

This manual is intended for the service mechanic who is seeking information about maintenance and service replacement parts. It contains a section on troubleshooting which will enable a qualified mechanic to locate and solve problems which may occur.

OPERATOR INSTRUCTIONS

This manual does not contain operation instructions. Operator Instructions in tag or booklet form are sent with each truck. Additional copies can be ordered if required. These booklets are for you and your personnel to insure years of safe, trouble-free operation of your Crown Lift Truck. For WE/WS operator manual, refer to Crown publication, "You and "WE/WS Operator Manual" (PF-12579).

DRIVER TRAINING

Crown has available a complete series of Driver Training programs; in two parts concerning basic safety rules and operating characteristics of your walkie stacker. To obtain this informative material, ask your Crown dealer about "WE/WS Walkie Stacker" operator training program.

SERVICE TRAINING

Complete Service Training is available to the lift truck mechanic, covering all Crown Lift Trucks, SCR systems, wire guidance, hydraulic and electrical systems. To obtain more information concerning service training, contact your Crown Dealer.

When ordering replacement parts from this manual, always specify, along with the part number, the model and serial number of the truck. This information will further enable us to give correct, fast and efficient service.

For Series WE/WS capacities, technical information and dimensional specifications, please refer to the following sales literature:

| | |
|----------------------|----------|
| WE/WS Literature | CPG12597 |
| WE/WS Specifications | CPG12612 |

Copies of publications can be obtained from your Crown dealer or by writing to:

Crown Equipment Corporation
44 South Washington Street
New Bremen, Ohio 45869

This manual is arranged according to major sections. The first part of the page number, found at the bottom of each page, denotes the section in which a particular form will be located. The front of the manual covers written maintenance. The back covers replacement parts. The sectional descriptions are as follows:

| MAINTENANCE | | REPLACEMENT PARTS | |
|-------------|---------------------------------|-------------------|---------------------|
| SECTION | DESCRIPTION | SECTION | DESCRIPTION |
| M1 | Lubrication and Adjustment | 1 | Fork Carriage Parts |
| M2 | Hydraulic Maintenance | 2 | Hydraulic Parts |
| M3 | Drive Unit Maintenance | 3 | Drive Unit Parts |
| M4 | Electrical Maintenance | 4 | Electrical Parts |
| M5 | Brake Maintenance | 5 | Brake Parts |
| M6 | Steering Maintenance | 6 | Steering |
| M7 | Main Frame and Mast Maintenance | 7 | Mast Parts |
| M8 | Cylinder Maintenance | 8 | Cylinders Parts |
| M9 | Platform Covers | 9 | Covers |
| M10 | Glossary | 10 | Labels And Decals |

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HYDRAULIC

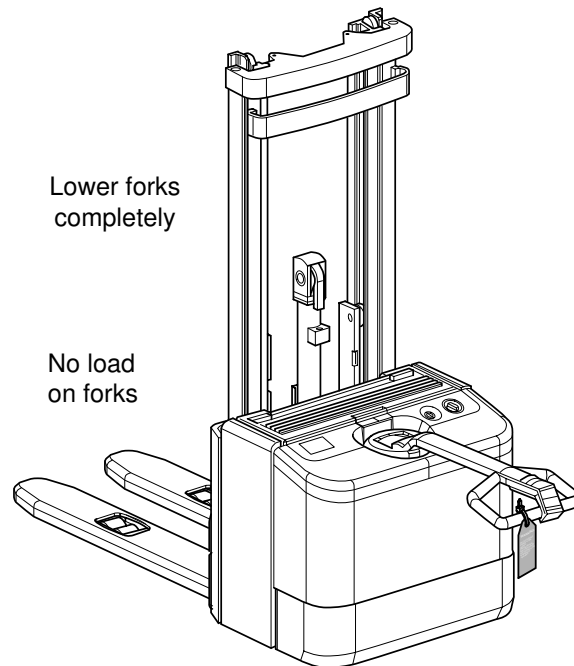
 **WARNING**

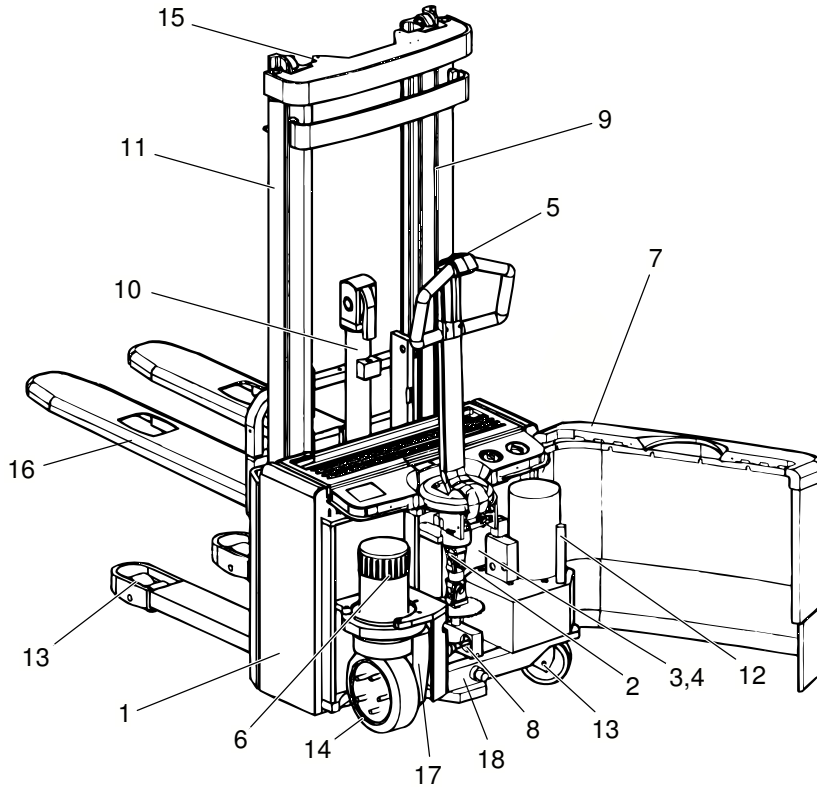
AVOID HIGH PRESSURE FLUIDS—Escaping fluid under pressure can penetrate the skin causing serious injury. Relieve pressure before disconnecting hydraulic lines. Tighten all connections before applying pressure. Keep hands and body away from pin holes which eject fluids under high pressure. Use a piece of cardboard or paper to search for leaks. Do not use your hand.

Any fluid injected into the skin under high pressure should be considered as a serious medical emergency despite an initial normal appearance of the skin. There is a delayed onset of pain, and serious tissue damage may occur. Medical attention should be sought immediately by a specialist who has had experience with this type of injury.

When maintenance is to be performed on the hydraulic system, to make sure the hydraulic system is not under pressure:

1. Move truck to a secure non-traffic maintenance area with a level floor.
2. No load on forks.
3. Completely lower load engaging means (mast) or, if required for maintenance, block mast sections at appropriate height as described in Mast of this section.
4. Lockout or tagout truck as described in Battery - Lockout/Tagout in this section.





6751

ILLUSTRATION 2

| INDEX | COMPONENT | Lube Type | 30 da. 100 hr. | 90 da. 250 hr. | 180 da. 500 hr. | 360 da. 1000 hr. |
|-------|--|-----------|-------------------|-------------------|--------------------|---------------------|
| 1 | Battery and Battery Compartment | | Check | | | |
| 2 | Contacts and Contactor Tips | | Check | | | |
| 3 | Electrical Components | | Check | | | |
| 4 | Transistor Controller | | Check | | | |
| 5 | High/Low Speed Switch and Controls | | Check | | | |
| 6 | Brake Assembly | | Check | | | |
| 7 | Protective Cover (Power Unit Door) | C | Check | | Lube | |
| 8 | Steering | C | Check | | Lube | |
| 9 | Lifting Chain and Column Rollers | E,B | Check | Lube | | |
| 10 | Mast Cylinder | | Check | | | |
| 11 | Lift Cylinder | | Check | | | |
| 12 | Hydraulic Oil, Tank and Filter | D | Check | | | Change |
| 13 | Load and Caster Wheels and Bearings | B | Check | | Lube | |
| 14 | Drive Wheel | | Check | | | |
| 15 | Mast Stops | | Check | | | |
| 16 | Forks | | | | Check | |
| 17 | Gearbox and Oil | A | | | Check | Change |
| 18 | Drive Unit and Articulated Undercarriage | B | | | Check | Lube |

INSPECTION, ADJUSTMENT AND LUBRICATION CHART 2

Refer to appropriate section of service manual for additional information concerning inspection and/or adjustment.

Note: Hours are based on traction hours which are accessible by using Curtis handset.

HYDRAULIC

Hydraulic Schematic Symbols

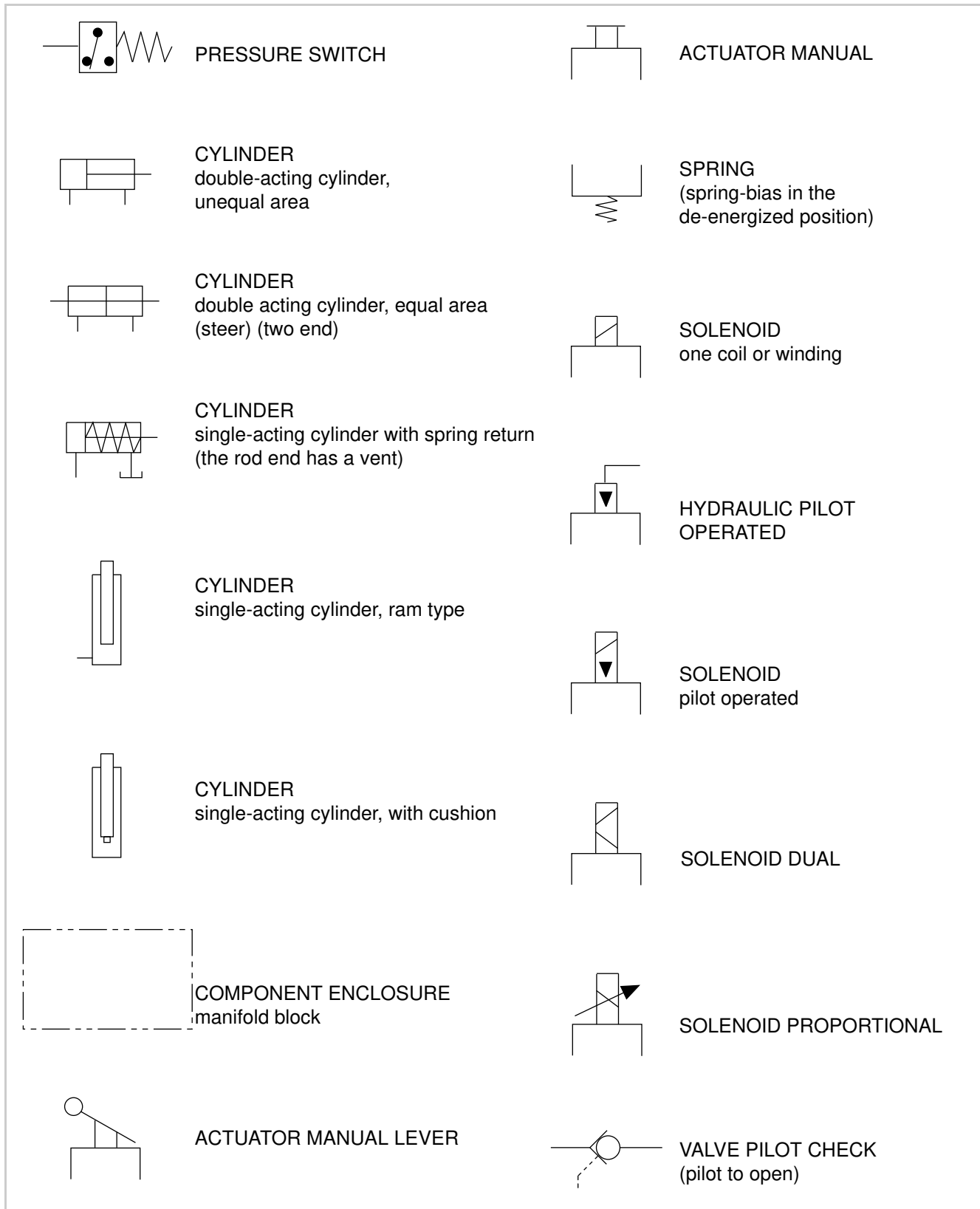


Fig. 2 (3560-05)

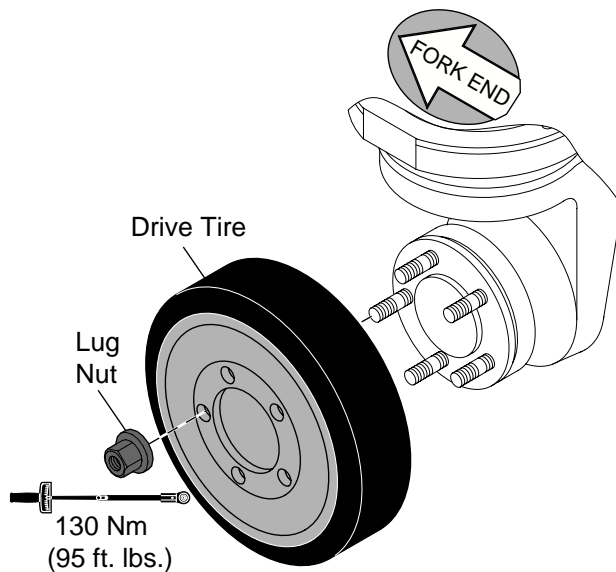
Drive Tire Removal

Removal (Refer to Illustration 1)

1. Disconnect battery and chock wheels.
2. Raise rear of truck and block. Refer to Control Of Hazardous Energy Section for lifting and blocking instructions.
3. Rotate drive unit until lug nuts are accesable.
4. Remove lug nuts.
5. Remove drive tire from truck.
6. Inspect tire for wear, cuts or foreign materials in tire. Replace tire if needed.

Tire Installation (Refer to Illustration 1)

1. Install drive tire and secure with five lug nuts.
2. Torque lug nuts to 130 Nm (95 ft. lbs.).
3. Remove blocking material, lower truck to floor.



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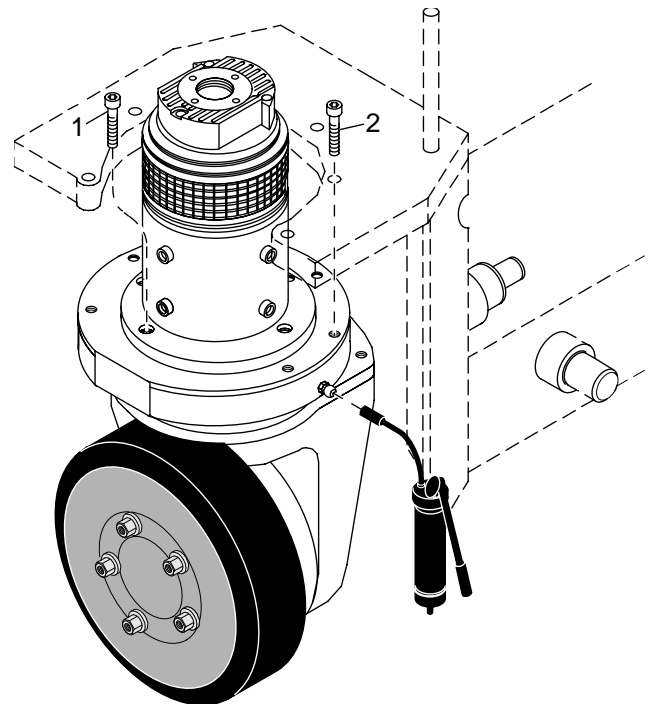
ILLUSTRATION 1

General

The drive unit is located on the left side of the vehicle behind the power unit door. It consists of a compound-wound motor which is mounted vertically on the swivel bevel gearing. The bevel gears mounted in taper roller bearings and the gears operate in an oil bath.

Removal (Refer to Illustration 2)

1. Disconnect battery and chock wheels.
2. Raise rear of truck and block.
3. Open power unit door.
4. Remove steering chain.
5. Disconnect brake.
6. Disconnect electrical cables from drive motor.
7. Remove screws (2) that mount drive unit to power unit.
8. Remove drive unit from truck.



6699-01

ILLUSTRATION 2

Maintenance

There are no user serviceable parts inside the Curtis PMC 1207 controller. No attempt should be made to open the controller. Opening the controller may damage it and will void the warranty. It is recommended that the controller exterior be cleaned periodically. If a hand-held programmer is available, the periodic cleaning provides a good opportunity to check the controller's diagnostic history file.

Safety

The 1207 controller is inherently a high power device. When working around any battery powered vehicle, proper safety precautions should be taken. These include, but are not limited to:

- Properly trained personnel
- Wearing proper eye protection
- Avoid wearing any jewelry
- Avoid wearing loose clothing
- Use insulated wrenches and hand tools

Cleaning the 1207 Controller

1. Disconnect battery.
2. Block vehicle wheels to insure vehicle will not roll.
3. Raise vehicle so drive wheel can rotate freely.
4. Discharge controller capacitor by switching an electrical load (i.e. activating horn).
5. Remove the cable.
6. Remove any dirt or corrosion from contact area.
7. Wipe controller with a clean, damp cloth.
8. Before connecting cables check to see that the controller is completely dry. Reattach cable with correct tool.

Removal and Installation of 1207 Controller

1. Disconnect battery.
2. Block vehicle wheels to insure vehicle will not roll.

3. Raise vehicle so drive wheel can rotate freely.
4. Open covering hood.
5. Discharge controller capacitor by switching an electrical load (i.e. activating horn).
6. Disconnect connector assembly.
7. Remove power cables.
8. Remove securing screws and take out controller.
9. Installation can be performed by following these steps in reverse order.

Controller Check



CAUTION

Before any inspection, adjustments, servicing, parts replacement or any other act is performed requiring physical contact with the electrical working components or wiring of system controller, disconnect battery, raise drive wheels clear of floor and place blocks under vehicle frame. Place Key switch to off and Brake switch open. Do not stand in path of vehicle while performing test.

1. Slide open cover on top of controller (Model 1207 only).
2. Connect programmer.
3. Turn the key switch to the "on" position.
 - The programmer should power up.
 - The controller status LED should begin blinking.

NOTE

If neither happens, check for continuity in the key switch circuit and controller ground B-.

4. Switch program to diagnostic mode.
 - Display should show "No faults found".
 - The controller status LED should remain blinking.
5. Bring control pod to the walkie position.
 - Display should show "No faults found".
 - The controller status LED should remain blinking.

Reverse Safety Switch (SAS)

Removal

1. Disconnect battery and chock wheels.
2. Raise and block truck.
3. Remove screws on the handle and raise the switch cover.
4. Disconnect three (3) connectors and remove switch cover.
5. Remove screws and bracket.
6. Remove screws securing switch to handle and remove switch.

Installation

1. Reverse Steps 1 thru 6 to assemble switch into handle.

Key Switch (KYS)

Removal

1. Disconnect battery and chock wheels.
2. Raise and block truck.
3. Open power unit door.
4. Disconnect connectors.
5. Remove nut and washer.
6. Remove switch.

Installation

1. Reverse Steps 1 thru 6 to assemble switch into truck.

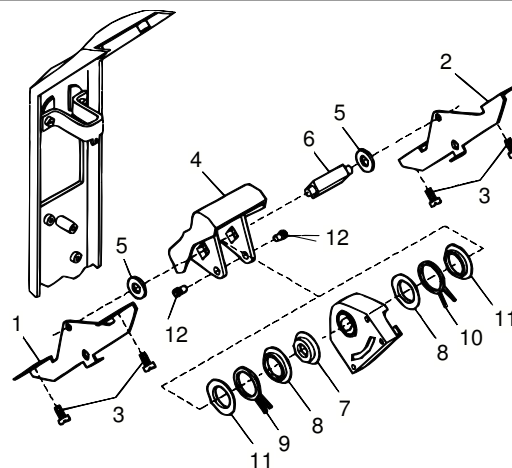
Drive Switch (POT, FS/RS)

Removal (Refer to Illustration 1)

1. Disconnect battery and chock wheels.
2. Raise and block truck.
3. Remove screws on handle and raise switch cover.
4. Disconnect three (3) connectors and remove switch cover.
5. Remove mounting screws (3) and drive switch.
6. Remove items 4 to 11.

Installation (Refer to Illustration 1)

1. Rotate adjustment pin (12) until it is flush with the drive switch rocker (4).
2. Install drive switch so it is located in the center of the recess on the switch cover.
3. Install screws (3).
4. Press brackets (1) and (2) together gently so there is no noticeable play on the switch rocker.
5. Complete assembly in reverse order of steps 1 thru 6.
6. Tighten the attachment screws.
7. Verify switch operation.

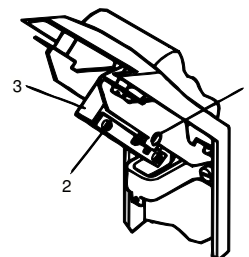


6715

ILLUSTRATION 1

Adjusting Drive Switch (Refer to Illustration 2)

1. Raise and block truck.
2. Remove screws on handle and raise switch cover.
3. Adjust the drive switch rocker by rotating the right eccentric screw (1) until there is no play.
4. Connect the programmable handset to the traction controller.
5. Call-up test menu and view drive switch % display.
6. Loosen screws (2) on the drive switch (3).
7. Move the drive switch until the % displayed on the handset is zero (0).
8. Average out the amount of play and tighten screws (2).
9. Activate the drive switch completely in both directions. The display should read 100%.



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ILLUSTRATION 2

Verification of Drive Switch Setting

1. Raise and block truck.
2. Connect the programmable handset to the traction controller.
3. Call-up test menu and view throttle % display.

The display must be 0% in neutral and 100% when activated in any direction.

There must not be any noticeable play in the neutral position. The drive rocker switch must operate freely in the cover and must immediately return to the neutral position after being activated.

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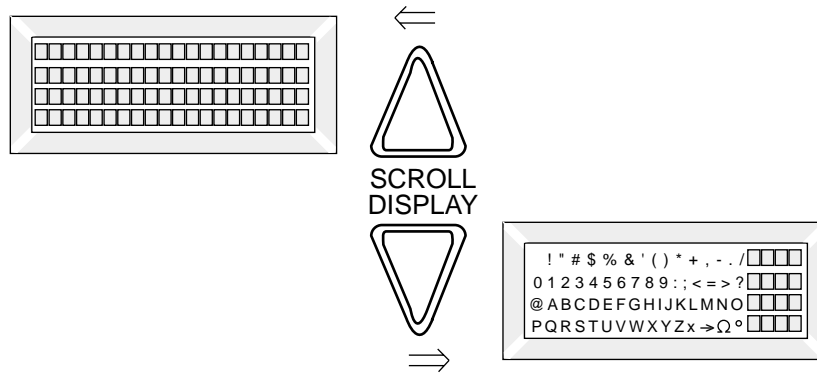
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PROGRAMMER OPERATION

Each time the programmer is connected to the controller, it acquires all the controller's parameters and stores them in its temporary memory. You can revert back to these original settings at any time during a programming session via the Special Program Menu. Select "Revert to Previous Settings" by scrolling it to the top of the display window, press the MORE INFO key, and follow the instructions displayed. Any inadvertent changing of parameters can be "undone" using this procedure—even if you can't remember what the previous settings were—as **long as the programmer has not been unplugged and power has not been removed from the controller.**

Programmer Self Test

You can test the programmer by displaying two special test screens. Press the MORE INFO key while the programmer is powering up. During the Self Test, you can toggle between the two test screens by pressing the SCROLL DISPLAY keys. The first screen turns on every LCD element, and the second screen displays all the characters used in the various menus. As part of the Self Test, you can also test the keys by pressing each one and observing whether its corner LED lights up. To exit the Self Test, unplug the programmer or turn off the controller, and then repower it without holding the MORE INFO key.



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ILLUSTRATION 4.2-16

Functions Menu

The Curtis handheld programmer can also be used to copy data between units, reset data and many other functions unique to the unit.

SETTINGS

- GET SETTINGS FROM CONTROLLER
- WRITE SETTINGS TO CONTROLLER
- RESET ALL SETTINGS

Information Menu

When the Curtis handheld programmer is connected to the unit information, such as software, hardware and parameter block versions are also uploaded.

MODEL #
SERIAL #
MFG DATE
SOFTWARE VERSION

Programmer Setup Menu

There are several setup options and information that can be accessed in this Menu.

PROGRAM

- LCD CONTRAST
- LANGUAGE

INFORMATION

- OEM INFO
- RECONFIGURED
- MODEL #
- SERIAL #
- MFG DATE
- SOFTWARE VERSION
- HDWE VERSION
- MC - PROTOCOL VERSION
- ES - PROTOCOL VERSION
- S - PROTOCOL VERSION
- DEVICE TYPE

WET CELL

The care and maintenance of the battery is very important to obtain efficient truck operation and maximum battery life.

**CAUTION**

Gases produced by a battery can be explosive. Do not smoke, use an open flame, create an arc or sparks in the vicinity of the battery. Ventilate an enclosed area well when charging.

Batteries contain sulfuric acid which may cause severe burns. Avoid contact with eyes, skin or clothing. In case of contact, flush immediately and thoroughly with clean water. Obtain medical attention when eyes are affected. A baking soda solution (one pound to one gallon of water) applied to spilled acid until bubbling stops, neutralizes the acid for safe handling and disposal.

Leakage voltage from battery terminals to battery case can cause misleading trouble symptoms with the truck electrical system. Since components of the truck electrical system are insulated from truck frame, leakage voltage will not normally affect truck operation unless a short circuit or breakdown of circuit wire insulation to truck frame occurs.

A voltage check from battery connector terminal to battery case should indicate near zero volts. Typically, however, the sum of the voltages at both terminals will equal battery volts. This leakage voltage will discharge the battery. As battery cleanliness deteriorates, the usable charge of the battery decreases due to this self discharge.

Although a leakage voltage reading of zero volts may not be possible, a cleaner battery will have more usable charge for truck operation and not affect operation of electronic devices on the unit.

Safety Rules

- Wear protective clothing, such as, rubber apron, gloves, boots and goggles when performing any maintenance on batteries. Do not allow electrolyte to come in contact with eyes, skin, clothing or floor. If electrolyte comes in contact with eyes, flush immediately and thoroughly with clean water. Obtain medical attention immediately. Should electrolyte be spilled on skin, rinse promptly with clean water and wash with soap. A baking soda solution (one pound to one gallon of water) will neutralize acid spilled on clothing, floor or any other surface. Apply solution until bubbling stops and rinse with clean water.
- Keep vent plugs firmly in place at all times except when adding water or taking hydrometer readings.
- Do not bring any type of flame, spark, etc., near the battery. Gas formed while the battery is charging, is highly explosive. This gas remains in the cells long after charging has stopped.
- Do not lay metallic or conductive objects on battery. Arcing will result.
- Do not allow dirt, cleaning solution or other foreign material to enter cells. Impurities in electrolyte has a neutralizing effect reducing available charge.
- If battery repair is planned, follow the battery manufacturer's instructions concerning repair practices and procedures.

Checking

Battery electrolyte level should be checked before each charge of the battery. The level should be maintained at one-half inch above plates or just below the lower lip of the filler hole at all times. If low, add distilled water or approved local supply (consult battery manufacturer) at the end of a charge cycle. Do not overfill. For maximum battery life, specific gravity readings should be taken daily on a pilot cell and recorded. A different pilot cell should be selected on a monthly basis with readings taken on all cells at semi annual or annual intervals. Do not take specific gravity readings immediately after adding water. Water and electrolyte must be thoroughly mixed by charging before a reliable reading can be taken. Normal full charged specific gravity should be between 1.265 and 1.285.

Brake Adjustment

AIR GAP ADJUSTMENT

The "air gap" is the distance between the magnet body and the armatures with the brake applied. As the brake pads and rotor wear normally, the air gap will increase and should be readjusted when it measures 0.2 mm (0.008 in.).

NOTE

If the air gap measures more than 0.2 mm (0.008 in.), the brake may not release properly.

Air gap adjustment can be performed as long as the brake pads and rotor function properly or until the adjustable spacer threads are fully engaged (adjustment limit reached). To adjust gap (brake applied):

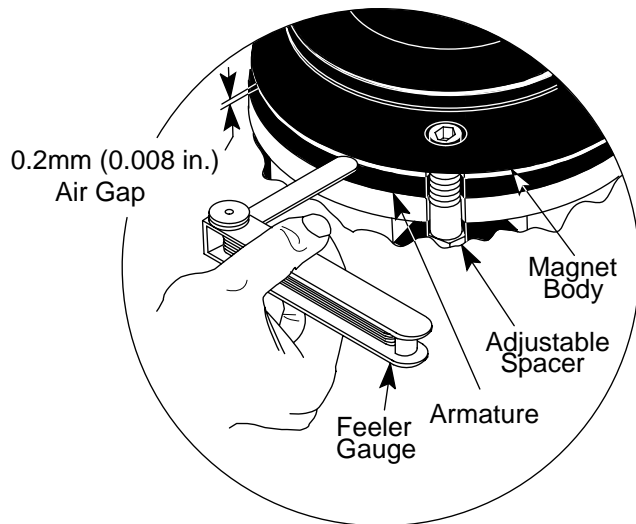


ILLUSTRATION 3

6739-01

1. Chock load wheels and open power unit doors to access brake assembly.
2. Using low pressure air, remove any dirt between armatures and magnet body.
3. Loosen (only) the brake assembly screws.
4. Rotate adjustable spacers evenly and adjust air gap to 0.2 mm (0.008 in.). Check gap near each spacer.
5. Tighten the brake assembly screws 9.5Nm (7.0 ft. lbs.).
6. Remove chocks and check operation.

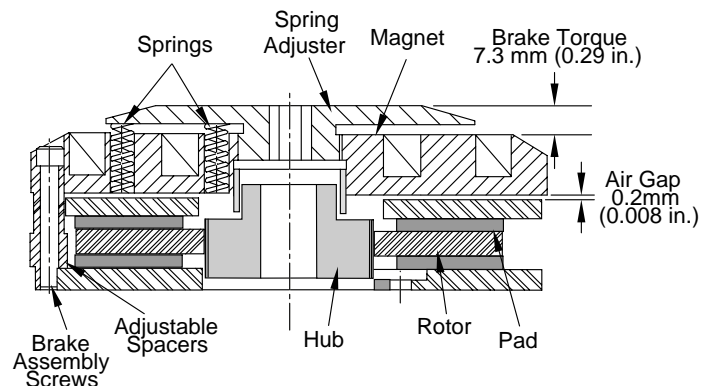


ILLUSTRATION 4

6737-01

Measuring the lift chains for wear with a steel tape measure

1. Raise the forks 152 mm (6 in).
2. Select a section of the lift chain that moves over a pulley during operation.
3. See Figure 3. Measure the lift chain pitch (1) from the center of the center of two chain pins of an outer plate.

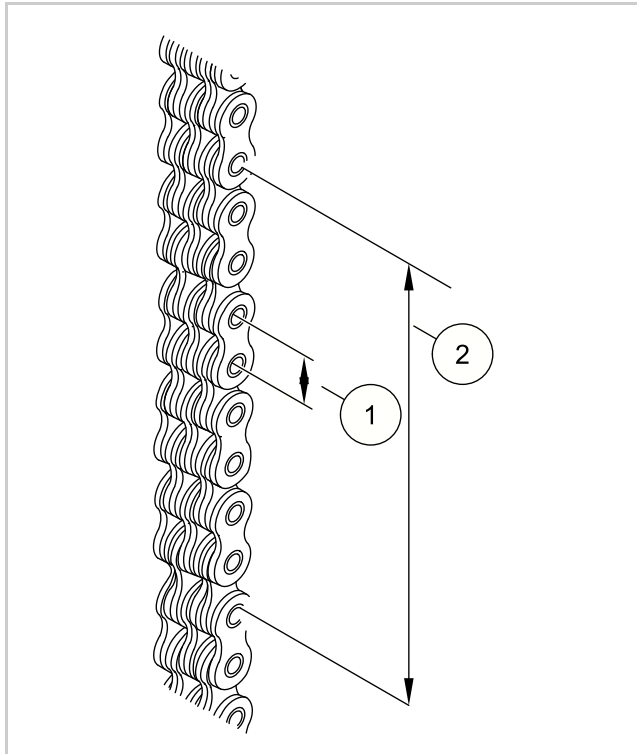


Fig. 3 (33492)

4. See the pitch value in the Lift Chain Wear table to find the number of chain links that are necessary for the measurement.

| Lift Chain Wear | | | | | | |
|-----------------|-------|-------------|------------|------|------------|--------|
| Pitch | | Chain Links | New Length | | Wear Limit | |
| mm | in | | mm | in | mm | in |
| 25.4 | 1.0 | 12 | 305 | 12.0 | 314 | 12.375 |
| 19.05 | 0.75 | 16 | 305 | 12.0 | 314 | 12.375 |
| 15.88 | 0.625 | 20 | 318 | 12.5 | 327 | 12.875 |

Checking the lift chain elongation

1. Using the chain link number found in the Lift Chain Wear table, count the chain links on the lift truck.
2. See Figure 3. Measure the length (2) from the center of the first chain pin to the center of the last chain pin.

Note: The pitch is the distance between the pins.

3. Calculate the percent of lift chain elongation (x).
Percent of the lift chain elongation = [measured length / (new length/100)]-100

Example: The lift chain pitch is 25 mm (1.0 in). The Lift Chain Wear table shows that the new length for this lift chain pitch is 305 mm (12.0 in). The measured length with the steel tape measure is 309 mm (12.2 in).

$$x = [309 / (305 / 100)] - 100$$

$$x = 309 / 3.05 - 100$$

$$x = 101.3 - 100$$

$$x = 1.3$$

In this example, the lift chain elongation is 1.3%.

4. Replace the lift chain if the elongation is more than 3% or if it will be more than 3% before the next maintenance interval. See the Lift Chain Wear table.
 - Do not repair lift chains by removing a worn section of a lift chain and installing a new piece.
 - If the lift truck has two lift chains, replace both lift chains at the same time.
 - If a part of the lift chain is worn, replace both lift chains.

GENERAL

All covers and panels on this truck contribute towards operator safety or truck protection. They must be replaced in the event they are damaged or lost. The truck must not be operated without the corresponding covers in place.

Protective Cover

Removal

1. Disconnect battery and chock wheels.
2. Remove mounting screws.
3. Remove protective cover.

Installation

1. Reverse steps 1 thru 3.

Battery Cover

Removal

1. Disconnect battery and chock wheels.
2. Remove mounting screws (1).
3. Remove battery cover (2) from the lower cover (3).

Installation

1. Install replacement adhesive strips (4) to lower cover (3).
2. Insure that the slip-on nuts (5) are securely in place.
3. Complete assembly by reversing steps 1 thru 3.

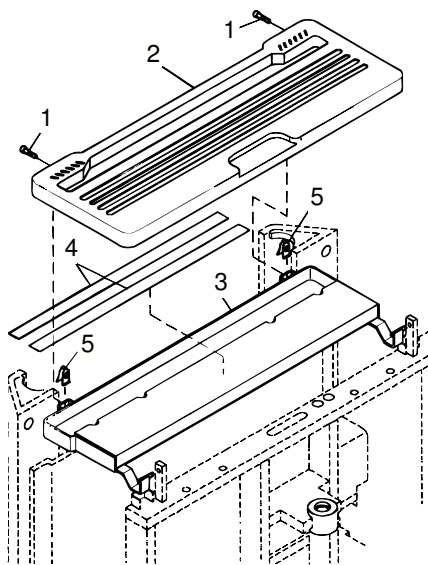


ILLUSTRATION 1

6728

Brake Switch (BRS) Cover

Removal

1. Disconnect battery and chock wheels.
2. Remove mounting screws on handle switch cover.
3. Disconnect three connectors on switch cover and remove cover.
4. Remove screws that secure handle to truck and remove handle.
5. Remove screws that secure shaft cover to shaft and remove cover.

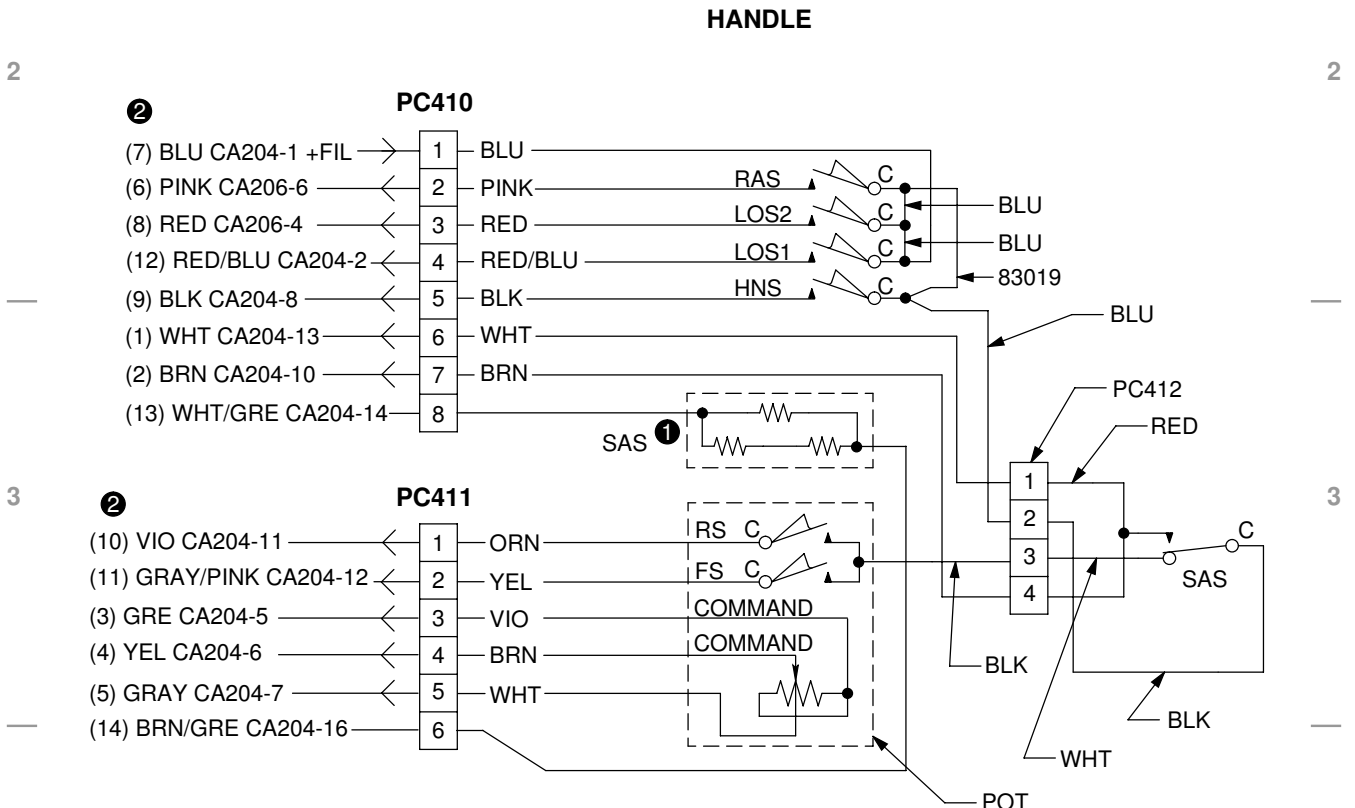
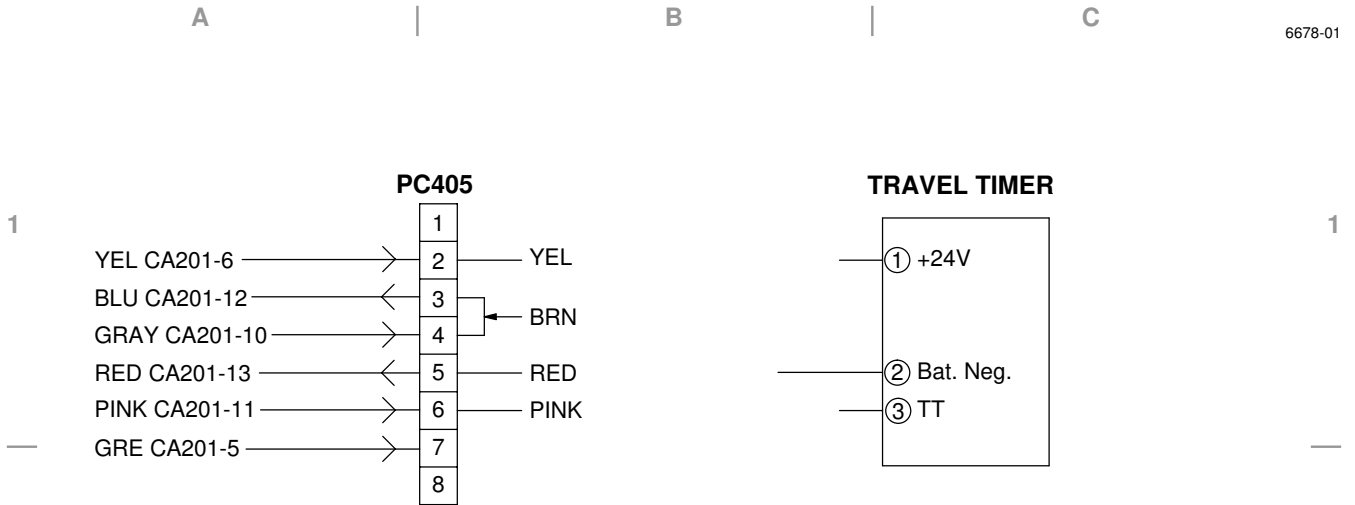
Installation

1. Assemble by reversing steps 1 thru 5.

Knuckle Cover Adjustment

The edge of the shaft cover must be positioned approximately 5 mm (0.02 in.) below the adjacent covers.

1. Disconnect battery and chock wheels.
2. Loosen mounting nuts on the knuckle.
3. Adjust knuckle up or down until a gap of 5 mm (0.02 in.) is achieved.
4. Tighten mounting nuts loosened in step 2 to 60 Nm (44.25 ft. lbs.).



NOTES:

- ① Resistors Between PC410-8 And PC411-6 For Optional Freezer/Corrosion.
- ② Numbers In Parenthesis Pertain To Freezer/Corrosion Trucks Only. Disregard Color And Use Number to Identify Lead.

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