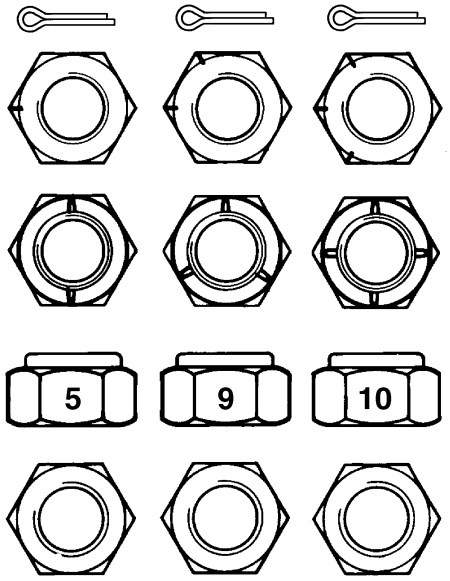
Yale®

Maintenance

METRIC AND INCH (SAE) FASTENERS



HM210064

6. Connect the battery; install floor plate and floor mat for lift truck models

- GLP60-70VX (GC/GLC135-155VX) (C878, D878, E878, F878)
- GLP60-70VX (GLP135-155VX, GP155VXS) (G878)
- GLP80VX, GLP80VX9, GLP90VX (GLP170VX, GLP175VX36, GLP190VX) (A909, B909)
- GLP80VX, GLP80VX9, GLP90VX (C909)
- GLP80VX, GLP80VX9, GLP90VX (D909)

Connect the battery and lower the hood for lift truck models

- GC/GLC/GDC135-155CA (B879)
- GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C879, D879, E879, F879)
- GC070-120LJ/MJ (D818)
- GLC40-55VX; GLC55SVX; (GC/GLC080-120VX; GC/GLC080-100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818, F818)
- GDP60-70CA (GP/GLC/GDP135-155CA (B878)
- GLP/GDP3.5-5.5LJ/MJ (GP/GLP/GDP70-120LJ/MJ) (E813)
- GLP40VX5/VX6; GLP45SVX5, GLP45VX6, GLP50-55VX (GP/GLP080-120VX) (F813, G813, H813, J813, K813)

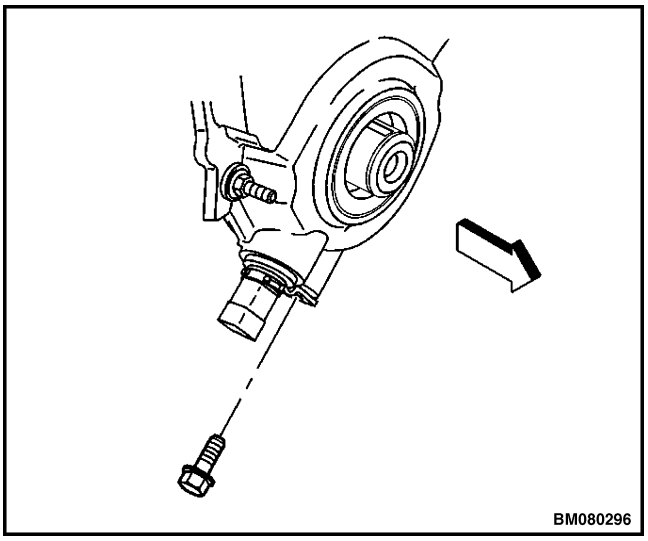
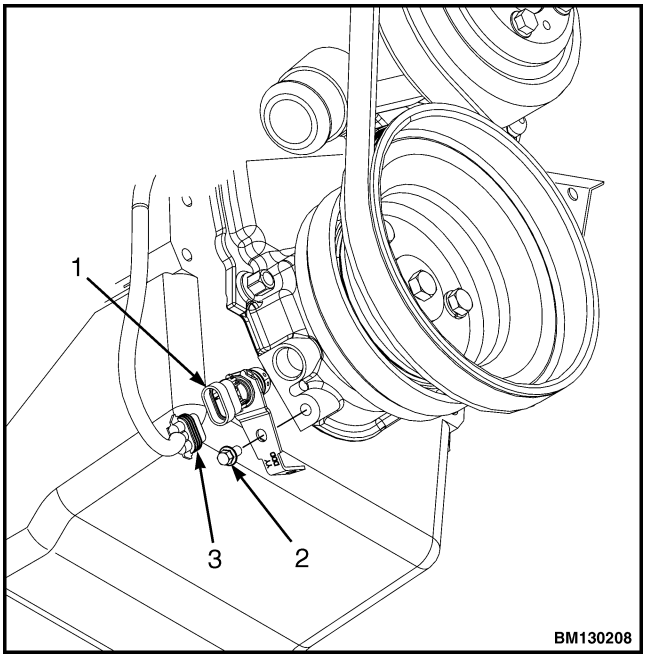


Figure 32. Crankshaft Position (CKP) Sensor Mounting Bolt



1. CRANKSHAFT POSITION SENSOR
2. MOUNTING BOLT
3. CRANKSHAFT SENSOR HARNESS CONNECTOR

Figure 33. Crankshaft Position (CKP) Sensor Removal/Installation

Camshaft Position (CMP) Sensor

Remove

1. Disconnect the spark plug wires and ignition coil wire from the distributor. Refer to Spark Plug Wire Replacement and Figure 34.

2. Disconnect the camshaft position (CMP) sensor harness connector from the distributor. See Figure 35.

3. Remove the capscrews retaining the distributor cap. Remove the distributor cap. See Figure 36.

4. Remove the rotor retaining screws. See Figure 37.

5. Remove the rotor. See Figure 38.

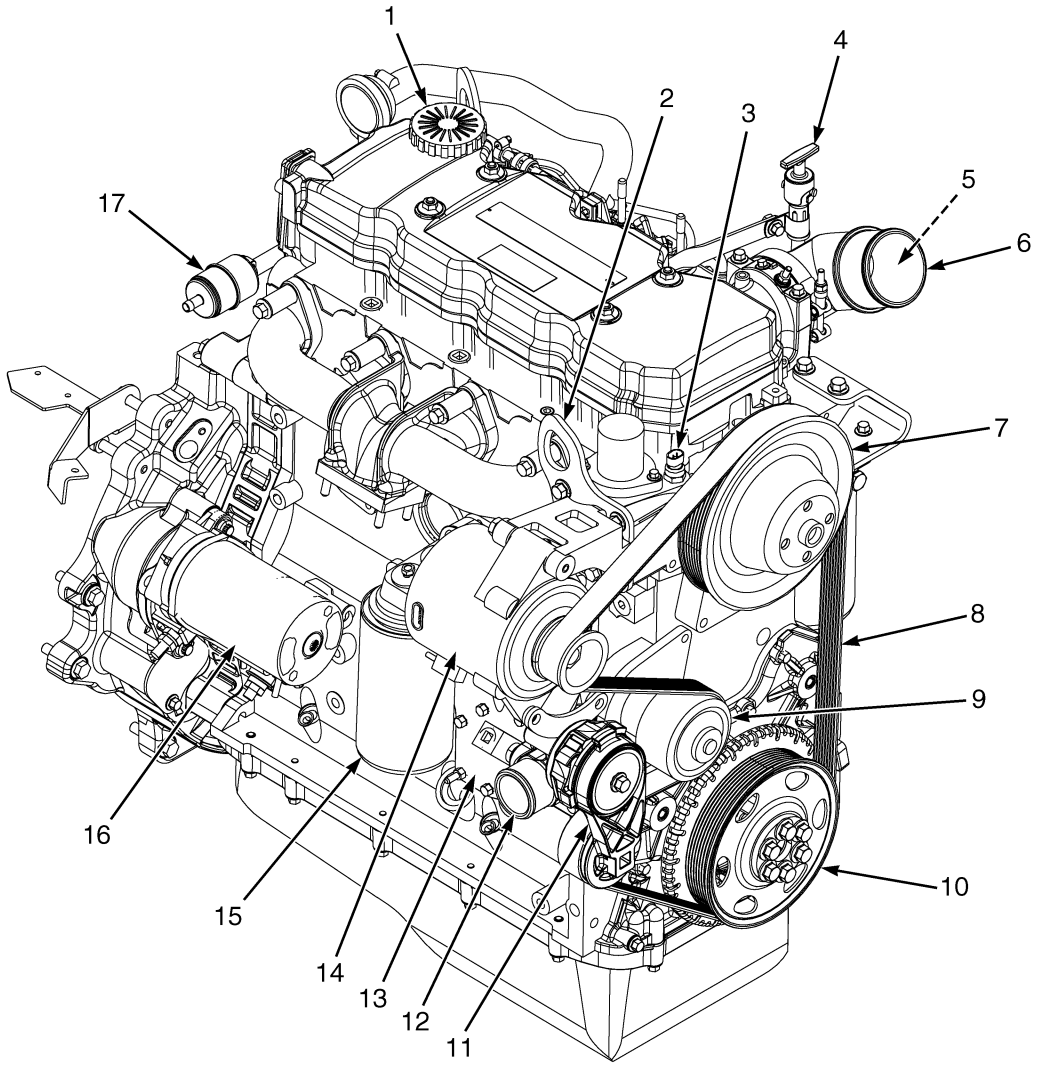
6. Align the square slot in the reluctor wheel with the CMP sensor. See Figure 39.

CHECK	PROCEDURE	ACTION
Mast Cushion Check (All Except 2-Stage Mast)	Ensure the following before starting procedure: • Truck operating on flat surface. • Adequate overhead clearance to raise forks to maximum height. **WARNING** **Ensure load is secured so it will not move when mast is tilted fully forward.** • Secured capacity load on forks. 1. Operate engine at low idle and raise forks to maximum height of main lift cylinders. 2. Lower forks as fast as possible and observe cylinder rod as main lift cylinders reach bottom of stroke. ***Does fork speed slow and does a hissing sound come from cylinder at bottom of stroke?***	**YES:** Cushion valve is OK. Go to next check. **NO:** Inspect and clean cushion valve. Refer to appropriate **Cylinder Repair** manual, depending on lift truck model.
Lift/Tilt Mast Adjustment Check	Ensure the following before starting procedure: • Truck operating on flat surface. • Adequate overhead clearance to raise forks to maximum height. • No load on forks. 1. Operate engine at governed speed and raise forks to maximum height ***Does the top sections of mast kick to one side at maximum height?*** *Continue:* 2. Reduce engine speed to low idle. Tilt the mast full forward and then full backward at maximum height and observe movement of mast. ***Does the top sections of mast make noise during tilting and show excessive movement of mast sections?***	**YES:** Shim lift cylinders. Refer to appropriate **Mast Repair** manual, depending on lift truck model. **NO:** Mast cylinder is adjusted OK. Continue with this procedure. **YES:** Shim and adjust mast. Refer to appropriate **Mast Repair** manual, depending on lift truck model. **NO:** Mast shimming is OK. Go to next check.
Tilt Racking Check	Actuate mast back tilt function until hydraulic valve goes over relief. ***Do both sides of mast stop evenly?***	**YES:** Tilt stops are adjusted OK. Go to next check. **NO:** Adjust tilt stops. Refer to appropriate **Mast Repair** manual, depending on lift truck model.

Cummins (Diesel) Engine

DESCRIPTION

The Cummins diesel engine is a naturally-aspirated, liquid-cooled, in-line four configuration with a direct injection fuel system. The key components of the Cummins diesel engine are shown in Figure 9020-10-14.



1. OIL FILL
2. FRONT ENGINE LIFTING BRACKET
3. SENSOR COOLANT TEMPERATURE
4. DIPSTICK
5. INTAKE AIR PREHEATER (NOT SHOWN)
6. ENGINE AIR-INLET
7. FAN PULLEY
8. DRIVE BELT (SERPENTINE)
9. WATER PUMP
10. FRONT PULLEY
11. AUTOMATIC BELT TENSIONER
12. WATER INLET
13. LUBRICATING OIL COOLER
14. ALTERNATOR
15. LUBRICATING OIL FILTER
16. STARTER
17. FUEL STRAINER

Figure 9020-10-14. Cummins Diesel Engine Components

Intake Air Temperature Sensor

The Intake Air Temperature (IAT) sensor is a thermistor-type sensor. This sensor detects the intake air temperature going into the engine. The resistance changes according to the intake air temperature.

When the intake air temperature is high, the resistance is low. When the intake air temperature is low, the resistance is high. See Figure 9020-10-52 and Table 9020-10-2.

Table 9020-10-2. IAT Ambient Temperature

Temperature	Current	Impedance
−30 ±1°C (−22 ±34°F)	0.1 mA max.	28.6 ±2.86 KOhms
−20 ±1°C (−4 ±34°F)	0.1 mA max.	16.2 ±1.62 KOhms
20 ±0.5°C (68 ±32°F)	0.1 mA max.	2.45 ±0.24 KOhms
80 ±0.5°C (176 ±32°F)	1.0 mA max.	0.322 ±0.032 KOhms
120 ±0.5°C (248 ±32°F)	1.0 mA max.	0.117 ±0.0117 KOhms

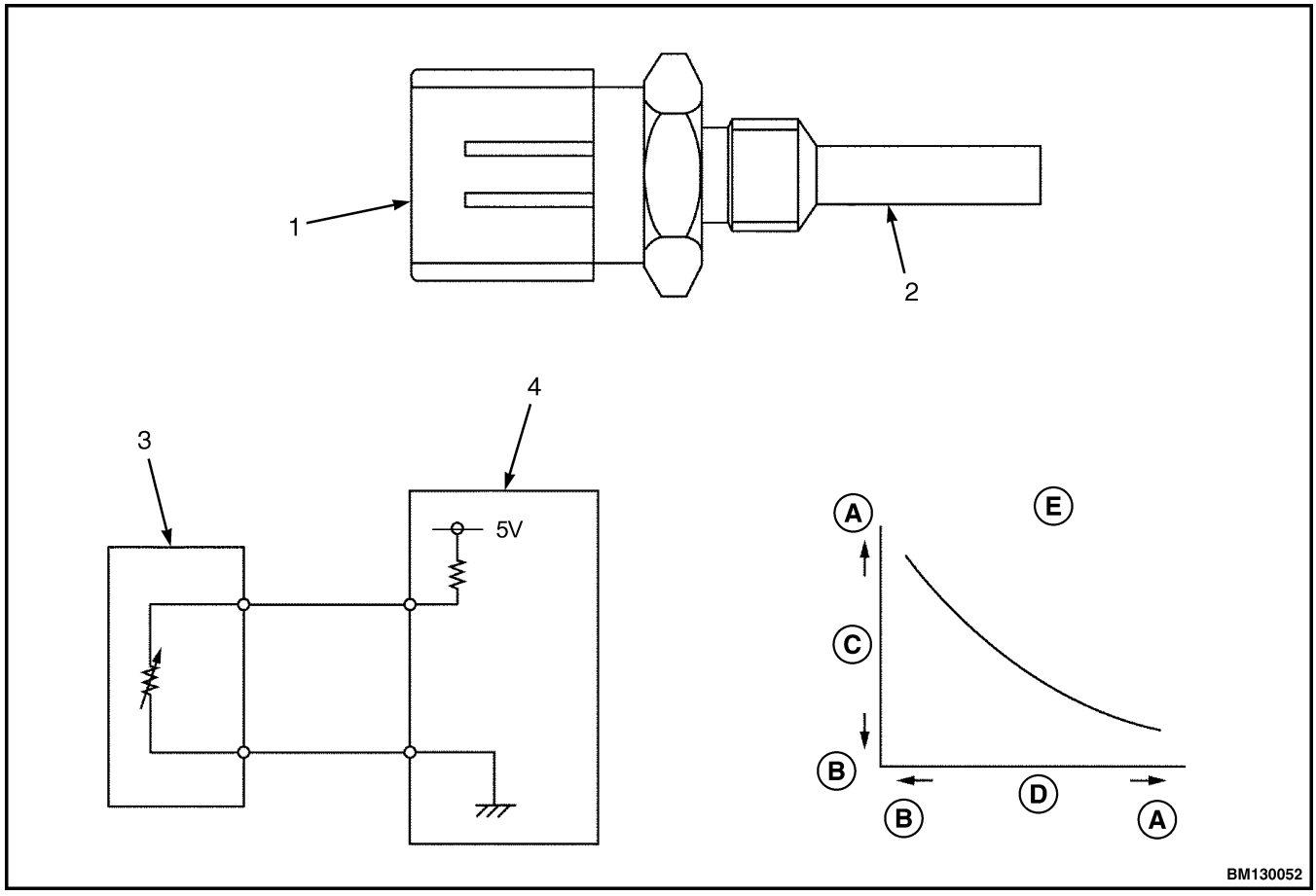


Figure 9020-10-52. Intake Air Temperature (IAT) Sensor

GM/TGFI 2.4L (Four-Cylinder) Gasoline System Components

Depending on your lift truck, the GM/TGFI 2.4L gasoline system schematic is shown in Figure 9020-10-99 or Figure 9020-10-100.

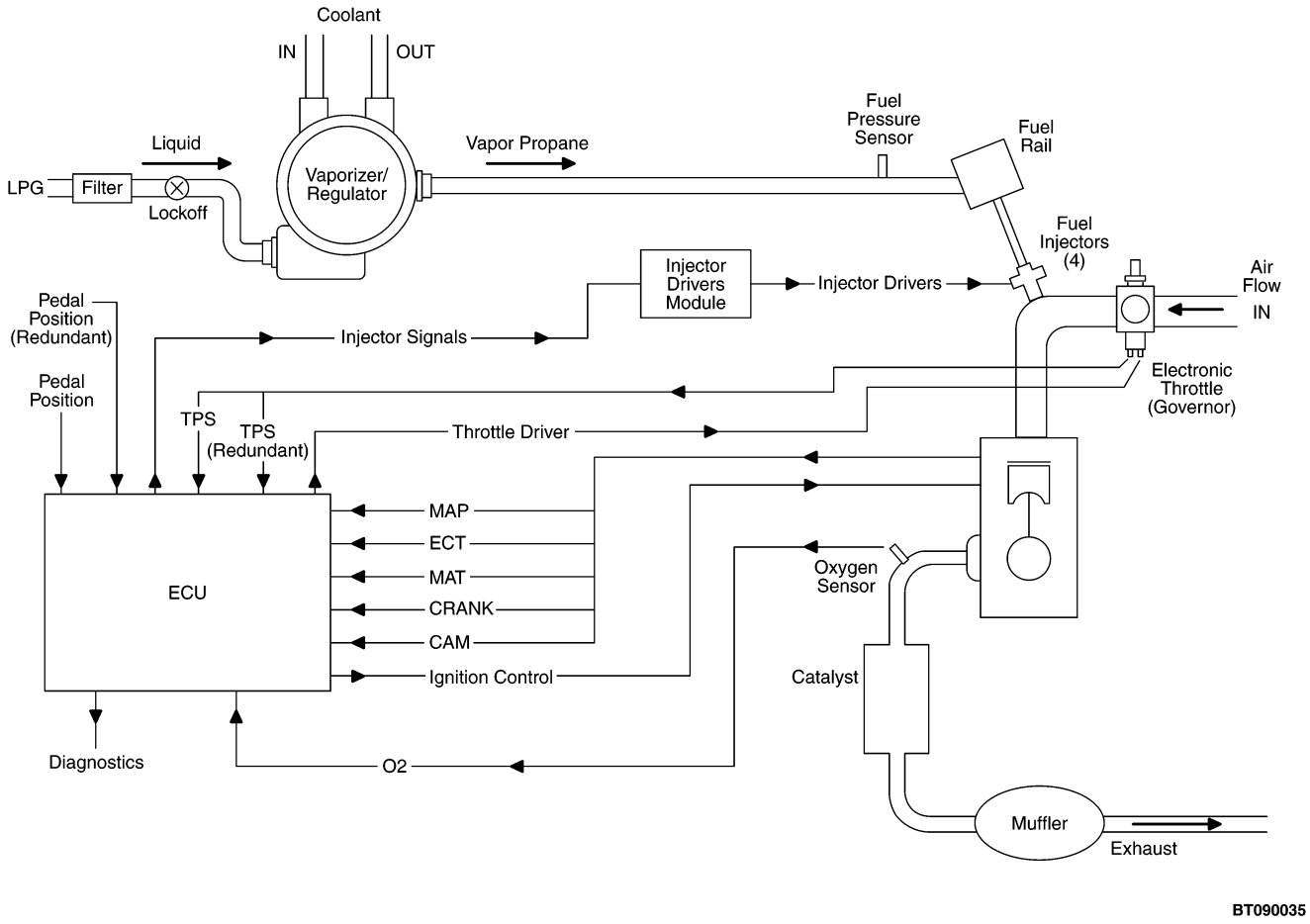
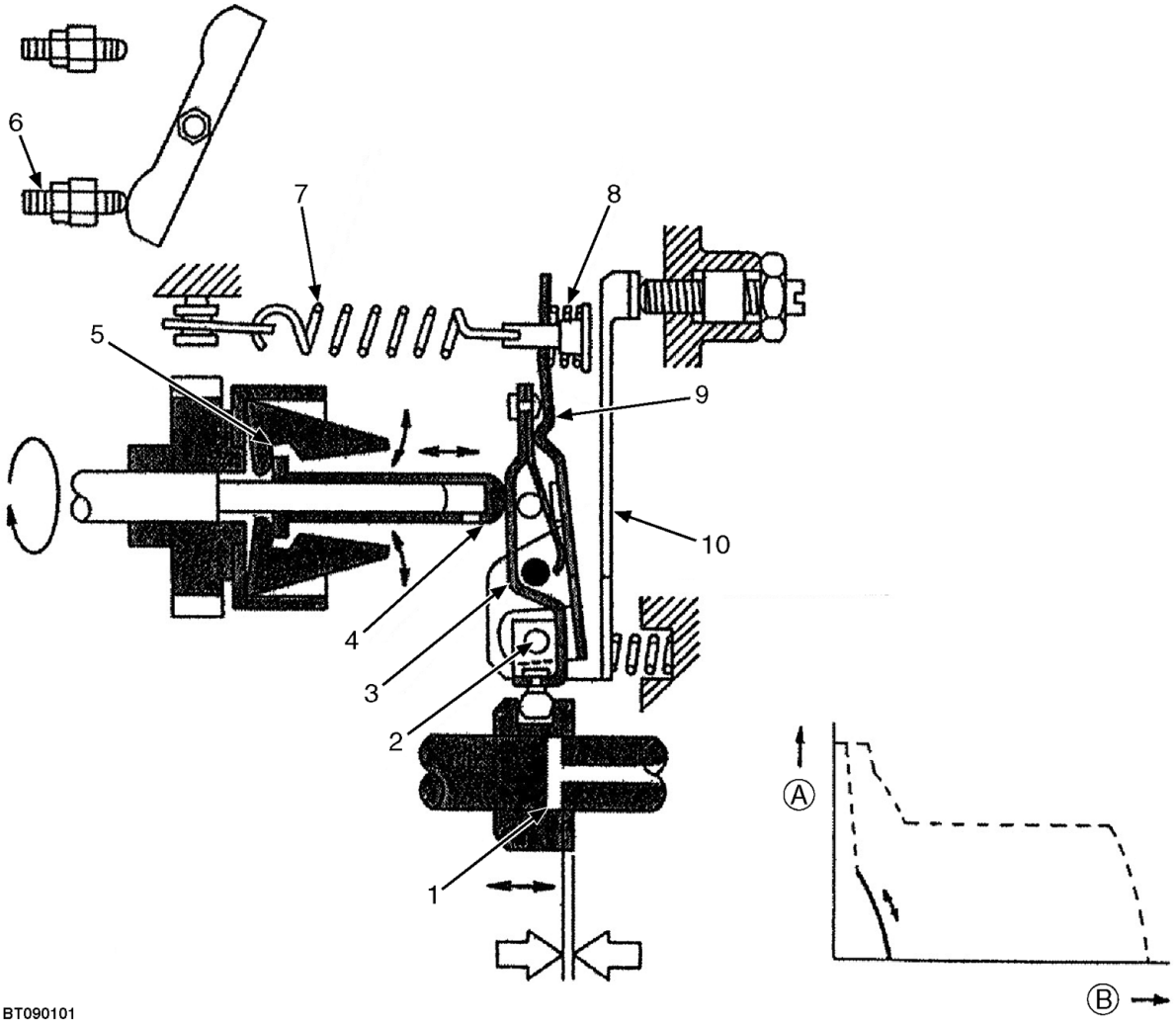


Figure 9020-10-99. GM/TGFI 2.4L Gasoline System Components (Lift Trucks Built Before January, 2010)

During Idle



A. INJECTION VOLUME
B. PUMP RPM

1. CONTROL SLEEVE
2. M2 (FULCRUM)
3. START LEVER
4. GOVERNOR SLEEVE
5. FLYWEIGHT
6. IDLING STOPPER BOLT
7. GOVERNING SPRING
8. IDLE SPRING
9. TENSION LEVER
10. CORRECTOR LEVER

Figure 9020-10-161. Injection Volume During Idling

When the engine starts and the accelerator pedal is released, the control lever returns to the idle position and the tension of the governor spring becomes zero. Therefore, the flyweight opens outwardly even at low revolutions to move the governor sleeve to the right. This makes the start lever turn clockwise with M2 being the fulcrum to move the control sleeve in the direction to reduce the fuel volume. The governor sleeve stops at a point where the flyweight centrifugal and idle spring force are balanced to ensure stable idling.

CAUSE J - ENGINE LIFT PUMP NOT OPERATING PROPERLY (KUBOTA DIESEL ENGINES ONLY).

PROCEDURE OR ACTION:

1. With engine OFF and ignition power ON, verify the lift pump is operating.
   Is the lift pump operating correctly?
   YES: Resume operation.
   NO: Refer to the appropriate **Fuel System** manual, depending on lift truck model.

CAUSE K - ACTUAL RAIL PRESSURE NOT FOLLOWING TARGET RAIL PRESSURE. (KUBOTA DIESEL ENGINES ONLY).

PROCEDURE OR ACTION:

1. Check for DTC on the DSC or PC Service Tool.
   Is a rail pressure related DTC present?
   YES: Check rail pressure sensor for shorts or broken wires. If wiring OK, replace sensor. Refer to the appropriate **Kubota Diesel Engine** manual, depending on lift truck model.
   NO: Go to CAUSE L.

CAUSE L - CAM AND CRANK SENSORS NOT OPERATING PROPERLY (KUBOTA DIESEL ENGINES ONLY).

PROCEDURE OR ACTION:

1. Check for DTC on the DSC or PC Service Tool.
   Is a Cam and/or Crank related DTC present?
   YES: Check sensor(s) for shorts or broken wires. If wiring OK, replace sensor(s). Refer to the appropriate **Kubota Diesel Engine** manual, depending on lift truck model.
   NO: Go to CAUSE M.

CAUSE M - FUEL LEAKS.

PROCEDURE OR ACTION:

1. Inspect fuel system for leaks.
   Is there evidence of fuel leaking in the engine compartment?
   YES: See Fuel Leaks.
   NO: Go to CAUSE N.

CAUSE N - DIRTY AIR CLEANER.

PROCEDURE OR ACTION:

1. Check the condition of the air cleaner.
   Does the air filter need to be replaced?
   YES: Replace air filter with new air filter.
   NO: Go to CAUSE O.

Fan or Alternator Bearing Noise

POSSIBLE CAUSE

A. LOOSE FAN OR SHROUD
B. IMPROPER ALTERNATOR BELT TENSION.
C. IMPROPER ALTERNATOR ALIGNMENT.
D. DAMAGED ALTERNATOR.
E. COOLANT PUMP BEARING
F. WORN ENGINE MOUNTS.

CAUSE A - LOOSE FAN OR SHROUD

PROCEDURE OR ACTION:

1. Check for proper installation of fan, fan hub, or shroud.
   Is fan, fan hub, or shroud loose or crooked?
   YES: Properly install fan, fan hub, or shroud. Refer to appropriate **Cooling System** and **GM Engine Repair**, **GM Engines, 5.7 Liter V-8 LPG**, **Mazda Engine**, **Kubota Diesel Engines**, or **Yanmar Diesel Engines** manual, depending on lift truck model. For Cummins 4.5L and QSB 3.3L engines, contact your local **YALE** dealer or see **Yale Axcess Online** .
   NO: Go to CAUSE B.

CAUSE B - IMPROPER ALTERNATOR BELT TENSION.

PROCEDURE OR ACTION:

1. Check for proper alternator belt tension.
   Is alternator belt tension out of specifications?
   YES: Adjust alternator belt tension. Refer to appropriate **Periodic Maintenance** manual and **Operating Manual**, depending on lift truck model.
   NO: Go to CAUSE C.

CAUSE C - IMPROPER ALTERNATOR ALIGNMENT.

PROCEDURE OR ACTION:

1. Check to see if alternator pulley lines up with coolant pump and crankshaft pulleys.
   Is alternator not installed properly?
   YES: Properly install alternator. For GM 2.4L and Yanmar engines, refer to appropriate **Alternator With Regulator** manual, depending on lift truck model. For GM 4.3L, GM 5.7L, or Mazda engines, refer to appropriate **Electrical System** manual, depending on lift truck model. For Cummins 4.5L and QSB 3.3L engines, contact your local **YALE** dealer or see **Yale Axcess Online** .
   NO: Go to CAUSE D.

Engine Compression Test (Kubota 2.4L)

This test will check sealing condition of combustion chamber components, such as piston rings, valves, and cylinder head gasket.

Warm-up engine prior to performing the following procedure:

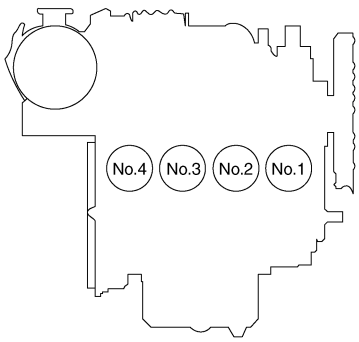


Figure 9020-40-198. Cylinder Number Sequence

1. Remove air cleaner, muffler, glow lead, and glow plugs.
2. Install compression gauge and compression gauge adapter. Refer to Table 9020-40-4.
3. Perform compression test, starting on cylinder 1, 2, 3, then 4. See Figure 9020-40-198 for cylinder location and sequence order. Cylinder 1 is closest to the gear case side.

Table 9020-40-4. Special Tools

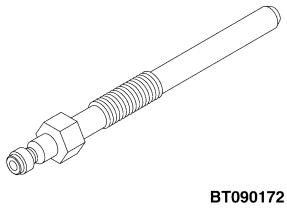
Compression Gauge Adapter (**Yale**#582050207)	
Pressure Test Gauge	0 - 3.45 MPa (0 - 500 psi) Pressure Gauge

Table 9020-40-5. Test Specifications - Kubota 2.4L Engine

Factory Specifications	Allowable Limit
2.95 to 3.23 MPa (427 to 469 psi)	2.35 MPa (341 psi)

4. Crank engine with the starter to operate the engine approximately 200 to 300 RPM.

NOTE: Always use a fully charged battery when performing compression test.

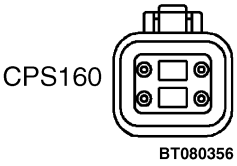
5. Measure maximum compression value. Repeat procedure twice for each cylinder, verifying pressures. Refer to Table 9020-40-5.

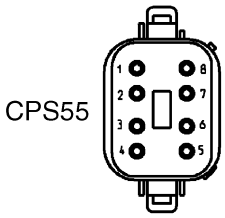
NOTE: Compression value variance must be less than 10%

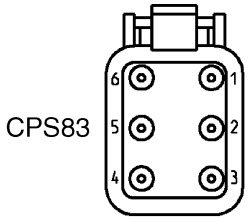
TABLE OF CONTENTS

MAZDA 2.0/2.2L (GAS/LPG)

CPS 55 Wire Numbers	Conversion for new connectors
750-A:1	CPS 160:1
005-C:2	CPS 160:2
207-A:3	CPS 160:3
121-A:4	
759-A:5	CPS 55:1
751-B:6	CPS 55:2
349-A:7	CPS 55:3
840-A:8	
112-A:9	CPS 55:4
126-A:10	
387-B:11	
388-B:12	
542-A:13	
753-A:14	
543-A:15	CPS 55:5
356_357-A:16	CPS 55:6
351-A:17	
870-B:17	
354-A:18	
370-A:18	CPS 83:1
353-A:19	
355-A:20	
371-A:20	CPS 83:2
541-A:21	
383-B:21	
754-A:22	
384-B:22	
259-A:23	
261-A:23	CPS 83:3
260-A:24	
262-A:24	CPS 83:4
901-K:25	CPS 55:7
900-K:26	CPS 55:8
103-A:27	
115-A:27	CPS 83:5
871-B:28	
104-A:29	
116-A:29	CPS 83:6







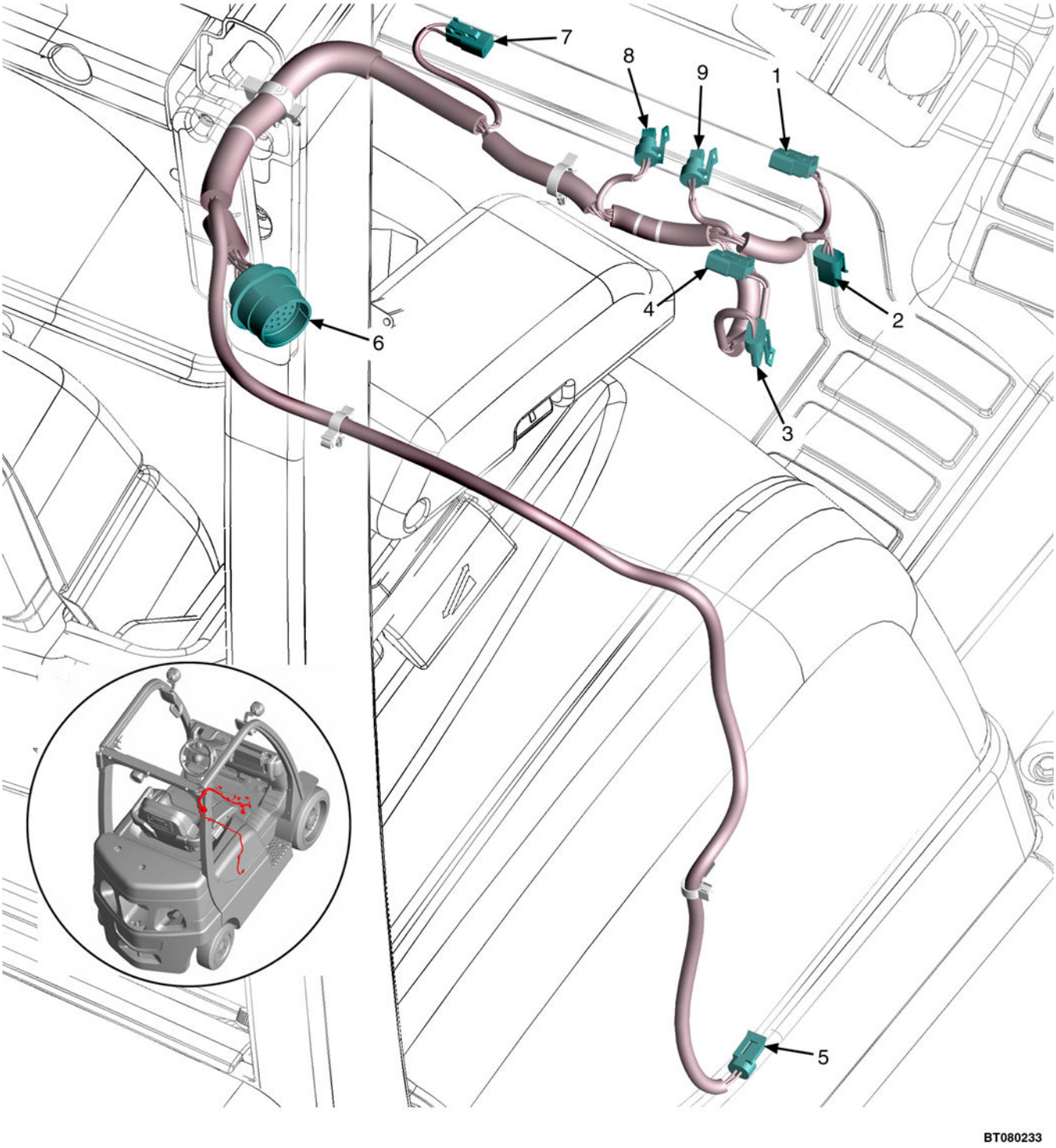
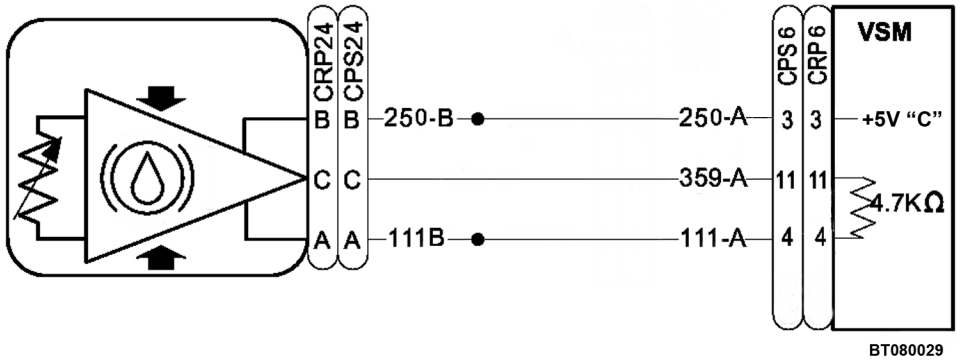


Figure 9030-03-20. Single-Speed Transmission Harness Assembly

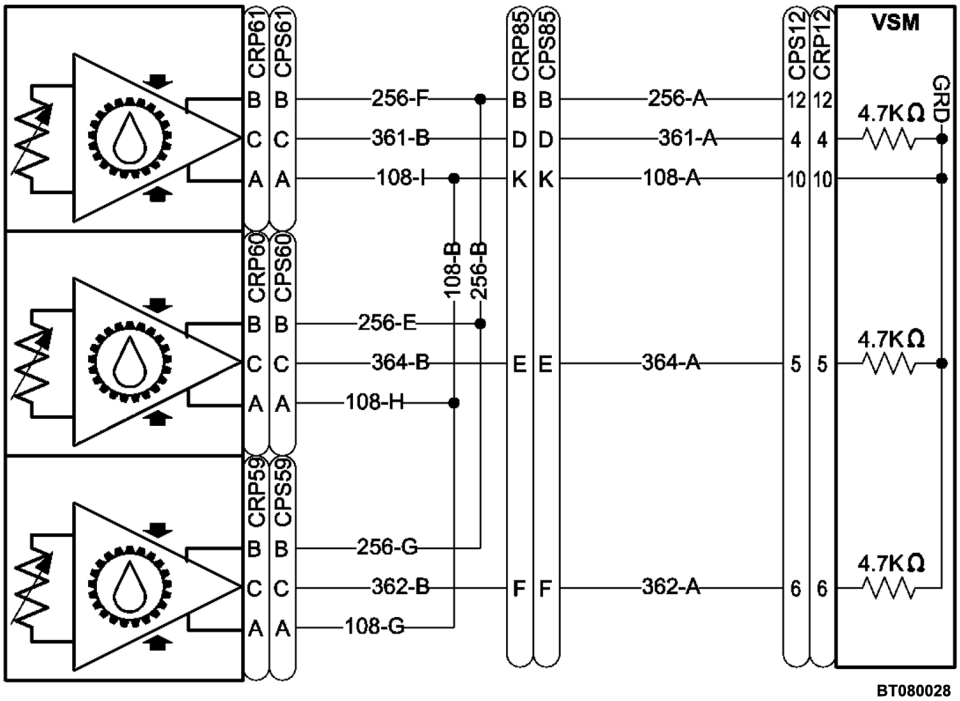
WIRE # 115 = SENSOR GROUND
WIRE # 380 = SENSOR SUPPLY
WIRE # 261 = SENSOR SIGNAL

Oil Pressure (2007 Mazda EPA)



WIRE # 111, (GREEN) = SENSOR GROUND
WIRE # 250, (RED) = SENSOR SUPPLY
WIRE # 359, (WHITE) = SENSOR SIGNAL

Service Brake Pressure Schematic



WIRE # 108, (GREEN) = SENSOR GROUND
WIRE # 256, (RED) = SENSOR SUPPLY
WIRE # 361, (WHITE) = XMSN FWD 1 PRESSURE SENSOR SIGNAL
WIRE # 362, (WHITE) = XMSN FWD 2 PRESSURE SENSOR SIGNAL
WIRE # 364, (WHITE) = XMSN REV PRESSURE SENSOR SIGNAL

XMSN Pressure Sensors Schematic

Temperature Sensor OORL

Analog Reading Below Calibrated Data Threshold

CODES

DTC 110-4 - Coolant Temperature Sensor OORL
DTC 110-4 - Cummins-Code 145. See QSB 3.3L Troubleshooting and Repair
DTC 132-3 - MAF sensor OORL
DTC 171-4 - IAT Sensor Voltage OORL (w/ integrated MAF sensor)
DTC 172-4 - Intake Air Temperature Voltage OORL
DTC 174-4 - Fuel Temp Voltage OORL
DTC 177-4 - Transmission Oil Temperature Sensor OORL
DTC 3242-4 - EGT Sensor #1 OORL
DTC 3246-4 - EGT Sensor #2 OORL
DTC 4765-4 - EGT Sensor #0 OORL
DTC 522231-4 - Transmission Oil Temperature Sensor OORL (TCU)
DTC 522555-4 - Coolant Temperature Sensor OORL (Mazda Gas ECM)
DTC 522603-4 - Fuel Temp (LPG) Voltage OORL
DTC 524010-4 - Hydraulic Tank Temperature Sensor OORL
DTC 524235-4 - Wet Disk Brake Temperature Sensor OORL

POSSIBLE CAUSE

A. SENSOR SIGNAL SHORTED TO SENSOR GROUND.
B. SENSOR SIGNAL SHORTED TO FRAME GROUND.
C. SENSOR FAILURE
D. FUNCTIONAL FAILURE IN CONTROLLER

NOTE
Please refer to the end of this procedure for supporting diagrams.

COMPONENT OPERATIONAL CHECK

PROCEDURE OR ACTION:

1. Turn power to **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC.
   Does reported DTC reoccur?
   YES: Go to Step 2.
   NO: Problem not verified. Resume operation.
2. Conduct a quick visual inspection of all connectors/wiring associated with the displayed fault code.
   Are any faults detected/observed?
   YES: Repair/replace connector or wiring associated with faults found. Refer to the appropriate **Electrical System**YRM .
   NO: Go to CAUSE A.

CAUSE C - SENSOR (THROTTLE BODY) FAILURE

PROCEDURE OR ACTION:

1. Ensure truck power is **OFF**.
2. Disconnect sensor connector.
3. Turn truck power **ON**.
4. Select volts scale on DMM.

NOTE: The throttle position sensors for the Cummins and Yanmar/VSM controlled lift trucks consist of two independent circuits; including sensor supply, sensor return, and sensor signals. When troubleshooting this configuration, make certain both circuits are tested.

5. At the sensor harness connector, measure voltage across sensor supply (+) and sensor ground (−).
   Is voltage approximately +5Vdc?
   YES: Supply connections are OK. Go to Step 6.
   NO: Go to DTC 524261.
6. Ensure truck power is **OFF**.
7. Reconnect sensor connector.
8. Turn truck power **ON**.
9. Go to DSC Service Menu, **ENTER**.
10. Scroll to DIAGNOSTICS, **ENTER**.
11. Scroll to ENGINE DATA, **ENTER**.
12. Scroll to THROTTLE POSITION A (THROTTLE B), **ENTER**.
13. With accelerator pedal released, record Throttle A and Throttle B voltage.
14. Compare readings of the two voltages using the formula: ***(Voltage B x 2 - Sensor Voltage A) x 100 < ±6%.***
    Do the sensor voltages differ by more than ±6%?
    YES: Go to Step 15.
    NO: Go to CAUSE F.
15. Replace sensor (throttle body). Refer to the appropriate **Electrical System**YRM .
16. Repeat Step 3 through Step 14.
    Do the sensor voltages differ by more than ±6%?
    YES: Go to Step 17.
    NO: For Mazda Only go to Step 19. For Cummins 4.5L and Yanmar engines, go to CAUSE E. All other lift trucks, go to CAUSE F.
17. Ensure truck power is **OFF**.
18. Disconnect sensor connector.
19. Change DMM to ohms scale. Verify zero reading on DMM.
20. At throttle body (sensor) connector, monitor the resistance between sensor signal pin 1 and pin 6 while moving the throttle body from fully closed to fully open.
    Does the resistance change smoothly between 870Ω and 1500Ω with no observed interrupts, jumps, or shorts?
    YES: Go to Step 21.
    NO: Replace sensor (throttle body). Refer to the appropriate **Electrical System**YRM and retest per Component Operational CheckStep 3 through Step 8.
21. At throttle body (sensor) connector, monitor the resistance between sensor signal pin 4 and pin 6 while moving the throttle body from fully closed to fully open.
    Does the resistance change smoothly between 1400Ω and 450Ω with no observed interrupts, jumps, or shorts?
    YES: Go to CAUSE D.
    NO: Replace sensor (throttle body). Refer to the appropriate **Electrical System**YRM and retest per Component Operational CheckStep 3 through Step 8.

CAUSE B - SENSOR SIGNAL OPEN CIRCUIT

PROCEDURE OR ACTION:

1. Ensure truck power is **OFF**.
2. Disconnect indicated sensor connector.
3. Change DMM to ohms scale. Verify DMM zero reading.
4. At sensor harness connector, measure resistance between sensor signal pin (+) and sensor ground pin (-).
   Is resistance approximately equal to the resistor value shown in applicable schematic?
   YES: Go to CAUSE F.
   NO: If resistance measurement is infinite, sensor signal wire has open circuit. Locate and repair/replace open wire/connection. See **Wire Harness Repair** 2200YRM1128. If resistance measurement is less than 0.5 ohms, go to CAUSE C.

CAUSE C - SENSOR SIGNAL SHORTED TO SENSOR GROUND

PROCEDURE OR ACTION:

1. Disconnect indicated sensor connector and VSM/ECU/GCU connector.
2. At the sensor harness connector, measure resistance between sensor signal pin (+) and sensor ground pin (-).
   Is resistance less than 0.5 ohms?
   YES: Sensor signal wire is shorted to sensor ground wire. Locate and repair/replace shorted wire/connector. See **Wire Harness Repair** 2200YRM1128.
   NO: Go to CAUSE D.

CAUSE D - SENSOR SIGNAL SHORTED TO FRAME GROUND

PROCEDURE OR ACTION:

1. At the sensor harness connector, measure resistance between sensor signal pin and a clean frame ground on truck.
   Is resistance less than 0.5 ohms?
   YES: Sensor signal wire is shorted to frame ground. Locate and repair/replace shorted wire/connector. See **Wire Harness Repair** 2200YRM1128.
   NO: Go to CAUSE E.

CAUSE E - SENSOR FAILURE

PROCEDURE OR ACTION:

1. Ensure truck power is **OFF**.

NOTE: Do not discard original sensor after removal.

2. Replace sensor.
3. Ensure that all connections are completely inserted.
4. Turn truck power **ON**.
   Does reported DTC reoccur?
   YES: Reinstall original sensor and go to CAUSE F. See **Electrical System** 2200YRM1142.
   NO: Problem has been corrected. Resume operation. Discard faulty sensor.

Drive Command Signal OORL

CODES

DTC 524237-4 - Front Wiper Drive Command OORL
DTC 524238-4 - Rear Wiper Drive Command OORL
DTC 524240-4 - Washer Pump Drive Command OORL

POSSIBLE CAUSE

A. PARK SWITCH STUCK OPEN (DTC 524237 OR 524238 ONLY)
B. MOTOR/PUMP/DRIVE OUTPUT SHORTED TO GROUND
C. SUSTAIN DRIVE SUPPLY FAILURE/OPEN CIRCUIT
D. IGNITION 1 CAB RELAY DEFECTIVE
E. PUMP/DEVICE FAILURE
F. FUNCTIONAL FAILURE IN CONTROLLER

NOTE
Please refer to the end of this procedure for supporting diagrams.

COMPONENT OPERATIONAL CHECK

PROCEDURE OR ACTION:

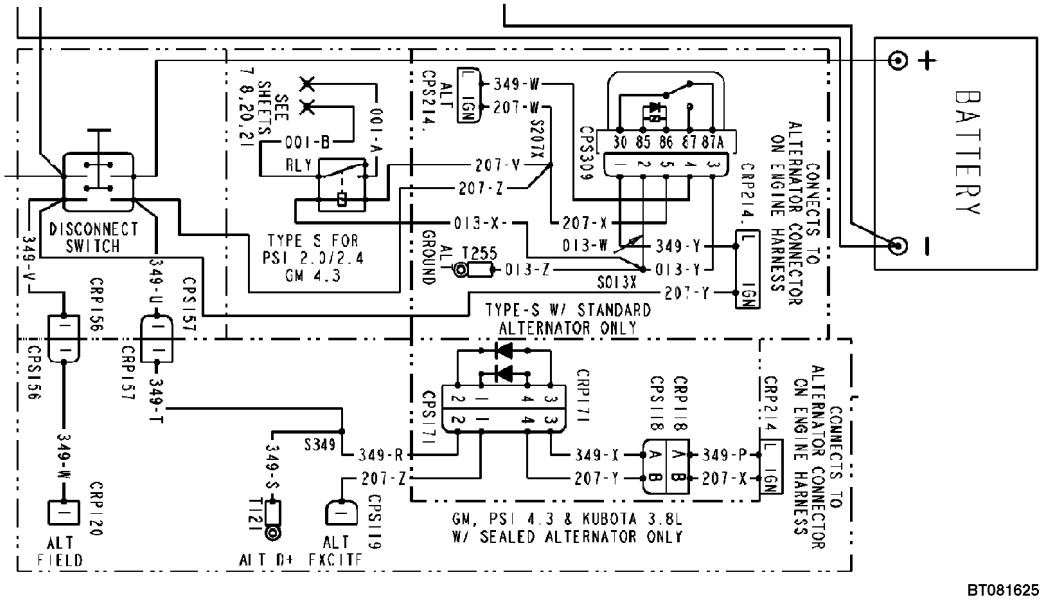
1. Turn power to **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC.
   Does reported DTC reoccur?
   YES: Go to Step 2.
   NO: Problem not verified. Resume operation.
2. Conduct a quick visual inspection of all connectors/wiring associated with the displayed fault code.
   Are any faults detected/observed?
   YES: Repair/replace connector or wiring associated with faults found. See **Electrical System** 2200YRM1142.
   NO: Go to CAUSE A.

CAUSE A - PARK SWITCH STUCK OPEN (DTC 524237 OR 524238 ONLY)

PROCEDURE OR ACTION:

NOTE: This fault will only be detected when wiper delay time of > than 2 seconds is in operation.

1. Disconnect connector on wiper motor.
2. Operate wiper and turn truck power **OFF** before wiper can return to normal park position.
3. Using DMM selected to ohms scale, verify zero reading.
4. Measure resistance between pins 1 and 4 of wiper motor connector CRP 47/48.
   Is resistance greater than 0.5 ohms?
   YES: Park switch is failed in open position. Replace wiper motor. See **Electrical System** 2200YRM1142.
   NO: Go to CAUSE B.



Battery and Charging System Schematic (Kubota 2.4L)

END FAULT

Coil Driver Output OORH

High Source Driver Is Off, Low Source Driver Is On, And Feedback Current Is Greater Than Threshold.

CODES

DTC 523920-3 - REV1 Circuit Shorted High (Powershift Transmission Repair)
DTC 523925-3 - Range1/FWD2/REV1/Return Coil Driver OORH (Powershift Transmission Repair)
DTC 523930-3 - Clutch FWD1/Return Coil Driver OORH (Powershift Transmission Repair)
DTC 523977-3 - Aux 2 Base/Rod Return Coil Driver OORH (Main Control Valve)
DTC 523978-3 - Aux 1 Base/Rod Return Coil Driver OORH (Main Control Valve)
DTC 523986-3 - Aux 3 Base/Rod Return Coil Driver OORH (Main Control Valve)
DTC 524284-3 - Lift/Lower/Return Coil Driver OORH (Main Control Valve)
DTC 524285-3 - Tilt Base Coil Driver OORH (Main Control Valve)

POSSIBLE CAUSE

A. COIL DRIVER OUTPUT/DRIVER RETURN SHORTED TO BATTERY
B. COIL DRIVER OUTPUT/DRIVER RETURN OPEN CIRCUIT
C. VALVE COIL OPEN CIRCUIT
D. FUNCTIONAL VALVE FAILURE
E. FUNCTIONAL FAILURE IN CONTROLLER

NOTE
Please refer to the end of this procedure for supporting diagrams.

COMPONENT OPERATIONAL CHECK

PROCEDURE OR ACTION:

1. Turn power to **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC.
   Does reported DTC reoccur?
   YES: Go to Step 2.
   NO: Problem not verified. Resume operation.
2. Conduct a quick visual inspection of all connectors/wiring associated with the displayed fault code.
   Are any faults detected/observed?
   YES: Repair/replace connector or wiring associated with faults found. See **Electrical System** 2200YRM1142.
   NO: Go to CAUSE A.

Pressure Sensor Data Out of NOR

CODES

DTC 106-0 - MAP Sensor Pressure Greater Than NOR
DTC 106-1 - MAP Sensor Pressure Less Than NOR
DTC 106-2 - MAP Sensor Pressure Present At Stall
DTC 106-14 - MAP Sensor While Cranking, Not Different From Atmospheric Pressure
DTC 157-0 - Rail Pressure Greater Than NOR

POSSIBLE CAUSE

A. MAP SENSOR FAILURE
B. BAD RAIL PRESSURE SENSOR
C. BAD SUCTION CONTROL VALVE (SCV) (KUBOTA ONLY)
D. BAD FUEL PUMP
E. FUNCTIONAL FAILURE IN CONTROLLER

NOTE
Please refer to the end of this procedure for supporting diagrams.

COMPONENT OPERATIONAL CHECK

PROCEDURE OR ACTION:

1. Turn power to **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC. Start engine.
   Does reported DTC reoccur?
   YES: Stop engine and turn power to **OFF**. Go to Step 2.
   NO: Problem not verified or problem resolved. Resume operation.
2. Conduct a quick visual inspection of all connectors/wiring associated with the displayed fault code.
   Are any of the connectors/wiring damaged?
   YES: Repair/replace connector or wiring associated with faults found. Refer to the appropriate **Electrical System**YRM . Repeat Step 1.
   NO: Go to CAUSE A.

CAUSE A - MAP SENSOR FAILURE

PROCEDURE OR ACTION:

1. Ensure truck power is **OFF**.

NOTE: Do not discard original sensor after removal.

2. Replace sensor.
3. Ensure that all connections are completely inserted.
4. Turn truck power **ON**.
   Does reported DTC reoccur?
   YES: Reinstall original sensor and go to CAUSE B. Refer to the appropriate **Electrical System**YRM .
   NO: Problem has been corrected. Resume operation. Discard faulty sensor.

CAUSE A - SENSOR SIGNAL RETURN SHORTED HIGH

PROCEDURE OR ACTION:

WARNING

Exhaust system components are hot to touch. Be sure exhaust system components are cool before starting disassembly, or personal injury may occur.

1. Ensure truck power is **OFF**.
2. Select volts on DMM scale.
3. Disconnect the sensor connector and the indicated connector from the ECU. See Harness Assembly Data.
4. At the sensor connector, check voltage between signal return pin and ground.
   Is there a voltage potential on the signal wire?
   YES: The sensor return wire is shorted to power. Locate and repair/replace shorted wire/connection. Refer to appropriate **Electrical System** manual, depending on lift truck model.
   NO: Replace sensor. Refer to appropriate **Electrical System** manual, depending on lift truck model. Go to Step 5.
5. Restore all connections/components. Repeat Component Operational Check.
   Does DTC reoccur?
   YES: Go to CAUSE B.
   NO: Problem has been corrected. Resume operation.

CAUSE B - FUNCTIONAL FAILURE IN CONTROLLER

PROCEDURE OR ACTION:

1. Ensure all previous procedures have been completed.
2. Ensure truck power is **OFF**.
3. Ensure that all connections to the controller are completely inserted.
4. Ensure truck power is **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC.
   Does reported DTC reoccur?
   YES: Go to Step 5.
   NO: Problem corrected. Resume operation.
5. At the DSC, press **ENTER** to access Main Menu.
6. Scroll to VIEW VERSIONS, press **ENTER**.
7. Scroll to TRUCK SERIAL NUMBER, press **ENTER**.
8. View the TRUCK SERIAL NUMBER on the display.
   Does the truck serial number on display match serial number on truck nameplate (VSM Only)?
   YES: Go to Step 9.
   NO: Controller has been substituted from another truck. Replace VSM with VSM that has the correct truck serial number or obtain new VSM with correct Serial number/ CDF. Refer to appropriate **Electrical System** manual, depending on lift truck model.
9. **Resident Service Approval Required prior to VSM replacement for Trucks under warranty.** Make sure to indicate the DTC code(s) on the warranty claim and include an accurate problem description leading to the controller replacement.
10. For other controllers, Replace indicated controller. (ECU-ECM/GCU/TCU). Refer to appropriate **Electrical System** and **LPG Fuel System** or **Gasoline Fuel System** manual, depending on lift truck model.
11. Reinstall all removed components and ensure that all connectors are completely inserted.

NOTE: For Post 2007 Engine Connectors Interface, see Post 2007 Engine Connections.

12. Repeat Component Operational Check.

1. Turn power to **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC.
   Does reported DTC reoccur?
   YES: Go to Step 2.
   NO: Problem not verified or problem resolved. Resume operation.
2. Conduct a quick visual inspection of all connectors/wiring associated with the displayed fault code.
   Are any of the connectors/wiring damaged?
   YES: Repair/replace connector or wiring associated with faults found. Refer to the appropriate **Electrical System**YRM . Repeat Step 1.
   NO: Go to CAUSE A.

CAUSE A - FUEL INJECTOR OPEN CIRCUIT

PROCEDURE OR ACTION:

1. Ensure truck power is **OFF**.
2. At injector indicated by DTC, disconnect connector.
3. At ECU, as indicated in schematic, remove indicated connector.
4. Set DMM to ohms scale. Verify DMM zero reading.
5. Measure the resistance between each indicated pin on injector connector and corresponding pin on ECU connector.
   Is resistance less than 0.5 ohms?
   YES: Go to CAUSE B.
   NO: The injector harness has an open connection. Locate and repair/replace open wire/connection. Refer to the appropriate **Wiring Harness Repair**YRM .

CAUSE B - SUCTION CONTROL VALVE (SCV) OPEN CIRCUIT (KUBOTA ONLY)

PROCEDURE OR ACTION:

1. Ensure truck power is **OFF**.
2. Disconnect the wiring harness connector from the SCV.
3. At ECM, as indicated in schematic, remove indicated connector.
4. Verify DMM to ohms scale. Verify DMM zero reading.
5. Measure the resistance between each indicated pin on SCV wiring harness connector and corresponding pin on ECU connector.
   Is resistance low or close to zero ohms?
   YES: Go to CAUSE C.
   NO: The SCV wiring harness has an open connection. Locate and repair/replace open wire/connection. Refer to the appropriate **Wiring Harness Repair**YRM .

CAUSE C - SUCTION CONTROL VALVE (SCV) SHORTED TO GROUND (KUBOTA ONLY)

PROCEDURE OR ACTION:

1. Ensure truck power is **OFF**.
2. Verify DMM to ohms scale. Verify DMM zero reading.
3. Measure the resistance between each indicated pin on SCV wiring harness connector and ground.
   Is resistance low or close to zero ohms?
   YES: The SCV wiring harness has an shorted connection. Locate and repair/replace open wire/connection. Refer to the appropriate **Wiring Harness Repair**YRM .
   NO: If lift truck is equipped with an Injector Driver Module, go to CAUSE D. Otherwise, go to CAUSE E.

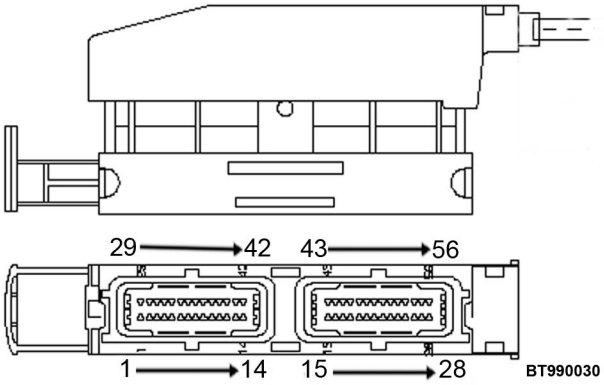
CAUSE E - FUNCTIONAL FAILURE IN CONTROLLER

PROCEDURE OR ACTION:

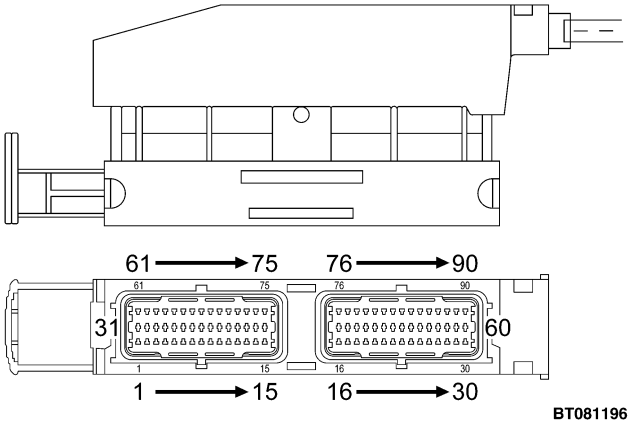
1. Ensure all previous procedures have been completed.
2. Ensure truck power is **OFF**.
3. Ensure that all connections to the controller are completely inserted.
4. Ensure truck power is **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC.
   Does reported DTC reoccur?
   YES: Go to Step 5.
   NO: Problem corrected. Resume operation.
5. At the DSC, press **ENTER** to access Main Menu.
6. Scroll to VIEW VERSIONS, press **ENTER**.
7. Scroll to TRUCK SERIAL NUMBER, press **ENTER**.
8. View the TRUCK SERIAL NUMBER on the display.
   Does the truck serial number on display match serial number on truck nameplate (VSM Only)?
   YES: Go to Step 9.
   NO: Controller has been substituted from another truck. Replace VSM with VSM that has the correct truck serial number or obtain new VSM with correct Serial number/ CDF. See **Electrical System** 2200YRM1142.
9. **Resident Service Approval Required prior to VSM replacement for Trucks under warranty.** Make sure to indicate the DTC code(s) on the warranty claim and include an accurate problem description leading to the controller replacement.
10. For other controllers, Replace indicated controller. (ECU-ECM/GCU/TCU). See **Electrical System** 2200YRM1142. For GM 4.3L LPG engines, see **LPG Fuel System, GM 4.3L Engine with GFI** 0900YRM1242. For GM 4.3L gasoline engines, see **Gasoline Fuel System** 0900YRM1244 for all controllers.
11. Reinstall all removed components and ensure that all connectors are completely inserted.
12. Repeat Component Operational Check.

END POSSIBLE CAUSES

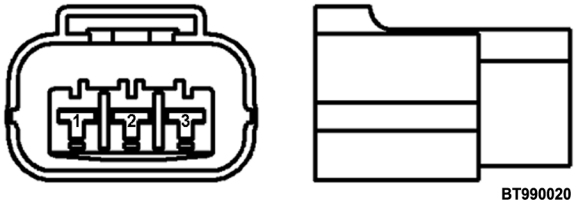
CONNECTOR(S)



Mazda ECU Connector CPS 202



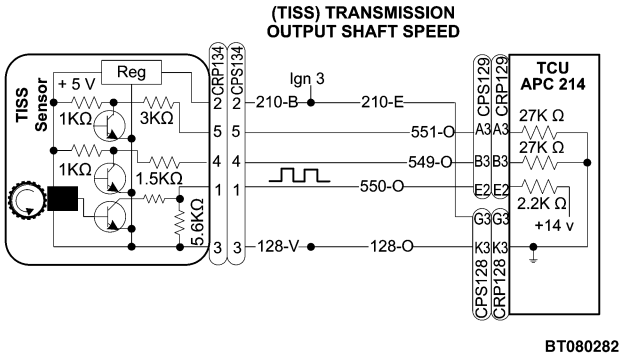
GM (2011) and Mazda ECU Connector CPS 202 (2007 Mazda EPA and 2011 GM)



Mazda MAP Sensor Connector

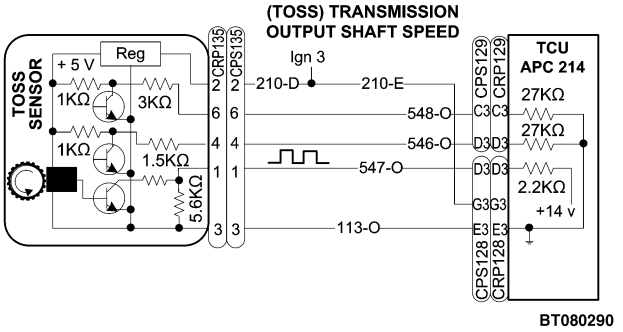
END FAULT

DIAGRAMS



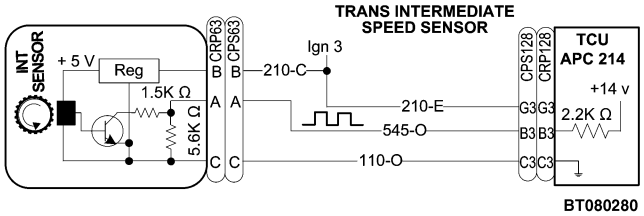
- WIRE # 128 (DK GRN) = SENSOR RETURN
- WIRE # 210 (RED) = SENSOR SUPPLY
- WIRE # 549 (WHITE) = SENSOR SIGNAL
- WIRE # 550 (WHITE) = SENSOR SIGNAL
- WIRE # 551 (WHITE) = SENSOR SIGNAL

TISS Transmission Input Shaft Speed



- WIRE # 113 (DK GRN) = SENSOR RETURN
- WIRE # 210 (RED) = SENSOR SUPPLY
- WIRE # 546 (WHITE) = SENSOR SIGNAL
- WIRE # 547 (WHITE) = SENSOR SIGNAL
- WIRE # 548 (WHITE) = SENSOR SIGNAL

TOSS Transmission Output Shaft Speed



- WIRE # 110 (DK GRN) = SENSOR RETURN
- WIRE # 210 (RED) = SENSOR SUPPLY
- WIRE # 545 (WHITE) = SENSOR SIGNAL

Transmission Intermediate Shaft Speed Sensor

Calibration - Algorithm Failed

CODES

DTC 522197-14 - Range2 Calibration Error Cause Algorithm Failed
DTC 522198-14 - Range1 Calibration Error Cause Algorithm Failed
DTC 522199-14 - REV1 Calibration Error Cause Algorithm Failed
DTC 522200-14 - FWD2 Calibration Error Cause Algorithm Failed
DTC 522201-14 - FWD1 Calibration Error Cause Algorithm Failed
DTC 522201-16 - Clutch Calibration Error Cause Algorithm Failed

POSSIBLE CAUSE

A. INCORRECT PARAMETER IN APT FILE

COMPONENT OPERATIONAL CHECK

PROCEDURE OR ACTION:

1. Turn power to **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC.
   Does reported DTC reoccur?
   YES: Go to Step 2.
   NO: Problem not verified. Resume operation.
2. Conduct a quick visual inspection of all connectors/wiring associated with the displayed fault code.
   Are any faults detected/observed?
   YES: Repair/replace connector or wiring associated with faults found. See **Electrical System** 2200YRM1142.
   NO: Go to CAUSE A.

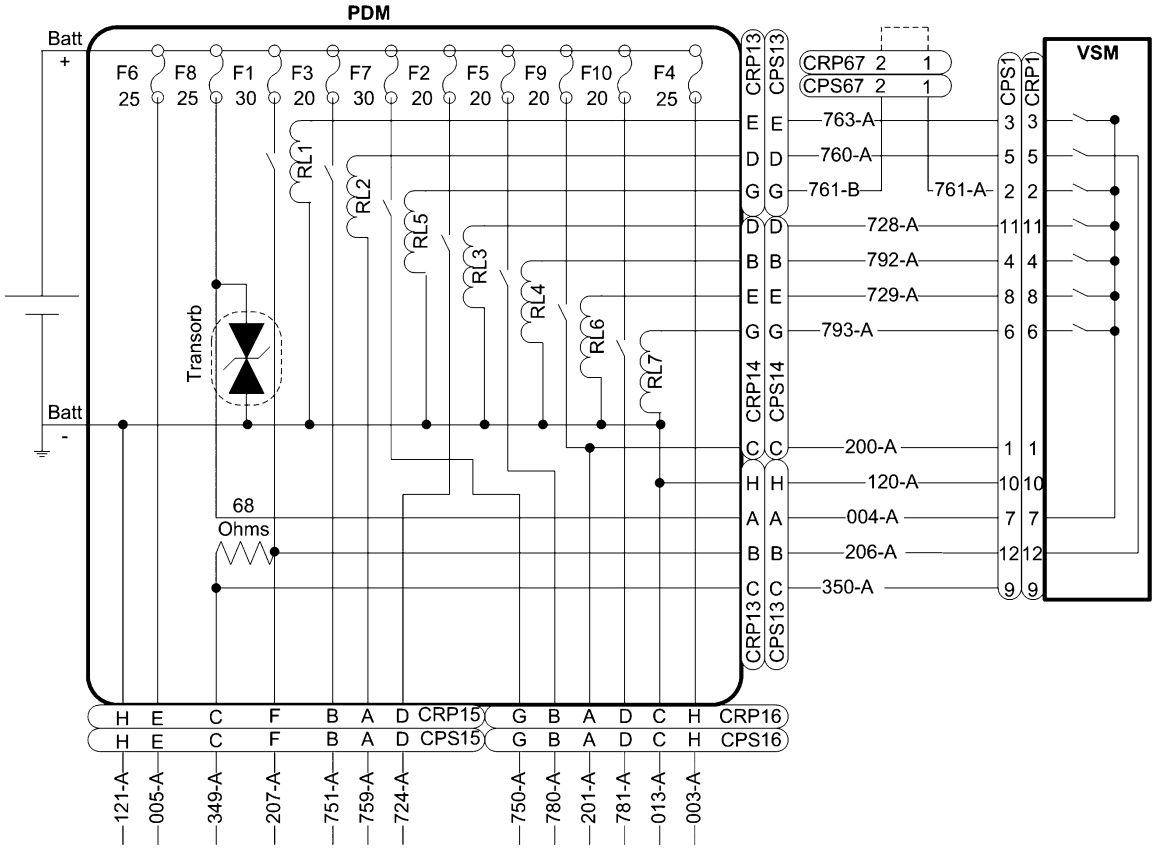
CAUSE A - INCORRECT PARAMETER IN APT FILE

PROCEDURE OR ACTION:

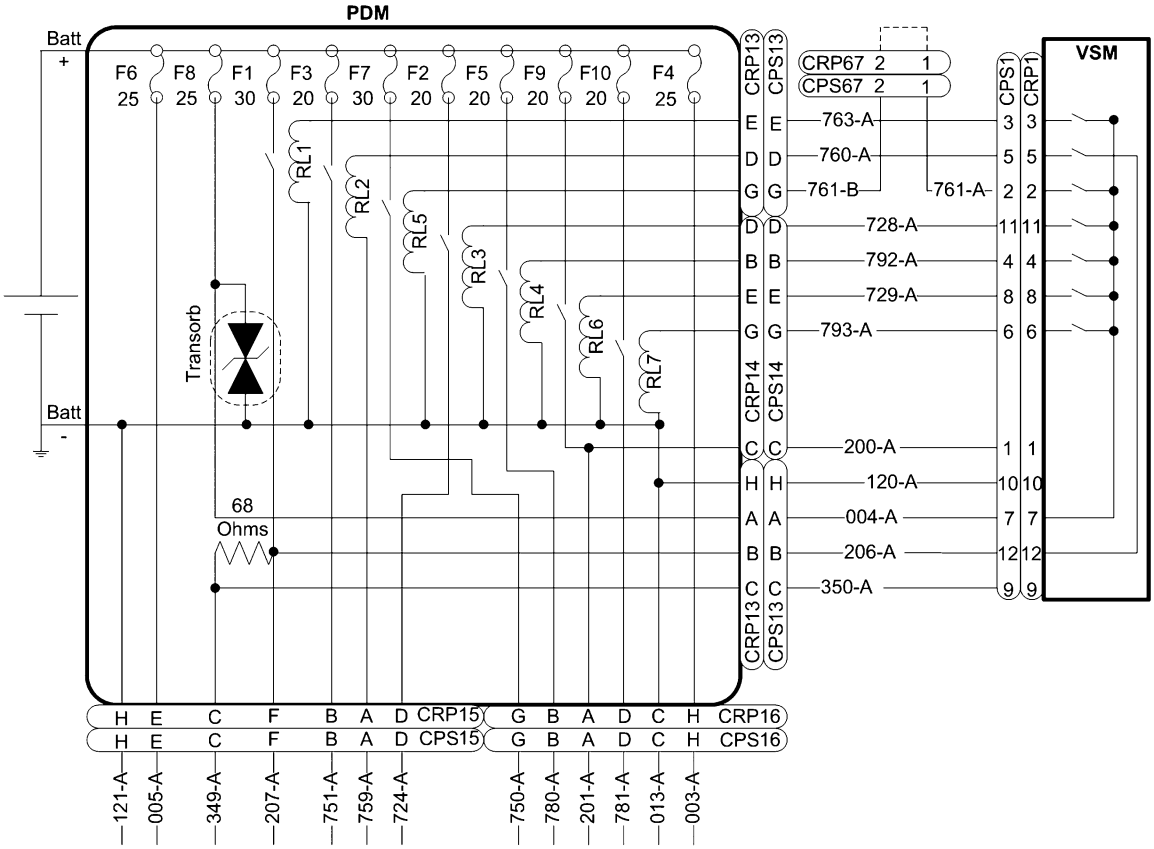
1. Reprogram the TCU using the Dana Dashboard.
2. Cycle power to **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC.
   Does DTC reoccur?
   YES: Go to Step 3.
   NO: Problem not verified. Resume operation.
3. Contact your local **YALE** dealer or see **Yale Axcess Online** .

END POSSIBLE CAUSES

END FAULT



- WIRE # 003 (RED) = FUSED BATTERY POWER (F4)
- WIRE # 004 (RED) = FUSED BATTERY POWER (F8)
- WIRE # 005 (RED) = FUSED BATTERY POWER (F6)
- WIRE # 013 (BLK) = BATTERY GROUND
- WIRE # 109 (BLK = VSM POWER GROUND
- WIRE # 120 (BLK) = BATTERY GROUND
- WIRE # 121 (BLK) = BATTERY GROUND
- WIRE # 200 (RED) = IGN 1 POWER (RL6) OUTPUT
- WIRE # 201 (RED) = IGN 1 POWER (RL6) OUTPUT
- WIRE # 203 (RED) = IGN 2 VSM REGULATED OUTPUT
- WIRE # 206 (RED) = IGN 3 POWER (RL1) OUTPUT
- WIRE # 207 (RED) = IGN 3 POWER (RL1) OUTPUT
- WIRE # 349 (WHITE) = ALTERNATOR EXCITE
- WIRE # 350 (WHITE) = ALTERNATOR EXCITE
- WIRE # 724 (WHITE) = BACK UP ALARM OUTPUT (RL3)
- WIRE # 728 (RED) = RELAY 3 (BACK UP ALARM) DRIVER
- WIRE # 729 (RED) = RELAY 6 (IGN 1) DRIVER
- WIRE # 750 (WHITE) = START RELAY (RL5) OUTPUT
- WIRE # 751 (RED) = FUEL RELAY (RL2) OUTPUT
- WIRE # 759 (WHITE) = FUEL RELAY RETURN (ECU)
- WIRE # 760 (RED) = RELAY 2 (FUEL PUMP) DRIVER
- WIRE # 761 (RED) = RELAY 5 (STARTER) DRIVER
- WIRE # 763, (RED) = RELAY 1 (IGN3) DRIVER
- WIRE # 780 (WHITE) = FRONT WORK LIGHTS (RL4) OUTPUT
- WIRE # 781 (WHITE) = REAR WORK LIGHTS (RL7) OUTPUT
- WIRE # 792 (RED) = RELAY 4 (FRONT WORK LIGHTS) DRIVER
- WIRE # 793 (RED) = RELAY 7 (REAR WORK LIGHTS) DRIVER



- WIRE # 003 (RED) = FUSED BATTERY POWER (F4)
- WIRE # 004 (RED) = FUSED BATTERY POWER (F8)
- WIRE # 005 (RED) = FUSED BATTERY POWER (F6)
- WIRE # 013 (BLK) = BATTERY GROUND
- WIRE # 109 (BLK = VSM POWER GROUND
- WIRE # 120 (BLK) = BATTERY GROUND
- WIRE # 121 (BLK) = BATTERY GROUND
- WIRE # 200 (RED) = IGN 1 POWER (RL6) OUTPUT
- WIRE # 201 (RED) = IGN 1 POWER (RL6) OUTPUT
- WIRE # 203 (RED) = IGN 2 VSM REGULATED OUTPUT
- WIRE # 206 (RED) = IGN 3 POWER (RL1) OUTPUT
- WIRE # 207 (RED) = IGN 3 POWER (RL1) OUTPUT
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- WIRE # 750 (WHITE) = START RELAY (RL5) OUTPUT
- WIRE # 751 (RED) = FUEL RELAY (RL2) OUTPUT
- WIRE # 759 (WHITE) = FUEL RELAY RETURN (ECU)
- WIRE # 760 (RED) = RELAY 2 (FUEL PUMP) DRIVER
- WIRE # 761 (RED) = RELAY 5 (STARTER) DRIVER
- WIRE # 763, (RED) = RELAY 1 (IGN3) DRIVER
- WIRE # 780 (WHITE) = FRONT WORK LIGHTS (RL4) OUTPUT
- WIRE # 781 (WHITE) = REAR WORK LIGHTS (RL7) OUTPUT
- WIRE # 792 (RED) = RELAY 4 (FRONT WORK LIGHTS) DRIVER
- WIRE # 793 (RED) = RELAY 7 (REAR WORK LIGHTS) DRIVER

CAUSE B - FUNCTIONAL FAILURE IN CONTROLLER

PROCEDURE OR ACTION:

1. Ensure all previous procedures have been completed.
2. Ensure truck power is **OFF**.
3. Ensure that all connections to the controller are completely inserted.
4. Ensure truck power is **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC.
   Does reported DTC reoccur?
   YES: Go to Step 5.
   NO: Problem corrected. Resume operation.
5. At the DSC, press **ENTER** to access Main Menu.
6. Scroll to VIEW VERSIONS, press **ENTER**.
7. Scroll to TRUCK SERIAL NUMBER, press **ENTER**.
8. View the TRUCK SERIAL NUMBER on the display.
   Does the truck serial number on display match serial number on truck nameplate (VSM Only)?
   YES: Go to Step 9.
   NO: Controller has been substituted from another truck. Replace VSM with VSM that has the correct truck serial number or obtain new VSM with correct Serial number/ CDF. Refer to the appropriate **Electrical System**YRM .
9. **Resident Service Approval Required prior to VSM replacement for Trucks under warranty.** Make sure to indicate the DTC code(s) on the warranty claim and include an accurate problem description leading to the controller replacement.
10. For other controllers, replace indicated controller. Refer to the appropriate **Electrical System** and **Fuel System**YRM .
11. Reinstall all removed components and ensure that all connectors are completely inserted.
12. Repeat Component Operational Check.

END POSSIBLE CAUSES

END FAULT

DTC 522518-5
Ground Reference Open

POSSIBLE CAUSE

A. GROUND REFERENCE WIRE FROM ECM OPEN
B. FUNCTIONAL FAILURE IN CONTROLLER

NOTE
Please refer to the end of this procedure for supporting diagrams.

COMPONENT OPERATIONAL CHECK

PROCEDURE OR ACTION:

1. Turn power to **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC.
   Does reported DTC reoccur?
   YES: Go to CAUSE A.
   NO: Problem not verified. Resume operation.
2. Conduct a quick visual inspection of all connectors/wiring associated with the displayed fault code.
   Are any faults detected/observed?
   YES: Repair/Replace connector or wiring associated with faults found. See **Electrical System** 2200YRM1142.
   NO: Go to CAUSE A.

CAUSE A - GROUND REFERENCE WIRE FROM ECM OPEN

PROCEDURE OR ACTION:

1. Ensure truck power is OFF.
2. Disconnect CRS 202 from Interface Module.
3. Disconnect CRS 203 from the ECM.
4. Change DMM to read ohms.
5. Check for continuity between pin 39 of CRS 202 and pins 46 of CRS 203.
   Is there continuity between CRS 202 and CRS 203?
   YES: The ground reference is ok. Go to Step 6.
   NO: Repair/replace shorted wire/connection. See **Wire Harness Repair** 2200YRM1128.
6. Turn truck power **ON**.
7. Ignore any new DTCs generated due to open connections.
8. Repeat the measurements from Step 5.
   Does reported DTC reoccur?
   YES: Go to Step 10 of CAUSE B.
   NO: Resume operation.

DTC 1347-5
SCV Driver Open Circuit

POSSIBLE CAUSE

A. SUCTION CONTROL VALVE (SCV) SHORTED TO POWER
B. SUCTION CONTROL VALVE (SCV) SHORTED TO GROUND
C. BAD SUCTION CONTROL VALVE (SCV)
D. FAULTY ECU

NOTE
Please refer to the end of this procedure for supporting diagrams.

COMPONENT OPERATIONAL CHECK

PROCEDURE OR ACTION:

1. Turn power to **OFF** for no less than 30 seconds, and then to **ON** to clear displayed DTC.
   Does reported DTC reoccur?
   YES: Go to Step 2.
   NO: Problem not verified. Resume operation.
2. Conduct a quick visual inspection of all connectors/wiring associated with the displayed fault code.
   Are any faults detected/observed?
   YES: Repair/Replace connector or wiring associated with faults found. Refer to the appropriate **Electrical System**YRM .
   NO: Go to CAUSE A.

CAUSE A - SUCTION CONTROL VALVE (SCV) SHORTED TO POWER

PROCEDURE OR ACTION:

1. Turn key to ON position. Using the PC Service Tool, view the **Target SCV Current** and **Actual SCV Current.**
   Does Actual Current follow Target Current?
   YES: Clear DTC and retest system. If DTC returns, go to CAUSE D.
   NO: Go to Step 2.
2. Disconnect ECU Connector and measure voltage between ECU connector 1, socket 1-11 and B(-) ground.
   Is voltage approximately 0 volts?
   YES: Go to Step 3.
   NO: SCV harness is shorted to a switched battery source. Refer to the appropriate **Diagrams and Schematics**YRM to determine possible source. Locate and repair/replace shorted wire/connection. Refer to the appropriate **Wiring Harness Repair**YRM .
3. Measure voltage between ECU connector 1, socket 1-12 and B(-) ground.
   Is voltage approximately 0 volts?
   YES: Turn key OFF, disconnect battery, and proceed to CAUSE B.
   NO: SCV harness is shorted to a switched battery source. Refer to the appropriate **Diagrams and Schematics**YRM to determine possible source. Locate and repair/replace shorted wire/connection. Refer to the appropriate **Wiring Harness Repair**YRM .

CAUSE B - COOLANT TEMPERATURE SENSOR FAULT

PROCEDURE OR ACTION:

1. Measure resistance between the coolant temperature sensor, pin 1 and pin 2.
   - 20°C(68°F) Approx 2.5kΩ
   - 40°C(104°F) Approx 1.2kΩ
   - 60°C(140°F) Approx 0.58kΩ
   - 80°C(176°F) Approx 0.32kΩ
   - 100°C(212°F) Approx 0.18kΩ

   Is resistance within specifications?
   YES: Proceed to CAUSE C.
   NO: Replace faulty coolant temperature sensor.

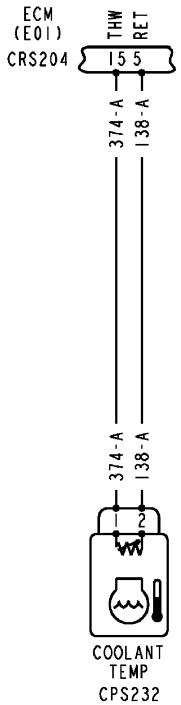
CAUSE C - ECU FAULT

PROCEDURE OR ACTION:

1. If no wiring or communication faults are present, replace faulty ECU, clear DTC and retest system.

END POSSIBLE CAUSES

DIAGRAMS



BT081746

Troubleshooting Scenes

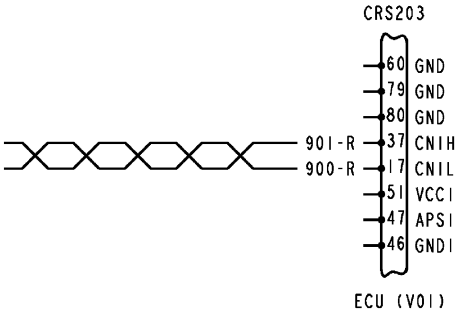
CAUSE B - ECU FAULT

PROCEDURE OR ACTION:

1. If no wiring or communication faults are present, replace faulty ECU, clear DTC and retest system.

END POSSIBLE CAUSES

DIAGRAMS



Troubleshooting Scenes

END FAULT

CAUSE A - RAIL PRESSURE SENSOR WIRING FAULT

PROCEDURE OR ACTION:

NOTE: Key in ON position.

NOTE: The rail pressure sensor and crank sensor share 5 volt reference circuit 267-A,

1. Disconnect the rail pressure sensor connector CPS254 and measure voltage between socket 3 and B(-).
   Is voltage 5 ± 0.5 Vdc?
   YES: Proceed to Step 2.
   NO: Inspect circuit 267-B and 267-A for open or short.
2. Measure voltage between the rail pressure sensor connector CPS254, socket 3 and socket 1.
   Is voltage 5 ± 0.5 Vdc?
   YES: Disconnect battery and proceed to Step 3.
   NO: Inspect ground circuit 131-A for open or short.
3. Disconnect ECU connector CRS204. Measure resistance between the ECU connector CRS204, socket 13 and the rail pressure sensor connector CPS254, socket 2.
   Is resistance ≤ 1 ohm?
   YES: Connect ECU connector CRS204 and proceed to CAUSE B.
   NO: Inspect signal circuit 389-C for open, short, or source of excessive resistance.

CAUSE B - RAIL PRESSURE SENSOR FAULT

PROCEDURE OR ACTION:

NOTE: Key ON, engine OFF

1. Measure voltage between the pressure sensor connector CPS254, socket 2 and B(-).
   Is voltage approximately 0.5 Vdc?
   YES: Proceed to Step 2.
   NO: Proceed to CAUSE C.

NOTE: Key ON, engine ON.

2. Start engine and measure voltage between the pressure sensor connector CPS254, socket 2 and B(-).
   Is voltage between 0.9 and 2.9 Vdc?
   YES: Proceed to CAUSE C.
   NO: Replace faulty rail pressure sensor.

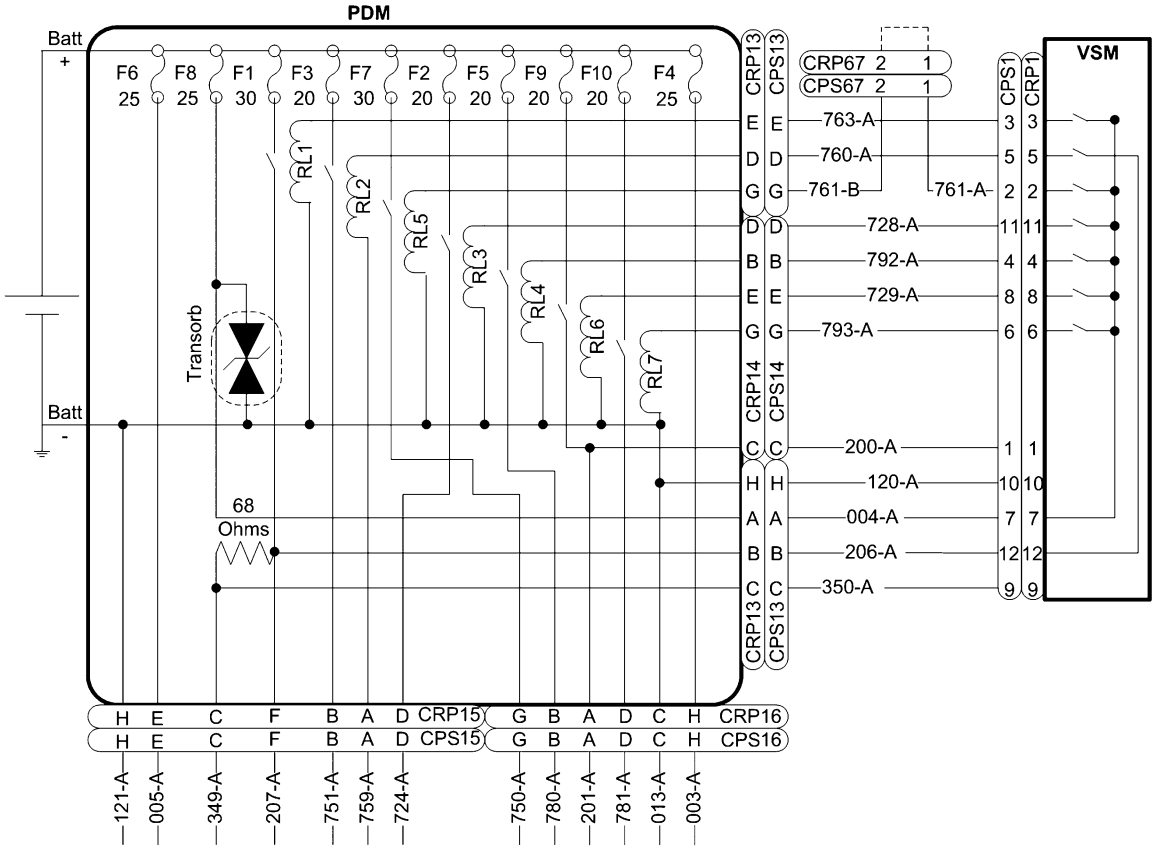
CAUSE C - ECU FAULT

PROCEDURE OR ACTION:

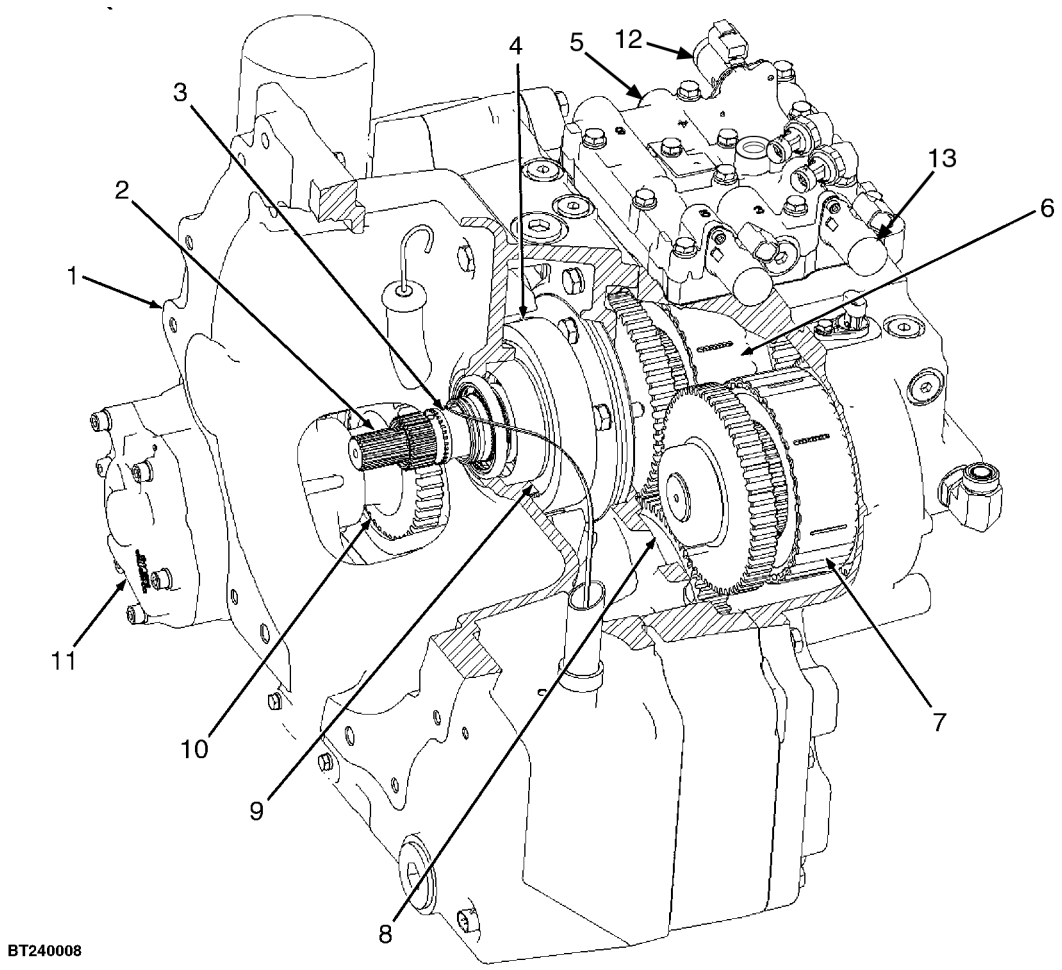
1. If no wiring or communication faults are present, replace faulty ECU, clear DTC and retest system.

END POSSIBLE CAUSES

Vehicle Does Not Power On

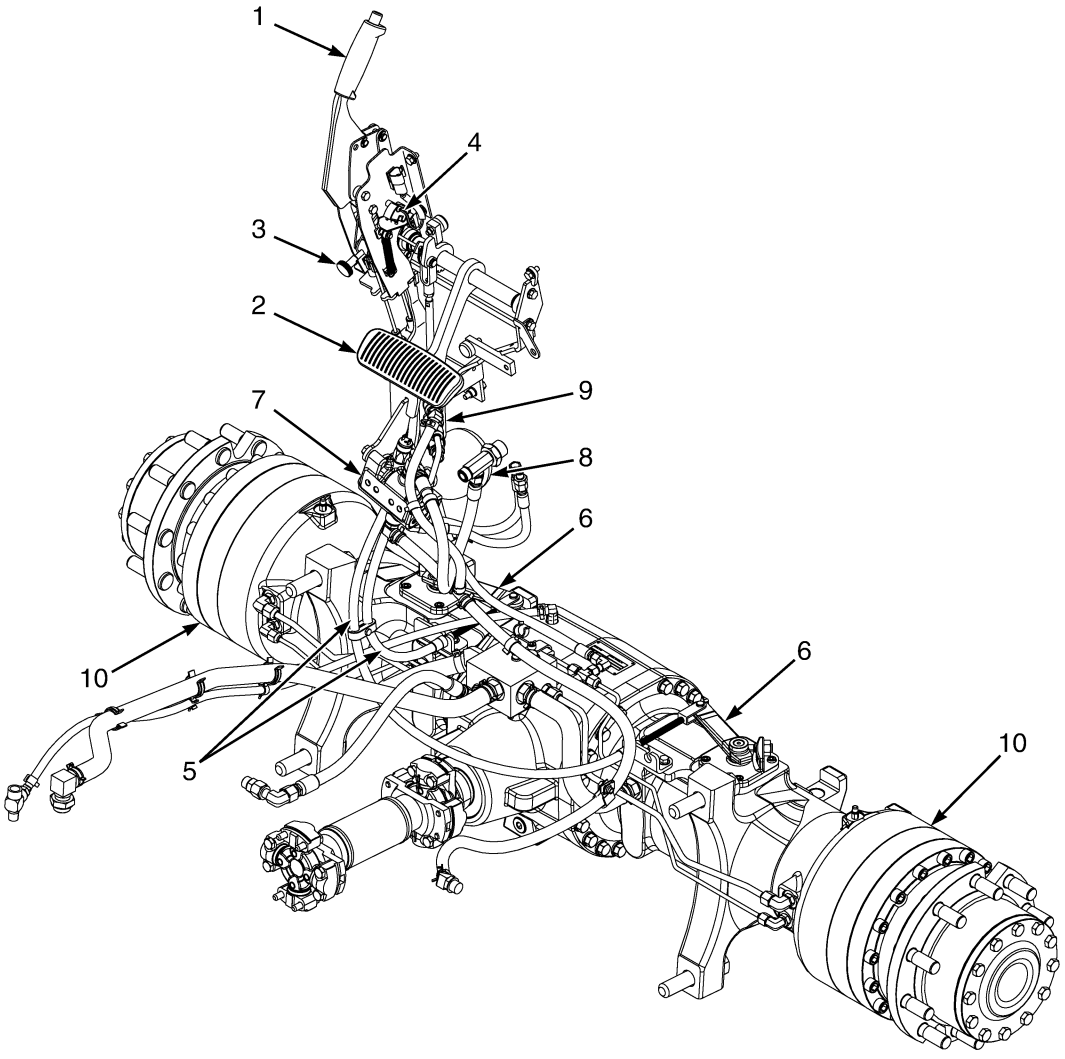


- WIRE # 003 (RED) = FUSED BATTERY POWER (F4)
- WIRE # 004 (RED) = FUSED BATTERY POWER (F8)
- WIRE # 005 (RED) = FUSED BATTERY POWER (F6)
- WIRE # 013 (BLK) = BATTERY GROUND
- WIRE # 109 (BLK = VSM POWER GROUND
- WIRE # 120 (BLK) = BATTERY GROUND
- WIRE # 121 (BLK) = BATTERY GROUND
- WIRE # 200 (RED) = IGN 1 POWER (RL6) OUTPUT
- WIRE # 201 (RED) = IGN 1 POWER (RL6) OUTPUT
- WIRE # 203 (RED) = IGN 2 VSM REGULATED OUTPUT
- WIRE # 206 (RED) = IGN 3 POWER (RL1) OUTPUT
- WIRE # 207 (RED) = IGN 3 POWER (RL1) OUTPUT
- WIRE # 349 (WHITE) = ALTERNATOR EXCITE
- WIRE # 350 (WHITE) = ALTERNATOR EXCITE
- WIRE # 724 (WHITE) = BACK UP ALARM OUTPUT (RL3)
- WIRE # 728 (RED) = RELAY 3 (BACK UP ALARM) DRIVER
- WIRE # 729 (RED) = RELAY 6 (IGN 1) DRIVER
- WIRE # 750 (WHITE) = START RELAY (RL5) OUTPUT
- WIRE # 751 (RED) = FUEL RELAY (RL2) OUTPUT
- WIRE # 759 (WHITE) = FUEL RELAY RETURN (ECU)
- WIRE # 760 (RED) = RELAY 2 (FUEL PUMP) DRIVER
- WIRE # 761 (RED) = RELAY 5 (STARTER) DRIVER
- WIRE # 763, (RED) = RELAY 1 (IGN3) DRIVER
- WIRE # 780 (WHITE) = FRONT WORK LIGHTS (RL4) OUTPUT
- WIRE # 781 (WHITE) = REAR WORK LIGHTS (RL7) OUTPUT
- WIRE # 792 (RED) = RELAY 4 (FRONT WORK LIGHTS) DRIVER
- WIRE # 793 (RED) = RELAY 7 (REAR WORK LIGHTS) DRIVER



1. TORQUE CONVERTER HOUSING
2. INPUT SHAFT
3. STATOR
4. CHAIN
5. CONTROL VALVE
6. FORWARD CLUTCH PACK
7. REVERSE CLUTCH PACK
8. MAIN TRANSMISSION OUTPUT GEAR
9. DRIVE SPROCKET
10. PUMP SPROCKET
11. CHARGE PUMP
12. PROPORTIONAL VALVE (FORWARD)
13. PROPORTIONAL VALVE (REVERSE)

Figure 9040-10-9. Single-Speed Transmission



1. PARK BRAKE HANDLE ASSEMBLY
2. INCH/BRAKE PEDAL
3. ADJUSTMENT KNOB
4. BRAKE POSITION SENSOR
5. PARK BRAKE CABLE
6. PARK BRAKE LEVER
7. CHARGE VALVE
8. ACCUMULATOR
9. MODULATING BRAKE VALVE
10. DRIVE AXLE ASSEMBLY

Figure 9040-10-41. Brake System, Wet Brake Axle (8.0-9.0 Ton Lift Truck)

Throttle Cable (Mazda Engine Only) is out of Adjustment

POSSIBLE CAUSE

A. THROTTLE CABLE (MAZDA ENGINE ONLY) IS OUT OF ADJUSTMENT
B. MAZDA (LPG) ACCELERATOR IS OUT OF ADJUSTMENT
C. MAZDA (GAS) ACCELERATOR IS OUT OF ADJUSTMENT

CAUSE A - THROTTLE CABLE (MAZDA ENGINE ONLY) IS OUT OF ADJUSTMENT

PROCEDURE OR ACTION:

1. Ensure truck power is **OFF**.
2. Turn truck power **ON**.
3. Go to DSC Service Menu, **ENTER**.
4. At the DSC, from the MAIN MENU, scroll down to Main Menu Calibration, **ENTER**.
5. Scroll to view the Calibration Lift Valve Output, **ENTER**.
6. Scroll to view Calibration Accelerator Pedal, **ENTER**.

NOTE: Top line shows the % the accelerator pedal is pressed and the bottom line shows the engine RPMs.

7. Scroll to view the Accel Pedal, **ENTER**.
8. View values: XX % XXXX RPM.
9. Slowly press the accelerator pedal until the engine RPM increases to 850 RPMs.
   Is accelerator pedal value between 22% and 27%?
   YES: Resume operation.
   NO: For Mazda (LPG), go to CAUSE B. For Mazda (GAS), go to CAUSE C.

CAUSE B - MAZDA (LPG) ACCELERATOR IS OUT OF ADJUSTMENT

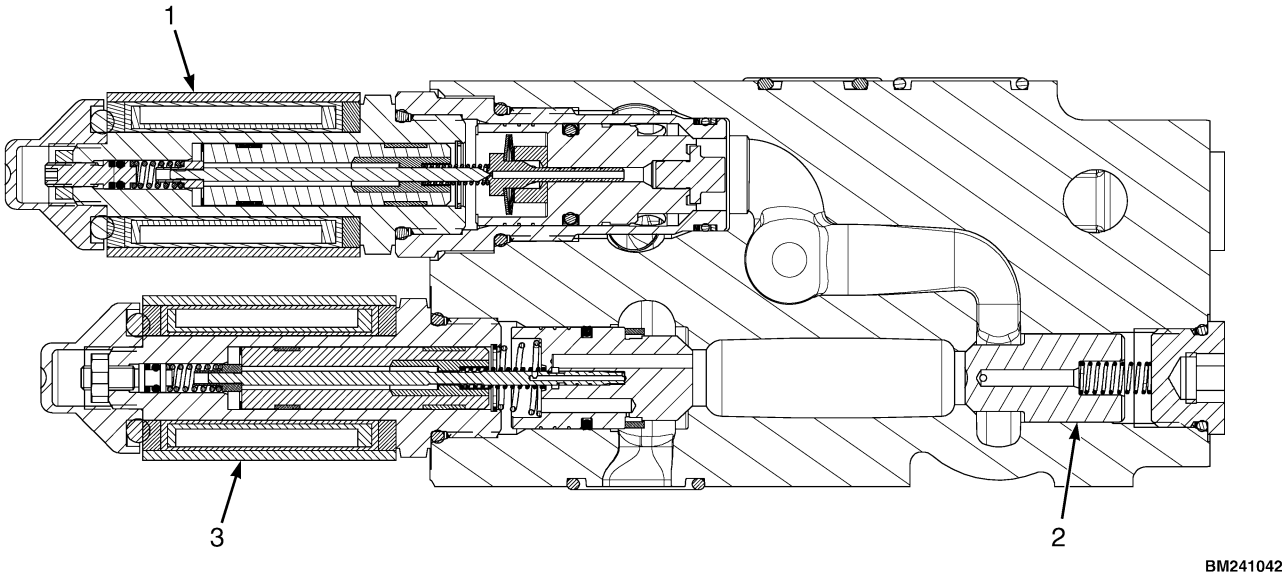
PROCEDURE OR ACTION:

NOTE: When adjustment is complete, tighten throttle cable adjusting screws.

1. Slowly press the accelerator pedal until the engine RPM increases to 850 RPMs.
   Is accelerator pedal value below 22%?
   YES: Adjust slack into the cable by adjusting the nuts on the engine throttle cable bracket.
   NO: Go to Step 2.

NOTE: When adjustment is complete, tighten throttle cable adjusting screws.

2. Slowly press the accelerator pedal until the engine RPM increases to 850 RPMs.
   Is accelerator pedal value above 27%?
   YES: Remove slack in the cable by adjusting the nuts on the engine throttle cable bracket. Refer to appropriate **Frame** manual, depending on lift truck model.
   NO: Resume operation.



1. LOWER EHPV
2. LOAD CHECK VALVE
3. LIFT EHPV

Figure 9050-10-22. Lift/Lower EHPVs

For the Lift function, the (EF) passage is connected to the work port, with oil first passing through the lift load-sense chamber and passing the low leak load check valve poppet. Oil then flows from the (EF) passage into the lift cylinder. Because the unloader maintains the (EF) pressure at Standby Pressure (see Table 9050-10-1) above the lift load-sense signal, the lift flow is compensated. This means lift speed will be the same no matter how much load is on the forks, since the pressure differential is constant.

For the Lower function, the work port is connected directly to the tank. Nothing but the lowering poppet is in this circuit. The gravitational forces on the forks force the oil in the cylinder back through the work port and to the tank passage. Because this is a single-acting cylinder, the pump is not pumping any oil into the other side of the cylinder. For this reason, the lowering flow is not compensated. The speed at which the forks lower will be directly proportional to the load.

EHPV Operation

With zero current applied to the coil of the EHPV, pump pressure acts on the top of the poppet (control chamber). This creates a higher pressure at the top of the poppet (control chamber) than on the nose of the poppet, keeping the poppet seated and restricting any oil flow (closed).

Raise (Metering): As current is applied to the EHPV coil, the balanced pilot spool is raised, allowing oil to drain from the top of the poppet (control chamber) to the lift work port. This creates a pressure drop between the top of the poppet (control chamber) and the nose of the poppet. As a result, the poppet raises, allowing oil to flow from the side of the poppet to the nose. This flow of oil allows the lift function to rise. See Figure 9050-10-23.

Lower (Metering): Lift cylinder high pressure oil acts on the nose of the lowering EHPV. Some of this oil is directed to the control chamber via an internal passage. This creates a higher pressure at the top of the poppet (control chamber) than on the nose of the poppet, keeping the poppet seated. As current is applied to the EHPV coil, the pilot pin is raised, allowing oil to drain from the top of the poppet (control chamber) to tank. This creates a lower pressure on top of the poppet than on the nose of the poppet. The pressure differential causes the poppet to rise off of the seat, allowing oil to flow from the high pressure (lift work port) to tank. See Figure 9050-10-24.

Auxiliary Function is Slow or Does Not Function (Manual Valve)

POSSIBLE CAUSE

A. PUMP NOT GENERATING ENOUGH FLOW.
B. LOAD IS GREATER THAN TRUCK CAPACITY.
C. SPOOL IS NOT FULLY ACTUATED.
D. SECONDARY RELIEF VALVE IS SET TOO LOW.
E. SECONDARY RELIEF VALVE DAMAGED OR STUCK OPEN.
F. MAIN RELIEF VALVE SET TOO LOW, DAMAGED, OR STUCK OPEN.
G. MAST/ATTACHMENT IS BINDING.
H. ENGINE HIGH IDLE SETTING NOT CORRECT.
I. EXCESSIVE INTERNAL SPOOL LEAKAGE.

CAUSE A - PUMP NOT GENERATING ENOUGH FLOW.

PROCEDURE OR ACTION:

1. Do hydraulic pump flow check. See Operational Diagnostic Procedures, Operational Checkout, Page 9010-05-11.
   Does pump pass check?
   YES: Pump is OK. Go to CAUSE B.
   NO: Do Hydraulic Pump Flow Test before replacing pump.

CAUSE B - LOAD IS GREATER THAN TRUCK CAPACITY.

NOTE: See Serial Number plate or **Operating Manual** for lift capacity.

PROCEDURE OR ACTION:

1. Check load weight and compare to truck capacity rating.

CAUSE C - SPOOL IS NOT FULLY ACTUATED.

PROCEDURE OR ACTION:

1. Inspect linkage. See **Main Control Valve** 2000YRM1137.
   Does linkage prematurely contact dash?
   YES: Repair or replace linkage.
   NO: Go to CAUSE D.

CAUSE D - SECONDARY RELIEF VALVE IS SET TOO LOW.

PROCEDURE OR ACTION:

1. Test and adjust pressure. See Secondary Relief Valve Test and Adjustment.
   Is relief set at specifications?
   YES: Go to CAUSE E.
   NO: Adjust pressure to test specifications.

CAUSE E - HYDRAULIC FLUID CONTAMINATED OR WRONG TYPE.

PROCEDURE OR ACTION:

1. Check hydraulic oil for contamination and correct type.
   Is hydraulic oil contaminated or incorrect type used?
   YES: Drain and refill hydraulic tank. For 1.0-2.0 Ton Cushion and Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1207. For 2.0-3.5 Ton Cushion and Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1150. For 4.0-5.5 Ton Cushion and Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1248. For 6.0-7.0 Ton Cushion Trucks, see **Periodic Maintenance** 8000YRM1319. For 6.0-7.0 Ton Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1322. For 8.0-9.0 Ton Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1407.
   NO: Go to CAUSE F.

CAUSE F - EXCESSIVE DEBRIS IN HYDRAULIC CIRCUIT.

PROCEDURE OR ACTION:

1. Check for plugged and bypassing hydraulic oil filter.
   Is hydraulic oil filter plugged and bypassing?
   YES: Clean or replace hydraulic oil filter. For 1.0-2.0 Ton Cushion and Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1207. For 2.0-3.5 Ton Cushion and Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1150. For 4.0-5.5 Ton Cushion and Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1248. For 6.0-7.0 Ton Cushion Trucks, see **Periodic Maintenance** 8000YRM1319. For 6.0-7.0 Ton Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1322. For 8.0-9.0 Ton Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1407.
   NO: Go to Step 2.
2. Check for contaminated oil.
   Is hydraulic oil contaminated?
   YES: Drain and refill hydraulic tank. For 1.0-2.0 Ton Cushion and Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1207. For 2.0-3.5 Ton Cushion and Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1150. For 4.0-5.5 Ton Cushion and Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1248. For 6.0-7.0 Ton Cushion Trucks, see **Periodic Maintenance** 8000YRM1319. For 6.0-7.0 Ton Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1322. For 8.0-9.0 Ton Pneumatic Trucks, see **Periodic Maintenance** 8000YRM1407.
   NO: Go to CAUSE G.

CAUSE G - HYDRAULIC OIL TANK OPEN TO ATMOSPHERE.

PROCEDURE OR ACTION:

1. Check hydraulic oil tank for missing breather or missing dipstick.
   Is breather or dipstick missing from hydraulic oil tank?
   YES: Replace breather or dipstick.
   NO: Go to CAUSE H.

Lift Function Is Slow (All other hydraulic functions are okay)

POSSIBLE CAUSE

A. MLM/JOYSTICK CONTROL MALFUNCTION.
B. RAMP SETTING TOO LOW FOR FUNCTION.
C. MAX FUNCTION SPEED SETTING TOO LOW.
D. CALIBRATION OF OUTPUT THRESHOLD IS TOO HIGH.
E. SYSTEM PRESSURE IS TOO LOW.
F. PUMP NOT GENERATING ENOUGH FLOW.
G. NOT ENOUGH PILOT PRESSURE BEING PRODUCED BY PPRV.
H. STUCK SPOOL IN CONTROL VALVE.

CAUSE A - MLM/JOYSTICK CONTROL MALFUNCTION.

PROCEDURE OR ACTION:

1. Check the DSC for DTC.
   Is a DTC displayed?
   YES: Go to DTC diagnostic procedure.
   NO: Check for full stroke of lever. Use DSC or install the Service Tool to monitor functions.

PROCEDURE OR ACTION:

2. Stroke each lever to full stroke and allow to snap back to center.
3. **(Do not start.)** Turn key switch to **ON** position or press power ON/OFF button.
4. See **User Interface - Service Technician** 2200YRM1131. Follow instructions to view Lever Input Value. With Service Password, view Diagnostics – Hydraulic Data Display – Hydraulic Input.
5. Operate each lever to full stroke forward and read input.
   Is lever Input = - 92%?
   YES: Go to Step 6.
   NO: Replace lever. See **Electrical System** 2200YRM1142.
6. Operate each lever to full stroke backward and read input.
   Is lever Input = + 92%?
   YES: Go to CAUSE B.
   NO: Replace lever. See **Electrical System** 2200YRM1142.

CAUSE B - RAMP SETTING TOO LOW FOR FUNCTION.

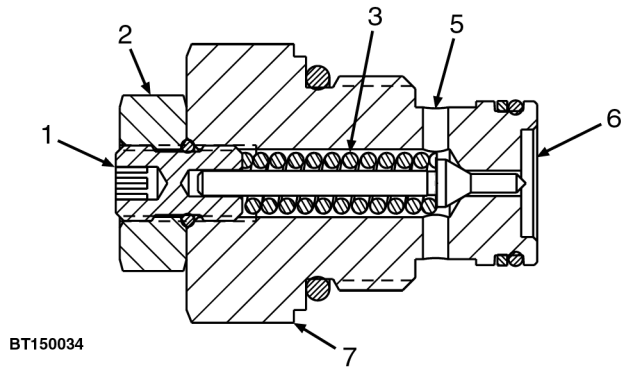
PROCEDURE OR ACTION:

1. Adjust function ramp setting on DSC. See **User Interface - Service Technician** 2200YRM1131. If problem is still present, go to CAUSE C.

CAUSE C - MAX FUNCTION SPEED SETTING TOO LOW.

PROCEDURE OR ACTION:

1. Adjust function speed setting on DSC. If problem is still present, go to CAUSE D.



1. ADJUSTMENT SCREW
2. JAM NUT
3. SPRING
4. POPPET
5. TO TANK
6. LOAD-SENSE PRESSURE
7. VALVE BODY

Figure 9050-43-57. Main Relief Valve (Electro-Hydraulic Control Valve)

NOTE: Cycling the lift function over relief after adjustment gives the relief valve spring opportunity to reposition itself inside the valve. This must be done after each adjustment until pressure is repeatable on gauge.

6. Cycle the lift control lever on and off against the relief three times to see if pressure is repeatable.

NOTE: Tightening the jam nut can sometimes take the adjustment screw with it and increase pressure setting. You may have to account for this change in your adjustment in Step 5.

7. Tighten the jam nut. Cycle lever over relief a few more times to verify the setting is still correct. If setting does not stabilize, clean or replace relief valve. See **Main Control Valve** 2000YRM1137.

8. Remove test equipment and reinstall test port plugs.

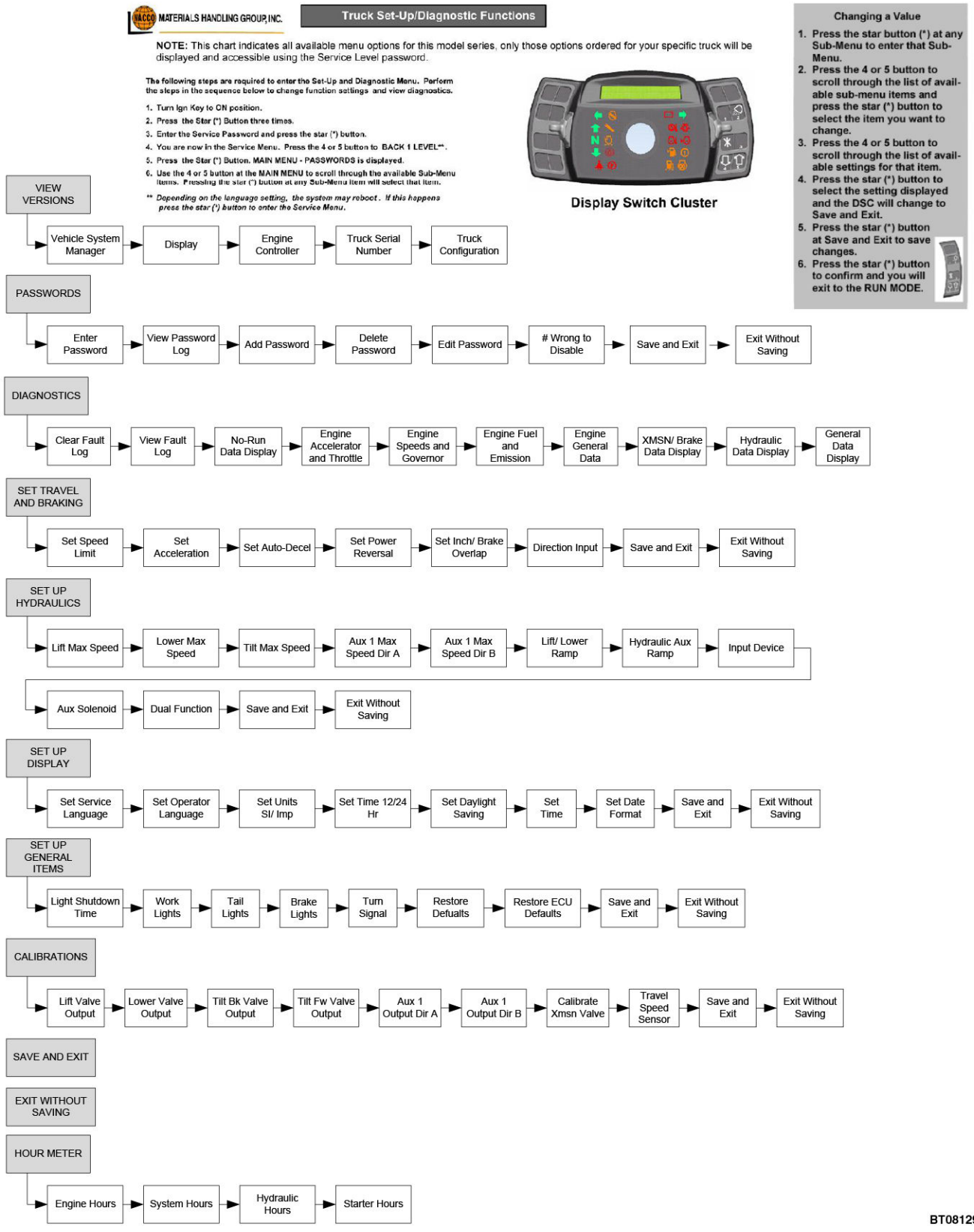


Figure 9060-10-12. Menus

Tilt and Sideshift Cylinders

DESCRIPTION

Tilt Cylinder

The tilt cylinders are used to move the mast forward and backward. To extend the cylinder rod (tilt forward), oil enters the tilt cylinder port behind the piston. The oil pressure pushes the cylinder rod out of the cylinder. Oil in front of the piston returns to the hydraulic tank. To retract the cylinder rod (tilt backward), the oil enters the port in front of the piston. The oil pressure pushes the cylinder rod into the tilt cylinder. The oil behind the piston returns to the hydraulic tank.

Sideshift Cylinder

The sideshift cylinder is removable for service. It is a double-acting, non-differential, piston-type cylinder, which allows the sideshift to attain the same speed moving either left or right. The cylinder also has flow restricting orifices in the ports.

Lowering Control Valves

DESCRIPTION

The lowering control system permits easy entry of hydraulic oil into the cylinder during lifting, but restricts flow when rod is retracted to limit the speed at which a load maybe lowered. A pressure-compensated lowering control valve regulates the lowering speed to a more uniform value over the entire capacity range. The two types of lowering control valves used are designated as primary and secondary.

PRINCIPLES OF OPERATION

See Figure 9070-10-16. The Primary lowering control valve limits the lowering speed of the mast to a maximum controlled rate over the full range of loads. This valve is mounted externally on the middle crossmember of the outer mast. This type of lowering control valve uses these basic parts: (1) valve body, (2) spring, (3) special washer, (5) orifice sleeve, (6) plunger, and (7) main sleeve. The orifice sleeve position is controlled completely by oil flow. The plunger position is controlled by oil pressure and spring tension. During lifting, oil entering the lift cylinder goes through the center of the main sleeve to the large holes. The oil flow through the plunger and bore moves the orifice sleeve to the end of the plunger. The flange of the orifice sleeve is then aligned with the large part of the bore in the body. This alignment lets the oil flow past the orifice sleeve to the cylinder. During lowering, oil from the lift cylinder moves the orifice sleeve. The orifice sleeve moves away from the larger inner diameter area of the bore in the valve body. This movement makes a restriction to the oil flow. As the pressure increases, the plunger begins to move against the spring. The movement begins to close the openings of the large holes in the main sleeve. Additional pressure will push the plunger against the main sleeve to close the large holes completely. All the oil must then go through the small holes to the center of the main sleeve. This restriction permits the piston rod to lower only at a maximum controlled speed.

The Secondary lowering control valve is installed in each cylinder and is used only for emergency lowering. In the event an hydraulic line ruptures, this valve will lower the mast at a controlled rate. This type of lowering control valve uses these parts: (1) a special fitting for the valve body, (2) a spring, and (3) a special washer. There is a variation in the shapes of the special washer. The volume of the hydraulic oil flowing through the inlet port controls the shape of the special washer. When the piston rod is lowered, the oil flow pushes against the special washer and spring. When the oil flow reaches the limit, the special washer is moved against the special fitting. The oil then flows only through the hole in the center of the special washer. This restriction permits the piston rod to lower only at a maximum controlled speed.

Misphasing of Full Free-Lift Mast

POSSIBLE CAUSE

A. MAST DAMAGED
B. COLD OPERATING CONDITIONS
C. CARRIAGE IS BINDING
D. HYDRAULIC RESTRICTION TO FREE-LIFT CYLINDER
E. EXCESSIVE OIL ON TOP SIDE OF FREE-LIFT CYLINDER PISTON

CAUSE A - MAST DAMAGED

NOTE: See **Operating Manual**.

PROCEDURE OR ACTION:

1. Visually inspect mast for damage.
   Is the mast in good condition?
   YES: Go to CAUSE B.
   NO: Repair or replace damaged components. For 1.0-3.5 Ton Cushion and Pneumatic Trucks, see **Mast Repairs (S/N A551, A555, A559, A661, A662, A663, A664, B507, B508, B509, B551, B555, B559, B562, B563, B564, B661, B662, B663, C515, C551, C555, C559, D507, D508, D509, D515, D562, D563, D564, E509, and E564)** 4000YRM1148. For 4.0-7.0 Ton Cushion and Pneumatic Trucks, see **Mast Repairs, 2- and 3-Stage Masts (S/N A513, A514, A613, A614, A702, A703, A704, A705, A706, A707, A751, A752, B513, B514, B586, B587, B588, B589, B590, B591, B749, B750, B751, B752, B753, B754)** 4000YRM1250.

CAUSE B - COLD OPERATING CONDITIONS

NOTE: See **Operating Manual**.

PROCEDURE OR ACTION:

1. Confirm that oil is at correct operating temperature. See Hydraulic Warm-Up Procedure.
   Does mast misphase after oil is at operating temperature?
   YES: Go to CAUSE C.
   NO: Incorrect hydraulic oil is being used. Consult **Operating Manual** for correct grade of hydraulic oil for your operating conditions.

This section is for the following models:

(GC/GLC030VX, GC/GLC035VX, GC/GLC040SVX) [C809];
GLP/GDP16VX, GLP/GDP18VX, GLP/GDP20SVX (GP/GLP/GDP030VX, GP/GLP/GDP035VX, GP/GLP/GDP040SVX) [C810];
GLC20-35VX (GC/GLC040-070VX, GC/GLC055SVX) [A910];
(GLC050LX) [A967];
GLP/GDP20-35VX (GP/GLP/GDP040-070VX) [B875];
GLP/GDP20-25LX (GLP/GDP050LX) [A974];
GLC40, 45, 55VX; GLC55SVX (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) [E818, F818];
GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6, GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) [F813, G813, H813, J813];
GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) [C879, D879, E879, F879];
GLP/GDP60VX, GLP/GDP70VX (GP/GLP/GDP135VX, GP/GLP/GDP155VX) [C878, D878, E878];
GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (GLP/GDP170VX, GLP/GDP175VX36, GLP/GDP190VX) [A909, B909]

WARNING

The radiator or other parts of the cooling system may be hot or under pressure and cause serious injury.

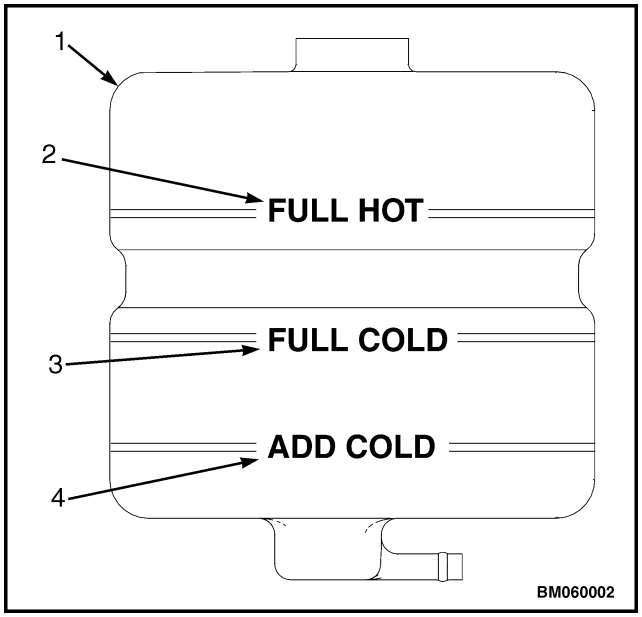
25. Start and run the engine until thermostat opens (The upper radiator hose will be warm).

CAUTION

Additives may damage the cooling system. Before using additives, contact you local Yale dealer.

26. Check coolant level at the auxiliary coolant reservoir. Add coolant as necessary to keep level between the **ADD** and **FULL** marks on the reservoir.

27. Shut down the engine for one minute or longer prior to checking the transmission oil level. If the transmission oil is low, add transmission oil at the dipstick tube at the correct level indicated on the dipstick. Oil is specified in **Periodic Maintenance** section for your lift truck.



1. AUXILIARY COOLANT RESERVOIR
2. FULL "HOT" MARK
3. FULL "COLD" MARK
4. ADD "COLD" MARK

Figure 24. Reservoir for Lift Truck Models GLP/GDP60VX, GLP/GDP70VX (GP/GLP/GDP135VX, GP/GLP/GDP155VX) (C878, D878, E878) and GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (GLP/GDP170VX, GLP/GDP174VX36, GLP/GDP190VX) (A909, B909)

CLEAN

WARNING

Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety procedures.

WARNING

Compressed air is used for cleaning or drying purposes, or for clearing restrictions. Wear protective clothing (goggles/shield, gloves, etc.) to avoid injury to personnel.

1. Clean bearings by placing them in a wire basket and immersing in a container of fresh solvent. Agitate the bearings in the solvent to remove all traces of old lubricant.
2. After cleaning the bearings, dry them with clean compressed air. Take care to prevent spinning the bearings when using a compressed air jet.
3. Immediately wrap bearings in a lint-free cloth to protect them from dust and other foreign matter.

INSPECT

1. Inspect for loose, burned, missing, cracked or damaged hardware.
2. Inspect all parts for dents, holes, bends, burrs, rust, corrosion or marred finish.

NOTE: If the spindle, bearings or tie rods need to be repaired, go to Spindles, Bearings, and Tie Rods Repair.

ASSEMBLE

NOTE: For specified lubricant to use, refer to one of the following sections:

Periodic Maintenance 8000 YRM 1150 for lift truck models
- GLC20-35VX (GC/GLC040-070VX, GC/GLC055SVX) (A910
- GLP/GDP20-35VX (GP/GLP/GDP040-070VX) (B875)

Periodic Maintenance 8000 YRM 1207 for lift truck models
- GC/GLC030-035VX, GC/GLC040SVX (C809)
- GLP/GDP16-18VX, GLP/GDP20SVX (GP/GLP/GDP030-035VX, GP/GLP/GDP040SVX) (C810)

Periodic Maintenance 8000 YRM 1248 for lift truck models
- GLC40, 45, 55VX; GLC55SVX; (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818)
- GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813)

Periodic Maintenance 8000 YRM 1558 for lift truck models
- GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (H813)

Periodic Maintenance 8000 YRM 1604 for lift truck models
- GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (J813)

Periodic Maintenance 8000 YRM 1319 for lift truck models
- GLC/GDC60VX, GLC/GDC70VX, (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C879, D879)

Periodic Maintenance 8000 YRM 1571 for lift truck models
- GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (E879)

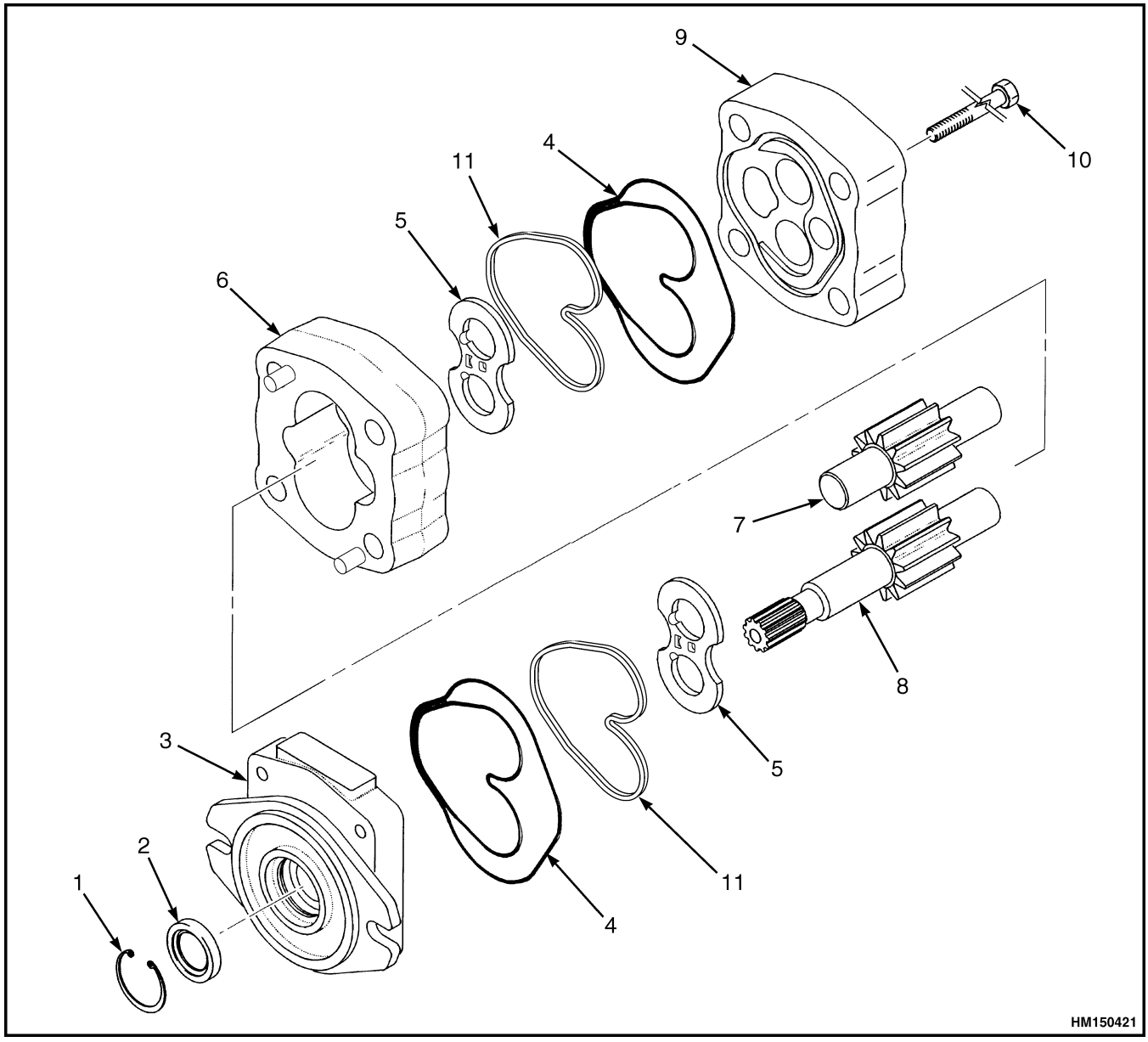
Periodic Maintenance 8000 YRM 1606 for lift truck models
- GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (F879)

Periodic Maintenance 8000 YRM 1322 for lift truck models
- GLP/GDP60VX, GLP/GDP70VX (GP/GLP/GDP135VX, GP/GLP/GDP155VX) (C878, D878)

Periodic Maintenance 8000 YRM 1407 for lift truck model
- GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (GLP/GDP170VX, GLP/GDP170VX36, GLP/GDP190VX) (A909)

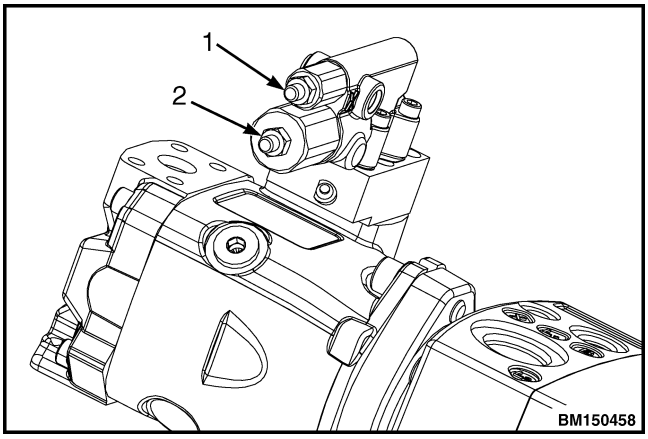
Periodic Maintenance 8000 YRM 1586 for lift truck model
- GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (B909)

Periodic Maintenance 8000 YRM 1583 for lift truck model
- GLP/GDP60VX, GLP/GDP70VX (GP/GLP/GDP135VX, GP/GLP/GDP155VX) (E878)



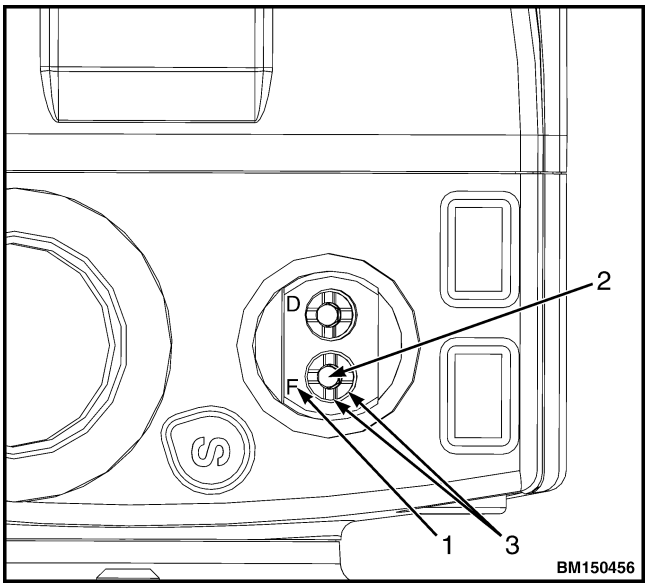
1. SNAP RING
2. SHAFT SEAL
3. FLANGE END HOUSING
4. PLATE SEAL
5. PRESSURE PLATE
6. GEAR HOUSING
7. DRIVEN GEAR
8. DRIVE GEAR
9. REAR VALVE HOUSING
10. CAPSCREW
11. BACKUP SEAL

Figure 7. Hydraulic Pump Assembly



1. SECONDARY PUMP FLOW COMPENSATOR ADJUSTMENT JAM NUT
2. SECONDARY PUMP PRESSURE COMPENSATOR ADJUSTMENT JAM NUT

Figure 43. Secondary Pump Flow and Pressure Adjustments



1. PRIMARY PUMP FLOW COMPENSATOR ADJUSTMENT INDICATOR
2. PRIMARY PUMP FLOW COMPENSATOR ADJUSTMENT SETSCREW
3. PRIMARY PUMP FLOW COMPENSATOR JAM NUT

Figure 44. Primary Pump Flow Adjustment

Pressure Compensator Adjustments (Tandem Pump)

NOTE: Pressure compensator setting for VDPs is 228 bar (3307 psi). Pumps are set independently.

1. Install a 0 to 344 bar (0 to 5000 psi) pressure gauge at the P-port and EF-port. See Figure 45.
2. Start engine and operate hydraulics until oil temperature reaches 50 to 65°C (122 to 150°F).
3. Raise mast until it stops. Hold lever and check primary pump pressure on the P gauge. See Table 9 for pressure specification.
4. Check secondary pump pressure on EF gauge. See Table 9 for pressure specification.
5. Perform following steps to adjust secondary pump pressure compensator if not within specifications:
   - **a.** Turn lift truck **OFF**.
   - **b.** Turn secondary pump pressure compensator adjustment jam nut counterclockwise. See Figure 43.
   - **c.** On primary pump flow compensator, count the number of turns while turning the primary pump flow compensator setscrew clockwise using special tool 582067556 (see Special Tools). See Figure 44.
   - **d.** Repeat Step c for secondary pump.
   - **e.** On primary pump, turn primary pump pressure compensator setscrew counterclockwise using special tool 582067556 (see Special Tools). See Figure 46.
   - **f.** Repeat Step e for secondary pump.
   - **g.** Turn lift truck **ON**.

NOTE: DO NOT operate hydraulics during .

   - **h.** On primary pump, with truck at governed speed, slowly adjust primary pressure compensator jam nut to specification shown in Table 9. Read pressure at P-port.

NOTE: Initial pressure at EF-port, prior to adjustment of secondary pump, will be the same as P-port above. Adjust secondary pump pressure jam nut until EF pressure is slightly higher than P-port, then adjust it back down until they are equal.

   - **i.** On secondary pump with truck still at governed speed, slowly adjust pressure compensator jam nut to specification shown in Table 9. Read pressure at EF-port.

4. Install new O-rings into the side of tilt control valve section. Install the auxiliary I control valve section on the four tie rods. See Figure 18.

5. Install the anti-stall valve into the auxiliary I control valve section. Install new O-rings into the side of auxiliary I control valve section. See Figure 15.

6. Install the auxiliary II control valve section on the four tie rods. Install new O-rings into the side of auxiliary II control valve section.

7. Install the outlet control valve section. See Outlet Control Valve Section, Install.

Tilt Control Valve Section

Remove

1. Remove the outlet control valve section. See Outlet Control Valve Section, Remove.

2. Remove the auxiliary control valve section. See Auxiliary Control Valve Sections, Remove.

3. Remove the tilt control valve section from the lift/lower control valve section.

4. Remove and discard O-rings from the side of lift/lower control valve section.

See Figure 21 for lift truck models

- GC/GLC030VX, GC/GLC035VX, GC/GLC040SVX (C809)
- GLP/GDP16VX, GLP/GDP18VX, GLP/GDP20SVX (GP/GLP/GDP030VX, GP/GLP/GDP035VX, GP/GLP/GDP040SVX) (C810)
- GLC20-35VX (GC/GLC040-070VX, GC/GLC055SVX) (A910)
- GLP/GDP20-35VX (GP/GLP/GDP040-070VX) (B875)
- GLC40, 45, 55VX; GLC55SVX; (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818, F818)

See Figure 22 for lift truck models

- GLC/GDC60VX, GLC/GDC70VX, (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C879, D879, E879, F879)
- GLP/GDP60VX, GLP/GDP70VX (GP/GLP/GDP135VX, GP/GLP/GDP155VX) (C878, D878, E878)
- GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6, GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813, H813, J813)

Disassemble

NOTE: Disassemble the tilt control valve section only as needed to accomplish the repairs required.

NOTE: Perform Step 1 for lift truck models

- GC/GLC030VX, GC/GLC035VX, GC/GLC040SVX (C809)
- GLP/GDP16VX, GLP/GDP18VX, GLP/GDP20SVX (GP/GLP/GDP030VX, GP/GLP/GDP035VX, GP/GLP/GDP040SVX) (C810)
- GLC20-35VX (GC/GLC040-070VX, GC/GLC055SVX) (A910)
- GLP/GDP20-35VX (GP/GLP/GDP040-070VX) (B875)
- GLC40, 45, 55VX; GLC55SVX; (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818, F818)
- GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813, H813, J813)
- GLC/GDC60VX, GLC/GDC70VX, (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C879, D879, E879, F879)
- GLP/GDP60VX, GLP/GDP70VX (GP/GLP/GDP135VX, GP/GLP/GDP155VX) (C878, D878, E878)

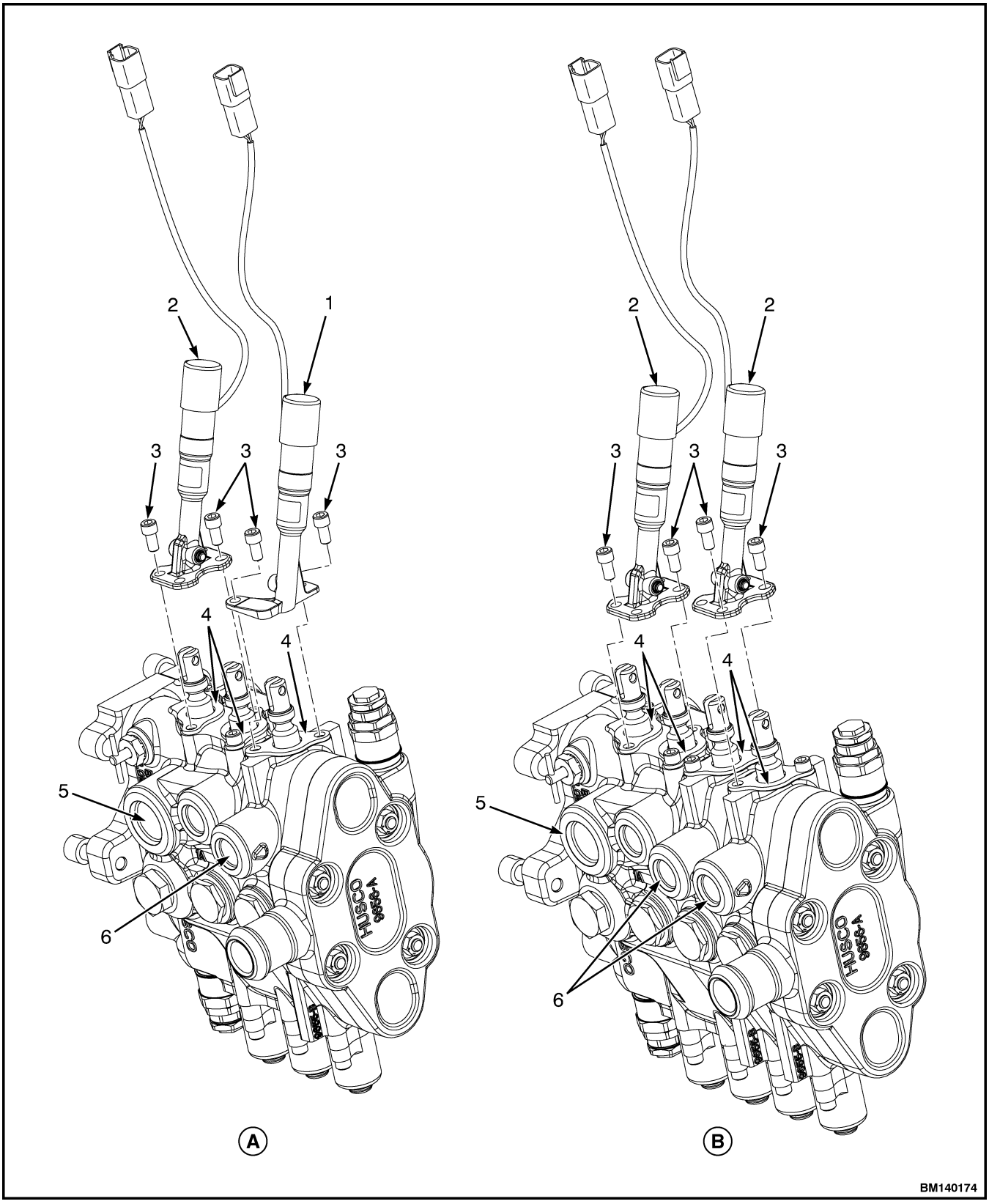
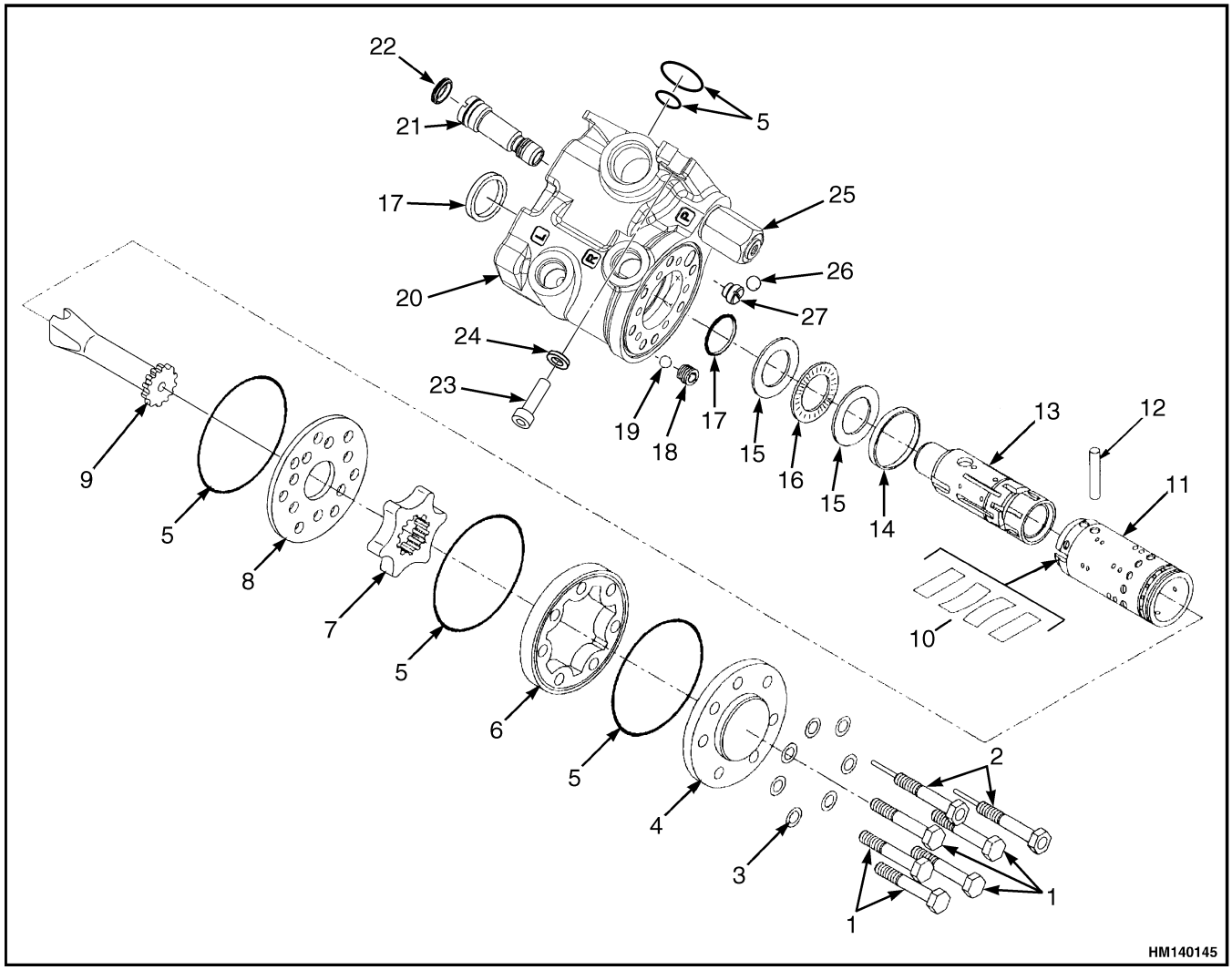


Figure 45. Solenoid Lockout and Manual Control Valve



1. CAPSCREW
2. SPECIAL SCREW
3. WASHER
4. END COVER
5. O-RING
6. GEAR RING
7. GEAR
8. DISTRIBUTOR PLATE
9. CARDAN SHAFT
10. SPRING SET
11. SLEEVE
12. CROSS PIN
13. SPOOL
14. RETAINING RING
15. THRUST WASHER
16. THRUST BEARING
17. SEAL
18. EMERGENCY STEER SEAT
19. EMERGENCY STEER CHECK BALL
20. STEERING CONTROL UNIT HOUSING
21. SYSTEM RELIEF VALVE
22. CAP
23. MOUNTING BOLT
24. LOCKWASHER
25. LOAD SENSE PLUG
26. LOAD SENSE CHECK BALL
27. LOAD SENSE SEAT

Figure 67. Steering Control Unit

Main Lift Cylinder Mounting Nut To Outer Mast, For Lift Truck Models

- **GC/GLC030VX, GC/GLC035VX, GC/GLC040SVX (C809)**
- **ERC/P16-20AAF (ERC030-040AH) (B814, C814)**
- **H1.6FT, H1.8FT, H2.0FTS (H30FT, H35FT, H40FTS) (F001)**
  GLP/GDP16VX. GLP/GDP18VX, GLP/GDP20SVX (GP/GLP/GDP030VX, GP/GLP/GDP035VX, GP/GLP/GDP040SVX) (C810)
- **GLC20-35VX (GC/GLC040-070VX, GC/GLC055SVX) (A910)**
- **ERP1.60-1.80-2.00ATF (ERP030-040TH) (F807)**
- **GLP/GDP20-35VX (GP/GLP/GDP040-70VX) (B875)**
- **GLC40-55VX, GLC55SVX (GC/GLC080-120VX, GC/GLC080-100VXBCX, GC/GLC120SVX, GC/GLC120VXPRS) (E818, F818)**
- **ERP20-32ALF (ERP040-35DH) (E216)**
- **ERC20-32AGF (ERC040-065GH) (A908)**
- **GLC050LX (A967)**
- **GLP/GDP20-25LX (GLP/GDP050LX) (A974)**

53 N•m (39 lbf ft)

Main Lift Cylinder Mounting Nut To Outer Mast, For Lift Truck Models

- **GLP/GDP40VX5/VX6, GLP/GDP45SVX5, GLP/GDP45VX6, GLP/GDP50-55VX (GP/GLP/GDP080-120VX) (F813, G813, H813, J813)**
- **ERC35-55HG (ERC70-120HH) (C839)**

38 N•m (28 lbf ft)

Retainer Nuts
35 N•m (24 lbf ft)

Chain Guard Capscrew (Free-Lift Cylinder)
66 N•m (49 lbf ft)

Crosshead Mount Capscrew
435 N•m (320 lbf ft)

Free-Lift Cylinder Mounting Bolts (All Mast Except Three-Stage FFL)
53 N•m (39 lbf ft)

Free-Lift Cylinder Mounting Bolts (Three-Stage FFL)
38 N•m (28 lbf ft)

LIFT CYLINDER LEAK CHECK

WARNING

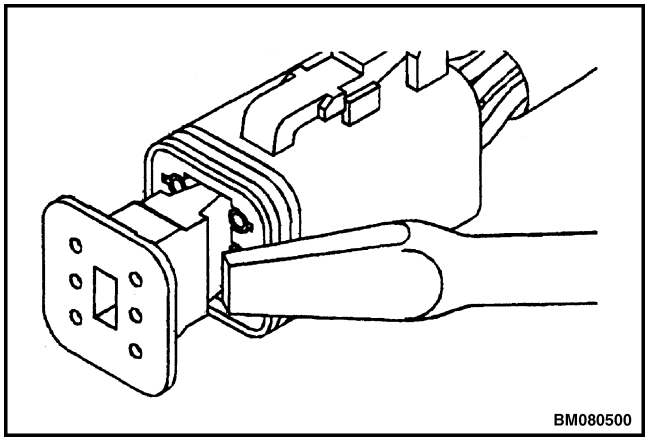
During the test procedures for the hydraulic system, use chains to fasten the load to the carriage to prevent it from falling. Keep all people away from the lift truck during the tests.

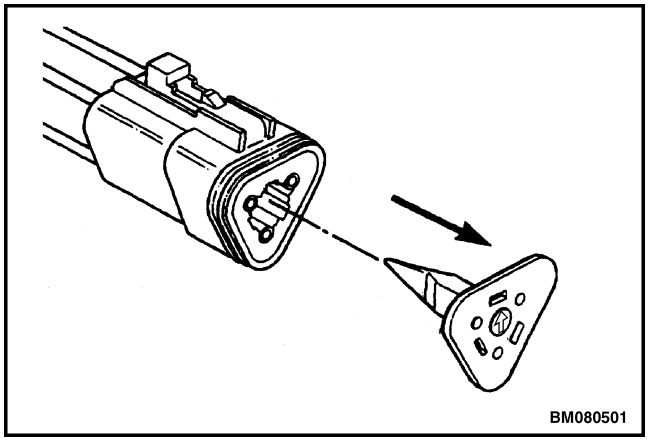
Do NOT try to find hydraulic leaks by putting your hand on hydraulic components under pressure. Hydraulic oil can be injected into the body by the pressure.

1. Operate hydraulic system. Put capacity load on forks. Use safety chain to hold load to carriage. Raise and lower load several times. Lower load and tilt mast forward and backward several times. Check for leaks.

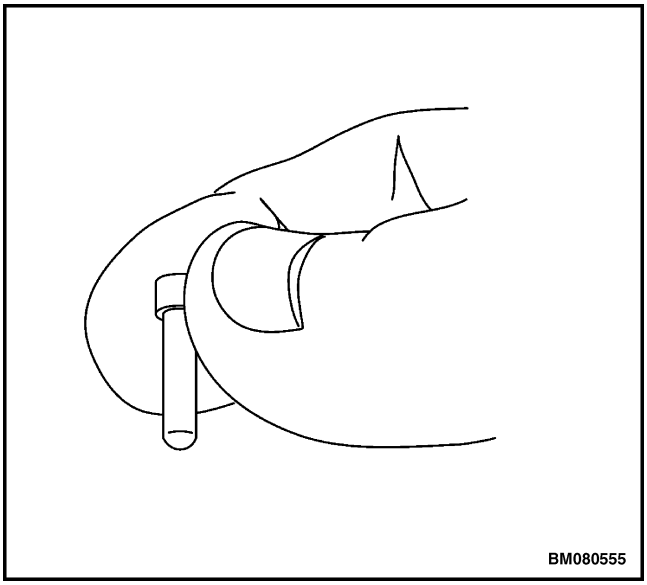
2. Raise carriage and load 1 m (3 ft). If carriage slowly lowers when control valve is in **NEUTRAL** position, there are leaks in hydraulic system. The maximum speed the carriage is allowed to lower is 50 mm (2 in.) per 10 minutes when hydraulic oil is 30°C (86°F). If oil temperature is 70°C (158°F), the maximum speed the carriage can lower is 150 mm (6 in.) per 10 minutes.

STEP 2.
Using a small, flat-blade screwdriver (Yale P/N 150121838) , remove the secondary lock from the connector plug.

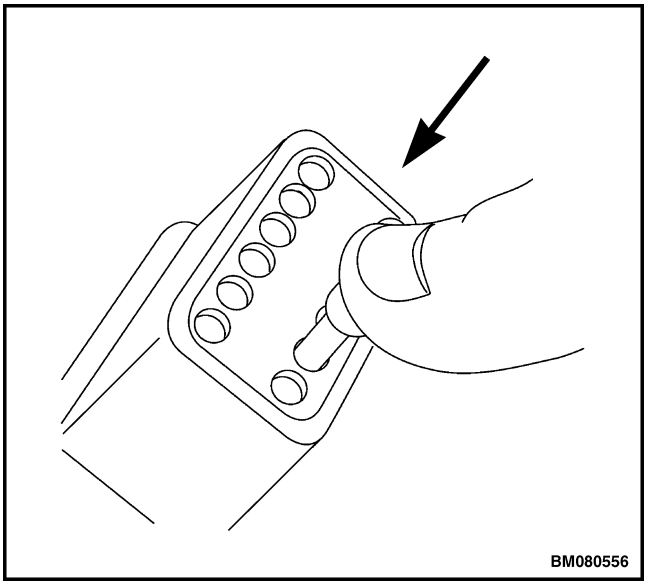




STEP 2.
Hold the sealing plug with the large diameter end away from the connector.



STEP 3.
Insert the sealing plug into the connector contact cavity. Gently apply downward pressure to force the sealing plug into the cavity.



Maintenance

1. Wipe tool and dies with clean, soft cloth. Remove any debris with a clean, soft brush. DO NOT use objects that could damage the tool. When not in use, keep handles closed to prevent debris from becoming lodged in the crimping dies, and store in a clean, dry area.

HOW TO USE PRO-CRIMPER II TOOL

NOTE: This tool is provided with a crimp adjustment feature. Initially the crimp height should be verified as stipulated in Crimp Height Inspection and Crimp Height Adjustment sections to verify height before using the tool to crimp desired contacts and wire sizes.

1. Using Table 9 select wire of specified size and insulation diameter. Assemble wire seal onto wire as specified in Mini Mic Receptacle and Tab Contact section.

2. Strip wire to the length indicated in Table 9 taking care not to nick or cut wire strands. Select contact and identify appropriate crimping chamber according to the wire size markings on the tool.

3. Hold tool so that the back (wire side) is facing you. Squeeze tool handles together and allow them to open fully.

4. Holding contact by mating end, insert the contact, insulation barrel first, through the front of the tool and into the appropriate crimping chamber.

5. Position the contact tho that the mating end of contact is on locator side of tool and the open "U" of the wire and insulation barrels face the top of the tool. Fit the contact into the nest so the movable locator drops into the slot in the contact. See Figure 60. Butt front end of wire barrel against movable locator.

NOTE: Make sure both sides of insulation barrel are started evenly into the crimping chamber. DO NOT attempt to crimp and improperly positioned contact.

6. Hold contact in position and squeeze the tool handles together until ratchet engages enough to hold contact in position. DO NOT deform insulation barrel or wire barrel.

7. Insert stripped wire, with wire seal, into insulation and wire barrels until it is butted against wire stop. See Figure 60.

NOTE: The crimped contact may stick in the crimping area, but the contact can be easily removed by pushing downward on the top of the locator. See Figure 60.

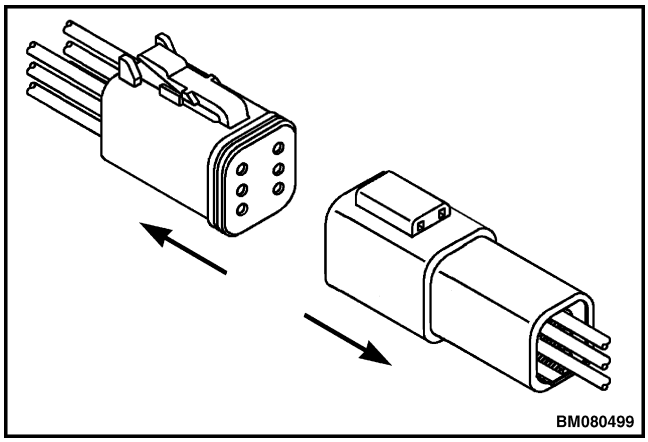
8. Holding wire in position, squeeze tool handles together until ratchet releases. Allow tool handles to open and remove crimped contact.

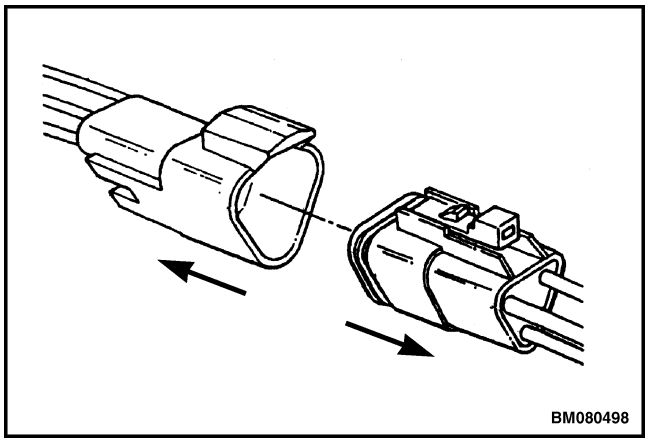
9. Check contact crimp height as described in Crimp Height Inspection section. If necessary, adjust the crimp height as specified in Crimp Height section.

TABLE OF CONTENTS (Continued)

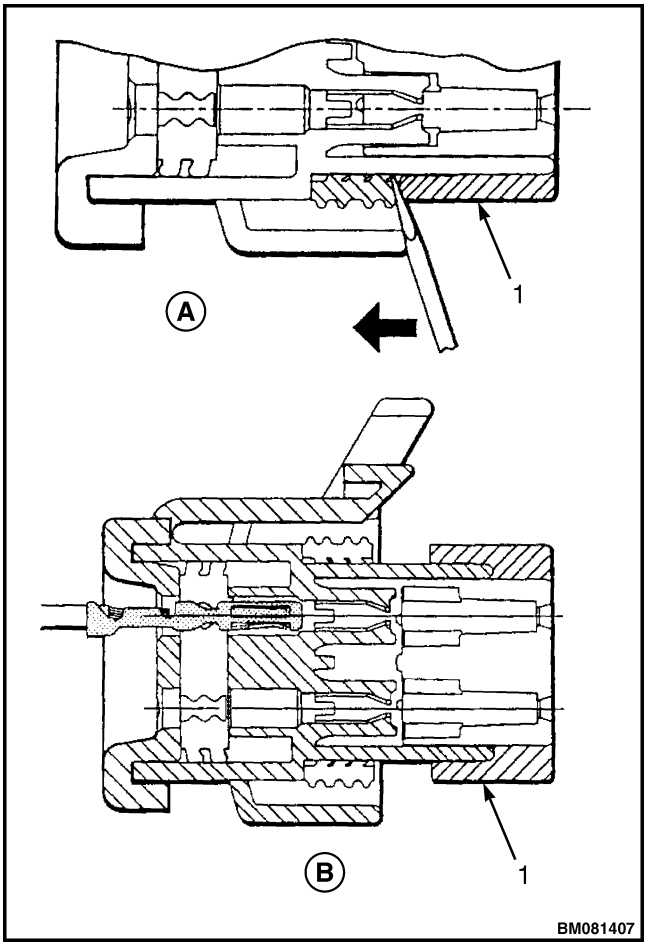
Connector Plug Socket Replacement

STEP 1.
Release the external locking clip(s) and separate the connector plug from the connector receptacle.





STEP 1.
Insert a screwdriver blade between the mating seal and one of the red wedge lock tabs. Pry open the wedge lock to the OPEN position.



NOTE: SCREWDRIVER TO BE MOVED IN DIRECTION OF ARROW.

A. CLOSED POSITION
B. OPEN POSITION

1. WEDGE LOCK TAB

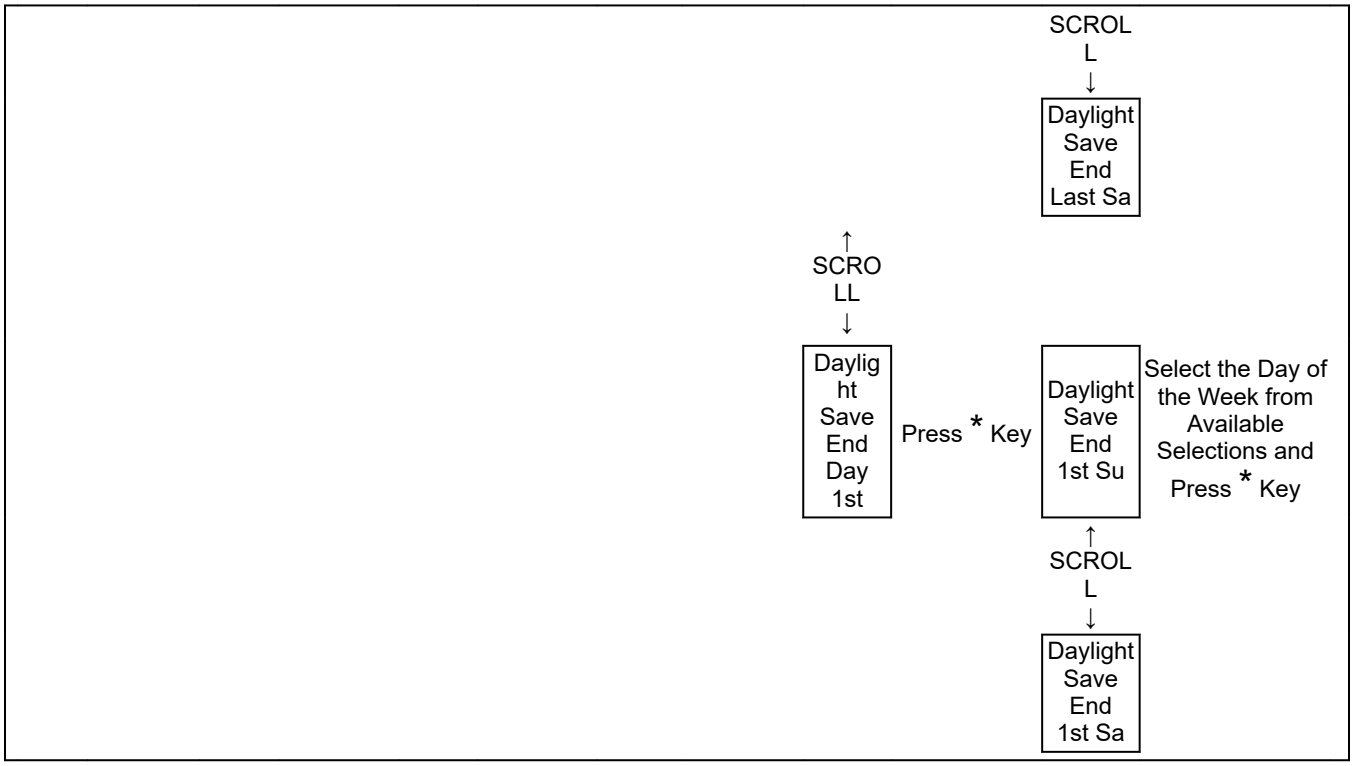
Table 13. Wire Strip Length and Crimp Measurements (Continued)

Wire Size (AWG)	Insulation Diameter	Strip Length	Wire Barrel		Insulation Barrel
			Crimp Width	Crimp Height	Crimp Width
14	4.06 to 5.33 mm (0.106 to 0.210 in.)	6.22 to 6.45 mm (0.245 to 0.255 in.)	3.0 to 3.1 mm (0.118 to 0.122 in.)	1.7 to 2.03 mm (0.067 to 0.080 in.)	6.3 to 6.4 mm (0.248 to 0.252 in.)
	3.81 to 4.83 mm (0.150 to 0.190 in.)			1.93 to 2.03 mm (0.076 to 0.080 in.)	5.28 to 5.38 mm (0.208 to 0.212 in.)
	3.05 to 4.32 mm (0.120 to 0.170 in.)	7.01 to 7.26 mm (0.276 to 0.286 in.)	2.74 to 2.84 mm (0.108 to 0.112 in.)	1.88 to 1.98 mm (0.074 to 0.078 in.)	4.01 to 4.11 mm (0.158 to 0.162 in.)
		6.60 to 6.86 mm (0.260 to 0.270 in.)	3.25 to 3.35 mm (0.128 to 0.132 in.)	1.78 to 1.88 mm (0.070 to 0.074 in.)	4.52 to 4.62 mm (0.178 to 0.182 in.)
	3.05 to 4.06 mm (0.120 to 0.160 in.)	5.82 to 6.07 mm (0.229 to 0.239 in.)	2.74 to 2.84 mm (0.108 to 0.112 in.)	1.88 to 1.98 mm (0.074 to 0.078 in.)	4.01 to 4.62 mm (0.158 to 0.182 in.)
	3.05 to 3.68 mm (0.120 to 0.145 in.)				4.01 to 4.11 mm (0.158 to 0.162 in.)
	2.54 to 4.32 mm (0.100 to 0.170 in.)			1.55 to 1.65 mm (0.061 to 0.065 in.)	4.52 to 4.62 mm (0.178 to 0.182 in.)
				1.83 to 1.93 mm (0.072 to 0.076 in.)	4.01 to 4.11 mm (0.158 to 0.162 in.)
	2.2 to 4.44 mm (0.090 to 0.175 in.)	5.1 to 6.1 mm (0.201 to 0.240 in.)		1.8 to 1.9 mm (0.071 to 0.075 in.)	4.52 to 4.62 mm (0.178 to 0.182 in.)

b. Crimp length must be within dimensions indicated in Table 13.

c. Front and rear bellmouths to match images and dimensions shown in Figure 76.

Table 24. Set Daylight Saving Time Menu (Continued)



SET TIME

This function allows the supervisor to set the time on the on-board clock.

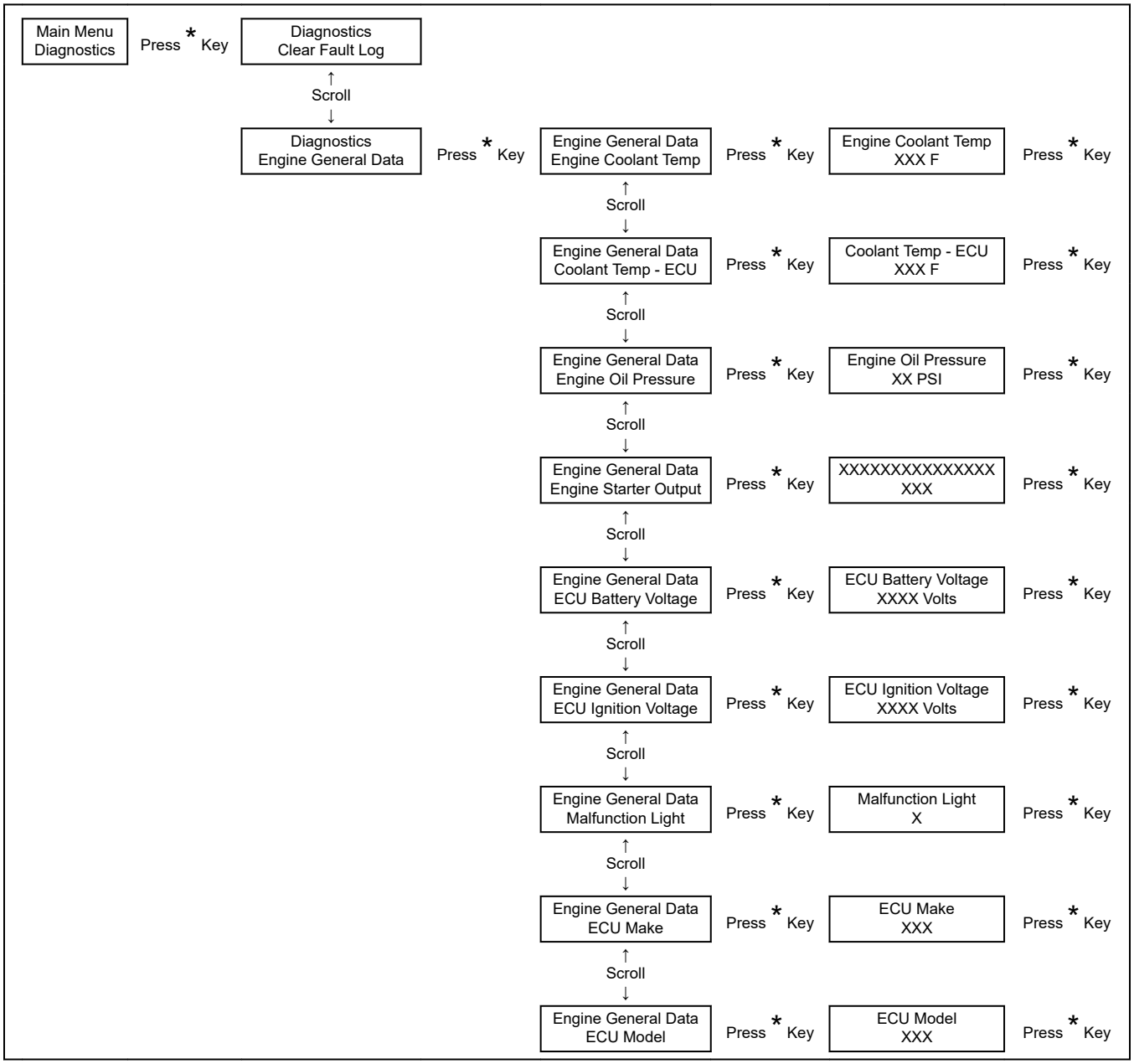
After entering the Set Time menu, a flashing cursor will appear over the time segment that can be changed.

See Table 25. Move from segment to segment by pressing the * key. When finished, press the * key to access the Exit Options menu and choose the appropriate action.

Table 25. Set Time Menu

Main Menu Setup Display	Press * Key	Setup Display Set Time	Press * Key	Set Time Set Time XX:XX pm	Change Hours and Press * Key	Set Time Set Time XX:XX pm	Change Minutes and Press * Key	Set Time Set Time XX:XX pm	Change am/pm and Press * Key

Table 17. Engine General Data Display



XMSN/BRAKE DATA DISPLAY

This function will allow the service technician to view inputs from the Transmission and Braking systems while the engine is running. Use the scroll keys to move to the desired function and press the * key to select the function. See Table 18. When finished viewing an input or value, press the * key to return to the previous menu.

NOTE: Depending on how an individual lift truck is equipped, some functions shown in the menu may not be available for viewing.

IDLE-UP AUTO/ACTIVE REGENERATION

1. Lift Truck model with Kubota 2.4L Stage V diesel engine with DPF may have an optional engine Idle-up feature that is active during Auto/Active Regeneration. See Figure 28. When the Soot Meter displays 3 bars, engine idle speed will increase the first time the operator applies the accelerator pedal. For the duration of the Auto/Active Regeneration process, minimum engine speed will be 1100 rpm.

2. The feature improves the Auto/Active Regeneration cleaning process and will take 15-30 minutes to complete. Lift truck operation can continue without any limitations, but avoid engine shut-down while truck is in Idle-up mode.

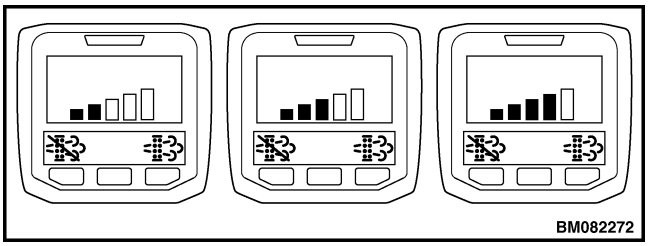


Figure 28. Idle-up Active Range

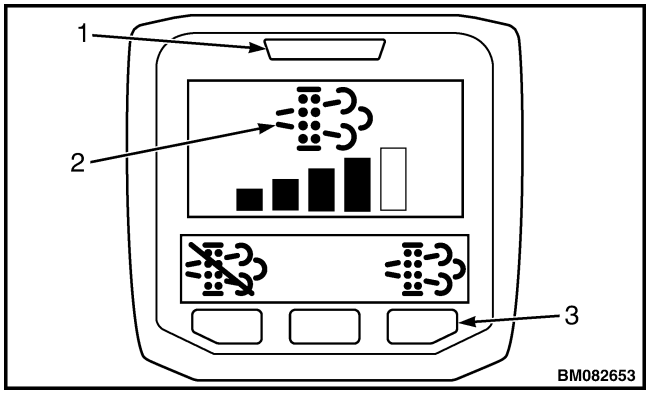
3. Engine Idle-up will start when the Soot Meter reaches 3 bars, and will remain active while 2, 3, or 4 bars are displayed. Optional Parked Regeneration is still possible at 3 or more Soot Meter bards, but should not be required once Auto/Active Regeneration is complete.

4. Once Auto/Active Regeneration is complete, engine idle speed returns to normal.

PARKED REGENERATION REQUEST

Regeneration Level 2

1. After upto 2 hours Auto/Active Regeneration, the ECU will request a Parked Regeneration. DPF icon is on to indicate Parked Regeneration is available. See Figure 29.



1. LED INDICATOR
2. PARKED REGENERATION AVAILABLE ICON
3. PARKED REGENERATION INITIATE BUTTON

Figure 29. Parked Regeneration Request

WARNING

Prior to initiating the Parked Regeneration process, move the lift truck to a location suitable for elevated exhaust gas temperatures. Make sure the suitable location is free of combustible materials, liquids, and gasses. Failure to do so could cause serious injury to operator and/or serious damage to property.

2. To initiate the Parked Regeneration process, the operator needs to push the Parked Regeneration Initiate Button after all of the following conditions have been met. See Figure 29.

- Engine Running
- Park Brake **ON**
- Transmission in Neutral
- Accelerator pedal **NOT** depressed
- Soot Meter displays 3, 4, or 5 bars

5. Connect battery. For lift truck models below, install floor plate and floor mat.
   - GLP/GDP60VX, GLP/GDP70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C878, D878, E878)

   Connect battery. For lift truck models below, lower hood.
   - GC/GLC030VX, GC/GLC035VX, GC/GLC040SVX (C809)
   - GLP/GDP16VX, GLP/GDP18VX, GLP/GDP20SVX (GP/GLP/GDP030VX, GP/GLP/GDP035VX, GP/GLP/GDP040SVX) (C810)
   - GLC20-35VX (GC/GLC040-070VX, GC/GLC055SVX) (A910)
   - GLP/GDP20-35VX (GP/GLP/GDP040-070VX) (B875)
   - GLC40, 45, 55VX; GLC55SVX; (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818, F818)
   - GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6, GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813, H813, J813)
   - GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C879, D879, E879, F879)

SERVICE BRAKE PEDAL POSITION SENSOR

Remove

1. For lift truck models below, to access battery, remove floor mat and floor plate. Disconnect battery.
   - GLP/GDP60VX, GLP/GDP70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C878, D878, E878)
   - GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (GLP/GDP170VX, GLP/GDP175VX36, GLP/GDP190VX) (A909, B909)

   For lift truck models below, to access battery, raise hood. Disconnect battery.
   - GC/GLC030VX, GC/GLC035VX, GC/GLC040SVX (C809)
   - GLP/GDP16VX, GLP/GDP18VX, GLP/GDP20SVX (GP/GLP/GDP030VX, GP/GLP/GDP035VX, GP/GLP/GDP040SVX) (C810)
   - GLC20-35VX (GC/GLC040-070VX, GC/GLC055SVX) (A910)
   - GLP/GDP20-35VX (GP/GLP/GDP040-070VX) (B875)
   - GLC40, 45, 55VX; GLC55SVX; (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818, F818)
   - GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6, GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813, H813, J813)
   - GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C879, D879, E879, F879)

2. Remove upper steering column cover and dash and kick panel. See Dash and Kick Panel, Remove and Install for procedures.

3. Disconnect brake pedal position sensor from cowl harness.

   See Figure 14 for lift truck models
   - GLC40, 45, 55VX; GLC55SVX; (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818, F818)
   - GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6, GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813, H813, J813)
   - GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C879, D879, E879, F879)
   - GLP/GDP60VX, GLP/GDP70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C878, D878, E878)

   See Figure 15 for lift truck models
   - GC/GLC030VX, GC/GLC035VX, GC/GLC040SVX (C809)
   - GLP/GDP16VX, GLP/GDP18VX, GLP/GDP20SVX (GP/GLP/GDP030VX, GP/GLP/GDP035VX, GP/GLP/GDP040SVX) (C810)
   - GLC20-35VX (GC/GLC040-070VX, GC/GLC055SVX) (A910)
   - GLP/GDP20-35VX (GP/GLP/GDP040-070VX) (B875)

   See Figure 16 for lift truck models
   - GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (GLP/GDP170VX, GLP/GDP175VX36, GLP/GDP190VX) (A909, B909)

   See Figure 17 for lift truck models

- GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C879, D879, E879, F879)

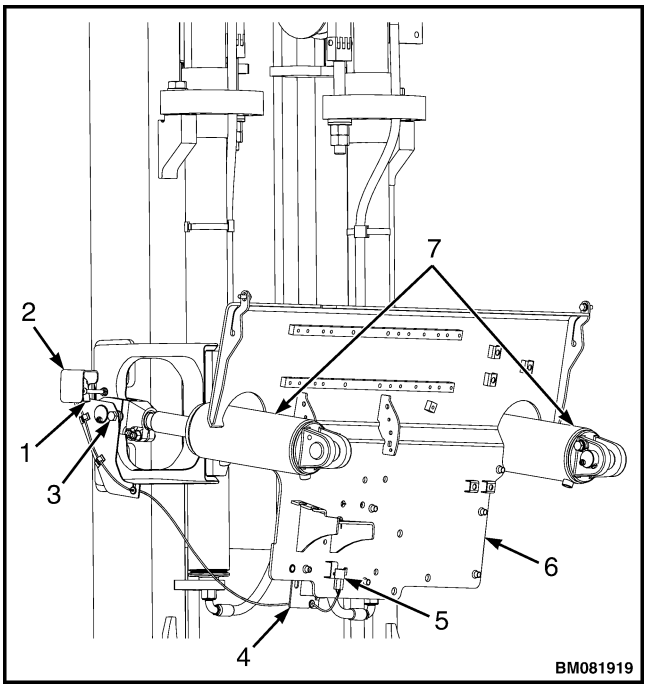
2. Disconnect sensor harness from cowl harness. See Figure 42.

3. Remove harness bracket from cowl and remove harness from bracket.

4. Remove capscrew that attaches tilt sensor bracket to mast. See Figure 42.

5. Remove sensor bracket and tilt sensor from mast.

6. Remove two torx capscrews and nuts holding tilt sensor to sensor bracket. Remove sensor from bracket.



NOTE: GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (E879) SHOWN.

1. TILT SENSOR
2. TILT SENSOR BRACKET
3. CAPSCREW
4. SENSOR HARNESS BRACKET
5. SENSOR CONNECTOR TO COWL HARNESS
6. COWL
7. TILT CYLINDERS

Figure 42. Return to Set Tilt (Tilt Angle) Sensor

Install

1. Install new tilt sensor onto sensor bracket using two torx capscrews and nuts.

2. Secure sensor bracket and tilt sensor to mast using capscrew. Tighten capscrew to 90 to 99 N•m (66 to 73 lbf ft). See Figure 42.

3. Place sensor harness in harness bracket and install bracket onto cowl. Tighten capscrew to 38 N•m (28 lbf ft).

4. Connect sensor harness connector to cowl harness.

5. Connect the battery, install floor plate and floor mat, on lift truck models

- GLP/GDP60VX, GLP/GDP70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C878, D878, E878)
- GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (GLP/GDP170VX, GLP/GDP175VX36, GLP/GDP190VX) (A909, B909)

Connect the battery and lower the hood, on lift truck models

- GLC40, 45, 55VX; GLC55SVX; (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818, F818)
- GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6, GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813, H813, J813)
- GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C879, D879, E879, F879)

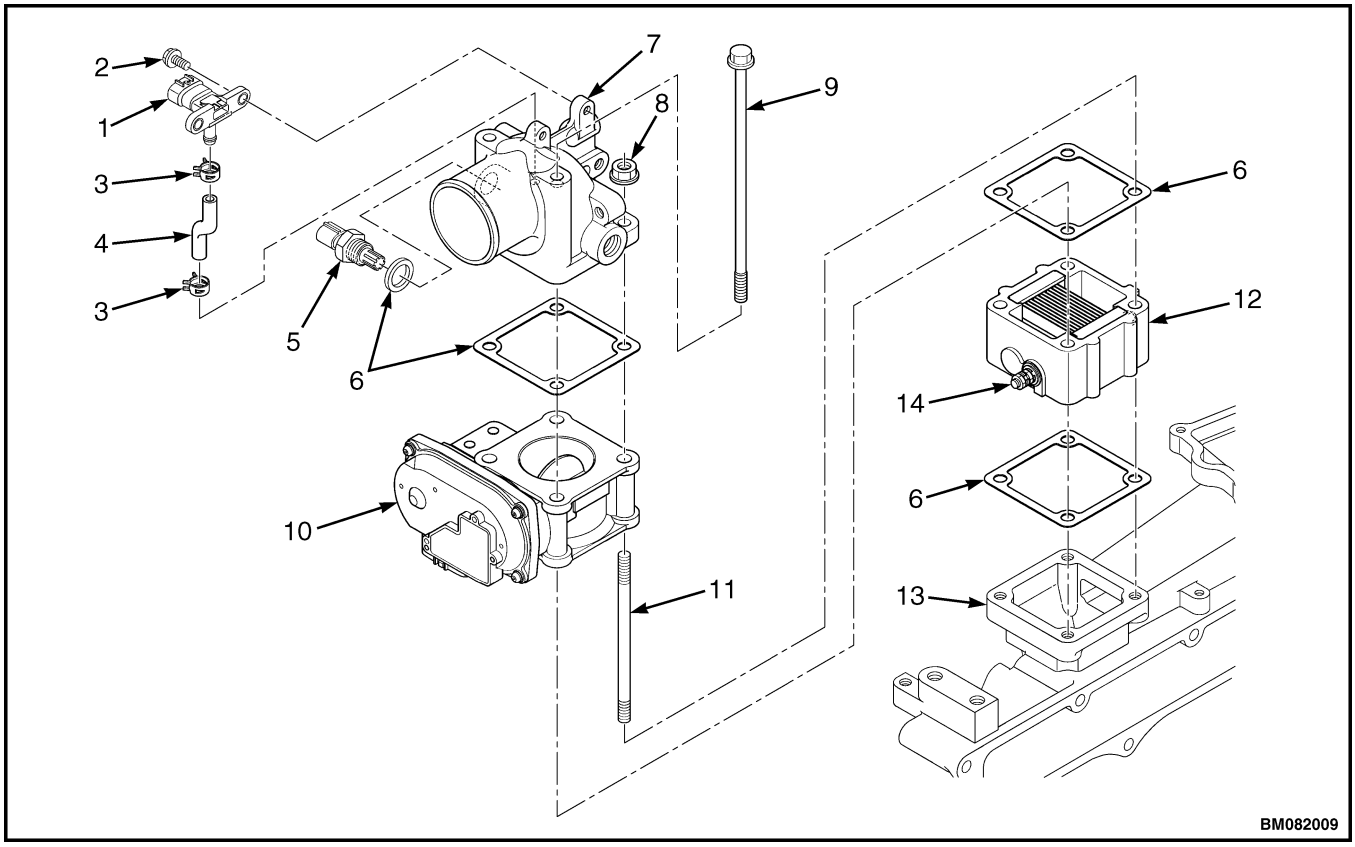
6. Tilt the mast completely forward and backward to ensure that the tilt sensor is correctly installed and connected.

REAR HORN BUTTON SWITCH

Remove

1. To access the battery, remove the floor mat and floor plate, on lift truck models below. Disconnect the battery.

- GLP/GDP60VX, GLP/GDP70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C878, D878, E878)



1. BOOST SENSOR
2. CAPSCREW
3. CLAMP
4. HOSE
5. INTAKE AIR TEMPERATURE SENSOR
6. GASKET
7. AIR INTAKE HOUSING
8. FLANGE NUTS
9. FLANGE BOLTS
10. THROTTLE VALVE ASSEMBLY
11. STUD
12. AIR INTAKE HEATER
13. INTAKE MANIFOLD
14. AIR HEATER TERMINAL NUTS

Figure 74. Air Intake Housing and Throttle Valve

Install

NOTE: If intake air temperature sensor has been identified as faulty, replace sensor with new one.

1. Install new gasket and intake air temperature sensor. Tighten to 16 to 23 N•m (12 to 17 lbf ft).

2. Connect intake air temperature sensor electrical sensor.

3. Connect battery and lower the hood on lift truck models

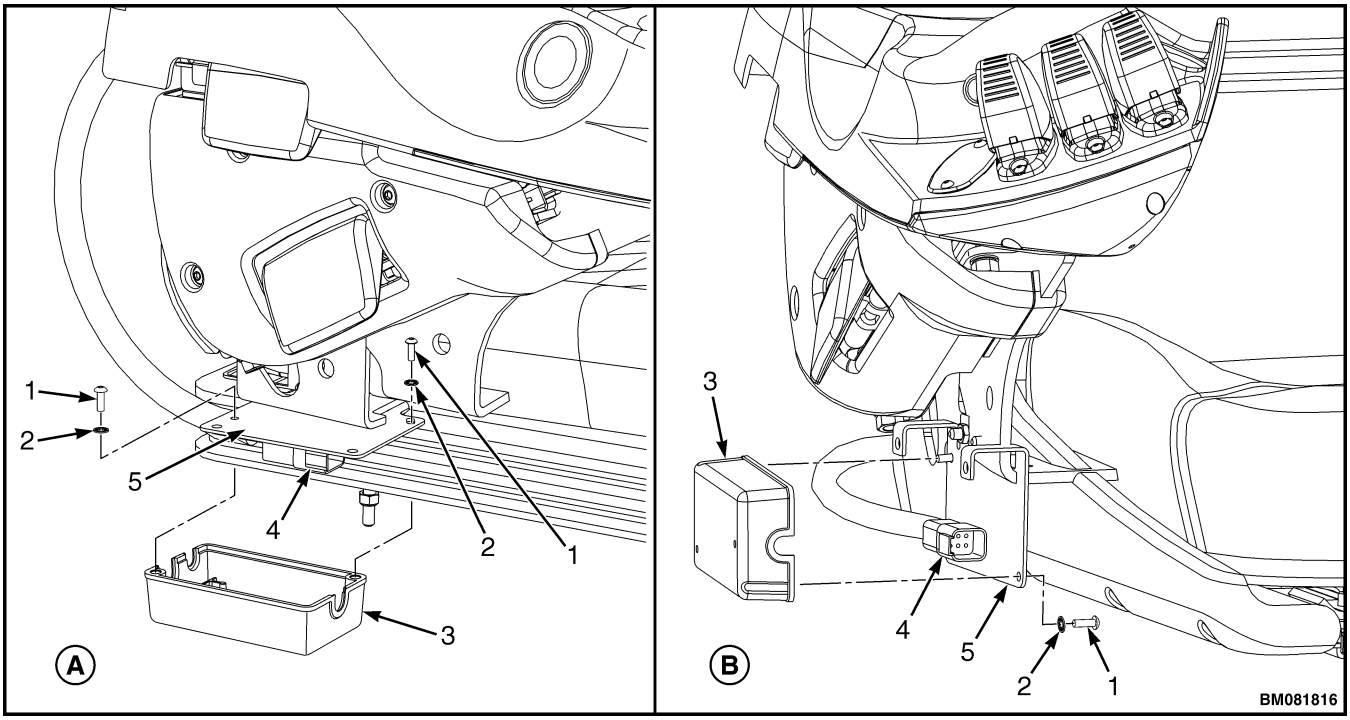
- GLP/GDP60VX, GLP/GDP70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (E878)
- GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (GLP/GDP170VX, GLP/GDP175VX36, GLP/GDP190VX) (B909)
- GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (J813)
- GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (F879)

Boost Sensor

Remove

1. To access battery, raise hood, on lift truck models below. Disconnect the battery.

- GLP/GDP60VX, GLP/GDP70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (E878)
- GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (GLP/GDP170VX, GLP/GDP175VX36, GLP/GDP190VX) (B909)



NOTE: SOME COMPONENT PARTS AND ELECTRICAL CONNECTIONS OMITTED OR MOVED FOR CLARITY.

A. FULL SUSPENSION SEATS

1. CAPSCREWS
2. WASHERS
3. SEAT BOX

B. SEMI SUSPENSION SEATS

4. E-HYDRAULIC ARMREST HARNESS CONNECTOR
5. COVER PLATE

Figure 111. Seat Box Cover Removal

3. Pull up on handle (see Figure 112) and slide armrest all the way forward and remove the flange capscrew from under the armrest mounting bracket that attaches the armrest to the mounting bracket. Pull up on handle and slide armrest all the way back and remove the other flange capscrew. See Figure 113.

Proc_Cal_007: Tilt Forward Valve Output Threshold

WHEN TO PERFORM

Performed when troubleshooting procedures indicate, when tilt forward valve components have been serviced, or when the tilt forward valve is replaced.

CALIBRATION ORDER

1. Proc_Cal_025
2. Proc_Cal_001
3. Proc_Cal_002
4. Proc_Cal_007

WHY PERFORM

All electro-hydraulic valves have different operating characteristics. One of the key characteristics is the point at which hydraulic flow begins for a given command current. This cracking' current is determined by this process.

HOW TO PERFORM

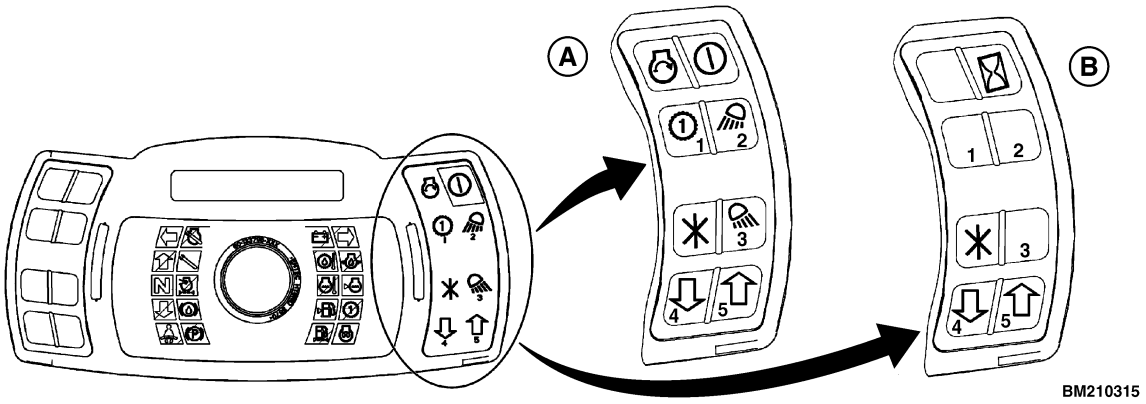
WARNING

Keep yourself and all others clear of the lift mechanism. Never allow anyone under or on the forks.

Never put hands, arms, head, or legs through the mast or near the carriage or lift chains. This warning applies not only to the operator but also the helper. A helper must not be near the load or the lift mechanism while the operator is attempting to handle a load. The lift mechanism has moving parts with close clearances that can cause serious injury.

Refer to Table 9 for the procedures on how to perform Proc_Cal_007: Tilt Forward Valve Output Threshold.

Table 9. Proc_Cal_007: Tilt Forward Valve Output Threshold



A. TYPICAL DISPLAY WITHOUT KEY, WITH OPTIONS
B. TYPICAL DISPLAY WITH KEY, WITHOUT OPTIONS

Perform Proc_Cal_025: Hydraulic Valve Pressure Gage Installation, Proc_Cal_001: Service Password Entry, and Proc_Cal_002: Hydraulic Valve Calibration Warm Up and Air Bleed before proceeding.

Information: "Creep" is defined as the threshold when a function first starts to move very slowly (barely perceptible motion). The identification of this motion is defined as the "visual method." The method that provides more consistent calibration is by monitoring the change in pressure when the function is activated; this is defined as the "pressure method."

Information:
Pressure Method: Perform Actions 1, 2, 3, 4, and 6.
Visual Method: Perform Actions 2, 3, 5, and 6.

Information: Leave truck running at idle after performing Proc_Cal_002.

TABLE OF CONTENTS (Continued)

This section is for the following models:

GLC40, 45, 55VX; GLC55SVX (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) [E818, F818];
GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) [F813, G813, H813, J813]

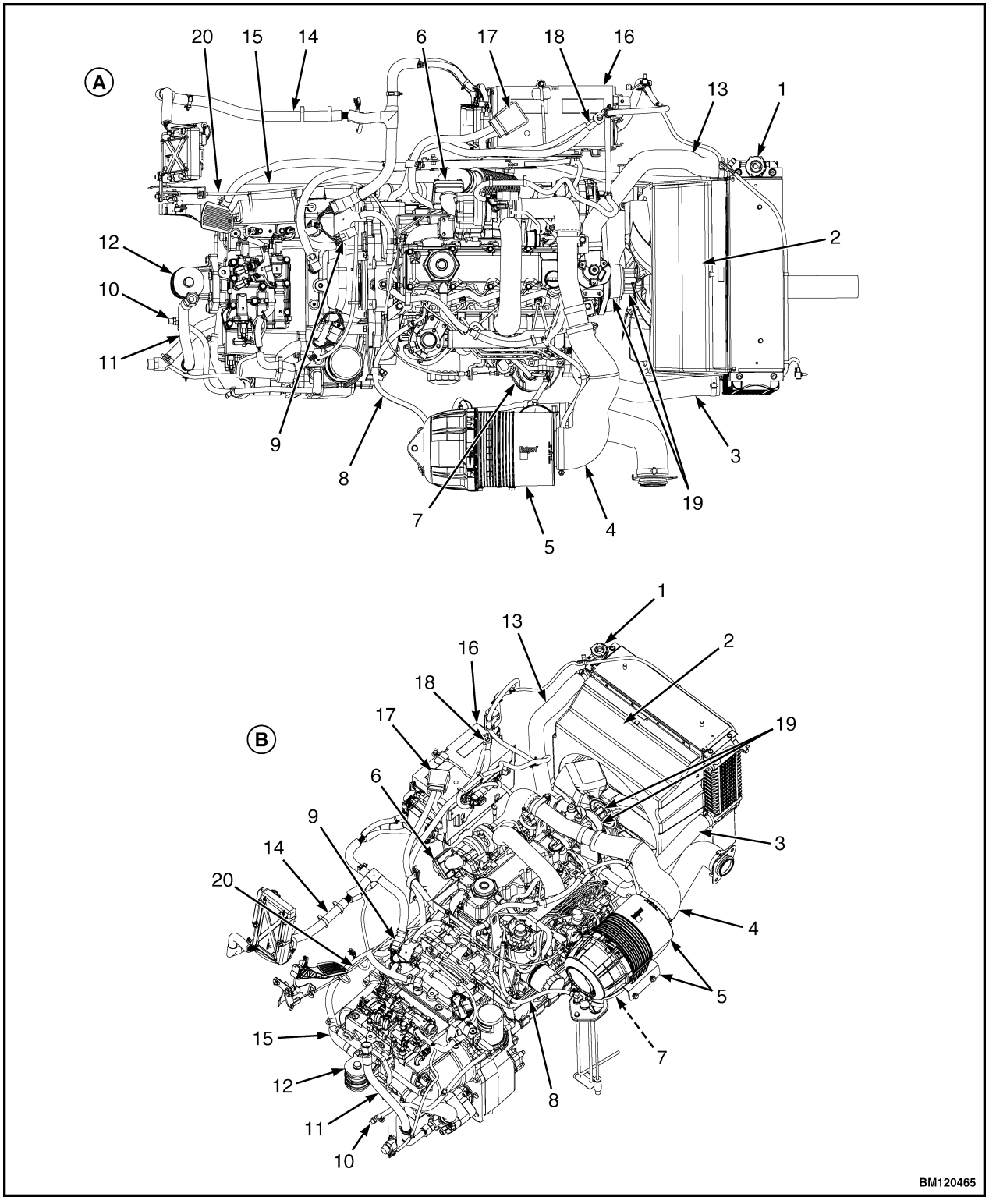


Figure 31. Kubota 3.6L Engine and Transmission for Lift Truck Models GLP/GDP40VX5/VX6; GLP/GDP45SVX5,GLP/GDP45VX6, GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (H813) Manufactured Before February, 2012

21. Install new gasket on DPF out. See Figure 59 and Figure 58.

22. Install exhaust pipe (elbow) and four locknuts. Tighten locknuts to 49 to 55 N•m (37 to 41 lbf ft).

23. Install exhaust pipe (intermediate pipe) onto exhaust pipe (elbow) and orientate so overhead exhaust pipe can be installed onto exhaust pipe (intermediate pipe). See Figure 58.

24. Install overhead exhaust pipe onto exhaust pipe (intermediate pipe).

25. Install u-bolt, clamp, washers and nuts clamping together exhaust pipe (intermediate pipe) to exhaust pipe (elbow).

26. Install overhead exhaust pipe into counterweight and onto exhaust pipe (intermediate pipe).

27. Install u-bolt, clamp, washers, and nuts clamping together exhaust pipe (intermediate pipe) to overhead exhaust pipe.

28. Tighten nuts on clamps for both exhaust pipe (intermediate pipe) onto exhaust pipe (elbow) connection and exhaust pipe (intermediate pipe) to overhead exhaust pipe connection.

29. Install three capscrews into overhead exhaust pipe flange and counterweight. Tighten capscrews.

30. Install exhaust flange cover onto overhead exhaust flange.

NOTE: Perform Step 31 for lift trucks equipped with a tail pipe.

31. Install tail pipe and four lock nuts onto DPF outlet. Tighten locknuts to 49 to 55 N•m (37 to 41 lbf ft).

32. Install counterweight grill using two capscrews. Tighten capscrews to 38 N•m (28 lbf ft).

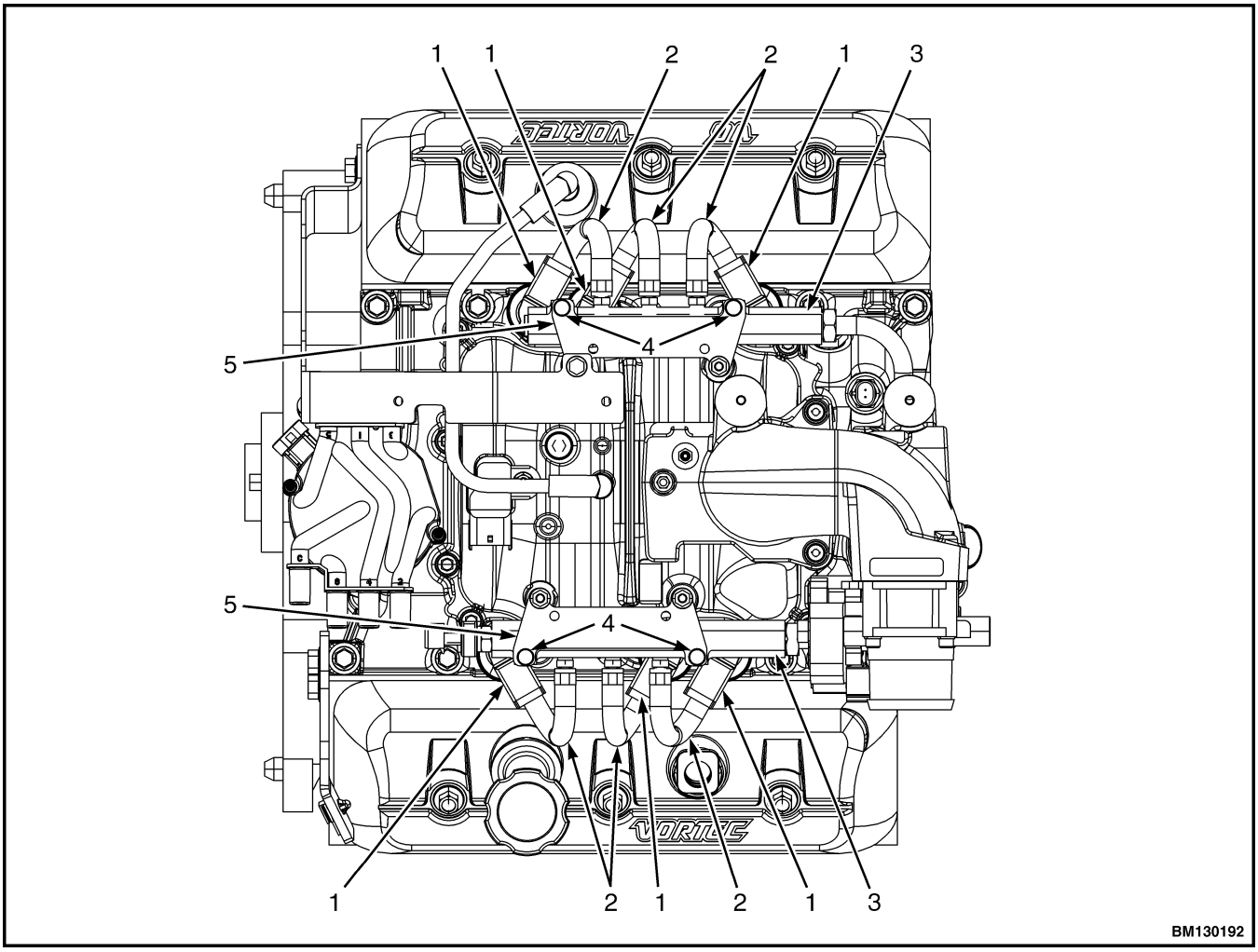
Cooling System

DESCRIPTION

The cooling system is used to cool engine and keep it at correct operating temperature. The cooling system is comprised of following main components:

- Radiator
- Fan and belt
- Fan shroud
- Coolant hoses and lines
- Coolant reservoir

For procedures to repair, clean, inspect, and install radiator and cooling system components, refer to **Cooling System** 0700YRM1123.



1. FUEL INJECTOR
2. HOSE
3. FUEL RAIL
4. CAPSCREWS
5. FUEL RAIL MOUNTING BRACKET

Figure 22. Fuel Injector Positioning

8. Connect the electrical connectors to the fuel injectors. Verify that the connectors click/lock into place.

9. Connect the fuel line to the fuel rail. Tighten the fuel line to 25 N•m (18.44 lbf ft).

10. If installing the right-hand side fuel injector rail, connect the fuel pressure sensor electrical connector. See Figure 14.

11. If installing the left-hand side fuel rail, install the ECU and injector drivers as an assembly. See Electronic Control Unit (ECU) and Injector Driver Modules AssemblyInstall.

12. Connect the negative battery cable.

NOTE: Opening the fuel valve too quickly can cause the internal excess flow valve to close, restricting the flow of fuel. If this happens, close the fuel valve, wait a few seconds, and then slowly open the fuel valve again. This will reset the excess flow valve.

13. Slowly open the fuel valve on tank.

14. Turn the key to the **ON** position and back to the **OFF** position to pressurize the fuel system. Check for leaks.

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

- 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 CONNECTOR 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 **YALE 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.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- 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 are on orange background. The CAUTION symbol and word are on yellow background.

Install for Lift Trucks Built Before January, 2010

NOTE: Lift trucks equipped with standard exhaust follow Step 1 through Step 7. Lift trucks equipped with overhead exhaust follow Step 8 through Step 16.

1. Install new gasket onto exhaust pipe (16, Figure 32) and connect exhaust pipe (16, Figure 32) to engine exhaust manifold. Tighten locknuts to 39 N•m (345 lbf in).
2. Install new gasket between exhaust pipe (15 and 16, Figure 32). Connect exhaust pipe (15, Figure 32) onto exhaust pipe (16, Figure 32). Tighten locknuts to 39 N•m (345 lbf in).
3. Place the muffler onto the lift truck frame and install the washers, isolators, spacers, locknuts, and capscrews to attach the muffler to the lift truck frame. 22 N•m (195 lbf in).
4. Install new gasket onto exhaust pipe (15, Figure 32). Connect exhaust pipe (15, Figure 32) to muffler. Tighten nuts to 39 N•m (345 lbf in).
5. Install clamp and exhaust pipe (8, Figure 32) to muffler.
6. Install the oxygen sensors in exhaust pipe (16, Figure 32).
7. Install the counterweight. See the section Counterweight Repair for the installation procedures for the counterweight.

NOTE: The following procedures is for lift trucks equipped with overhead exhaust.

8. Install new gasket onto exhaust pipe (16, Figure 32) and connect exhaust pipe (16, Figure 32) to engine exhaust manifold. Tighten locknuts to 22 N•m (195 lbf in).
9. Install new gasket between exhaust pipe (15 and 16, Figure 32). Connect exhaust pipe (15) onto exhaust pipe (16). Tighten locknuts to 39 N•m (345 lbf in).
10. Place the muffler onto the lift truck frame and install the washers, isolators, spacers, locknuts, and capscrews to attach the muffler to the lift truck frame. 22 N•m (195 lbf in).
11. Install new gasket onto exhaust pipe (15, Figure 32). Connect exhaust pipe (15, Figure 32) to muffler. Tighten nuts to 39 N•m (345 lbf in).
12. Install clamp and exhaust pipe (7, Figure 32) to muffler.
13. Connect the oxygen sensors to exhaust pipe (16, Figure 32).
14. Install the counterweight. See the section Counterweight Repair for the installation procedures for the counterweight.
15. Install clamp (6, Figure 32) and connect exhaust pipe (1, Figure 32) to exhaust pipe (7, Figure 32).
16. Install flange bolts and flange cover to secure exhaust pipe (1, Figure 32) to the counterweight.

Install for Lift Trucks Built After January, 2010

NOTE: Lift trucks equipped with standard exhaust follow Step 1 through Step 7. Lift trucks equipped with overhead exhaust follow Step 8 through Step 15.

1. Install new gaskets, exhaust pipe (18, Figure 33), washers, and locknuts onto exhaust manifold.
2. Install new gasket, exhaust pipe (18, Figure 33), flange bolts, and locknuts onto exhaust pipe (17, Figure 33).
3. Place muffler onto lift truck frame. Install spacers, isolators, capscrews, and locknuts onto muffler and lift truck frame. See Figure 33.
4. Install new gasket, exhaust pipe (17, Figure 33), capscrews, and locknuts onto muffler.
5. Install exhaust pipe (7, Figure 33) and clamp onto muffler.
6. Connect three oxygen sensors (10, Figure 33) to exhaust pipe (18, Figure 33) and muffler.
7. Install the counterweight. See the section Counterweight Repair in **Frame** 100 YRM 1316 for installation procedures.
8. Install new gaskets, exhaust pipe (18, Figure 33), washers, and locknuts onto exhaust manifold.
9. Install new gasket, exhaust pipe (18, Figure 33), flange bolts, and locknuts onto exhaust pipe (17, Figure 33).
10. Place muffler onto lift truck frame. Install spacers, isolators, capscrews, and locknuts onto muffler and lift truck frame. See Figure 33.

Torque Specifications

Axle Shaft Capscrews
90 to 99 N•m (66 to 73 lbf ft)

Bearing Cap Capscrews
225 to 270 N•m (166 to 199 lbf ft)

Brake Assembly to Axle Mount Capscrews
340 to 375 N•m (250 to 276 lbf ft)

Brake Manifold to Differential Housing Capscrews
23 to 28 N•m (17 to 21 lbf ft)

Differential Assembly Support to Differential Housing
66 to 79 N•m (49 to 58 lbf ft)

Differential Carrier Halves Capscrews
125 to 145 N•m (92 to 107 lbf ft)

Differential Drain Plug
50 to 55 N•m (37 to 41 lbf ft)

Differential Fill Plug
151 to 166 N•m (111 to 122 lbf ft)

Drive Shaft Capscrews
50 to 66 N•m (37 to 49 lbf ft)

Drop Box Housing Capscrews
19 to 23 N•m (14 to 17 lbf ft)

Hanger Assembly to Differential Housing
225 to 248 N•m (166 to 183 lbf ft)

Hanger Assembly to Frame
820 to 902 N•m (605 to 665 lbf ft)

Pinion Cover Capscrews
19 to 23 N•m (14 to 17 lbf ft)

Pinion Gear Capscrews
152 to 167 N•m (112 to 123 lbf ft)

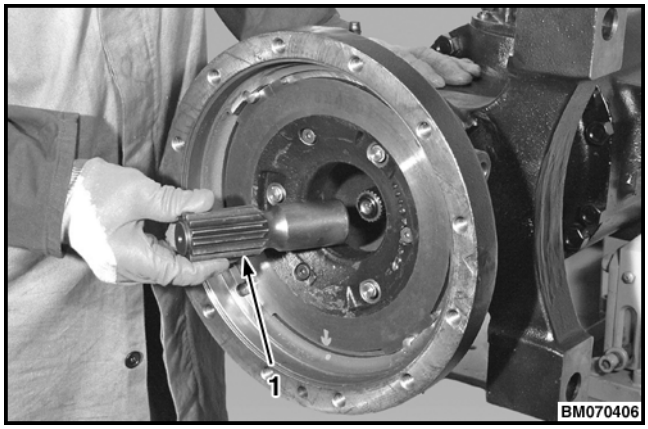
Pinion Nut, for Pre-Load
370 to 410 N•m (273 to 302 lbf ft)

Pinion Nut, to Seat Bearings
530 to 645 N•m (391 to 476 lbf ft)

Transmission Mount Bolt to Differential Housing
225 to 250 N•m (166 to 184 lbf ft)

Wheel Nuts
610 to 680 N•m (450 to 502 lbf ft)

STEP 16.
Lubricate the internal spline of the pinion with John Deere JDM J20C and install the pinion.

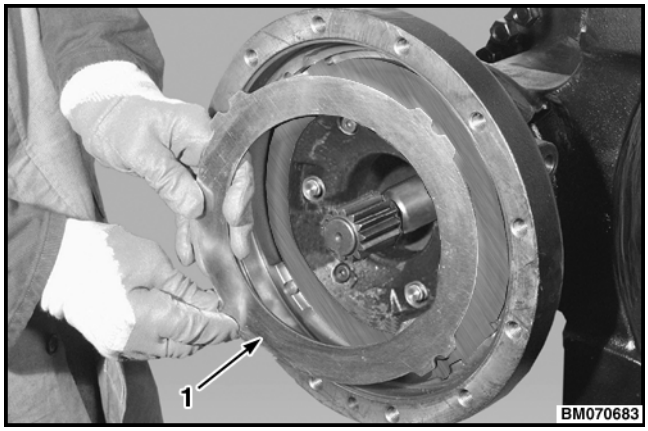


1. PINION

NOTE: The GLC45, 55VX; GLC55SVX; (GC/GLC100, 120VX; GC/GLC100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818, F818, G818); GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813, H813, J813, K813) series lift truck drive axle will have two brake discs and two friction plates. The GLC40VX (GC/GLC080VX; GC/GLC080VXBCS) (E818, F818, G818) series lift truck drive axle will only have one brake disc and one friction plate.

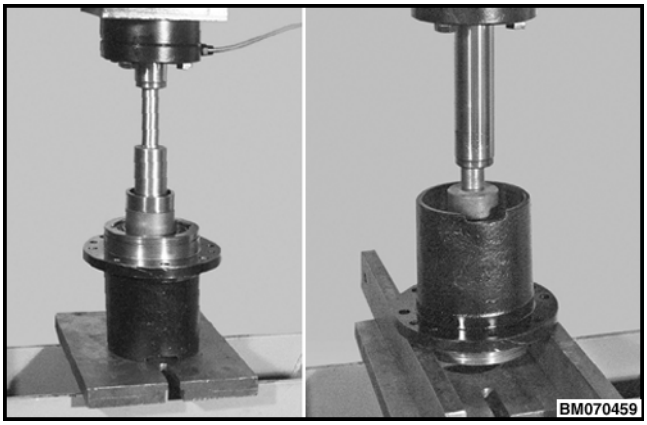
NOTE: If installing the brake discs and friction plates for a GLC45, 55VX; GLC55SVX; (GC/GLC100, 120VX; GC/GLC100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818, F818, G818); GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813, H813, J813, K813) series lift trucks, install the brake discs and friction plates in the same position as removed.

STEP 17.
Lightly lubricate the friction plate with John Deere JDM J20C and place it in position on the arm.

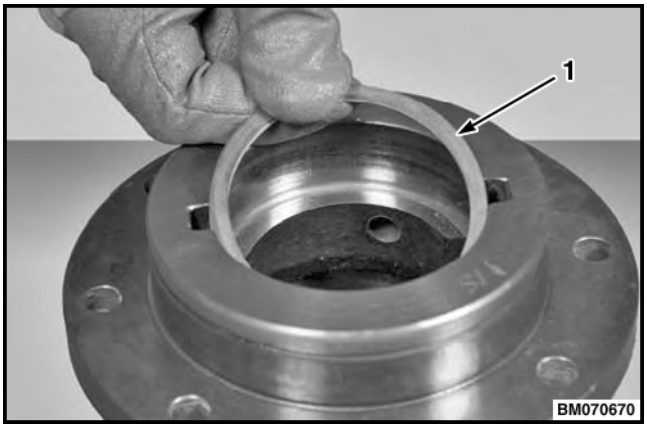


1. FRICTION DISC

STEP 8.
Remove the bearing cups from the bevel pinion housing.



STEP 9.
Remove the shims from the bevel pinion housing.



1. SHIMS

CLEAN AND INSPECT

WARNING

Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the recommendations of the manufacturer.

WARNING

Compressed air can move particles so that they cause injury to the user or to other personnel. Make sure that the path of the compressed air is away from all personnel. Wear protective goggles or a face shield to prevent injury to the eyes.

Clean and inspect the following parts:

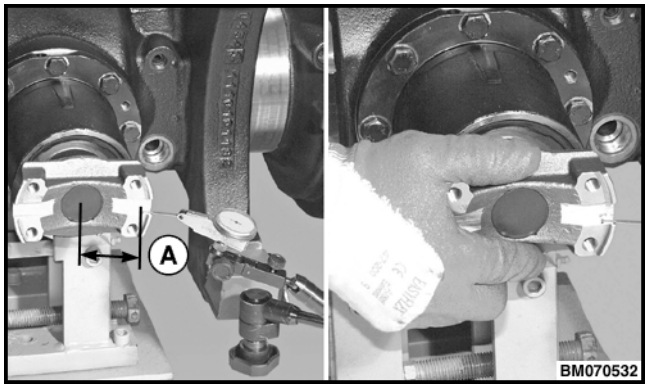
- **Bearings** - Inspect the cup, cone, rollers, and cage of all tapered roller bearings in the assembly. If bearings show signs of wear, cracks, or damage, replace with new bearing cone and cup.
- **Bevel Pinion** - Inspect the bevel pinion for wear or damage. Replace as needed. If the bevel pinion is replaced, the bevel gear must also be replaced.
- **Bevel Pinion Housing** - Inspect the housing for wear and damage. Replace as needed.

ASSEMBLE

Refer to Figure 20 and Figure 21.

STEP 13.
Install a dial gauge as shown and shift the flange to check the tolerance between the bevel gear teeth.

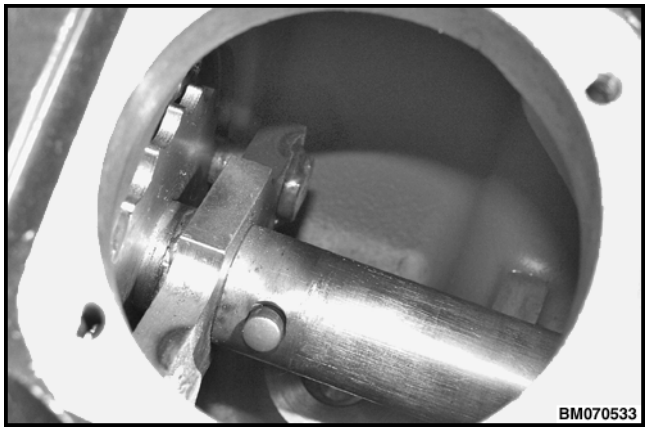
Manually move the bevel gear in both directions to check the existing backlash between the bevel pinion and bevel gear.



A. 50 mm (1.9685 in.)

STEP 14.
Adjust the backlash between the bevel pinion and the bevel gear by loosening one of the ring nuts and tightening the opposite ring nut.

The backlash must be set between 0.25 to 0.34 mm (0.0098 to 0.01339 in.).



STEP 15.
Apply Loctite® 242 to the threads of the socket head screw and install the socket head screw into one of the two holes to lock the ring nut in position. Tighten the socket head screw to 23.8 to 26.2 N•m (17.6 to 19.3 lbf ft). Repeat on opposite side.

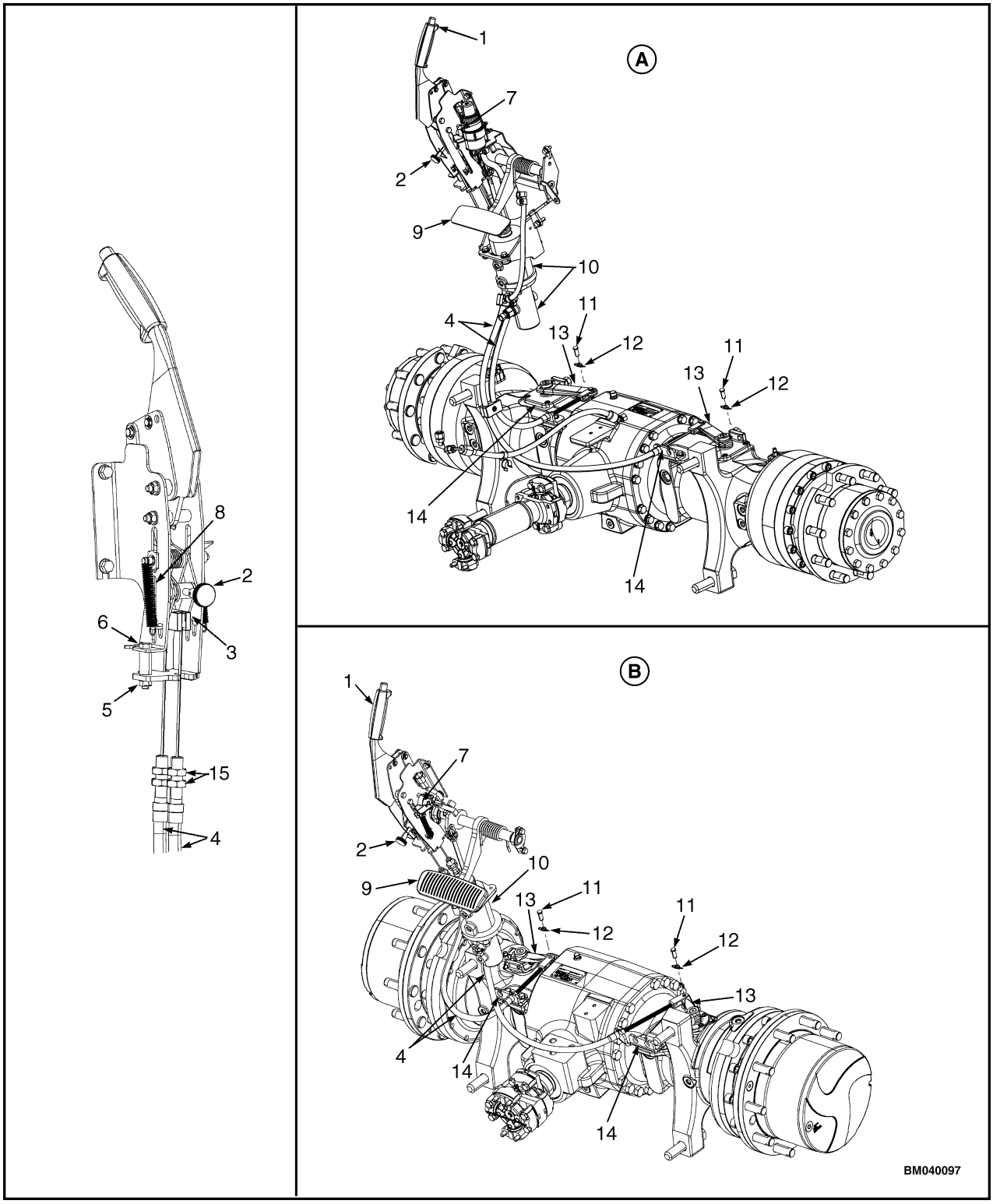


Figure 19. Parking Brake Lever Adjustment for Lift Truck Models With Wet Brake SystemGLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C879, D879, E879, F879) and GLP/GDP60VX, GLP/GDP70VX (GP/GLP/GDP135VX, GP/GLP/GDP155VX) (C878, D878, E878)

General

WARNING

DO NOT make repairs or adjustments unless you have both authorization and training. Repairs and adjustments that are not correct can make a dangerous operating condition.

WARNING

DO NOT operate a lift truck that needs repairs. Report the need for repairs immediately. If repair is necessary, put a DO NOT OPERATE tag in the operator's area. Remove the key from the key switch.

CAUTION

Disposal of lubricants and fluids must meet local environmental regulations.

This section contains a **Maintenance Schedule** and instructions for maintenance and inspection.

The **Maintenance Schedule** has time intervals for inspection, lubrication, and maintenance of your lift truck. The service intervals are provided in both operating hours recorded on the lift truck hourmeter and in calendar time. The recommendation is to use the interval that comes first.

The recommendations for the time intervals provided is for eight hours of operation per day. The time intervals must be decreased from the recommendations in the **Maintenance Schedule** for the following conditions:

- The lift truck is used more than eight hours per day.
- The lift truck must work in dirty operating conditions.
- Poor ground conditions.
- Intensive usage at high performance levels or other abnormal conditions will require more frequent servicing.

Your dealer for Yale lift trucks has the equipment and trained service personnel to do a complete program of inspection, lubrication, and maintenance. A regular program of inspection, lubrication, and maintenance will help your lift truck provide more efficient performance and operate for a longer period of time.

Some users have service personnel and equipment to do the inspection, lubrication, and maintenance shown in the **Maintenance Schedule**. Service manuals are available from your dealer for Yale lift trucks to help users who do their own maintenance.

SERIAL NUMBER DATA

The serial number for the lift truck is on the Nameplate. It is also on the right side of the frame, under the floor plate.

application of the inching/brake pedal applies the service brakes and puts the transmission in **NEUTRAL**.

Lift trucks with aFoot Directional Control pedal. When the inching/brake pedal is fully applied, a switch in the starting circuit is closed so that the engine can be started.

Parking Brake

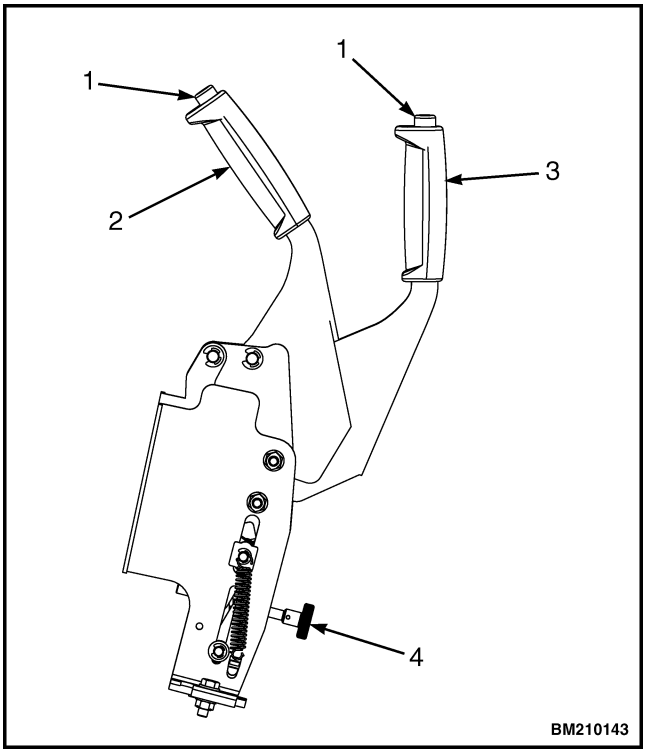
Make sure service brakes are adjusted and the operation of the automatic adjuster mechanism is correct before parking brake is adjusted.

Lift trucks with aFoot Directional Control pedal. The switch energizes the seat warning circuit when hand lever is released. This switch puts the transmission in **NEUTRAL** by de-energizing the direction solenoid. There is also a switch on the left side of bracket. This switch prevents engine from starting unless parking brake is applied.

NOTE: Make sure parking brake is released before making adjustment.

1. Turn adjustment knob to raise the equalized link and tighten parking brake cables shown in Figure 30. DO NOT tighten the adjustment so that brake is applied when the lever is released. The lever for the parking brake has a lock. Use your thumb or finger to release lock on lever when parking brake is released.

2. For burnished brakes, test the operation of the parking brake. The lift truck with a capacity load must not move when parking brake is applied on a 15 percent grade [a slope that increases 1.5 m in 10 m (1.5 ft in 10 ft)].



1. LOCK BUTTON RELEASE
2. OFF POSITION
3. ON POSITION
4. ADJUSTMENT KNOB

Figure 30. Parking Brake

Engine Oil Pressure

NOTE: The engine will enter shutdown mode after a warning buzzer sounds and a 30-second countdown, if engine oil presssure is less than 34.5 kPa (5 psi) on lift trucks with powertrain protection system. Lift trucks equipped with a Cummins diesel engine will enter the shutdown mode whent he engine oil pressure is less than 49 kPa (7 psi) on lift trucks with powertrain protection system. See the **Engine Shutdown** procedures in the **Operating Manual**.

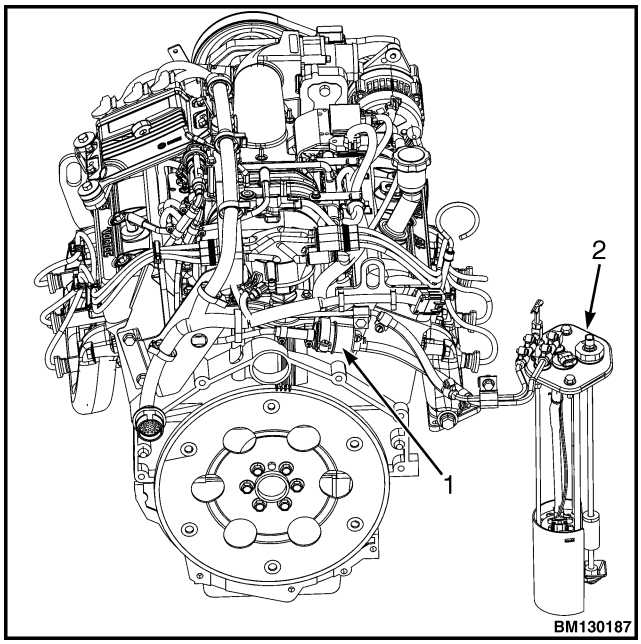
There is an indicator light for the engine oil pressure on the Display Switch Cluster. During normal operation, the red indicator light will illuminate when the key switch is turned to **ON**, if the truck is equipped with a key switch, or when the power **ON/OFF** button is pressed, if the truck is equipped with this option, and will stay illuminated until correct oil pressure is obtained, at which time the light will go off.

If the light continues to stay on when engine is running, the engine oil pressure is low. Stop the engine

GASOLINE FUEL FILTER

Remove and Replace for Lift Trucks Equipped with GFI

1. Raise the hood and disconnect the negative terminal of the battery.
2. Remove and discard the fuel filter. See Figure 84.
3. Install the new fuel filter and tighten the clamp screws to 2.45 to 2.77 N•m (22 to 25 lbf in).
4. Connect the negative terminal of the battery and close the hood.

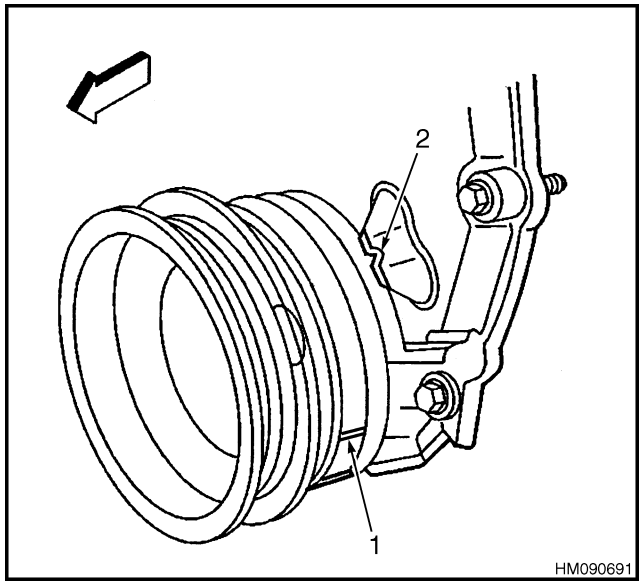


1. FUEL FILTER
2. FUEL PUMP/SENDER UNIT

Figure 84. Fuel Filter Replacement (GM 4.3L with GFI)

Remove and Replace for Lift Trucks Equipped with PSI

1. Raise the hood and disconnect the negative terminal of the battery.
2. Remove the hose clamps on the return tube and fuel filter. See Figure 85.
3. Remove the return tube and set aside. See Figure 85.
4. Remove the capscrew and nut in the clamp holding the fuel filter. Remove clamp from fuel filter. See Figure 85.
5. Remove the supply hose from the fuel filter. See Figure 85.
6. Remove the fuel filter from the supply tube and discard the fuel filter. See Figure 85.
7. Install clamp on new fuel filter.
8. Connect the fuel filter to the supply tube. See Figure 85.
9. Connect the fuel supply hose to the fuel filter. Install hose clamps on the fuel supply hose and the supply tube as shown in Figure 85.
10. Install fuel filter and clamp on the manifold bracket using the capscrew and nut. See Figure 85.
11. Install the return tube and return tube hose clamps. See Figure 85.
12. Connect the negative terminal of the battery and close the hood.



NOTE: ONCE THE VALVE ROCKER ARM ASSEMBLIES ARE INSTALLED AND PROPERLY TORQUED, NO ADDITIONAL VALVE LASH ADJUSTMENT IS REQUIRED.

1. CRANKSHAFT BALANCER ALIGNMENT MARK
2. ENGINE FRONT COVER ALIGNMENT TAB

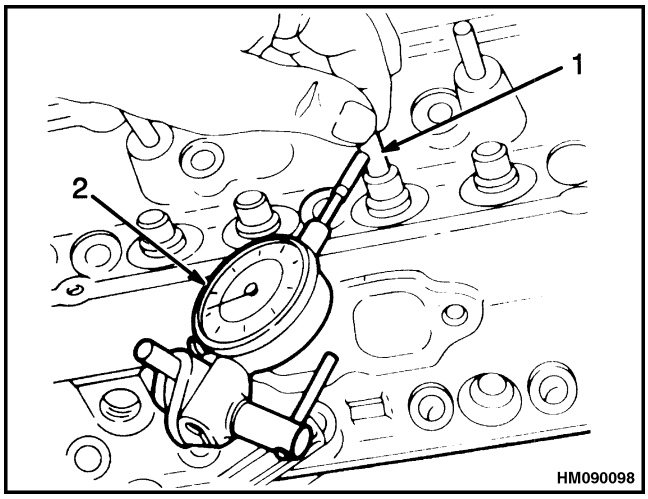
Figure 13. Rotate Crankshaft Balancer

VALVE GUIDES AND SEATS, REPAIRS

Measure clearance between valve stem and guide as follows:

1. Clamp a dial indicator on exhaust port side of the cylinder head. See Figure 14.
2. Position dial indicator so that movement of valve stem from side to side, crosswise to cylinder head, will cause a direct movement of dial indicator stem.
   The dial indicator stem must contact side of valve stem just above valve guide.
3. Lower valve head about 1.6 mm (0.063 in.) below valve seat.
4. Using light pressure, move valve stem from side to side in order to obtain valve stem-to-guide clearance reading.

See Engine Specifications for maximum clearances. If clearance is more than maximum amount, oversize valves or new valve guides must be installed. Use a reamer of correct size when installing new valve guides. Use normal service procedures when grinding valve seats. See Engine Specifications for dimensions.



1. VALVE STEM
2. DIAL INDICATOR

Figure 14. Valve Steam Clearance

VALVES, REPAIR

NOTE: Before any work is performed on valve faces and seats, make sure clearance of valve stems in their valve guides is within specifications.

A correction for minimum wear and damage to valve and seat can be done by a process called lapping. When th valve seats are lapped, keep valve faces and seats within the specifications. Make sure all of the lapping compound is removed from the valve and valve seat when the process is completed.

Valves with minor pits in valve faces can be machined to proper angle. There are many different types of equipment for repairing valve faces. Follow instructions of manufacturer of equipment that you are using. Valves must be machined to proper specifications. See Figure 15.

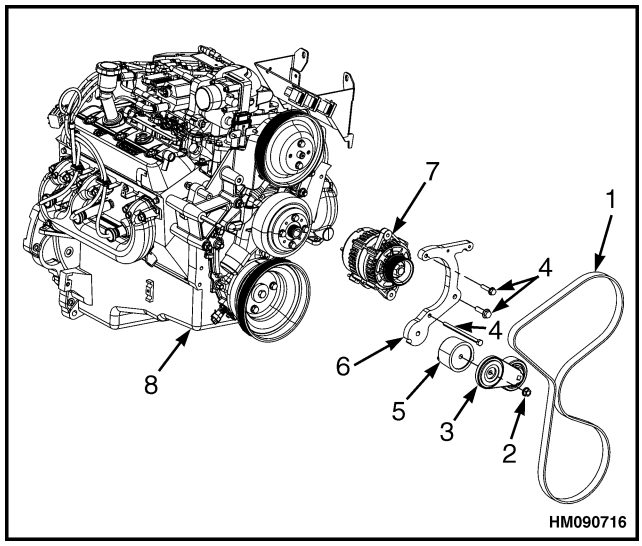
Drive Belt Installation

REMOVE

1. Remove drive belt from engine. See Figure 84.
2. Remove lock nut, tensioner pulley, and tensioner from bracket.

NOTE: Remove bracket only if it is damaged.

3. Remove three capscrews, bracket, and alternator from engine.



1. DRIVE BELT
2. LOCK NUT
3. TENSIONER PULLEY
4. CAPSCREW
5. TENSIONER
6. BRACKET
7. ALTERNATOR
8. ENGINE

Figure 84. Drive Belt Tensioner

CLEAN

WARNING

Cleaning solvents can be flammable and toxic and can cause skin irritation. When using cleaning solvents, always follow the solvent manufacturer's recommended safety procedures.

Clean all components thoroughly.

Clean rubber components with warm soapy water.

Metal components (except the alternator) may be wiped down using a cloth with cleaning solvent.

INSPECT

1. Inspect drive belt for wear and damage. See Figure 85. A few small cracks that run across the belt are acceptable. A belt with cracks that run the length of the belt or a belt with pieces missing is not acceptable. Replace a drive belt that is damaged.
2. Inspect all other components for cracks or other damage that would render part as non-usable. Replace damaged parts or assemblies.

INSTALL, FOR LIFT TRUCK MODELS ERC35-55HG (ERC70-120HH) (C839), GLC40, 45, 55VX; GLC55SVX; (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818, F818, G818) AND GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813, H813, J813, K813)

1. Connect a lifting device to carriage. Install load backrest and forks on carriage. See Fork Replacement. Move lift truck up to carriage. Make sure carriage is stable.

2. Use lift cylinders to raise inner mast until it is above the load rollers of the carriage, and carefully lower inner mast onto carriage.

NOTE: Install new chain anchor pins so that heads of pins face inside and center of mast. Both legs of cotter pin must be bent against chain anchor pin.

3. Replace worn or unserviceable chain anchor pins and chain anchors on the carriage with new ones and install new cotter pin. Connect lift chains to chain anchors on carriage. Tighten chain anchor nuts to 120 N•m (86 lbf ft). See Figure 18 and Figure 19.

NOTE: If lift truck is equipped with quick disconnect hoses, see section Connecting Attachment Hydraulic Quick Disconnect Hoses.

4. Remove protective caps and plugs from hydraulic lines and cylinder ports. Connect lines to sideshift cylinder as tagged during removal.

Hang On Sideshift Carriage Repair

REMOVE, LIFT TRUCK MODELS GLP/GDP60VX, GLP/GDP70VX (GP/GLP/GDP135VX, GP/GLP/GDP155VX) (C878, D878, E878) AND GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C879, D879, E879, F879)

NOTE: The hang on sideshift carriage assembly is made up of either two or three assemblies. If the lift truck is equipped with a fork positioner, the hang on sideshift carriage assembly consists of the standard carriage (fixed frame), the hang on sideshift assembly and the fork positioner assembly.

See Figure 20 for lift trucks manufactured before August, 2012.

See Figure 21 for lift trucks below, manufactured after August, 2012

- GLP/GDP60VX, GLP/GDP70VX (GP/GLP/GDP135VX, GP/GLP/GDP155VX) (E878)

See Figure 22 for lift trucks below, manufactured after August, 2012

- GLC/GDC60VX, GLC/GDC70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (E879, F879)

If the lift truck is not equipped with a fork positioner, the hang on sideshift carriage assembly is made up of the standard carriage (fixed frame) and the hang on sideshift assembly. When the word carriage is used in procedures below, it refers to the complete hang on sideshift carriage assembly; either with the fork positioner or without the fork positioner.

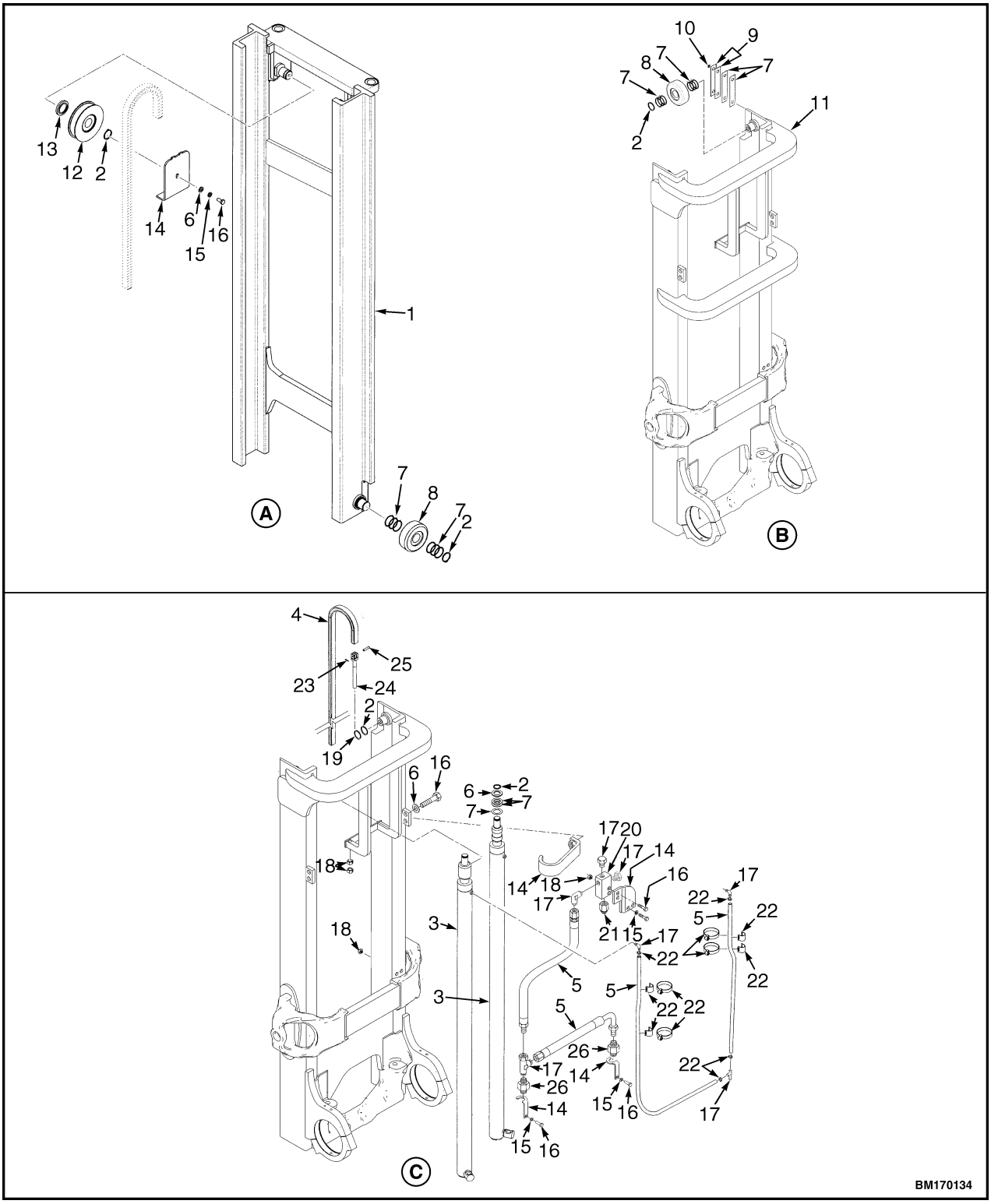


Figure 66. Two-Stage Mast With Limited Free-Lift for Lift Truck Models Manufactured Before April, 2013 and GLC40, 45, 55VX; GLC55SVX; (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818, F818) and ERC35-55HG (ERC70-120HH) (C839) GLC40, 45, 55VX; GLC55SVX; (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (G818)

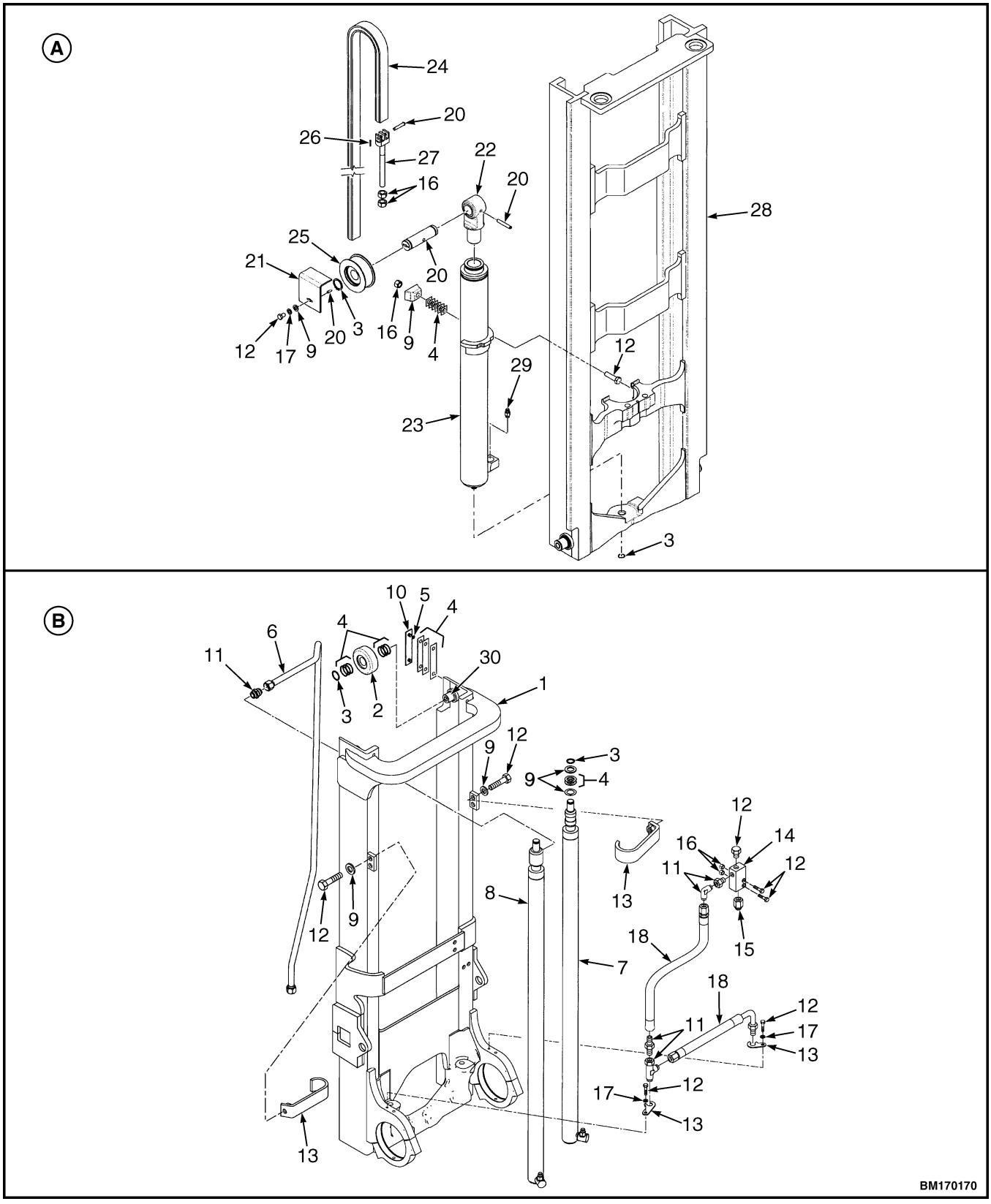


Figure 93. Two-Stage Mast With Full Free-Lift Repair for Lift Truck Models ERC35-55HG (ERC70-120HH) (C839)

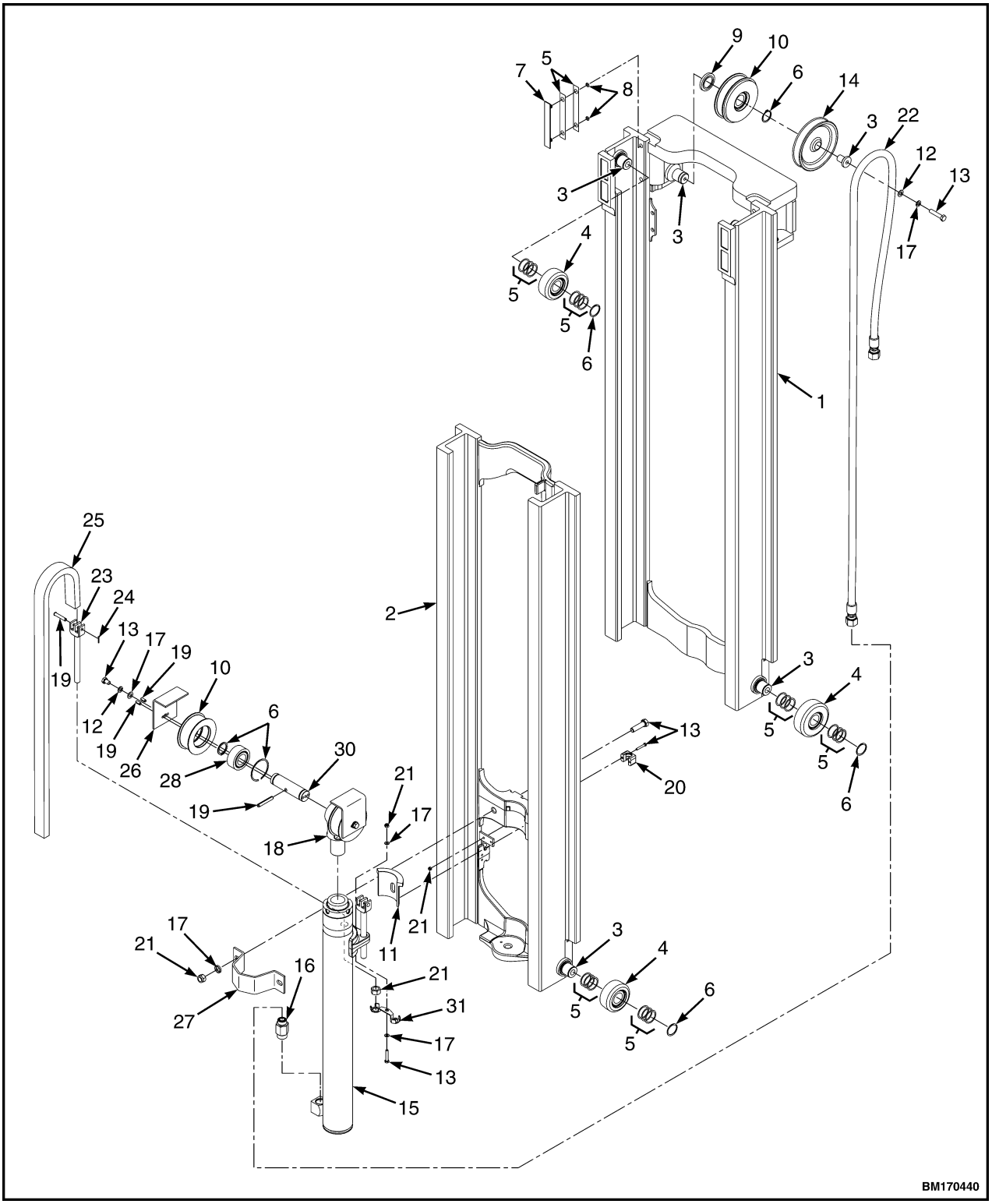


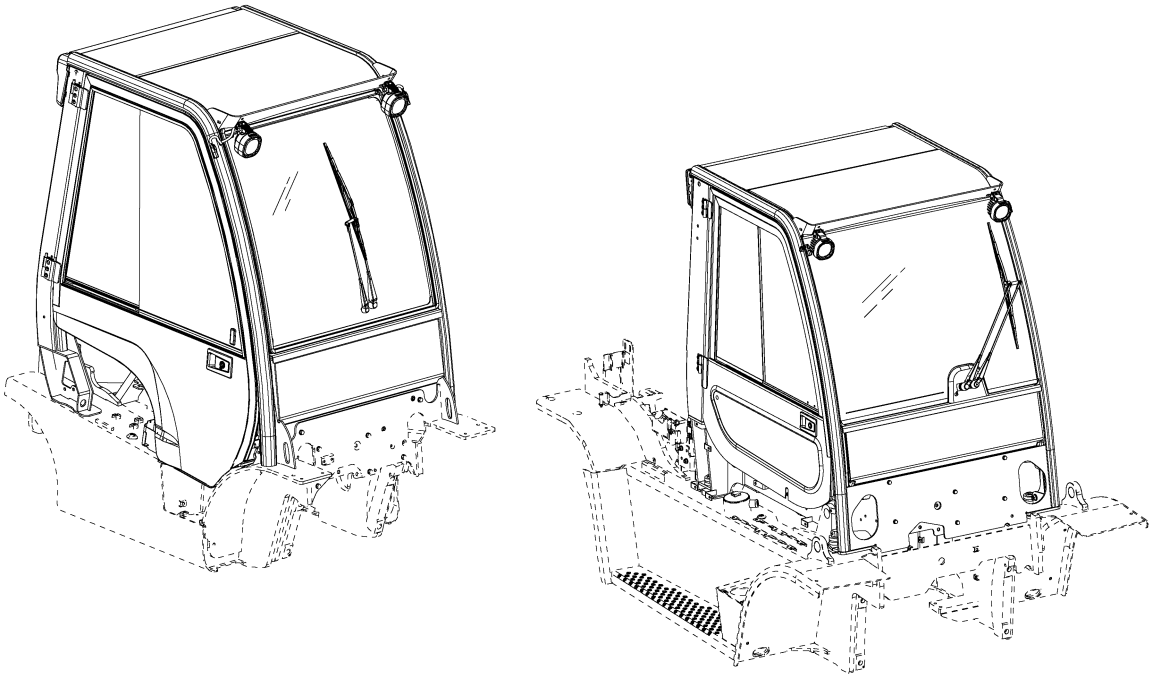
Figure 120. Three-Stage Mast With Full Free-Lift, Hose and Chain Sheaves and Load Rollers, for Lift Truck Models , Manufactured After April, 2013 and GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (H813, J813) GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (K813)

Yale

Maintenance

OPERATOR'S CAB

**GLP/GDP16VX, GLP/GDP18VX,
GLP/GDP20SVX, GLP/GDP030VX [C810];
GLP/GDP20-35VX (GP/GLP/GDP040-070VX) [B875, C875];
GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6;
GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX)
[F813, G813, H813, J813];
GLP/GDP60VX, GLP/GDP70VX (GP/GLP/GDP135VX,
GP/GLP/GDP155VX) [C878, D878, E878];
GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX
(GLP/GDP170VX, GLP/GDP175VX36, GLP/GDP190VX)
[A909, B909]**



PART NO. 524306203 **0100 YRM 1290**

Legend for Figure 40

1. PLUG
2. FASTENER
3. GAS SPRING
4. FAN AND HEATER KNOBS
5. SCREW
6. KNOB PLATE
7. HANDLE
8. HANDLE PLATES
9. WASHER
10. HEATER/FAN LOUVER
11. CAPSCREW
12. DOOR COVER
13. PRE-FILTER
14. HEATER VALVE AND SWITCH PLATE
15. STAR NUT

Door Cover With Air Conditioner/Heater Unit

NOTE: Only lift truck models GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (G813, H813, J813) with a Cummins QSB 3.3L or Kubota diesel engine may be equipped with an air conditioner/heater unit.

NOTE: The procedures in this section remove air conditioner/heater unit assembly door cover from right side door. For procedures to remove or replace other components of air conditioner/heater unit assembly, go to Heater and Air Conditioner Assembly section.

1. Remove four screws and washers that attach handle to door cover. Remove handle. See Figure 41.

2. Remove hose wrap from AC hoses.

See Figure 35 for lift truck models

- GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (G813)

See Figure 36 for lift truck models

- GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (H813)

See Figure 37 for lift truck models

- GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (J813)

3. Remove fan and heater/AC knobs from knob plate. Remove four screws that fasten knob plate to heater valve and switch plate. Remove knob plate and heater valve from door cover. See Figure 41.

4. Remove two fasteners from top of door cover.

5. Remove four capscrews that fasten AC rocker switch plate to door cover. Remove AC rocker switch plate from door cover. See Figure 41.

6. Remove five plugs, washers, and star nuts along sides and front of door cover. Remove two capscrews and washers from bottom of door cover. Remove door cover from door frame.

7. Remove prefilter, located on bottom of door frame. See Figure 41.

Install

1. Place strobe light assembly and strobe light guard onto mounting bracket. Secure assembly to mounting bracket with capscrews, washers, and flange nuts. See Figure 75.
2. Connect strobe light electrical connector to overhead guard wiring harness.
3. Connect battery, install floor plate and floor mat on lift truck models
   - GLP/GDP60VX, GLP/GDP70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C878, D878, E878)
   - GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (GLP/GDP170VX, GLP/GDP175VX36, GLP/GDP190VX) (A909, B909)

   Connect battery, lower hood, on lift truck models
   - GLP/GDP16VX, GLP/GDP18VX, GLP/GDP20SVX (GP/GLP/GDP030VX, GP/GLP/GDP035VX, GP/GLP/GDP040SVX) (C810)
   - GLP/GDP20-35VX (GP/GLP/GDP040-070VX) (B875, C875)
   - GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813, H813, J813)

TURN, STOP, TAIL, AND BACKUP LIGHT

NOTE: The turn, stop, tail, and backup light assembly is non-repairable. See **Parts Manual** for replacement turn, stop, tail, and backup lights.

Remove

1. Disconnect battery.

   To access battery, remove floor mat and floor plate on lift truck models
   - GLP/GDP60VX, GLP/GDP70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C878, D878, E878)
   - GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (GLP/GDP170VX, GLP/GDP175VX36, GLP/GDP190VX) (A909, B909)

   To access battery, raise hood, on lift truck models
   - GLP/GDP16VX, GLP/GDP18VX, GLP/GDP20SVX (GP/GLP/GDP030VX, GP/GLP/GDP035VX, GP/GLP/GDP040SVX) (C810)
   - GLP/GDP20-35VX (GP/GLP/GDP040-070VX) (B875, C875)
   - GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6; GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813, H813, J813)
2. Remove screw securing turn, stop, tail, and backup light to mounting bracket. Pull Turn, Stop, Tail, and Backup Light downward to remove it from mounting bracket.
3. Disconnect turn, stop, tail, and backup light from cab wiring harness. See Figure 74.
4. If mounting bracket must be removed from cab, remove rear crossmember cover and remove mounting bracket from cab. See Figure 74.

Install

1. If mounting bracket was removed, install rear crossmember cover. Install mounting bracket on cab.
2. Connect turn, stop, tail, and backup light to cab wiring harness. See Figure 74.
3. Install screw to attach turn, stop, tail, and backup light to mounting bracket. See Figure 74.
4. Connect battery, install floor plate and floor mat on lift truck models
   - GLP/GDP60VX, GLP/GDP70VX (GC/GLC/GDC135VX, GC/GLC/GDC155VX) (C878, D878, E878)
   - GLP/GDP80VX, GLP/GDP80VX9, GLP/GDP90VX (GLP/GDP170VX, GLP/GDP175VX36, GLP/GDP190VX) (A909, B909)

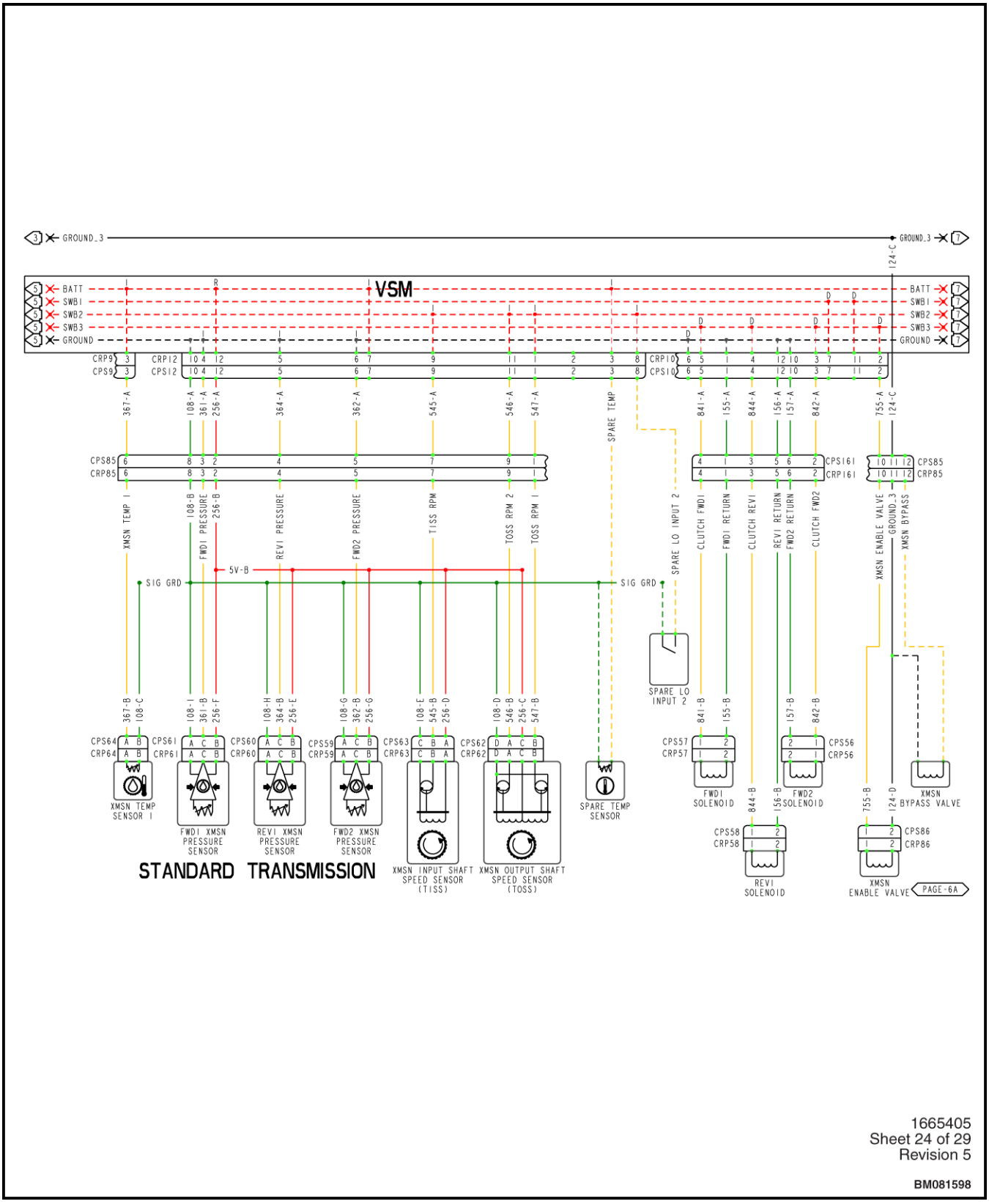


Figure 15. Standard (Powershift) Transmission Electrical Schematic

General Information About Diagrams and Schematics

The chassis wiring used in these vehicles conforms to the electrical circuit identification standard **ES-1359** and in addition to surface marked ID circuit numbers, generally utilizes the colors that are indicated in Table 1.

Foot Directional Control , engine harnesses, wiring to sensors, and other applications vary with respect to wire colors.

Diagrams and schematics in this manual can be viewed and printed in color. If not printed or viewed in color, refer to the electrical circuit identification located on schematic circuits. When viewing a color version of the diagrams and schematics, the white chassis wires are seen as yellow. Other wires are shown in colors similar to actual colors, i.e. tan shows as yellow. Use circuit identification for true wire color.

Refer to **Diagnostic Troubleshooting Manual** 9000YRM1112 Section 9030, Group 03 - General Maintenance and Diagnostic Data, for further information.

Table 1. Wire Colors

Color	Use/Function
Red	Battery-level power circuits and 5 volt supply circuits
Black	Heavy current grounds
Green	Signal grounds
White	Other circuits
Twisted Pair (Yellow/Green) Yellow Green	**CANbus** CAN-Hi CAN-Lo
Twisted Pair (Dk Blue/Pink and Dk Blue/White) Dk Blue/Pink Dk Blue/White	**CANbus (Mazda)** CAN-Hi CAN-Lo
Letter on the VSM BUS	**Use/Function**
R	Regulated Output Voltage
D	Driver
I	Input

SYMBOL DEFINITIONS

See Table 2 for description of symbol definitions.

Table 2. Symbol Definitions

Symbol Name	Definition
Type S	Identifies information for UL Safety rated trucks. Applicable trucks are rated for GS, LPS, and DS depending on fuel type.
Arrow Symbol 	Go to specified page of schematic, located in lower right corner in the hexagon symbol.
-----X	Go to specified sheet of diagram. Sheet number is located in lower right corner of figure.

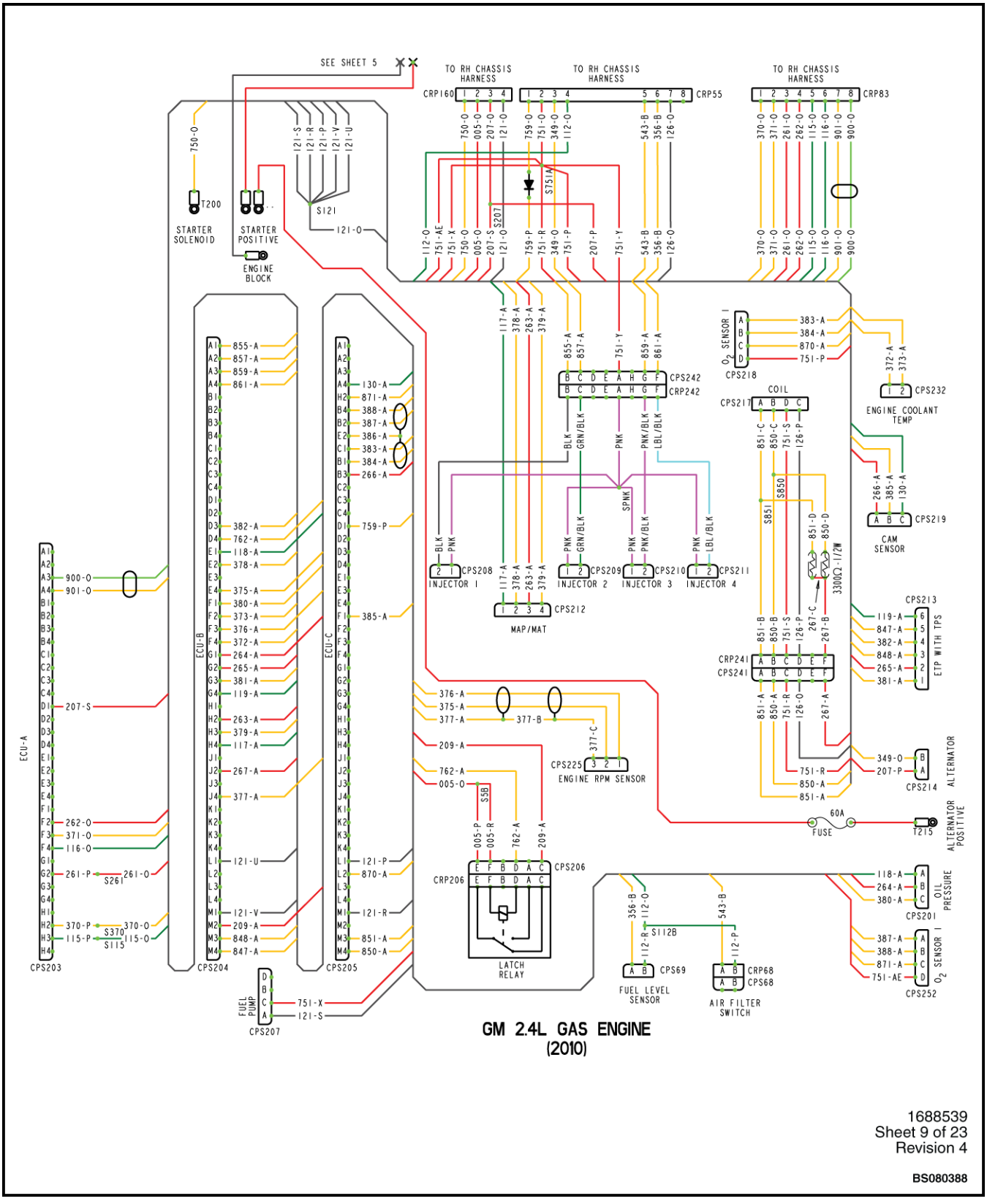
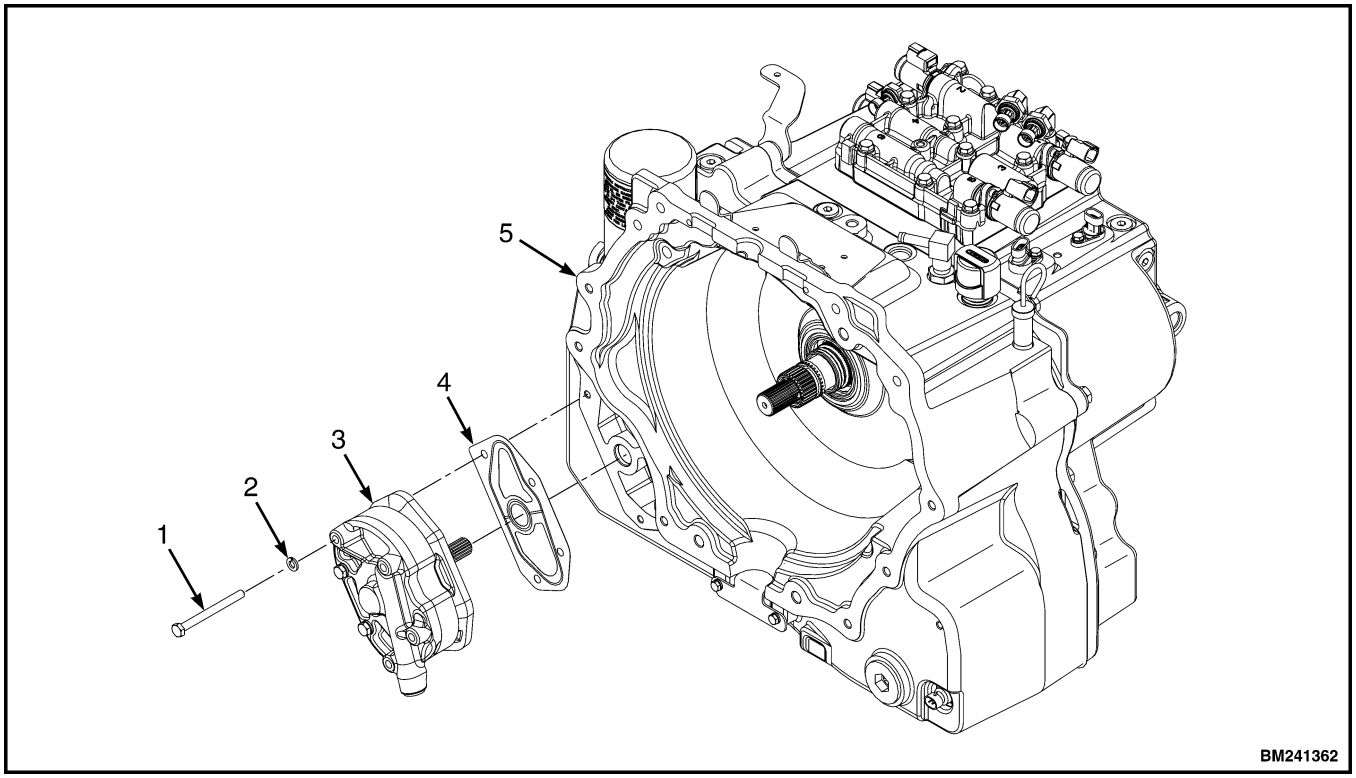


Figure 30. GM 2.4L Gas Engine Wiring Diagram



NOTE: THE TRANSMISSION IS SHOWN REMOVED FROM LIFT TRUCK FOR CLARITY.

1. CAPSCREW
2. WASHER
3. CHARGE PUMP
4. GASKET
5. TORQUE CONVERTER HOUSING

Figure 3. Transmission Charge Pump

Torque Converter Replace

REMOVE

WARNING

Make sure the engine and transmission are held in position so that they will not fall and cause an injury and damage to the equipment.

CAUTION

Be careful that you DO NOT damage parts of the torque converter or transmission when the transmission is separated from the engine. Keep the transmission and engine in alignment until they are completely separated so parts of the transmission are not damaged. Use a crane or lifting device to separate the transmission from the engine.

1. Remove engine and transmission as a unit from lift truck as described in one of the following sections:

See **Frame** 0100YRM1243 for lift truck models:

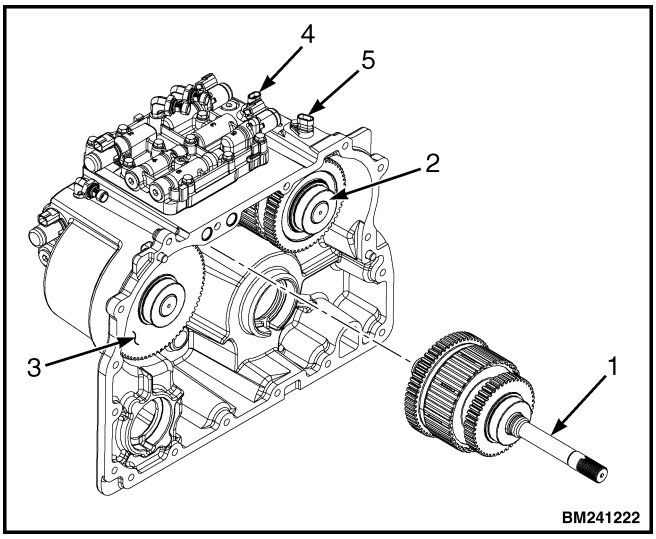
- GLC40, 45, 55VX; GLC55SVX; (GC/GLC080, 100, 120VX; GC/GLC080, 100VXBCS; GC/GLC120SVX; GC/GLC120VXPRS) (E818)
- GLP/GDP40VX5/VX6; GLP/GDP45SVX5, GLP/GDP45VX6, GLP/GDP50-55VX (GP/GLP/GDP080, 090, 100, 110, 120VX) (F813, G813)

Legend for Figure 31.

1. SEAL
2. BEARING
3. GEAR ASSEMBLY DRUM
4. PISTON SEAL
5. PISTON
6. SPRING
7. SPRING GUIDE
8. SNAP RING
9. CONICAL PLATE
10. FRICTION DISK
11. SEPARATOR PLATE
12. PRESSURE PLATE
13. BACK PLATE
14. OUTPUT GEAR

Clutch Assemblies, Remove and Disassemble

STEP 1.
Pull forward clutch (low gear), reverse clutch and forward clutch (high gear) assemblies straight out from transmission housing.



1. FORWARD CLUTCH (LOW GEAR)
2. REVERSE CLUTCH
3. FORWARD CLUTCH (HIGH GEAR)
4. TRANSMISSION INPUT SPEED SENSOR (TISS)
5. TRANSMISSION OUTPUT SPEED SENSOR (TOSS)