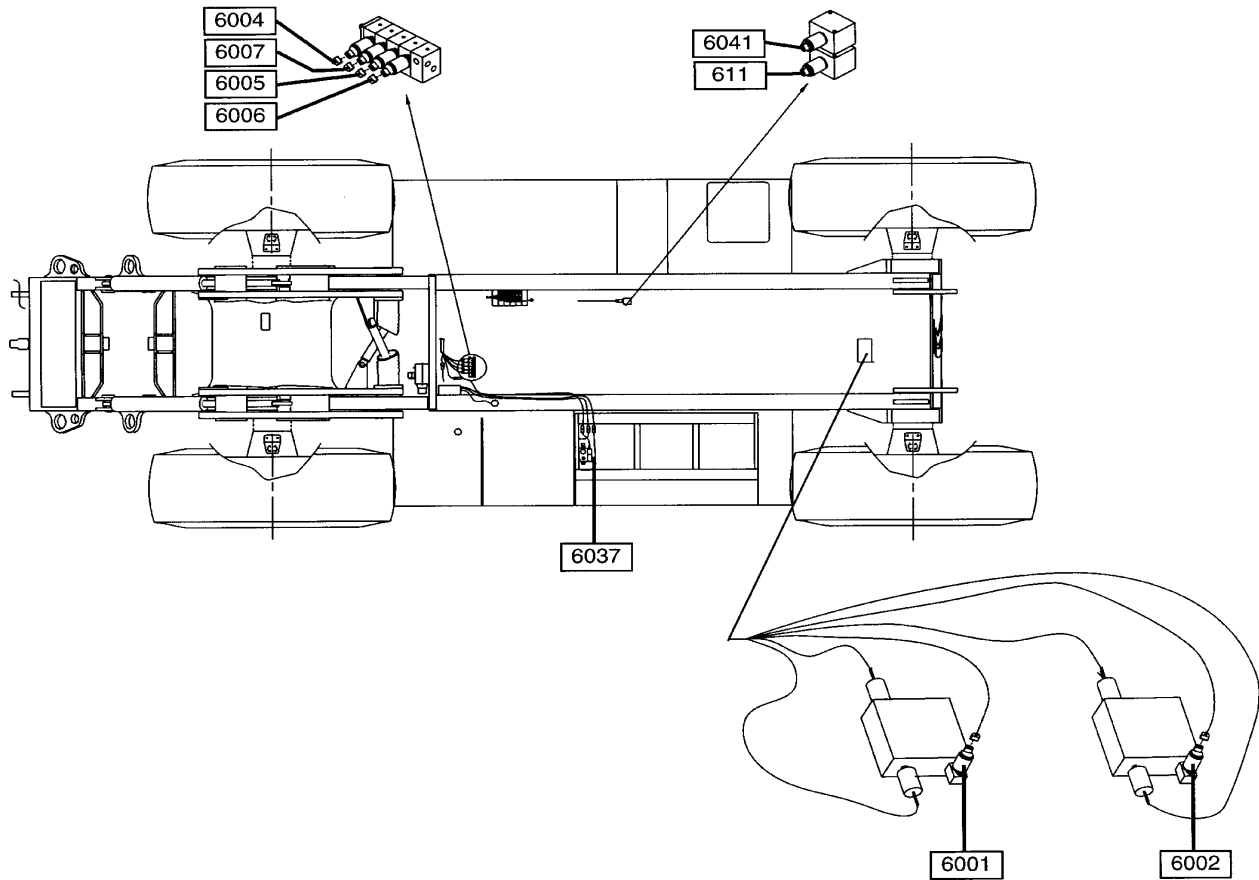
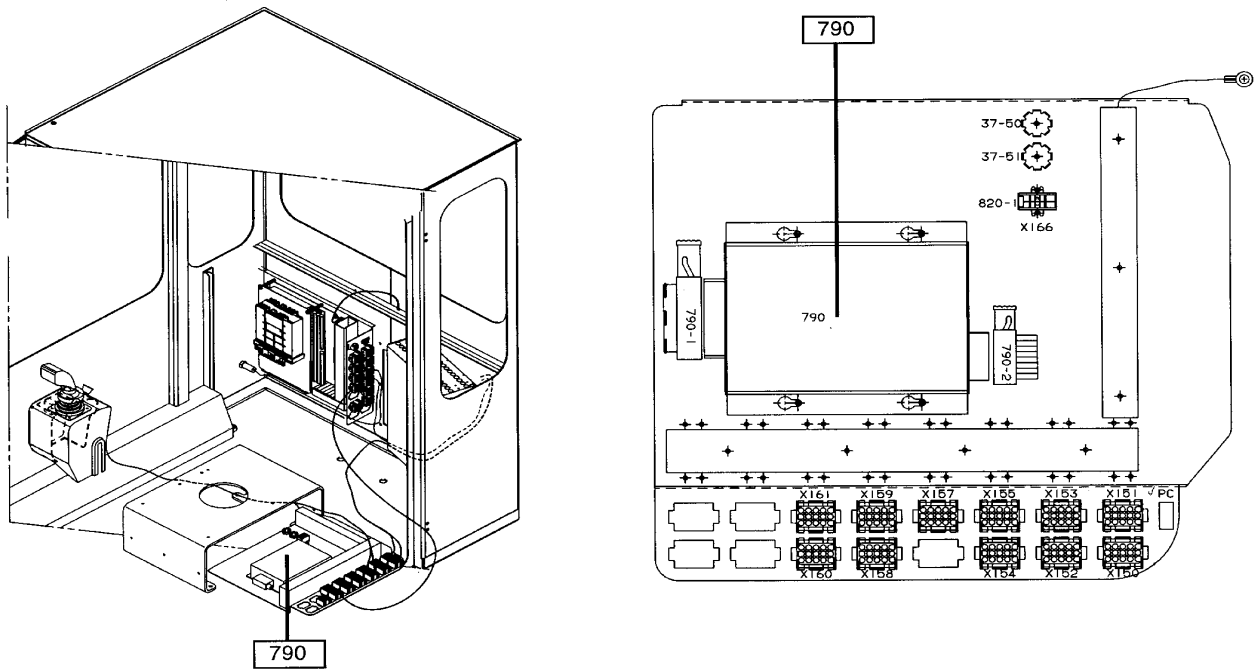
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 264 - Tophandler Tilt IN Control, Wiring Circuit Failure - Continued</b></p>	<p>b. If voltage is not present, enter “DIAG ATTACHMENT 13 (16)” menu and check current of TILT IN OUTPUT. Current should be present with joystick activated to tilt tophandler in.</p>	<p>a. If current is not present, replace ECU (791) (WP 0076 00). b. If current is present, notify SRA.</p>

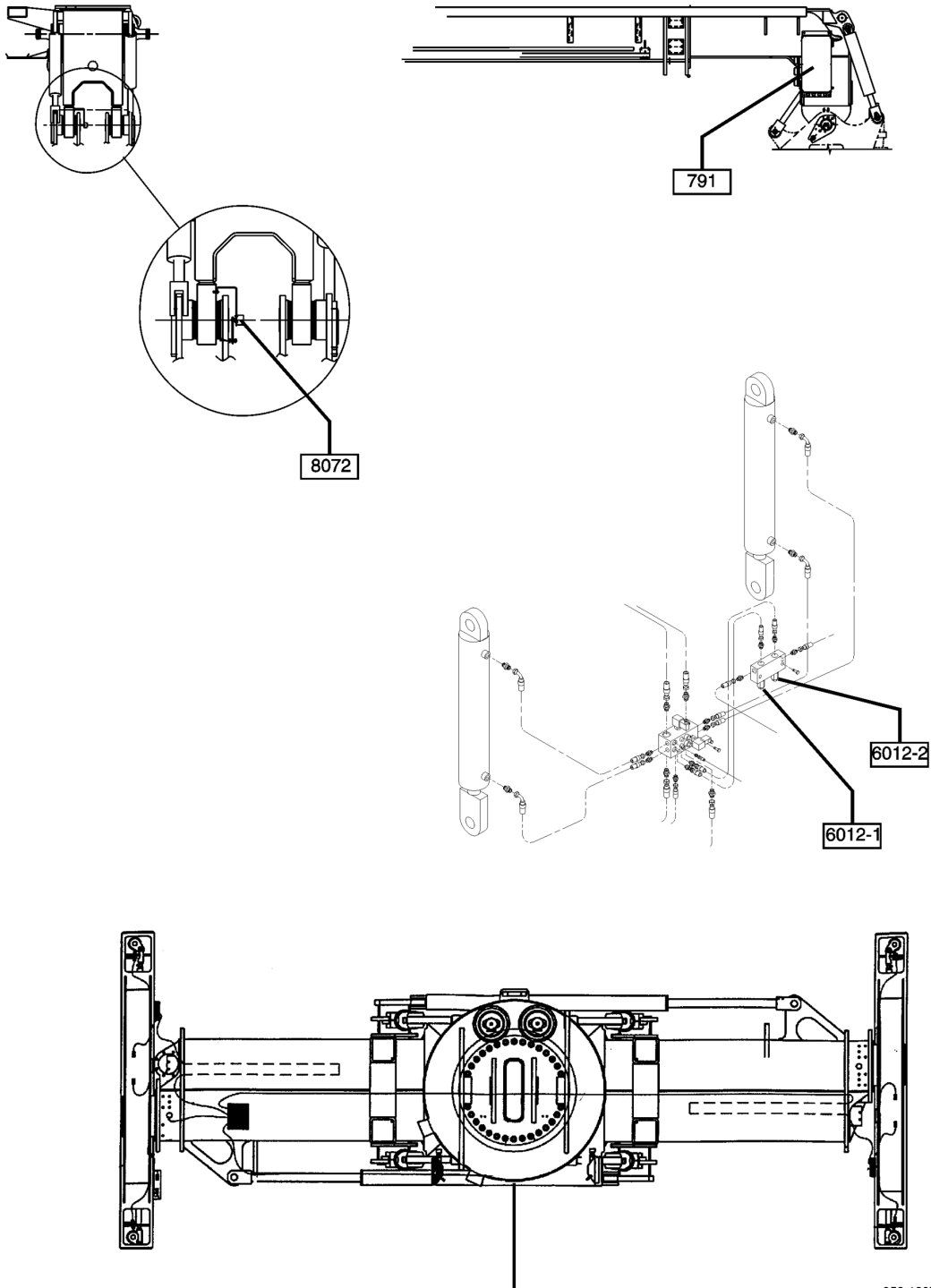
**Table 7. Error Code 265 - Tophandler Tilt IN Control, Component Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 265 - Tophandler Tilt IN Control, Component Failure</b></p>  <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>DIAG TOP LIFT 13 (16)              OUTPUT/INPUT              TILT IN 0mA 0mA              TILT OUT 0mA 0mA</p> </div>	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6011 from tophandler tilt IN solenoid. Place ignition switch to ON position. Error code 264 will be displayed. Perform voltage check.</li> <li>3. Disconnect connector X188 from tophandler junction box at end of boom. Place ignition switch to OFF position and check continuity between connector 6011 pin 1 and pin 2 and between connector 6011 pin 1 and pin 2 and chassis.</li> <li>4. Enter “DIAG ATTACHMENT 13 (16)” menu and check current of TILT IN OUTPUT. Current should be present with joystick activated to tilt tophandler in.</li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6011, replace tilt IN solenoid (WP 0169 00).</p> <p>a. If continuity is not present, repair or replace connectors (WP 0111 00). b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00). b. If current is present, notify SRA.</p>



350-1034





6009	6010	6019	6021	6035	6039	6034-1
6008	6011	6018	6020	6036	6040	6034-2

THE VALVES OF THE HYDRAULICS

350-1037

END OF WORK PACKAGE

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**THIS WORK PACKAGE COVERS**

Error Code 128 - Joystick-to-ECU (790) Failure  
 Error Code 130 - Overload Protection System Failure  
 Error Code 240 - Tophandler Leveling Locking Control, Wiring Circuit Failure  
 Error Code 267 - Tophandler Leveling Right, Open Circuit Failure

Error Code 268 - Tophandler Leveling Right, Short Circuit Failure  
 Error Code 270 - Tophandler Leveling Left, Open Circuit Failure  
 Error Code 271 - Tophandler Leveling Left, Short Circuit Failure

**INITIAL SETUP**

**References**

- TM 10-3930-675-10
- Current Supply (A34738.0200) (WP 0199 00-31)
- ECS Electrical Servo (A34648.0200) (WP 0199 00-5)
- ECS Attachment (A34652.0200) (WP 0199 00-23)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

**Table 1. Error Code 128 - Joystick-to-ECU (790) Failure Troubleshooting Procedures.**

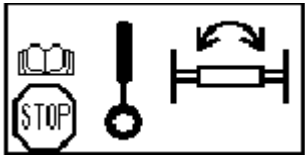
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 128 - Joystick-to-ECU (790) Failure</b></p> 	<p>1. Enter “DIAG SERVO 6 (13)” menu and check SLEW CW/CCW voltage. If voltage is not 5.00V, perform the following steps:</p> <p>a. Remove ECU (790) cover from operator’s seat base and slide ECU mounting tray out (WP 0079 00).</p>	

Table 1. Error Code 128 - Joystick-to-ECU (790) Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 128 - Joystick-to-ECU (790) Failure - Continued</b></p>	<p>b. Check ECU (790) connector 1 and tray grounding leads for proper connections.</p> <p>c. Check voltage between connector X155 pin 3 and pin 13.</p> <p>d. If voltage in step c was not the same as on “DIAG SERVO 6 (13)” menu, check continuity between ECU (790) connector 1 pin 11 and connector X155 pin 3 and between ECU (790) connector 1 pin 26 and connector X155 pin 13.</p> <p>e. Remove joystick cover and disconnect connector from joystick.</p> <p>f. Check continuity between joystick connector pin 9 and connector X155 pin 12 and between connector X155 pin 12 and connector X155 pin 14.</p> <p>g. Check continuity between connector X155 pin 14 and ECU (790) connector 1 pin 27 and between joystick connector pin 10 and connector X155 pin 13.</p> <p>h. Check continuity between joystick connector pin 11 and connector X155 pin 3.</p>	<p>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</p> <p>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>If continuity is not present, repair or replace connectors (WP 0111 00).</p>



Table 1. Error Code 128 - Joystick-to-ECU (790) Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 128 - Joystick-to-ECU (790) Failure - Continued</b></p>	<ul style="list-style-type: none"> <li>i. Check resistance of joystick potentiometer: joystick pin 9 to joystick pin 10 should be 1.1-1.4k ohms; joystick pin 9 to joystick pin 11 should be 1.6-1.9k ohms; joystick pin 11 to joystick pin 10 should be 1.6-1.9k ohms.</li> <li>j. Replace ECU (790) (WP 0079 00).</li> </ul> <p>2. Enter "Diagnosis Servo 6 (13)" menu and check voltage of SLEW CW/CCW. If voltage reads 5V, perform the following steps:</p> <ul style="list-style-type: none"> <li>a. Slowly activate slewing function and move joystick right and left. Observe voltage on menu. Voltage should be 1-9V.</li> <li>b. Remove ECU (790) cover from operator's seat base and slide ECU mounting tray out.</li> <li>c. Remove joystick cover.</li> <li>d. Check ECU (790) connector 1, tray grounding leads, and joystick connector X155 for proper connections.</li> </ul>	<p>If resistance is not as specified, replace joystick (WP 0081 00).</p> <p>If voltage suddenly goes out of range when joystick is moved, replace joystick (WP 0081 00).</p> <ul style="list-style-type: none"> <li>a. Connect any loose or disconnected connections. Push ECU mounting tray in and install cover.</li> <li>b. Repair or replace any damaged connectors (WP 0111 00). Push ECU mounting tray in and install cover.</li> </ul>

Table 2. Error Code 130 - Overload Protection System Failure Troubleshooting Procedures.


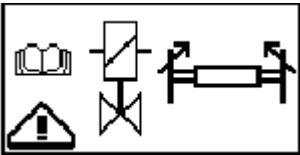
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 130 - Overload Protection System Failure</b></p> 	<p>Overload protection system failure occurs due to an earlier failure (error codes 131-136) on any component related to the overload protection system. Hydraulic speeds are limited and the error code will flash on the display every 5 seconds.</p>	<p>Perform troubleshooting procedures for the original error code (error codes 131-136).</p>

Table 3. Error Code 240 - Tophandler Leveling Locking Control, Wiring Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 240 - Tophandler Leveling Locking Control, Wiring Circuit Failure</b></p>  <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>DIAG TOP LIFT 15 (16)              ACTIVE OUTPUT/INPUT              OSC. 24.00V 900mA              TILT 24.00V 900mA</p> </div>	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler junction box to tilt locking valve at front of boom for obvious damage.</li> <li>2. Disconnect electrical connectors 6034-1 and 6034-2 from leveling locking valve solenoids. Place ignition switch to ON position and deactivate "leveling locked" switch on joystick. Perform voltage check at pins 1 and 2.             <ol style="list-style-type: none"> <li>a. If 20-25V is present at connectors 6034-1 and 6034-2, replace leveling locking valve solenoids (WP 0169 00).</li> </ol> </li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p>

**Table 3. Error Code 240 - Tophandler Leveling Locking Control, Wiring Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 240 - Tophandler Leveling Locking Control, Wiring Circuit Failure - Continued</b>	b. If voltage is not present, enter “Diag ATTACHMENT 15 (16)” menu and check voltage of OSC. OUTPUT. Voltage should change from 0 to 24V and vice versa if the “leveling locked” switch is activated/deactivated.	a. If voltage is not as specified, replace ECU (791) (WP 0076 00). b. If voltage is changing, notify SRA.

**Table 4. Error Code 267 - Tophandler Leveling Right, Open Circuit Failure Troubleshooting Procedures.**

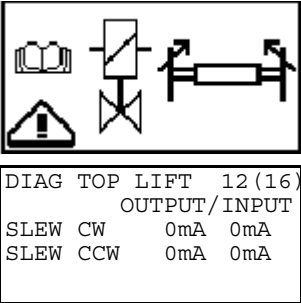
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 267 - Tophandler Leveling Right, Open Circuit Failure</b></p> 	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6035 from tophandler right leveling solenoid. Place ignition switch to ON position and perform voltage check at pins 1 and 2.</li> <li>3. Disconnect connector X189 from tophandler junction box at end of boom. Place ignition switch to ON position and perform voltage check between connector X189 pin E and pin F.</li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6035, replace right leveling solenoid (WP 0169 00).</p>

Table 4. Error Code 267 - Tophandler Leveling Right, Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 267 - Tophandler Leveling Right, Open Circuit Failure - Continued</b></p>	<p>a. If 20-25V is present, check continuity between connector X189 pin E and connector 6035 pin 1; between connector X189 pin F and connector 6035 pin 2; between connector X189 pin F and ECU (791) connector 3 pin 5.</p> <p>b. If voltage is not present, enter "DIAG ATTACHMENT 14 (16)" menu and check current of OSCILLATION, RIGHT OUTPUT. Current should be present with joystick leveling right activated.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If current is present, notify SRA.</p>

Table 5. Error Code 268 - Tophandler Leveling Right, Short Circuit Failure Troubleshooting Procedures.

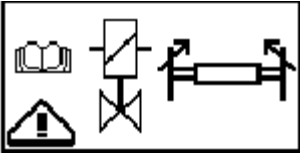
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 268 - Tophandler Leveling Right, Short Circuit Failure</b></p>  <pre> DIAG TOP LIFT 12 (16)       OUTPUT/INPUT SLEW CW      0mA 0mA SLEW CCW     0mA 0mA                     </pre>	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6035 from tophandler leveling right solenoid. Place ignition switch to ON position. Error code 267 will be displayed. Perform voltage check at pins 1 and 2.</li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6035, replace leveling right solenoid (WP 0169 00).</p>

Table 5. Error Code 268 - Tophandler Leveling Right, Short Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 268 - Tophandler Leveling Right, Short Circuit Failure - Continued</b></p>	<ol style="list-style-type: none"> <li>3. Disconnect connector X189 from tophandler junction box at end of boom. Place ignition switch to OFF position and check continuity between connector 6035 pin 1 and pin 2 and between connector 6035 pin 1 and pin 2 and chassis.</li> <li>4. Enter "DIAG ATTACHMENT 14 (16)" menu and check current of OSCILLATION, RIGHT OUTPUT. Current should be present with joystick leveling right activated.</li> </ol>	<ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness requires replacement, notify DS Maintenance.</li> <li>a. If current is not present, replace ECU (791) (WP 0076 00).</li> <li>b. If current is present, notify SRA.</li> </ol>

Table 6. Error Code 270 - Tophandler Leveling Left, Open Circuit Failure Troubleshooting Procedures.

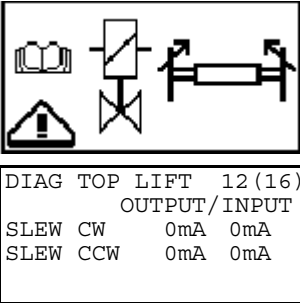
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 270 - Tophandler Leveling Left, Open Circuit Failure</b></p>  <p>DIAG TOP LIFT 12 (16) OUTPUT/INPUT SLEW CW 0mA 0mA SLEW CCW 0mA 0mA</p>	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6036 from tophandler left leveling solenoid. Place ignition switch to ON position and perform voltage check at pins 1 and 2.</li> <li>3. Disconnect connector X189 from tophandler junction box at end of boom. Place ignition switch to ON position and perform voltage check between connector X189 pin G and pin H.</li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6036, replace leveling left solenoid (WP 0169 00).</p>

Table 6. Error Code 270 - Tophandler Leveling Left, Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 270 - Tophandler Leveling Left, Open Circuit Failure - Continued</b></p>	<p>a. If 20-25V is present, check continuity between connector X189 pin G and connector 6036 pin 1; between connector X189 pin H and connector 6036 pin 2; and between connector X189 pin H and ECU (791) connector 3 pin 13.</p> <p>b. If voltage is not present, enter "DIAG ATTACHMENT 14 (16)" menu and check current of OSCILLATION, LEFT OUTPUT. Current should be present with joystick leveling right activated.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If current is present, notify SRA.</p>

Table 7. Error Code 271 - Tophandler Leveling Left, Short Circuit Failure Troubleshooting Procedures.

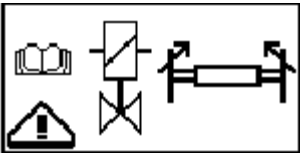
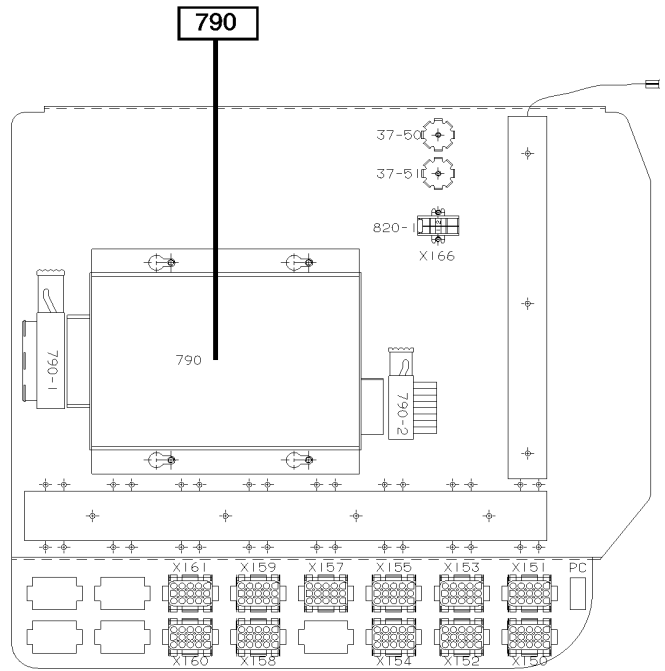
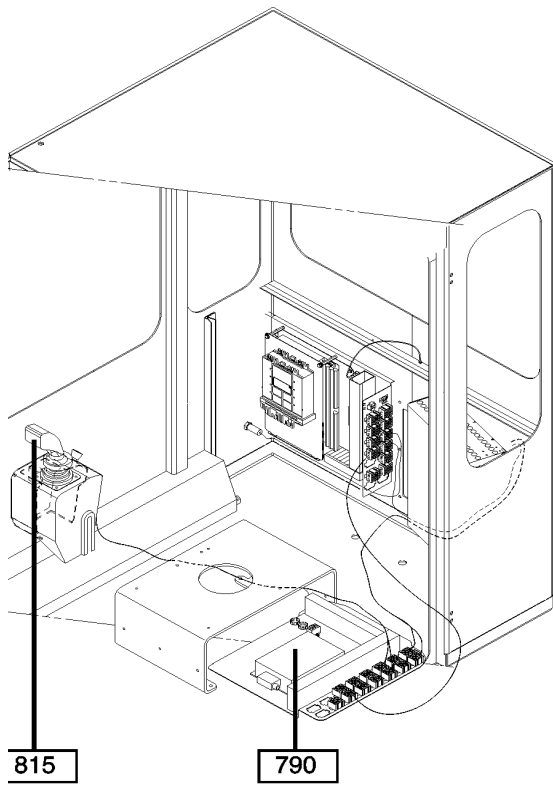
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 271 - Tophandler Leveling Left, Short Circuit Failure</b></p>  <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>DIAG TOP LIFT 12 (16)              OUTPUT/INPUT              SLEW CW 0mA 0mA              SLEW CCW 0mA 0mA</p> </div>	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6036 from tophandler leveling left solenoid. Place ignition switch to ON position. Error code 270 will be displayed. Perform voltage check at pins 1 and 2.</li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6036, replace leveling left solenoid (WP 0169 00).</p>

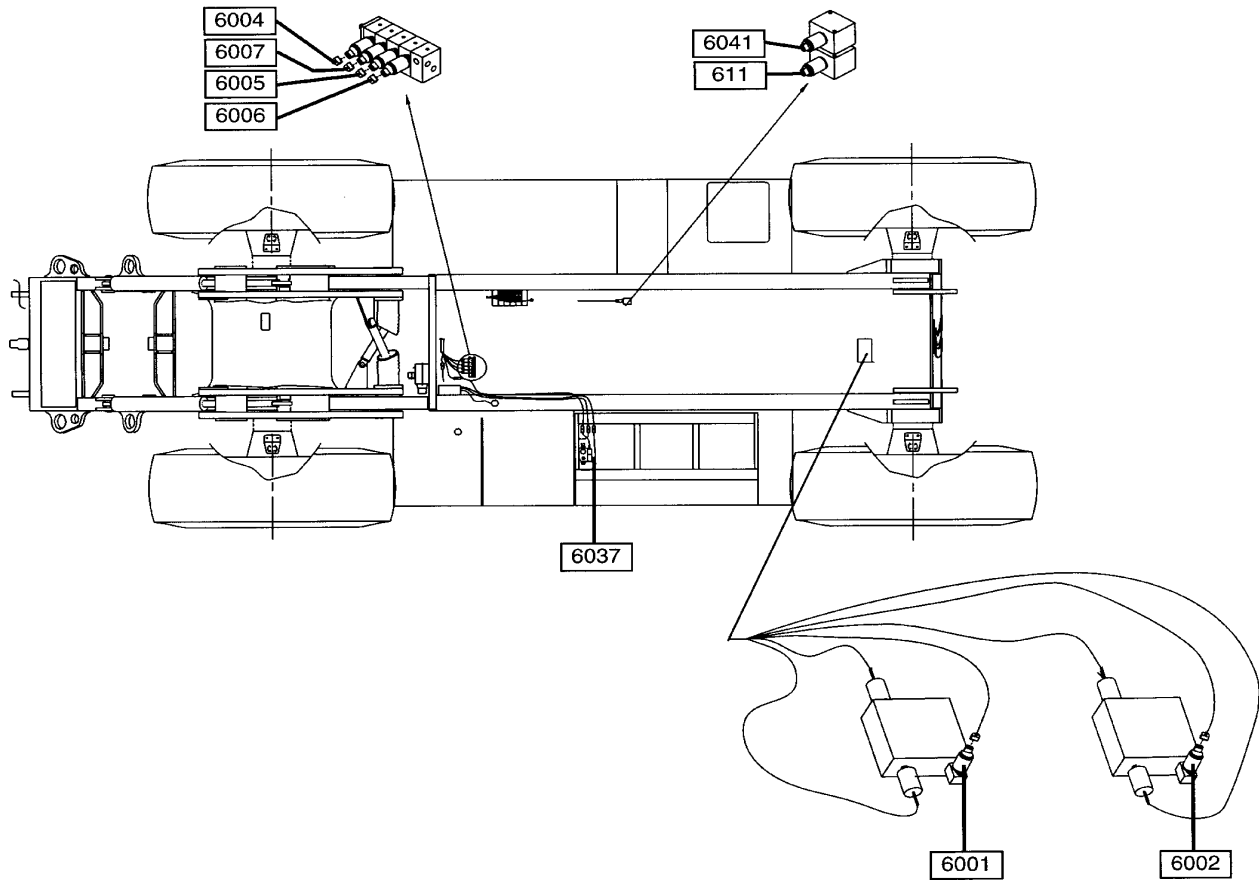
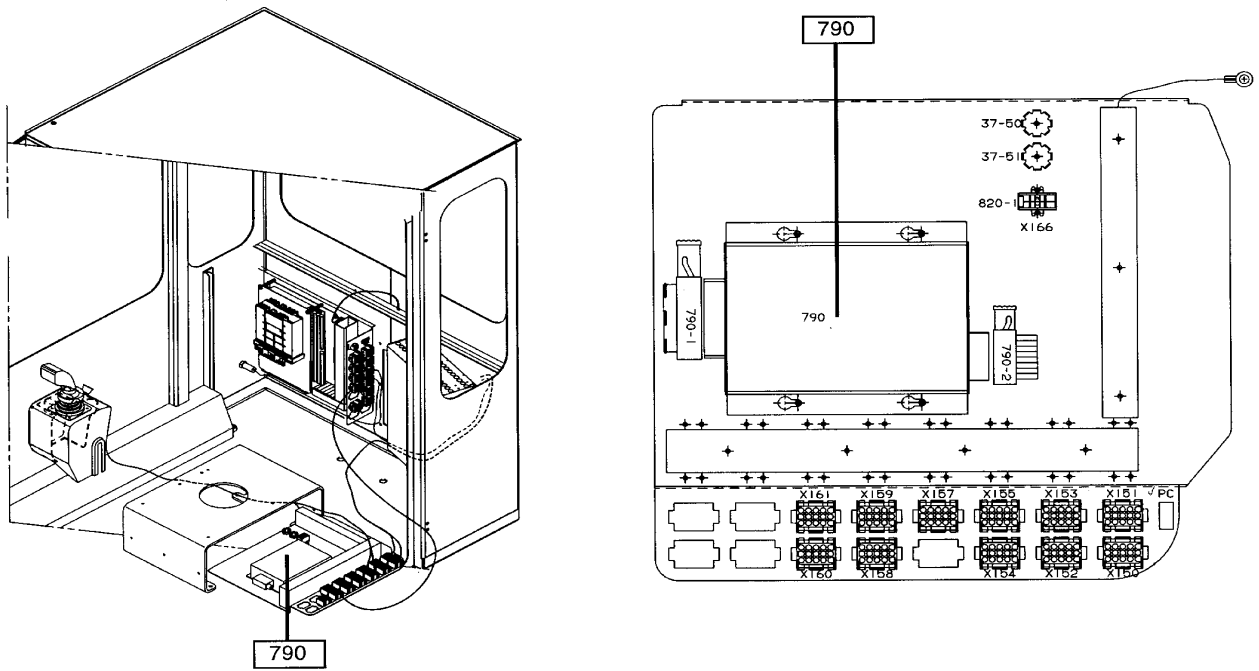
Table 7. Error Code 271 - Tophandler Leveling Left, Short Circuit Failure Troubleshooting Procedures - Continued.

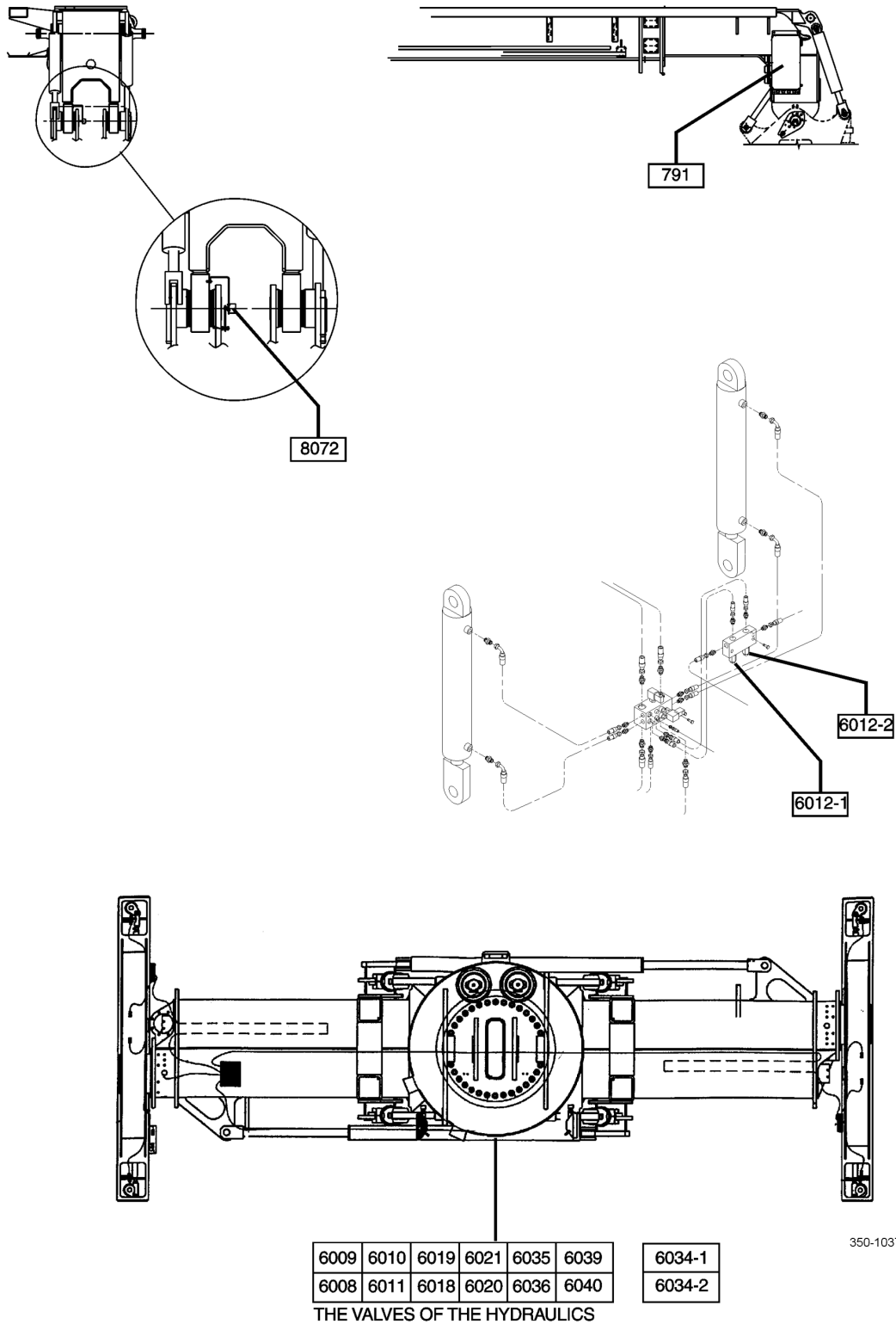
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 271 - Tophandler Leveling Left, Short Circuit Failure - Continued</b></p>	<p>3. Disconnect connector X189 from tophandler junction box at end of boom. Place ignition switch to OFF position and check continuity between connector 6036 pin 1 and pin 2 and between connector 6036 pin 1 and pin 2 and chassis.</p> <p>4. Enter "DIAG ATTACHMENT 14 (16)" menu and check current of OSCILLATION, LEFT OUTPUT. Current should be present with joystick leveling right activated.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If current is present, notify SRA.</p>



350-1034







END OF WORK PACKAGE

THIS WORK PACKAGE COVERS

Error Code 225 - Tophandler Sideshift Left, Open Circuit Failure

Error Code 228 - Tophandler Sideshift Right, Open Circuit Failure

Error Code 226 - Tophandler Sideshift Left, Short Circuit Failure

Error Code 229 - Tophandler Sideshift Right, Short Circuit Failure

INITIAL SETUP

References

TM 10-3930-675-10

ECS Attachment (A34652.0200) (WP 0199 00-23)

NOTE

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

Table 1. Error Code 225 - Tophandler Sideshift Left, Open Circuit Failure Troubleshooting Procedures.

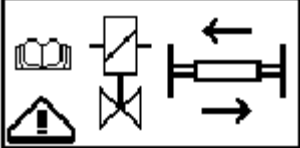
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION								
<p><b>Error Code 225 - Tophandler Sideshift Left, Open Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG TOP LIFT</td> <td>7 (16)</td> </tr> <tr> <td>SIDE SH. OUTPUT/INPUT</td> <td></td> </tr> <tr> <td>LEFT</td> <td>0.00mV 0mA</td> </tr> <tr> <td>RIGHT</td> <td>0.00mV 0mA</td> </tr> </table>	DIAG TOP LIFT	7 (16)	SIDE SH. OUTPUT/INPUT		LEFT	0.00mV 0mA	RIGHT	0.00mV 0mA	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6020 from tophandler sideshift left solenoid. Place ignition switch to ON position and perform voltage check at pins 1 and 2.</li> <li>3. Disconnect connector X189 from tophandler junction box at end of boom. Place ignition switch to ON position and perform voltage check between connector X189 pin A and pin B.</li> </ol>	<p>Repair or replace damaged wires (WP 0111 00).</p> <p>If 20-25V is present at connector 6020, replace sideshift left solenoid (WP 0169 00).</p>
DIAG TOP LIFT	7 (16)									
SIDE SH. OUTPUT/INPUT										
LEFT	0.00mV 0mA									
RIGHT	0.00mV 0mA									

Table 1. Error Code 225 - Tophandler Sideshift Left, Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 225 - Tophandler Sideshift Left, Open Circuit Failure - Continued</b></p>	<p>a. If 20-25V is present, check continuity between connector X189 pin A and connector 6020 pin 1; between connector X189 pin B and connector 6020 pin 2; and between connector X189 pin B and ECU (791) connector 2 pin 3.</p> <p>b. If voltage is not present, enter "DIAG ATTACHMENT 7 (16)" menu and check current of SIDESHIFT LEFT OUTPUT. Current should be present with joystick sideshift left activated.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If current is present, notify SRA.</p>

Table 2. Error Code 226 - Tophandler Sideshift Left, Short Circuit Failure Troubleshooting Procedures.

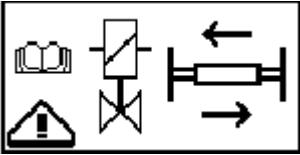
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 226 - Tophandler Sideshift Left, Short Circuit Failure</b></p>  <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>DIAG TOP LIFT 7(16)              SIDE SH. OUTPUT/INPUT              LEFT 0.00mV 0mA              RIGHT 0.00mV 0mA</p> </div>	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6020 from tophandler sideshift left solenoid. Place ignition switch to ON position. Error code 225 will be displayed. Perform voltage check at pins 1 and 2.</li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6020, replace sideshift left solenoid (WP 0169 00).</p>

Table 2. Error Code 226 - Tophandler Sideshift Left, Short Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 226 - Tophandler Sideshift Left, Short Circuit Failure - Continued</b></p>	<p>3. Disconnect connector X189 from tophandler junction box at end of boom. Place ignition switch to OFF position and check continuity between connector 6020 pin 1 and pin 2 and between connector 6020 pin 1 and pin 2 and chassis.</p> <p>4. Enter “DIAG ATTACHMENT 7 (16)” menu and check current of SIDESHIFT LEFT OUTPUT. Current should be present with joystick sideshift left activated.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If current is present, notify SRA.</p>

Table 3. Error Code 228 - Tophandler Sideshift Right, Open Circuit Failure Troubleshooting Procedures.

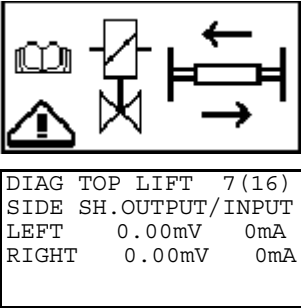
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 228 - Tophandler Sideshift Right, Open Circuit Failure</b></p> 	<p>1. Check wires and cables from tophandler control valve to boom for obvious damage.</p> <p>2. Disconnect electrical connector 6021 from tophandler sideshift right solenoid. Place ignition switch to ON position and perform voltage check at pins 1 and 2.</p>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6021, replace sideshift right solenoid (WP 0169 00).</p>

Table 3. Error Code 228 - Tophandler Sideshift Right, Open Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 228 - Tophandler Sideshift Right, Open Circuit Failure - Continued</b></p>	<p>3. Disconnect connector X189 from tophandler junction box at end of boom. Place ignition switch to ON position and perform voltage check between connector X189 pin C and pin D.</p> <p>a. If 20-25V is present, check continuity between connector X189 pin C and connector 6021 pin 1; between connector X189 pin D and connector 6021 pin 2; and between connector X189 pin D and ECU (791) connector 2 pin 11.</p> <p>b. If voltage is not present, enter "DIAG ATTACHMENT 7 (16)" menu and check current of SIDESHIFT RIGHT OUTPUT. Current should be present with joystick sideshift right activated.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If current is present, notify SRA.</p>

Table 4. Error Code 229 - Tophandler Sideshift Right, Short Circuit Failure Troubleshooting Procedures.

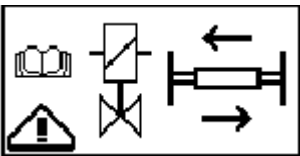
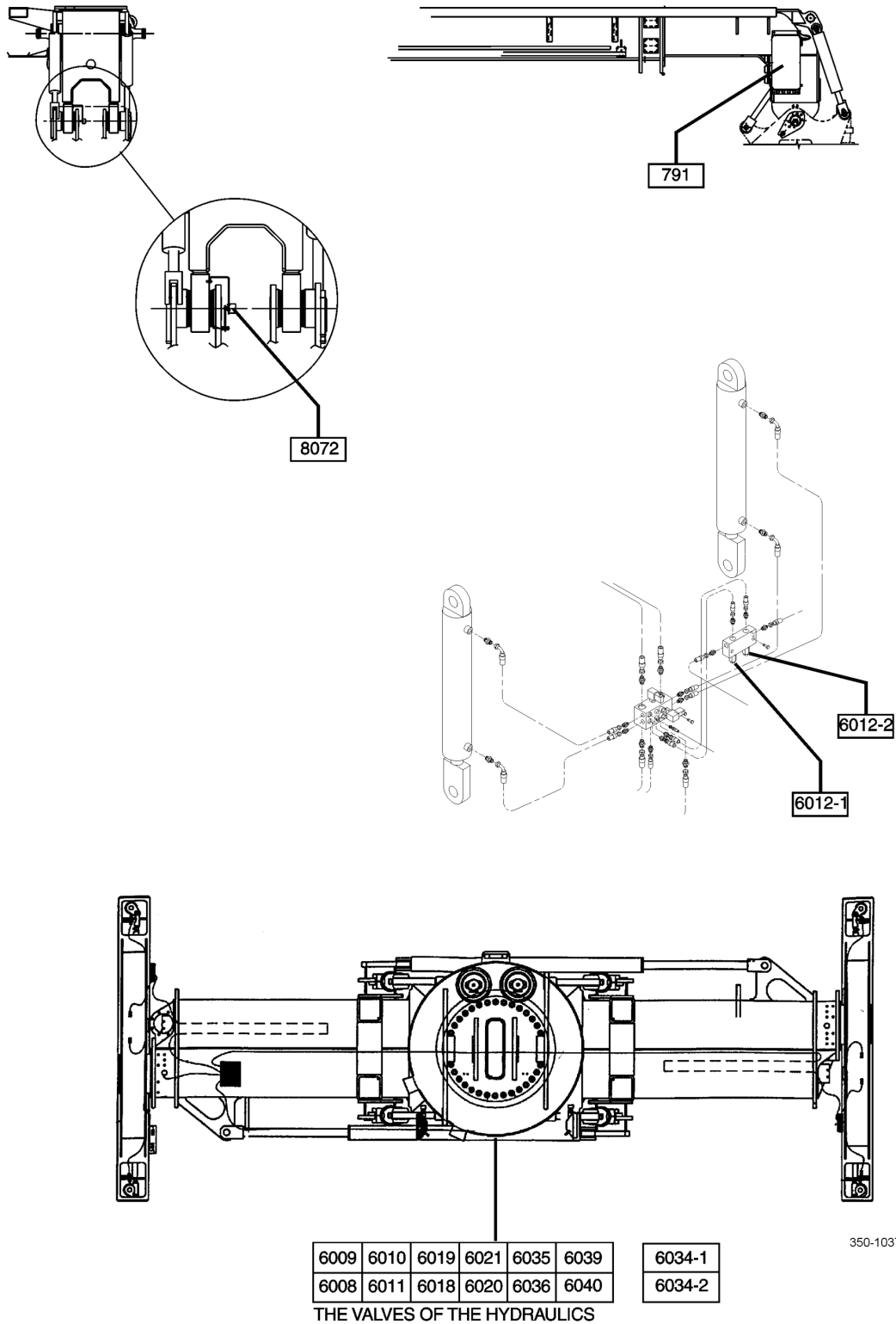
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION								
<p><b>Error Code 229 - Tophandler Sideshift Right, Short Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG TOP LIFT</td> <td>7 (16)</td> </tr> <tr> <td>SIDE SH. OUTPUT/INPUT</td> <td></td> </tr> <tr> <td>LEFT</td> <td>0.00mV 0mA</td> </tr> <tr> <td>RIGHT</td> <td>0.00mV 0mA</td> </tr> </table>	DIAG TOP LIFT	7 (16)	SIDE SH. OUTPUT/INPUT		LEFT	0.00mV 0mA	RIGHT	0.00mV 0mA	<p>1. Check wires and cables from tophandler control valve to boom for obvious damage.</p> <p>2. Disconnect electrical connector 6021 from tophandler sideshift right solenoid. Place ignition switch to ON position. Error code 228 will be displayed. Perform voltage check at pins 1 and 2.</p>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6021, replace sideshift right solenoid (WP 0169 00).</p>
DIAG TOP LIFT	7 (16)									
SIDE SH. OUTPUT/INPUT										
LEFT	0.00mV 0mA									
RIGHT	0.00mV 0mA									

Table 4. Error Code 229 - Tophandler Sideshift Right, Short Circuit Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 229 - Tophandler Sideshift Right, Short Circuit Failure - Continued</b></p>	<p>3. Disconnect connector X189 from tophandler junction box at end of boom. Place ignition switch to OFF position and check continuity between connector 6021 pin 1 and pin 2 and between connector 6021 pin 1 and pin 2 and chassis.</p> <p>4. Enter “DIAG ATTACHMENT 7 (16)” menu and check current of SIDESHIFT RIGHT OUTPUT. Current should be present with joystick sideshift right activated.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If current is present, notify SRA.</p>



END OF WORK PACKAGE



THIS WORK PACKAGE COVERS

Error Code 231 - Tophandler Spreader Opening, Open Circuit Failure

Error Code 234 - Tophandler Spreader Closing, Open Circuit Failure

Error Code 232 - Tophandler Spreader Opening, Short Circuit Failure

Error Code 235 - Tophandler Spreader Closing, Short Circuit Failure

INITIAL SETUP

References

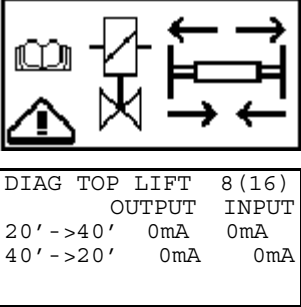
TM 10-3930-675-10

ECS Attachment (A34652.0200) (WP 0199 00-23)

NOTE

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustration at end of work package for component location.

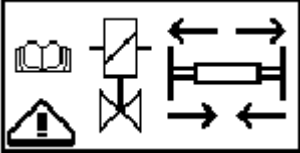
Table 1. Error Code 231 - Tophandler Spreader Opening, Open Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<p><b>Error Code 231 - Tophandler Spreader Opening, Open Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG</td> <td>TOP LIFT</td> <td>8 (16)</td> </tr> <tr> <td></td> <td>OUTPUT</td> <td>INPUT</td> </tr> <tr> <td>20' -&gt; 40'</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>40' -&gt; 20'</td> <td>0mA</td> <td>0mA</td> </tr> </table>	DIAG	TOP LIFT	8 (16)		OUTPUT	INPUT	20' -> 40'	0mA	0mA	40' -> 20'	0mA	0mA	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6018 from tophandler spreader opening solenoid. Place ignition switch to ON position and perform voltage check.</li> <li>3. Disconnect connector X188 from tophandler junction box at end of boom. Place ignition switch to ON position and perform voltage check between connector X188 pin J and pin K.</li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6018, replace spreader opening solenoid (WP 0169 00).</p>
DIAG	TOP LIFT	8 (16)												
	OUTPUT	INPUT												
20' -> 40'	0mA	0mA												
40' -> 20'	0mA	0mA												

**Table 1. Error Code 231 - Tophandler Spreader Opening, Open Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>Error Code 231 - Tophandler Spreader Opening, Open Circuit Failure - Continued</b>	<p>a. If 20-25V is present, check continuity between connector X188 pin J and connector 6018 pin 1; between connector X188 pin K and connector 6018 pin 2; and between connector X188 pin K and ECU (791) connector 2 pin 4.</p> <p>b. If voltage is not present, enter “DIAG ATTACHMENT 8 (16)” menu and check current of 20’-40’ OUTPUT. Current should be present with joystick activated to open tophandler spreader.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If current is present, notify SRA.</p>

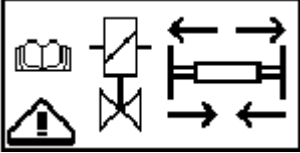
**Table 2. Error Code 232 - Tophandler Spreader Opening, Short Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<b>Error Code 232 - Tophandler Spreader Opening, Short Circuit Failure</b>    <table border="1"> <tr> <td>DIAG</td> <td>TOP LIFT</td> <td>8 (16)</td> </tr> <tr> <td></td> <td>OUTPUT</td> <td>INPUT</td> </tr> <tr> <td>20’ -&gt; 40’</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>40’ -&gt; 20’</td> <td>0mA</td> <td>0mA</td> </tr> </table>	DIAG	TOP LIFT	8 (16)		OUTPUT	INPUT	20’ -> 40’	0mA	0mA	40’ -> 20’	0mA	0mA	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6018 from tophandler spreader opening solenoid. Place ignition switch to ON position. Error code 231 will be displayed. Perform voltage check at pins 1 and 2.</li> </ol>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6018, replace spreader opening solenoid (WP 0169 00).</p>
DIAG	TOP LIFT	8 (16)												
	OUTPUT	INPUT												
20’ -> 40’	0mA	0mA												
40’ -> 20’	0mA	0mA												

**Table 2. Error Code 232 - Tophandler Spreader Opening, Short Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 232 - Tophandler Spreader Opening, Short Circuit Failure - Continued</b></p>	<p>3. Disconnect connector X188 from tophandler junction box at end of boom. Place ignition switch to OFF position and check continuity between connector 6018 pin 1 and pin 2 and between connector 6018 pin 1 and pin 2 and chassis.</p> <p>4. Enter “DIAG ATTACHMENT 8 (16)” menu and check current of 20’-40’ OUTPUT. Current should be present with joystick activated to open tophandler spreader.</p>	<p>a. If continuity is present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If current is present, notify SRA.</p>

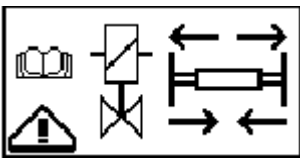
**Table 3. Error Code 234 - Tophandler Spreader Closing, Open Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<p><b>Error Code 234 - Tophandler Spreader Closing, Open Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG</td> <td>TOP LIFT</td> <td>8 (16)</td> </tr> <tr> <td></td> <td>OUTPUT</td> <td>INPUT</td> </tr> <tr> <td>20’ -&gt;40’</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>40’ -&gt;20’</td> <td>0mA</td> <td>0mA</td> </tr> </table>	DIAG	TOP LIFT	8 (16)		OUTPUT	INPUT	20’ ->40’	0mA	0mA	40’ ->20’	0mA	0mA	<p>1. Check wires and cables from tophandler control valve to boom for obvious damage.</p> <p>2. Disconnect electrical connector 6019 from tophandler spreader closing solenoid. Place ignition switch to ON position and perform voltage check at pins 1 and 2.</p>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6019, replace spreader closing solenoid (WP 0169 00).</p>
DIAG	TOP LIFT	8 (16)												
	OUTPUT	INPUT												
20’ ->40’	0mA	0mA												
40’ ->20’	0mA	0mA												

**Table 3. Error Code 234 - Tophandler Spreader Closing, Open Circuit Failure Troubleshooting Procedures - Continued.**

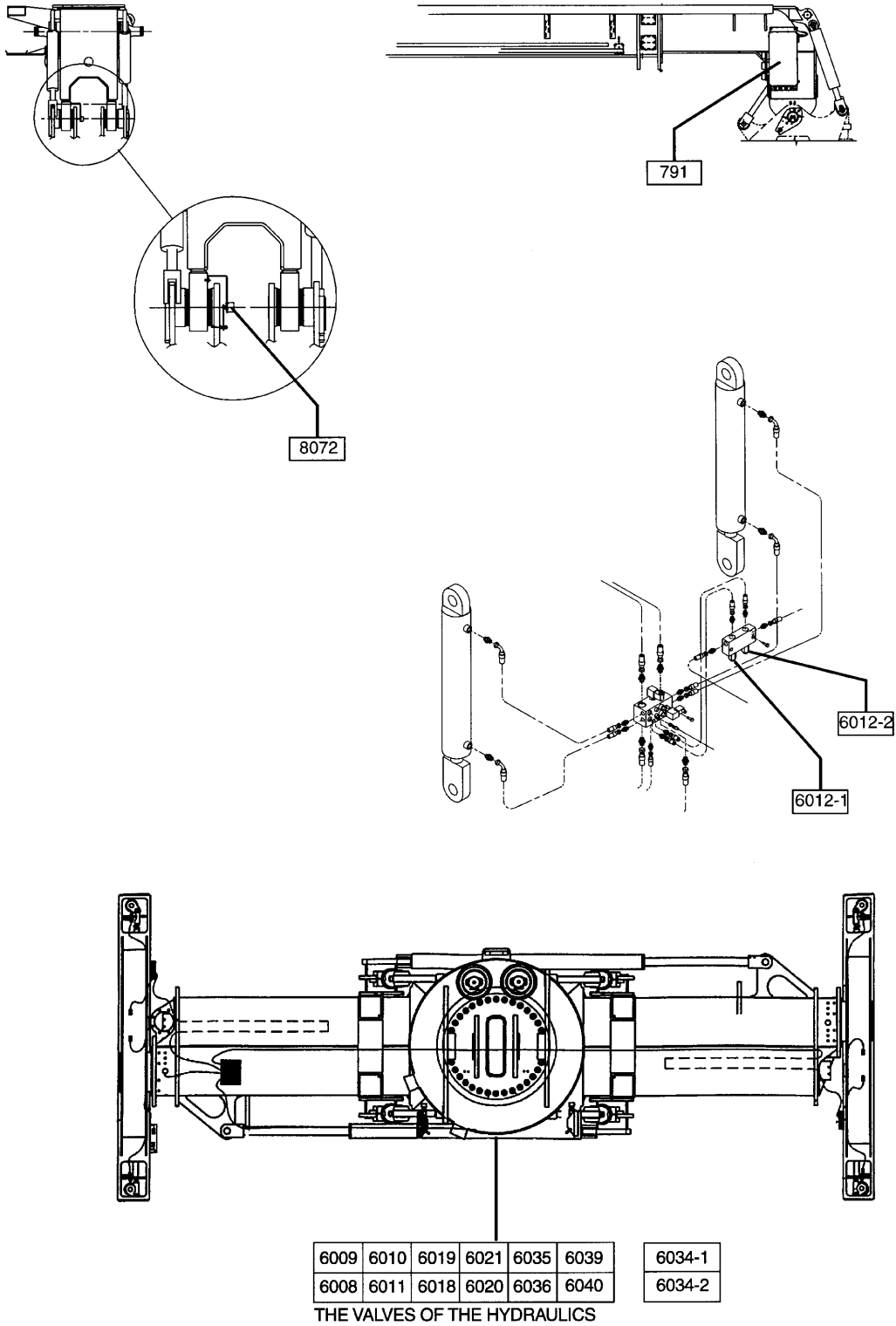
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 234 - Tophandler Spreader Closing, Open Circuit Failure - Continued</b></p>	<p>3. Disconnect connector X188 from tophandler junction box at end of boom. Place ignition switch to ON position and perform voltage check between connector X188 pin L and pin M.</p> <p>a. If 20-25V is present, check continuity between connector X188 pin L and connector 6019 pin 1; between connector X188 pin M and connector 6019 pin 2; and between connector X188 pin M and ECU (791) connector 2 pin 12.</p> <p>b. If voltage is not present, enter "DIAG ATTACHMENT 8 (16)" menu and check current of 20'-40' OUTPUT. Current should be present with joystick activated to close tophandler spreader.</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If current is present, notify SRA.</p>

**Table 4. Error Code 235 - Tophandler Spreader Closing, Short Circuit Failure Troubleshooting Procedures.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION												
<p><b>Error Code 235 - Tophandler Spreader Closing, Short Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG</td> <td>TOP LIFT</td> <td>8 (16)</td> </tr> <tr> <td></td> <td>OUTPUT</td> <td>INPUT</td> </tr> <tr> <td>20' -&gt;40'</td> <td>0mA</td> <td>0mA</td> </tr> <tr> <td>40' -&gt;20'</td> <td>0mA</td> <td>0mA</td> </tr> </table>	DIAG	TOP LIFT	8 (16)		OUTPUT	INPUT	20' ->40'	0mA	0mA	40' ->20'	0mA	0mA	<p>1. Check wires and cables from tophandler control valve to boom for obvious damage.</p> <p>2. Disconnect electrical connector 6019 from tophandler spreader closing solenoid. Place ignition switch to ON position. Error code 234 will be displayed. Perform voltage check at pins 1 and 2.</p>	<p>Repair or replace damaged connectors (WP 0111 00).</p> <p>If 20-25V is present at connector 6019, replace spreader closing solenoid (WP 0169 00).</p>
DIAG	TOP LIFT	8 (16)												
	OUTPUT	INPUT												
20' ->40'	0mA	0mA												
40' ->20'	0mA	0mA												

**Table 4. Error Code 235 - Tophandler Spreader Closing, Short Circuit Failure  
Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 235 - Tophandler Spreader Closing, Short Circuit Failure - Continued</b></p>	<p>3. Disconnect connector X188 from tophandler junction box at end of boom. Place ignition switch to OFF position and check continuity between connector 6019 pin 1 and pin 2 and between connector 6019 pin 1 and pin 2 and chassis.</p> <p>4. Enter "DIAG ATTACHMENT 8 (16)" menu and check current of 20'-40' OUTPUT. Current should be present with joystick activated to close tophandler spreader.</p>	<p>a. If continuity (short) to chassis, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If current is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If current is present, notify SRA.</p>



350-1037

END OF WORK PACKAGE

**THIS WORK PACKAGE COVERS**

Error Code 212 - Tophandler Left Twistlocks Indication Failure

Error Code 243 - Tophandler Twistlock Locking Circuit Failure

Error Code 213 - Tophandler Right Twistlocks Indication Failure

Error Code 246 - Tophandler Twistlock Unlocking Circuit Failure

Error Code 214 - Tophandler Forklift Sensor Indication Failure

**INITIAL SETUP**

**References**

TM 10-3930-675-10

Current Supply (A34738.0200) (WP 0199 00-31)

ECS Attachment (A34652.0200) (WP 0199 00-23)

**NOTE**

- Refer to WP 0004 00 for additional troubleshooting guidance, information, and illustrations that locate critical components.
- Refer also to illustrations at end of work package for component location.

**Table 1. Error Code 212 - Tophandler Left Twistlocks Indication Failure Troubleshooting Procedures.**

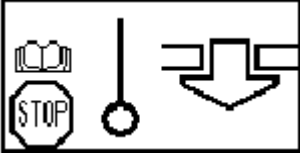
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 212 - Tophandler Left Twistlocks Indication Failure</b></p>  <pre> DIAG TOP LIFT 4(16) TWIST LOCK  LE UNL. 1  RI UNL. 1 LE LOCK 0  RI LOCK 0                     </pre>	<ol style="list-style-type: none"> <li>1. Inspect all twistlock proximity switches for grease and dirt.</li> <li>2. Check twistlock proximity switches for secure mounting and proper adjustment by placing tophandler on a container or, with assistance, simulating placement on a container (WP 0074 00).</li> </ol>	<p>Clean proximity switch tips and indicator lights as required.</p> <p>Tighten and adjust proximity switches as required (WP 0074 00).</p>

Table 1. Error Code 212 - Tophandler Left Twistlocks Indication Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 212 - Tophandler Left Twistlocks Indication Failure - Continued</b></p>	<p>3. Remove tophandler junction box cover and ensure that circuit breakers F41, F42, and F43 are not tripped. Check wire from circuit breaker F42 to connector X181 for damage.</p> <p>4. Remove junction box X183 cover (located on left end of tophandler) and check voltage between connector X183 pin 3 and pin 4. Voltage should be 20-25V.</p> <p>a. If voltage is present, perform functional check of left side twistlock proximity switches by placing a metal object within 5 mm of tip of each switch. Proximity switch indicator light should illuminate.</p> <p>b. If indicator lights illuminate, check voltage at junction box X183 pin 5 (for unlocked) and pin 6 (for locked).</p> <p>5. Remove cover from junction box X182 (located on top of tophandler). Check voltage between junction box X182 pin 4 and pin 5. Voltage should be 20-25V.</p> <p>6. Check continuity between junction box X182 pin 8 and junction box X183 pin 5 and between junction box X182 pin 9 and junction box X183 pin 6.</p>	<p>a. Reset circuit breakers as required (WP 0076 00).</p> <p>b. Replace damaged connectors (WP 0111 00).</p> <p>If indicator lights do not illuminate, replace proximity switch (WP 0074 00).</p> <p>If voltage is not present, replace proximity switch (WP 0074 00).</p> <p>If voltage is not as specified, repair or replace cable from junction box X183 to connector X182 (WP 0111 00).</p> <p>If continuity is not present, repair or replace cable from junction box X183 to connector X182 (WP 0111 00).</p>



Table 1. Error Code 212 - Tophandler Left Twistlocks Indication Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 212 - Tophandler Left Twistlocks Indication Failure - Continued</b></p>	<p>7. Disconnect connector X181 from tophandler junction box located at end of boom. Check voltage between junction box pin A and pin B. Voltage should be 20-25V.</p> <p>8. Check continuity between junction box X182 pin 8 and connector X181 pin J and between junction box X182 pin 9 and connector X181 pin K.</p>	<p>a. If voltage is not as specified, repair cable from connector X181 to junction box X182 (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify DS Maintenance.</p> <p>c. If voltage is not present, notify SRA.</p> <p>a. If continuity is not present, repair or replace cable from connector X181 to junction box X182 (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify DS Maintenance.</p>

Table 2. Error Code 213 - Tophandler Right Twistlocks Indication Failure Troubleshooting Procedures.

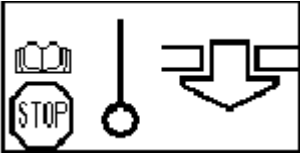
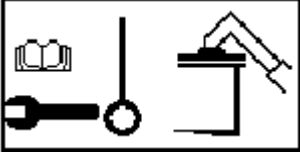
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 213 - Tophandler Right Twistlocks Indication Failure</b></p>  <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p>DIAG TOP LIFT 4(16) TWIST LOCK</p> <p>LE UNL. 1 RI UNL. 1 LE LOCK 0 RI LOCK 0</p> </div>	<p>1. Inspect all twistlock proximity switches for grease and dirt.</p> <p>2. Check twistlock proximity switches for secure mounting and proper adjustment by placing tophandler on a container or, with assistance, simulating placement on a container (WP 0074 00).</p> <p>3. Remove tophandler junction box cover and ensure that circuit breakers F41, F42, and F43 are not tripped. Check wire from circuit breaker F42 to connector X181 for damage.</p> <p>4. Remove junction box X184 cover (located on right end of tophandler) and check voltage between connector X184 pin 3 and pin 4. Voltage should be 20-25V.</p>	<p>Clean proximity switch tips and indicator lights as required.</p> <p>Tighten and adjust proximity switches as required (WP 0074 00).</p> <p>a. Reset circuit breakers as required (WP 0076 00).</p> <p>b. Replace damaged connectors (WP 0111 00).</p>

Table 2. Error Code 213 - Tophandler Right Twistlocks Indication Failure Troubleshooting Procedures - Continued.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 213 - Tophandler Right Twistlocks Indication Failure - Continued</b></p>	<p>a. If voltage is present, perform functional check of right side twistlock proximity switches by placing a metal object within 5 mm of tip of each switch. Proximity switch indicator light should illuminate.</p> <p>b. If indicator lights illuminate, check voltage at junction box X184 pin 5 (for unlocked) and pin 6 (for locked).</p> <p>5. Remove cover from junction box X182 (located on top of tophandler). Check voltage between junction box X182 pin 4 and pin 5. Voltage should be 20-25V.</p> <p>6. Check continuity between junction box X182 pin 12 and junction box X184 pin 5 and between junction box X182 pin 13 and junction box X184 pin 6.</p> <p>7. Disconnect connector X181 from tophandler junction box located at end of boom. Check voltage between junction box pin A and pin B. Voltage should be 20-25V.</p> <p>8. Check continuity between junction box X182 pin 12 and connector X181 pin G and between junction box X182 pin 13 and connector X181 pin H.</p>	<p>If indicator lights do not illuminate, replace proximity switch (WP 0074 00).</p> <p>If voltage is not present, replace proximity switch (WP 0074 00).</p> <p>If voltage is not as specified, repair or replace cable from junction box X183 to connector X182 (WP 0111 00).</p> <p>If continuity is not present, repair or replace cable from junction box X183 to connector X182 (WP 0111 00).</p> <p>a. If voltage is not as specified, repair cable from connector X181 to junction box X182 (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify DS Maintenance.</p> <p>a. If continuity is not present, repair or replace cable from connector X181 to connector X182 (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify DS Maintenance.</p>

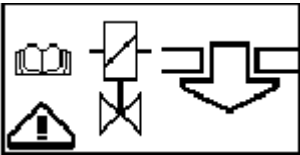
Table 3. Error Code 214 - Tophandler Forklift Sensor Indication Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 214 - Tophandler Forklift Sensor Indication Failure</b></p>  <pre> DIAG TOP LIFT 5(16) DAMPING 20/40 0 TOP LIFT SIG 1 1 TOP LIFT SIG 2 1                     </pre>	<ol style="list-style-type: none"> <li>1. Inspect forklift proximity switches for grease and dirt.</li> <li>2. Check forklift proximity switches for secure mounting and proper adjustment.</li> <li>3. Remove tophandler junction box cover and ensure that circuit breakers F41, F42, and F43 are not tripped. Check wire from circuit breaker F42 to connector X181 for damage.</li> <li>4. Remove junction box X183 cover (located on left end of tophandler) and check voltage between junction box X183 pin 3 and pin 4. Voltage should be 20-25V. <ol style="list-style-type: none"> <li>a. If voltage is present, perform functional check of forklift proximity switches by placing a metal object within 5 mm of tip of each switch. Proximity switch indicator lights should illuminate.</li> <li>b. If indicator lights illuminate, check voltage at junction box X183 pin 5 (for unlocked) and pin 6 (for locked).</li> </ol> </li> <li>5. Remove cover from junction box X182 (located on top of tophandler). Check voltage between junction box X182 pin 4 and pin 5. Voltage should be 20-25V.</li> </ol>	<p>Clean proximity switch tips and indicator lights as required.</p> <p>Tighten and adjust proximity switches as required (WP 0074 00).</p> <ol style="list-style-type: none"> <li>a. Reset circuit breakers as required (WP 0076 00).</li> <li>b. Replace damaged connectors (WP 0111 00).</li> </ol> <p>If indicator lights did not illuminate, replace proximity switch (WP 0074 00).</p> <p>If voltage is not present, replace proximity switch (WP 0074 00).</p> <p>If voltage is not as specified, repair or replace cable from junction box X183 to junction box X182 (WP 0111 00).</p>

**Table 3. Error Code 214 - Tophandler Forklift Sensor Indication Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 214 - Tophandler Forklift Sensor Indication Failure - Continued</b></p>	<p>6. Check continuity between junction box X182 pin 2 and junction box X183 pin 7 and between junction box X182 pin 3 and junction box X183 pin 8.</p> <p>7. Disconnect connector X181 from tophandler junction box located at end of boom. Check voltage between junction box pin A and pin B. Voltage should be 20-25V.</p> <p>8. Check continuity between junction box X182 pin 2 and connector X181 pin M and between junction box X182 pin 3 and connector X181 pin N.</p>	<p>If continuity is not present, repair or replace cable from junction box X183 to junction box X182 (WP 0111 00).</p> <p>a. If voltage is not as specified, repair cable from connector X181 to junction box X182 (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify DS Maintenance.</p> <p>a. If continuity is not present, repair or replace cable from connector X181 to junction box X182 (WP 0111 00).</p> <p>b. If wiring harness must be replaced, notify DS Maintenance.</p>

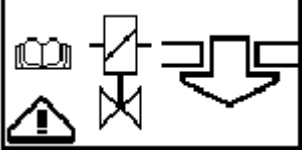
**Table 4. Error Code 243 - Tophandler Twistlock Locking Circuit Failure Troubleshooting Procedures.**

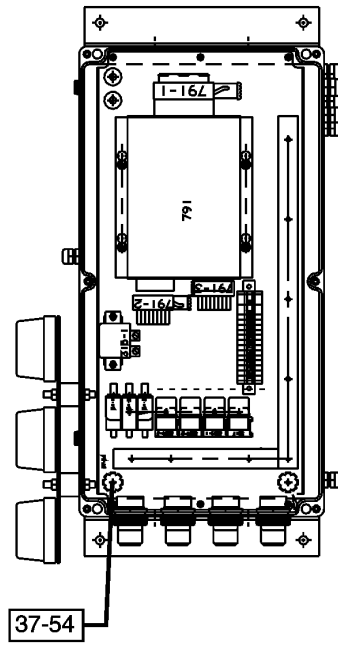
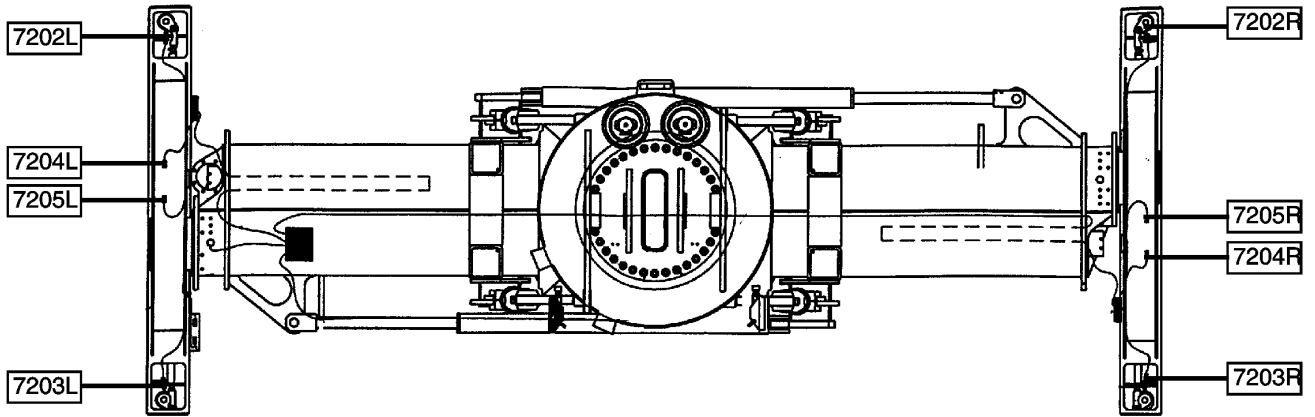
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION								
<p><b>Error Code 243 - Tophandler Twistlock Locking Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG TOP LIFT</td> <td>6 (16)</td> </tr> <tr> <td>TW-LOCK OUTPUT</td> <td>INPUT</td> </tr> <tr> <td>UNLOCKED</td> <td>0.00V 0mA</td> </tr> <tr> <td>LOCKED</td> <td>0.00V 0mA</td> </tr> </table>	DIAG TOP LIFT	6 (16)	TW-LOCK OUTPUT	INPUT	UNLOCKED	0.00V 0mA	LOCKED	0.00V 0mA	<p>1. Check wires and cables from tophandler control valve to boom for obvious damage.</p> <p>2. Disconnect electrical connector 6040 from tophandler twistlock locking solenoid. Place ignition switch to ON position and perform voltage check at pins 1 and 2.</p>	<p>Repair or replace damaged wires (WP 0111 00).</p> <p>If 20-25V is present at connector 6040, replace twistlock locking solenoid (WP 0169 00).</p>
DIAG TOP LIFT	6 (16)									
TW-LOCK OUTPUT	INPUT									
UNLOCKED	0.00V 0mA									
LOCKED	0.00V 0mA									

**Table 4. Error Code 243 - Tophandler Twistlock Locking Circuit Failure Troubleshooting Procedures - Continued.**

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<p><b>Error Code 243 - Tophandler Twistlock Locking Circuit Failure - Continued</b></p>	<p>3. Disconnect connector X189 from tophandler junction box at end of boom. Place ignition switch to ON position and perform voltage check between connector X189 pin L and pin M.</p> <p>a. If 20-25V is present, check continuity between connector X189 pin L and connector 6040 pin 1 and between connector X189 pin M and connector 6040 pin 2. Check continuity between connector 6040 pin 1 and pin 2 and to chassis. Check continuity between connector X189 pin M and ECU (791) connector 2 pin 16.</p> <p>b. If voltage is not present, enter "DIAG ATTACHMENT 6 (16)" menu and check voltage of LOCKED OUTPUT. Voltage should be present with joystick activated to lock/unlock (press switch twice for lock and unlock).</p>	<p>a. If continuity is not present, repair or replace connectors (WP 0111 00).</p> <p>b. If wiring harness requires replacement, notify DS Maintenance.</p> <p>a. If voltage is not present, replace ECU (791) (WP 0076 00).</p> <p>b. If voltage is present, notify SRA.</p>

Table 5. Error Code 246 - Tophandler Twistlock Unlocking Circuit Failure Troubleshooting Procedures.

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION								
<p><b>Error Code 246 - Tophandler Twistlock Unlocking Circuit Failure</b></p>  <table border="1"> <tr> <td>DIAG TOP LIFT</td> <td>6(16)</td> </tr> <tr> <td>TW-LOCK OUTPUT</td> <td>INPUT</td> </tr> <tr> <td>UNLOCKED</td> <td>0.00V 0Ma</td> </tr> <tr> <td>LOCKED</td> <td>0.00V 0mA</td> </tr> </table>	DIAG TOP LIFT	6(16)	TW-LOCK OUTPUT	INPUT	UNLOCKED	0.00V 0Ma	LOCKED	0.00V 0mA	<ol style="list-style-type: none"> <li>1. Check wires and cables from tophandler control valve to boom for obvious damage.</li> <li>2. Disconnect electrical connector 6039 from tophandler twistlock unlocking solenoid. Place ignition switch to ON position and perform voltage check.</li> <li>3. Disconnect connector X189 from tophandler junction box at end of boom. Place ignition switch to ON position and perform voltage check between connector X189 pin J and pin K.             <ol style="list-style-type: none"> <li>a. If 20-25V is present, check continuity between connector X189 pin J and connector 6039 pin 1 and between connector X189 pin K and connector 6039 pin 2. Check continuity between connector 6039 pin 1 and pin 2 and to chassis. Check continuity between connector X189 pin K and ECU (791) connector 2 pin 8.</li> <li>b. If voltage is not present, enter "DIAG ATTACHMENT 6 (16)" menu and check voltage of UNLOCKED OUTPUT. Voltage should be present with joystick lock/unlock and override switch 1005 activated (press switch twice for lock and unlock).</li> </ol> </li> </ol>	<p>Repair or replace damaged wires (WP 0111 00).</p> <p>If 20-25V is present at connector 6039, replace twistlock unlocking solenoid (WP 0169 00).</p> <ol style="list-style-type: none"> <li>a. If continuity is not present, repair or replace connectors (WP 0111 00).</li> <li>b. If wiring harness requires replacement, notify DS Maintenance.</li> <li>a. If voltage is not present, replace ECU (791) (WP 0076 00).</li> <li>b. If voltage is present, notify SRA.</li> </ol>
DIAG TOP LIFT	6(16)									
TW-LOCK OUTPUT	INPUT									
UNLOCKED	0.00V 0Ma									
LOCKED	0.00V 0mA									



350-1038

END OF WORK PACKAGE



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*General, United States Army*  
*Chief of Staff*

Official:

  
JOEL B. HUDSON  
*Administrative Assistant to the*  
*Secretary of the Army*  
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ITEM	PAGE	PARA-	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON
	0035 00-1	Initial Setup				Item number for Oil, lubricating is not correct

**SAMPLE**

\* Reference to line numbers within the paragraph or subparagraph.

TYPED NAME, GRADE OR TITLE Johnny Wilson, E-5, MOTOR SGT	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION DSN 867-7967	SIGNATURE
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## THE METRIC SYSTEM AND EQUIVALENTS

<p><b>Linear Measure</b></p> <p>1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches          1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches          1 Kilometer = 1000 Meters = 0.621 Miles</p> <p><b>Weights</b></p> <p>1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces          1 Kilogram = 1000 Grams = 2.2 Pounds          1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons</p> <p><b>Liquid Measure</b></p> <p>1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces          1 Liter = 1000 Milliliters = 33.82 Fluid Ounces</p>	<p><b>Square Measure</b></p> <p>1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches          1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet          1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles</p> <p><b>Cubic Measure</b></p> <p>1 Cu Centimeter = 1,000 Cu Millimeters = 0.06 Cu Inches          1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet</p> <p><b>Temperature</b></p> <p><math>5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}</math>          212° Fahrenheit is equivalent to 100° Celsius          90° Fahrenheit is equivalent to 32.2° Celsius          32° Fahrenheit is equivalent to 0° Celsius  <math>9/5 \text{ C}^{\circ} + 32 = \text{F}^{\circ}</math></p>
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## APPROXIMATE CONVERSION FACTORS

To Change	To	Multiply By
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Sq Inches	Sq Centimeters	6.451
Sq Feet	Sq Meters	0.093
Sq Yards	Sq Meters	0.836
Sq Miles	Sq Kilometers	2.590
Acres	Sq Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Sq Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

To Change	To	Multiply By
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Sq Centimeters	Sq Inches	0.155
Sq Meters	Sq Feet	10.764
Sq Meters	Sq Yards	1.196
Sq Kilometers	Sq Miles	0.386
Sq Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Sq Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621

