

Introduction

This manual is for service technicians who are approved and correctly trained to do troubleshooting and maintenance procedures on the lift truck. The manual contains information about maintenance, troubleshooting, and replacement parts.

Operator Instructions

This manual does not have operator instructions. There are operator instructions in tag or booklet form with each lift truck. If it is necessary, more copies can be ordered. The operator instructions are to make sure that you and your personnel know how to operate your Crown lift truck safely. For operator instructions, see the "SHC Operator Manual".

Operator Training

Crown has operator training programs that are available through your Crown dealer. For more information on operator training, consult your Crown dealer or go to "Training" on www.crown.com.

Service Training

Service training is available for:

- All Crown lift trucks
- Module systems

- Hydraulic systems
- Electrical systems

For more information on service training, consult your Crown dealer or go to "Training" on www.crown.com.

Replacement Parts

For correct and fast service, when you consult Crown for replacement parts, always give this information:

- The part number
- The lift truck model number
- The lift truck serial number
- The lift truck data number

Consult your Crown dealer or go to www.crown.com for:

- The newest service manuals
- The newest operator manuals
- Training
- Lift truck capacities
- Lift truck specifications

Manual Structure

This manual contains sections that have maintenance and replacement parts. The section descriptions are as follows:

Service and Parts Pages			
Maintenance		Replacement Parts	
Section	Description	Section	Description
MA	Safety	1	Power Unit Parts
M1	Inspection and Lubrication	2	Hydraulic Parts
M1.91	Componentry	3	Drive Unit Parts
M2	Hydraulic	4	Electrical Parts
M3	Drive Unit	5	Brake Parts
M4	Electrical	6	Steering Parts
M5	Brake	7	Lifting Mechanism Parts
M6	Steering	8	Cylinder Parts
M7	Lifting Mechanism	9	Reach and Attachment Parts
M8	Cylinders	10	Accessories
M9	Reach and Attachments	12	Labels and Decals
M10	Glossary		

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Cleaning of Material Handling Equipment

Crown Cleaning Products		
Cleaner Type	Part Number	Package Quantity
Degreaser and cleaner	363105-001 363105-012	19 oz can (12) 19 oz cans
All-purpose cleaner	363114-001 363114-012	19 oz can (12) 20 oz cans
Glass cleaner	363101-001 363101-012	19 oz can (12) 19 oz cans
Waterless hand cleaner	363111-001 363111-012	15 oz tube (12) 15 oz tubes
Pumiced and smooth hand cleaner	363112-001 363112-004	1 gal jug (4) 1 gal jugs
Wall-mounted deluxe soap dispenser	363122	Use with P/N 363112-001
Tough on grease	063009-005	1 gal jug
Citrus degreaser spray	363156-001 363156-012	32 oz spray bottle (12) 32 oz spray bottles
Citrus degreaser spray	363157-101 363158-101	1 gal refill (use with P/N 363134-001) 1 gal concentrated (use with P/N 363134-001)
Citra-sol degreaser	363146-001 363146-012	19 oz can (12) 19 oz cans
Battery cleaner	363124-001 363124-012	18 oz can (12) 18 oz cans

Control of Hazardous Energy

Disconnecting the tilt cylinders

The following procedures describe how to disconnect the tilt cylinders from the mast safely.



WARNING

Avoid high-pressure fluids.

High-pressure fluids can go through the skin and cause severe injury. High-pressure fluid that goes into the skin can become a severe medical emergency even when the skin looks normal. There is a delayed start of pain and severe tissue damage may occur.

- Release the pressure before you disconnect the hydraulic plumbing.
- Tighten all connections before you apply hydraulic pressure.
- Keep your hands away from pin-holes which eject high-pressure fluids.
- Use a piece of cardboard or paper to examine for leaks. Do not use your hand.
- You must immediately get medical aid from a specialist experienced with this type of injury.

1. Move the lift truck to a maintenance area on a level floor.
2. Fully lower the mast and forks.
3. Make sure that the forks are empty.
4. Turn off the lift truck.
5. Lockout/tagout the lift truck.
6. See Figure 8. Put the chocks (2) against the wheels.
7. Attach a sling and an overhead lifting device (1) to all cross members of the mast to prevent movement of the mast when the tilt cylinders are disconnected.
8. See Figure 9. Remove the screws (1) and the pins (2) that connect the tilt cylinders to the mast.

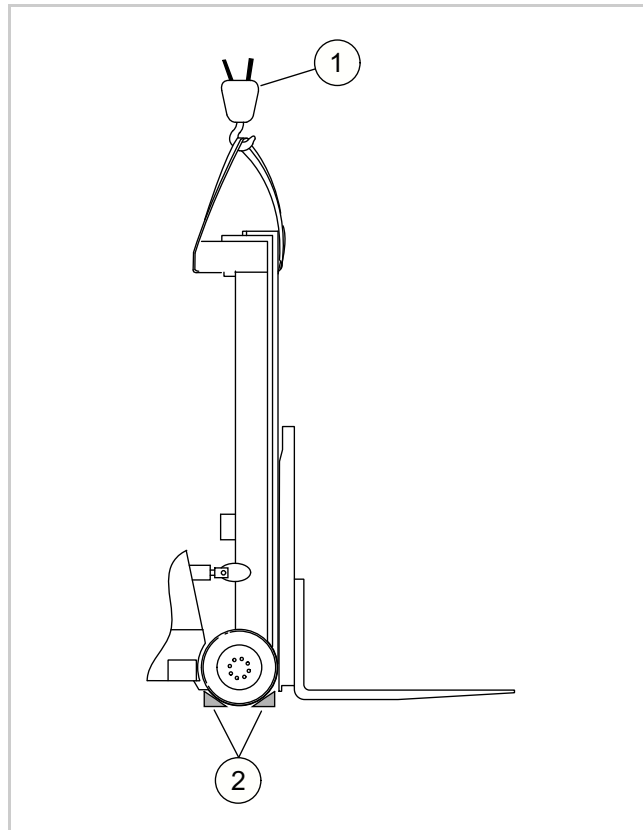


Fig. 8 (34437)

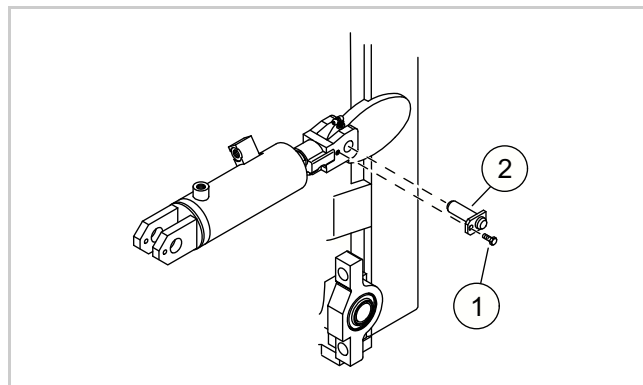


Fig. 9 (34438)

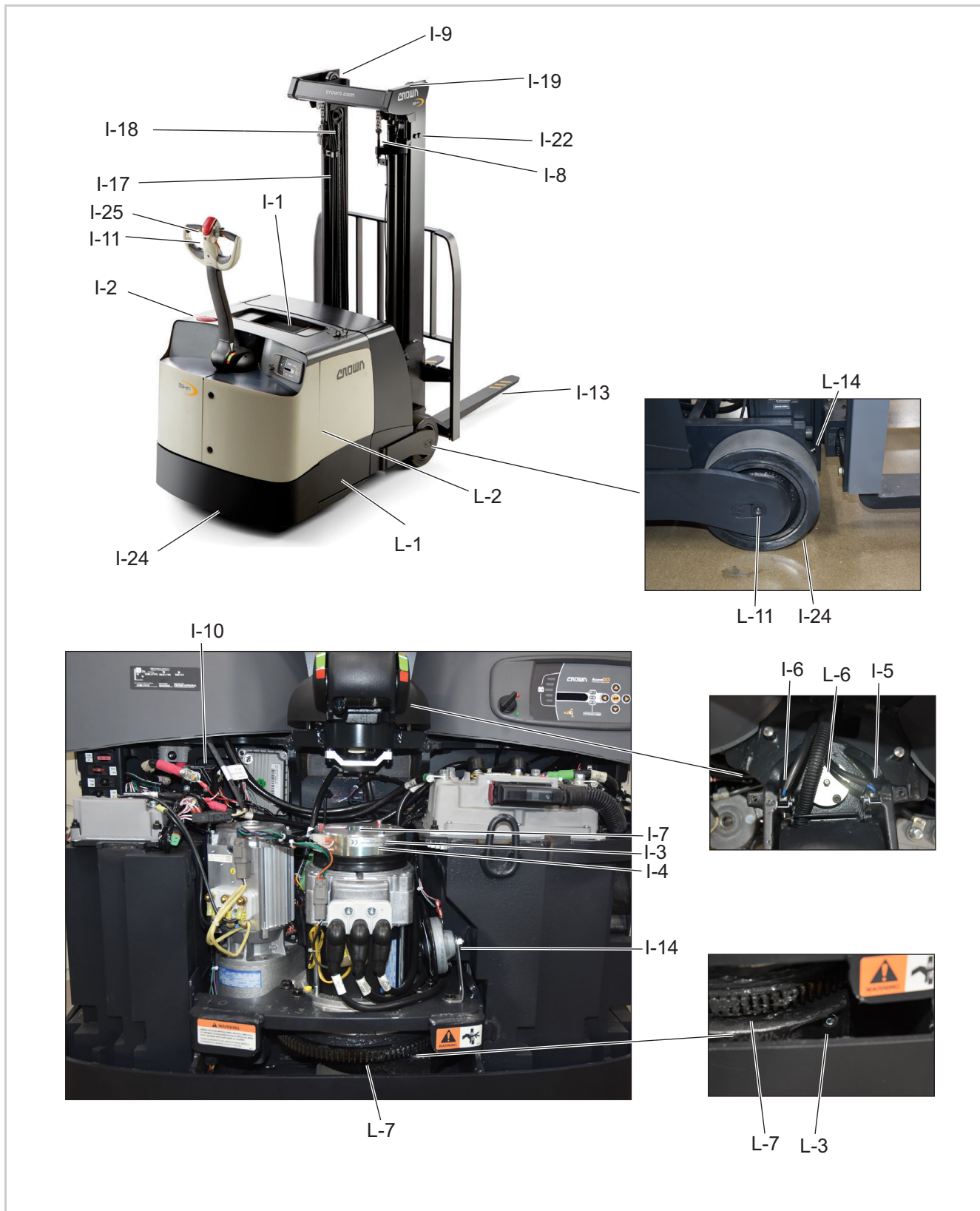


Fig. 1

Torque Chart						
Bolt Diameter	Grade 5			Grade 8		
	Dry Torque Specification			Dry Torque Specification		
in	ft lb	kg-m	Nm	ft lb	kg-m	Nm
1/4	9 ± 3	1.2 ± 0.4	12 ± 4	13 ± 4	1.8 ± 0.5	17.5 ± 5.5
5/16	18 ± 5	2.5 ± 0.7	24.5 ± 7	25 ± 5	3.5 ± 0.7	34 ± 7
3/8	32 ± 5	4.4 ± 0.7	43.5 ± 7	48 ± 10	6.6 ± 1.3	65 ± 13.5
7/16	50 ± 10	6.9 ± 1.4	67.5 ± 13.5	75 ± 10	10.4 ± 1.4	102 ± 13.5
1/2	75 ± 10	10.4 ± 1.4	101.5 ± 13.5	112 ± 15	15.5 ± 2.0	152 ± 20.5
9/16	110 ± 15	15.2 ± 2.0	149 ± 20.5	163 ± 20	22.5 ± 3.0	221 ± 27
5/8	150 ± 20	20.7 ± 2.8	203.5 ± 27	225 ± 30	31.1 ± 4.1	305 ± 41
3/4	265 ± 35	36.6 ± 4.8	359 ± 47.5	400 ± 50	55.2 ± 6.9	542 ± 68
7/8	420 ± 60	58.1 ± 8.3	569 ± 81	640 ± 80	88.3 ± 11.0	868 ± 108
1	640 ± 80	88.5 ± 11.1	868 ± 109	960 ± 115	132.5 ± 15.9	1300 ± 156
1 1/8	800 ± 100	110.6 ± 13.8	1085 ± 136			
1 1/4	1000 ± 120	138 ± 16.6	1356 ± 163			
1 3/8	1200 ± 150	166 ± 20.7	1630 ± 203			
1 1/2	1500 ± 200	207 ± 27.7	2034 ± 271			
Torque specifications for bolts related to hydraulic valves.						
5/16	13 ± 2	1.8 ± 0.3	17.5 ± 2.5			
3/8	24 ± 2	3.3 ± 0.3	32.5 ± 2.5			
7/16	39 ± 2	5.4 ± 0.3	53 ± 2.5			
NOTE: Special torque values in the maintenance and parts sections of this manual override the standard torque values in this section.						

FU_EWS (Not Shown, Optional)

FU_EWS (Not Shown, Optional)

Early Warning System Fuse**Location:** on the EWS wiring harness**Purpose:** protects EWS components and associated wiring from over current**Data:** 2 A**Adjustments:** not applicable**Diagrams:** not applicable**Parts Breakdown:** not shown

HGTS1 (See LMS1)

HN

Horn**Location:** on the power unit, mounted next to M1**Purpose:** audible alarm actuated by the operator to warn of lift truck movement**Data:** information is received from operator input via HNS1 or HNS2 on the control handle**Adjustments:** not applicable**Diagrams:** not applicable**Parts Breakdown:** 04.0-8155-001

HNS1 / HNS2

Horn Switch**Location:** on the control handle**Purpose:** allows the operator to sound HN**Data:** wired normally open. Circuit closes and sounds HN when horn switch button on handgrip is depressed**Adjustments:** not applicable**Diagrams:** not applicable**Parts Breakdown:** 04.5-8155-001

HSS

High Speed Switch**Location:** control handle cap**Purpose:** controls traction speed**Data:** information received from operator input via switches and controls on the X10® Handle**Adjustments:** not applicable**Diagrams:** not applicable**Parts Breakdown:** 04.5-8155-100

04.5-8155-125

04.5-8155-150

04.5-8155-175

K1

accessory Relay**Location:** on the control panel bracket inside the power unit**Purpose:** provides power to optional Work Assist® components (i.e. worklights, strobe lights, operator fan)**Adjustments:** not applicable**Diagrams:** not applicable**Parts Breakdown:** 04.1-8155-001

K_EWS (Optional)

Early Warning System Relay**Location:** on the power unit above the fuse panel**Purpose:** provides the EWS signal to the ACCESS 1**Adjustments:** not applicable**Diagrams:** not applicable**Parts Breakdown:** not shown

KYS

Key Switch**Location:** ACCESS 1 display panel**Purpose:** allows the operator to power up and shut down the lift truck**Data:** key-operated selector switch, energizes control circuitry in the ignition position**Adjustments:** not applicable**Diagrams:** not applicable**Parts Breakdown:** not shown

SAS

Safety Reverse Switch

Location: control handle cap

Purpose: moves the lift truck in direction of forks when actuated

Data: momentary contact switch wired normally open, held closed by the button on end of the control handle cap

Adjustment: not applicable

Diagrams: not applicable

Parts Breakdown: 04.5-8155-100

04.5-8155-125

04.5-8155-150

04.5-8155-175

SVA1 / SVA2

Location: manifold block with accessories

Purpose: selects the direction of hydraulic flow for accessory functions

Data: not applicable

Adjustment: not applicable

Diagrams: not applicable

Parts Breakdown: 02.4-8155-001

SLS

Sideshift Left Switch (Lift Trucks with Optional Sideshift Function)

Location: control handle cap

Purpose: indicates the sideshift left request

Data: wired normally closed, held open. when the side-shift button is pressed in correct direction, the switch closes and activates the function

Adjustment: adjustments can be made in performance menus to determine the desired pump speed

Diagrams: not applicable

Parts Breakdown: 04.5-8155-152

04.5-8155-177

SRS

Sideshift Right Switch (Lift Trucks with Optional Sideshift Function)

Location: control handle cap

Purpose: indicates the sideshift right request

Data: wired normally closed, held open. when the side-shift button is pressed in correct direction, the switch closes and activates the function

Adjustment: adjustments can be made in performance menus to determine the desired pump speed

Diagrams: not applicable

Parts Breakdown: 04.5-8155-152

04.5-8155-177

SVCV

Solenoid Check Valve

Location: on the manifold block with accessories

Purpose: prevents the back flow of hydraulic fluid to allow proper lift

Data: not applicable

Adjustment: not applicable

Diagrams: HYD-8155-001

Parts Breakdown: 02.4-8155-001

Hydraulic lines and fittings

Blow air through all hoses and lines to remove loose particles before installing. Any rubber hose with wire braid inner construction and any steel tube lines that are collapsed or kinked are permanently damaged. Damaged hoses must be replaced even if the damage is not externally visible.

Flexible hoses must be replaced if they collapse in the normal operating position.

All hoses must be away from any surface or edge causing wear, damage, or cuts.

All connections must be free of leaks.

Beaded elbows in suction ports of all pumps must be positioned so that the suction hose retains its full volume flow and does not collapse.

Hydraulic oils

Use only a high grade of hydraulic oil. See the Lubrication section. For freezer condition lift trucks, use low temperature hydraulic oil.

Note: Do not use hydraulic brake fluid.

Drift test

All drift tests must be conducted with a capacity load (see the lift truck serial plate for the rated capacity). Material used for test load must be evenly stacked within limits of a four foot square pallet. The material must be secured to the fork carriage with the forks spread to the maximum width.

Note: The lift measurement is taken from the tip of the fork to the floor. The tilt measurement is taken on the tilt cylinder rod.



WARNING

Never stand or work under a suspended load.

Lift drift test

Raise the test load approximately 600 mm (24.0 in) and turn off the lift truck. After five minutes, measure the distance the forks have drifted. Drifting must not be more than 63.5 mm (2.5 in). A five-minute duration of this test is necessary due to the centering time required for the control valve spool.

Occasionally, a slight creep of the fork assembly can occur due to internal leakage in the check valve or the

control valve. To seat these valves properly when this occurs, raise and lower the forks to flush out any foreign material from the valve seat. Check the system for leaks if there is any abnormal loss of oil.

Tilt test

Raise the test load approximately 600 mm (24.0 in) and tilt the mast fully back. Turn off the lift truck. Measure the drift on the tilt cylinder rod. The mast must not drift forward more than 20 mm (0.75 in) in five minutes when measured on the tilt cylinder rod.

Occasionally, a slight creep of the mast assembly can occur due to internal leakage in the tilt cylinder piston pack. A slight creep can also be caused by leakage in the check valve or the control valve. To seat these valves properly when this occurs, tilt the mast forward and back to flush out any foreign material from valve seat.

Check the system for leaks if there is any abnormal loss of oil.

Pressure Settings		
Valve	Set Pressure (MPa)	Set Pressure (psi)
RV	21.37 MPa	3100 psi
RVA	10.34 MPa	1500 psi

Troubleshooting		
Symptom	Probable Cause	Possible Solution
Oil leaks around manifold.	Defective o-rings in the cartridge valve or port connector fittings.	Replace the o-rings.
Carriage does not raise (M2 runs).	RV is stuck in the open position. SVCV is not opening.	Replace the relief valve. Actuate the valves and try to dislodge the debris. Check to see that the valve (solenoid only) is not over-tightened. If neither remedy works, replace the valve.
Carriage does not raise a capacity load.	Relief valve not adjusted correctly.	Readjust the relief valve in accordance with the Pressure Settings Table.
Carriage drifts down more than the amount specified in the drift test.	Defective o-rings on check valves, solenoid valves, or proportional valve. Debris caught in check valve seats.	Replace the o-rings or back-up rings. Check the valve capacity at the o-ring sealing area for nicks or rough surfaces. Actuate the valves and try to dislodge the debris. If that does not work, replace valve.
Carriage will not lower.	Solenoid coil failure. Cylinder malfunction. Electrical malfunction.	Replace the solenoid coil. Refer to Cylinders. Refer to Electrical.



Fig. 9 (19164)

24. See Figure 5. Press the bearing (49) onto the bevel gear (48). Use the two holes in the bevel gear. Remove the washers (43) adjust the thickness:
 - To reduce the clearance: Increase the number of shims (43).
 - To increase the clearance: Reduce the number of shims (43).
25. Install the washers (43) with the adjusted size.
26. See Figure 5. Press the roller bearing (49).
27. Install the shaft and check the clearance again. Keep adjusting if necessary until the clearance is within the tolerance range of 0.2–0.5 mm (0.008–0.020 in).
28. See Figure 8. Press the shaft seal (54) over the holes in the flange on the shaft in the correct position.

Note: For gearboxes with screw-on cover (43):

 - See Figure 5. Clean the contact surface of the housing (57) and cover (46) with a suitable solvent.
 - Install the O-ring (58) to the cover (46).
 - Attach the cover (46) with the screws (45). Torque to 10 N m (7 ft lb).

Note: Before adding oil, check the hardening times required for the sealing compound used.

For gearboxes with a press-on cover (46).

 - Install O-ring (58) to a new cover (46) with the sealed side facing out.
 - Using a plastic hammer strike the cover evenly without damaging the cover (46).
29. Install the drive gear cover (26) into the correct position.
30. See Figure 4. Install the O-ring (22), shim (23), supporting ring (24), and retaining ring (27) into the correct position and fasten the screws (15). Torque to 25 N m (18 ft lb).
31. See Figure 4. Install the bleeder valve (25).
32. Install and tighten the drain plug.
33. See Figure 4. Install the intermediate flange (16) and torque to 35 N m (26 ft lb).

Note: Before adding oil, check the hardening times requiring for each sealing compound used.
34. Add oil. See Lubrication and Adjustment for recommended oil.

Access 5 Inputs

continued from page -005

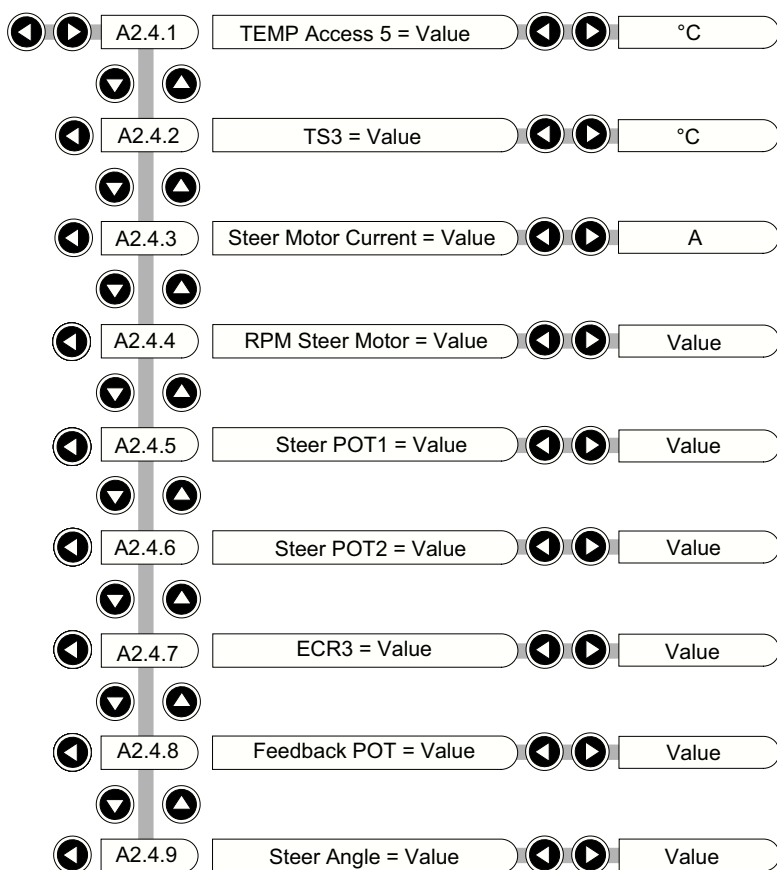


Fig. 7 (34706)

Events menus

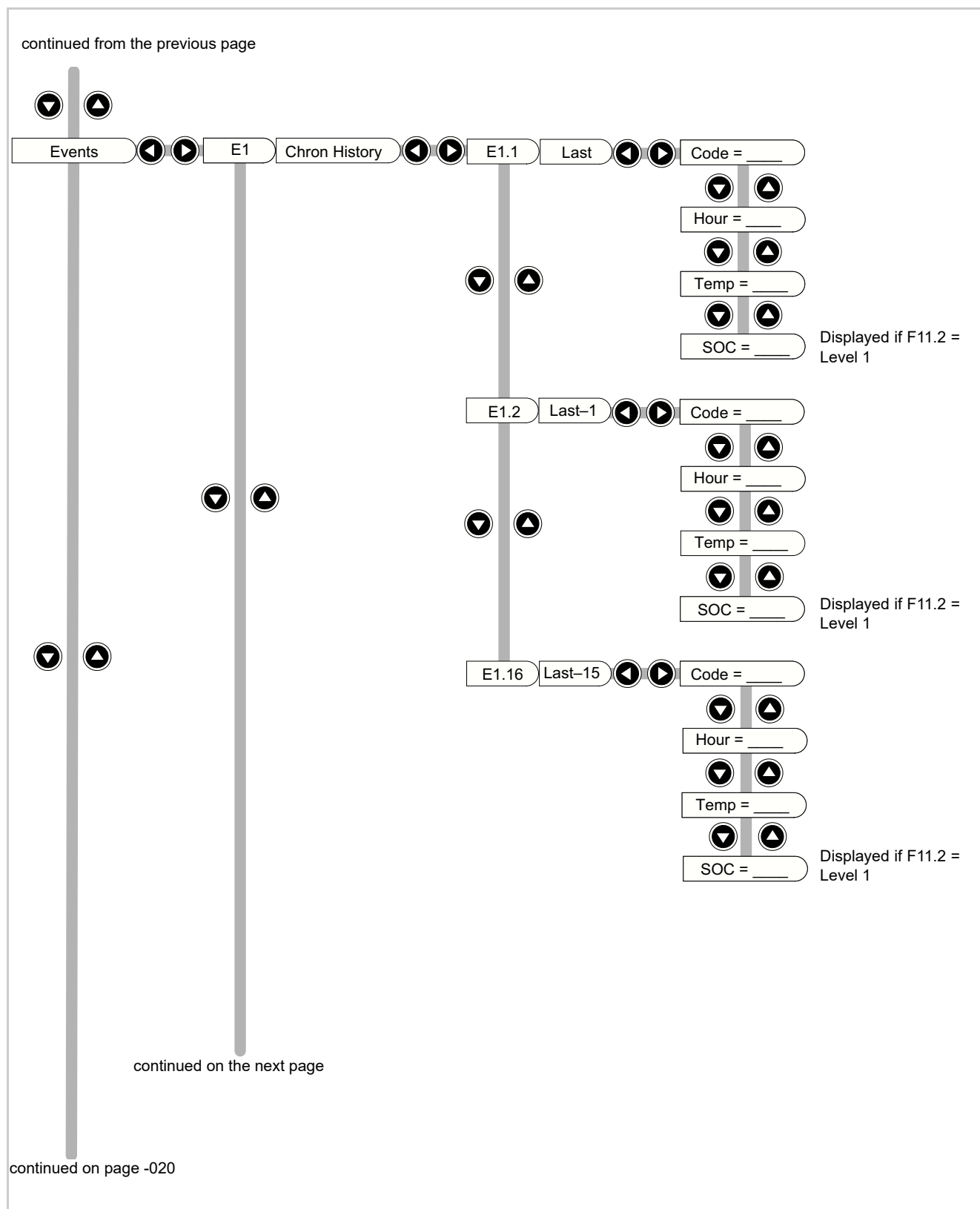


Fig. 17 (34713)

Contactors

Note: The contacts (8, 9) wear during typical operation. This does not have an effect on typical operation. Do not clean blackened or tarnished contacts, as that could cause them to wear faster.

Checking the coil

Refer to Figure 28096.

1. Use a digital volt-ohm multimeter (DVOM) to measure the resistance between the connections on the coil (11).

Note: If there is a diode between the connections on the coil (11), desolder the diode on one side, then measure the resistance between the connections on the coil. If you do not do this, the results will be incorrect.

- ⇒ The resistance of the coil must be 15–19 Ω .
- ⇒ If the resistance is not 15–19 Ω , replace the coil.

Checking the return spring

Refer to Figure 28096.

1. Check the return spring (7) for corrosion or discolor from heat.
 - ⇒ Replace the return spring (7) if it has corrosion or discolor.

Torque Values

For general torque values, refer to *INSPECTION AND LUBRICATION/Metric Torque Values* or *INSPECTION AND LUBRICATION/SAE Torque Values*.

Component Replacement

Refer to Figure 28096.

Contact Replacement

1. Disconnect the electrical connections to the contactor.

Note: It is not necessary to disconnect the coil (11) for this procedure.

2. Remove the two screws (5) from the cover (6).
3. Remove the cover (6).
4. Remove and replace both fixed contacts (8) and the mobile contact (9).
5. Install the cover (6) with the two screws (5).
6. Connect the electrical connections to the contactor.

Coil Replacement

1. Disconnect all electrical connections to the contactor.
2. Remove the two screws that secure the contactor to the contactor panel.
3. Remove the contactor.

4. Remove the two screws (5) from the cover (6).
5. Remove the cover (6) from the coil (11).
6. Install the mobile contact (9) in the replacement coil (11).
7. Install the cover (6) on the replacement coil (11) with the two screws (5).
8. Install the contactor on the contactor panel with the two screws.
9. Connect all electrical connections to the contactor.

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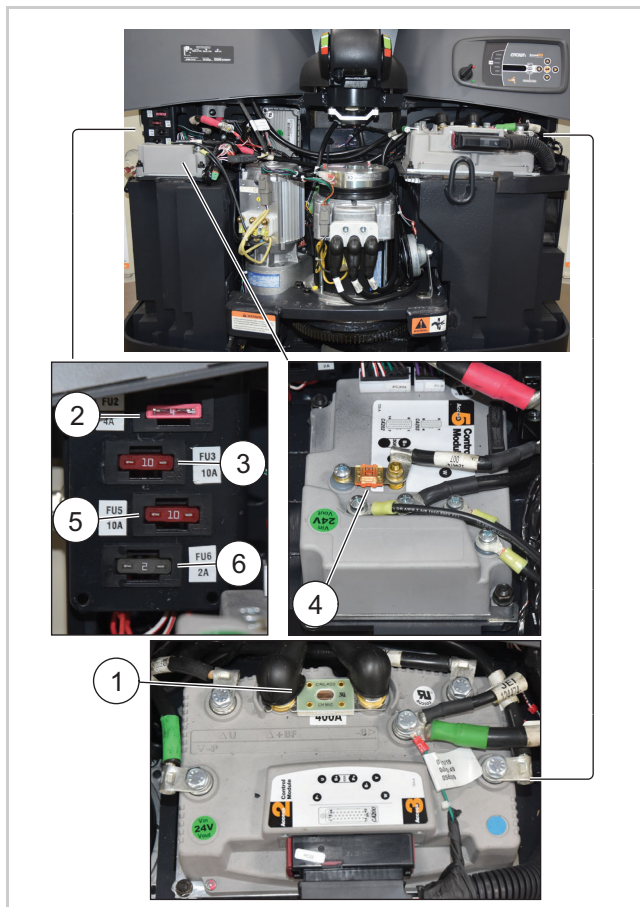


Fig. 6 (34754)

Servicing Control Modules



WARNING

There are fire risks from short circuits. Control modules operate at high currents. Please note:

- You must be trained to perform this work.
- Use fatigue-free eye protection.
- Wear close-fitting clothing.
- Do not wear jewelry.
- Always use insulated tools.



WARNING

There is a risk of serious injury, avoid accidents by:

- Switching the lift truck off.
- Disconnecting the battery.
- Preventing the lift truck from being switched on again. See the SAFETY / Control of Hazardous Energy section.

Discharging Capacitors

The lift truck must be de-energized and secured. See the SAFETY / Control of Hazardous Energy.

1. Discharge the capacitors.
2. Make sure that the control modules are clean and dry.
3. Make sure that the nuts attaching the power cables are tight.

Replacing Control Modules

Removing

The lift truck must be de-energized and secured. See the SAFETY / Control of Hazardous Energy section.

1. Discharge the capacitors.
2. Disconnect all wires (mark the wires if necessary). Remove the bus bars if present.
3. Remove the control module mounting screws.
4. Remove the control module.
5. Check the tooth pattern left by back plate of the control module on the assembly plate. The full sur-

Power Cable Connections

Due to capacitance voltage present on the motor control panel, whenever performing maintenance which may permit contact with the bus bars and associated power cables, discharge capacitor on the traction control panel by placing a minimum 100 ohm, two watt resistor (062033-030) between positive (+) and negative (-) of capacitor for three or more seconds.



ACCESS 1

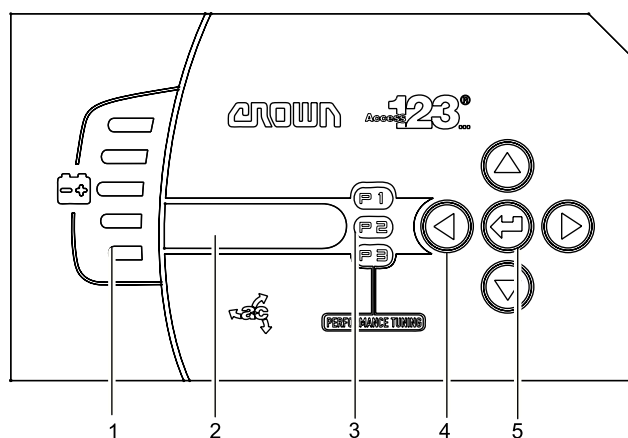


Figure 19121

- 1 Battery Discharge Indicator
- 2 Display Screen
- 3 Service Required Indicator
- 4 Navigation Keys - up, down, left and right arrows; used to scroll through menus
- 5 Enter or Return Key - used to navigate in and out of menus and accept inputs

ACCESS 1: Display Control Module (DCM)

ACCESS 2 and 3 combination (Combi): Hydraulic (HCM) and Traction (TCM)

ACCESS 5: Steering Control Module (SCM)

ACCESS 7: Accessory Control Module (ACM)

ACCESS 8: Operator Control Module (OCM)

Event Code 220

Current Sensor Low

The pump chopper current sensor feedback is too low (below 0.5 V). Not related to external components. Clear code and re-key the truck.

- If: Event clears.
 - Then return to operation.
- If: Event continues.
 - Then replace ACCESS 2 and 3 combination. One or more ON/OFF valve drivers opened (not able to close, so not able to drive the valve).

Event Code 221

EEP VERIFIESUM

This issue caused internally, verify sum issue. Clear code and re-key the truck.

- If: Event clears.
 - Then return to operation.
- If: Event continues.
 - Then replace ACCESS 2 and 3 combination. One or more ON/OFF valve drivers opened (not able to close, so not able to drive the valve).

Event Code 222

RAM Warning

This issue caused internally, verify sum issue. Clear code and re-key the truck.

- If: Event clears.
 - Then return to operation.
- If: Event continues.
 - Then replace ACCESS 2 and 3 combination.

Event Code 223

Waiting For Traction

This code is not entered.

Event Code 224

EVP Driver KO

EVP valve driver not able to drive the load (does not close), an internal issue. Clear code and re-key the truck.

- If: Event clears.
 - Then return to operation.
- If: Event continues.
 - Then replace ACCESS 2 and 3 combination.

Event Code 305

Logic Failure #1

Occurs during an overvoltage or undervoltage condition. Overvoltage threshold is 45 V. Undervoltage threshold is 9 V in the 24 V controller.

Step 1: Verify if issue is a startup code or occurs after startup in run time mode.

- If: Not startup code.
 - Then proceed to Step 4.
- If: Startup code.
 - Then proceed to Step 2.

Step 2: Temporarily remove (disable) any accessories that may be added on. Issue is likely an undervoltage caused by an initial current inrush at the key input signal pulling down the input voltage due to external loads, like DC/DC converters starting-up, relays or contactor switching, solenoids energizing or de-energizing.

- If: Event is a result of external loads.
 - Then consult the Crown pictorials for proper addition of accessories.

Step 3: Clear code and re-key the truck.

- If: Event clears.
 - Then return to operation.
- If: Event continues.
 - Then replace ACCESS 2 and 3 combination.

Step 4: When the issue appears during motor driving, an undervoltage or overvoltage condition exists. When an issue occurs during traction acceleration or driving hydraulic functions, it is likely an undervoltage condition. Verify battery charge condition, power cable connections.

- If: Issue exists in battery or power cable connections.
 - Then repair or replace as necessary.
- If: Issue does not exist in battery or power cable connections.
 - Then proceed to Step 5.

Step 5: When an issue occurs during release braking, it is likely an overvoltage condition. Verify the line contactor contact is fully seated and power cable connections are correct and tight. Proceed to Step 6.

Step 6: Clear code and re-key the truck.

- If: Event clears.
 - Then return to operation.
- If: Event continues.
 - Then replace ACCESS 2 and 3 combination.

Event Code 306

VMN Low

Verified at start-up and at runtime.

Start up test

Before switching the line contactor ON, the software verifies the power bridge: it turns ON alternating the high side power mosfets (metal oxide semiconductor field-effect transistors) and expects the phases voltage to increase toward the rail capacitor value. When the phases' voltage does not increase, this issue occurs.

Run time test

Motor running test. When the traction motor (M1) is running, power bridge is ON, the motor voltage feedback is tested if it is lower than commanded value issue status is entered.

Step 1: Verify the line contactor is closing properly with good contact.

- If: Contacts are not closing properly.
 - Then repair or remove the contactor as necessary.

Step 2: Verify the power cables for M1 are properly connected.

- If: Power cables are not correct.
 - Then repair or remove cables as necessary.

Event Code 326

Truck Not Configured

An internal ACCESS 3 issue. Replace ACCESS 2 and 3 combination.

Event Code 327

POS AUX Short

The output of the built in smart driver, which supplies the positive to the electromechanical brake is high (24 V) when the tiller switch is open.

Step 1: Verify the wire harness is correctly connected to the smart driver output at PC200-30 and connects to the electric brake.

- If: Wires not correct.
 - Then repair or replace wiring as necessary.

Step 2: Disconnect wire 2927 (+) from the connector pin.

- If: Output stays at high value.
 - Then replace ACCESS 2 and 3 combination as necessary. The smart driver is probably shorted.

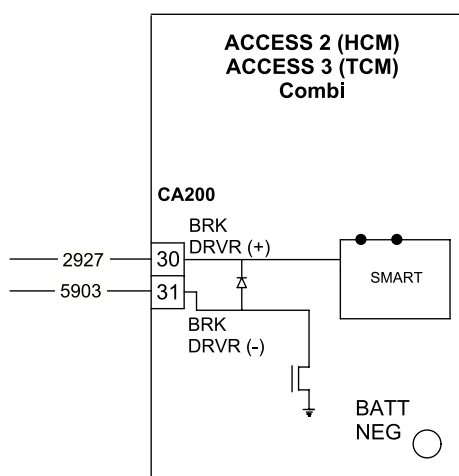


Figure 19104

Event Code 328

Waiting Slave

ACCESS receives a message that another ACCESS in the CAN network is in alarm condition. Resolve any other codes, clear this code and re-key the truck.

- If: Event clears.
 - Then return to operation.
- If: Event continues.
 - Then replace ACCESS 2 and 3 combination.

Event Code 329

Coil Short HW KO

The hardware circuit that manages short circuit protection of line contactor and the electric brake coils has an internal issue. Clear code and re-key the truck.

- If: Event clears.
 - Then return to operation.
- If: Event continues.
 - Then replace ACCESS 2 and 3 combination.

Event Code 330

Incorrect Setpoint

ACCESS 3 has detected an ACCESS 2 hydraulic function setpoint issue. Replace ACCESS 2 and 3 combination.

Event Code 524

FB Sensor POT Locked

Take care when working with the feedback potentiometer (POT3) when steering is disabled as movement of POT3 can cause unexpected steering movement. Keep hands clear. POT3 wiper at PC203-6 does not change (or changes in the opposite direction) value even when commanded.

Step 1: Verify steering is properly calibrated (drive tire gear box at right of the tire when handle is straight ahead).

- If: Steering is not properly calibrated.
 - Then follow the calibration procedure.

Step 2: Verify the feedback potentiometer is not mechanically loosened. Turn truck OFF and verify if POT3 is loose.

- If: POT3 is loose.
 - Then reattach POT3, turn ON truck and calibrate the steering system.
- If: POT3 is not loose.
 - Then verify any mechanical blocks of the steered wheel.
- If: No mechanical blocks are present.
 - Then turn key ON with code present. Verify steering is disabled due to code by moving the handle.

Step 3: Lift up the truck and manually turn steer wheel left facing the power unit. Verify the POT voltage rises in voltage by reading analyzer mode A2.4.8.

- If: Voltage decreases.
 - Then verify if POT3 is wired correctly (positive and negative swapped will cause the feedback to show backward).

Step 4: Verify the wiring is per PC211 from PC203. Also verify wiring to the POT3.

- If: Wiring is correct.
 - Then remove PC211 and read voltage pin 2 to positive and pin 1 to negative. Voltage should be 4 to 5 V.
- If: Voltage is not present.
 - Then verify at PC203 pin 1 (-) and pin 2 (+).

- If: Voltage is present.
 - Then issue exists in wiring to PC211.
- If: Voltage is not present.
 - Then replace ACCESS 5 (voltage is supplied by ACCESS 5).

Step 5: Wiring is correct and voltage is correct to the POT3 and manual movement of the steer does not change the POT3 voltage. Read the voltage from the wiper at PC203-6 and battery negative.

- If: No change in voltage when moving the POT3.
 - Then replace POT3.
- If: Voltage exists when moving the POT3.
 - Then replace ACCESS 5.

Step 6: Then calibrate the steer system, clear codes and re-key the truck.

- If: Event clears.
 - Then return to operation.
- If: Event continues.
 - Then replace ACCESS 5.
- If: Event still continues.
 - Then contact Crown Service.

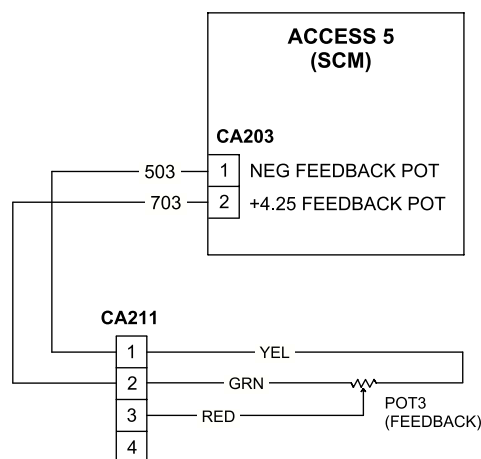


Figure 19109

Event Code 700 - 701

Event Code 700:

This is a self test made while running and in stand by mode. Possibly caused by a CAN bus malfunctioning, which blinds master-slave communication otherwise the issue is internal to the ACCESS.

Event Code 701:

CAN Bus communication has failed. Other issues may cause this condition. Address this code first when other issues have occurred. Verify each ACCESS has power and negative, which will cause a CAN issue. Also, a CAN issue has been caused, due to an encoder issue when one or both the encoder channels are missing. This condition results in the traction motor drawing high current. This high current may trigger a CAN issue. When the traction moves slowly and draws high current address, address this issue prior to the CAN issue.

Step 1: Verify the CAN Bus network uses two terminating 120 ohm resistors, located inside ACCESS 1 and ACCESS 5, running in parallel. Resistance is 60 ohm. Power OFF truck and disconnect battery. Locate CA240 near fuse block and disconnect. Measure the resistance PC240-1 CAN HI and PC240-2 CAN LO.

- If: Resistance is not approximately 60 ohm.
 - Then locate wiring issue in ACCESS 2 and 3 combination.
- If: Resistance is approximately 60 ohm.
 - Then ACCESS 1 and ACCESS 5 are wired correctly.

Step 2: Disconnect PC200 and verify continuity at PC200-27 to PC240-1 CAN HI then verify PC200-42 to PC240-2 CAN LO. Disconnect PC200 and verify continuity at PC200-27 to PC240-1 CAN HI then verify PC200-42 to PC240-2 CAN LO.

- If: Wires not correct.
 - Then locate wiring issue.
- If: Wires correct.
 - Then proceed to Step 3.

Step 3: Disconnect PC250 and verify continuity at PC250-4 to PC240-1 CAN HI and PC250-1 to PC240-2 CAN LO.

- If: Wires not correct.
 - Then locate wiring issue to ACCESS 8.

- If: Wires correct.
 - Then proceed to Step 4.

Step 4: Disconnect PC205 and verify continuity at PC205-6 to PC240-1 CAN HI and PC205-3 to PC240-2 CAN LO.

- If: Wires not correct.
 - Then locate wiring issue to ACCESS 7.
- If: Wires correct.
 - Then replace ACCESS 2 and 3 combination.

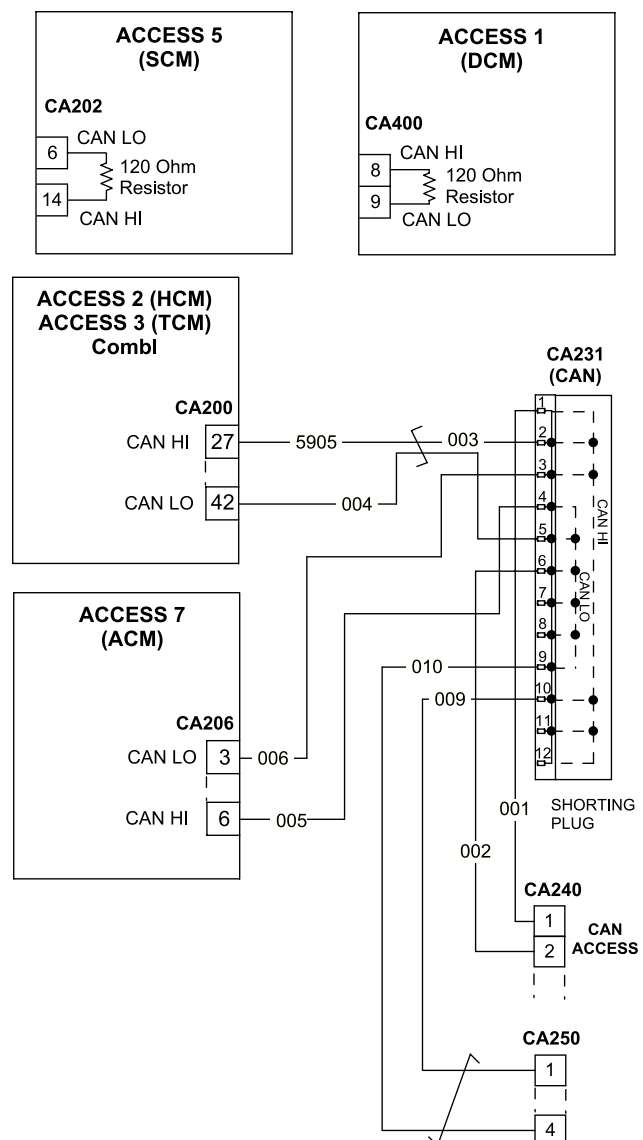


Figure 19098

Brake System

General

The brake is only activated when:

- The truck is idle (automatically through the traction controller).
- When the Emergency Disconnect is pulled.

It acts as a parking brake and becomes an emergency brake as soon as the Emergency Disconnect is pulled.

It is not used as a service brake and is therefore virtually wear-free.

The drive motor is used as a service brake in regenerative mode.

Servicing the Brake

Servicing is limited to checking the air gap every 1000 service hours.

Measuring the air gap

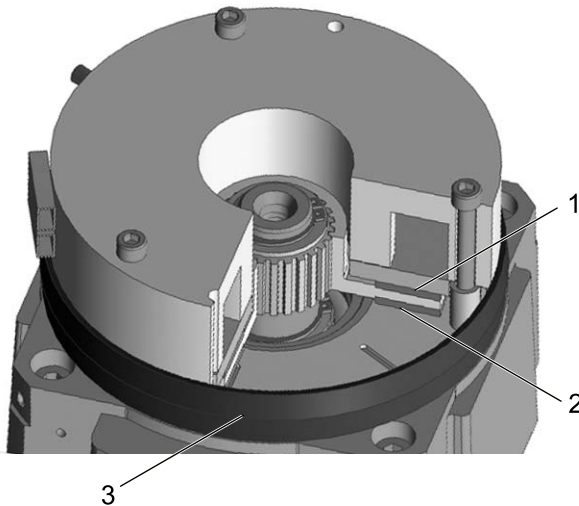


Figure 18866

The brake is mounted on the drive motor.

1. Switch off the truck and disconnect the battery.
2. Remove the panel.
3. Remove the dust shield ring (3). Refer to Figure 18866.
4. Apply weak pressurized air to the abrasion.

5. Use a feeler gauge to measure the air gap between the brake lining (2) and the armature disk (1).

Repair the brake if the air gap is > 0.5 mm (0.02 in). The air gap cannot be adjusted, a wear part kit is available. Refer to Brake Parts.

The wear part kit consists of the following:

- Friction plate
- Brake disk
- Elastic band and 2 screws to aid installation and to secure during transport.

10. Calibration Completion

Move to the end of the Calibration menu after C2.11 Tiller Angle. Press back key.

- Display will ask if you want to save. "SAVE? N or SAVE? Y".
- If SAVE? Y, press Enter key.
 - Display will ask to "RE-KEY".
 - Calibration is complete.
- If SAVE? N, press Enter key.
 - Truck will remain not functional until calibration is complete and saved.

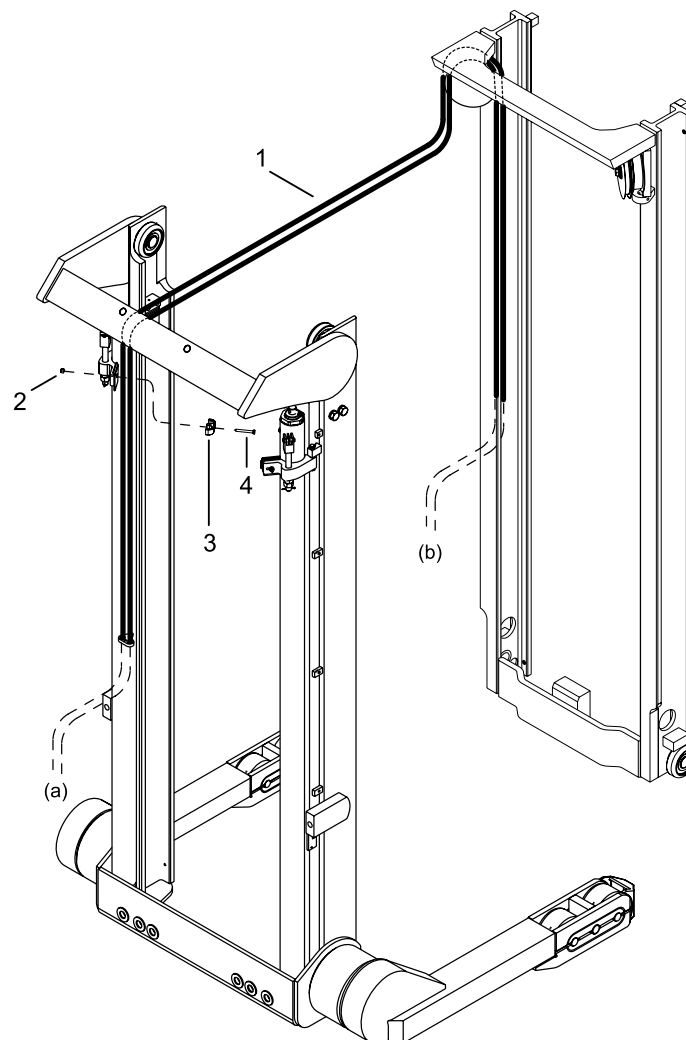


Figure 16645

- a To Hydraulic Mast
- b To Reach Assembly

40. Make connections of reach hoses to third stage mast, route thru yoke and make connections to reach assembly. Refer to figure 16645.
41. Install control cable grip springs and harness clamps to third stage mast, route control cable(s) thru yoke and make connections to reach assembly. Refer to figure 16645.
42. Assemble guard, item 1, over hydraulic tubes. Refer to figure 18726.
43. Install load backrest and forks to carriage.
44. Install safety shield.



CAUTION

Be sure all stops and safety devices are in place before cycling mast to check for proper operation.

45. Remove lifting device, install battery and check truck operation.

Fork Inspection



DANGER

This section shows causes of fork failure. Fork failure causes loss of equipment, damaged materials, bodily injury, and loss of life. Inspect and measure the forks at each planned maintenance interval to check for wear, overload, fatigue, bends, and so on.



WARNING

- Use the proper fork for how it was designed to be used.
- Avoid using fork extensions.
- Do not modify the forks.
- Only qualified personnel can make repairs.
- Visually inspect the forks each work day.



WARNING

If the fork locking pin is not fully engaged, the fork could become unintentionally disengaged.

Abrasion

See Figure 1.

Abrasion gradually reduces the thickness of the fork. Make sure that the fork thickness is within the specifications. Do not allow the forks to rub against the floor during operation. If the forks rub the floor when the mast is vertical, then check the lift chain adjustment.

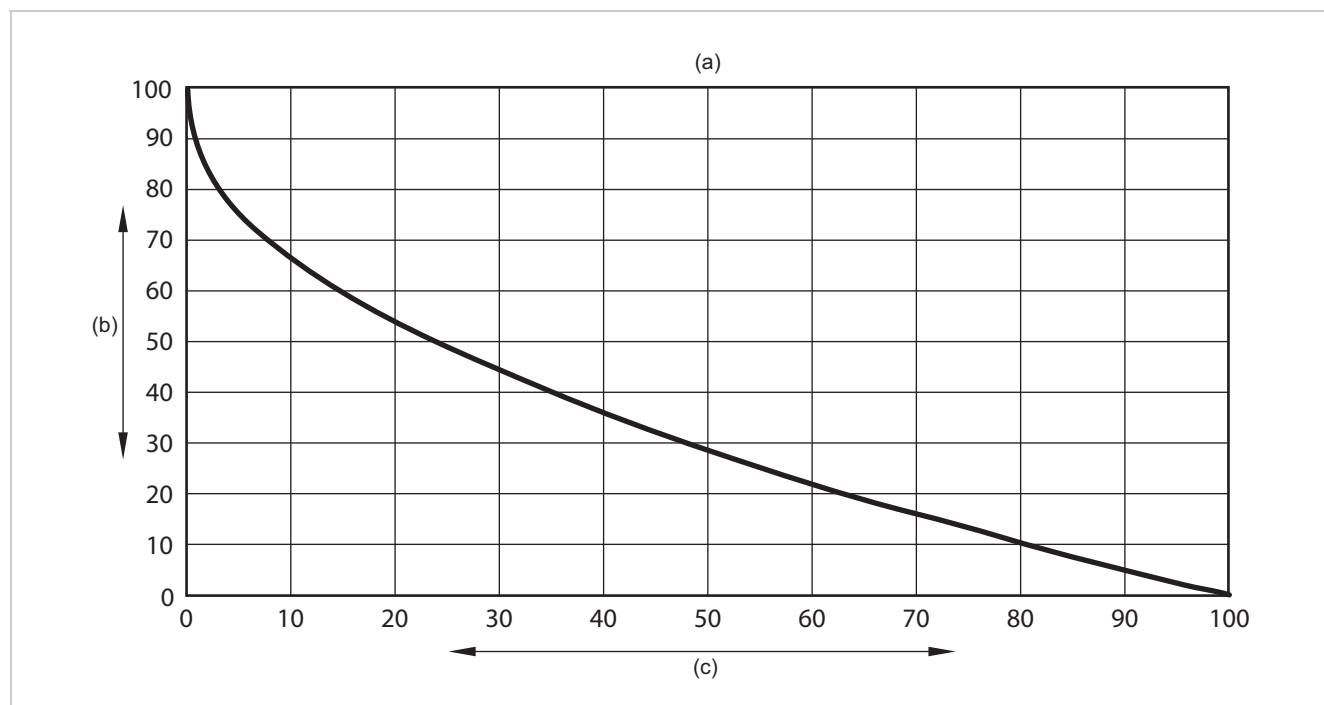


Fig. 1 (16858-02)

(a)	Fork wear versus load capacity	(c)	Percentage reduction in fork blade thickness
(b)	Percentage remaining of specified fork load capacity		

Fork wear at the fork heel must not exceed 10% of the original thickness. When the fork heel has worn 10% of the original thickness, 80% of rated capacity is the

maximum load that the forks can support. The rated capacity of the fork decreases exponentially as the fork wears. Use the fork wear calipers, a measuring instru-

Lift Cylinder

Material covered in this section applies to all tilt, reach and lift cylinders.

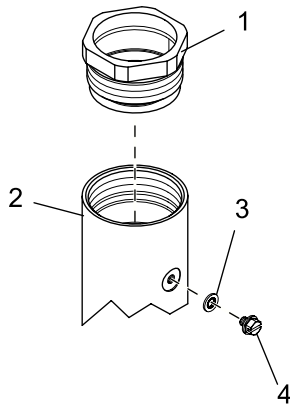


Figure 19146

Disassembly

Turn the cap (1) counterclockwise and unscrew it from the cylinder tube (2). Remove the cap (1) and carefully extract the ram assembly from the cylinder bore, never allowing the ram to come in contact with any sharp edges. Refer to Figure 19146.

Seals

The seals used in the cylinders are made of extremely durable, hard polyurethane which can be deformed temporarily to allow for installation without permanent damage.

Seal Removal

When an excessive amount of hydraulic oil is evident on the cylinder, where the ram exists from the cap, the rod packing is probably bad and should be replaced. The replacement of the packing can be accomplished without removing the ram assembly from the cylinder tube or truck.

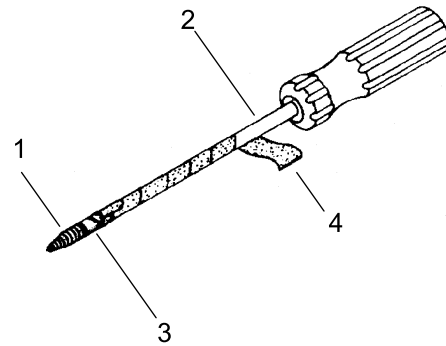


Figure 19147

Unfasten and remove the cap as explained in "Disassembly". If the packing is seated in the cap itself, a hooked tool should be used to remove the packing. If the packing is located below the cap and remains in the cylinder bore after the cap is removed, a pair of special tools can be used to facilitate packing removal. To make these tools, weld or braze a headless 4 mm self tapping screw to the end of a screwdriver (2). The screwdriver (2) must have at least 150 mm (6.0 in) of shank length with no larger than 4 mm (5/32 in) shank diameter. After attaching the screw to the screwdriver, grind off excess weld to a diameter of 4 mm (5/32 in) (3). Wrap the shank with electrical tape (4) from the tip of the screw to the screwdriver handle. This will prevent scratching of the cylinder bore or the ram. Refer to Figure 19147.

NOTE

Extreme care should be taken to prevent damage to cylinder wall and ram assembly. At this time, the wiper ring should also be removed since packing and wiper rings should always be replaced in pairs. Thoroughly clean the area where the seals seat. Any burrs, dirt or seal debris must be removed before reinstalling new seals.

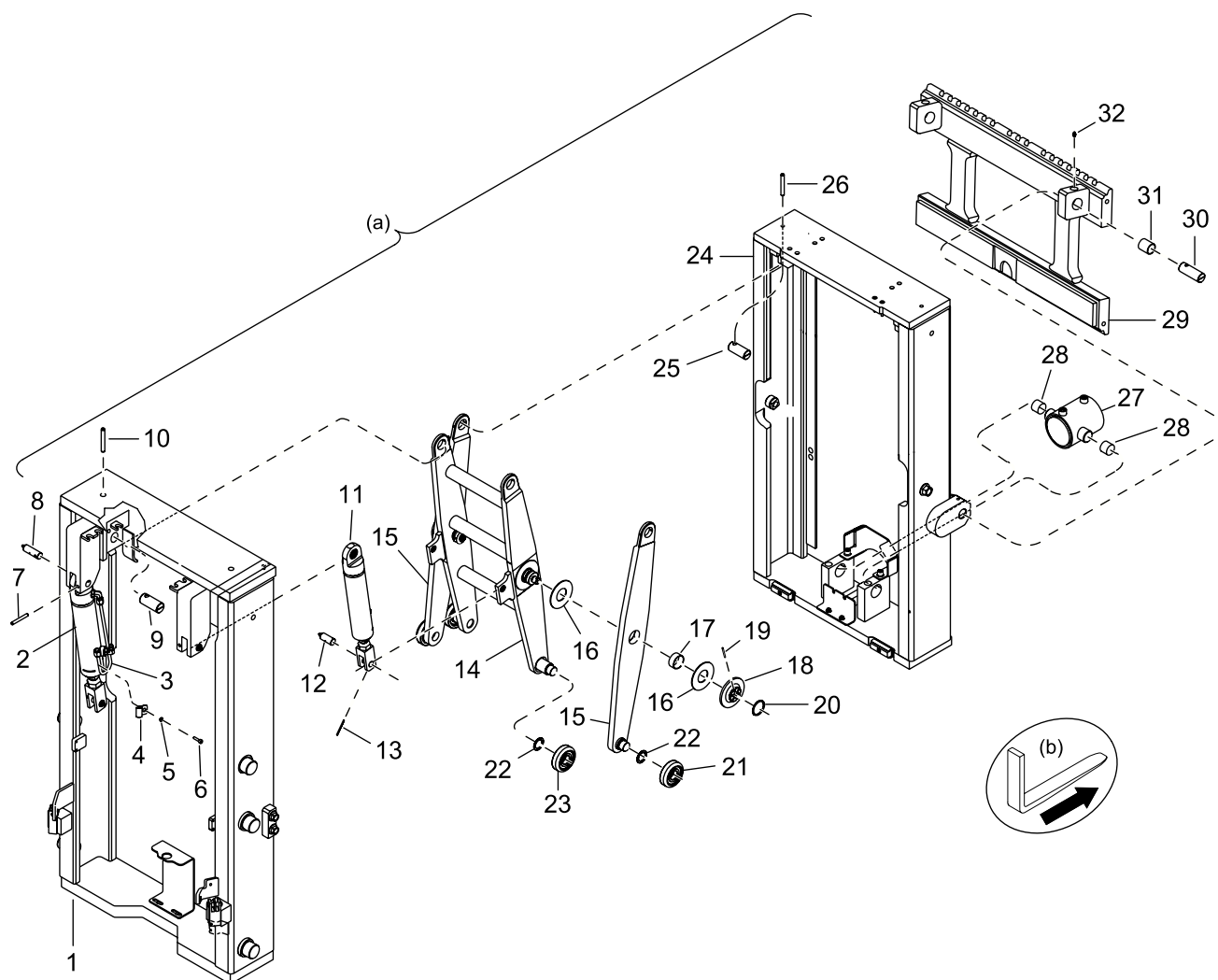


Figure 19202

- (a) TL Mast Shown
(b) Left and Right Determined from Operator's Perspective

Disassembly

Refer to Figure 19202 as follows:

NOTE

Disconnect battery. If complete disassembly of reach assembly is required, removal of entire reach assembly from mast assembly will ease disassembly procedure.

1. Remove four screws holding load backrest (not shown) to carriage (29) and remove load backrest.
2. Remove forks (not shown) from fork plate.

3. Extend reach assembly and place a 50 x 100 x 200 mm (2 x 4 x 8 in) hardwood block (approximate size) in either left or right channel of reach support (1).
4. Retract reach assembly until column roller (21) on outer arm (15) is resting on hardwood block. The hardwood block will not allow assembly to retract when the reach cylinders are removed.

NOTE

Ensure hoist has a minimum lifting capacity of 905 kg (2000 lb).

Glossary

Connectors on the SH/SHR 5500 Series truck are listed in chart form to assist the maintenance mechanic in locating these components on the Electrical Diagrams and on the truck.

The chart is in columns: **COMPONENT**; **LOCATION**; **FUNCTION**; **DIAGRAM**. The **COMPONENT** column

contains the abbreviation (or designator) of the component as it appears on the diagrams in the Maintenance Section. The **LOCATION** column gives the general location on the truck such as on platform or in power unit. The **FUNCTION** column explains the function or circuit of the device. The **DIAGRAM** column gives the grid point and page number of the appropriate wiring diagram.

CONNECTIONS			
	Location	Function	Diagram
CA200	COMBI AC1 (ACCESS 2&3)	Inputs & Outputs	DIA-8055-003 (B-1)
CA201	Bottom Left of Power Unit below ACCESS 5	Controller Cooling Fan	DIA-8055-003 (A-2)
CA202	EPS ACO (ACCESS 5)	Inputs & Outputs	DIA-8055-003 (B-3)
CA203	EPS ACO (ACCESS 5)	Inputs & Outputs	DIA-8055-003 (B-4)
CA204	HVC (ACCESS 7)	BNEG for Module	DIA-8055-004 (B-1)
CA205	HVC (ACCESS 7)	CAN Communication	DIA-8055-004 (B-1)
CA206	HVC (ACCESS 7)	Inputs & Outputs	DIA-8055-004 (B-1)
CA207	Mast Cable	SVT, SVS, SVR, LMS2	DIA-8055-004 (B-1)
CA208	Mast Cable	LMS1/LMS2	DIA-8055-004 (B-2)
CA209	M1- Traction Motor	ECR1	DIA-8055-004 (B-2)
CA210	M3 - Steer Motor	ECR3	DIA-8055-004 (B-3)
CA211	On Power Unit to Left of Steer Motor	POT3	DIA-8055-004 (B-3)
CA212	X10 Handle	POT1/POT2	DIA-8055-004 (B-3)
CA213	On ORS	ORS	DIA-8055-004 (B-3)
CA214	On BRS	BRS	DIA-8055-004 (B-3)
CA228	Power Unit Near Strobe Power Supply	Strobe Light (LGT3)	DIA-8055-006 (B-2)
CA230	Behind M1	Shorting Plug	DIA-8055-004 (B-4)
CA231	Behind M1	CAN Shorting Plug	DIA-8055-005 (B-1)
CA240	Left Side of Power Unit Near Fuses	CAN ACCESS	DIA-8055-005 (A-2)
CA250	Behind M1		DIA-8055-005 (A-2)
CA401	ACCESS 1	Display	DIA-8055-005 (B-2)
CA402	ACCESS 8	X10 Handle CAN	DIA-8055-005 (B-3)
CA403	ACCESS 8	COMBI AC1 CAN	DIA-8055-005 (B-3)
CA404	ACCESS 8	X10 Switches	DIA-8055-005 (B-4)
CA410	X10 Main PCB Handle	ACCESS 8 CAN	DIA-8055-005 (B-2)
CA411	X10 Main PCB Handle	POT1/FS/RS	DIA-8055-005 (C-2)

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