

# **DIAGNOSTIC TROUBLE CODE (DTC) REFERENCE**

**H2.0A, H2.5A6, H2.5A, H3.0A, H3.5A (H40A, H50A6,  
H60A, H70A) [R177]; S2.0A, S2.5A, S2.5A6, S3.0A,  
S3.5A (S40A, S50A, S55AS, S60A,  
S70A) [J187]; H1.6A, H1.8A, H2.0AS (H30A, H35A,  
H40AS) [H001]; S30A, S35A, S40AS [G010]**

***HYSTER***

# SAFETY PRECAUTIONS

## MAINTENANCE AND REPAIR

- The Service Manuals are updated on a regular basis, but may not reflect recent design changes to the product. Updated technical service information may be available from your local authorized Hyster® dealer. Service Manuals provide general guidelines for maintenance and service and are intended for use by trained and experienced technicians. Failure to properly maintain equipment or to follow instructions contained in the Service Manual could result in damage to the products, personal injury, property damage or death.
- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- **DISCONNECT THE BATTERY** before doing any maintenance or repair on electric lift trucks. Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See **HOW TO PUT THE LIFT TRUCK ON BLOCKS** in the **Operating Manual** or the **Periodic Maintenance** section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use **HYSTER® APPROVED** parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a **DO NOT OPERATE** tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the **WARNING** and **CAUTION** notes in the instructions.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

**NOTE:** The following symbols and words indicate safety information in this manual:



### **WARNING**

**Indicates a hazardous situation which, if not avoided, could result in death or serious injury.**



### **CAUTION**

**Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury and property damage.**

**On the lift truck, the WARNING symbol (and word, if present) are on orange background. The CAUTION symbol (and word, if present) are on yellow background.**



### **WARNING**

Installing improper electrical accessories or installing an electrical accessory incorrectly can increase the risk of equipment damage, personal injury and fire. DO NOT install electrical accessories to the truck unless you have been trained and authorized to do so. Personnel installing the electrical accessories must document the changes made to the truck. DO NOT install accessories which affect the truck's compliance with standard ANSI/ITSDF B56.1, UL 558, or UL 583, or which otherwise affect the safe operation of the truck.



### **WARNING**

Installing improper electrical accessories or installing an electrical accessory incorrectly can increase the risk of equipment damage, personal injury and fire. DO NOT install electrical accessories to the truck unless you have been trained and authorized to do so. Personnel installing the electrical accessories must document the changes made to the truck. DO NOT install accessories which affect the truck's compliance with standard EN 1175:2020.



### **WARNING**

California Proposition 65 - Operating, servicing and maintaining a powered industrial truck can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).



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## Error code reference charts

### VEHICLE SYSTEM MANAGER (VSM) ERROR CODE REFERENCE CHART

202001-190

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2201-0 I/O Box Output Enable Low OE_CONTROL_LOW_OORH</b>				
Commanded output from I-box or O-box is low, but feedback voltage is high	>1V	LEN101-A	a. Module failure	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu of display</li> <li>2. Check voltage at battery</li> <li>3. Check alternator output</li> <li>4. Check voltage at module</li> <li>5. Check for draw on battery or short to ground</li> </ol>
<b>DTC 2201-3 I/O Box Output Enable High OE_CONTROL_HIGH_OORH</b>				
Commanded output from I-box or O-box is high, and feedback voltage is high	>13V	LEN101-A	a. Module failure	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu of display</li> <li>2. Check voltage at battery</li> <li>3. Check alternator output</li> <li>4. Check voltage at module</li> <li>5. Check for draw on battery or short to ground</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2201-4 I/O Box Output Enable High OE_CONTROL_HIGH_OORL</b>				
Commanded output from I-box or O-box is high, but feedback voltage is low	<3V	LEN101-A	a. Module failure	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu of display</li> <li>2. Check voltage at battery</li> <li>3. Check alternator output</li> <li>4. Check voltage at module</li> <li>5. Check for draw on battery or short to ground</li> </ol>
<b>DTC 3101-1 Invalid Encoder Configuration ENCODER_LLD_OUTPUT_ERROR</b>				
Encoder configuration LLD failure  The requested encoder channel is out of bounds, the count mode is not regular or quad mode, or the driver has failed; likely caused by invalid CDF setting	Flag	FYN102-A FYN103-A FYN104-A	a. Hardware failure b. Software issue	<ol style="list-style-type: none"> <li>1. Check software version</li> <li>2. Update software if newer version available</li> <li>3. Replace VSM</li> </ol> <p><b>NOTE:</b> Contact Hyster Service for authorization before replacing hardware</p>
<b>DTC 3101-18 Invalid Encoder Configuration ENCODER_SPEED_CALC_ERROR</b>				
Encoder configuration measurement error  The VSM encoder reports measure time of 0 seconds; likely caused by invalid CDF setting	0 seconds	FYN102-A FYN103-A FYN104-A	a. Application software updated and incompatible with installed CDF b. New or different CDF installed without updating application software	<ol style="list-style-type: none"> <li>1. Reinstall original hardware</li> <li>2. Check VSM and display software versions in the truck display</li> <li>3. Consult Hyster Service to determine if CDF is compatible with current application software version</li> <li>4. Update CDF and VSM application software</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3102-02 Invalid TISS Configuration TISS_CONFIG_ERROR</b>				
CDF TISS gear tooth count exceeds maximum threshold or CDF gear tooth count is less than or equal to 0	150	FYN102-A	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 3103-2 Invalid TOSS Configuration TOSS_CONFIG_ERROR</b>				
CDF TOSS gear count exceeds threshold CDF gear tooth count <=0 CDF configure speed <=0.01 kph CDF axle ratio <=0.1	150	FYN103-A FYN104-A	a. Misconfigured CDF b. New CDF loaded without updating application software	1. Check VSM and display software versions in the truck display 2. Consult Hyster Service to determine if CDF is compatible with current application software version
<b>DTC 695-9 TSC1 Message Receipt Lost</b>				
TSC1 message receipt lost	Run time >0.0 Key on time >2.0	CHN102 CLN102	a. Open or short in CAN circuit CHN102 b. Open or short in CAN circuit CLN102 c. Possible VSM is faulty or damaged d. Possible ECU is faulty or damaged	1. Check VSM and display software versions in the truck display 2. Consult Hyster Service to determine if CDF is compatible with current application software version

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 64949-9 Y_ECR1 Message Receipt Lost</b>				
Y_ECR1 message receipt lost	Run time >0.0 Key on time >2.0	CHN102 CLN102	a. Open or short in CAN circuit CHN102 b. Open or short in CAN circuit CLN102 c. Possible VSM is faulty or damaged d. Possible ECU is faulty or damaged	1. Check VSM and display software versions in the truck display 2. Consult Hyster Service to determine if CDF is compatible with current application software version
<b>DTC 7071-19 Communication with Display NM_ERROR_DISPLAY</b>				
VSM timed out while initializing Display node	1 sec	CAN1: CHN101 and CLN101 Node: 0x7	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7074-9 Communication with Impact Sensor MISSING_MESSAGE_IMPACT_SENSOR</b>				
VSM timed out when waiting to receive a specific CAN message from telemetry Node A	100 mS	CAN1: CHN101 and CLN101 Node: 0xA	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7074-19 Communication with Impact Sensor NM_ERROR_IMPACT_SENSOR</b>				
VSM timed out while initializing telemetry Node A	1 sec	CAN1: CHN101 and CLN101 Node: 0xA	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
				3. Check for power and ground at module
<b>DTC 7075-9 Communication with MLM or Joystick MISSING_MESSAGE_ILM</b>				
VSM timed out when waiting to receive a specific CAN message from minilever (MLM) or joystick node	100 mS	CAN1: CHN101 and CLN101 Node: 0xB	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7075-19 Communication with MLM or Joystick NM_ERROR_ILM</b>				
VSM timed out while initializing minilever (MLM) or joystick node	1 sec	CAN1: CHN101 and CLN101 Node: 0xB	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7081-9 Communication with IBOX 1 MISSING_MESSAGE_IBOX1</b>				
VSM timed out when waiting to receive a specific CAN message from I-box node	Flag	CAN1: CHN101 and CLN101 Node: 0x11	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7081-19 Communication with IBOX 1 NM_ERROR_IBOX1</b>				
VSM timed out while initializing I-box node	1 sec	CAN1: CHN101 and CLN101 Node: 0x11	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module	1. Check CAN resistance and voltage at service connector

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
			d. Module hardware failure	2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7082-9 Communication with IBOX 2 MISSING_MESSAGE_IBOX2</b>				
VSM timed out when waiting to receive a specific CAN message from I-box node	Flag	CAN1: CHN101 and CLN101 Node: 0x12	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7082-19 Communication with IBOX 2 NM_ERROR_IBOX2</b>				
VSM timed out while initializing I-box node	1 sec	CAN1: CHN101 and CLN101 Node: 0x12	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7083-9 Communication with IBOX 3 MISSING_MESSAGE_IBOX3</b>				
VSM timed out when waiting to receive a specific CAN message from I-box node	Flag	CAN1: CHN101 and CLN101 Node: 0x13	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 7083-19 Communication with IBOX 3 NM_ERROR_IBOX3</b>				
VSM timed out while initializing I-box node	1 sec	CAN1: CHN101 and CLN101 Node: 0x13	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7097-9 Communication with OBOX 1 MISSING_MESSAGE_OBOX1</b>				
VSM timed out when waiting to receive a specific CAN message from O-box node	Flag	CAN1: CHN101 and CLN101 Node: 0x21	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7097-19 Communication with OBOX 1 NM_ERROR_OBOX1</b>				
VSM timed out while initializing O-box node	1 sec	CAN1: CHN101 and CLN101 Node: 0x21	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 7123-9 Communication with OAS MISSING_MESSAGE_OAS</b>				
VSM timed out when waiting to receive a specific CAN message from Operator Assist System (OAS)	100 mS	CAN1: CHN101 and CLN101 Node: 0x3B	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7123-19 Communication with OAS NM_ERROR_OAS</b>				
VSM timed out while initializing Operator Assist System (OAS) node	1 sec	CAN1: CHN101 and CLN101 Node: 0x3B	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7128-9 Communication with Engine Controller MISSING_MESSAGE_ECU</b>				
VSM timed out when waiting to receive a specific CAN message from Engine Control Unit node	100 mS	CAN2: CHN102 and CLN102 Node: 0x0	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 7128-19 Communication with Engine Controller NM_ERROR_ECU</b>				
VSM timed out while initializing Engine Control Unit node	1 sec	CAN2: CHN102 and CLN102 Node: 0x0	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7131-9 Communication with Hydrostatic MISSING_MESSAGE_HST</b>				
VSM timed out when waiting to receive a specific CAN message from Hydrostatic Transmission (HST) node	30 mS	CAN2: CHN102 and CLN102 Node: 0x3	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7173-9 Communication with Front Wiper MISSING_MESSAGE_FRONT_WIPER</b>				
VSM timed out while waiting for a CAN message from the front wiper	Flag	CAN2: CHN102 and CLN102 Node: 0x2D	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7174-9 Communication with Rear Wiper MISSING_MESSAGE_REAR_WIPER</b>				
VSM timed out while waiting for a CAN message from the rear wiper	Flag	CAN2: CHN102 and CLN102 Node: 0x2E	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 7175-9 Communication with Top Wiper MISSING_MESSAGE_TOP_WIPER</b>				
VSM timed out while waiting for a CAN message from the top wiper	Flag	CAN2: CHN102 and CLN102 Node: 0x2F	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7241-9 Communication with Height Sensor MISSING_MESSAGE_HEIGHT_SENSOR</b>				
VSM timed out when waiting to receive a specific CAN message from height sensor node	100 mS	CAN3: CHN103 and CLN103 Node: 0x31	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7241-19 Communication with Height Sensor NM_ERROR_HEIGHT_SENSOR</b>				
VSM timed out while initializing height sensor node	1 sec	CAN3: CHN103 and CLN103 Node: 0x31	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 7242-9 Communication with Mast Tilt Sensor MISSING_MESSAGE_MAST_TILT_SENSOR</b>				
VSM timed out when waiting to receive a specific CAN message from mast tilt sensor node	100 mS	CAN3: CHN103 and CLN103 Node: 0x32	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7242-19 Communication with Mast Tilt Sensor NM_ERROR_MAST_TILT_SENSOR</b>				
VSM timed out while initializing mast tilt sensor node	1 sec	CAN3: CHN103 and CLN103 Node: 0x32	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7254-9 VSM initialization Error FAULT_COMMS_INIT_TIMEOUT</b>				
VSM timed out while initializing a node	10 sec	VSM: BUS ID 0 Node: 0x3	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7255-9 VSM initialization Error FAULT_DATA_GATHER_TIMEOUT</b>				
VSM timed out while collecting operational information from one or more nodes  Examples include CDF serial numbers, CDF CRC, and hour meter	50 sec	VSM: BUS ID 0 Node: 0x3	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 7256-9 NVM Storage Failure FAULT_BACKUP_RECOVERY_TIMEOUT</b>				
VSM timed out while writing CDF or hour meter to NVM	20 sec	VSM: BUS ID 0 Node: 0x3	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Module hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7257-19 Wake Input Failure SPI_FAILURE</b>				
VSM cannot access wake-up inputs, including uC2 bus, keyswitch, seat switch, wake inputs, and uC2 inputs 21-26	Flag	VSM: BUS ID 0 Node: 0x3	a. Module failure	1. Check voltage in diagnostics menu of display 2. Check voltage at battery 3. Alternator output 4. Check voltage at module 5. Check for draw on battery or short to ground
<b>DTC 7258-19 NVM Storage Failure EEPROM_COMMUNICATION_FAILURE</b>				
VSM cannot access NVM parameters, including CDF storage and user settings	Flag	VSM: BUS ID 0 Node: 0x3	a. Software issue b. Hardware failure	1. Check software version 2. Update software if newer version available 3. Replace VSM <b>NOTE:</b> Contact Hyster Service for authorization before replacing hardware

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 7400-9 Communication with Telemetry Module MISSING_MESSAGE_TELEMETRY_MODULE</b>				
VSM timed out while waiting for specific message from telemetry node	1 min	CAN4: CHN104 and CLN 104 Node: 0x30	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7400-19 Communication with Telemetry Module NM_ERROR_TELEMETRY_MODULE</b>				
VSM timed out while initiating telemetry node	1 sec	CAN4: CHN104 and CLN 104 Node: 0x30	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7641-9 Communication with Switch Bank 1 MISSING_MESSAGE_SWITCH_BANK_1</b>				
VSM timed out while waiting for a specific message from switch bank 1 node	Flag	CAN2: CHN102 and CLN 102 Node: 0x82	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 7642-9 Communication with Switch Bank 2 MISSING_MESSAGE_SWITCH_BANK_2</b>				
VSM timed out while waiting for a specific message from switch bank 2 node	Flag	CAN2: CHN102 and CLN 102 Node: 0x81	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module d. Hardware failure	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 7642-19 Communication with Switch Bank 2 NM_ERROR_SWITCH_BANK_2</b>				
VSM timed out while initiating switch bank 2 node	1 sec	CAN2: CHN102 and CLN 102 Node: 0x82	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module
<b>DTC 8004-2 Incompatible Serial Number SERIAL_NUMBER_MISMATCH</b>				
VSM truck serial number is not equal to display truck serial number  <b>NOTE:</b> Can occur when hardware modules are swapped between trucks	Flag	VSM: BUS ID 0 Node: 0x3	a. Application software updated and incompatible with installed CDF b. New or different CDF installed without updating application software	1. Reinstall original hardware 2. Check VSM and display software versions in the truck display 3. Consult Hyster Service to determine if CDF is compatible with current application software version 4. Update CDF and VSM application software

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 8006-14 CDF - Invalid Cold Start COLD_START_CDF_INVALID</b>				
Configuration Data File (CDF) deactivation temperature parameter is greater than activation temperature parameter	Flag	VSM: BUS ID 0 Node: 0x3	a. Bad CDF parameters	1. Consult HYG service to confirm CDF parameters 2. Reload CDF
<b>DTC 8007-11 VSM Reset VSM_RESET</b>				
Uncontrolled VSM shutdown due to watchdog reset, LVP relay power disconnect, truck power supply failure or e-stop	Flag	VSM: BUS ID 0 Node: 0x3	a. CAN issue b. Module connectivity issue c. Loss of power and ground to module	1. Check CAN resistance and voltage at service connector 2. Check CAN resistance and voltage at module 3. Check for power and ground at module

## ENGINE ERROR CODE REFERENCE CHART

202001-191

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 0173-0 High Exhaust Temperature ECU_EXHAUST_GAS_TEMPERATURE_HIGH</b>				
Activate: If ECU sends DTC 173-0 with MIL on Deactivate: If ECU sends DTC 173-0 with MIL off	Flag	CAN2: CHN102 and CLN102 Node: 0x00	Exhaust throttle sticking	Consult guided troubleshooting 173-0 Exhaust Gas Temperature High (LPG and Bi-Fuel Engines)
<b>DTC 1001-15 Air Filter Restriction Sensor AIR_FILTER_RESTRICT_FAILURE</b>				
Engine not running but a restriction is still detected in air filter	Flag	ADP301-A	a. Air filter sensor issue b. Intake air issue	1. Check for power and ground at sensor 2. Check for short to power 3. Check component resistance 4. Replace air filter

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1006-3 Throttle Actuator 2 Feedback ENGINE_THROTTLE_ACT_2_FEEDBACK_OORH</b>				
Feedback voltage on throttle sensor is greater than threshold for longer than activation time	>2.7V	ADP306-A	a. Short to power on wire harness b. Short circuit in sensor c. Short circuit in wire harness	1. Check for power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1006-4 Throttle Actuator 2 Feedback ENGINE_THROTTLE_ACT_2_FEEDBACK_OORL</b>				
Feedback voltage on throttle sensor is less than threshold for longer than activation time	>0.13V	ADP306-A	a. Short to ground on wire harness b. Short circuit in sensor c. Short circuit in wire harness	1. Check for power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1007-0 Throttle Position Too Command ENGINE_THROTTLE_ACT_POS_EXCEEDS_COMMAND</b>				
Measured throttle percent greater than (desired throttle percent + throttle percent tolerance)	5% tolerance	ADP306-A ADP307-A	Parameters need to be tuned	Perform calibration using PC Service Tool
<b>DTC 1007-1 Throttle Position Too Command ENGINE_THROTTLE_ACT_POS_SHORT_COMMAND</b>				
Measured throttle percent less than (desired throttle percent + throttle percent tolerance)	15% tolerance	ADP306-A ADP307-A	Parameters need to be tuned	Perform calibration using PC Service Tool
<b>DTC 1007-2 Throttle Actuator 1 and 2 Feedback ENGINE_THROTTLE_ACT_DUAL_FAILURE</b>				
(Throttle acuator 2 feedback voltage * 2 - throttle actuator 1 feedback voltage) greater than threshold for longer than activation time	0.6V	ADP306-A ADP307-A	a. Short to power b. Short to ground	1. Check power and ground at sensor 2. Check for short to ground 3. Check for short to power 4. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1007-3 Throttle Actuator 1 Feedback ENGINE_THROTTLE_ACT_1_FEEDBACK_OORH</b>				
Feedback voltage on throttle sensor is greater than threshold for longer than activation time	>4.9V	ADP307-A	<ul style="list-style-type: none"> <li>a. Short to power on wire harness</li> <li>b. Short circuit in sensor</li> <li>c. Short circuit in wire harness</li> </ul>	<ul style="list-style-type: none"> <li>1. Check for power and ground at sensor</li> <li>2. Check for short to power</li> <li>3. Check component resistance</li> </ul>
<b>DTC 1007-4 Throttle Actuator 1 Feedback ENGINE_THROTTLE_ACT_1_FEEDBACK_OORL</b>				
Feedback voltage on throttle sensor is less than threshold for longer than activation time	<0.31V	ADP307-A	<ul style="list-style-type: none"> <li>a. Short to ground on wire harness</li> <li>b. Short circuit in sensor</li> <li>c. Short circuit in wire harness</li> </ul>	<ul style="list-style-type: none"> <li>1. Check for power and ground at sensor</li> <li>2. Check for short to ground</li> <li>3. Check component resistance</li> </ul>
<b>DTC 1008-0 Engine Oil Pressure Sensor ENGINE_OIL_PRESSURE_RATIONALITY_1</b>				
Sensor indicates oil pressure is present for longer than activation time	Flag	ADP308-A	<ul style="list-style-type: none"> <li>a. Short to power</li> <li>b. Short to ground</li> </ul>	<ul style="list-style-type: none"> <li>1. Check power and ground at sensor</li> <li>2. Check for short to ground</li> <li>3. Check for short to power</li> <li>4. Check component resistance</li> </ul>
<b>DTC 1012-3 Fuel level Sensor FUEL_LEVEL_DIESEL_OORH</b>				
<p>Activate: If input voltage on fuel level sensor is greater than threshold for longer than 3 seconds</p> <p>Deactivate: If input voltage on fuel level sensor is less than threshold for longer than .5 seconds</p>	7000mV	ADN121-A	<ul style="list-style-type: none"> <li>a. Short to power on wire harness</li> <li>b. Short circuit in sensor</li> <li>c. Short circuit in wire harness</li> </ul>	<ul style="list-style-type: none"> <li>1. Check for power and ground at sensor</li> <li>2. Check for short to power</li> <li>3. Check component resistance</li> </ul>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1012-4 Fuel level Sensor FUEL_LEVEL_DIESEL_OORL</b>				
<p>Activate: If input voltage on fuel level sensor is less than threshold for longer than 3 seconds</p> <p>Deactivate: If input voltage on fuel level sensor is greater than threshold for longer than .5 seconds</p>	1000mV	ADN121-A	<p>a. Short to ground on wire harness</p> <p>b. Open circuit in sensor</p> <p>c. Open circuit in wire harness</p>	<p>1. Check for power and ground at sensor</p> <p>2. Check for short to ground</p> <p>3. Check component resistance</p>
<b>DTC 1018-4 Alternator Charge Low ENGINE_ALTERNATOR_CHARGING</b>				
<p>Activate: If engine is running AND battery voltage is less than threshold for longer than 30 seconds</p> <p>Deactivate: If engine is not running OR engine is running AND battery voltage is greater than threshold for longer than 3 seconds</p>	12V	ADN118-A	<p>a. Alternator failure</p> <p>b. No power to field</p> <p>c. Weak battery causing charging failure</p>	<p>1. Check alternator output with engine running</p> <p>2. Check voltage on field terminal on alternator</p> <p>3. Service battery and perform load test</p>
<b>DTC 102-3 Yanmar DTC P0238 Sensor, EGR Low-Pressure Side Sensor, Excessive Sensor Output</b>				
<p>Sensor voltage greater than threshold</p>	4.8V	<p>ADE131-A</p> <p>ADE132-A</p>	<p>a. Damaged sensor</p> <p>b. Damaged harness</p> <p>c. Short to power</p>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Check sensor, connector, and wire harness for damage</p> <p>2. Check wire harness for short to power</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 102-4 Yanmar DTC P0237 Sensor, EGR Low-Pressure Side Sensor, Insufficient Sensor Output</b>				
Sensor voltage less than threshold	0.2V	ADE131-A ADE132-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Check sensor, connector, and wire harness for damage 2. Check wire harness for open or short to ground 3. Check power and ground at the sensor
<b>DTC 102-10 Yanmar DTC P1673 Sensor, EGR Low-Pressure Side Sensor, Detected Value Error</b>				
Difference between EGR low-pressure and atmospheric pressure is within a specific value	Flag	ADE131-A ADE132-A	a. Damaged sensor b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Check sensor, connector, and wire harness for damage 2. Check power and ground at the sensor
<b>DTC 102-13 Yanmar DTC P0236 Sensor, EGR Low-Pressure Side Sensor, Abnormal Learning Value</b>				
Final offset value of intake manifold pressure is less than or greater than threshold	-150 kPa (-22.8 psi) <Offset Value <150 kPa (22.8 psi)	ADE131-A ADE132-A	a. Damaged sensor b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Check sensor, connector, and wire harness for damage 2. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 105-3 Yanmar DTC P040D Sensor, Intake Manifold Temperature Sensor, Excessive Sensor Output</b>				
Sensor voltage greater than threshold	4.8V	ATE101-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check wire harness for short to power
<b>DTC 105-4 Yanmar DTC P040C Sensor, Intake Manifold Temperature Sensor, Insufficient Sensor Output</b>				
Sensor voltage less than threshold	0.2V	ATE101-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check wire harness for open or short to ground  3. Check power and ground at the sensor
<b>DTC 105-10 Yanmar DTC P1676 Sensor, Intake Manifold Temperature Sensor, Detected Value Error</b>				
Difference between intake manifold temperature and fresh air temperature right after key on is greater than or equal to threshold	30°C (86°F)	ATE101-A	a. Damaged sensor b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 108-3 Yanmar DTC P2229 Sensor, Atmospheric Pressure Sensor, Excessive Sensor Output</b>				
Sensor voltage greater than threshold	4.8V	TBD	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short to power
<b>DTC 108-4 Yanmar DTC P2228 Sensor, Atmospheric Pressure Sensor, Insufficient Sensor Output</b>				
Sensor voltage less than threshold	0.2V	TBD	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for open or short to ground 3. Check power and ground at the sensor
<b>DTC 108-10 Yanmar DTC P1231 Sensor, Atmospheric Pressure Sensor, Abnormal Atmospheric Pressure Sensor Characteristic</b>				
Final offset value of the intake manifold pressure and exhaust manifold pressure are both greater than or equal to threshold.	5 kPa (0.73 psi)	TBD	a. Damaged sensor b. Damaged harness	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 110-0 Yanmar DTC P0217 Sensor, Coolant Temperature Sensor, Increase In Coolant Temperature</b>				
Measured coolant temperature is greater than threshold	110°C (230°F)	SGE100-A ATE100-A	a. Engine overheating b. Damaged sensor c. Damaged harness	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Wait for engine to cool 2. Check sensor, connector, and wire harness for damage 3. Check power and ground at the sensor
<b>DTC 110-3 Yanmar DTC P0118 Sensor, Coolant Temperature Sensor, Excessive Sensor Output</b>				
Sensor voltage greater than threshold	4.8V	SGE100-A ATE100-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short to power
<b>DTC 110-4 Yanmar DTC P0117 Sensor, Coolant Temperature Sensor, Insufficient Sensor Output</b>				
Sensor voltage less than threshold	0.2V	SGE100-A ATE100-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Check sensor, connector, and wire harness for damage 2. Check wire harness for open or short to ground 3. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 110-10 Yanmar DTC P1674 Sensor, Coolant Temperature Sensor, Detected Value Error</b>				
Difference between current temperature measurement and the measurement after engine startup is greater than threshold	40°C (104°F)	SGE100-A ATE100-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check wire harness for open or short to ground  3. Check power and ground at the sensor
<b>DTC 110-15 Yanmar DTC P1674 Sensor, Coolant Temperature Sensor Higher Than Expected 1</b>				
Engine Coolant Temperature Sensor Higher Than Expected	105°C (221°F)	SGE100-A ATE100-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check wire harness for open or short to ground  3. Check power and ground at the sensor
<b>DTC 1202-2 Yanmar DTC U0426 Communication, Immobilizer (CAN Message), Immobilizer System Error</b>				
Detect certification NG by CAN communication	Flag	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A CHN104-K CLN104-K	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check CAN1 and CAN2 health using PC Service Tool  2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector  3. Check CAN1 at telemetry module

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1209-3 Yanmar DTC P0473 Sensor, EGR High-Pressure Side Sensor, Excessive Sensor Output</b>				
Sensor voltage greater than threshold	4.8V	ADE106-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short to power
<b>DTC 1209-4 Yanmar DTC P0472 Sensor, EGR High-Pressure Side Sensor, Insufficient Sensor Output</b>				
Sensor voltage less than threshold	0.2V	ADE106-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for open or short to ground 3. Check power and ground at the sensor
<b>DTC 1209-10 Yanmar DTC P1679 Sensor, EGR High-Pressure Side Sensor, Detected Value Error</b>				
Difference between EGR low-pressure and atmospheric pressure is within a specific value	±0.4 kPa (0.06 psi)	ADE106-A	a. Damaged sensor b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1209-13 Yanmar DTC P0471 Sensor, EGR High-Pressure Side Sensor, Abnormal Learning Value</b>				
Final offset value of intake manifold pressure is less than or greater than threshold	-150 kPa (-22.8 psi) >Offset Value >150 kPa (22.8 psi)	ADE106-A	a. Damaged sensor b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check power and ground at the sensor
<b>DTC 1485-2 Yanmar DTC P068A Contact Output, Main Relay, Early Opening of the Main Relay</b>				
ECU power is cut off without performing an after-run (writing to EEPROM)	Flag	RVR108-B RVR207-A	a. Relay stuck b. Open circuit	Do not tap test solid state relays. Solid state relays have no mechanical contacts.  NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Mechanical relays only: tap relay housing to release stuck contacts  2. Check wire harness for short to ground

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1485-7 Yanmar DTC P068B Contact Output, Main Relay, Main Relay Fixation</b>				
Main relay does not open after ECU shuts off.	Flag	RVR108-B RVR207-A	a. Relay stuck b. Devices not turned off c. Short to ground	Do not tap test solid state relays. Solid state relays have no mechanical contacts.  NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Mechanical relays only: tap relay housing to release stuck contacts 2. Check relay circuit loads for devices not turning off 3. Check wire harness for short to ground
<b>DTC 157-0 Yanmar DTC P0088 CRS, Rail Pressure Fault, Abnormally High Rail Pressure</b>				
Common rail pressure is greater than or equal to threshold	170 MPa (24656 psi)	ADE120-A	a. Faulty rail pressure sensor b. Open or short to ground in wire harness c. Faulty fuel pressure limiting valve	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check fuel rail pressure sensor, connector, and wire harness for damage 2. Check wire harness for short to ground 3. Check for power and ground at sensor 4. Check fuel pressure limiting valve (regulator)

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 157-3 Yanmar DTC P0193 Sensor, Rail Pressure Sensor, Excessive Sensor Output</b>				
Sensor voltage greater than threshold	4.75V	ADE120-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short to power
<b>DTC 157-4 Yanmar DTC P0192 Sensor, Rail Pressure Sensor, Insufficient Sensor Output</b>				
Sensor voltage less than threshold	0.24V	ADE120-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for open or short to ground 3. Check power and ground at the sensor
<b>DTC 157-15 Yanmar DTC P0093 CRS, Rail Pressure Fault, Rail Pressure Deviation Fault (Too High)</b>				
Actual rail pressure is greater than target rail pressure by threshold value for more than 5 seconds	20 MPa (2900 psi)	ADE120-A	a. Faulty rail pressure sensor b. Open or short to ground in wire harness c. Faulty fuel pressure limiting valve	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check fuel rail pressure sensor, connector, and wire harness for damage 2. Check wire harness for short to ground 3. Check for power and ground at sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
				4. Check fuel pressure limiting valve (regulator)
<b>DTC 157-16 Yanmar DTC P000F CRS, Rail Pressure Fault, PLV valve is open</b>				
Common rail pressure control valve is open	Flag	ADE120-A	a. Faulty rail pressure sensor b. Open or short to ground in wire harness c. Faulty fuel pressure limiting valve	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check fuel rail pressure sensor, connector, and wire harness for damage 2. Check wire harness for short to ground 3. Check for power and ground at sensor 4. Check fuel pressure limiting valve (regulator)
<b>DTC 157-18 Yanmar DTC P0094 CRS, Rail Pressure Fault, Rail Pressure Deviation Fault (Too Low)</b>				
Actual rail pressure is less than target rail pressure by threshold value for more than 3 seconds	20 MPa (2900 psi)	ADE120-A	a. Faulty rail pressure sensor b. Open or short to ground in wire harness c. Faulty fuel pressure limiting valve	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check fuel rail pressure sensor, connector, and wire harness for damage 2. Check wire harness for short to ground 3. Check for power and ground at sensor 4. Check fuel pressure limiting valve (regulator)

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 172-3 Yanmar DTC P0113 Sensor, Fresh Air Temperature Sensor, Excessive Sensor Output</b>				
Sensor voltage greater than threshold	4.85V	ATE106-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short to power
<b>DTC 172-4 Yanmar DTC P0112 Sensor, Fresh Air Temperature Sensor, Insufficient Sensor Output</b>				
Sensor voltage less than threshold	0.15V	ATE106-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for open or short to ground 3. Check power and ground at the sensor
<b>DTC 173-3 Yanmar DTC P0546 Sensor, Exhaust Manifold Temperature Sensor, Excessive Sensor Output</b>				
Sensor voltage greater than threshold	4.8V	ATE103-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short to power

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 173-4 Yanmar DTC P0545 Sensor, Exhaust Manifold Temperature Sensor, Insufficient Sensor Output</b>				
Sensor voltage less than threshold	0.2V	ATE103-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check wire harness for open or short to ground  3. Check power and ground at the sensor
<b>DTC 173-10 Yanmar DTC P1677 Sensor, Exhaust Manifold Temperature Sensor, Detected Value Error</b>				
Difference between current exhaust manifold temperature and exhaust manifold temperature right after key on is less than or equal to threshold	100°C (212°F)	ATE101-A	a. Damaged sensor b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check power and ground at the sensor
<b>DTC 174-0 Yanmar DTC P0168 Sensor, Fuel Temperature Sensor, Increase In Fuel Temperature</b>				
Measured fuel temperature is greater than threshold	90°C (194°F)	ATE102-A	a. Fuel overheating b. Damaged sensor c. Damaged harness	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Wait for fuel to cool  2. Check sensor, connector, and wire harness for damage  3. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 174-3 Yanmar DTC P0183 Sensor, Fuel Temperature Sensor, Excessive Sensor Output</b>				
Sensor voltage greater than threshold	4.8V	ATE102-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short to power
<b>DTC 174-4 Yanmar DTC P0182 Sensor, Fuel Temperature Sensor, Insufficient Sensor Output</b>				
Sensor voltage less than threshold	0.2V	ATE102-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for open or short to ground 3. Check power and ground at the sensor
<b>DTC 190-0 Yanmar DTC P0219 Others, Over-Rotation, Speed Excess 2</b>				
Engine speed is greater than threshold	Maximum Idle Speed + 600 rpm	ADE102-A ADE103-A	a. Faulty crank sensor b. Encoder issue c. Open circuit in sensor	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check sensor mounting and encoder wheel 3. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2003-5 Glow Plug Driver GLOW_PLUG_OPEN</b>				
Glow plugs steady off and open circuit in glow plug relay	Low-side driver <0.5V	LDP303-A	a. Open circuit internal to relay b. Open in component harness c. Component disconnected	1. Check relay coil circuit for open 2. Check relay wiring for open circuit
<b>DTC 2003-6 Glow Plug Driver GLOW_PLUG_OORH</b>				
Glow plugs steady off and short to high side on glow plug relay	Flag	LDP303-A	a. Relay internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check relay circuit for short 2. Check component resistance 3. Check wire harness for short
<b>DTC 2057-5 Starter Relay Driver ENGINE_STARTER_RELAY_DRIVER_OPEN</b>				
Before engine is running driver voltage is greater than threshold	>300mV	HDN107-A	a. Open circuit internal to relay b. Open in component harness c. Component disconnected	1. Check relay coil circuit for open 2. Check relay wiring for open circuit
<b>DTC 2057-6 Starter Relay Driver ENGINE_STARTER_RELAY_DRIVER_SHORT</b>				
VSM high side driver detects overcurrent on output	Flag	HDN107-A	a. Relay internally shorted b. Relay stuck closed c. Short in relay harness	1. Check relay coil circuit for short 2. Check relay wiring for short circuit
<b>DTC 2059-5 Ignition Relay Driver ENGINE_IGNITION_RELAY_DRIVER_OPEN</b>				
Before engine is running driver voltage is greater than threshold	>300mV	HDN109-A	a. Open circuit internal to relay b. Open in component harness c. Component disconnected	1. Check relay coil circuit for open 2. Check relay wiring for open circuit
<b>DTC 2059-6 Ignition Relay Driver ENGINE_IGNITION_RELAY_DRIVER_SHORT</b>				
VSM high side driver detects overcurrent on output	Flag	HDN109-A	a. Relay internally shorted b. Relay stuck closed c. Short in relay harness	1. Check relay coil circuit for short 2. Check relay wiring for short circuit

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2060-6 Fuel Run Relay Driver FUEL_RUN_RELAY_DRIVER_SHORT</b>				
VSM high side driver detects overcurrent on output	Flag	HDN110-A	a. Relay internally shorted b. Relay stuck closed c. Short in PDM harness d. VSM module driver failure	1. Check relay coil circuit for short 2. Check relay wiring for short circuit
<b>DTC 237-13 Yanmar DTC U3002 Communication, VI (CAN Message), VI Reception Data Fault</b>				
The received VI does not match the existing VI in ECU	Flag	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check CAN1 and CAN2 health using PC Service Tool 2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector
<b>DTC 237-31 Yanmar DTC U0168 Communication, VI (CAN Message), VI Reception Time Out Error</b>				
There is no response from the VIN request after the configured number of attempts	3 times	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check CAN1 and CAN2 health using PC Service Tool 2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2791-0 Yanmar DTC P0404 Actuator, EGR, Overvoltage Fault</b>				
Supply voltage to EGRV exceeds threshold for 5 seconds	18V	HDE140-A RVF203-A	a. Faulty EGR valve b. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check power at EGR valve 2. Check 12V battery output
<b>DTC 2791-1 Yanmar DTC P1404 Actuator, EGR, Low-voltage Fault</b>				
Supply voltage to EGRV does not reach threshold in 13 seconds	8V	HDE140-A RVF203-A	a. Faulty EGR valve b. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check power at EGR valve 2. Check 12V battery output
<b>DTC 2791-7 Yanmar DTC P1409 Actuator, EGR, Feedback Fault</b>				
Overduty on motor driving	Flag	HDE140-A RVF203-A	a. Faulty EGR valve b. Short to ground in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check EGR valve, connector, and wire harness for damage 2. Check wire harness for short to ground 3. Check EGR for continuously running motor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2791-9 Yanmar DTC U0401 Actuator, EGR, ECM Data Fault</b>				
Instruction packet cut-off from ECU is detected	Flag	HDE140-A RVF203-A	a. Faulty EGR valve b. Damaged wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check EGR valve, connector, and wire harness for damage 2. Check power and ground at EGR valve
<b>DTC 2791-12 Yanmar DTC P0403 Actuator, EGR, Disconnection Between motor Coils</b>				
Disconnection in motor is detected	Flag	HDE140-A RVF203-A	a. Faulty EGR valve b. Open in wire harness c. Short to ground in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check EGR valve, connector, and wire harness for damage 2. Check wire harness for open or short to ground 3. Check power and ground at EGR valve
<b>DTC 2797-6 Yanmar DTC P1146 CRS, Injector (Shared), Injector Bank 1 Short-Circuit</b>				
Short to ground of highside low side or short from high side to B+	Flag	HDE130-A LDE130-A HDE131-A LDE131-A HDE132-A LDE132-A HDE133-A LDE133-A	a. Damaged injector b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check injector, connector, and wire harness for damage 2. Check wire harness for short to power

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2798-6 Yanmar DTC P1149 CRS, Injector (Shared), Injector Bank 2 Short-Circuit</b>				
Short to ground of highside low side or short from high side to B+	Flag	HDE130-A LDE130-A HDE131-A LDE131-A HDE132-A LDE132-A HDE133-A LDE133-A	a. Damaged injector b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check injector, connector, and wire harness for damage 2. Check wire harness for short to power
<b>DTC 28-3 Yanmar DTC P0223 Sensor, Accelerator Sensor 2, Excessive Sensor Output</b>				
Sensor voltage is greater than threshold	4.6V	ADN103-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short to power
<b>DTC 28-4 Yanmar DTC P0222 Sensor, Accelerator Sensor 1, Insufficient Sensor Output</b>				
Sensor voltage is less than threshold	0.2V	ADN103-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for open or short to ground 3. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2950-3 Yanmar DTC P1658 Actuator, Intake Throttle Drive Circuit, VB Short-Circuit of the Drive H Bridge Output 1 of Throttle Valve</b>				
VB Short Circuit Occurs at Terminal 1 of Drive Circuit Output	Flag	SGE102-A 5VE102-A ADE106-A ADE134-A HDE101-A LDE101-A	a. Faulty intake throttle b. Short to power	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check intake throttle, connector and wire harness for damage  2. Check wire harness for short to power
<b>DTC 2950-4 Yanmar DTC P1659 Actuator, Intake Throttle Drive Circuit, GND Short-Circuit of the Drive H Bridge Output 1 of Throttle Valve</b>				
GND Short Circuit Occurs at Terminal 1 of Drive Circuit Output	Flag	SGE102-A 5VE102-A ADE106-A ADE134-A HDE101-A LDE101-A	a. Faulty intake throttle b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check intake throttle, connector and wire harness for damage  2. Check wire harness for short to ground

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2950-5 Yanmar DTC P0660 Actuator, Intake Throttle Drive Circuit, No Load on the Drive H Bridge Circuit of Throttle Valve</b>				
Absence of load (disconnection) on the drive rotation is detected	Flag	SGE102-A 5VE102-A ADE106-A ADE134-A HDE101-A LDE101-A	a. Faulty intake throttle b. Short to ground c. Short to power d. Faulty ECU	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check intake throttle, connector and wire harness for damage  2. Check wire harness for short to ground  3. Check wire harness for short to power  4. Contact Hyster-Yale Service department for authorization to replace ECU

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2950-6 Yanmar DTC P1660 Actuator, Intake Throttle Drive Circuit, Overload on the Drive H Bridge Circuit of Throttle Valve</b>				
The component temperature of the drive circuit exceeds the threshold value	Flag	SGE102-A 5VE102-A ADE106-A ADE134-A HDE101-A LDE101-A	a. Faulty intake throttle b. Short to ground c. Short to power d. Faulty ECU	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Check intake throttle, connector and wire harness for damage 2. Check wire harness for short to ground 3. Check wire harness for short to power 4. Contact Hyster-Yale Service department for authorization to replace ECU
<b>DTC 2950-7 Yanmar DTC P02E4 Actuator, Valve Stuck Open Fault</b>				
Target intake throttle position is greater than threshold and actual position is $\pm 10\%$ from target position	50%	SGE102-A 5VE102-A ADE106-A ADE134-A HDE101-A LDE101-A	a. Faulty intake throttle b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Check intake throttle, connector and wire harness for damage 2. Check wire harness for short to ground

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2951-3 Yanmar DTC P1661 Actuator, Intake Throttle Drive Circuit, VB Short-Circuit of the Drive H Bridge Output 2 of Throttle Valve</b>				
VB Short Circuit Occurs at Terminal 2 of Drive Circuit Output	Flag	SGE102-A 5VE102-A ADE106-A ADE134-A HDE101-A LDE101-A	a. Faulty intake throttle b. Short to power	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check intake throttle, connector and wire harness for damage  2. Check wire harness for short to power
<b>DTC 2951-4 Yanmar DTC P1662 Actuator, Intake Throttle Drive Circuit, GND Short-Circuit of the Drive H Bridge Output 2 of Throttle Valve</b>				
GND Short Circuit Occurs at Terminal 2 of Drive Circuit Output	Flag	SGE102-A 5VE102-A ADE106-A ADE134-A HDE101-A LDE101-A	a. Faulty intake throttle b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check intake throttle, connector and wire harness for damage  2. Check wire harness for short to ground
<b>DTC 2951-7 Yanmar DTC P02E5 Actuator, Valve Stuck close Fault</b>				
Target intake throttle position is less than threshold and actual position is $\pm 10\%$ from target position	50%	SGE102-A 5VE102-A ADE106-A ADE134-A HDE101-A LDE101-A	a. Faulty intake throttle b. Intake obstructed c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check intake throttle, connector and wire harness for damage  2. Check intake for obstructions  3. Check wire harness for short to ground

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3059-3 Yanmar DTC P053C Contact Output, Breather Heater, VB Short Circuit</b>				
ECU detected disconnect-circuit (over current) by A34 internal diagnosis circuit	Flag	RVR203-A PGB104-E	a. Faulty breather heater b. Faulty harness c. Short to power	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Check breather heater, connector and wire harness for damage 2. Check wire harness for short to power 3. Check power and ground at breather heater
<b>DTC 3059-4 Yanmar DTC P053B Contact Output, Breather Heater, GND Short Circuit</b>				
ECU detected GND short circuit by internal diagnosis circuit of the port A34	Flag	RVR203-A PGB104-E	a. Faulty breather heater b. Faulty harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Check breather heater, connector and wire harness for damage 2. Check wire harness for short to ground 3. Check power and ground at breather heater

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3059-5 Yanmar DTC P053A Contact Output, Breather Heater, Disconnection</b>				
ECU detected disconnection circuit by internal diagnosis circuit of the port A34	Flag	RVR203-A PGB104-E	a. Faulty breather heater b. Faulty harness c. Open circuit	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check breather heater, connector and wire harness for damage  2. Check wire harness for open circuit  3. Check power and ground at breather heater
<b>DTC 03226-0 NOx Control Diagnostic DPF_NOX_DTC_ACTIVE</b>				
Activate: If ECU sends DTC 3226-0 with MIL on  Deactivate: If ECU sends DTC 3226-0 with MIL off	Flag	CAN2: CHN102 and CLN102  Node: 0x00	a. NOx sensor issue b. Fuel management issue c. DPF catalyst failure	Consult Guided Troubleshooting

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3242-0 Yanmar DTC P1436 Aftertreatment Control, DPF Inlet Temperature Sensor, Abnormally High Temperature</b>				
DPF inlet temperature is greater than or equal to threshold	700°C (1292°F)	ATE107-A SGE133-B	<ul style="list-style-type: none"> <li>a. Damaged sensor, connector or wire harness</li> <li>b. Blow-by of combustion gas</li> <li>c. Injector failure</li> <li>d. Faulty ECU</li> </ul>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Check sensor, connector, and wire harness for damage</li> <li>2. Check wire harness for short or open</li> <li>3. Check power and ground at sensor</li> <li>4. Repair exhaust piping</li> <li>5. Service injectors</li> <li>6. Contact Hyster-Yale Service department for authorization to replace ECU</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3242-3 Yanmar DTC P1428 Sensor, DPF Entrance Temperature Sensor, Excessive Sensor Output</b>				
Sensor voltage is greater than threshold	4.8V	ATE107-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check wire harness for short to power
<b>DTC 3242-4 Yanmar DTC P1427 Sensor, DPF Entrance Temperature Sensor, Insufficient Sensor Output</b>				
Sensor voltage is less than threshold	0.2V	ATE107-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check wire harness for open or short to ground  3. Check power and ground at the sensor
<b>DTC 3242-10 Yanmar DTC P167E Sensor, DPF Entrance Temperature Sensor, Detected Value Error</b>				
Difference between current DPF inlet temperature and DPF inlet temperature upon startup is less than or equal to threshold	100°C (212°F)	ATE107-A	a. Damaged sensor b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3250-1 Yanmar DTC P0420 Aftertreatment Control, DPF Intermediate Temperature Sensor, Abnormally High Temperature</b>				
DPF intermediate temperature is greater than or equal to threshold.	750°C (1382°F)	ATE108-A SGE133-D	a. Damaged sensor b. Damaged harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short or open
<b>DTC 3250-1 Yanmar DTC P0420 Aftertreatment Control, DPF Intermediate Temperature Sensor, Abnormally Low Temperature</b>				
DPF intermediate temperature is less than threshold	300°C (572°F) during stationary regeneration OR 250°C (482°F) during recovery regeneration	ATE108-A SGE133-D	a. Damaged sensor b. Damaged harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short or open
<b>DTC 3250-3 Yanmar DTC P1434 Sensor, DPF Intermediate Temperature Sensor, Excessive Sensor Output</b>				
Sensor voltage is greater than threshold	4.8V	ATE108-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short to power

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3250-4 Yanmar DTC P1435 Sensor, DPF Intermediate Temperature Sensor, Insufficient Sensor Output</b>				
Sensor voltage is less than threshold	0.2V	ATE108-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check wire harness for open or short to ground  3. Check power and ground at the sensor
<b>DTC 3250-10 Yanmar DTC P167A Sensor, DPF Intermediate Temperature Sensor, Detected Value Error</b>				
Difference between current DPF intermediate temperature and DPF intermediate temperature upon startup is less than or equal to threshold	100°C (212°F)	ATE108-A	a. Damaged sensor b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check power and ground at the sensor
<b>DTC 3251-0 Yanmar DTC P2452 Aftertreatment Control, DPF Differential Pressure Sensor, Abnormally High Differential Pressure</b>				
DPF differential pressure is greater than or equal to threshold	50 kPa (7.3 psi)	SGE133-C ADE133-A 5VE133-A ADE134-A	a. Damaged sensor b. Damaged harness c. ECU failure	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check power and ground at the sensor  3. Contact Hyster-Yale Service department for authorization to replace ECU

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3251-3 Yanmar DTC P2455 Sensor, DPF Differential Pressure Sensor, Excessive Sensor Output</b>				
Sensor voltage is greater than threshold	4.8V	ADE133-A ADE134-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short to power
<b>DTC 3251-4 Yanmar DTC P2454 Sensor, DPF Differential Pressure Sensor, Insufficient Sensor Output</b>				
Sensor voltage is less than threshold	0.2V	ADE133-A ADE134-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for open or short to ground 3. Check power and ground at the sensor
<b>DTC 3251-13 Yanmar DTC P2453 Sensor, DPF Differential Pressure Sensor, Abnormal Learning Value</b>				
Final offset value of DPF differential pressure is less than or greater than threshold	-38 kPa (-22.8 psi) >Offset Value >50 kPa (22.8 psi)	ADE133-A ADE134-A	a. Damaged sensor b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3609-3 Yanmar DTC P1455 Sensor, DPF High-Pressure Side Sensor, Excessive Sensor Output</b>				
Sensor voltage is greater than threshold	4.8V	ADE133-A ADE134-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check wire harness for short to power
<b>DTC 3609-4 Yanmar DTC P1454 Sensor, DPF High-Pressure Side Sensor, Insufficient Sensor Output</b>				
Sensor voltage is less than threshold	0.2V	ADE133-A ADE134-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check wire harness for open or short to ground  3. Check power and ground at the sensor
<b>DTC 3609-10 Yanmar DTC P167C Sensor, DPF High-Pressure Side Sensor, Detected Value Error</b>				
Difference between DPF high-pressure and atmospheric pressure is within a specific value	±0.3 kPa (0.04 psi)	ADE133-A ADE134-A	a. Damaged sensor b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3719-0 Yanmar DTC P1424 Aftertreatment Control, DPF OP Interface, Backup Mode</b>				
Transition to backup mode	Flag	N/A	a. Stationary regeneration standby emergency mode b. ECU failure c. Blow-by of combustion gas d. DOC deterioration or breakage e. Injector failure	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Contact Hyster-Yale Service department for authorization to replace DOC 2. Repair exhaust piping 3. Service injectors 4. Contact Hyster-Yale Service department for authorization to replace ECU
<b>DTC 3719-7 Yanmar DTC P1446 Aftertreatment Control, DPF OP Interface, Recovery Regeneration Prohibition</b>				
The recovery regeneration started	Flag	N/A	a. Too much particulate matter in DPF	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Service DPF

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3719-9 Yanmar DTC P1445 Aftertreatment Control, DPF OP Interface, Recovery Regeneration Failure</b>				
The recovery regeneration fails	Flag	N/A	a. Recovery regeneration did not complete b. ECU failure c. Blow-by of combustion gas d. DOC deterioration or breakage e. Injector failure	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Contact Hyster-Yale Service department for authorization to replace DOC 2. Repair exhaust piping 3. Service injectors 4. Contact Hyster-Yale Service department for authorization to replace ECU
<b>DTC 3719-16 Yanmar DTC P1421 Aftertreatment Control, DPF OP Interface, Stationary Regeneration Standby</b>				
The operation transits to the stationary regeneration mode for factors other than external SW/CAN instructions and stationary regeneration is not being operated	Flag	N/A	a. Stationary regeneration skipped too many times b. ECU failure c. Blow-by of combustion gas d. DOC deterioration or breakage e. Injector failure	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Contact Hyster-Yale Service department for authorization to replace DOC 2. Repair exhaust piping 3. Service injectors 4. Contact Hyster-Yale Service department for authorization to replace ECU

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3720-0 Yanmar DTC P1420 Aftertreatment Control, DPF OP Interface, Ash Cleaning Request 2</b>				
The ash accumulation density is greater than threshold	60 g/L (60,000 ppm)	N/A	a. DPF requires service b. ECU failure	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Repair or replace soot filter 2. Contact Hyster-Yale Service department for authorization to replace ECU
<b>DTC 3720-16 Yanmar DTC P242F Aftertreatment Control, DPF OP Interface, Ash Cleaning Request 1</b>				
The ash accumulation density is greater than low threshold but less than high threshold	Low threshold: 50 g/L (50,000 ppm) High threshold: 60 g/L (60,000 ppm)	N/A	a. DPF requires service b. ECU failure	NOTE: Yanmar SMARASSIST required to check status of fault code. 1. Repair or replace soot filter 2. Contact Hyster-Yale Service department for authorization to replace ECU
<b>DTC 4041-3 Charge Air Cooler Temperature Sensor ENGINE_CHARGE_AIR_COOLER_TEMP_OORH</b>				
Temperature sensor voltage is greater than threshold for longer than 3 seconds	4.9V	ATP201-A	a. Wire harness short to power b. Short in sensor c. Short in sensor harness	1. Check for power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 4041-3 Coolant Temperature Sensor ENGINE_WATER_TEMP_OORH</b>				
Temperature sensor voltage is greater than threshold for longer than 3 seconds	4.9V	ATP301-A	a. Wire harness short to power b. Short in sensor c. Short in sensor harness	1. Check for power and ground at sensor 2. Check for short to power 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 4041-4 Charge Air Cooler Temperature Sensor ENGINE_CHARGE_AIR_COOLER_TEMP_OORL</b>				
Temperature sensor voltage is less than threshold for longer than 3 seconds	0.1V	ATP201-A	a. Wire harness short to ground b. Open circuit in sensor c. Open circuit in sensor harness	1. Check for power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 4041-4 Coolant Temperature Sensor ENGINE_WATER_TEMP_OORL</b>				
Temperature sensor voltage is less than threshold for longer than 3 seconds	0.1V	ATP301-A	a. Wire harness short to ground b. Open circuit in sensor c. Open circuit in sensor harness	1. Check for power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 412-3 Yanmar DTC P041D Sensor, EGR Gas Temperature Sensor, Excessive Sensor Output</b>				
Sensor voltage is greater than threshold	4.8V	ATE105-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for short to power
<b>DTC 412-4 Yanmar DTC P041C Sensor, EGR Gas Temperature Sensor, Insufficient Sensor Output</b>				
Sensor voltage is less than threshold	0.07V	ATE105-A	a. Damaged sensor b. Damaged harness c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check wire harness for open or short to ground 3. Check power and ground at the sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 412-10 Yanmar DTC P1675 Sensor, EGR Gas Temperature Sensor, Detected Value Error</b>				
Difference between current EGR gas temperature and EGR gas temperature right after key-on is less than or equal to threshold	40°C (104°F)	ATE105-A	a. Damaged sensor b. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check sensor, connector, and wire harness for damage 2. Check power and ground at the sensor
<b>DTC 4236-0 Closed Loop LPG High ECU_CL_LPG_HIGH_1</b>				
Activate: If ECU sends DTC 4236-1 with MIL on  Deactivate: If ECU sends DTC 4236-1 with MIL off	Flag	CAN2: CHN102 and CLN102  Node: 0x00	a. Oxygen sensor issue b. Fuel issue c. Intake air issue	Consult Guided Troubleshooting 4236-0 CL High (LPG)
<b>DTC 4236-1 Closed Loop LPG Low ECU_CL_LPG_LOW_1</b>				
Activate: If ECU sends DTC 4236-1 with MIL on  Deactivate: If ECU sends DTC 4236-1 with MIL off	Flag	CAN2: CHN102 and CLN102  Node: 0x00	a. Oxygen sensor issue b. Fuel issue c. Intake air issue	Consult Guided Troubleshooting 4236-1 CL Low (LPG)
<b>DTC 4237-1 Closed Loop LPG Low ECU_CL_LPG_LOW_2</b>				
Activate: If ECU sends DTC 4237-1 with MIL on  Deactivate: If ECU sends DTC 4237-1 with MIL off	Flag	CAN2: CHN102 and CLN102  Node: 0x00	a. Oxygen sensor issue b. Fuel issue c. Intake air issue	Consult Guided Troubleshooting 4237-1 AL Low (LPG)
<b>DTC 4257-12 Yanmar DTC P0611 CRS, Injector Drive Circuit, Drive IC Error</b>				
A fault in the drive integrated circuit is detected by the ECU	Flag	N/A	Faulty drive circuit in ECU	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Contact Hyster-Yale Service department for authorization to replace ECU

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 4795-31 Yanmar DTC P226D Sensor, DPF Substrate or DPF Differential Pressure Sensor, Removal of DPF Substrate or Sensor Detected Value Error</b>				
DPF differential pressure less than or equal to threshold	0.3 kPa (0.04 psi)	ADE133-A ADE134-A	a. Empty can b. Damaged sensor c. Short to ground	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Replace DPF substrate 2. Check sensor, connector, and wire harness for damage 3. Check power and ground at the sensor
<b>DTC 51-3 Yanmar DTC P02E9 Sensor, Intake Throttle Opening Sensor, Excessive Sensor Output</b>				
Sensor voltage greater than threshold	4.8V	HDE101-A LDE101-A	a. Obstructed intake b. Faulty wire harness c. Short to power	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check intake plumbing and throttle body for obstructions. 2. Check the wire harness, the connector and terminals for damage. 3. Check wire harness for short to power.

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 51-4 Yanmar DTC P02E8 Sensor, Intake Throttle Opening Sensor, Insufficient Sensor Output</b>				
Sensor voltage less than threshold	0.2V	HDE101-A LDE101-A	a. Obstructed intake b. Faulty wire harness c. Short to ground d. Open circuit	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check intake plumbing and throttle body for obstructions  2. Check the wire harness, the connector and terminals for damage  3. Check wire harness for open or short to ground  4. Check power and ground at sensor
<b>DTC 51-3 Yanmar DTC P02E9 Sensor, Intake Throttle Opening Sensor, Excessive Sensor Output</b>				
Sensor voltage greater than threshold	4.8V	HDE101-A LDE101-A	a. Obstructed intake b. Faulty wire harness c. Short to power	NOTE: Yanmar SMARASSIST required to check status of fault code.  1. Check intake plumbing and throttle body for obstructions.  2. Check the wire harness, the connector and terminals for damage.  3. Check wire harness for short to power.

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522243-6 Yanmar DTC P0541 Contact Output, Startup Assist Relay, GND Short-Circuit</b>				
Short to ground is detected by the ECU	Flag	HDE139-A	a. Relay stuck b. Devices not turned off c. Short to ground	Do not tap test solid state relays. Solid state relays have no mechanical contacts. NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Mechanical relays only: tap relay housing to release stuck contacts 2. Check relay circuit loads for devices not turning off 3. Check wire harness for short to ground
<b>DTC 522323-0 Yanmar DTC P1101 Contact Input, Air Cleaner SW, Air Cleaner Blockage Alarm</b>				
Air cleaner sensor on	Flag	RVR112-C ADE100-A	a. Airflow restricted b. Damaged wire harness c. Faulty sensor	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Remove obstruction from air intake 2. Check sensor, connector and wire harness for damage 3. Check wire harness for open or short 4. Check for power and ground at sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522329-0 Yanmar DTC P1151 Contact Input, Oil and Water Separator SW, Oil and Water Separator Alarm</b>				
Oil and water separator switch on	Flag	SGP301-D ADP302-A	<ul style="list-style-type: none"> <li>a. Oil and water separator needs drained</li> <li>b. Damaged wire harness</li> <li>c. Faulty sensor</li> </ul>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Drain oil and water separator</li> <li>2. Check sensor, connector and wire harness for damage</li> <li>3. Check wire harness for open or short</li> <li>4. Check for power and ground at sensor</li> </ol>
<b>DTC 522400-2 Yanmar DTC P0336 Sensor, Crank, Abnormal Signal</b>				
Crank sensor detected more abnormal pulses than allowed	25 pulses	ADE102-A and ADE103-A	<ul style="list-style-type: none"> <li>a. Crank sensor issue</li> <li>b. Encoder issue</li> <li>c. Open circuit in sensor</li> <li>d. Open circuit in sensor harness</li> </ul>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Check sensor for damage</li> <li>2. Check sensor mounting and encoder wheel</li> <li>3. Check wire harness for open or short</li> <li>4. Check power and ground at sensor</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522400-5 Yanmar DTC P0337 Sensor, Crank, No Signal</b>				
Crank sensor detected no pulses for threshold period	2 rotations	ADE102-A and ADE103-A	a. Crank sensor open circuit in ground, supply or signal b. Crank sensor short circuit in signal c. Crank sensor issue	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check sensor for damage 2. Check sensor mounting and encoder wheel 3. Check wire harness for open or short 4. Check power and ground at sensor
<b>DTC 522401-2 Yanmar DTC P0341 Sensor, Cam, Abnormal Signal</b>				
Cam sensor detected incorrect pulses in threshold period	4 rotations	ADE104-A, SGE104-A and 5VE104-A	a. Cam sensor issue b. Encoder issue c. Open circuit in sensor d. Open circuit in sensor harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check sensor for damage 2. Check sensor mounting and encoder wheel 3. Check wire harness for open or short 4. Check power and ground at sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522401-5 Yanmar DTC P0342 Sensor, Cam, No Signal</b>				
Cam sensor detected no pulses for threshold period	2.2 rotations	ADE104-A, SGE104-A and 5VE104-A	a. Cam sensor open circuit in ground, supply or signal b. Cam sensor short circuit in signal c. Cam sensor issue	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check sensor for damage 2. Check sensor mounting and encoder wheel 3. Check wire harness for open or short 4. Check power and ground at sensor
<b>DTC 522401-7 Yanmar DTC P1341 Sensor, Cam, Angular Offset Abnormal</b>				
Cam sensor phase difference to crank is out of range	>30 degrees or <-20 degrees	ADE104-A, SGE104-A and 5VE104-A	a. Cam sensor issue b. Encoder issue c. Open circuit in sensor d. Open circuit in sensor harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check sensor for damage 2. Check sensor mounting and encoder wheel 3. Check wire harness for open or short 4. Check power and ground at sensor

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522571-3 Yanmar DTC P1641 CRS, High-Pressure Pump Drive Circuit, Low Side VB Short Circuit</b>				
Short in VB circuit	Flag	RVR207-A PGB104-E	a. Faulty pump b. Short in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check pump for damage 2. Check wire harness and connector for damage. 3. Check wire harness for short
<b>DTC 522571-6 Yanmar DTC P1643 CRS, High-Pressure Pump Drive Circuit, Low Side GND Short Circuit</b>				
GND short circuit detected too many times in 1 second	5 occurrences	RVR207-A PGB104-E	a. Faulty pump b. Short in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check pump for damage 2. Check wire harness and connector for damage. 3. Check wire harness for short
<b>DTC 522572-6 Yanmar DTC P062A CRS, High-Pressure Pump Drive Circuit, Drive Current (High Level)</b>				
Drive current is too high	Flag	RVR207-A PGB104-E	Faulty drive circuit in ECU	NOTE: Yanmar SMARTASSIST required to check status of fault code.  1. Contact Hyster-Yale Service department for authorization to replace ECU

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522572-11 Yanmar DTC P1645 CRS, High-Pressure Pump Drive Circuit, Pump Overload Error</b>				
Abnormal heating in drive circuit is detected	Flag	RVR207-A PGB104-E	a. Faulty pump b. Short in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check pump for damage 2. Check wire harness and connector for damage. 3. Check wire harness for short
<b>DTC 522573-0 Yanmar DTC P2463 Aftertreatment Control, DPF, Over PM Accumulation (C Method)</b>				
Operationg transits to back up mode because PM accumulation amount (C method) is greater than threshold for more than 10 minutes	12 g/L (12,000 ppm)	ATE108-A	a. Need to perform stationary regeneration b. Damaged sensor c. Damaged harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Perform stationary regen 2. Check sensor, connector, and wire harness for damage 3. Check wire harness for short or open

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522574-0 Yanmar DTC P1463 Aftertreatment Control, DPF, Over PM Accumulation (P Method)</b>				
Operationg transits to back up mode because PM accumulation amount (P method) is greater than threshold for more than 10 minutes	12 g/L (12,000 ppm)	ATE108-A	<ul style="list-style-type: none"> <li>a. Need to perform stationary regeneration</li> <li>b. Damaged sensor</li> <li>c. Damaged harness</li> </ul>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ul style="list-style-type: none"> <li>1. Perform stationary regen</li> <li>2. Check sensor, connector, and wire harness for damage</li> <li>3. Check wire harness for short or open</li> </ul>
<b>DTC 522575-7 Yanmar DTC P2458 Aftertreatment Control, DPF, Regeneration Defect (Stationary Regeneration Failed)</b>				
The operation transits to backup mode due to stationary regeration failed	Flag	ATE108-A SGE133-D	<ul style="list-style-type: none"> <li>a. DPF intermediate temperature sensor failure</li> <li>b. DOC deterioration or breakage</li> <li>c. Injector failure</li> </ul>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ul style="list-style-type: none"> <li>1. Check sensor, connector, and wire harness for damage</li> <li>2. Check wire harness for short or open</li> <li>3. Contact Hyster-Yale Service department for authorization to replace DOC</li> <li>4. Service injectors</li> </ul>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522576-12 Yanmar DTC P160E ECU, EEPROM, EEPROM Memory Reading Fault</b>				
EEPROM reading malfunctions: - This error is determined on the checksum	Flag	N/A	a. Faulty ECU	NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.  NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Contact Hyster-Yale Service department for authorization to replace ECU
<b>DTC 522577-11 Yanmar DTC P2459 Aftertreatment Control, DPF, Regeneration Defect (Stationary Regeneration Not Operated)</b>				
The operation transits to backup mode due to stationary regeneration not performed when requested	Flag	CPS1000 CPS1001	a. DPF wire harness not connected or poor connection  b. Need to perform stationary regeneration  c. Engine speed too low during regeneration  d. Faulty ECU	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check connector, and wire harness for damage  2. Perform stationary regen  3. Contact Hyster-Yale Service department for authorization to replace ECU

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522578-12 Yanmar DTC P160F ECU, EEPROM, EEPROM Memory Writing Fault</b>				
EEPROM writing malfunctions: - This error occurs when there are 3 failed attempts to write one datum	Flag	N/A	a. Faulty ECU	NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.  NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Contact Hyster-Yale Service department for authorization to replace ECU
<b>DTC 522579-12 Yanmar DTC P1405 Actuator, EGR, Short Circuit Between motor Coils</b>				
Overcurrent caused by short circuit motor coils is detected	Flag	HDE140-A RVF203-A	a. Faulty EGR valve b. Short to power in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check EGR valve, connector, and wire harness for damage 2. Check wire harness for short to power
<b>DTC 522580-12 Yanmar DTC P0488 Actuator, EGR, Position Sensor Fault</b>				
Overvoltage or undervoltage from position sensor is detected	Flag	HDE140-A RVF203-A	a. Faulty EGR valve b. Damaged wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check EGR valve, connector, and wire harness for damage 2. Check power and ground at EGR valve

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522581-7 Yanmar DTC P148A Actuator, EGR, Valve Stuck Open Fault</b>				
The number of steps from full-open to full-close during initialization is greater than or equal to threshold	45	HDE140-A RVF203-A	a. Faulty EGR valve b. Open in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check EGR valve, connector, and wire harness for damage 2. Check wire harness for open
<b>DTC 522582-7 Yanmar DTC P049D Actuator, EGR, Initialization Fault</b>				
Initialization time exceeds range	Flag	HDE140-A RVF203-A	a. Faulty EGR valve b. Damaged wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check EGR valve, connector, and wire harness for damage 2. Check power and ground at EGR valve
<b>DTC 522583-1 Yanmar DTC P1410 Actuator, EGR, High-Temperature Thermistor Fault</b>				
The thermistor voltage of high-temperature side within the control unit is less than or equal to threshold	0.2V	HDE140-A RVF203-A	a. Faulty EGR valve b. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check power at EGR valve 2. Check 12V battery output

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522584-1 Yanmar DTC P1411 Actuator, EGR, Low-Temperature Thermistor Fault</b>				
The thermistor voltage of low-temperature side within the control unit is less than or equal to threshold	0.2V	ATE105-A SGE102-D	a. Faulty temperature sensor b. Open in wire harness c. Short to ground	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector and wire harness for damage  2. Check wire harness for open or ground  3. Check for power and ground at sensor
<b>DTC 522585-12 Yanmar DTC P1613 ECU, ECU Internal Fault, CY146 SPI Communication Fault</b>				
A communication fault between the CPU and the H bridge control IC	Flag	N/A	a. Faulty ECU	NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.  NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Contact Hyster-Yale Service department for authorization to replace ECU

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522588-12 Yanmar DTC P1608 ECU, ECU Internal Fault, Excessive Voltage Supply 1</b>				
5V supply voltage to the actuator drive is excessive	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 522589-12 Yanmar DTC P1617 ECU, ECU Internal Fault, Insufficient Voltage Supply 1</b>				
5V supply voltage to the actuator drive is insufficient	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522590-12 Yanmar DTC P1609 ECU, ECU Internal Fault, Sensor Supply Voltage Error 1</b>				
5V supply voltage of sensor exceeds the threshold value	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 522591-12 Yanmar DTC P1618 ECU, ECU Internal Fault, Sensor Supply Voltage Error 2</b>				
5V supply voltage of sensor exceeds the threshold value	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522592-12 Yanmar DTC P1619 ECU, ECU Internal Fault, Sensor Supply Voltage Error 3</b>				
5V supply voltage of sensor exceeds the threshold value	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 522596-9 Yanmar DTC U0292 Communication, TSC1 (CAN Message), TSC1 Reception Time Out (SA1)</b>				
Reception timeout detected at fixed time	250 ms	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A	a. CAN communication error	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Check CAN1 and CAN2 health using PC Service Tool</p> <p>2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522597-9 Yanmar DTC U1301 Communication, TSC1 (CAN Message), TSC1 Reception Time Out (SA2)</b>				
Reception timeout detected at fixed time	250 ms	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check CAN1 and CAN2 health using PC Service Tool  2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector
<b>DTC 522599-9 Yanmar DTC U1292 Communication, Y_ECR1 (CAN Message), Y_ECR1 Reception Time Out Error</b>				
Reception timeout detected at fixed time	250 ms	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check CAN1 and CAN2 health using PC Service Tool  2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector
<b>DTC 522600-9 Yanmar DTC U1293 Communication, Y_EC (CAN Message), Y_EC Reception Time Out Error</b>				
Reception timeout detected at fixed time	500 ms	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check CAN1 and CAN2 health using PC Service Tool  2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522601-9 Yanmar DTC U1294 Communication, Y_RSS (CAN Message), Y_RSS Reception Time Out Error</b>				
Reception timeout detected at fixed time	500 ms	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check CAN1 and CAN2 health using PC Service Tool  2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector
<b>DTC 522609-9 Yanmar DTC U1300 Communication, Y_ETCP1 (CAN Message), Y_ETCP1 Reception Time Out Error</b>				
Reception timeout detected at fixed time	5 sec	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check CAN1 and CAN2 health using PC Service Tool  2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522610-9 Yanmar DTC U010B Communication, EGR, CAN Message From EGR Valve Time Out Error</b>				
Reception timeout detected at fixed time	500 ms	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A CLE101-B CHE101-B	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check CAN1 and CAN2 health using PC Service Tool  2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector  3. Check CAN1 at EGR valve
<b>DTC 522611-9 Yanmar DTC U1107 Actuator, Exhaust Throttle, CAN Message From the Exhaust Throttle Time Out</b>				
Reception timeout detected at fixed time	500 ms	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A RVR202-E PGB104-F	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check CAN1 and CAN2 health using PC Service Tool  2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector  3. Check CAN1 at exhaust throttle

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522617-12 Yanmar DTC U1401 Actuator, EGR, Out of Target Value Range</b>				
Out-of-range of the aperture intrusion is detected	Flag	HDE140-A RVF203-A	a. Faulty EGR valve b. Damaged wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check EGR valve, connector, and wire harness for damage 2. Check power and ground at EGR valve
<b>DTC 522618-9 Yanmar DTC U1302 Communication, EBC1 (CAN Message), EBC1 Reception Time Out Error</b>				
A fixed time passes after a reception time out was detected	500 ms	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check CAN1 and CAN2 health using PC Service Tool 2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector
<b>DTC 522619-9 Yanmar DTC U1303 Communication, Y_DPFIF (CAN Message), Y_DPFIF Reception Time Out Error</b>				
Reception timeout detected at fixed time	5 sec	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check CAN1 and CAN2 health using PC Service Tool 2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522623-7 Yanmar DTC P1647 Sensor, Accelerator Sensor 1 and Accelerator Sensor 2, Dual Accelerator Sensor (Open Position) Failure</b>				
(Estimated APS2 terminal voltage - APS2 terminal voltage) > detected value of dual accelerator sensor	Flag	ADN101-A ADN103-A	a. Faulty sensor b. Poor sensor mounting c. Faulty sensor harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check power and ground at sensor. 2. Check sensor, connector, and wiring harness for damage. 3. Check sensor mounting. 4. Check sensor for full range of motion.
<b>DTC 522624-7 Yanmar DTC P1646 Sensor, Accelerator Sensor 1 and Accelerator Sensor 2, Dual Accelerator Sensor (Closed Position) Failure</b>				
(APS2 terminal voltage - estimated APS2 terminal voltage) > detected value of dual accelerator sensor	Flag	ADN101-A ADN103-A	a. Faulty sensor b. Poor sensor mounting c. Faulty sensor harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check power and ground at sensor 2. Check sensor, connector, and wiring harness for damage 3. Check sensor mounting 4. Check sensor for full range of motion

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522730-12 Yanmar DTC U0167 Communication, Immobilizer (CAN Message), Immobilizer CAN Communication Error</b>				
After sending a request to start certification, no reply from the immobilizer for configured time	2 sec	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A CHN104-K CLN104-K	a. CAN communication error	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check CAN1 and CAN2 health using PC Service Tool  2. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector  3. Check CAN1 at telemetry module
<b>DTC 522744-4 Yanmar DTC P1625 ECU, ECU Internal Fault, Actuator Drive Circuit 1 Short to Gound</b>				
Overcurrent in UB2 terminal is detected by IC in the ECU	Flag	N/A	a. Faulty ECU	NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.  NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Contact Hyster-Yale Service department for authorization to replace ECU

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522746-12 Yanmar DTC P1438, Actuator, Exhaust Throttle, Voltage Fault</b>				
Supply voltage to the exhaust throttle continue to be less than low threshold for 10 seconds OR Supply voltage to the exhaust throttle exceeds high threshold for 1 second	Low threshold: 6V High threshold: 16V	RVR202-E PGB104-F	a. Faulty exhaust throttle b. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check power at exhaust throttle 2. Check 12V battery output
<b>DTC 522747-12 Yanmar DTC P1439, Actuator, Exhaust Throttle, Motor Fault</b>				
Duty ratio for the driving motor exceeds threshold for predetermined time OR Motion range of valve detected by learning function is abnormal OR Detecting over current, over voltage, open circuit, or short circuit fo motor coil	Flag	RVR202-E PGB104-F	a. Faulty exhaust throttle b. Short in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check that exhaust throttle motor continues to operate 2. Check exhaust throttle, connector and wire harness for damage 3. Check wire harness for short

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522747-12 Exhaust Throttle ECU_THROTTLE_EXHAUST_1</b>				
Activate: If ECU sends DTC 522747-12 (P1439) with MIL on  Deactivate: If ECU sends DTC 522747-12 (P1439) with MIL off	Flag	CAN2: CHN102 and CLN102  Node: 0x00	Consult Guided Troubleshooting	Consult Guided Troubleshooting
<b>DTC 522748-12 Yanmar DTC P1440, Actuator, Exhaust Throttle, Sensor System Fault</b>				
Actual position measured by internal position sensor do not follow the target position  OR  Detecting excessive or insufficient output voltage of internal position sensor	Flag	RVR202-E  PGB104-F	a. Faulty exhaust throttle  b. Short in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check exhaust throttle, connector and wire harness for damage  2. Check power and ground at exhaust throttle
<b>DTC 522748-12 Exhaust Throttle ECU_THROTTLE_EXHAUST_2</b>				
Activate: If ECU sends DTC 522748-12 (P1440) with MIL on  Deactivate: If ECU sends DTC 522748-12 (P1440) with MIL off	Flag	CAN2: CHN102 and CLN102  Node: 0x00	Consult Guided Troubleshooting	Consult Guided Troubleshooting
<b>DTC 522749-12 Yanmar DTC P1441, Actuator, Exhaust Throttle, MPU Fault</b>				
Exhaust throttle detects internal MPU fault	Flag	RVR202-E  PGB104-F	a. Faulty exhaust throttle  b. Short in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check exhaust throttle, connector and wire harness for damage  2. Check power and ground at exhaust throttle

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522750-12 Yanmar DTC P1442, Actuator, Exhaust Throttle, PCB Fault</b>				
Exhaust throttle detects excessive or insufficient output voltage of internal thermistor	Flag	RVR202-E PGB104-F	a. Faulty exhaust throttle b. Short in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check exhaust throttle, connector and wire harness for damage  2. Check power and ground at exhaust throttle
<b>DTC 522751-19 Yanmar DTC P1443, Actuator, Exhaust Throttle, CAN Fault</b>				
Exhaust throttle detects CAN reception timeout OR CAN communication controller in exhaust throttle detects initialization failure	Flag	CTN101-A CHN101-A CLN101-A CTN102-A CHN102-A CLN102-A RVR202-E PGB104-F	a. Faulty exhaust throttle b. Short in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check power and ground at exhaust throttle  2. Check CAN1 and CAN2 health using PC Service Tool  3. Check CAN1 and CAN2 health by measuring resistance at diagnostic connector  4. Check CAN1 at exhaust throttle

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 522994-4 Yanmar DTC P1633 ECU, ECU Internal Fault, Actuator Drive Circuit 2 Short to Ground</b>				
Overcurrent in UB3 terminal is detected by IC in the ECU	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 523249-5 Yanmar DTC P0008 Sensor, Crank and Cam, Angular Offset Abnormal</b>				
Neither crank nor cam sensors detected no pulses for threshold period	10 sec	ADE102-A and ADE103-A  ADE104-A, SGE104-A and 5VE104-A	a. Cam and crank sensor issue b. Encoder issue c. Open circuit in sensors d. Open circuit in sensor harness	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Check sensors for damage</p> <p>2. Check wire harness for open or short</p> <p>3. Check power and ground at sensors</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523460-7 Yanmar DTC P1670 CRS, Rail Pressure Fault, Operation Time Error During RPS Limp Home</b>				
<p>The rail pressure sensor and the high-pressure pump drive circuit (MPROP) are abnormal</p> <p>OR</p> <p>The rail pressure sensor and the fuel temperature sensor are abnormal</p>	Flag	<p>ADE120-A</p> <p>ATE102-A</p>	<p>a. Faulty rail pressure sensor</p> <p>b. Faulty fuel temperature sensor</p> <p>c. Open or short to ground in wire harness</p> <p>d. Faulty Suction Control Valve (SCV)</p>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Check fuel rail pressure sensor, connector, and wire harness for damage</li> <li>2. Check fuel temperature sensor, connector, and wire harness for damage</li> <li>3. Check wire harness for open or short to ground</li> <li>4. Check power and ground at both sensors</li> <li>6. Check Suction Control Valve (SCV)</li> </ol>
<b>DTC 523462-13 Yanmar DTC P1648 Others, QR Data, IQA Corrected Injection Amount for CYLNO.1 Error</b>				
<p>The injector corrected value is not entered or entered incorrectly, and the EEPROM cannot be read</p>	Flag	N/A	<p>a. Error in entering injector corrected value</p>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check injector QR codes.</p> <ol style="list-style-type: none"> <li>1. Check QR code on injector and compare to what was entered</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523463-13 Yanmar DTC P1649 Others, QR Data, IQA Corrected Injection Amount for CYLNO.2 Error</b>				
The injector corrected value is not entered or entered incorrectly, and the EEPROM cannot be read	Flag	N/A	a. Error in entering injector corrected value	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check injector QR codes.</p> <p>1. Check QR code on injector and compare to what was entered</p>
<b>DTC 523464-13 Yanmar DTC P1650 Others, QR Data, IQA Corrected Injection Amount for CYLNO.3 Error</b>				
The injector corrected value is not entered or entered incorrectly, and the EEPROM cannot be read	Flag	N/A	a. Error in entering injector corrected value	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check injector QR codes.</p> <p>1. Check QR code on injector and compare to what was entered</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523465-13 Yanmar DTC P1651 Others, QR Data, IQA Corrected Injection Amount for CYLNO.4 Error</b>				
The injector corrected value is not entered or entered incorrectly, and the EEPROM cannot be read	Flag	N/A	a. Error in entering injector corrected value	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check injector QR codes.</p> <p>1. Check QR code on injector and compare to what was entered</p>
<b>DTC 523468-9 Yanmar DTC P1665 CRS, Rail Pressure Fault, Controlled Rail Pressure Error After PLV Valve Opening</b>				
Rail pressure deviates from range after common rail pressure control valve is opened	50 to 120 MPa (7252 to 17405 psi)	ADE120-A	<p>a. Faulty rail pressure sensor</p> <p>b. Open or short to ground in wire harness</p> <p>c. Faulty supply pump</p> <p>d. Faulty fuel rail</p>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Check fuel rail pressure sensor, connector, and wire harness for damage</p> <p>2. Check wire harness for open or short to ground</p> <p>3. Check for power and ground at sensor</p> <p>4. Check high pressure supply pump and fuel rail components</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523469-0 Yanmar DTC P1666 CRS, Rail Pressure Fault, Times of PLV Opening Error</b>				
Pressure control valve of common rail system has opened more times than the threshold	50 times	ADE120-A	<ul style="list-style-type: none"> <li>a. Faulty rail pressure sensor</li> <li>b. Open or short to ground in wire harness</li> <li>c. Faulty supply pump</li> <li>d. Faulty fuel rail</li> </ul>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Check fuel rail pressure sensor, connector, and wire harness for damage</li> <li>2. Check wire harness for open or short to ground</li> <li>3. Check for power and ground at sensor</li> <li>4. Check high pressure supply pump and fuel rail components</li> </ol>
<b>DTC 523470-0 Yanmar DTC P1667 CRS, Rail Pressure Fault, Time of PLV Opening Error</b>				
Cumulative opening time of the pressure control valve of common rail exceeds threshold	5 hours	ADE120-A	<ul style="list-style-type: none"> <li>a. Faulty rail pressure sensor</li> <li>b. Open or short to ground in wire harness</li> <li>c. Faulty supply pump</li> <li>d. Faulty fuel rail</li> </ul>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Check fuel rail pressure sensor, connector, and wire harness for damage</li> <li>2. Check wire harness for open or short to ground</li> <li>3. Check for power and ground at sensor</li> <li>4. Check high pressure supply pump and fuel rail components</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523471-6 Yanmar DTC P1467 ECU, ECU Internal Fault, Actuator Drive Circuit 3 Short to Gound</b>				
Overcurrent in UB5 terminal is detected by IC in the ECU	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 523473-12 Yanmar DTC P1469 ECU, ECU Internal Fault, AD Converter Fault 1</b>				
A pulse error is detected through diagnosis of the AD converter	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523474-12 Yanmar DTC P1470 ECU, ECU Internal Fault, AD Converter Fault 2</b>				
A voltage error is detected through diagnosis of the AD converter	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 523475-12 Yanmar DTC P1471 ECU, ECU Internal Fault, External Monitoring IC and CPU Fault 1</b>				
An error is detected through mutual diagnosis of the external monitoring IC and the CPU	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523477-12 Yanmar DTC P1473 ECU, ECU Internal Fault, ROM Fault</b>				
Checksum of all ROM areas is abnormal	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 523478-12 Yanmar DTC P1474 ECU, ECU Internal Fault, Shutoff Path Fault 1</b>				
A response error from CPU to the external monitoring IC is detected by the external monitoring IC	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523479-12 Yanmar DTC P1475 ECU, ECU Internal Fault, Shutoff Path Fault 2</b>				
An operation error of shutoff path test is detected by the external monitoring IC	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 523479-12 Yanmar DTC P1475 ECU, ECU Internal Fault, External Monitoring IC and CPU Fault 2</b>				
A communication error is detected between the external monitoring IC and the CPU	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523480-12 Yanmar DTC P1476 ECU, ECU Internal Fault, Shutoff Path Fault 3</b>				
An response time error of shutoff path test is detected by the external monitoring IC	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 523481-12 Yanmar DTC P1477 ECU, ECU Internal Fault, Shutoff Path Fault 4</b>				
An communication error of shutoff path test is detected by the external monitoring IC	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523482-12 Yanmar DTC P1478 ECU, ECU Internal Fault, Shutoff Path Fault 5</b>				
An insufficient value of voltage in shutoff path test is detected by the external monitoring IC	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 523483-12 Yanmar DTC P1479 ECU, ECU Internal Fault, Shutoff Path Fault 6</b>				
An error of the external monitoring IC in shutoff path test is detected by the external monitoring IC	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523484-12 Yanmar DTC P1480 ECU, ECU Internal Fault, Shutoff Path Fault 7</b>				
An error of OS call time in shutoff path test is detected by the external monitoring IC	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 523485-12 Yanmar DTC P1481 ECU, ECU Internal Fault, Shutoff Path Fault 8</b>				
An error of positive test of shutoff path test is detected by the external monitoring IC	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523486-12 Yanmar DTC P1482 ECU, ECU Internal Fault, Shutoff Path Fault 9</b>				
An error of operation time of shutoff path test is detected by the external monitoring IC	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 523487-12 Yanmar DTC P1483 ECU, ECU Internal Fault, Shutoff Path Fault 10</b>				
An excessive value of voltage in shutoff path test is detected by the external monitoring IC	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523488-12 Yanmar DTC P1484 ECU, ECU Internal Fault, Recognition Error of Engine Speed</b>				
An error is detected through mutual diagnosis of engine speed	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Contact Hyster-Yale Service department for authorization to replace ECU</p>
<b>DTC 523489-0 Yanmar DTC P1668 CRS, Rail Pressure Fault, Actual Rail Pressure Too High During PLV Limp Home</b>				
The pressure control valve of common rail fails to open when common rail has pressure higher than threshold	160 MPa (23206 psi)	ADE120-A	<p>a. Faulty rail pressure sensor</p> <p>b. Open or short to ground in wire harness</p> <p>c. Faulty supply pump</p> <p>d. Faulty fuel rail</p>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <p>1. Check fuel rail pressure sensor, connector, and wire harness for damage</p> <p>2. Check wire harness for open or short to ground</p> <p>3. Check for power and ground at sensor</p> <p>4. Check high pressure supply pump and fuel rail components</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 523491-0 Yanmar DTC P1669 CRS, Rail Pressure Fault, Injector B/F Temperature Error During PLV4 Limp Home</b>				
Fuel temperature exceeds threshold after common rail pressure control valve is opened	80°C (176°F)	ADE120-A	<ul style="list-style-type: none"> <li>a. Faulty rail pressure sensor</li> <li>b. Open or short to ground in wire harness</li> <li>c. Faulty supply pump</li> <li>d. Faulty fuel rail</li> </ul>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Check fuel rail pressure sensor, connector, and wire harness for damage</li> <li>2. Check wire harness for open or short to ground</li> <li>3. Check for power and ground at sensor</li> <li>4. Check high pressure supply pump and fuel rail components</li> </ol>
<b>DTC 630-12 Yanmar DTC P0601 ECU, EEPROM, EEPROM Memory Deletion Fault</b>				
<p>EEPROM deletion malfunctions:</p> <ul style="list-style-type: none"> <li>- The EEPROM has two pages and uses them alternately</li> <li>- Error occurs when a page fails to clear during page switching</li> </ul>	Flag	N/A	a. Faulty ECU	<p>NOTE: Yanmar SMARTASSIST software is required to check and update ECU software.</p> <p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Contact Hyster-Yale Service department for authorization to replace ECU</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 633-3 Yanmar DTC P0629 CRS, High-Pressure Pump Drive Circuit, High Side VB Short Circuit</b>				
Short in VB circuit	Flag	RVR207-A PGB104-E	a. Faulty pump b. Short in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check pump for damage  2. Check wire harness and connector for damage.  3. Check wire harness for short
<b>DTC 633-5 Yanmar DTC P0627 CRS, High-Pressure Pump Drive Circuit, Disconnection</b>				
Disconnection in drive circuit detected	Flag	RVR207-A PGB104-E	a. Faulty pump b. Short to ground in wire harness c. Open in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check pump for damage  2. Check wire harness and connector for damage.  3. Check wire harness for open or short to ground  4. Check power and ground at pump

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 633-6 Yanmar DTC P1642 CRS, High-Pressure Pump Drive Circuit, High Side GND Short Circuit</b>				
GND short circuit detected too many times in 1 second	5 occurrences	RVR207-A PGB104-E	a. Faulty pump b. Short in wire harness	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check pump for damage 2. Check wire harness and connector for damage. 3. Check wire harness for short
<b>DTC 651-3 Yanmar DTC P1271 CRS, CYLNO.4, Short Circuit</b>				
Short to B+ of the low side in the drive circuit is detected	Flag	HDE133-A LDE133-A	a. Damaged injector b. Open or short in wire harness c. Open or short in injector	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check injector and connector for damage 2. Check wire harness, connector, and terminals for damage 3. Check wire harness for open or short to ground 4. Check power and ground at injector

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 651-5 Yanmar DTC P0204 CRS, CYLNO.4, Disconnection</b>				
Disconnection of high side or low side in the drive circuit is detected	Flag	HDE133-A LDE133-A	a. Damaged injector b. Short to ground	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Check injector and connector for damage</li> <li>2. Check wire harness, connector, and terminals for damage</li> <li>3. Check wire harness for short to ground</li> <li>4. Check resistance at injector</li> </ol>
<b>DTC 651-6 Yanmar DTC P0271 CRS, CYLNO.4, Coil Short</b>				
Short circuit within the coil is detected	Flag	HDE133-A LDE133-A	a. Damaged injector b. Short to power	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Check injector and connector for damage</li> <li>2. Check wire harness, connector, and terminals for damage</li> <li>3. Check wire harness for short to power</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 652-3 Yanmar DTC P1268 CRS, CYLNO.3, Short Circuit</b>				
Short to B+ of the low side in the drive circuit is detected	Flag	HDE132-A LDE132-A	a. Damaged injector b. Open or short in wire harness c. Open or short in injector	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check injector and connector for damage 2. Check wire harness, connector, and terminals for damage 3. Check wire harness for open or short to ground 4. Check power and ground at injector
<b>DTC 652-5 Yanmar DTC P0203 CRS, CYLNO.3, Disconnection</b>				
Disconnection of high side or low side in the drive circuit is detected	Flag	HDE132-A LDE132-A	a. Damaged injector b. Short to ground	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check injector and connector for damage 2. Check wire harness, connector, and terminals for damage 3. Check wire harness for short to ground 4. Check resistance at injector

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 652-6 Yanmar DTC P0268 CRS, CYLNO.3, Coil Short</b>				
Short circuit within the coil is detected	Flag	HDE132-A LDE132-A	a. Damaged injector b. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check injector and connector for damage  2. Check wire harness, connector, and terminals for damage  3. Check wire harness for short to power
<b>DTC 653-3 Yanmar DTC P1265 CRS, CYLNO.2, Short Circuit</b>				
Short to B+ of the low side in the drive circuit is detected	Flag	HDE131-A LDE131-A	a. Damaged injector b. Open or short in wire harness c. Open or short in injector	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check injector and connector for damage  2. Check wire harness, connector, and terminals for damage  3. Check wire harness for open or short to ground  4. Check power and ground at injector

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 653-5 Yanmar DTC P020 CRS, CYLNO.2, Disconnection</b>				
Disconnection of high side or low side in the drive circuit is detected	Flag	HDE131-A LDE131-A	a. Damaged injector b. Short to ground	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check injector and connector for damage  2. Check wire harness, connector, and terminals for damage  3. Check wire harness for short to ground  4. Check resistance at injector
<b>DTC 653-6 Yanmar DTC P0265 CRS, CYLNO.2, Coil Short</b>				
Short circuit within the coil is detected	Flag	HDE131-A LDE131-A	a. Damaged injector b. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check injector and connector for damage  2. Check wire harness, connector, and terminals for damage  3. Check wire harness for short to power

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 654-3 Yanmar DTC P1262 CRS, CYLNO.1, Short Circuit</b>				
Short to B+ of the low side in the drive circuit is detected	Flag	HDE130-A LDE130-A	a. Damaged injector b. Open or short in wire harness c. Open or short in injector	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check injector and connector for damage 2. Check wire harness, connector, and terminals for damage 3. Check wire harness for open or short to ground 4. Check power and ground at injector
<b>DTC 654-5 Yanmar DTC P0201 CRS, CYLNO.1, Disconnection</b>				
Disconnection of high side or low side in the drive circuit is detected	Flag	HDE130-A LDE130-A	a. Damaged injector b. Short to ground	NOTE: Yanmar SMARTASSIST software is required to check status of fault code. 1. Check injector and connector for damage 2. Check wire harness, connector, and terminals for damage 3. Check wire harness for short to ground 4. Check resistance at injector

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 654-6 Yanmar DTC P0262 CRS, CYLNO.1, Coil Short</b>				
Short circuit within the coil is detected	Flag	HDE130-A LDE130-A	a. Damaged injector b. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check injector and connector for damage  2. Check wire harness, connector, and terminals for damage  3. Check wire harness for short to power
<b>DTC 8011-0 Coolant Temperature EVENT_ENGINE_WATER_TEMP_HOT_UPPER_THRESHOLD</b>				
Engine coolant temperature is at or above hot coolant upper threshold	Flag	VSM: Bus ID 0 Node: 0x3	Engine coolant temperature high	If condition persists, notify service
<b>DTC 8011-16 Coolant Temperature EVENT_ENGINE_WATER_TEMP_HOT_LOWER_THRESHOLD</b>				
Engine coolant temperature is at or above hot coolant lower threshold	Flag	VSM: Bus ID 0 Node: 0x3	Engine coolant temperature high	If condition persists, notify service
<b>DTC 8012-1 Engine Oil Pressure Sensor EVENT_ENGINE_OIL_PRESSURE_LOW</b>				
Engine oil pressure is low	Flag	VSM: Bus ID 0 Node: 0x3	Engine oil pressure is low	If condition persists, notify service
<b>DTC 91-3 Yanmar DTC P0123 Sensor, Accelerator Sensor 1, Excessive Sensor Output</b>				
Sensor voltage is greater than threshold	4.6V	ADN101-A	a. Damaged sensor b. Damaged harness c. Short to power	NOTE: Yanmar SMARTASSIST software is required to check status of fault code.  1. Check sensor, connector, and wire harness for damage  2. Check wire harness for short to power

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 91-4 Yanmar DTC P0122 Sensor, Accelerator Sensor 1, Insufficient Sensor Output</b>				
Sensor voltage is less than threshold	0.2V	ADN101-A	<ul style="list-style-type: none"> <li>a. Damaged sensor</li> <li>b. Damaged harness</li> <li>c. Short to ground</li> </ul>	<p>NOTE: Yanmar SMARASSIST required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Check sensor, connector, and wire harness for damage</li> <li>2. Check wire harness for open or short to ground</li> <li>3. Check power and ground at the sensor</li> </ol>
<b>DTC 94-0 Fuel Pressure Sensor, Excessive Sensor Output</b>				
Fuel pressure is greater than threshold	4.6V	ADE120-A	<ul style="list-style-type: none"> <li>a. Malfunctioning fuel pump</li> <li>b. Damaged sensor</li> <li>c. Damaged harness</li> <li>d. Short to power</li> </ul>	<p>NOTE: Yanmar SMARTASSIST software is required to check status of fault code.</p> <ol style="list-style-type: none"> <li>1. Check Pump, sensor, connector, and wire harness for damage</li> <li>2. Check wire harness for short to power</li> </ol>

**TRANSMISSION ERROR CODE  
REFERENCE CHART**
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Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1013-0 Transmission Forward Pack Pressure XMSN_FWDPRESSURESENSOR_RATIONALITY_2a</b>				
Pressure is too high for command with oil pressure between 80-120°C (176-248°F)	Transmission pressure - Allowed Over Error (PSI) 40	ADN113-A	a. Stuck valve b. Pressure reading invalid	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance 5. Replace valve.
<b>DTC 1013-1 Transmission Forward Pack Pressure XMSN_FWDPRESSURESENSOR_RATIONALITY_1a</b>				
Pressure is too low for command with oil pressure between 80-120°C (176-248°F)	Transmission pressure - Allowed Under Error (PSI) 60	ADN113-A	a. Stuck valve b. Pressure reading invalid	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance 5. Replace valve.

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1013-3 Transmission Forward Pack Pressure XMSN_FWD_PRESSURE_SENSOR_OORH</b>				
Sensor voltage greater than threshold for longer than activation time	> 4.5V	ADN113-A	a. Sensor open internally b. Open in wire harness c. Sensor disconnected	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance
<b>DTC 1013-4 Transmission Forward Pack Pressure XMSN_FWD_PRESSURE_SENSOR_OORL</b>				
Sensor voltage less than threshold for longer than activation time	< 0.5V	ADN113-A	a. Wire harness short to ground b. Sensor is open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1013-15 Transmission Forward Pack Pressure XMSN_FWD_PRESSURE_SENSOR_RATIONALITY_3a</b>				
Calibration pressure out of range - high	Flag	ADN113-A	a. Calibration failed due to bad hardware b. Calibration failed due to required maintenance	1. Perform any required periodic maintenance 2. Perform transmission calibration using PC Service Tool

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1013-16 Transmission Forward Pack Pressure XMSN_FWDPRESSURESENSOR_RATIONALITY_2b</b>				
Pressure is too high for command with oil pressure less than 80°C (176°F)		ADN113-A	a. Stuck valve b. Pressure reading invalid	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance 5. Replace valve.
<b>DTC 1013-17 Transmission Forward Pack Pressure XMSN_FWDPRESSURE_SENSOR_RATIONALITY_3b</b>				
Calibration pressure out of range low	Flag	ADN113-A	a. Calibration failed due to bad hardware b. Calibration failed due to required maintenance	1. Perform any required periodic maintenance 2. Perform transmission calibration using PC Service Tool
<b>DTC 1013-18 Transmission Forward Pack Pressure XMSN_FWDPRESSURESENSOR_RATIONALITY_1b</b>				
Pressure is too low for command with oil pressure less than 80°C (176°F)		ADN113-A	a. Stuck valve b. Pressure reading invalid	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance 5. Replace valve.

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1014-0 Transmission Reverse Pack Pressure XMSN_REVPRESSURESENSOR_RATIONALITY_2a</b>				
Pressure is too high for command with oil pressure between 80-120°C (176-248°F)	Transmission pressure - Allowed Over Error (PSI) 40	ADN114-A	a. Stuck valve b. Pressure reading invalid	<ol style="list-style-type: none"> <li>1. Check that sensor is connected to wire harness</li> <li>2. Check wire harness for damage</li> <li>3. Check wire harness for high or infinite resistance</li> <li>4. Check component resistance</li> <li>5. Replace valve.</li> </ol>
<b>DTC 1014-1 Transmission Reverse Pack Pressure XMSN_REVPRESSURESENSOR_RATIONALITY_1a</b>				
Pressure is too low for command with oil pressure between 80-120°C (176-248°F)	Transmission pressure - Allowed Under Error (PSI) 60	ADN114-A	a. Stuck valve b. Pressure reading invalid	<ol style="list-style-type: none"> <li>1. Check that sensor is connected to wire harness</li> <li>2. Check wire harness for damage</li> <li>3. Check wire harness for high or infinite resistance</li> <li>4. Check component resistance</li> <li>5. Replace valve.</li> </ol>
<b>DTC 1014-3 Transmission Reverse Pack Pressure XMSN_REV_PRESSURE_SENSOR_OORH</b>				
Sensor voltage greater than threshold for longer than activation time	> 4.5V	ADN114-A	a. Sensor open internally b. Open in wire harness c. Sensor disconnected	<ol style="list-style-type: none"> <li>1. Check that sensor is connected to wire harness</li> <li>2. Check wire harness for damage</li> <li>3. Check wire harness for high or infinite resistance</li> <li>4. Check component resistance</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1014-4 Transmission Reverse Pack Pressure XMSN_REV_PRESSURE_SENSOR_OORL</b>				
Sensor voltage less than threshold for longer than activation time	< 0.5V	ADN114-A	a. Wire harness short to ground b. Sensor is open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1014-15 Transmission Reverse Pack Pressure XMSN_REV_PRESSURE_SENSOR_RATIONALITY_3a</b>				
Calibration pressure out of range - high	Flag	ADN114-A	a. Calibration failed due to bad hardware b. Calibration failed due to required maintenance	1. Perform any required periodic maintenance 2. Perform transmission calibration using PC Service Tool
<b>DTC 1014-16 Transmission Reverse Pack Pressure XMSN_REVPRESSURESENSOR_RATIONALITY_2b</b>				
Pressure is too high for command with oil pressure less than 80°C (176°F)		ADN114-A	a. Stuck valve b. Pressure reading invalid	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance 5. Replace valve.
<b>DTC 1014-17 Transmission Reverse Pack Pressure XMSN_REV_PRESSURE_SENSOR_RATIONALITY_3b</b>				
Calibration pressure out of range low	Flag	ADN114-A	a. Calibration failed due to bad hardware b. Calibration failed due to required maintenance	1. Perform any required periodic maintenance 2. Perform transmission calibration using PC Service Tool

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1014-18 Transmission Reverse Pack Pressure XMSN_REVPRESSURESENSOR_RATIONALITY_1b</b>				
Pressure is too low for command with oil pressure less than 80°C (176°F)		ADN114-A	a. Stuck valve b. Pressure reading invalid	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance 5. Replace valve.
<b>DTC 2001-0 Transmission Forward Valve XMSN_FWD_PROP_VALVE_OORL</b>				
(Commanded current minus actual current) on forward travel proportional valve is greater than threshold for longer than activation time	Delta > 500 mA	LDN101-A	a. Internal short in solenoid c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2001-6 Transmission Forward Valve XMSN_FWD_PROP_VALVE_OORH</b>				
Current on forward travel proportional valve is greater than threshold for longer than activation time	> 2.2 Amp	LDN101-A	a. Internal short in solenoid b. Solenoid stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2002-0 Transmission Reverse Valve XMSN_REV_PROP_VALVE_OORL</b>				
(Commanded current minus actual current) on reverse travel proportional valve is greater than threshold for longer than activation time	Delta > 500 mA	LDN102-A	a. Open in solenoid b. Solenoid disconnected c. Open, damaged, or corroded wire harness	1. Check solenoid resistance 2. Check connection to solenoid 3. Check wire harness for damage or corrosion

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2002-6 Transmission Reverse Valve XMSN_REV_PROP_VALVE_OORH</b>				
Current on reverse travel proportional valve is greater than threshold for longer than activation time	> 2.2 Amp	LDN102-A	a. Internal short in solenoid b. Solenoid stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2053-5 Transmission Enable Valve XMSN_ENABLE_VALVE_OORL</b>				
Current less than threshold for longer than activation time	<100mA	HDN103-A	a. Internal short in solenoid c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2053-6 Transmission Enable Valve XMSN_ENABLE_VALVE_OORH</b>				
VSM detects overcurrent	Flag	HDN103-A	a. Internal short in solenoid b. Solenoid stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 3102-0 Transmission Input Shaft Speed XMSN_TISS_RATIONALITY_2c</b>				
TISS greater than threshold for longer than activation time	≥5KHz	FYN102-A	a. Misrouted wire harness b. Damaged wire harness c. Sensor damaged or malfunctioning d. Interference from operating environment	1. Check wire harness for damage to signal or shield wires 2. Shield wiring harness 3. Check harness routing 4. Check sensor for damage

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3102-1 Transmission Input Shaft Speed XMSN_TISS_RATIONALITY_3b</b>				
Directional control in neutral, engine RPM>TISS Sensor Engine RPM, TISS<TISS Sensor TISS RPM and vehicle speed>TISS Sensor TOSS MPH	TISS Sensor Engine RPM: 1000 RPM TISS Sensor TISS RPM: 20 RPM TISS Sensor TOSS MPH: 5 MPH	FYN102-A	a. Sensor open internally b. Open in wire harness c. Sensor disconnected	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance
<b>DTC 3102-16 Transmission Input Shaft Speed XMSN_TISS_RATIONALITY_1</b>				
Engine running and TISS pulse count greater than threshold for longer than activation time	>2700 RPM	FYN102-A	a. Misrouted wire harness b. Damaged wire harness c. Sensor damaged or malfunctioning d. Interference from operating environment	1. Check wire harness for damage to signal or shield wires 2. Shield wiring harness 3. Check harness routing 4. Check sensor for damage
<b>DTC 3102-18 Transmission Input Shaft Speed XMSN_TISS_RATIONALITY_3a</b>				
Directional control in neutral, engine RPM>TISS Sensor Engine RPM, TISS<TISS Sensor TISS RPM and vehicle speed>TISS Sensor TOSS MPH	TISS Sensor Engine RPM: 1000 RPM TISS Sensor TISS RPM: 20 RPM TISS Sensor TOSS MPH: 5 MPH	FYN102-A	a. Sensor open internally b. Open in wire harness c. Sensor disconnected	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3103-0 Transmission Output Shaft Speed XMSN_TOSS_RATIONALITY_4</b>				
TOSS greater than threshold for longer than activation time; TOSS is greater than maximum truck speed	> 150% of rated truck speed	FYN103-A FYN104-A	a. Misrouted wire harness b. Damaged wire harness c. Sensor damaged or malfunctioning d. Interference from operating environment	1. Check wire harness for damage to signal or shield wires 2. Shield wiring harness 3. Check harness routing 4. Check sensor for damage
<b>DTC 3103-1 Transmission Output Shaft Speed XMSN_TOSS_RATIONALITY_6</b>				
Engine speed greater than threshold and full current commanded to solenoid, and TOSS indicates 0 speed for longer than activation time	> 2200 eRPM	FYN103-A FYN104-A	a. Sensor open internally b. Open in wire harness c. Sensor disconnected	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance
<b>DTC 3103-5 Transmission Output Shaft Speed TOSS_SENSOR_UNPLUGGED_2</b>				
TOSS sensor RPM is 0 and TOSS input voltage is greater than threshold, and valve current is greater than TOSS valve current, and all brakes are off, and fault timer has expired.	TOSS voltage > 9.0V TOSS feedback valve current > 750mA Fault timer 30 seconds	FYN103-A	a. Sensor open internally b. Open in wire harness c. Sensor disconnected	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 3103-16 Transmission Output Shaft Speed XMSN_TOSS_RATIONALITY_5</b>				
TOSS delta is greater than threshold for longer than activation time	One TOSS channel reports speed delta +/-10Hz from other channel	FYN103-A FYN104-A	a. Misrouted wire harness b. Damaged wire harness c. Sensor damaged or malfunctioning d. Interference from operating environment	1. Check wire harness for damage to signal or shield wires 2. Shield wiring harness 3. Check harness routing 4. Check sensor for damage
<b>DTC 3104-5 Transmission Output Shaft Speed TOSS_SENSOR_UNPLUGGED_1</b>				
TOSS sensor RPM is 0 and TOSS input voltage is greater than threshold, and pack pressure is greater than threshold, and all brakes are off.	TOSS voltage > 9.0V TOSS Sensor_Pack pressure 7 bar minimum	FYN103-A FYN104-A	a. Sensor open internally b. Open in wire harness c. Sensor disconnected	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance
<b>DTC 4042-3 Transmission Oil Temperature Sensor XMSN_TEMP_SENSOR_OORH</b>				
Oil temp voltage greater than threshold for longer than activation time	> 4.98V, low pass filter	ATN102-A	a. Sensor open internally b. Open in wire harness c. Sensor disconnected	1. Check that sensor is connected to wire harness 2. Check wire harness for damage 3. Check wire harness for high or infinite resistance 4. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 4042-4 Transmission Oil Temperature Sensor XMSN_TEMP_SENSOR_OORL</b>				
Oil temp voltage lower than threshold for longer than activation time	< 0.19V, low pass filter	ATN102-A	a. Wire harness short to ground b. Sensor is open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 8010-0 Transmission Oil Temperature EVENT_XMSN_TEMP_HOT_UPPER_THRESHOLD</b>				
Transmission oil temperature at or above hot oil upper threshold	Flag	VSM: Bus ID 0 Node: 0x3	Transmission is too hot	1. Allow transmission to cool 2. If condition persists, inspect transmission for damage or low oil
<b>DTC 8010-1 Transmission Oil Temperature EVENT_XMSN_TEMP_COLD_THRESHOLD</b>				
Transmission oil temperature at or below low oil upper threshold	Flag	VSM: Bus ID 0 Node: 0x3	Transmission is too cold	1. Allow transmission to warm up 2. If condition persists, inspect transmission for damage
<b>DTC 8010-16 Transmission Oil Temperature EVENT_XMSN_TEMP_HOT_LOWER_THRESHOLD</b>				
Transmission oil temperature at or above hot oil lower threshold	Flag	VSM: Bus ID 0 Node: 0x3	Transmission is too hot	1. Allow transmission to cool 2. If condition persists, inspect transmission for damage or low oil
<b>DTC 9001-0 Hydrostatic Transmission Controller HST_TCU_DISABLE</b>				
Transmission controller sends fault message with severity 0	Flag	CAN2: CHN102 and CLN102 Node: 0x00	Fault from transmission controller	Resolve other transmission faults
<b>DTC 9001-15 Hydrostatic Transmission Controller HST_TCU_WARNING</b>				
Transmission controller sends fault message with severity 99	Flag	CAN2: CHN102 and CLN102 Node: 0x00	Fault from transmission controller	Resolve other transmission faults

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 9001-16 Hydrostatic Transmission Controller HST_TCU_DERATE</b>				
Transmission controller sends fault message with severity 1	Flag	CAN2: CHN102 and CLN102 Node: 0x00	Fault from transmission controller	Resolve other transmission faults

### DRIVE AXLE ERROR CODE REFERENCE CHART 202001-193

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1002-0 Automatic Park Brake Slow To Apply PBRAKE_PRESSURE_SENSOR_RATIONALITY_2</b>				
Activate: Park brake is commanded to apply and pressure is greater than threshold for longer than activation time Deactivate: Park brake commanded to release	10 bar	ADN102-B	a. Brake assembly issue b. Position sensor issue c. Calibration issue	1. Check brake application and release 2. Check service brake pressure using PC Service Tool 3. Visually inspect brake system for leakage
<b>DTC 1002-3 Automatic Park Brake Pressure Sensor PBRAKE_PRESSURE_SENSOR_OORH</b>				
Voltage on auto park brake pressure sensor greater than threshold for longer than activation time	4.875V	ADN102-B	Short to power	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1002-4 Automatic Park Brake Pressure Sensor PBRAKE_PRESSURE_SENSOR_OORL</b>				
Voltage on auto park brake pressure sensor less than threshold for longer than activation time	0.125V	ADN102-B	a. Short to ground b. Brake is not fully disengaged mechanically c. Residual pressure in hydraulic release circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance 4. Check hydraulic release pressure using PC Service Tool

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1002-15 Automatic Park Brake Not Applied PBRAKE_PRESSURE_SENSOR_RATIONALITY_5</b>				
Key is on, engine is not running, and the parking brake pressure sensor is greater than threshold for longer than activation time	>2 bar	ADN102-B	a. Brake assembly issue b. Position sensor issue c. Calibration issue	1. Check brake application and release 2. Check service brake pressure using PC Service Tool 3. Visually inspect brake system for leakage
<b>DTC 1002-16 Automatic Park Brake Slow To Release PBRAKE_PRESSURE_SENSOR_RATIONALITY_1</b>				
Activate: Park brake is commanded to release and pressure is greater than threshold for longer than activation time  Deactivate: Park brake commanded to apply	3.75 V	ADN102-B	a. Brake assembly issue b. Position sensor issue c. Calibration issue	1. Check brake application and release 2. Check service brake pressure using PC Service Tool 3. Visually inspect brake system for leakage
<b>DTC 1002-17 Park Brake Accumulator Needs Service PBRAKE_PRESSURE_SENSOR_RATIONALITY_3</b>				
Pressure drops below threshold for longer than activation time	<40 bar	ADN102-B	a. Brake assembly issue b. Position sensor issue c. Calibration issue	1. Check brake application and release 2. Check service brake pressure using PC Service Tool 3. Visually inspect brake system for leakage
<b>DTC 1002-17 Park Brake Accumulator Needs Service PBRAKE_PRESSURE_SENSOR_RATIONALITY_6</b>				
Pressure drops below threshold for longer than activation time	<40 bar	ADN102-B	a. Brake assembly issue b. Position sensor issue c. Calibration issue	1. Check brake application and release 2. Check service brake pressure using PC Service Tool 3. Visually inspect brake system for leakage

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1002-18 Automatic Park Brake Not Holding PBRAKE_PRESSURE_SENSOR_RATIONALITY_4</b>				
Key is on, engine is not running, and travel speed is greater than 0 and pressure is greater than threshold for longer than activation time	40 bar	ADN102-B	a. Brake assembly issue b. Position sensor issue c. Calibration issue	1. Check brake application and release 2. Check service brake pressure using PC Service Tool 3. Visually inspect brake system for leakage
<b>DTC 1003-3 Manual Park Brake Sensor PBRAKE_POSITION_SENSOR_OORH</b>				
Activate: If position sensor greater than threshold for longer than  Deactivate: If position sensor at or below threshold for longer than deactivation time	> 4.5V	ADN122-A	Short to power	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1003-4 Manual Park Brake Sensor PBRAKE_POSITION_SENSOR_OORL</b>				
Activate: If position sensor less than threshold for longer than activation time  Deactivate: If position sensor at or above threshold for longer than deactivation time	< 0.27V	ADN122-A	a. Short to ground b. Brake is not fully disengaged mechanically c. Residual pressure in hydraulic release circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance 4. Check hydraulic release pressure using PC Service Tool
<b>DTC 1004-0 Inch Brake Failure SBRAKE_PEDAL_POSITION_RATIONALITY_2</b>				
Position sensor greater than threshold for longer than activation time	Pedal position 0% Pressure 0 bar	ADN104-A	a. Brake assembly issue (position sensor misaligned) b. Bad pressure sensor	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance 4. Check brake application and release 5. Check hydraulic release pressure using PC Service Tool

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1004-1 Service Brake Failure SBRAKE_PEDAL_POSITION_RATIONALITY_1</b>				
Pedal position less than pressure for longer than activation time	Pedal position 0% Pressure > 3.5 bar	ADN104-A	a. Service brake hydraulic circuit is malfunctioning b. Brake assembly issue c. Pressure sensor issue	1. Check brake application and release 2. Check service brake pressure using PC Service Tool
<b>DTC 1004-2 Service Brake Position A and B SBRAKE_PEDAL_POSITION_A_AND_B_MISMATCH</b>				
(Brake position B feedback voltage * 2 - brake position A feedback voltage) > threshold for longer than activation time	> 0.6V	ADN104-B ADN105-B	a. Short to power b. Short to ground	1. Check power and ground at sensor 2. Check for short to ground 3. Check for short to power 4. Check component resistance
<b>DTC 1004-3 Service Brake Position Sensor A SBRAKE_PEDAL_POSITION_A_OORH</b>				
Position sensor greater than threshold for longer than activation time	> 4.75V	ADN104-A	Short to power	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1004-4 Service Brake Position Sensor A SBRAKE_PEDAL_POSITION_A_OORL</b>				
Position sensor less than threshold for longer than activation time	< 0.25V	ADN104-A	a. Short to ground b. Brake is not fully disengaged mechanically c. Residual pressure in hydraulic release circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance 4. Check hydraulic release pressure using PC Service Tool
<b>DTC 1004-16 Service Brake Position Sensor SBRAKE_POSITION_SENSOR_RATIONALITY_2</b>				
Position sensor out of calibration range high	TBD	ADN104-A	a. Brake assembly issue b. Position sensor issue c. Calibration issue	1. Calibrate service brake 2. Check brake application and release 3. Check service brake pressure using PC Service Tool
<b>DTC 1004-18 Service Brake Position Sensor SBRAKE_POSITION_SENSOR_RATIONALITY_1</b>				
Position sensor out of calibration range low	TBD	ADN104-A	a. Brake assembly issue b. Position sensor issue c. Calibration issue	1. Calibrate service brake 2. Check brake application and release 3. Check service brake pressure using PC Service Tool
<b>DTC 1005-3 Service Brake Position Sensor B SBRAKE_POSITION_B_OORH</b>				
Position sensor greater than threshold for longer than activation time	> 2.7V	ADN105-B	Short to power	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1005-4 Service Brake Position Sensor B SBRAKE_POSITION_B_OORL</b>				
Position sensor less than threshold for longer than activation time	< 0.13V	ADN105-B	a. Short to ground b. Brake is not fully disengaged mechanically c. Residual pressure in hydraulic release circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance 4. Check hydraulic release pressure using PC Service Tool
<b>DTC 1006-0 Service Brake Pressure Leak SBRAKE_PRESSURE_RATIONALITY_1</b>				
Pressure less than commanded based on pedal position for activation time or longer	Pedal position >50% Pressure < 3.5 bar	ADN106-A	a. Service brake hydraulic service leaking down b. Brake assembly issue c. Pressure sensor issue	1. Check brake application and release 2. Check service brake pressure using PC Service Tool 3. Visually inspect brake system for leakage
<b>DTC 1006-3 Service Brake Pressure Sensor SBRAKE_PRESSURE_OORH</b>				
Pressure sensor greater than threshold for longer than activation time	> 4.75V	ADN106-A	Short to power	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1006-4 Service Brake Pressure Sensor SBRAKE_PRESSURE_OORL</b>				
Pressure sensor less than threshold for longer than activation time	< 0.25V	ADN106-A	a. Short to ground b. Brake is not fully disengaged mechanically c. Residual pressure in hydraulic release circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance 4. Check hydraulic release pressure using PC Service Tool

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1006-15 Service Brake Pressure Sensor SBRAKE_PRESSURE_SENSOR_RATIONALITY_2</b>				
Pressure sensor out of calibration range high	TBD	ADN106-A	a. Brake assembly issue b. Position sensor issue c. Calibration issue	1. Calibrate service brake 2. Check brake application and release 3. Check service brake pressure using PC Service Tool
<b>DTC 1006-17 Service Brake Pressure Sensor SBRAKE_PRESSURE_SENSOR_RATIONALITY_1</b>				
Pressure sensor out of calibration range low	TBD	ADN106-A	a. Brake assembly issue b. Position sensor issue c. Calibration issue	1. Calibrate service brake 2. Check brake application and release 3. Check service brake pressure using PC Service Tool
<b>DTC 2051-5 Automatic Park Brake Solenoid PBRAKE_RELEASE_SOLENOID_OPEN</b>				
Truck is initializing and automatic parking brake feedback voltage is greater than threshold for longer than activation time	>300mV	HDN101-C	a. Open circuit in parking brake solenoid	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2051-6 Automatic Park Brake Solenoid PBRAKE_RELEASE_SOLENOID_SHORT</b>				
Overcurrent detected on parking brake solenoid	Flag	HDN101-C	a. Short in parking brake solenoid	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for open

## FRONT END ERROR CODE REFERENCE CHART 202001-214

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 1001-3 Hydraulic Load Weight Sensor HYD_LOAD_WEIGHT_SENSOR_OORH</b>				
Output of load weight sensor exceeds acceptable range	>4.75V	ADN116-A	a. Wire harness short to power b. Sensor internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 1001-4 Hydraulic Load Weight Sensor HYD_LOAD_WEIGHT_SENSOR_OORL</b>				
Output of load weight sensor less than acceptable range	<0.25V	ADN116-A	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1007-17 Return To Set Tilt Override Button RTST_BYPASS_BUTTON_STUCK</b>				
During Key On, Return To Set Tilt button is stuck or there is an open circuit on the button	<3V	ADD107-B	a. Return To Set Tilt button is physically stuck in the depressed state b. Open circuit on Return To Set Tilt button	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance 4. Replace damaged Return To Set Tilt button
<b>DTC 1015-3 Discrete Mast Height Sensor MAST_LIFT_SENSOR_DESCRETE_OORH</b>				
Sensor voltage greater than threshold for longer than activation time	>8.0V	ADN115-C	a. Wire harness short to power b. Sensor internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1015-4 Discrete Mast Height Sensor MAST_LIFT_SENSOR_DESCRETE_OORH</b>				
Sensor voltage less than threshold for longer than activation time	<2.0V	ADN115-C	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1016-3 Hydraulic Tilt Spool Sensor HYD_TILT_SPOOL_SENSOR_OORH</b>				
Sensor voltage greater than expected range	>4.75V	ADN112-A	a. Wire harness short to power b. Sensor internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 1016-4 Hydraulic Tilt Spool Sensor HYD_TILT_SPOOL_SENSOR_OORL</b>				
Sensor voltage less than expected minimum	<0.25V	ADN112-A	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1016-13 Hydraulic Tilt Spool Position Sensor HYD_TILT_SPOOL_SENSOR_CALIBRATION REQUIRED</b>				
Missing VSM calibration points	Flag	ADN112-A	a. Calibration required	1. Perform tilt calibration using truck display or PC Service Tool
<b>DTC 2001-4 Mast Fork Laser MAST_FORK_LASER_OORL</b>				
Short to low source in fork laser	Laser off and 0.1V < low-side driver < 0.3V	LDP101-A	a. Component internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check laser operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2001-5 Mast Fork Laser MAST_FORK_LASER_OPEN</b>				
Open circuit in fork laser	Laser off and low-side driver < 0.05V	LDP101-A	a. Component internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check laser operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2001-6 Mast Fork Laser MAST_FORK_LASER_OORH</b>				
Short to high source in fork laser, or damaged laser	Laser off and low-side driver < 0.05V	LDP101-A	a. Component internal short b. Driven load is shorted or stuck c. Wire harness short d. Bad hardware	1. Check laser operation 2. Check component resistance 3. Check wire harness for short 4. Replace laser

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2003-4 Hydraulic Hoist Lift Solenoid HOIST_LIFT_SOLENOID_OORL</b>				
Short to low source in lift solenoid	Low-side driver <1.190V	LDQ103-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2003-4 Mast Light Relay MAST_LIGHTS_RELAY_OORL</b>				
Short to low source in mast light relay	Low-side driver <0.05V	LDP103-A	a. Relay internally shorted b. Relay stuck open c. Short in relay harness	1. Check relay circuit for short 2. Check relay wire harness for short
<b>DTC 2003-5 Hydraulic Hoist Lift Solenoid HOIST_LIFT_SOLENOID_OPEN</b>				
Open circuit in lift solenoid	2.375V<Low-side driver <7.130V	LDQ103-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2003-5 Mast Light Relay MAST_LIGHTS_RELAY_OPEN</b>				
Open circuit in mast light relay	Mast lights are off and 0.1V<low-side driver<0.3V	LDP103-A	a. Relay internally open b. Relay stuck open	1. Check relay circuit for open 2. Check relay wire harness for open
<b>DTC 2003-6 Hydraulic Hoist Lift Solenoid HOIST_LIFT_SOLENOID_OORH</b>				
Short to high source in lift solenoid, or shorted solenoid coil	Low-side driver >9.510V	LDQ103-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2003-6 Mast Light Relay MAST_LIGHTS_RELAY_OORH</b>				
Short to high source in mast light relay, or shorted relay	Mast lights are on, and low-side driver >500mA	LDP103-A	a. Relay internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check relay operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2003-13 Hydraulic Hoist Lift Solenoid HOIST_LIFT_SOLENOID_CALIBRATION_REQUIRED</b>				
Missing VSM calibration points	Flag	LDQ103-A	a. Calibration required	1. Perform tilt calibration using truck display or PC Service Tool
<b>DTC 2004-4 Hydraulic Hoist Lower Solenoid HOIST_LOWER_SOLENOID_OORL</b>				
Short to low source in lower solenoid	Low-side driver <1.190V	LDQ104-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2004-4 Return To Set Tilt Solenoid HYD_RTST_SOLENOID_OORL</b>				
Short to low source in Return To Set Tilt solenoid	Low-side driver <0.05V	LDQ104-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2004-4 Front Spot Light Driver OPS_FRONT_SPOTLIGHT_OORL</b>				
Short to low source in front spot light relay	Low-side driver <0.05V	LDQ104-A	a. Relay internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check relay operation 2. Check component resistance 3. Check wire harness for short

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2004-5 Hydraulic Hoist Lower Solenoid HOIST_LOWER_SOLENOID_OPEN</b>				
Open circuit in lower solenoid	2.375V <Low-side driver <7.130V	LDP104-B	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2004-5 Return to Set Tilt Solenoid HYD_RTST_SOLENOID_OPEN</b>				
Open circuit in Return To Set Tilt solenoid	0.1V <Low-side driver <0.3V	LDN104-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2004-5 Front Spot Light Driver OPS_FRONT_SPOTLIGHT_OPEN</b>				
Open circuit in front spot light relay	0.1V <Low-side driver <0.3V	LDP104-B	a. Relay internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check relay operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2004-6 Hydraulic Hoist Lower Solenoid HOIST_LOWER_SOLENOID_OORH</b>				
Short to high source in lower solenoid, or shorted solenoid coil	Low-side driver >9.510V	LDQ104-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2004-6 Return to Set Tilt Solenoid HYD_RTST_SOLENOID_OORH</b>				
Short to high source in Return To Set Tilt solenoid, or shorted solenoid coil	Flag	LDN104-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2004-6 Front Spot Light Driver OPS_FRONT_SPOTLIGHT_OORH</b>				
Short to high source in front spot light relay	>2A	LDP104-B	a. Relay internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check relay operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2004-13 Hydraulic Hoist Lower Solenoid HOIST_LOWER_SOLENOID_CALIBRATION_REQUIRED</b>				
Missing VSM calibration points	Flag	LDQ103-A	a. Calibration required	1. Perform tilt calibration using truck display or PC Service Tool
<b>DTC 2005-4 Hydraulic Tilt Back Solenoid TILT_BACK_SOLENOID_OORL</b>				
Short to low source in tilt back solenoid	Low-side driver <1.190V	LDQ105-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2005-5 Hydraulic Tilt Back Solenoid TILT_BACK_SOLENOID_OPEN</b>				
Open circuit in tilt back solenoid	2.375V <Low-side driver <7.130V	LDQ105-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2005-6 Hydraulic Tilt Back Solenoid TILT_BACK_SOLENOID_OORH</b>				
Short to high source in tilt back solenoid, or shorted solenoid coil	Low-side driver >9.510V	LDQ105-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2005-13 Hydraulic Tilt Back Solenoid TILT_BACK_SOLENOID_CALIBRATION_REQUIRED</b>				
Missing VSM calibration points	Flag	LDQ105-A	a. Calibration required	1. Perform tilt calibration using truck display or PC Service Tool

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2006-4 Hydraulic Tilt Forward Solenoid TILT_FWD_SOLENOID_OORL</b>				
Short to low source in tilt forward solenoid	Low-side driver <1.190V	LDQ106-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2006-5 Hydraulic Tilt Forward Solenoid TILT_FWD_SOLENOID_OPEN</b>				
Open circuit in tilt forward solenoid	2.375V <Low-side driver <7.130V	LDQ106-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2006-6 Hydraulic Tilt Forward Solenoid TILT_FWD_SOLENOID_OORH</b>				
Short to high source in tilt forward solenoid, or shorted solenoid coil	Low-side driver >9.510V	LDQ106-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2006-13 Hydraulic Tilt Forward Solenoid TILT_FORWARD_SOLENOID_CALIBRATION_REQUIRED</b>				
Missing VSM calibration points	Flag	LDQ106-A	a. Calibration required	1. Perform tilt calibration using truck display or PC Service Tool
<b>DTC 2007-4 Hydraulic Auxiliary 1A Solenoid AUX_1A_SOLENOID_OORL</b>				
Short to low source in auxiliary 1A solenoid	Low-side driver <1.190V	LDQ107-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2007-5 Hydraulic Auxiliary 1A Solenoid AUX_1A_SOLENOID_OPEN</b>				
Open circuit in auxiliary 1A solenoid	2.375V <Low-side driver <7.130V	LDQ107-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2007-6 Hydraulic Auxiliary 1A Solenoid AUX_1A_SOLENOID_OORH</b>				
Short to high source in auxiliary 1A solenoid, or shorted solenoid coil	Low-side driver >9.510V	LDQ107-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2007-13 Hydraulic Auxiliary 1A Solenoid AUXILIARY_1A_SOLENOID_CALIBRATION_REQUIRED</b>				
Missing VSM calibration points	Flag	LDQ107-A	a. Calibration required	1. Perform tilt calibration using truck display or PC Service Tool
<b>DTC 2008-4 Hydraulic Auxiliary 1B Solenoid AUX_1B_SOLENOID_OORL</b>				
Short to low source in auxiliary 1B solenoid	Low-side driver <1.190V	LDQ108-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2008-5 Hydraulic Auxiliary 1B Solenoid AUX_1B_SOLENOID_OPEN</b>				
Open circuit in auxiliary 1B solenoid	2.375V <Low-side driver <7.130V	LDQ108-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2008-6 Hydraulic Auxiliary 1B Solenoid AUX_1B_SOLENOID_OORH</b>				
Short to high source in auxiliary 1B solenoid, or shorted solenoid coil	Low-side driver >9.510V	LDQ108-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2008-13 Hydraulic Auxiliary 1B Solenoid AUXILIARY_1B_SOLENOID_CALIBRATION_REQUIRED</b>				
Missing VSM calibration points	Flag	LDQ108-A	a. Calibration required	1. Perform tilt calibration using truck display or PC Service Tool
<b>DTC 2009-4 Hydraulic Auxiliary 2A Solenoid AUX_2A_SOLENOID_OORL</b>				
Short to low source in auxiliary 2A solenoid	Low-side driver <1.190V	LDQ109-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2009-5 Hydraulic Auxiliary 2A Solenoid AUX_2A_SOLENOID_OPEN</b>				
Open circuit in auxiliary 2A solenoid	2.375V <Low-side driver <7.130V	LDQ109-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2009-6 Hydraulic Auxiliary 2A Solenoid AUX_2A_SOLENOID_OORH</b>				
Short to high source in auxiliary 2A solenoid, or shorted solenoid coil.	Low-side driver >9.510V	LDQ109-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2009-13 Hydraulic Auxiliary 2A Solenoid AUXILIARY_2A_SOLENOID_CALIBRATION_REQUIRED</b>				
Missing VSM calibration points	Flag	LDQ109-A	a. Calibration required	1. Perform tilt calibration using truck display or PC Service Tool

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2010-4 Hydraulic Auxiliary 2B Solenoid AUX_2B_SOLENOID_OORL</b>				
Short to low source in auxiliary 2B solenoid	Low-side driver <1.190V	LDQ110-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2010-5 Hydraulic Auxiliary 2B Solenoid AUX_2B_SOLENOID_OPEN</b>				
Open circuit in auxiliary 2B solenoid	2.375V <Low-side driver <7.130V	LDQ110-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2010-6 Hydraulic Auxiliary 2B Solenoid AUX_2B_SOLENOID_OORH</b>				
Short to high source in auxiliary 2B solenoid, or shorted solenoid coil	Low-side driver >9.510V	LDQ110-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2010-13 Hydraulic Auxiliary 2B Solenoid AUXILIARY_2B_SOLENOID_CALIBRATION_REQUIRED</b>				
Missing VSM calibration points	Flag	LDQ110-A	a. Calibration required	1. Perform tilt calibration using truck display or PC Service Tool
<b>DTC 2052-6 Hydraulic OPS Solenoid HYD_OPS_SOLENOID_FAULT</b>				
VSM high side driver detects overcurrent on output	Flag	HDN102-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2054-6 Hydraulic Anti-Stall Solenoid HYD_ANTI_STALL_SOLENOID_FAULT</b>				
VSM high side driver detects overcurrent on output	Flag	HDN104-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 4041-3 Hydraulic Oil Temperature Sensor HYD_VDP_TEMP_SENSOR_OORH</b>				
Hydraulic oil temperature greater than threshold for longer than activation time	≥4.98V	ATN101-A	a. Wire harness short to power b. Sensor internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 4041-4 Hydraulic Oil Temperature Sensor HYD_VDP_TEMP_SENSOR_OORL</b>				
Hydraulic oil temperature less than threshold for longer than activation time	<0.19V	ATN101-A	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 8008-0 Mast Tilt Sensor MAST_TILT_SENSOR_HIGH</b>				
Tilt angle feedback is greater than calibrated tilt forward end stop + tolerance for longer than activation time.	1% of calibrated tilt range	CAN3: CHN103 and CLN103 Node: 0x32	a. Wire harness short to power b. Sensor internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 8008-1 Mast Tilt Sensor MAST_TILT_SENSOR_LOW</b>				
Tilt angle feedback is less than calibrated tilt forward end stop - tolerance for longer than activation time.	1% of calibrated tilt range	CAN3: CHN103 and CLN103 Node: 0x32	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 8008-2 Mast Tilt Sensor MAST_TILT_SENSOR_FAILURE</b>				
Error in mast tilt sensor on mast:Hydraulic OPS solenoid is engaged, engine is running, spool position sensor is out of neutral, Return-To-Set-Tilt solenoid is at full flow, and tilt movement is 0 for 1 second	Flag	CAN3: CHN103 and CLN103 Node: 0x32	a. Open or short on mast tilt sensor CAN circuit b. Open or short on mast tilt sensor power circuit c. Sensor internal short	1. Check power and ground at sensor 2. Check component resistance
<b>DTC 8008-13 Mast Tilt Sensor MAST_TILT_SENSOR_CALIBRATION_REQUIRED</b>				
Missing VSM calibration points	Flag	CAN3: CHN103 and CLN103 Node: 0x32	a. Calibration required	1. Perform tilt calibration using truck display or PC Service Tool
<b>DTC 8009-0 Mast Height Sensor MAST_LIFT_SENSOR_CONTINUOUS_HIGH</b>				
Mast height feedback is greater than calibrated raised end stop + tolerance for longer than activation time.	1% of calibrated tilt range	CAN3: CHN103 and CLN103 Node: 0x31	a. Wire harness short to power b. Sensor internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 8009-1 Mast Height Sensor MAST_HEIGHT_SENSOR_CONTINUOUS_LOW</b>				
Mast height feedback is less than calibrated raised end stop - tolerance for longer than activation time.	1% of calibrated tilt range	CAN3: CHN103 and CLN103 Node: 0x31	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 8009-13 Mast Height Sensor MAST_LIFT_SENSOR_CONTINUOUS_CALIB_REQUIRED</b>				
Missing VSM calibration points	Flag	CAN3: CHN103 and CLN103 Node: 0x31	a. Calibration required	1. Perform tilt calibration using truck display or PC Service Tool

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 9001-14 Mast Tilt Sensor Internal Error MAST_TILT_SENSOR_CAN_EMERGENCY</b>				
Emergency message received from sensor	Flag	CAN3: CHN103 and CLN103 Node: 0x32	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 9001-14 Mast Height Sensor Internal Error MAST_HEIGHT_SENSOR_CAN_EMERGENCY</b>				
Emergency message received from sensor	Flag	CAN3: CHN103 and CLN103 Node: 0x31	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 9004-0 Hydraulic Hoist Lever Input HYD_INPUT_DEVICE_LEVER_1_POSITION_HIGH</b>				
Hydraulic lever 1 position is greater than threshold	126	CAN1: CHN101 and CLN101	a. Wire harness short to power b. Sensor internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 9004-1 Hydraulic Hoist Lever Input HYD_INPUT_DEVICE_LEVER_1_POSITION_LOW</b>				
Hydraulic lever 1 position is less than threshold	-126	CAN1: CHN101 and CLN101	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 9005-0 Hydraulic Tilt Lever Input HYD_INPUT_DEVICE_LEVER_2_POSITION_HIGH</b>				
Hydraulic lever 2 position is greater than threshold	126	CAN1: CHN101 and CLN101	a. Wire harness short to power b. Sensor internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 9005-1 Hydraulic Tilt Lever Input HYD_INPUT_DEVICE_LEVER_2_POSITION_LOW</b>				
Hydraulic lever 2 position is less than threshold	-126	CAN1: CHN101 and CLN101	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 9006-0 Hydraulic Auxiliary 1 Lever Input HYD_INPUT_DEVICE_LEVER_3_POSITION_HIGH</b>				
Hydraulic lever 3 position is greater than threshold	126	CAN1: CHN101 and CLN101	a. Wire harness short to power b. Sensor internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 9006-1 Hydraulic Auxiliary 1 Lever Input HYD_INPUT_DEVICE_LEVER_3_POSITION_LOW</b>				
Hydraulic lever 3 position is less than threshold	-126	CAN1: CHN101 and CLN101	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 9007-0 Hydraulic Auxiliary 2 Lever Input HYD_INPUT_DEVICE_LEVER_4_POSITION_HIGH</b>				
Hydraulic lever 4 position is greater than threshold	126	CAN1: CHN101 and CLN101	a. Wire harness short to power b. Sensor internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 9007-1 Hydraulic Auxiliary 2 Lever Input HYD_INPUT_DEVICE_LEVER_4_POSITION_LOW</b>				
Hydraulic lever 4 position is less than threshold	-126	CAN1: CHN101 and CLN101	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 9008-0 Direction of Travel HYD_INPUT_DEVICE_LEVER_5_POSITION_HIGH</b>				
Hydraulic lever 5 position is greater than threshold	126	CAN1: CHN101 and CLN101	a. Wire harness short to power b. Sensor internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 9008-1 Direction of Travel HYD_INPUT_DEVICE_LEVER_5_POSITION_LOW</b>				
Hydraulic lever 5 position is less than threshold	-126	CAN1: CHN101 and CLN101	a. Wire harness short to ground b. Sensor open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance

**OPERATOR STATION ERROR CODE  
REFERENCE CHART**
**202001-215**

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 1001-3 Ambient Light Sensor OPS_AMBIENT_LIGHT_OORH</b>				
Voltage is greater than threshold for longer than 1 sec	4.75V	ADP101-A	a. Wire harness short to power b. Sensor internal short c. Short in wire harness	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1001-4 Ambient Light Sensor OPS_AMBIENT_LIGHT_OORL</b>				
Voltage is less than threshold for longer than 1 sec	2.0V	ADP101-A	a. Wire harness short to ground b. Open circuit in sensor c. Open circuit in wire harness	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1006-3 Turn Signal Sensor OPS_TURN_SIGNAL_SENSOR_OORH</b>				
Sensor voltage exceeds threshold	>4.75V	ADP106-A	a. Wire harness short to power b. Lever internal short c. Wire harness short	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 1006-4 Turn Signal Sensor OPS_TURN_SIGNAL_SENSOR_OORL</b>				
Sensor voltage lower than threshold	<0.25V	ADP106-A	a. Wire harness short to ground b. Open circuit in lever c. Open circuit in wire harness	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1008-3 LPG Tank Bracket Sensor LPG_TANK_BRACKET_OORH</b>				
Activate: LPG tank bracket interlock voltage is greater than threshold for longer than 1 sec Deactivate: LPG tank bracket interlock voltage is less than threshold for longer than 0.5 sec	4.5V	ADP108-A	a. Wire harness short to power b. Sensor internal short c. Short in wire harness	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1008-4 LPG Tank Bracket Sensor LPG_TANK_BRACKET_OORL</b>				
Activate: LPG tank bracket interlock voltage is less than threshold for longer than 1 sec Deactivate: LPG tank bracket interlock voltage is above threshold for longer than 0.5 sec	0.5V	ADP108-A	a. Wire harness short to ground b. Open circuit in sensor c. Open circuit in wire harness	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1011-2 Key Start Stuck KEY_START_STUCK</b>				
Keyswitch turned, but engine cranked for 5 seconds without truck start	Flag	ADN111-A	a. Keyswitch physically stuck b. Short in keyswitch c. Short in wire between switch and VSM	1. Check start status with PC Service Tool 2. Check keyswitch for internal short 3. Check for short between keyswitch and VSM

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 1019-2 Direction of Travel Sensor 1 and 2 DIRECTION_OF_TRAVEL_RATIONALITY_1</b>				
(5.0V) minus (Sensor 1 voltage) minus (Sensor 2 voltage) is greater than threshold for 100 mS	0.6V	ADN119-E ADN120-E	a. Wire harness short to power b. Wire harness short to ground c. Sensor internal short d. Short in wire harness	1. Check power and ground at direction of travel sensor 1 and direction of travel sensor 2 2. Check for short to power in direction of travel sensor 1 and direction of travel sensor 2 3. Check for short to ground in direction of travel sensor 1 and direction of travel sensor 2 4. Check component resistance
<b>DTC 1019-2 Direction of Travel Sensor 1 and 2 DIRECTION_OF_TRAVEL_RATIONALITY_2</b>				
(Direction sensor 1 feedback voltage time 2) minus (Direction sensor 2 feedback voltage) is greater than threshold for 100 mS	0.6V	ADN119-E ADN120-E	a. Wire harness short to power b. Wire harness short to ground c. Sensor internal short d. Short in wire harness	1. Check power and ground at direction of travel sensor 1 and direction of travel sensor 2 2. Check for short to power in direction of travel sensor 1 and direction of travel sensor 2 3. Check for short to ground in direction of travel sensor 1 and direction of travel sensor 2 4. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 1019-3 Direction of Travel Sensor 1 DIRECTION_OF_TRAVEL_SENSOR_1_OORH</b>				
Direction of Travel Sensor 1 voltage greater than threshold for longer than 100 mS	Default: >4.75V Monotrol only: >2.7V	ADN119-E	a. Wire harness short to power b. Sensor internal short c. Short in wire harness	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1019-4 Direction of Travel Sensor 1 DIRECTION_OF_TRAVEL_SENSOR_1_OORL</b>				
Direction of Travel Sensor 1 voltage less than threshold for longer than 100 mS	Default: <0.25V Monotrol only: <0.13V	ADN119-E	a. Wire harness short to ground b. Open circuit in sensor c. Open circuit in wire harness	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1020-3 Direction of Travel Sensor 2 DIRECTION_OF_TRAVEL_SENSOR_2_OORH</b>				
Direction of Travel Sensor 2 voltage greater than threshold for longer than 100 mS	4.75V	ADN120-E	a. Wire harness short to power b. Sensor internal short c. Short in wire harness	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1020-4 Direction of Travel Sensor 2 DIRECTION_OF_TRAVEL_SENSOR_2_OORL</b>				
Direction of Travel Sensor 2 voltage less than threshold for longer than 100 mS	0.25V	ADN120-E	a. Wire harness short to ground b. Open circuit in sensor c. Open circuit in wire harness	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1021-2 Accelerator Pedal Position 1 and 2 APP_SENSOR_RATIONALITY_1</b>				
(Accelerator Pedal Position Sensor 2 voltage times 2) minus (Accelerator Pedal Position Sensor 1 voltage) is greater than threshold for 100 mS	0.6V	ADN101-A ADN103-A	a. Failure of potentiometer in sensor b. Wire harness fault	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 1021-2 Accelerator Pedal Position 1 and 2 APP_SENSOR_RATIONALITY_3</b>				
5.0V - sensor 1 voltage - sensor 2 voltage is greater than threshold for longer than activation time	0.6V	ADN101-A ADN103-A	a. Failure of potentiometer in sensor b. Wire harness fault	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1021-3 Accelerator Pedal Position Sensor 1 APP_SENSOR_1_OORH</b>				
Sensor voltage greater than threshold for longer than 100 mS	4.75V	ADN101-A	a. Wire harness short to power b. Sensor internal short c. Short in wire harness	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1021-4 Accelerator Pedal Position Sensor 1 APP_SENSOR_1_OORL</b>				
Sensor voltage less than threshold for longer than 100 mS	0.25V	ADN101-A	a. Wire harness short to ground b. Open circuit in sensor c. Open circuit in wire harness	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 1021-14 Accelerator Pedal Applied During Startup APP_SENSOR_RATIONALITY_2</b>				
Accelerator appears to be depressed when starting truck	0%	ADN101-A ADN103-A	a. Foot on accelerator pedal during startup b. Accelerator pedal position sensors misaligned	1. Remove foot from accelerator before starting truck 2. Check for correct sensor installation
<b>DTC 1022-3 Accelerator Pedal Position Sensor 2 APP_SENSOR_2_OORH</b>				
Sensor voltage greater than threshold for longer than 100 mS	Default: 2.7V Doppel Pedal only: 4.75V	ADN103-A	a. Wire harness short to power b. Sensor internal short c. Short in wire harness	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1022-4 Accelerator Pedal Position Sensor 2 APP_SENSOR_2_OORL</b>				
Sensor voltage less than threshold for longer than 100 mS	Default: 0.13V Doppel Pedal only: 0.25V	ADN103-A	a. Wire harness short to ground b. Open circuit in sensor c. Open circuit in wire harness	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1101-2 Push Button Start Stuck PUSH_BUTTON_START_STUCK</b>				
Start button pressed, but engine cranked for 5 seconds without truck start	Flag	WKN101-NA	a. Start button physically stuck b. Short in start button c. Short in wire between button and VSM	1. Check start status with PC Service Tool 2. Check start button for internal short 3. Check for short between start button and VSM
<b>DTC 1103-3 Seat Sensor SEAT_SENSOR_OORH</b>				
Seat sensor output higher than threshold	>4.75V	WKN103-B	a. Wire harness short to power b. Sensor internal short c. Short in wire harness	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 1103-4 Seat Sensor SEAT_SENSOR_OORL</b>				
Seat sensor output lower than threshold	<0.25V	WKN103-B	a. Wire harness short to ground b. Open circuit in sensor c. Open circuit in wire harness	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 2002-4 Pedestrian Awareness Light Driver OPS_PED_AWARENESS_LIGHTS_RELAY_OORL</b>				
Short to low source in pedestrian awareness light driver	Pedestrian awareness light is off and low-side driver<0.05V	LDP102-B	a. Relay internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check relay operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2002-5 Pedestrian Awareness Light Driver OPS_PED_AWARENESS_LIGHTS_RELAY_OPEN</b>				
Open circuit in pedestrian awareness light driver	Pedestrian awareness light is off and 0.1V<low-side driver<0.05V	LDP102-B	a. Relay internal open b. Driven load is shorted or stuck c. Wire harness short	1. Check relay operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2002-5 Cab Contactor CAB_CONTACTOR_PM_OPEN</b>				
Open circuit in cab contactor	Cab contactor steady off and low-side driver<0.3V	LDP202-A	a. Contactor internal open b. Driven load is shorted or stuck c. Wire harness short	1. Check contactor operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2002-6 Pedestrian Awareness Light Driver OPS_PED_AWARENESS_LIGHTS_RELAY_OORH</b>				
Short to high source in pedestrian awareness light driver	Pedestrian awareness light is on and low-side driver>500mA	LDP102-B	a. Relay internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check relay operation 2. Check component resistance 3. Check wire harness for short

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2002-6 Cab Contactor CAB_CONTACTOR_PM_OORH</b>				
Short to high source in cab contactor	Flag	LDP202-A	a. Contactor internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check contactor operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2055-5 Truck Horn Driver OPS_HORN_OPEN</b>				
When truck is initializing, feedback voltage is greater than threshold	300 mV	HDN105-A	a. Open in relay b. Open circuit in wire harness c. Relay disconnected	1. Check relay coil circuit for open 2. Check relay wiring for open circuit
<b>DTC 2055-6 Truck Horn Driver OPS_HORN_FAULT</b>				
VSM high side driver has detected overcurrent	Flag	HDN105-A	a. Overvoltage in horn b. Fault in horn wire harness c. Erroneous fault	1. Check power and ground at horn 2. Check power supply output 3. Check wire harness for damage, breakage, or disconnected
<b>DTC 2056-5 Rear Light And Alarm Relay Driver OPS_REAR_LIGHT_AND_ALARM_RELAY_OPEN</b>				
Truck is initializing and feedback voltage is greater than threshold for longer than activation time	300 mV	HDN106-A	a. Open in relay b. Open circuit in wire harness c. Relay disconnected	1. Check relay coil circuit for open 2. Check relay wiring for open circuit
<b>DTC 520231-0 Front Wiper Motor Internal Error FRONT_WIPER_CAN_DM1</b>				
Controller received fault SPN 7F027h (520231) from front wiper motor	Flag	CAN2: CHN102 and CLN102 Node: 0x2D		Consult Guided Troubleshooting 0520231-0 Front Wiper Motor Internal Error

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 520231-0 Top Wiper Motor Internal Error TOP_WIPER_CAN_DM1</b>				
Controller received fault SPN 7F027h (520231) from top wiper motor	Flag	CAN2: CHN102 and CLN102 Node: 0x2F		Consult Guided Troubleshooting 0520231-0 Top Wiper Motor Internal Error
<b>DTC 520231-0 Rear Wiper Motor Internal Error REAR_WIPER_CAN_DM1</b>				
Controller received fault SPN 7F027h (520231) from rear wiper motor	Flag	CAN2: CHN102 and CLN102 Node: 0x2E		Consult Guided Troubleshooting 0520231-0 Rear Wiper Motor Internal Error

**POWER SUPPLY ERROR CODE  
REFERENCE CHART**

**202001-216**

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 6001-3 System Battery POWER_OUT_BATTERY_HIGH</b>				
Battery voltage greater than threshold for longer than 1 sec	>15.50V (12V bus)	RVF101	a. 12V supply failure in module b. Charging system regulator failure	1. Check voltage in diagnostics menu on display 2. Check battery voltage 3. Check alternator output 4. Check voltage at module 5. Check for draw on battery or short to ground

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 6001-4 System Battery Not Cranking POWER_OUT_BATTERY_LOW</b>				
Battery voltage less than threshold for longer than 2 sec	<11.00V (12V bus)	RVF101	a. 12V supply failure in module b. Battery discharged c. Charging system failure d. 12V load is discharging battery	1. Check voltage in diagnostics menu on display 2. Check battery voltage 3. Check alternator output 4. Check voltage at module 5. Check for draw on battery or short to ground
<b>DTC 6001-17 System Battery When Cranking POWER_OUT_BATTERY_CRANK</b>				
Voltage lower than threshold for longer than 1 sec	<5V (12V bus)	RVF101	a. 12V supply failure in module b. Battery discharged c. Charging system failure d. 12V load is discharging battery	1. Check voltage in diagnostics menu on display 2. Check battery voltage 3. Check alternator output 4. Check voltage at module 5. Check for draw on battery or short to ground

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 6003-3 IBOX 1 Supply POWER_OUT_5_VOLT_IBOX_1_OORH</b>				
Supply overvoltage in IBOX 1	Flag	5VP101-A	a. 5V supply failure in module	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check voltage at module</li> <li>3. Check for 5 volt load shorted to another power source</li> </ol>
<b>DTC 6003-3 IBOX 2 Supply POWER_OUT_5_VOLT_IBOX_2_OORH</b>				
Supply overvoltage in IBOX 2	Flag	5VP201-A	a. 5V supply failure in module	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check voltage at module</li> <li>3. Check for 5 volt load shorted to another power source</li> </ol>
<b>DTC 6003-3 IBOX 3 Supply POWER_OUT_5_VOLT_IBOX_3_OORH</b>				
Supply overvoltage in IBOX 3	Flag	5VP301-A	a. 5V supply failure in module	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check voltage at module</li> <li>3. Check for 5 volt load shorted to another power source</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 6003-4 IBOX 1 Supply POWER_OUT_5_VOLT_IBOX_1_OORL</b>				
Voltage less than threshold for 600 mS	4.5V	5VP101-A	<ul style="list-style-type: none"> <li>a. 5V supply failure in module</li> <li>b. Battery discharged</li> <li>c. Charging system failure</li> <li>d. 5 volt load pulling down supply voltage</li> </ul>	<ul style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check battery voltage</li> <li>3. Check alternator output</li> <li>4. Check voltage at module</li> <li>5. Check for draw on battery or short to ground</li> </ul>
<b>DTC 6003-4 IBOX 2 Supply POWER_OUT_5_VOLT_IBOX_2_OORL</b>				
Voltage less than threshold for 600 mS	4.5V	5VP201-A	<ul style="list-style-type: none"> <li>a. 5V supply failure in module</li> <li>b. Battery discharged</li> <li>c. Charging system failure</li> <li>d. 5 volt load pulling down supply voltage</li> </ul>	<ul style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check battery voltage</li> <li>3. Check alternator output</li> <li>4. Check voltage at module</li> <li>5. Check for draw on battery or short to ground</li> </ul>
<b>DTC 6003-4 IBOX 3 Supply POWER_OUT_5_VOLT_IBOX_3_OORL</b>				
Voltage less than threshold for 600 mS	4.5V	5VP301-A	<ul style="list-style-type: none"> <li>a. 5V supply failure in module</li> <li>b. Battery discharged</li> <li>c. Charging system failure</li> <li>d. 5 volt load pulling down supply voltage</li> </ul>	<ul style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check battery voltage</li> <li>3. Check alternator output</li> <li>4. Check voltage at module</li> <li>5. Check for draw on battery or short to ground</li> </ul>

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 6051-3 5V Supply A POWER_OUT_5_VOLT_A_OORH</b>				
LLD flag set due to output is shorted to high voltage source	Flag (5.5V)	5VN101-A	a. 5V supply failure in module	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check voltage at module</li> <li>3. Check for 5 volt load shorted to another power source</li> </ol>
<b>DTC 6051-4 5V Supply A POWER_OUT_5_VOLT_A_OORL</b>				
Voltage is less than threshold for longer than 100 mS	<4.5V	5VN101-A	<ol style="list-style-type: none"> <li>a. 5V supply failure in module</li> <li>b. Battery discharged</li> <li>c. Charging system failure</li> <li>d. 5 volt load pulling down supply voltage</li> </ol>	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check battery voltage</li> <li>3. Check alternator output</li> <li>4. Check voltage at module</li> <li>5. Check for draw on battery or short to ground</li> </ol>
<b>DTC 6052-3 5V Supply B POWER_OUT_5_VOLT_B_OORH</b>				
LLD flag set due to output is shorted to high voltage source	Flag (5.5V)	5VN102-A	a. 5V supply failure in module	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check voltage at module</li> <li>3. Check for 5 volt load shorted to another power source</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 6052-31 5V Supply B POWER_OUT_5_VOLT_B_FAILURE</b>				
LLD flag set indicating Out Of Range High (OORH) and Out Of Range Low (OORL) simultaneously	Flag (5.5V)	5VN102-A	a. 5V supply failure in module	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check voltage at module</li> <li>3. Check for 5 volt load shorted to another power source</li> </ol>
<b>DTC 6052-4 5V Supply B POWER_OUT_5_VOLT_B_OORL</b>				
Voltage is less than threshold for longer than 100 mS	<4.5V	5VN102-A	<ol style="list-style-type: none"> <li>a. 5V supply failure in module</li> <li>b. Battery discharged</li> <li>c. Charging system failure</li> <li>d. 5 volt load pulling down supply voltage</li> </ol>	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check battery voltage</li> <li>3. Check alternator output</li> <li>4. Check voltage at module</li> <li>5. Check for draw on battery or short to ground</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 6053-3 5V Supply C POWER_OUT_5_VOLT_C_OORH</b>				
LLD flag set due to output is shorted to high voltage source	Flag (5.5V)	5VN103-A	a. 5V supply failure in module	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check voltage at module</li> <li>3. Check for 5 volt load shorted to another power source</li> </ol>
<b>DTC 6053-4 5V Supply C POWER_OUT_5_VOLT_C_OORL</b>				
Voltage is less than threshold for longer than 100 mS	<4.5V	5VN103-A	<ol style="list-style-type: none"> <li>a. 5V supply failure in module</li> <li>b. Battery discharged</li> <li>c. Charging system failure</li> <li>d. 5 volt load pulling down supply voltage</li> </ol>	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check battery voltage</li> <li>3. Check alternator output</li> <li>4. Check voltage at module</li> <li>5. Check for draw on battery or short to ground</li> </ol>
<b>DTC 6054-3 5V Supply D POWER_OUT_5_VOLT_D_OORH</b>				
LLD flag set due to output is shorted to high voltage source	Flag (5.5V)	5VN104-A	a. 5V supply failure in module	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check voltage at module</li> <li>3. Check for 5 volt load shorted to another power source</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 6054-4 5V Supply D POWER_OUT_5_VOLT_D_OORL</b>				
Voltage is less than threshold for longer than 100 mS	<4.5V	5VN104-A	a. 5V supply failure in module b. Battery discharged c. Charging system failure d. 5 volt load pulling down supply voltage	1. Check voltage in diagnostics menu on display 2. Check battery voltage 3. Check alternator output 4. Check voltage at module 5. Check for draw on battery or short to ground
<b>DTC 6055-3 5V Supply E POWER_OUT_5_VOLT_E_OORH</b>				
LLD flag set due to output is shorted to high voltage source	Flag (5.5V)	5VN105-A	a. 5V supply failure in module	1. Check voltage in diagnostics menu on display 2. Check voltage at module 3. Check for 5 volt load shorted to another power source
<b>DTC 6055-4 5V Supply E POWER_OUT_5_VOLT_E_OORL</b>				
Voltage is less than threshold for longer than 100 mS	<4.5V	5VN105-A	a. 5V supply failure in module b. Battery discharged c. Charging system failure d. 5 volt load pulling down supply voltage	1. Check voltage in diagnostics menu on display 2. Check battery voltage 3. Check alternator output 4. Check voltage at module 5. Check for draw on battery or short to ground

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 6101-0 V_Elec Current When Cranking V_ELEC_OUT_CURRENT_B</b>				
Two 12V supplies in parallel, elec 1 and 2; engine is cranking and V_ELEC current is greater than V_ELEC output threshold and V_ELEC voltage is less than V_ELEC input threshold for longer than 1 sec	V_ELEC output > 500 mA V_ELEC input < 5V	VSN101-A VSN102-A VSM Internal (V_ELEC_I_OUT)	a. 12V supply failure in module b. 12V load is pulling high current load	<ol style="list-style-type: none"> <li>1. Disconnect circuit loads and check if high draw is reduced or eliminated</li> <li>2. If there is high current load, identify source fo draw</li> <li>3. If there is no high current draw, replace VSM</li> </ol> <p><b>NOTE:</b> Contact Hyster Service for authorization before replacing hardware</p>
<b>DTC 6101-3 V_Elec 1 V_ELEC_OUT_VOLT_OORH_1</b>				
Two 12V supplies in parallel, elec 1 and 2; V_ELEC 1 voltage is greater than threshold for 100 mS	>12.9V	VSN101-A	a. 12V supply failure in module b. Charging system regulator failure	<ol style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check battery voltage</li> <li>3. Check alternator output</li> <li>4. Check voltage at module</li> <li>5. Check for draw on battery or short to ground</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 6101-4 V_Elec 1 V_ELEC_OUT_VOLT_OORL_1</b>				
Two 12V supplies in parallel, elec 1 and 2; V_ELEC 1 voltage is less than threshold for 100 mS	<10V	VSN101-A	<ul style="list-style-type: none"> <li>a. 12V supply failure in module</li> <li>b. Battery discharged</li> <li>c. Charging system failure</li> <li>d. 12V load is discharging battery</li> </ul>	<ul style="list-style-type: none"> <li>1. Check voltage in diagnostics menu on display</li> <li>2. Check battery voltage</li> <li>3. Check alternator output</li> <li>4. Check voltage at module</li> <li>5. Check for draw on battery or short to ground</li> </ul>
<b>DTC 6101-6 V_Elec Current Not Cranking V_ELEC_OUT_CURRENT_A</b>				
Two 12V supplies in parallel, elec 1 and 2; engine is not cranking and V_ELEC current is greater than threshold for 1 sec	Flag (V_ELEC out >3.2A)	VSN101-A VSN102-A VSM Internal (V_ELEC_I_OUT)	<ul style="list-style-type: none"> <li>a. 12V supply failure in module</li> <li>b. 12V load is pulling high current load</li> </ul>	<ul style="list-style-type: none"> <li>1. Disconnect circuit loads and check if high draw is reduced or eliminated</li> <li>2. If there is high current load, identify source of draw</li> <li>3. If there is no high current draw, replace VSM</li> </ul> <p><b>NOTE:</b> Contact Hyster Service for authorization before replacing hardware</p>
<b>DTC 6102-3 V_Elec 2 V_ELEC_OUT_VOLT_OORH_2</b>				
Two 12V supplies in parallel, elec 1 and 2; V_ELEC 2 voltage is greater than threshold for 100 mS	>12.9V	VSN102-A	<ul style="list-style-type: none"> <li>a. 12V supply failure in module</li> <li>b. 12V load shorted to power</li> <li>c. Open circuit in 12V supply</li> </ul>	<ul style="list-style-type: none"> <li>1. Check circuit loads on supply for short to power</li> <li>2. Check wiring for short or open circuits</li> <li>3. Check VSM connectors</li> </ul> <p><b>NOTE:</b> Contact Hyster Service for authorization before replacing hardware</p>

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 6102-4 V_Elec 2 V_ELEC_OUT_VOLT_OORL_2</b>				
Two 12V supplies in parallel, elec 1 and 2; V_ELEC 2 voltage is less than threshold for 100 mS	<10V	VSN102-A	a. 12V supply failure in module b. 12V load shorted to ground	1. Check circuit loads on supply for short to ground 2. Check wiring for damage 3. Check starting system current draw when cranking 4. Check for other heavy loads activating during crank

**CALIBRATION ERROR CODE  
REFERENCE CHART**

**202001-217**

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1001-13 Hydraulic Load Weight Sensor HYG_LOAD_WEIGHT_CALIBRATION_REQUIRED</b>				
Load weight sensor requires calibration	Flag	ADN116-A	a. Calibration issue b. Sensor issue	1. Use display menu calibrations to perform load weight sensor calibration 2. Check for power and ground at sensor
<b>DTC 2001-13 Transmission Forward Valve XMSN_FWD_PROP_RATIONALITY_1</b>				
Transmission Forward Proportional Valve missing VSM calibration points	Flag	LDN101-A	a. Calibration issue b. Solenoid issue	1. Use display menu calibrations to perform transmission clutch pack calibration 2. Check for power and ground at solenoid

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2002-13 Transmission Reverse Valve XMSN_REV_PROP_RATIONALITY_1</b>				
Transmission Reverse Proportional Valve missing VSM calibration points	Flag	LDN102-A	a. Calibration issue b. Solenoid issue	1. Use display menu calibrations to perform transmission clutch pack calibration 2. Check for power and ground at solenoid
<b>DTC 8003-14 No CDF NO_CDF</b>				
Both VSM and display CDF repositories are empty (that is, CDF has been erased from memory)	Flag	VSM: Bus ID 0 Node: 0x3	a. Software issue b. Hardware failure	1. Check software version and update to newer software if available 2. Upload CDF to VSM and display <b>NOTE:</b> Contact HYG Service for authorization before replacing hardware
<b>DTC 8005-14 Incompatible CDF CDF_INCOMPATIBLE</b>				
Application software is not compatible with installed CDF (occurs when old software attempts to access new CDF or the reverse)	Flag	VSM: Bus ID 0 Node: 0x3	a. Application software uploaded is incompatible with CDF b. New CDF uploaded without updating application software	1. Use the display to check VSM and display software versions 2. Consult HYG Service to learn if CDF is compatible with application software 3. Update CDF and VSM application software

## STEERING ERROR CODE REFERENCE CHART 202001-220

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1017-3 Steering Wheel Sensor OPS_STEER_WHEEL_SENSOR_OORH</b>				
Output exceeds expected range (0.5-4.5V)	> 4.75V	ADN117-B	Short to power	<ol style="list-style-type: none"> <li>1. Check power and ground at sensor</li> <li>2. Check for short to power</li> <li>3. Check component resistance</li> </ol>
<b>DTC 1017-4 Steering Wheel Sensor OPS_STEER_WHEEL_SENSOR_OORL</b>				
Output less than expected range (0.5-4.5V)	< 0.25V	ADN117-B	<ol style="list-style-type: none"> <li>a. Wire harness short to ground</li> <li>b. Sensor is open circuit</li> </ol>	<ol style="list-style-type: none"> <li>1. Check power and ground at sensor</li> <li>2. Check for short to ground</li> <li>3. Check component resistance</li> </ol>
<b>DTC 1017-13 Steering Wheel Sensor OPS_STEERING_WHEEL_SENSOR_CALIBRATION_REQUIRED</b>				
Missing VSM calibration points	Flag	ADN117-B	Calibration required	Perform calibration on truck display or PC Service Tool
<b>DTC 1023-2 Steering Axle Sensor 1 and 2 OPS_STEER_AXLE_SENSOR_RATIONALITY_1</b>				
5.0V - sensor 1 voltage - sensor 2 voltage greater than threshold for longer than activation time	0.6V	ADN123-B ADN124-B	<ol style="list-style-type: none"> <li>a. Failure of potentiometer in sensor</li> <li>b. Wire harness fault</li> </ol>	<ol style="list-style-type: none"> <li>1. Check power and ground at sensor</li> <li>2. Check for short to ground</li> <li>3. Check component resistance</li> </ol>
<b>DTC 1023-3 Steer Axle Sensor 1 OPS_STEER_AXLE_SENSOR_OUTPUT_1_OORH</b>				
Sensor voltage greater than threshold for longer than activation time	4.75V	ADN123-B	Short to power	<ol style="list-style-type: none"> <li>1. Check power and ground at sensor</li> <li>2. Check for short to power</li> <li>3. Check component resistance</li> </ol>

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 1023-4 Steer Axle Sensor 1 OPS_STEER_AXLE_SENSOR_OUTPUT_1_OORL</b>				
Sensor voltage less than threshold for longer than activation time	0.25V	ADN123-B	a. Wire harness short to ground b. Sensor is open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 1023-13 Steer Axle Sensor OPS_STEER_AXLE_SENSOR_CALIBRATION_REQUIRED</b>				
Missing VSM calibration points	Flag	ADN123-B ADN124-B	Calibration required	Perform calibration on truck display or PC Service Tool
<b>DTC 1024-3 Steer Axle Sensor 2 OPS_STEER_AXLE_SENSOR_OUTPUT_2_OORH</b>				
Sensor voltage greater than threshold for longer than activation time	4.75V	ADN124-B	Short to power	1. Check power and ground at sensor 2. Check for short to power 3. Check component resistance
<b>DTC 1024-4 Steer Axle Sensor 2 OPS_STEER_AXLE_SENSOR_OUTPUT_2_OORL</b>				
Sensor voltage less than threshold for longer than activation time	0.25V	ADN124-B	a. Wire harness short to ground b. Sensor is open circuit	1. Check power and ground at sensor 2. Check for short to ground 3. Check component resistance
<b>DTC 2003-4 Sync Steer Solenoid HYG_EFU_SOLENOID_OORL</b>				
Short to low source in synchronous steer solenoid	Low-side driver<0.05V	LDN103-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2003-5 Sync Steer Solenoid HYG_EFU_SOLENOID_OPEN</b>				
Open circuit in sync steer solenoid	Low-side driver<0.05V	LDN103-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short

Description	Threshold	Circuit ID	Cause	Troubleshooting Outline
<b>DTC 2003-6 Sync Steer Solenoid HYG_EFU_SOLENOID_OORH</b>				
Short to high source or shorted coil in synchronous steer solenoid	>2,2A	LDN103-A	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short

### HYDRAULIC FAN DRIVE ERROR CODE      202001-222 REFERENCE CHART

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2003-4 Hydraulic Fan Drive Solenoid B HFD_B_SOLENOID_OORL</b>				
Short to low source in hydraulic fan drive solenoid	Low-side driver<0.05V	LDP203-B	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2003-5 Hydraulic Fan Drive Solenoid B HFD_B_SOLENOID_OPEN</b>				
Open circuit in hydraulic fan drive solenoid	0.1V<Low-side driver<0.3V	LDP203-B	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2003-6 Hydraulic Fan Drive Solenoid B HFD_B_SOLENOID_OORH</b>				
Short to high source in hydraulic fan drive solenoid, or shorted solenoid coil	Flag	LDP203-B	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2004-4 Hydraulic Fan Drive Solenoid A HFD_A_SOLENOID_OORL</b>				
Short to low source in hydraulic fan drive solenoid	Low-side driver<0.05V	LDP204-B	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short

Description	Threshold	Circuit ID	Cause	Troubleshooting outline
<b>DTC 2004-5 Hydraulic Fan Drive Solenoid A HFD_A_SOLENOID_OPEN</b>				
Open circuit in hydraulic fan drive solenoid	0.1V<Low-side driver<0.3V	LDP204-B	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short
<b>DTC 2004-6 Hydraulic Fan Drive Solenoid A HFD_A_SOLENOID_OORH</b>				
Short to high source in hydraulic fan drive solenoid, or shorted solenoid coil	Flag	LDP204-B	a. Solenoid internal short b. Driven load is shorted or stuck c. Wire harness short	1. Check solenoid operation 2. Check component resistance 3. Check wire harness for short

## SUPPLEMENTARY DATA

### ABBREVIATIONS AND ACRONYMS

*Table 1. Abbreviations and Acronyms*

Term	Definition or Description
AC	Alternating Current
ACC	Accessory
A/D	Analog to Digital
ACK	Acknowledged
Activated	A feature whose functionality may be turned on or off by the technician (parameters or selectable SEFs) and is currently set to be functional
ADC	Analog to Digital Converter
ADS	Auto Deceleration System
APPS	Accelerator Pedal Position Sensor
AROC	Abnormal Rate of Change
AUX	Auxiliary
BATT	Battery
Baud	A line's signaling rate, the switching speed, or number of voltage or frequency changes made per second
BIT	Smallest element of binary data storage
BDC	Bottom Dead Center
bit	Smallest element of binary data storage
BTDC	Before Top Dead Center
Byte	The common unit of binary data storage. It is made up of eight bits.
C	Celsius
CA	Crank Angle
Calibration	Adjustment to accommodate truck-to-truck variations. Typical usage in system specifications applies to software processes to "learn" and store sensor baseline or extreme values. Calibration procedures may require repeating when controllers are replaced or if a specific sensor or mounting mechanism is replaced.
CANbus	CANbus is SAE J1939 Controller Area Network bus
CBB	Conventional Battery Box
CBDC	Counter Balanced Development Center
CD or CD-ROM	Compact Disc Read-Only Memory - a compact disc format used to hold text, graphics and hi-fi stereo sound in excess of 650MB of data, which is equivalent to about 250,000 pages of text

**Table 1. Abbreviations and Acronyms (Continued)**

<b>Term</b>	<b>Definition or Description</b>
CDF	Configuration Data File (previously known as Cal Data) - factory-created file defining truck configuration details, dependent on truck model and option permutations (considered unique for a given truck). Not modified by service technicians, but a replacement file (with alternate options) may be factory-generated and loaded into a truck's controller by a service technician
CO	Carbon Monoxide
COP	Computer Operating Properly
CMP	Cam Position Sensor
CPS	Connector Plug Socket
CPU	Central Processing Unit
CRC	Cyclic Redundancy Checksum
CRP	Connector Receptacle Pin
CRS	Connector Receptacle Socket
DA	Destination Address
D/A	Digital to Analog Converter
DBB	Drop Battery Box
DBP	Drawbar Pull
DC	Direct Current
DCN	Document Control Number
Deactivated	A feature which is not currently Activated
Defaults	The set of factory values for all truck parameters. A setup menu function can restore the default values of all parameters.
De-Rated Mode	Operational mode with reduced performance (typically reduced speed) and/or disabled functionality in response to faults detected or operator checklist answers
Disabled	A Software Enabled Feature which is NOT present on a given truck
DIS	Distributorless Ignition System
DM	Diagnostic Message
DMM	Digital Multimeter
DOC	Diesel Oxidation Catalyst
DPF	Diesel Particulate Filter
DSC	Display Switch Cluster - the instrument display and control assembly mounted on the steering column
DTC	Diagnostic Trouble Code
DTM	Diagnostic Troubleshooting Manual
ECT	Engine Coolant Temperature
ECU	Engine Control Unit
EDBP	Extended Drawbar Pull
EEPROM	Electrically Erasable Programmable Read Only Memory

**Table 1. Abbreviations and Acronyms (Continued)**

<b>Term</b>	<b>Definition or Description</b>
EF	Excess Flow
EFI	Electronic Fuel Injection
EGI	Electronic Gasoline Injection
EGO	Exhaust Gas Oxygen
EGP	Exhaust Gas Pressure
EGR	Exhaust Gas Recirculator
EGT	Exhaust Gas Temperature
EHP	Electro-Hydraulic Pilot
EHPV	Electro-Hydraulic Poppet Valve
E-Hyd	Electro-Hydraulic - hydraulic option utilizing electronic inputs and electrically-driven valves to actuate hydraulic functions, as opposed to manual hydraulics using mechanical levers
Embedded	Software that is installed on Lift Truck control system
EMI	Electro-Magnetic Interference
Enabled	A Software Enabled Feature which is present on a given truck, but not necessarily Activated (i.e., purchased but not necessarily in use)
EPA	Environmental Protection Agency
EPR	Electronic Pressure Regulator
ERPM	Engine (speed in) RPM
ESD	ElectroStatic Discharge
EST	Electronic Spark Timing
ETC	Electronic Throttle Control
FFL	Full-Free Lift
FMI	Fault Mode Indicator
FOSI	Format Output Specification Instances - an instance of the Output Specification (OS) that assigns values to the style characteristics for a particular document type declaration. The FOSI uses the syntax of an SGML/XML document instance and is designed to format documents for paper delivery.
FWD	Forward travel direction command signal to system
FWD1	Forward 1 gear (pack)
FWD2	Forward 2 gear (pack)
GB	Gigabyte - equal to 1024 Megabytes
GCU	Governor Control Unit
H	Henry - Unit of measurement of electrical inductance
HC	Hydro Carbons
HEGO	Heated Exhaust Gas Oxygen sensor

**Table 1. Abbreviations and Acronyms (Continued)**

<b>Term</b>	<b>Definition or Description</b>
HO <sub>2</sub> S	Heated Oxygen Sensor
HPCR	High-Pressure Common Rail
HPP	High Pressure Pump
HYDR	Hydraulic
Hz	Basic unit of frequency measurement, 1 Hz = 1 periodic interval in one second
IAC	Idle Air Control
IAFM	Intake Air Fuel Module
IAT	Intake Air Temperature
IBPP	Inching/Brake Pedal Position
ICE	Internal Combustion Engine
IGN	Ignition
ISR	Interrupt Service Routine
Joystick	Armrest-mounted module incorporating a single 2-axis control handle for Electro-Hydraulics. May include additional analog or digital inputs on control handle. Also includes additional inputs from sensors and/or switches in the seat area, to be broadcast over CAN
kBps	KiloBytes per second
kHz	KiloHertz - common frequency measurement of Hertz X 1000
kilobit	1,000 bits
kilobyte	A standard quantity measurement for disk and diskette storage. One kilobyte of memory equals 1024 bytes (8-bit characters) of computer memory.
kg	Kilogram, equal to 1000 grams
kPa	Kilo-Paschals, metric unit of pressure measurement X 1000
kph	Kilometers per Hour
L	Liter
LAN	Local Area Network
lbf ft	Foot Pounds
lbf in	Inch Pounds
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LFL	Limited Free Lift
Limp-Home Mode	See De-Rated Mode
LP (G)	Liquefied Petroleum (Gas)
LS	Load Sense
LSB	Least Significant Bit
LTFT	Long Term Fuel Trim

**Table 1. Abbreviations and Acronyms (Continued)**

<b>Term</b>	<b>Definition or Description</b>
MAF	Mass Air Flow
MAP	Manifold Absolute Pressure
MAT	Manifold Air Temperature
MB	Megabyte - 1,048,576 bytes, equal to 1,024 kilobytes. The basic unit of measurement of mass storage
MHz	Megahertz - a unit of frequency equal to 1024 kilohertz. A common method for describing the speed of a computer CPU
MIL	Malfunction Indicator Lamp
MLM	Mini Lever Module
mH	Milli-Henry, 1 one thousandth of a Henry
Modem	Modulator-Demodulator - a device that adapts a terminal or computer to a telephone line converting the computer's digital pulses into audio frequencies (analog) for the telephone system and converts the frequencies back into digital pulses at the receiving side
MOR	Manufacturer Of Record
MPH	Miles Per Hour
MRV	Main Relief Valve
ms	Milli-second, 1 one thousandth of a second
MSB	Most Significant Bit
NACK	Not Acknowledged
NEU	Neutral travel direction command signal to system
N•m	Newton Meters
NOR	Normal
NOx	Nitrogen Oxide
OBD	On Board Diagnostics
OC	Open Circuit - indicates an open connection or break in an electrical path
OORH	Out-Of-Range High
OORL	Out-Of-Range Low
ORFS	O-Ring Face Seal
OS	Operating System - the embedded system of instructions and applications that control the operation of the processor
Parameter	A system characteristic which may be adjusted by a technician, e.g., Auto-Deceleration, which may be set on a scale of from 1 to 10. Each parameter will also have a default value.
Pb	Lead
PbO <sub>2</sub>	Lead Peroxide
PC	Personal Computer

**Table 1. Abbreviations and Acronyms (Continued)**

<b>Term</b>	<b>Definition or Description</b>
PC Tool	Any software that is installed on a PC that is used to service the lift truck control system
PCB	Printed Circuit Board
PCV	Positive Crankcase Ventilation
PDA	Personal Digital Assistant
PDM	Power Distribution Module
PDU	Protocol Data Unit
PGN	Parameter Group Number
PPAP	Production Part Approval Process
PPRV	Proportional Pressure Reducing Valve
PRD	Product Requirements Document
PWM	Pulse Width Modulation
RAM	Random Access Memory - the computer's primary workspace where the contents of each byte can be accessed directly without regard to the bytes before or after it
REV	Reverse travel direction command signal to system
Rev.	Revision - the issue control or version number of an item
RL	Relay
ROM	Read Only Memory
RPM	Revolutions Per Minute
RTST	Return to Set Tilt
SA	Source Address
SAE	Society of Automotive Engineers
Scroll Repeat	The repeating, incrementing, or decrementing of a displayed value when continuously pressing the scroll buttons
Scroll Wrap-around	In the setup menu, if wrap-around is specified, when extreme-adjustment values are reached while scrolling, the value shall change to the other extreme of adjustment. I.e., scrolling down to lowest point on menu shall jump back to the top of the menu.
SCU	Steering Control Unit
SCV	Suction Control Valve
SEF	Software Enabled Function - options which are Enabled by software (either entirely or in combination with additional hardware). For all SEFs, enabling the function requires a new CDF. An SEF may be Selectable, allowing it to be Activated or Deactivated by the technician once it has been enabled, or it may be non-selectable, such that it cannot be deactivated after being enabled.
Selectable	See Software Enabled Function (SEF)
Service Pack	Software update provided by a software manufacturer to fix an error and/or improve quality
SGT	Surrounded Gate Transistor

**Table 1. Abbreviations and Acronyms (Continued)**

<b>Term</b>	<b>Definition or Description</b>
SLOT	Scaling, Lookup, Offset, Transform function
SMS	Severity Mitigating Software
SPED	Special Products Engineering Department - responsible for options not in the standard price book, but available by special order
SPI	Serial Peripheral Interface
SPN	Suspect Parameter Number
	Service Reference Manual
SRV	Secondary Relief Valve
STB	Short-To-Battery - indicates a short to a battery level voltage source
STFT	Short Term Fuel Trim
STG	Short-To-Ground - indicates a short to a ground or frame connection
STS	Short-To-Supply - indicates a short to a supply voltage source other than battery level
TBC	To Be Continued
TBD	To Be Determined
TBI	Throttle Body Injection
TC	Torque Converter
TCU	Transmission Control Unit
TDC	Top Dead Center
TISS	Transmission Input Shaft Speed - refers to a sensor utilized for measuring the rotational speed of the transmission input shaft (output of the torque converter)
TMAP	Combined sensor inputs of Manifold Temperature and Pressure
TOSS	Transmission Output Shaft Speed - refers to a sensor utilized for measuring the rotational speed of the transmission output shaft (which is directly related to the ground speed of the truck). The TOSS sensor detects speed and direction of the shaft.
TPS	Throttle Position Sensor (on engine)
Truck Settings	The specific adjustments of the various parameters on a given truck. They may be saved to a data file through the Service PC software and copied to additional similar trucks.
TSP	Troubleshooting Procedure
USB	Universal Serial Bus - serial 4-wire connection that has advanced features over a serial port. Normally found on computers as a slotted connector configuration
VSM	Vehicle System Manager - the master controller of the vehicle integrated control system
WOT	Wide Open Throttle
XMSN	Transmission



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