

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

OPERATOR INSTRUCTIONS

This manual does not contain operator instructions. Operator instructions 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 operator instructions, refer to Crown publication, "Operator Manual SC 4000 Series" (PF12733).

DRIVER TRAINING

Crown has available a complete series of Driver Training programs, in two parts concerning basic safety rules and operating characteristics of your truck. To obtain this information, ask your Crown Dealer about "Its up to You" and "You and Your Sitdown Rider".

SERVICE TRAINING

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

REPLACEMENT PARTS

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

For Series SC 4000 capacities, technical information and dimensional specifications, please refer to the following sales literature:

SC 4000 Series Literature	SF12731
SC 4000 Series Specifications	SF12735

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

Crown Equipment Corporation
44 S. Washington Street
New Bremen, OH 45869
(www.crown.com)

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 first portion of the manual covers the written maintenance. The later portion covers replacement parts. The sectional descriptions are as follows:

MAINTENANCE		REPLACEMENT PARTS	
SECTION	DESCRIPTION	SECTION	DESCRIPTION
M1	Lubrication and Adjustments	1	Basic Chassis or Power Unit
M2	Hydraulics	2	Hydraulic System and Components
M3	Drive Unit	3	Drive Unit and Components
M4	Electrical	4	Electrical Components
M5	Brake	5	Brake Assemblies and Brake Systems
M6	Steering	6	Steering System and Components
M7	Mast and Main Frame	7	Main Frame and Mast Assemblies
M8	Cylinder	8	Cylinders
M9	Carriage and Attachments	9	Carriage and Attachments
M10	Glossary	10	Accessories
		11	Specifications

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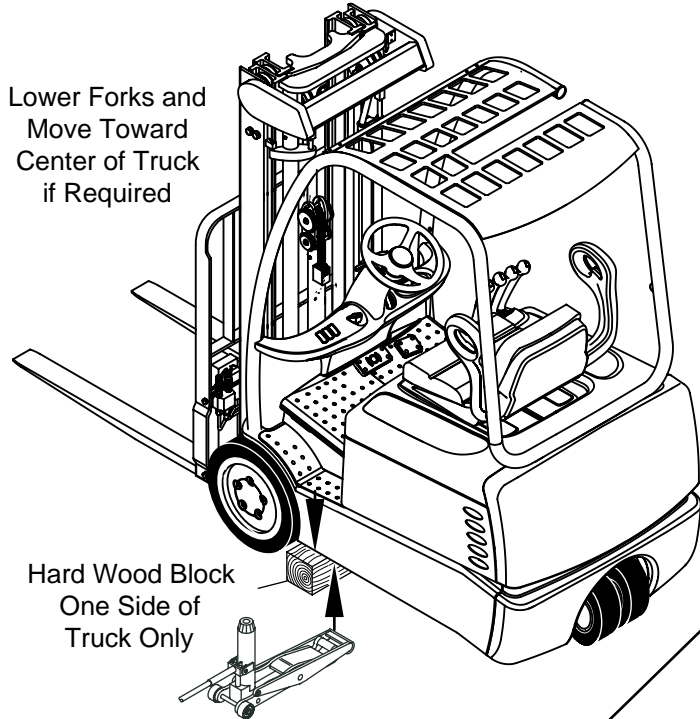


- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

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LIFTING & BLOCKING POINTS

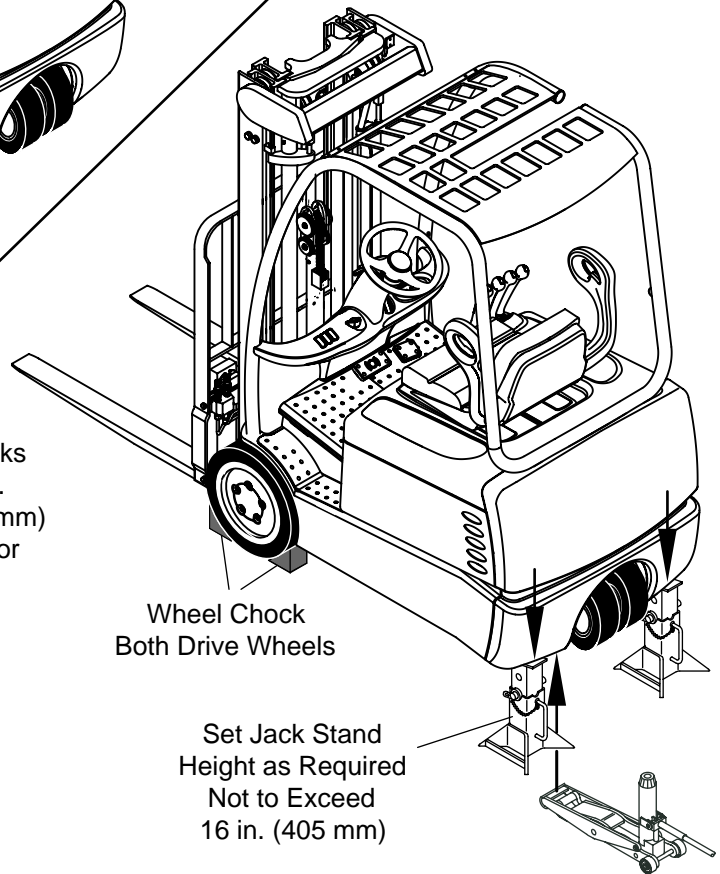
Side



! WARNING
 Do Not Raise Truck Skirt More Than 5.5 in. (140 mm) from Floor to Position Hard Wood Block

Raise Forks 3 to 6 in. (75 to 150 mm) From Floor

Steer Wheel



- NOTES:**
- Move Truck to a Secure Non Traffic Maintenance Area With a Level Floor
 - No Load on Forks
 - Disconnect Battery
 - Hydraulic Jack - Capacity 8000 LBS.
 Crown P/N: 122599
 Collapsed Height Minimum: 2.25 in. (60 mm)
 Raised Height Maximum: 16 in. (405 mm)
 - Jack Stand - Capacity 10,000 LBS.
 Commercially Available

Disconnecting Tilt Cylinder

When the tilt cylinders are disconnected from the hydraulic system or from the mounting brackets, the mast must be secured to keep the mast from pivoting toward, or away from the truck.

- Move truck to a secure non-traffic maintenance area with a level floor.
- Lower load engaging means (mast) completely. No load on forks.
- Lockout or tagout truck as described in Lockout - Tagout in this section.
- Chock wheels (refer to Lifting and Blocking in this section).
- Attach a sling and lifting device to all mast top cross braces so movement will be minimal when tilt cylinders are disconnected.

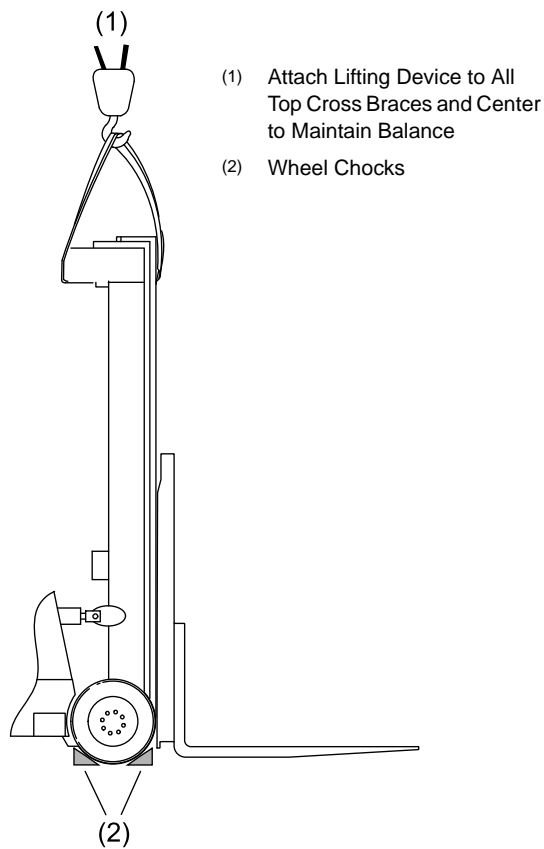


Figure 16961

For truck applications primarily operating in a cooler environment with intermittent freezer entry, use a 50/50 blend of low temperature (063001-006) and standard hydraulic oil (063001-021).

For trucks running continuously at temperatures of -12.2° C (10° F) or below, use an 80% low temperature (063001-006) and 20% standard hydraulic oil (063001-021).

The proper mixture of freezer hydraulic oil will ensure the best and most efficient operation of your Crown equipment.

All screws, washers, nuts, roll pins, retaining rings, etc. need to be coated with a rust preventive (078882) to protect against corrosion. Lubrication intervals must be changed to a frequency that will minimize corrosion and wear on moving shafts and parts.

NOTE

Use Planned Maintenance Inspection Reports (PF13178) for FC 4000 trucks as required to record and assure maintenance checks.

The image shows a detailed maintenance inspection report form for Crown FC 4000 Series trucks. The form is titled "FC 4000 Series Planned Maintenance Inspection Report" and includes fields for Customer, Dealer, and various inspection items. The items are organized into sections such as "Engine", "Transmission", "Hydraulic System", "Brakes", "Steering", "Suspension", "Wheels/Tires", "Electrical", "Safety", and "General". Each item has a "Status" column with checkboxes for "OK", "NG", "N/A", and "P". There are also checkboxes for "Lubricated" and "Adjusted". At the bottom, there are fields for "Technician Signature", "Date", and "Comments".

Figure 24422

Inspection Chart 5			
Index	Component	30 Days 100 Hrs	12 Months 2000 Hrs
I-1	Lift Cylinder and Mounting	Check	
I-2	Mast Hydraulic Lines, Hoses and Fittings	Check	
I-3	Yoke	Check	
I-4	Pulleys, Rollers and Bearings	Check	
I-5	Horn Switch	Check	
I-6	Directional Control	Check	
I-7	Electrical Connections, Cables and Wiring	Check	
I-8	Travel Alarm - Truck Frame	Check	
I-9	Seat Belt, Retainer and Switch	Check	
I-10	Battery Connector and Contacts	Check	
I-11	Battery and Cables	Check	
Refer to appropriate section of Service and Parts Manual for additional information concerning inspection and/or adjustment.			

LUBRICATION & ADJUSTMENT

Planned Maintenance

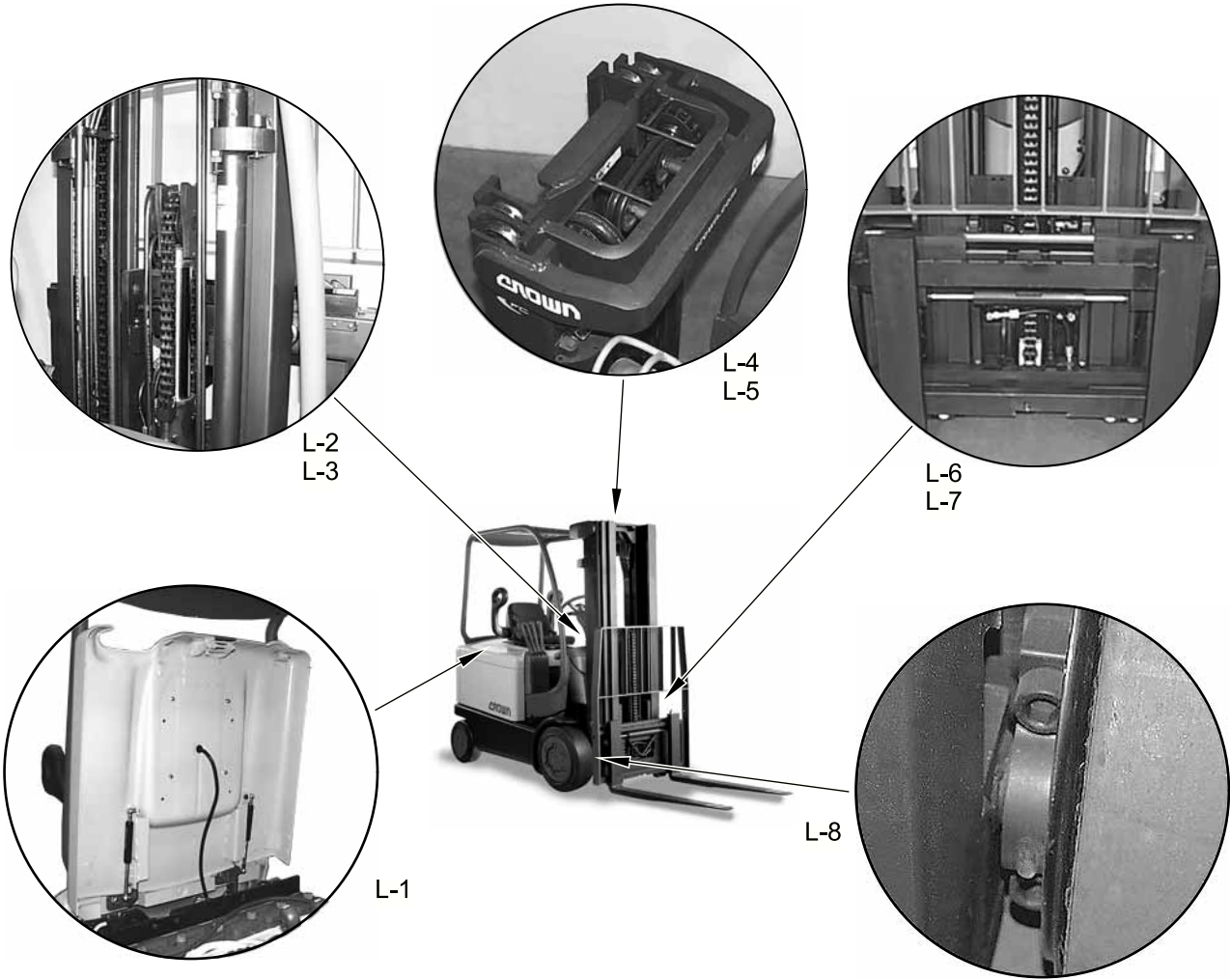


Figure 17480

LUBRICATION & ADJUSTMENT

Planned Maintenance

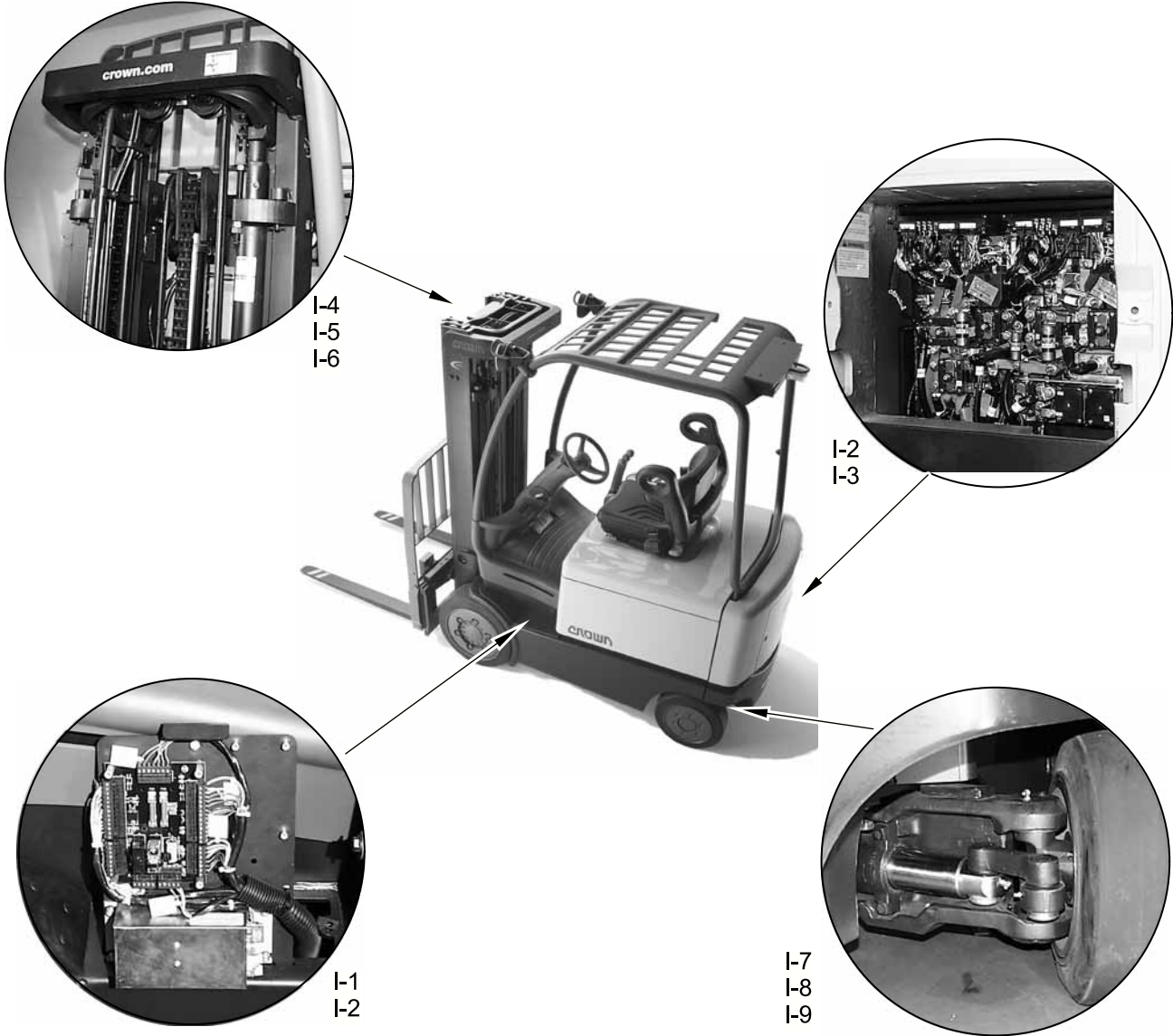


Figure 24424

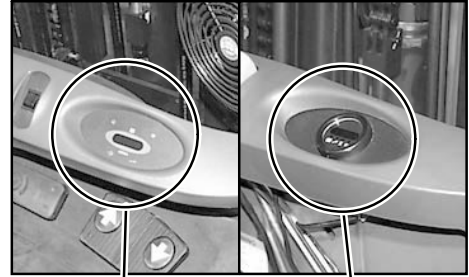
Dash Display

Location: console.

Purpose: display battery charge, hours of truck operation and fault codes.

Data: not applicable.

Adjustment: none required.



Enhanced

Standard

9039P

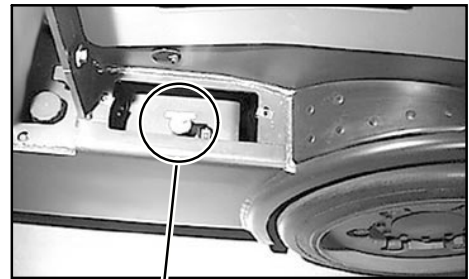
DIPSTICK Hydraulic Reservoir

Location: hydraulic reservoir under right side step.

Purpose: check fluid level in hydraulic reservoir.

Data: not applicable.

Adjustment: none required.



Dipstick

9257P

Distribution Panel

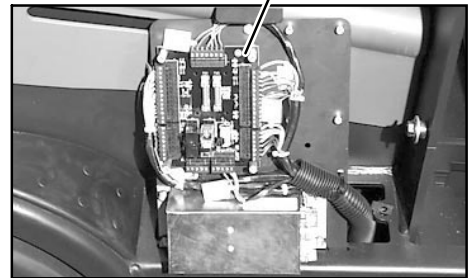
Location: under left side step.

Purpose: centralize wiring and troubleshooting efforts.

Data: not applicable.

Adjustment: none required.

Distribution Panel



9040P

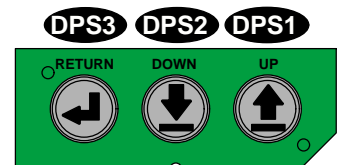
DPS1, DPS2, DPS3 Display Switches (enhanced display only)

Location: under right corner of console.

Purpose: allow operator to look at truck information.

Data: wired normally open, closed when switch depressed.

Adjustment: none required.



9041

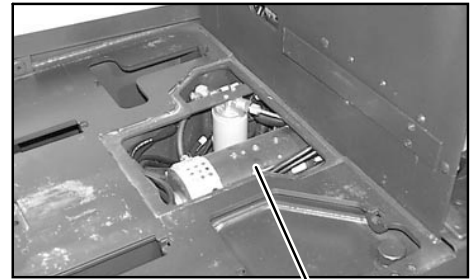
M2 Pump Motor

Location: below battery compartment.

Purpose: provide driving force for hydraulic pump supplying hydraulic oil flow for lift and accessory functions.

Data: movement of control lever closes contactor or inputs signal to MRC2.

Adjustment: none required.



M2

9283P

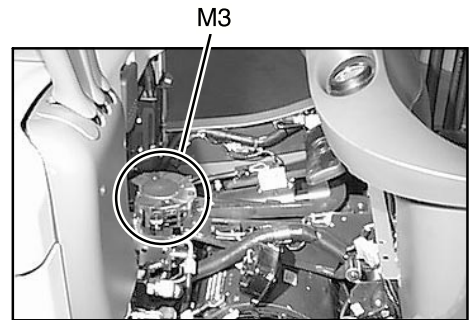
M3 Power Steering Motor

Location: below floorboard.

Purpose: provide driving force for hydraulic pump supplying hydraulic oil flow for steering and brake functions.

Data: energized via S contactor.

Adjustment: none required.



M3

9052P

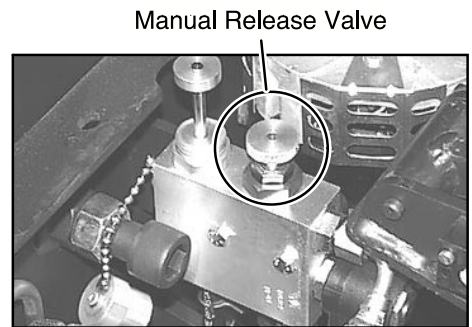
Manual Release Valve

Location: park brake release manifold.

Purpose: manually release park brake.

Data: not applicable.

Adjustment: none required.



Manual Release Valve

9045P

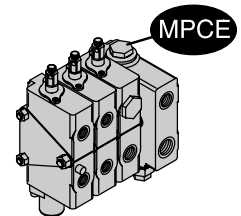
MPCE Main Pressure Compensating Element

Location: hydraulic function control valve.

Purpose: controls flow and pressure for lift, tilt and accessory hydraulic circuits.

Data: not applicable.

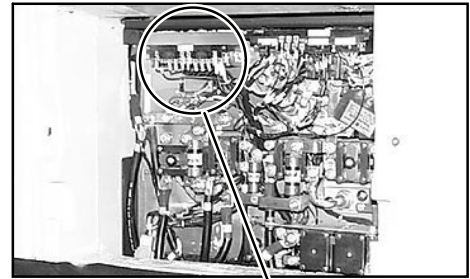
Adjustment: refer to section M2.



9284

TMM
Truck Management Module

Location: contactor panel.
 Purpose: provide motor overtemp and brushwear indication.
 Data: option available with contactor lift.
 Adjustment: none required.

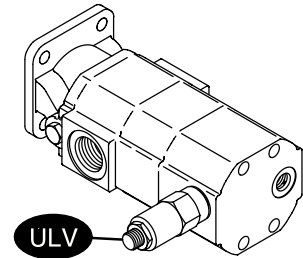


TMM

9314P

ULV
Valve

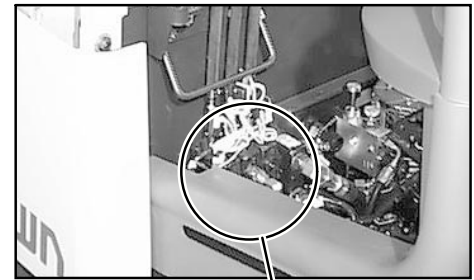
Location: steering and brake pump.
 Purpose: control pressure in the brake accumulator and limit maximum pressure in brake circuits.
 Data: not applicable.
 Adjustment: set at 7930 kPa/1150 psi.



9315

VALVE
Hydraulic Function Control

Location: left side of operator compartment.
 Purpose: manual control of hydraulic function.
 Data: not applicable.
 Adjustment: none required.

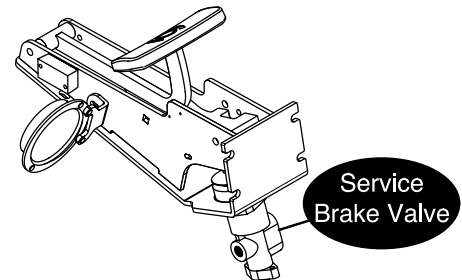


Hydraulic Function
 Control Valve

9181P

VALVE
Service Brake

Location: below brake pedal.
 Purpose: pressurize service brake system to apply service brake when brake pedal is pressed.
 Data: not applicable.
 Adjustment: none required.



9176

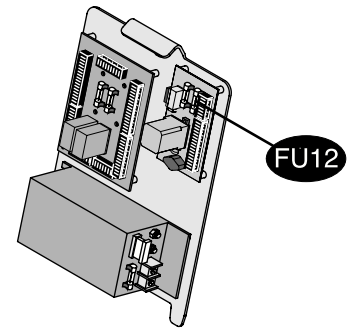
FU12
Freezer/Corrosion Fuse

Location: distribution panel.

Purpose: protect heaters and associated wiring from over current.

Data: 15A.

Adjustment: none required.



9268

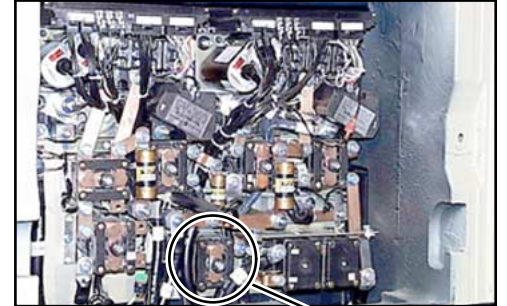
FW
Field Weakening Contactor

Location: contactor panel.

Purpose: provide traction motor with field weakening for higher top speed.

Data: positive voltage provided through KYS, battery negative controlled by MRC1.

Adjustment: none required.



9271P

Hand Pump

Location: park brake release manifold.

Purpose: manually pressurize parking brake hydraulic circuit to release parking brake.

Data: not applicable.

Adjustment: none required.

Hand Pump



9272P

HGTS1
Height Switch

Location: located on mast at staging.

Purpose: lift/tilt interlock and speed reduction above mast staging.

Data: wired normally open, closed when mast is below staging.

Adjustment: refer to section M4.0.



HGTS1

9046P

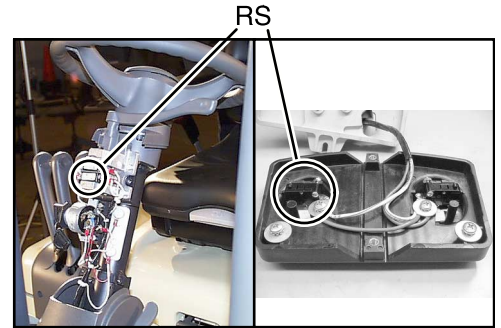
RS
Reverse Switch

Location: steering column directional control or foot operated directional control.

Purpose: for selection of reverse travel.

Data: momentary contact wired normally open, actuated when operator moves directional control to reverse travel position.

Adjustment: none required.



Steering Column Directional Control Foot Operated Directional Control

10031P

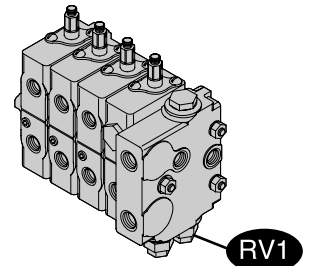
RV1
Relief Valve

Location: hydraulic function control valve.

Purpose: limit operating pressure for lift and tilt circuits.

Data: not applicable.

Adjustment: refer to section M2.



9058

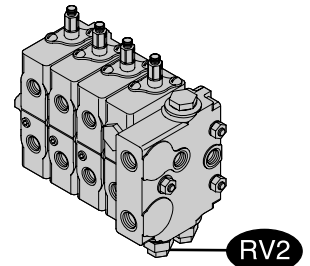
RV2
Relief Valve

Location: hydraulic function control valve.

Purpose: limit operating pressure for accessory circuits.

Data: not applicable.

Adjustment: refer to section M2.



9301

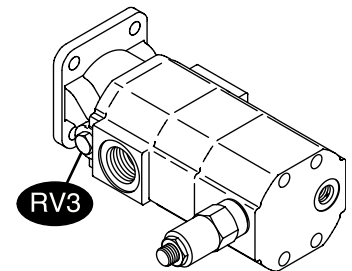
RV3
Steering Relief

Location: steering and brake pump.

Purpose: limit maximum pressure of steering hydraulic circuit.

Data: not applicable.

Adjustment: set at 9655 kPa/1400 psi.



9183

SAE Torque Values

It is important to tighten fasteners to the correct torque value. This section shows the standard torque values for the screws and bolts used in Crown lift trucks and vehicles. Special torque values in the maintenance and parts sections of this manual override the standard torque values in this section.

Grade




Grade Identification (on Head)	Specification	Bolt and Screw Size (in)
	SAE - Grade 2	1/4 through 1-1/2
	SAE - Grade 5	1/4 through 1-1/2
	SAE - Grade 8	1/4 through 1-1/2
<p>NOTE: Even though a bolt head is unmarked, Crown uses nothing less than Grade 5 in all its bolted assemblies. Instances do occur when Grade 5 bolts are manufactured unmarked. When a fastener is replaced that is unmarked, replace the fastener with a Grade 5.</p>		

Fig. 1 (14916-02)

Demand For Steer Right

Turning the steering wheel to the right moves the upper envelope of the SCU valve spool into position, allowing the hydraulic fluid that enters port P to pass through the orbitrol and exit the SCU at port R. This hydraulic fluid enters the steer actuator assembly, pushes the piston in the assembly against the rack, moving the rack, the pinion shaft, the steer wheels and the piston in the other end of the steer actuator assembly. Hydraulic fluid in that end of the steer actuator will exit the assembly, enter the SCU at port L, pass through the upper envelope of the valve spool, exit at port T and return to the reservoir through the 10 micron return line filter. Refer to Illustrations 5 and 6.

There is a check ball valve across ports P and T inside the SCU. This valve permits limited manual steering of the truck in the event the steering pump motor cannot be energized.

7579

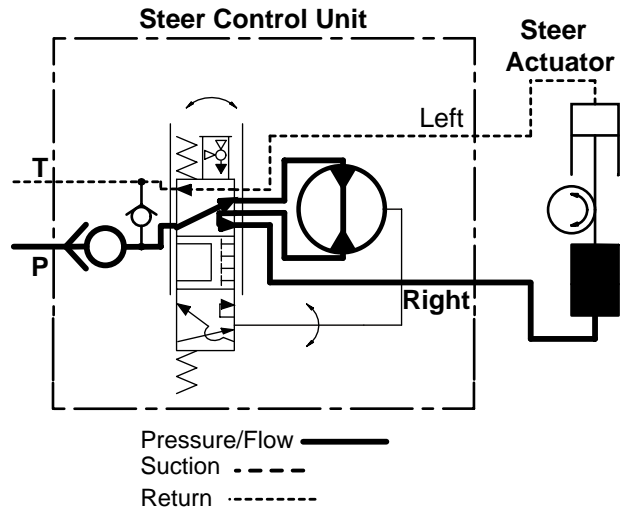


ILLUSTRATION 5

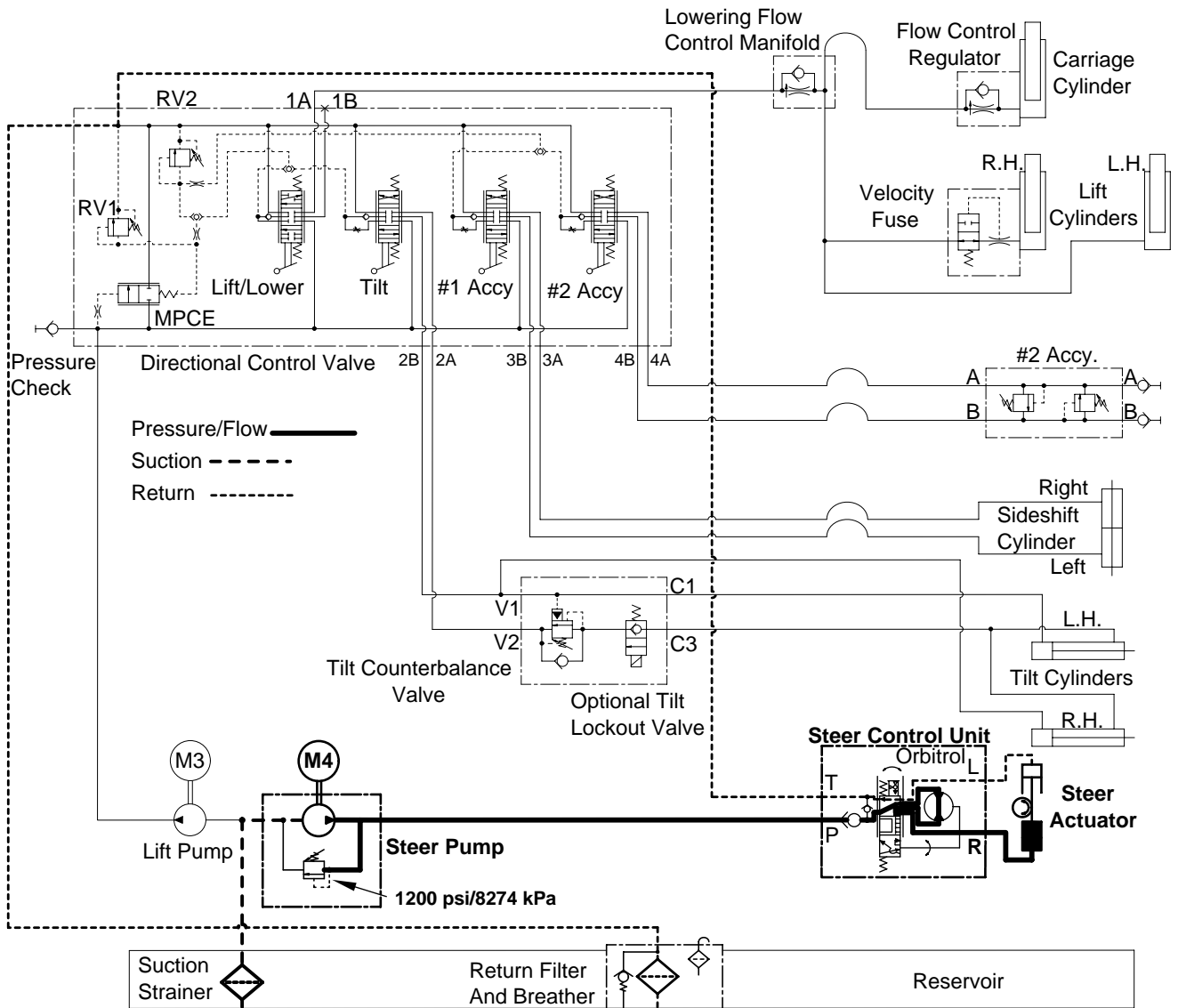


ILLUSTRATION 6

7580-01

A

B

C

1

1

2

2

3

3

4

4

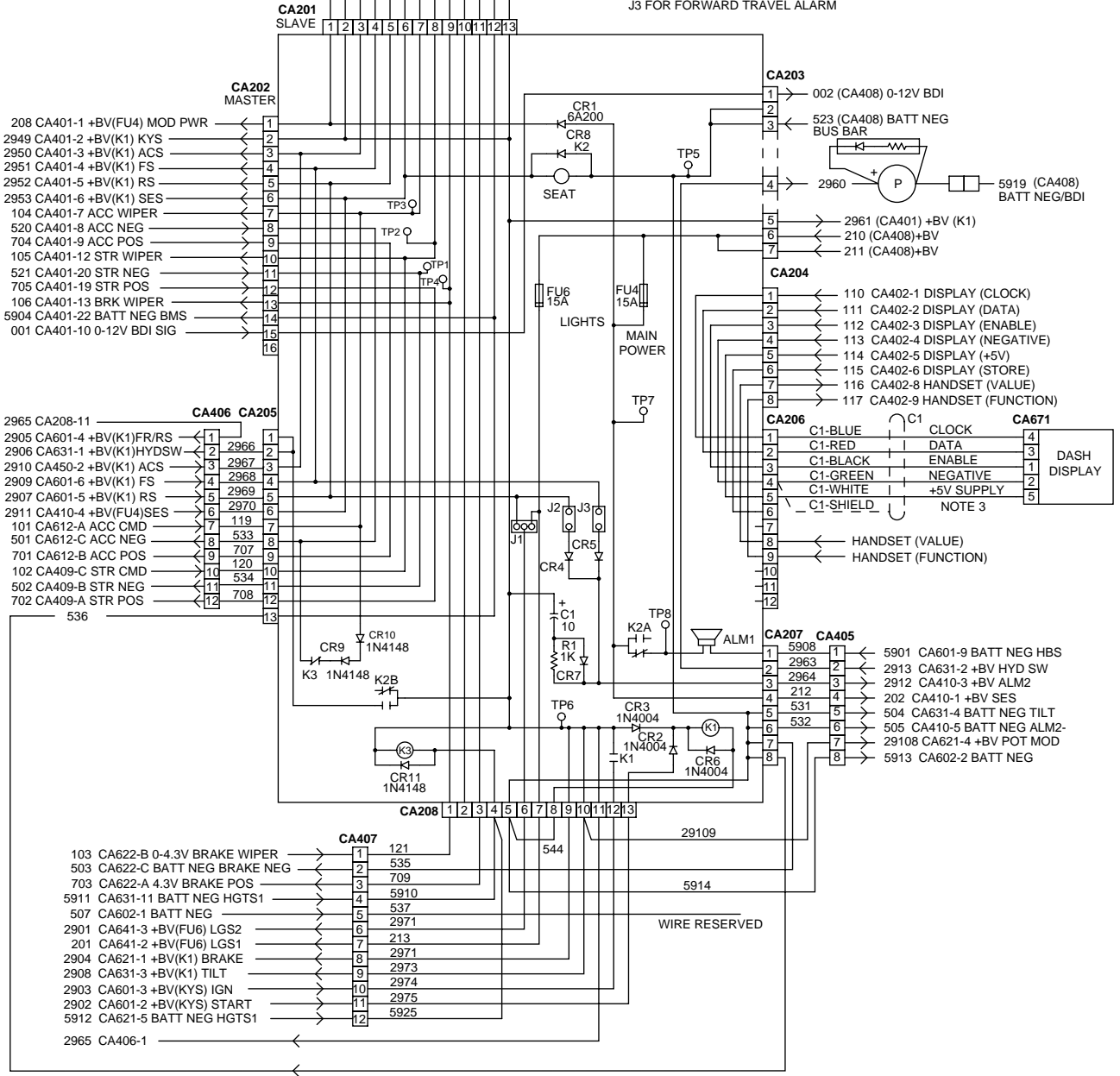
- 209 CA403-1 +BV(KU4) MOD PWR
- 2954 CA403-2 +BV(K1) KYS
- 2955 CA403-3 +BV(K1) ACS
- 2956 CA403-4 +BV(K1) FS
- 2957 CA403-5 +BV(K1) RS
- 2958 CA403-6 +BV(K1) SES
- 107 CA403-7 0-4.3V ACC WIPER
- 108 CA403-12 0-4.3V STR WIPER
- 109 CA403-13 0-4.3V BRK WIPER
- 522 CA403-8 BATT NEG BRK NEG
- 706 CA403-9 4.3V BRK POS
- 5905 CA403-22 BATT NEG BMS
- 2959 CA403-21 +BV(K1) SLAVE

- 208 CA401-1 +BV(FU4) MOD PWR
- 2949 CA401-2 +BV(K1) KYS
- 2950 CA401-3 +BV(K1) ACS
- 2951 CA401-4 +BV(K1) FS
- 2952 CA401-5 +BV(K1) RS
- 2953 CA401-6 +BV(K1) SES
- 104 CA401-7 ACC WIPER
- 520 CA401-8 ACC NEG
- 704 CA401-9 ACC POS
- 105 CA401-12 STR WIPER
- 521 CA401-20 STR NEG
- 705 CA401-19 STR POS
- 106 CA401-13 BRK WIPER
- 5904 CA401-22 BATT NEG BMS
- 001 CA401-10 0-12V BDI SIG

- 2965 CA208-11
- 2905 CA601-4 +BV(K1)FR/RS
- 2906 CA631-1 +BV(K1)HYDSW
- 2910 CA450-2 +BV(K1) ACS
- 2909 CA601-6 +BV(K1) FS
- 2907 CA601-5 +BV(K1) RS
- 2911 CA410-4 +BV(FU4)SES
- 101 CA612-A ACC CMD
- 501 CA612-C ACC NEG
- 701 CA612-B ACC POS
- 102 CA409-C STR CMD
- 502 CA409-B STR NEG
- 702 CA409-A STR POS

- 103 CA622-B 0-4.3V BRAKE WIPER
- 503 CA622-C BATT NEG BRAKE NEG
- 703 CA622-A 4.3V BRAKE POS
- 5911 CA631-11 BATT NEG HGTS1
- 507 CA602-1 BATT NEG
- 2901 CA641-3 +BV(FU6) LGS2
- 201 CA641-2 +BV(FU6) LGS1
- 2904 CA621-1 +BV(K1) BRAKE
- 2908 CA631-3 +BV(K1) TILT
- 2903 CA601-3 +BV(KYS) IGN
- 2902 CA601-2 +BV(KYS) START
- 5912 CA621-5 BATT NEG HGTS1
- 2965 CA406-1

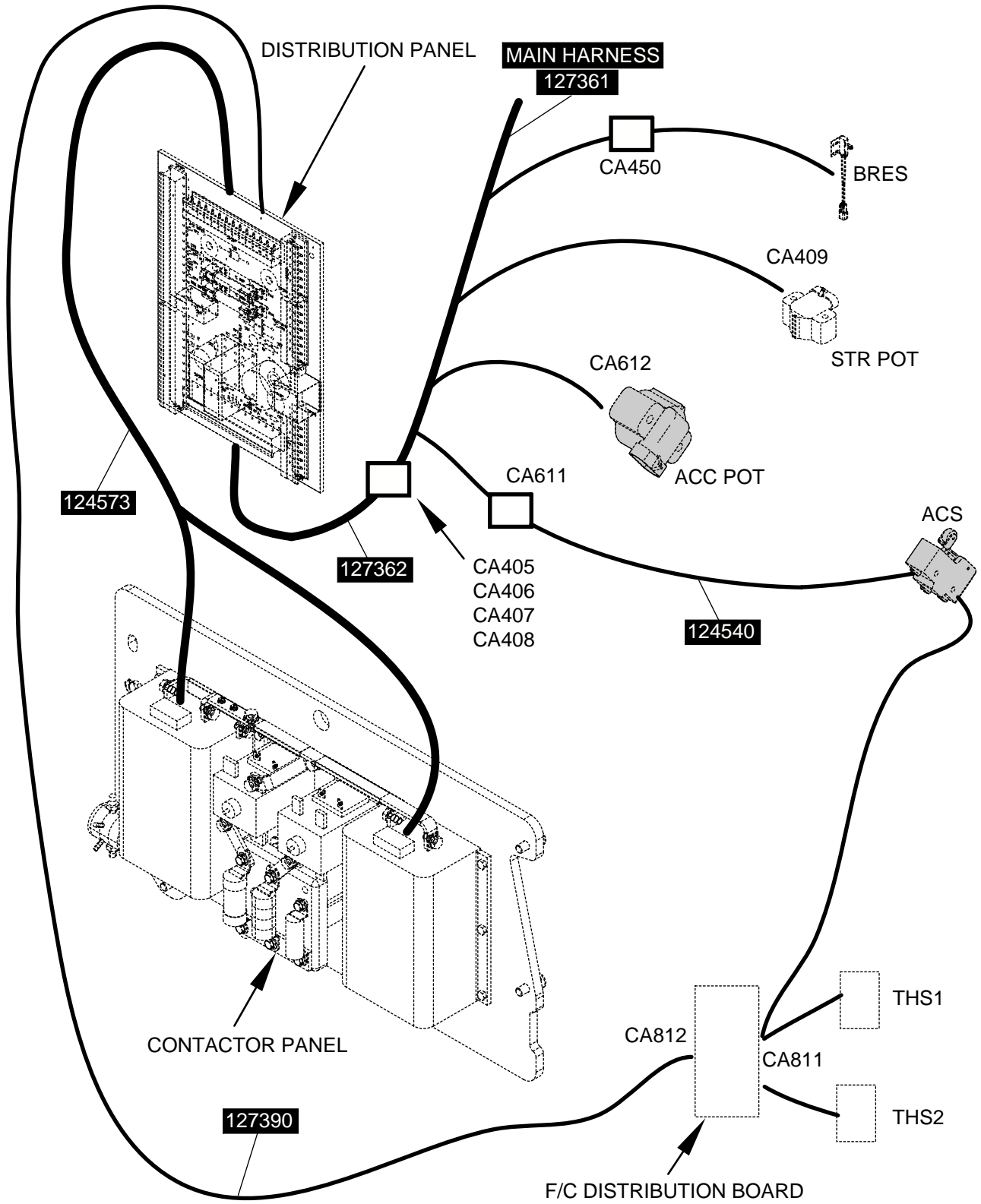
- NOTES**
- 1 WITH BDI, GREEN B- BUS WIRE AND 085653-343 WILL BE CONNECTED TO THE BDI BLOCK INSTEAD OF TO EACH OTHER
 - 2 TEST POINT DESCRIPTIONS
 TP1 = STR POT NEG
 TP2 = STR WIPER
 TP3 = ACC WIPER
 TP4 = BRK WIPER
 TP5 = B-
 TP6 = +BV(K1)
 TP7 = +BV(FU4)
 TP8 = SEAT ALARM
 - 3 GE HANDSET WILL PLUG DIRECTLY INTO CA206
 - 4 DISTRIBUTION BOARD JUMPERS
 J1 PINS 1 AND 2 FOR REAR WORKLIGHTS FROM LGS2
 J1 PINS 2 AND 3 FOR REAR WORKLIGHT IN REVERSE ONLY
 J2 FOR REVERSE TRAVEL ALARM
 J3 FOR FORWARD TRAVEL ALARM



A

B

C



Introduction to Diagram Use

Electrical schematics

Schematics are designed to provide a high-level view of the complete lift truck electrical system. They can be used to diagnose and understand the electrical path of major components in a specific circuit.

Pictorials

Pictorials are designed to provide a detailed view of the lift truck electrical system. The circuits are shown across multiple pages. Components, connectors, and wire are all part of pictorials. Each circuit always begins on the left side of the page and has its connecting page identified also.

The terminal board and connector numbers on the pictorials are in two groups: power unit and platform. The power unit terminal boards and connectors are as follows:

- 200s
- 400s
- 600s
- 800s

The platform terminal boards and connectors are as follows:

- 100s
- 300s
- 500s
- 700s
- 900s

The wires start at a specified location such as the distribution board. The connection points start from the lowest number. The next connection point from the distribution panel is with the next group of 100s and continue for each connection point away from the specified location.

The terminal board and connector numbers are in sequence on each page. A wire address with a connector number or terminal board number shows which direction to look in the electrical diagrams for the other end of the wire. When the wire goes to a component and not a terminal board or connector, the pictorial shows a terminal board to refer to. This terminal board is not a solid line and has the terminal board number in parentheses. This terminal board is not on the lift truck.

Each page includes a section of the lift truck. When a feature on the lift truck is not standard, a new page includes the standard and feature wires. Only one page

of the lift truck section is necessary for the applicable lift truck setup.

The page titles show the section of the lift truck wires on each page.

Components

Components such as solenoids, valves, encodes, or switches in schematics and pictorials are identified by symbols and reference designators. See the Electrical System section for more information. Reference designators are a short form of the component name.

Connectors

A connector can be a single connection, a plug indicated by PC, a jack indicated by JC. A combination of a plug and a jack together are indicated by CA in the diagrams. Connectors that have multiple connections are indicated by pin numbers. For example, PC120-2 indicates that the -2 is the pin number in connector PC120.

Wiring

Wiring identifies the conductor connecting the components. Standard circuits are indicated by a solid line representing the wire. Optional features are indicated by dashed lines representing the wire. Each wire has a color, number, and arrow associated with it. Wires identified by color are from a different manufacturer.

The wire arrows indicate whether the component is receiving or sending the signal. This helps identify the source of the signal or voltage.

Sideshift - Left Circuit

The number of accessories will vary from truck to truck, depending upon application. An accessory commonly found on lift trucks is sideshift function.

Sideshift left is accomplished when the operator pushes the sideshift control lever forward. This action moves the sideshift spool valve into position for sideshift lift and closes the sideshift switch (AXS1). The same contactor (P), pump and motor (M3) that is used for lift and tilt functions also supplies hydraulic fluid flow for sideshift. Hydraulic fluid enters the directional con-

trol valve, passes across the sideshift spool valve, through a flow control screw. A check valve, back across the sideshift spool valve and exits the directional control valve at port 3B. This hydraulic fluid flow is routed to the right side of the sideshift cylinder, causing it to shift to the left. Hydraulic fluid from the left side of the cylinder will enter the directional control valve at port 3A, pass across the sideshift spool valve, exit the valve and return to the reservoir through the 10 micron filter. RV2, is set to 3100 psi (21373 kPa) to protect the accessory circuits from over pressurization. Refer to Figure 7575-03.

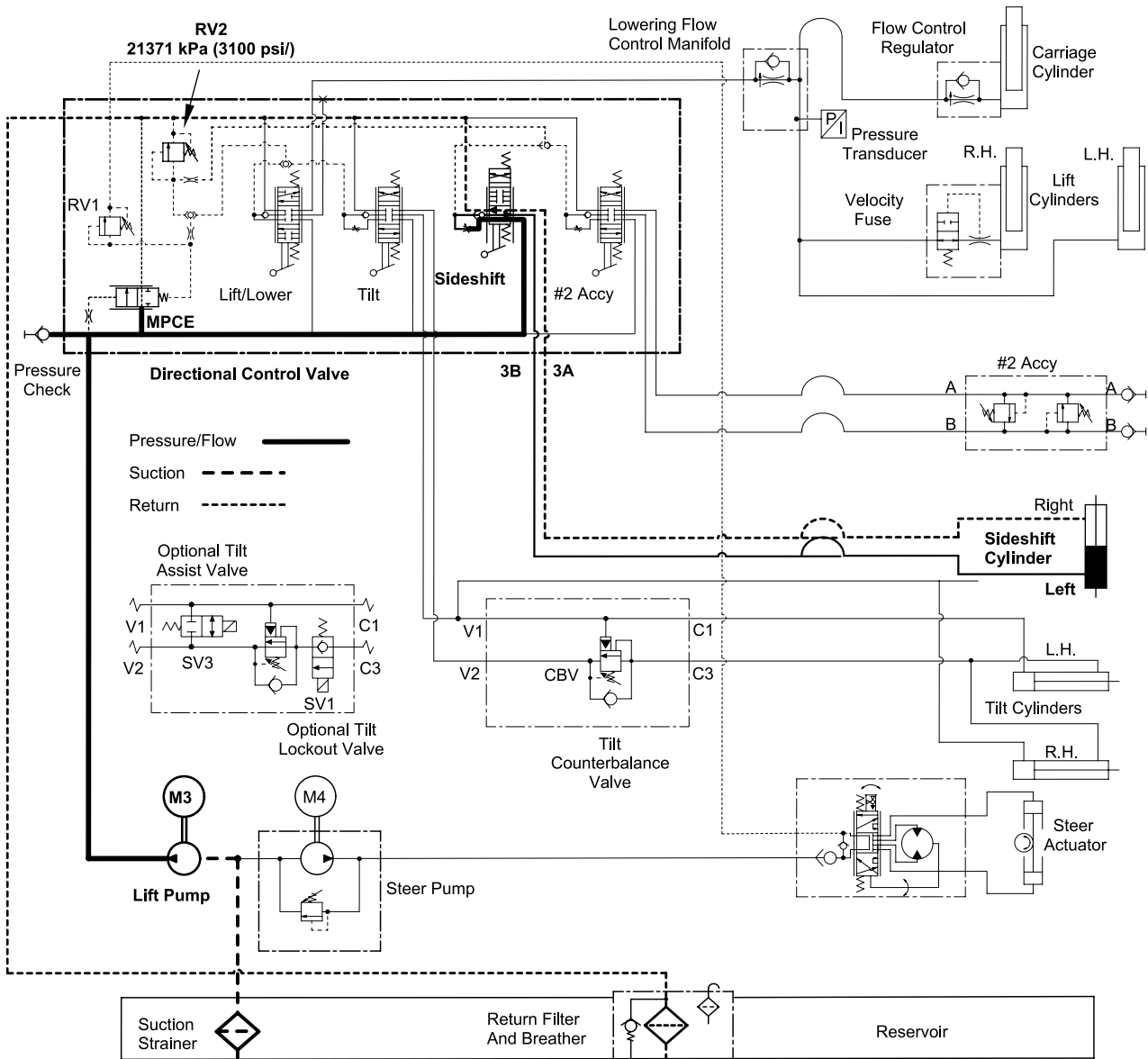


Figure 7575-03

To turn the truck left, the operator turns the steering wheel to the left. This action moves the lower envelope of the valve spool inside the steer orbitrol into position, routing hydraulic oil that enters port P through the orbitrol, out port L and into the steer cylinder causing the cylinder rod & piston assembly to shift turning the steer wheels. As the cylinder rod & piston shifts, oil is forced out of the other end of the cylinder. This hydraulic oil enters the steer orbitrol at port R, passes through the lower envelope of the valve spool, exits the steer orbitrol at port T and returns to the reservoir through the return line filter. Refer to Illustrations 3 & 4.

There is a check ball valve across ports P and T inside the steer orbitrol. This valve permits limited manual steering of the truck in the event the steering pump motor cannot be energized.

9139

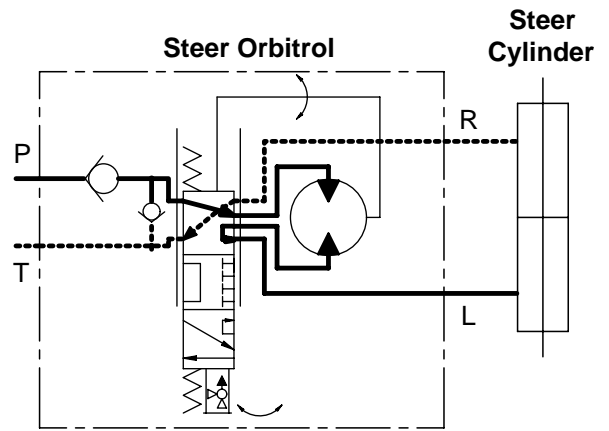


ILLUSTRATION 3

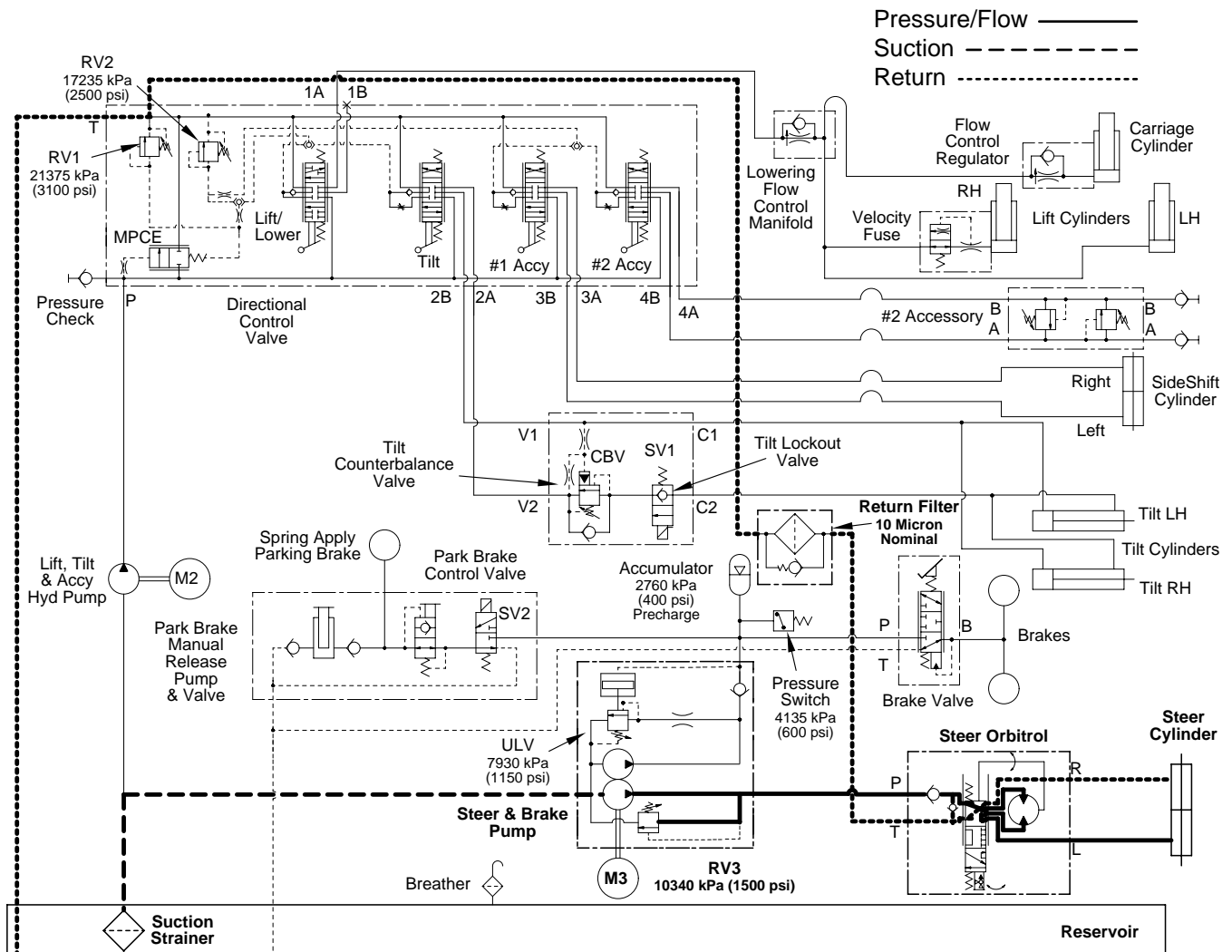


ILLUSTRATION 4

9138-02

The following information contains brief descriptions of the hydraulic circuits for the various hydraulic functions. Illustration 1 is a reference schematic for these descriptions and may vary for that which is applicable to your truck. Refer to the hydraulic schematic in the HYD section of this manual for the schematic of your unit.

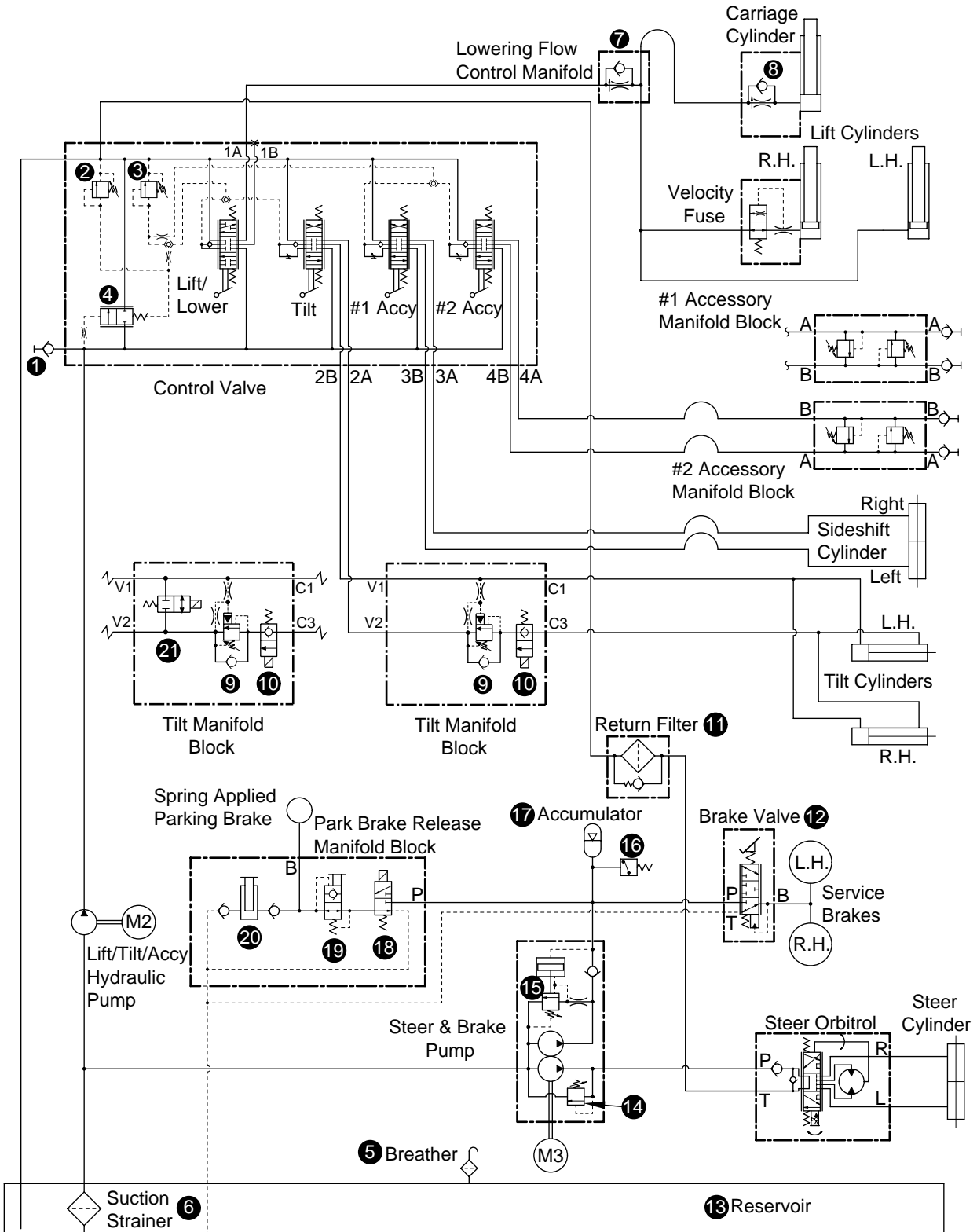
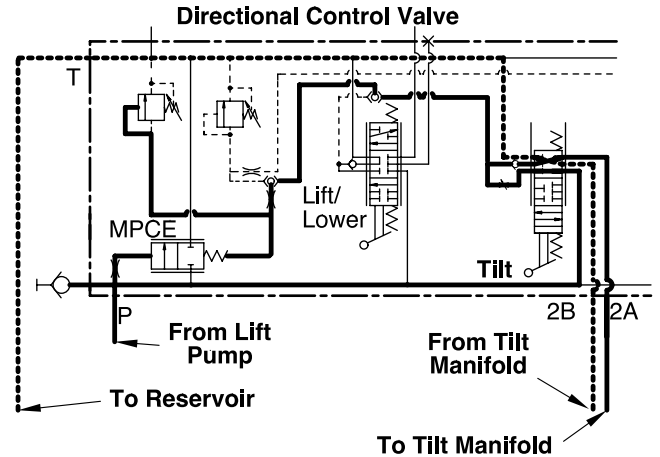


ILLUSTRATION 1

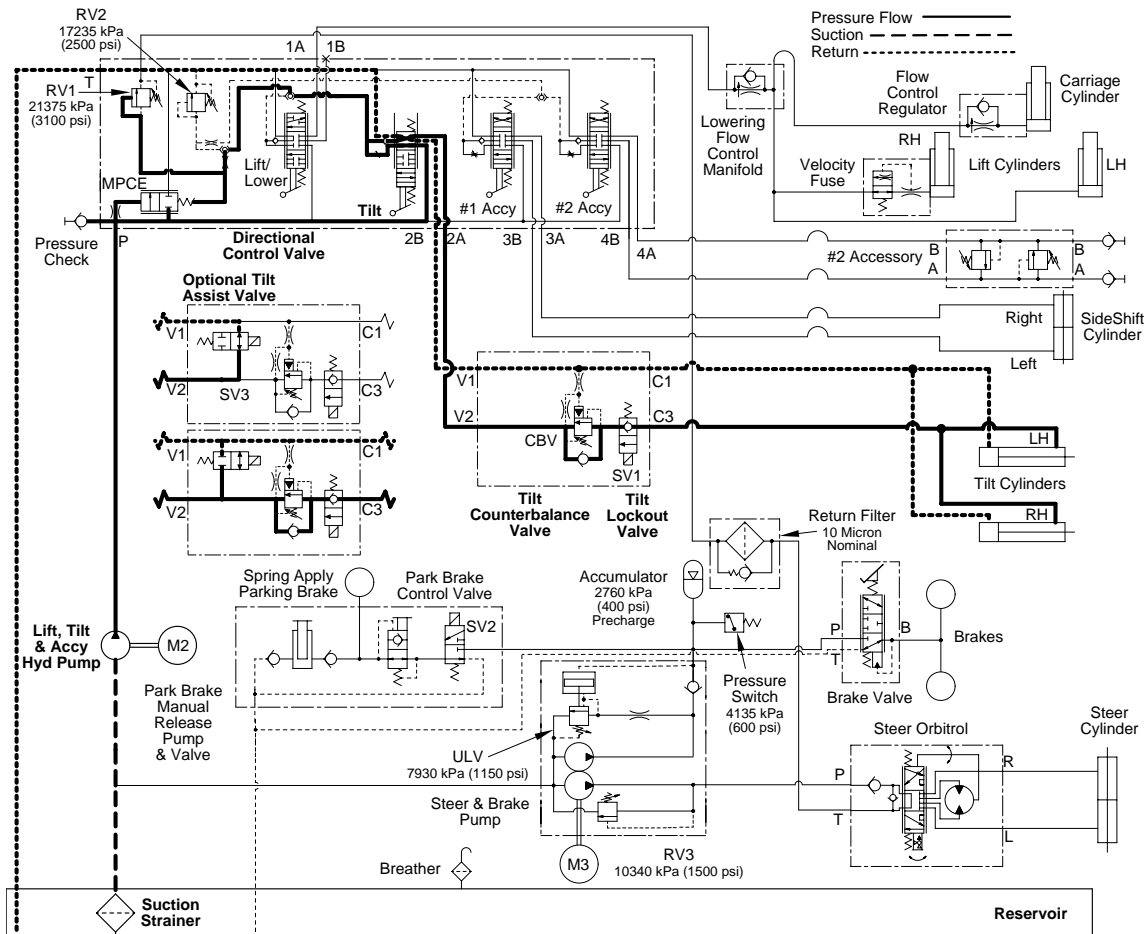
Tilt back is accomplished when the operator pulls back on the tilt control handle. This action moves the tilt spool into position for tilt back and closes the tilt back switch (TBS) and tilt switch (TLT). The tilt switch will energize the same pump contactor (P1) and motor (M2) as was used for the lift circuit. Hydraulic oil will be pulled from the reservoir by the pump and routed to the pressure check port, MPCE and the tilt spool valve. Hydraulic oil passes across the tilt spool valve, through a flow control screw, a check valve, back across the tilt spool valve and exits the directional control valve at port 2A. This hydraulic oil will enter the tilt counterbalance manifold at port V2, pass through the check portion of the valve, exit the manifold at port C2 and be routed to the front of the tilt cylinders. MPCE will again be acted on by both inlet and work port pressure to insure constant oil flow, and RV1 will limit circuit pressure to 21375 kPa (3100 psi). Return hydraulic oil will be pushed out of the rear of the cylinders entering port C1 of the tilt CBV manifold. Hydraulic oil will enter the directional control valve at port 2B, pass across the tilt spool, exit the

directional control valve and enter the reservoir. When Tilt Position Assist Option is ON and forks reach the level position, the VTS switch on the tilt cylinder activates the Tilt Assist Valve and hydraulic fluid passes through the valve and back to the reservoir. Forks will stay in the level position until the Tilt Position Assist Option is turned OFF. Refer to Illustrations 15 and 16.



9171-01

ILLUSTRATION 15



9165-03

ILLUSTRATION 16

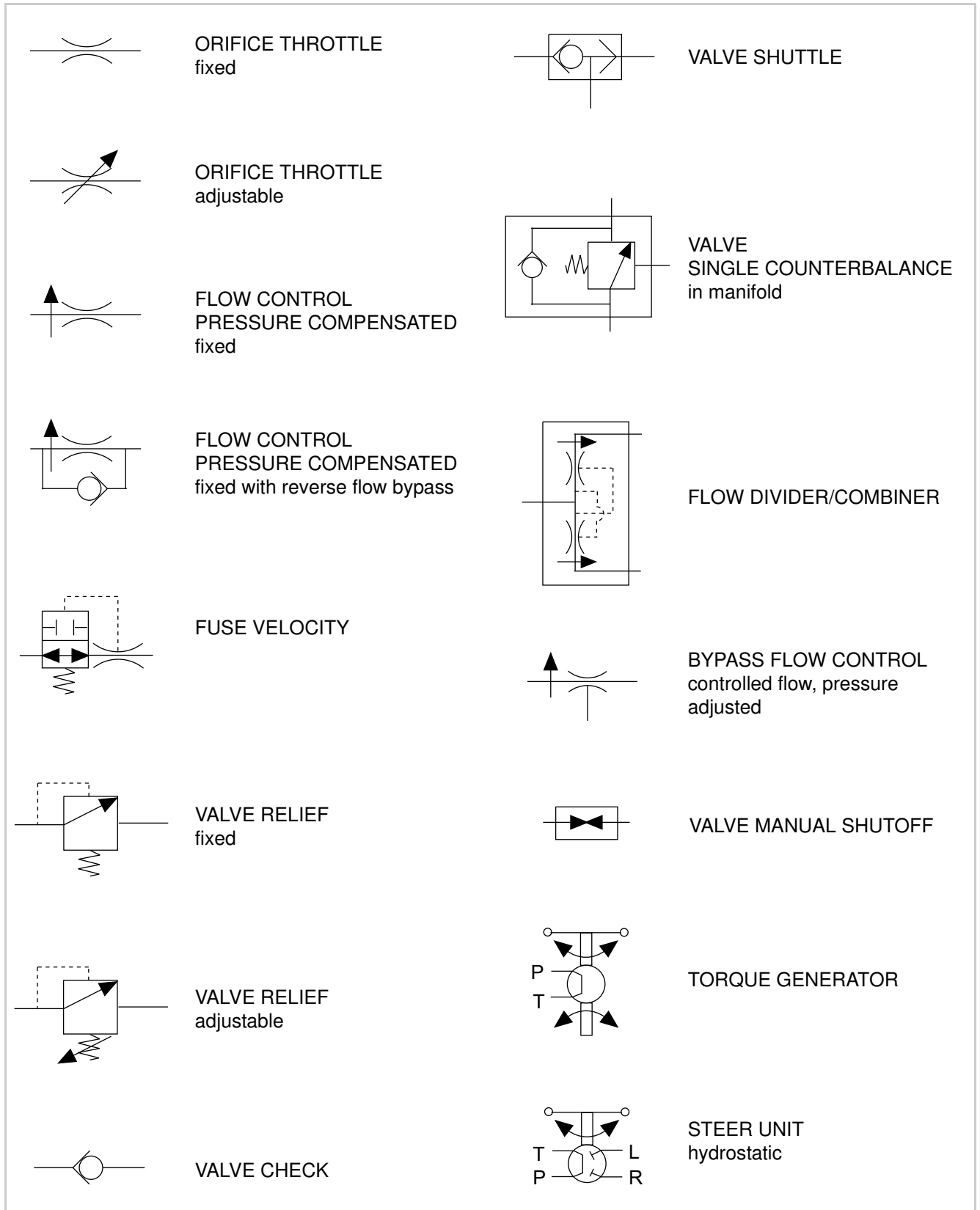


Fig. 3 (3561-05)

Notes:

Control Valve Cause & Solution Chart		
Sympton	Probable Cause	Possible Solution
Load will not hold	Cylinder leaking or worn	Check cylinders
	Oil by-passing valve spool	Replace valve or section
	Port relief valve noy holding	Remove and clean
Load lowers when spool is moved from neutral	Dirt in check valve	Disassemble and clean
	Scored check valve, poppet or seat	Replace poppet or lap poppet to seat
Poor hydraulic system	Defective pump	Check pressure or replace
	Dirt in relief valve, RV1 or RV2	Disassemble and clean
	Relief valve defective	Replace valve
	Worn cylinders	Repair or replace
	Load to heavy	Check line pressure
	Internal valve crack	Replace valve or section
	Spool not at full stroke	Check movement and linkage
	Reservoir low on oil	Add oil
	System filter clogged	Clean or replace filter
Lines restricted	Check lines	

Drive Tire Replacement

When replacing drive tire, make sure composition and size are such that maneuverability and braking requirements are maintained. Drive tire is a "press-on" type; press old tire off hub and press new tire on. It is recommended that both drive tires be replaced at the same time to maintain equal tire circumference.

1. Disconnect battery and chock wheels.
2. Raise and block power unit so drive tire is off floor. Loosen and remove five lug nuts and remove wheel and hub from drive unit.
3. Remove old drive tire and replace with new drive tire. Outside of hub must be pressed flush with outside edge of tire.
4. Mount wheel and hub onto drive unit axle and secure with five lug nuts. Apply thread locking adhesive (Crown no. 061004-019) to threads and anti-seize to ramp part of wheel nut.
5. Tighten lug nuts in increments of 49 Nm (36 ft lb), 98 Nm (72 ft lb), and 135 - 146 Nm (100 - 108 ft lb). Refer to Figure 17065 for torque sequence.

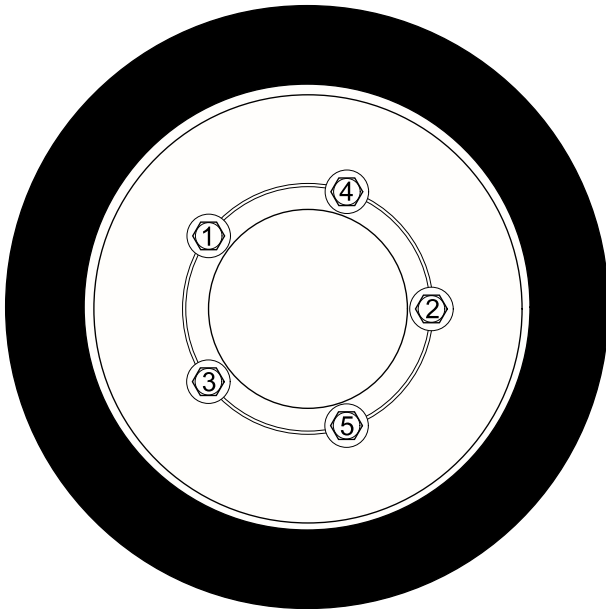
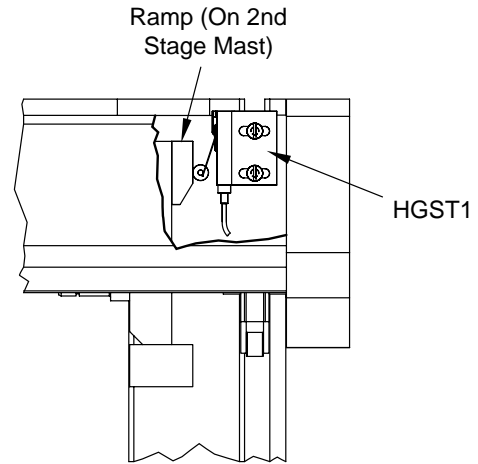


Figure 17065

6. Remove blocks, lower power unit, connect battery and remove wheel chocks.

**HGST1
Height Switch**

1. Loosen switch mounting screws.
2. Adjust switch so ramp on 2nd stage mast actuates switch when mast begins to stage and resets at free lift.
3. Tighten switch mounting screws.

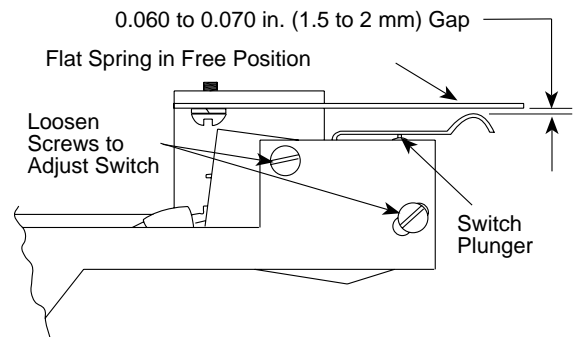


7739

ILLUSTRATION 15

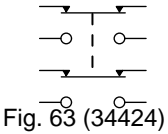
**SES1, SES2
Seat Switches**

1. Loosen switch mounting screws.
2. Adjust switch so 0.060 to 0.070 in. (1.5 to 2 mm) gap is obtained between flat spring and switch actuating arm with the actuating arm resting on switch plunger.
3. Tighten switch mounting screws.



7736

ILLUSTRATION 16

Switch Symbols						
Actuation	Description	No. of Terminals	Momentary		Fully Maintained	
	DPDT	8		 <p>Fig. 63 (34424)</p>		

WIRING COLOR CODES

The following information is an explanation of terms and symbols which are being standardized on Crown wiring diagrams.

The leads used are limited to the following colors. The color of the wire is based on the function of the circuit in which it is used. Each wire is assigned a three or four digit number. The first one or two numbers identify the color of the lead. The last two numerals number the lead from one thru ninety-nine. (See chart below) Exceptions to this can be leads supplied by vendors with components. The color of each function shall be shown on the schematic. Each wire shall be identified by a number on the wiring pictorial.

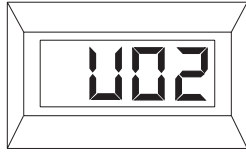
ABBR.	COLOR	NUMBER	FUNCTION	FUNCTION
BLK	Black	0 **	†Reverse	‡Traction Inputs/Outputs
BRN	Brown	1 **	†Potentiometer or 2nd Speed	‡Analog Inputs
RED	Red	2 **	†Positive	‡Battery Positive
ORG	Orange	3 **	†Hydraulic Solenoid Valves	‡Non-Battery Positive
YEL	Yellow	4 **	†Forward	‡Status Inputs/Outputs
GRE	Green	5 **	†Negative	‡Battery Negative
BLU	Blue	6 **	†Bypass or 3rd Speed	‡Isolated Negative
VIO	Violet	7 **	†Hydraulic Pump Motor	‡Load Position Inputs/Outputs
GRAY	Gray	8 **	†Horn	‡Indicators and Warning Devices
WHT	White	9 **	†Miscellaneous	‡Miscellaneous
R/W	Red Stripe/White	29 **	†Positive that has gone thru a switch	‡Positive that has gone thru a switch
G/W	Green Stripe/White	59 **	†Negative that has gone thru a switch	‡Negative that has gone thru a switch or resistor

** - 01 thru 99

†Trucks Prior to 1988

‡Trucks 1988 to Present

Press the number key 2 on the handset keypad to select function 2. The handset will display U 02 as shown for a brief moment to acknowledge which key has been pressed. Refer to Illustration 5.



3416

ILLUSTRATION 5

Next the display will switch to the actual setting for function 2. Refer to Illustration 6



3414

ILLUSTRATION 6

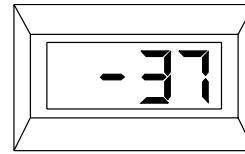
NOTE

If you do not wish to change the setting, depress the ESC key in the lower right corner of the keypad to exit the setting mode.

Refer to the Charts on following pages. If the value displayed on the handset is not as shown in the chart, press the CONT key. This will cause the setting number to change value (number will change to adjustment knob position) and begin to flash. Turn the adjustment knob on the handset to obtain the setting listed. When the proper reading is obtained, press the CONT or STORE key. This saves the reading in the control card memory. Depress the ESC key located at the lower right corner of the key pad to exit this setting. The handset should return to the neutral mode displaying all 8's. If the 8's are not displayed depress the continue key to return to the neutral mode. Make adjustments as necessary to the remaining functions in the same manner as described.

To access function settings greater than 15, depress the CONT key simultaneously with a number key, starting with 1 for function 16, 2 for function 17, etc.

When all settings are completed, exit the setting mode by pressing the ESC key twice. The display will show a -37. This indicates that the adjustments were stored. Refer to Illustration 7.



7743-01

ILLUSTRATION 7

The handset is now ready to be disconnected.



WARNING

Before connecting or disconnecting the handset, lift the drive wheels clear of floor and place hardwood blocks under truck frame. Turn keyswitch "OFF" and disconnect battery.

After tune up procedures are complete, turn keyswitch to "OFF" and disconnect the battery. Unplug handset and connect plug removed to connect handset.

Replacement Of Both Controllers

When both controllers are replaced, the slave controller must be assigned as the "slave". Use the following steps to assign the slave controller:

- Remove RS232 cable from "Y" plug on controller and connect GE handset to Slave Controller (CA404).
- Turn key to start position while holding down CONT on handset. All 8's should be displayed.
- With seat switch open, press CONT and 2 simultaneously. Code 53 should be displayed.
- Press CONT and a value will be flashing.
- Adjust POT on handset to 116 and press SAVE.
- Press ESC until all 8's go away.
- Turn key switch "OFF" and disconnect battery for approximately 10 seconds.

No Seat Switch Input to control.**-01**

This code indicates voltage at CA401-6 on master controller and CA403-6 on slave controller is less than 18 volts.

Step 1: Check for 36 volts at CA202-6 on the distribution panel with seat switches SES1 and SES2 closed.

If: 36 volts. Correct functional reading. Proceed to step 2.

If: less than 18 volts. Low voltage at distribution panel output. Check for 36 volts at CA205-6 on the distribution panel with switches SES1 and SES2 closed.

If: 36 volts. Correct functional reading. Make sure terminations are in good condition and recheck voltage at CA202-6. If still less than 18 volts, replace distribution board.

If: less than 18 volts. Check for voltage loss between CA205-6 and battery positive.

Step 2: Check for 36 volts at master controller CA401-6 with switches SES1 and SES2 closed.

If: 36 volts. Correct functional reading. Make sure terminations are in good condition. Proceed to step 3.

If: less than 18 volts. Check for voltage loss between distribution board CA202-6 and CA401-6 on master controller.

Step 3: Check for 36 volts at CA201-6 on the distribution panel with switches SES1 and SES2 closed.

If: 36 volts. Correct functional reading. Proceed to step 4.

If: less than 18 volts. Low voltage at distribution panel output. Check for loose connection or wiring at CA201-6 and recheck voltage. If still less than 18 volts, replace distribution panel.

Step 4: Check for 36 volts at slave controller CA403-6 with switches SES1 and SES2 closed.

If: 36 volts. Correct functional reading. Replace appropriate controller. See note.

If: less than 18 volts. Check for voltage loss between distribution panel CA201-6 and CA403-6 on slave controller.

Note: *Once making sure 36 volts is present at CA401-6 on master controller and CA403-6 on slave controller, switches SES1 and SES2 are closed with truck powered up and event code -01 is still displayed, then and only then, replace the appropriate controller. To determine the appropriate controller, install a new controller in the master controller position, set function code 17 to 53 and start truck. If code still exists, install new controller in the slave controller position and set function code 17 to 116 and start truck. Adjust all function codes as necessary.*

-201 Event Code indicates seat switch input is at CA401-6 on master controller but missing at CA403-6 on slave controller.

-301 Event Code indicates seat switch input is at CA403-6 on slave controller but missing at CA401-6 on master controller.

CONTINUED ON NEXT PAGE

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- Step 2:** Check for 36 volts at CA401-3 on master controller and CA403-3 on slave controller with truck powered up and accelerator depressed.
- If: 36 volts.**
Then proceed to step 4.
- If: less than 18 volts.**
Then locate and repair loose connection or wiring between CA202-3 on the distribution panel CA401-3 on slave controller or between CA201-3 on the distribution panel and CA403-3 on slave controller.
- Step 3:** Check for 36 volts at CA208-9 on the distribution panel.
- If: 36 volts.**
Then locate and repair loose connection or wiring between CA208-9 and CA205-3.
- If: less than 18 volts and truck is powered up.**
Then locate and repair loose connection or wiring between TP6 and battery positive.
- Step 4:** Check for battery negative at CA208-4.
- If: battery negative.**
Then replace distribution panel.
- If: no battery negative.**
Then adjust height switch HGTS1 as necessary.
Then locate and repair loose connection or wiring between battery negative and switch HGTS1 or between switch HGTS1 and CA208-4.
- Step 5:** Check ACC POT wiper input as described in step 1 at CA401-7 on master controller and at CA403-7 on slave controller.
- If: voltages as described.**
Then check mounting and calibration of ACC POT. Refer to section M4.3 of the service manual for calibration instructions.
Then proceed to step 6.
- If: voltages not as described.**
Then locate and repair loose connection or wiring between CA201-7 and CA202-7 on distribution panel and CA401-7 and CA403-7 as necessary.

CONTINUED ON NEXT PAGE

Steer Angle Potentiometer (STR POT) input above 4 Volts.**-10**

This code indicates voltage at CA401-12 on master controller (MRC1) and CA403-12 on slave controller (MRC2) is greater than 4.0 volts.

Step 1: Verify steer angle potentiometer STR POT input at TP2 on the distribution panel. With truck powered up, the STR POT input should be approximately 0.5 – 1.0 volts with steering at left lock and increase to approximately 3.5 – 4.0 volts with steering at right lock. Voltage with steering centered should be 2.0 – 2.5 volts.

If: voltages as described.

Then proceed to step 2.

If: voltages not as described.

Then proceed to step 3.

Step 2: Check STR POT wiper input as described in step 1 at CA401-12 on master controller and at CA403-12 on slave controller.

If: voltages as described.

Then check mounting and calibration of STR POT. Refer to section M4.3 of the service manual for calibration instructions.

Then proceed to step 3.

If: voltages not as described.

Then locate and repair loose connection or wiring between CA201-8 and CA202-10 on distribution panel and CA401-12 and CA403-12 as necessary.

Then replace distribution panel.

Step 3: Check voltage with voltmeter positive probe at CA401-19 on master controller with STR POT unplugged from main wire harness at CA409.

If: 4.3 volts. 3 2

Then replace appropriate controller. See note.

If: greater than 4.3 volts.

Then locate and repair loose connection or wiring between CA401-19 and STR POT.

Then check mounting and calibration of STR POT. Refer to section M4.3 of the service manual for calibration instructions.

Then replace STR POT. Refer to section M4.3 of the service manual for replacement and calibration instructions.

Then replace master controller. See note.

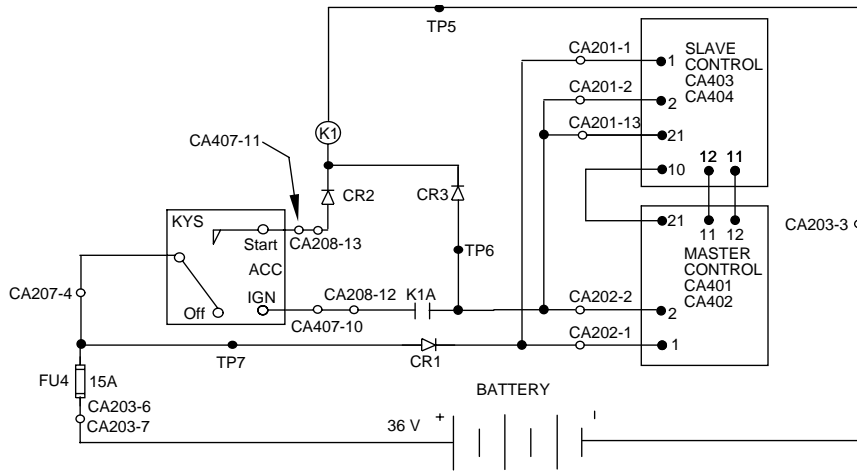
If: less than 0.3 volts.

Then check all wiring between CA401 and STR POT for loose or open connections.

Then check mounting and calibration of STR POT. Refer to section M4.3 of the service manual for calibration instructions.

Then replace master controller. See note.

CONTINUED ON NEXT PAGE



7598

Motor field current is high in FET forward path.

-24

This code indicates traction motor (M1 & M2) field current is too high at traction motor start up.

This code as well as code -23 does not refer to truck travel direction. Reverse and forward description refers to internal controller FET directional switching.

Step 1: Check M1 and M2 for open circuits between A1 and A2 terminals as well as F1 and F2 terminals.

If: open circuit.

Then replace motor

If: no open circuit.

Then check M1 and M2 for short circuits between A1, A2 terminals and motor frame as well as F1, F2 terminals and motor frame.

If: short circuit.

Then replace motor

If: no short circuit.

Then proceed to step 2.

Step 2: Check voltage applied across the A1 and A2 terminals of M1 and M2 while attempting traction.

If: voltage present.

Then armature circuit is open. Replace motor.

If: no voltage present.

Then check voltage applied across the F1 and F2 terminals of M1 and M2 while attempting traction.

If: voltage present.

Then field circuit is open. Replace motor.

If: no voltage present

Then replace master controller for faulty M1 motor circuit or slave controller for faulty M2 motor circuit. See note.

Note: *If there is no voltage output to M1 or M2 from the appropriate controller (master or slave controller) and all appropriate traction command inputs exist and event code -24 still exists, then and only then, replace the appropriate controller. Adjust all function codes as necessary.*

CONTINUED ON NEXT PAGE

Master Controller (MRC1) and/or Slave Controller (MRC2)
has timed out after not receiving any data.

-33

This code indicates master controller (MRC1) and/or slave controller (MRC2) has not received the first byte of expected data.

A 30 series event code indicates miscommunication between master controller and slave controller. Proper connection between CA402 on master controller and CA404 on slave controller must be established to allow data transfer. The two wires connected between CA402-11 and CA402-12 on master controller and CA404-11 and CA404-12 on slave controller should be a twisted pair. Always verify these connections are secure, free from corrosion and twisted before beginning the troubleshooting steps.

Step 1: Check for loose or corroded connections and open wires between CA402 on master controller and CA404 on slave controller.

If: connections and wiring okay.

Then proceed to step 2.

If: connections or wiring not okay.

Then repair as necessary.

Step 2: Check for 12 volts at CA401-21 on master controller.

If: 12 volts.

Then proceed to step 3.

If: less than 12 volts.

Then check for 12 volts at CA403-10 on slave controller.

If: 12 volts.

Then locate and repair loose connection or wiring between CA403-10 and CA401-21.

If: less than 12 volts.

Then proceed to step 3.

Step 3: Check for 36 volts at CA403-1, CA403-2 and CA403-21 on slave controller.

If: 36 volts.

Then proceed to step 4.

If: less than 18 volts.

Then locate and repair loose connection or wiring between CA403 on slave controller and battery positive.

Step 4: Replace appropriate controller. See note.

CONTINUED ON NEXT PAGE

Controller in thermal cutback.

-41

This code will be logged in master controller (MRC1) when master controller experienced thermal cutback and logged in slave controller (MRC2) when slave controller experienced thermal cutback.

This code will only be seen if the handset is plugged directly into CA402 on master controller or CA404 on slave controller.

Step 1: Verify truck use or application was not cause of event code.

If: application okay.

Then proceed to step 2.

If: application cause of event code.

Then operate truck within design intent.

Step 2: Allow controllers to cool then resume operation. Verify side panel vents are free from obstruction.

If: code still exists.

Then replace appropriate controller. See note.

If: code clears.

Then maintain truck operation within design intent.

Note: *If truck operation or application is not cause of event code and controllers are within temperature range but event code -41 still exists, then and only then, replace the appropriate controller. The appropriate controller is the same controller the handset is currently connected to (i.e. If the handset is plugged into CA402 on master controller then master controller should be replaced). Adjust all function codes as necessary.*

Current sensor voltage is too low during truck operation.

-57

This code indicates voltage at the internal controller current sensor is too low while truck is in operation.

Step 1: Check for battery voltage at the interconnecting bus bars located at the top of master controller and slave controller while attempting truck operation.

If: battery voltage during operation.

Then proceed to step 2.

If: battery voltage drops during operation.

Then repair power connections between bus bars and battery positive as necessary.

Step 2: Check all motor cable connections at master controller, slave controller, M1, and M2.

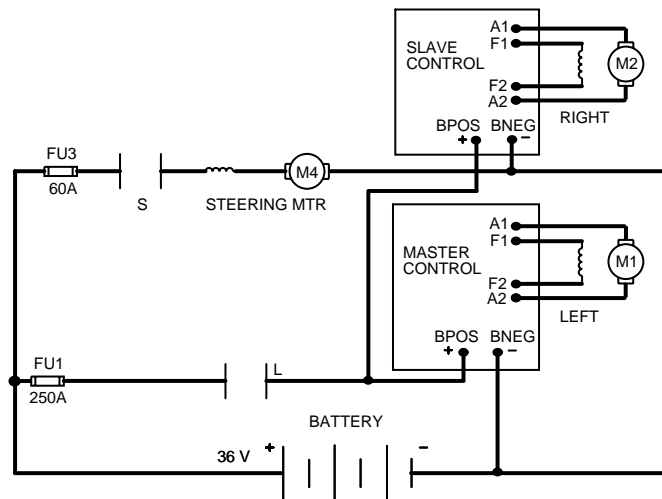
If: connections okay.

Then replace appropriate controller. See note.

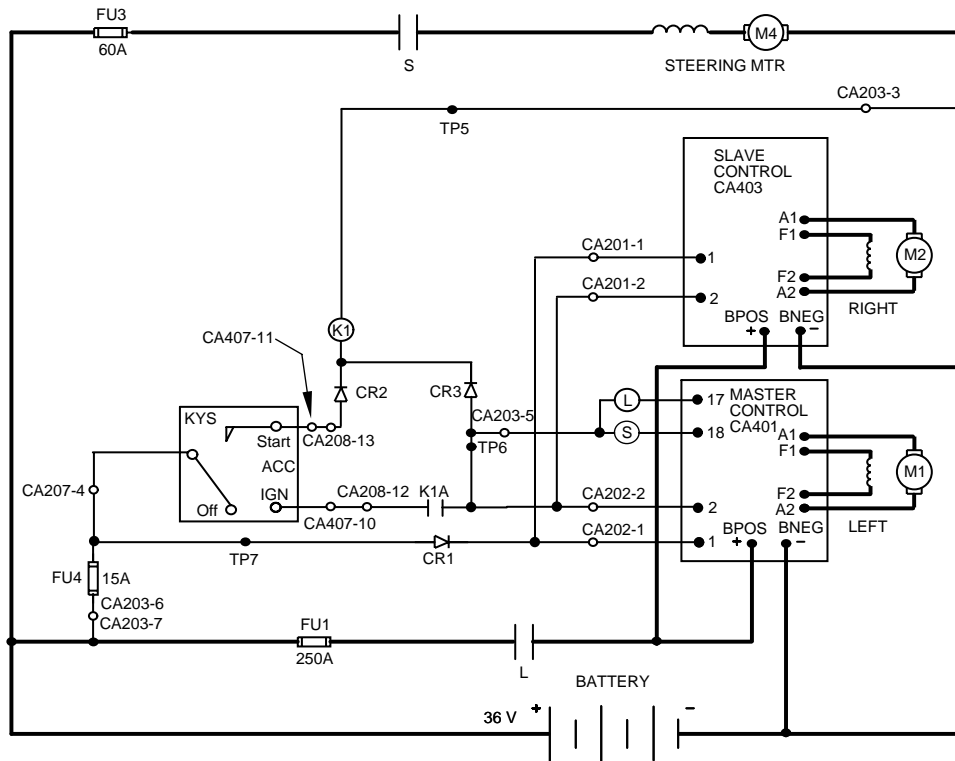
If: connections not okay.

Then repair as necessary.

Note: This event code indicates an internal condition if all bus and cable connections are serviceable. RS232 communication between master controller and slave controller must be disabled to determine the appropriate controller. Refer to the steps located at the beginning of this event code section to disable RS232 communication. Replace only the controller with an event code -57 stored. Adjust all function codes as necessary.



7606



7596

Potentiometer values are out of range.

–86

This code indicates at that least one potentiometer is out of range during the auto calibration routine.

Step 1: Verify ACC POT input at TP3 on the distribution panel. With truck powered up and mast collapsed, ACC POT input should be near zero volts with accelerator pedal released and increase toward 4.5 volts as accelerator pedal is depressed.

If: voltage is limited to 1.2 volts.

Then check for battery negative at CA208-4.

If: battery negative.

Then replace distribution panel.

If: no battery negative.

Then check for battery negative at CA207-5.

If: battery negative.

Then adjust switch HGTS1 as necessary. HGTS1 must be closed to calibrate.

Then locate and repair loose connection or wiring between battery negative and HGTS1 or between HGTS1 and CA208-4.

If: no battery negative.

Then verify voltmeter operation. Battery negative must exist at CA207-5 for truck to power up. Repeat step 1.

If: voltages as described.

Then proceed to step 2.

If: voltages not as described.

Then check for 5 volts with voltmeter negative probe at CA401-8 and positive probe at CA401-9 on master controller.

If: 5 volts.

Then locate and repair loose connection or wiring between CA401-8, CA401-9 and ACC POT.

Then check mounting and calibration of ACC POT. Refer to section M4.3 of the service manual for calibration instructions.

Then replace ACC POT. Refer to section M4.3 of the service manual for replacement and calibration instructions.

If: less than 3 volts.

Then check all wiring between CA401-8, CA401-9 and ACC POT for loose or open connections.

CONTINUED ON NEXT PAGE

No Code Displayed

Step 6: Verify operation of handset by plugging directly into CA402 on master controller.

If: handset operational.

Then locate and repair loose connection or wiring between CA402 on master controller and CA204 on the distribution panel or between CA206 on the distribution panel and dash display.

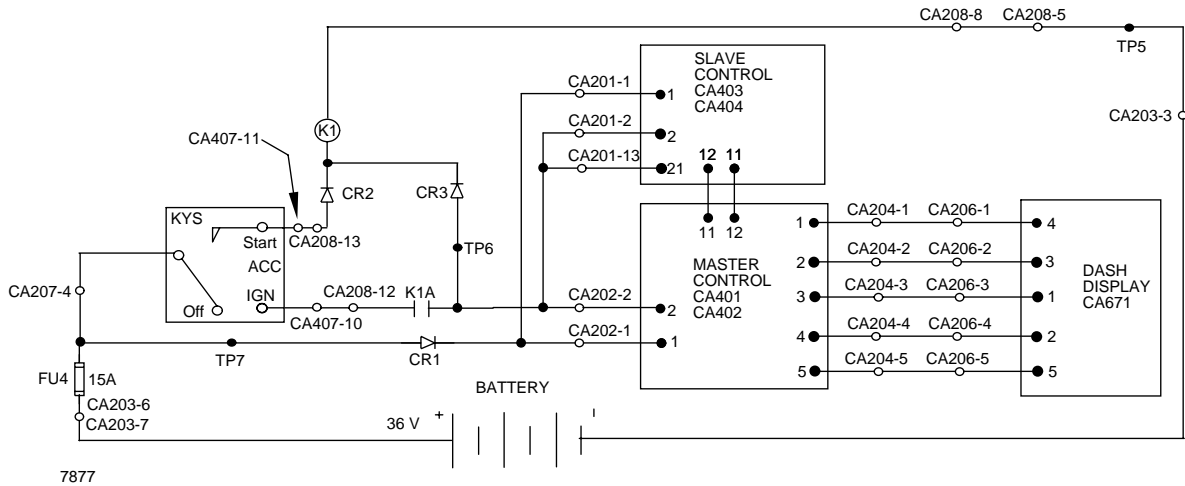
Then replace distribution panel.

Then replace dash display.

If: handset not operational.

Then replace master controller. See note.

Note: Once making sure there is not a power loss to master controller and the handset does not function when plugged directly into CA402 on master controller, then and only then, replace master controller. Set function code 17 to 53 and adjust other function codes as necessary.



Accelerator Switch (ACS) not closed when more than 40% traction requested.

-05

This code indicates voltage at CA401-7 on master controller and CA403-7 on slave controller is greater than 40% of full traction command while voltage at CA401-3 on master controller and CA403-3 on slave controller is less than 18 volts.

Step 1: Is the accelerator pedal depressed more than halfway when code occurs?

If: yes.

Then check for 36 volts at CA205-3 on the distribution panel with accelerator pedal depressed more than halfway.

If: 36 volts.

Then proceed to step 2.

If: less than 18 volts.

Then verify adjustment of accelerator switch ACS. Refer to section M4.0 of the service manual for adjustment instructions.

Then locate and repair loose connection or wiring between CA205-3 and battery positive.

If: code still exists.

Then proceed to step 3.

If: no.

Then verify accelerator potentiometer ACC POT wiper input at TP3 on the distribution panel. With truck powered up and mast collapsed, ACC POT input should be near zero volts with accelerator pedal released and increase toward 4.5 volts as accelerator pedal is depressed.

If: voltage is limited to 1.2 volts.

Then proceed to step 4.

If: voltages as described.

Then proceed to step 5.

If: voltages not as described.

Then proceed to step 6.

Check that battery restraint is properly installed making contact with battery restraint switch (BRES) and that switch is actuated. If optional battery restraint switch is not present check that CA450 jumper is properly installed either visually or by taking a resistance reading. On units built prior to 5/15/02, CA450 is located inside the right-hand leg weldment of the power unit.

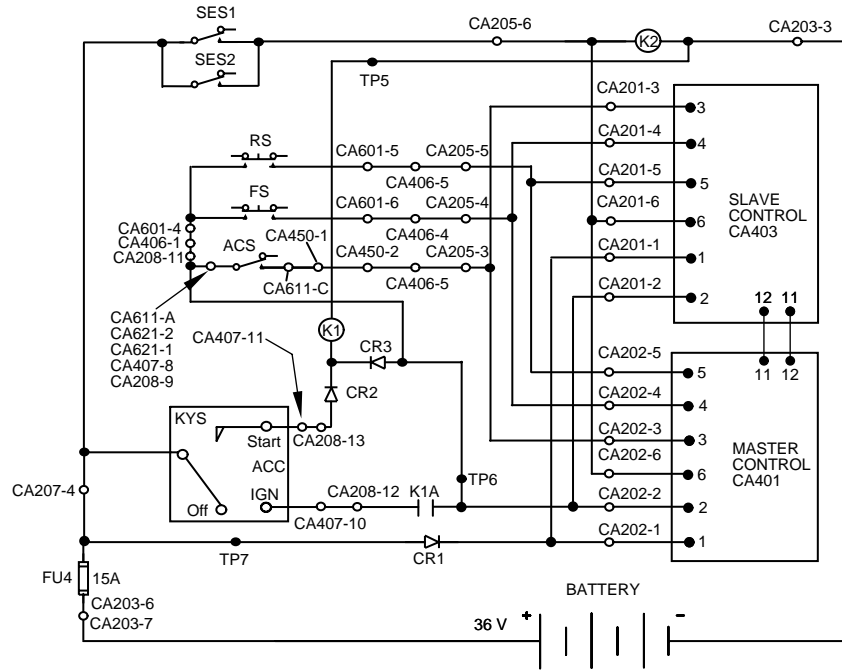
If: switch is actuated or jumper installed.

Then proceed to step 2.

If: switch is open or high resistance between CA205-3 and PC611-C.

Then properly install battery restraint or locate and repair loose connection or wiring between CA205-3 and PC611-C.

CONTINUED ON NEXT PAGE



7600

Low battery voltage at power up.

-15

This code indicates voltage at battery is less than 1.95 volts per cell at power up.

Step 1: Check battery state of charge at each battery cell for proper voltage (greater than 1.95 volts per cell).

If: battery cell voltage greater than 1.95 volts per cell.

Then check for corrosion and poor connection at battery connector.

If: battery connection corroded or poor.

Then repair connection as necessary.

If: battery connection okay.

Then proceed to step 2.

If: battery cell voltage less than 1.95 volts per cell.

Then recharge battery as necessary.

Step 2: Check voltage at TP7 on the distribution panel.

If: 35.1 volts or greater.

Then proceed to step 3.

If: less than 35.1 volts and truck is powered up.

Then locate and repair loose connections or wiring causing loss of voltage between the battery and the distribution panel.

Step 3: Check voltage at CA401-1 on master controller and CA403-1 on slave controller.

If: 35.1 volts or greater.

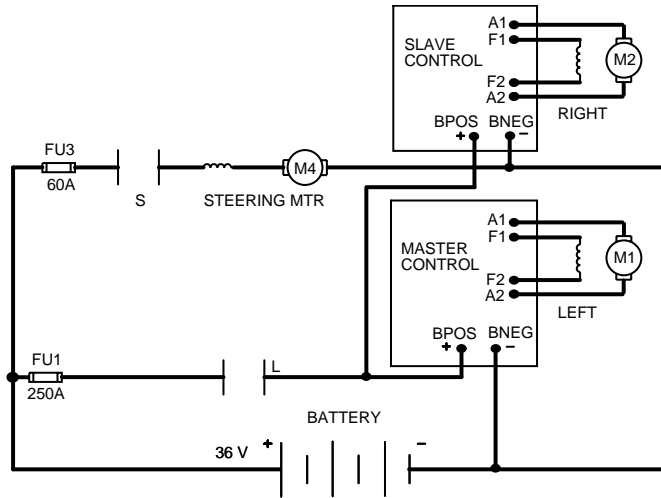
Then replace appropriate controller. See note.

If: less than 35.1 volts.

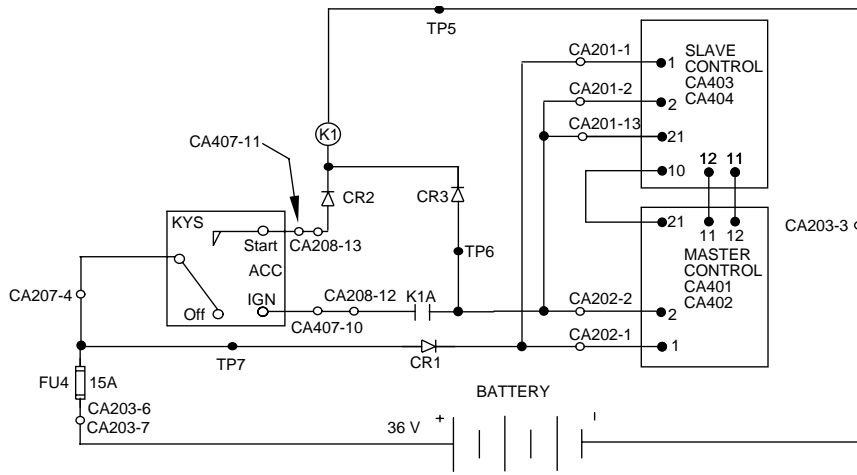
Then locate and repair loose connections or wiring causing loss of voltage between CA401-1 or CA403-1 and battery positive.

Note: *If battery and connector condition is okay and 35.1 volts or greater is present at CA401-1 and CA403-1 and code -15 still exists, then and only then replace the appropriate controller. RS232 communication between master controller and slave controller must be disabled to determine the appropriate controller. Refer to the steps located at the beginning of this event code section to disable RS232 communication. Replace only the controller with an event code -15 stored. Adjust all function codes as necessary.*

CONTINUED ON NEXT PAGE



7606



7597

Other Controller in thermal cutback.

-40

This code will be logged in master controller (MRC1) when slave controller (MRC2) experienced thermal cutback and logged in slave controller when master controller experienced thermal cutback.

This code will only be seen if the handset is plugged directly into CA402 on master controller or CA404 on slave controller.

Step 1: Verify truck use or application was not cause of event code.

If: application okay.

Then proceed to step 2.

If: application cause of event code.

Then operate truck within design intent.

Step 2: Allow controllers to cool then resume operation. Verify side panel vents are free from obstruction.

If: code still exists.

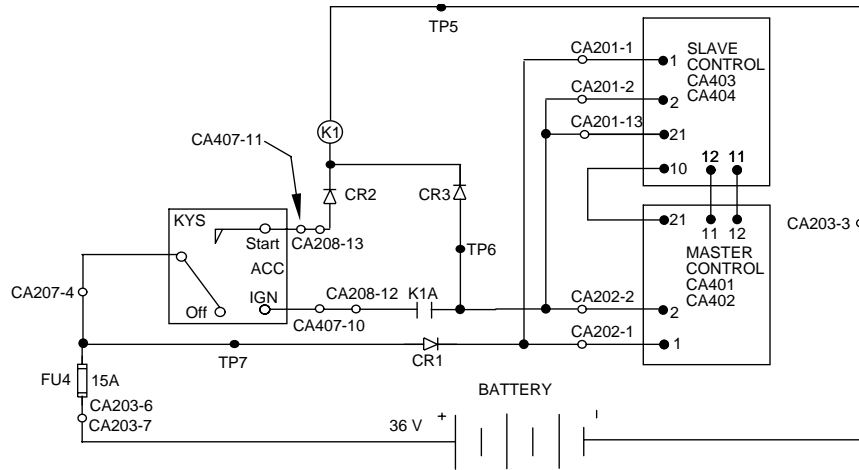
Then replace appropriate controller. See note.

If: code clears.

Then maintain truck operation within design intent.

Note: *If truck operation or application is not cause of event code and controllers are within temperature range but event code -40 still exists, then and only then, replace the appropriate controller. The appropriate controller is the opposite controller the handset is currently connected to (i.e. If the handset is plugged into CA402 on master controller then slave controller should be replaced). Adjust all function codes as necessary.*

Note: If 36 volts exists at B+ bus on master controller, slave controller, CA201-1, CA201-2, CA202-1, and CA202-2 on the distribution panel and event code -51 still exists, then and only then, replace the appropriate controller. RS232 communication between master controller and slave controller must be disabled to determine the appropriate controller. Refer to the steps located at the beginning of this event code section to disable RS232 communication. Replace only the controller with an event code -51 stored. Adjust all function codes as necessary.



7598

Capacitor voltage too high during regenerative braking.

-76

This code indicates the internal controller capacitor voltage is above 96 volts during the regenerative braking cycle.

Step 1: Check all power connections from controllers to battery for corrosion and poor connection.

If: connections secure.

Then proceed to step 2.

If: connections loose.

Then repair as necessary.

Step 2: Check condition and operation of line contactor L.

If: contactor okay.

Then proceed to step 3.

If: contactor not okay.

Then repair as necessary.

Step 3: Check condition of FU1.

If: FU1 okay.

Then replace appropriate controller. See note.

If: FU1 open.

Then replace FU1.

Note: *If all power connections are secure, line contactor is in good condition and has no intermittent operation, FU1 is not open and event code -76 is still displayed, then and only then, replace the appropriate controller. RS232 communication between master controller and slave controller must be disabled to determine the appropriate controller. Refer to the steps located at the beginning of this event code section to disable RS232 communication. Replace the controller with the event code -76 stored. Adjust all function codes as necessary.*

CONTINUED ON NEXT PAGE

Step 5: Check voltage at CA403-13 on slave controller for 1.3 volts while service brake pedal is released and 2.6 volts while service brake pedal is depressed.

If: voltages as described.

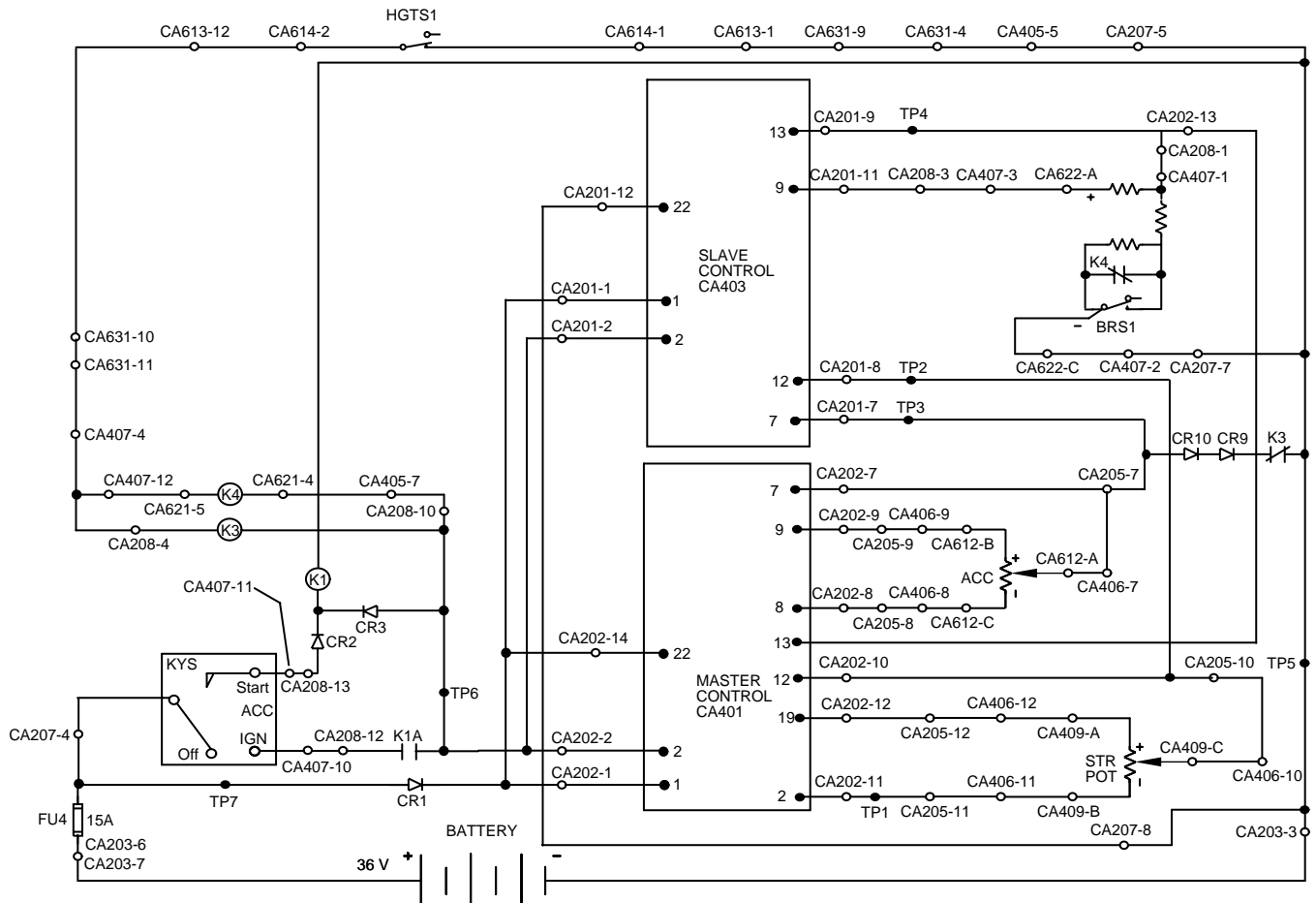
Then proceed to Step 6.

If: voltages not as described.

Then locate and repair loose connection or wiring between CA202-1 on the distribution panel and CA403-1 on slave controller.

Step 6: Verify function code 22 is set to 0. Cycle keyswitch and verify truck operation. Refer to the troubleshooting steps for any event code displayed after truck power up.

Note: ACC POT, STR POT, and brake pot module inputs must be as described in the above steps before calibration routine begins. This code typically indicates calibration steps were not followed in the specific order.



7916

The distribution board is mounted on the contactor panel with access by removing the left side battery compartment cover. The board has connectors CA201 through CA208 for connections to the master and slave traction modules as well as various switches. The maintenance handset is connected to CA206 for system troubleshooting and truck setup.



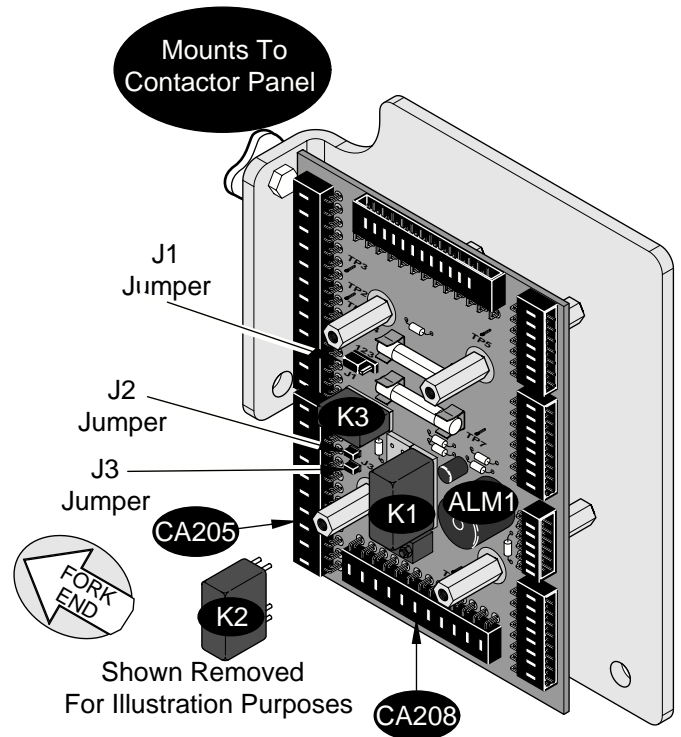
Distribution Board

7648P

ILLUSTRATION 1

Components Included On Distribution Board

- ALM1 Alarm for hand brake being set.
- Relay K1 is used for truck power-up.
- Relay K2 is used for seat alarm activation.
- Relay K3 is used to reduce speed at certain mast heights.
- Fuse FU4 for circuit protection of key switch (KYS), horn (HN), parking brake alarm (ALM1), steer and pump contactors (S & P), tail light assembly, line contactor (L) and module power.
- Fuse FU6 circuit protection for front and rear worklights.



7643-01

ILLUSTRATION 2

Distribution Board Jumper Configurations

The distribution board has J1, J2 and J3 jumpers to allow certain truck operational features. Refer to Illustration 2.

- J1 can be configured to either allow for the rear work lights to function (jumper pins 2 & 3) from the switch (LGS2) mounted on the console or when the truck is placed in reverse (jumper pins 1 & 2). Refer to Illustrations 3 and 4.

NOTE

For the rear worklight to function when the truck is placed in reverse (jumper pins 1 & 2), the rear worklight switch (LGS2) on the console must be left in the "on" position at all times.

NOTE

When returning the key switch to the "ON" position, make sure that the directional control is in neutral, accelerator is released, brake pedal released, parking brake released and that the seat is occupied to actuate the seat switch. If one of these conditions is not met, an "-83" event code will appear on the display. Once all of these conditions have been met, "- - -" will appear on the display.

Select the forward direction of travel, with the brake pedal fully released. The display will show "- - -".

Return the direction control to neutral, and the display will show "- -".

Select the forward direction of travel with the brake pedal fully depressed. "-" will be displayed.

Return directional control to neutral. The truck will either return to a normal operating state or an "-86" event code will appear on the display. If the "-86" code appears, either the hand brake is not released or the voltage change from brake pedal fully depressed to fully released is less than 1 volt. If the latter is true, the brake module likely needs replaced.

Exit Calibration

Depress the CONT key on the handset and hold depressed, then turn the truck keyswitch to "start" and "on" position to enter the Setup Mode. Release the CONT key.

With the seat switch not actuated, depress the CONT key on the handset and hold depressed, then press the number key 7 on the handset keypad to select function 22. The handset will display U22 for a brief moment to acknowledge which function has been accessed.

Next the display will switch to the actual setting for the selected function. With the adjustment knob on the handset, change the setting of function 22 to 0.

When the proper reading is obtained, press the CONT or STORE key. Depress the ESC key to exit this setting. The handset will return to the neutral mode displaying all 8's. If the 8's are not displayed depress the CONT key to return to the neutral mode.

Exit the setup mode by pressing the ESC key twice. The display will show a -37. This indicates that the adjustments have been stored.

AUTO CALIBRATION OF POTENTIOMETERS

Performing this mode of calibration will calibrate the Accelerator Potentiometer first followed by the Steer Angle Potentiometer and then the Brake Resistor Module.

Connect the Handset to CA206 on the distribution board.

Depress the CONT key on the handset and hold depressed, then turn the truck keyswitch to "start" and "on" position to enter the Setup Mode. Release the CONT key.

With the seat switch not actuated, depress the CONT key on the handset and hold depressed, then press the number key 7 on the handset keypad to select function 22. The handset will display U22 for a brief moment to acknowledge which function has been accessed.

Next the display will switch to the actual setting for the selected function. Depress the CONT key and the display will show the number of the adjustment knob position and begin to flash. Turn the adjustment knob on the handset to change the setting of function 22 to 255.

When the proper reading is obtained, press the CONT or STORE key. Depress the ESC key to exit this setting. The handset will return to the neutral mode displaying all 8's. If the 8's are not displayed depress the CONT key to return to the neutral mode.

Exit the setup mode by pressing the ESC key twice. The display will show a -37. This indicates that the adjustments have been stored.

Component Replacement

CONTACTS (Refer to Illustration 5)

1. Remove nut (Index 25) from armature. Lift washer, spring retainer, spring and spring guide washer (Index 24, 23, 22, 21) from armature.
2. Lift movable contact (Index 20) from armature. Install replacement contact.
3. Assemble spring guide washer, spring, spring retainer and washer on armature.
4. Install nut on armature and tighten to 14-18 inch-pounds torque (1.6 - 2.0 Newton meters).
5. Remove four (4) long screws (Index 17) and remove the stationary tip clamps (Index 15) from contactor assembly.
6. Remove stationary contacts.
7. Install replacement contacts and secure in place with stationary tip clamps. Tighten four screws, in one turn increments, using a diagonal pattern. Tighten screws to 14-18 inch-pounds torque (1.6 - 2.0 Newton meters).

COIL (Refer to Illustration 5)

1. Remove four (4) long screws (Index 17) and stationary tip clamps (Index 15).
2. Remove stationary contacts.
3. Lift stationary tip carrier (Index 13) with the armature assembly (Index 26) from the contactor assembly.
4. Remove magnet frame (Index 5).
5. Lift coil (Index 14) from post on base plate (Index 1). Note position of coil terminals in relation to base plate for assembly.
6. Position replacement coil on base plate, as noted at disassembly, and locate projections on base plate in indentations of coil.

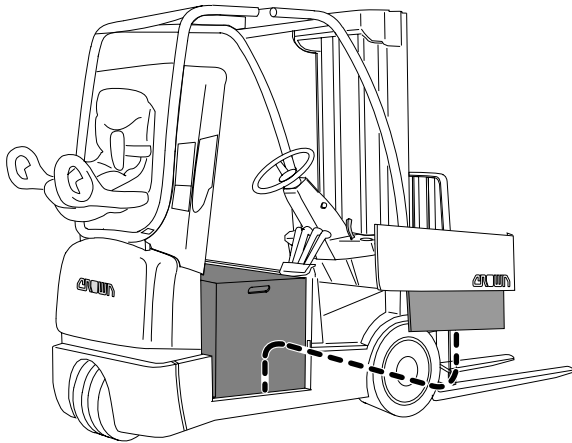
7. Position magnet frame over coil and locate projections on magnet frame in indentation of coil.
8. Make certain the small end of spiral spring (Index 6) is forced over small diameter of plunger (Index 7) as shown in Illustration 4. Assemble armature assembly and stationary tip carrier on top of magnet frame.



1738PS

ILLUSTRATION 4

9. Install stationary contacts and stationary tip clamps.
10. Start four (4) screws in tapped holes of base plate. Tighten screws, in one turn increments, using a diagonal pattern. Tighten to 14-18 inch-pounds torque (1.6 - 2.0 Newton meters).



7636

ILLUSTRATION 3

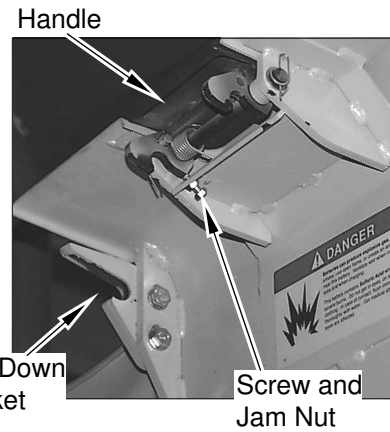
6. Install battery retainer side panel assembly onto truck. Remove spreader bar, if used.
7. Connect battery, lower and latch battery cover and return steering wheel to a comfortable position.
8. Check truck operation.

**CAUTION**

Make certain same battery or battery of equal weight is loaded into truck for stability. See name-plate for minimum battery weight.

BATTERY COVER LATCH ADJUSTMENT

1. The hold down bracket is adjusted with the slots to engage the stub shaft in the control lever assembly. The stub shaft will bottom out in the groove when the seat deck is in the closed position.
2. The handle latch bar should be adjusted when the seat deck is completely down against the stops and the gas cylinders are independent of the seat deck. Refer to Section 1.0.
3. Raise and rest the seat deck against the rubber stops on the OHG before assembling the gas cylinders.
4. Adjust screw and jam nut so that the front face of the handle is aligned with the front face of the seat deck. Refer to illustration 4.



8430

ILLUSTRATION 4

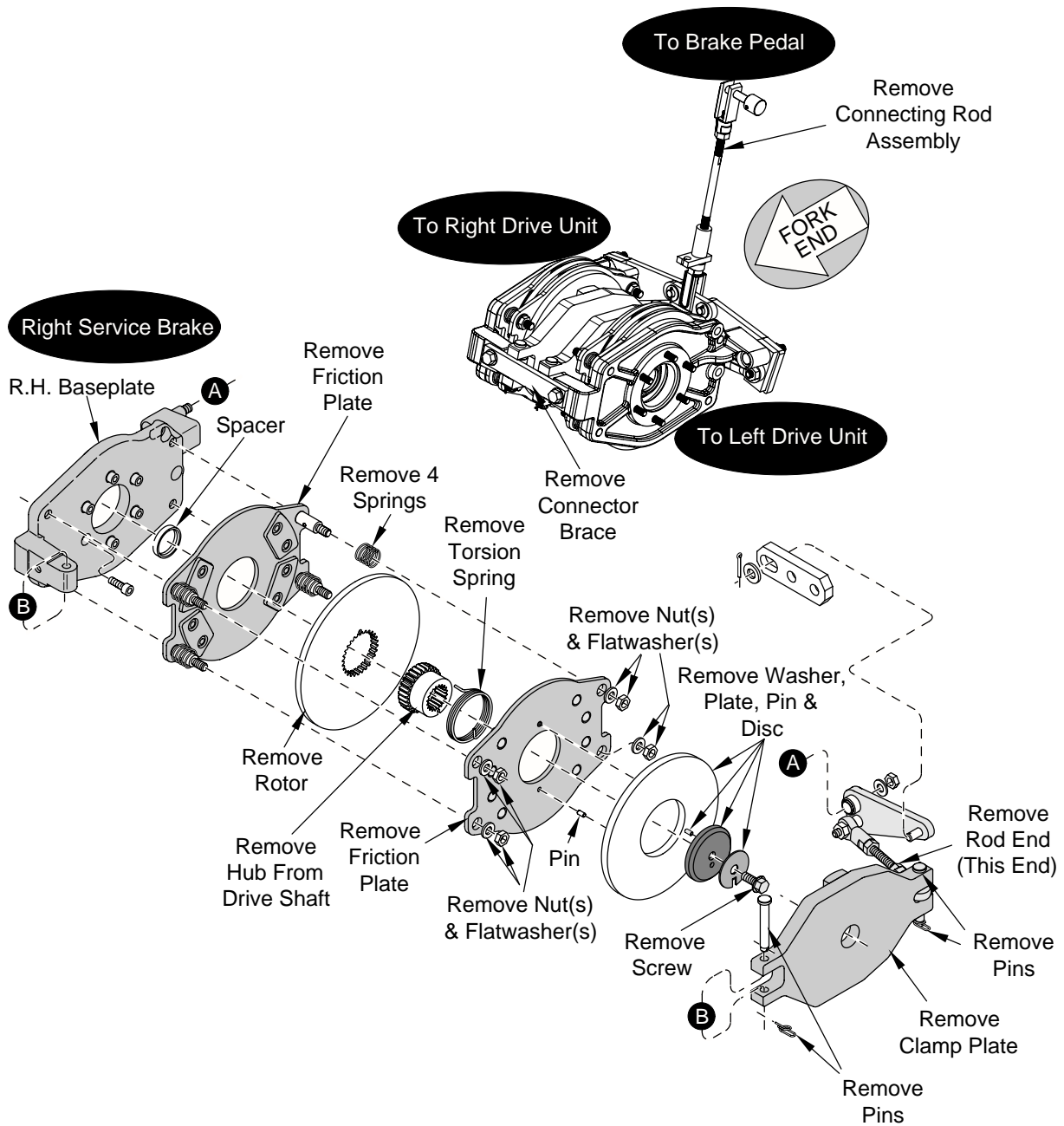
LEFT HAND SIDE PANEL ADJUSTMENT

1. To align rear lower corner of the side panel with the counterweight, loosen the mounting bolt, which is attached to the contactor panel. Move the flanged spacer and bolt up and down until panel is in the correct location. Tighten down the bolt. Refer to Section 1.0.

NOTE

There should be an approximate 6mm (.25") gap between the top edge of the side panel and the seat deck.

2. Loosen front mounting screw and move panel up or down to obtain a consistent gap between the panel and the seat deck. Tighten down the bolt. Refer to Section 1.0.

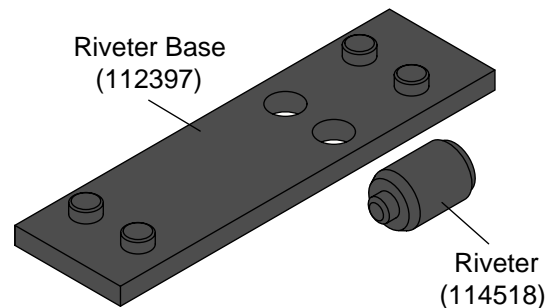


7555-01

ILLUSTRATION 10

Friction Plate Pad Replacement

Tools are available from Crown to permit replacement of the pads on the friction plate assembly. When used with a press, these tools allow the correct positioning of the pads and correct setting of the rivets. A press is required to insure the rivets provide the compression strength needed to keep the brake pads stationary. Refer to Illustration 11.



7556

ILLUSTRATION 11

Your truck is equipped with a hydraulic steering system. A hydrostatic steering control unit, located in the control column, is coupled via hydraulic tubes and hoses to the steering axle, mounted near the back of the power unit, used to actuate the steering.

HYDROSTATIC STEERING UNIT

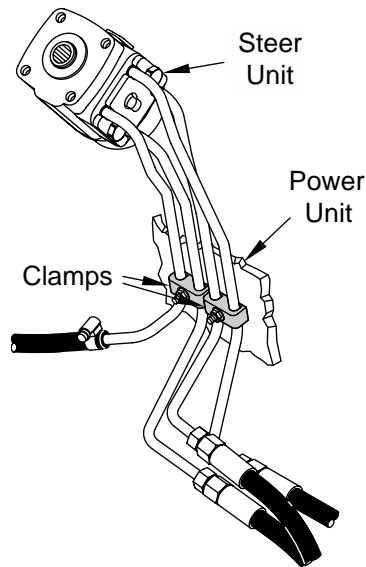
The hydrostatic steering unit (open center non-reaction) mounts in the control column below the steering wheel. The non-reaction unit maintains the steered position when the operator releases the steering wheel. The cylinder ports are blocked in the neutral valve position. The operator must steer the drive wheel back to the straight ahead position.

The steering unit meters a proportional amount of oil to the steering motor when the wheel is rotated. This pressurized oil is supplied by the PS pump, and is supplied to the appropriate side of the steering motor by the direction of rotation of the steer control unit via the steering wheel. When the steering wheel rotation is stopped, the steer motor ports are blocked to hold the steering in that position. In the event that pump flow is stopped, the steer unit can be manually rotated to "pump" flow to the appropriate steer actuator port by turning the steering wheel in the desired direction, thus allowing emergency steering.

Steer circuit relief pressure is non-adjusting and preset to 1200 - 1250 psi (8273 - 8618 kPa). Normal steering pressures are 400-800 psi (2758 - 5516 kPa).

NOTE

The clamps shown at the right secure steer unit hydraulic tubes to the power unit and must be securely in place to prevent fluid leakage.



7614

ILLUSTRATION 1

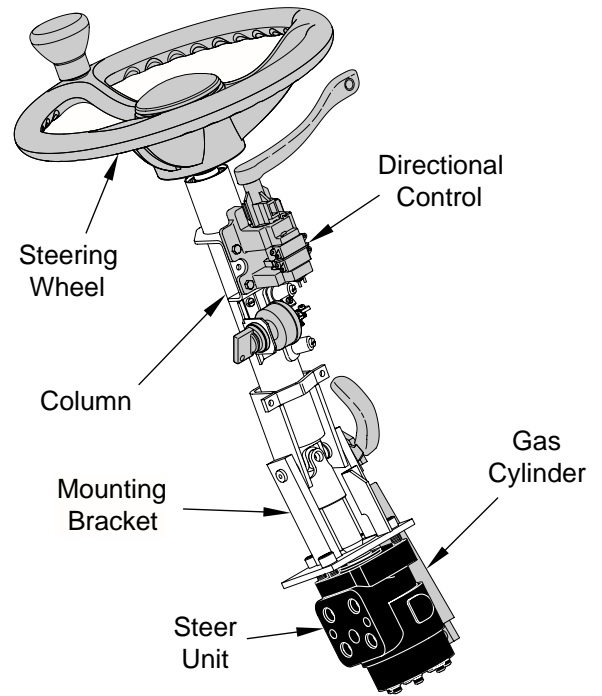
WARNING

The steering on your truck can be reversed by incorrectly connecting the hydraulic hoses. Care should be exercised when maintenance is performed on the steering system. Prior to disassembly, mark hose and tube locations so they can more easily be properly assembled.

After completing maintenance, always check to be sure steering system is functioning properly.

STEERING COLUMN ASSEMBLY

Refer to the following procedures and specifications when assembling the steering column.



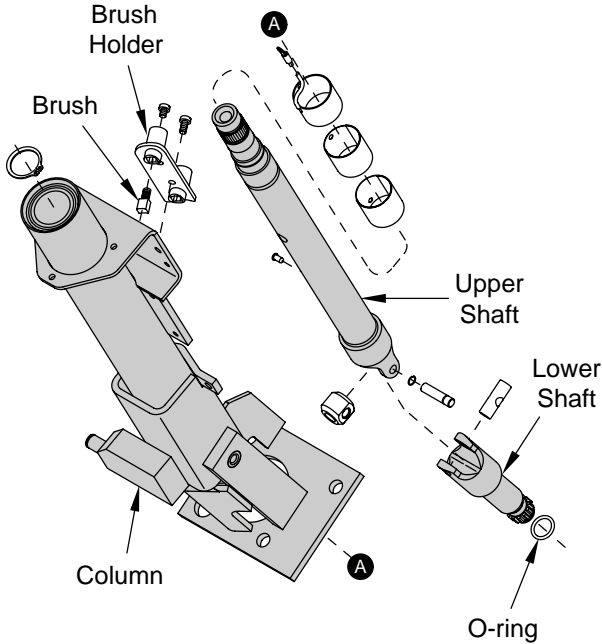
7615

ILLUSTRATION 2

Column

NOTE

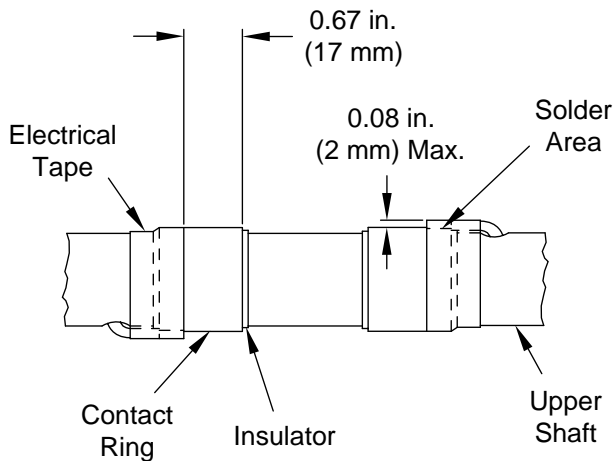
Before removing shaft assembly from column, remove the brush holder and brushes or they will be destroyed.



7617-01

ILLUSTRATION 3

- Refer to Illustration 4. Apply 1.5 to 2 turns of black electrical tape around upper shaft at positions where wires enter tube, covering solder area on contact ring and wire entering tube.

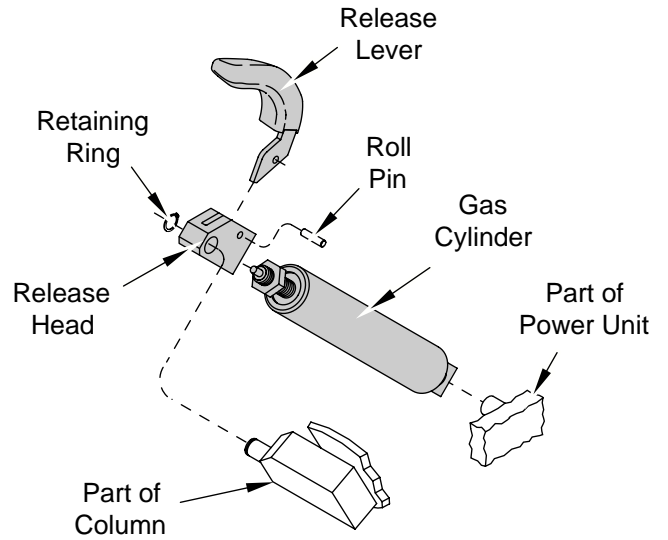


7625

ILLUSTRATION 4

- Apply a small amount of 063001-002 oil to outside of o-ring at bottom of lower shaft. Refer to Illustration 3.

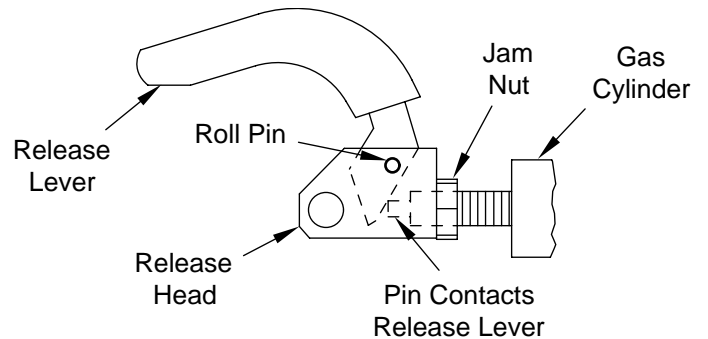
Gas Cylinder



7626

ILLUSTRATION 5

- Screw gas cylinder threaded shaft into threaded hole in release head until plunger pin on gas cylinder contacts bottom edge of release lever. Refer to Illustration 6.



7627

ILLUSTRATION 6

- Continue to screw the gas cylinder into head until release lever moves to its maximum position and lever is not "loose" within head. Screw gas cylinder another 1/4 rotation and lock in position by tightening jam nut.
- Rotate gas cylinder body until lower mounting tab is parallel with release head.

STEERING STEER UNIT



4. Remove the seal from the gerotor.
5. Remove the gerotor. Be careful not to drop the star.

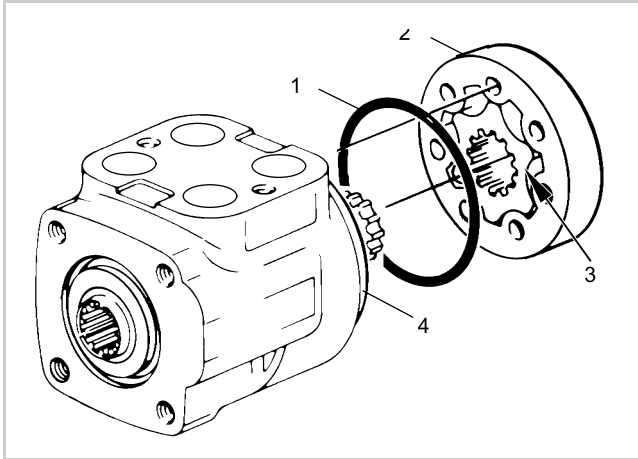


Fig. 31 (22645)

1	Seal
2	Gerotor
3	Star
4	Spacer plate

6. Remove the seal from the spacer plate.
7. Remove the drive.

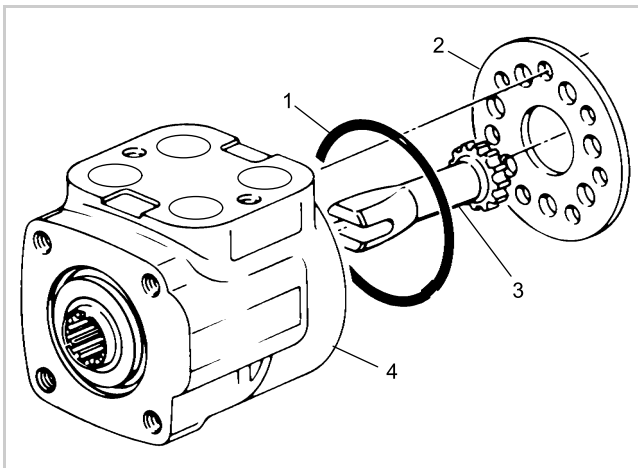


Fig. 32 (22646)

1	Seal
2	Spacer plate
3	Drive
4	Housing

8. Remove the spacer plate.
9. Remove the seal from the housing.

10. Remove the housing from the vise. Place the housing on a clean soft cloth to protect surface finish. Remove the retaining ring from the housing, as shown in Figure 33.

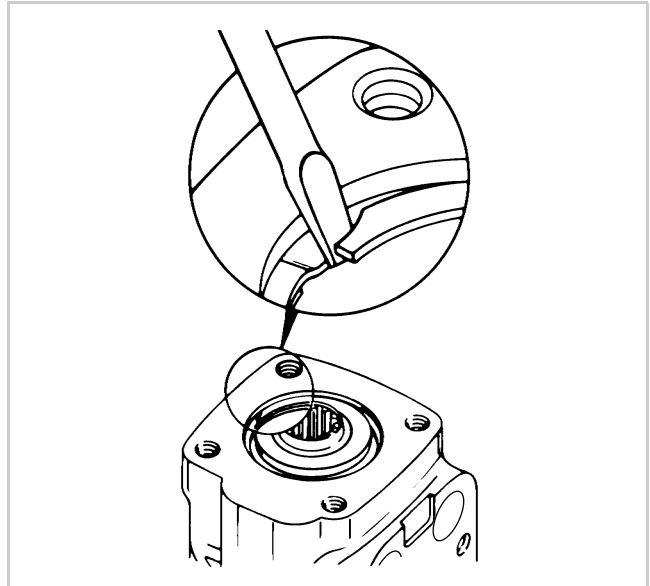


Fig. 33 (22647)

11. Rotate the spool and sleeve until the pin is horizontal. Push the spool and sleeve assembly forward with your thumbs just far enough to free the gland bushing from the housing, remove the bushing. Refer to Figure 34.

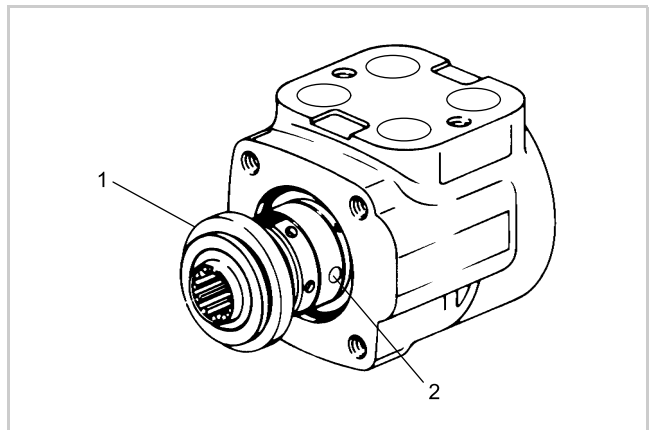


Fig. 34 (22648)

1	Seal gland bushing
2	Pin

9. Refer to Disassembly Procedure in this section if further disassembly is required.

NOTE

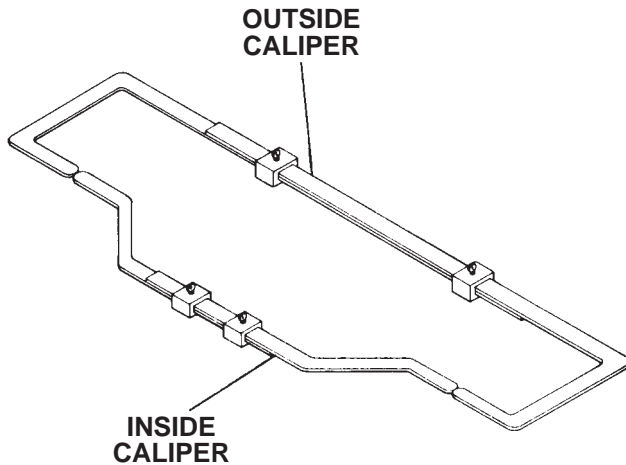
With the mast assembly laid down, the cylinder and mast assemblies must be removed by making all hookups with hoist as near the center of the assembly as possible to maintain balance.

ASSEMBLY MAST LYING HORIZONTAL

1. Clean column roller studs. If any paint or rust is evident on the studs, remove with emery cloth and grease with multi-purpose grease, Crown No. 063002-024.
2. Place two .030 in. (.76 mm) shims, Crown No. 060030-085, on each of the four studs and install column rollers. Two studs at the top of the first stage and two studs at the bottom of the second stage mast.
3. Use inside caliper and measure between the two rollers on the first stage mast. Refer to Illustration 3.

NOTE

The column roller studs are canted, measure at narrowest part of rollers.



1908S

ILLUSTRATION 3

4. Measure the outside of the second stage mast, along the area where the 1st stage column rollers will travel, with the outside caliper. After finding the widest contact point, lock the thumb screws and place the inside calipers together and determine the amount of shimming to be added to (or removed from) the column rollers. When shimming column rollers, try to balance out the number of shims on each side. Example: 2

6534

shims on right side and 2 shims on left side on column roller studs. If an odd number of shims are required, refer to Illustration 4.

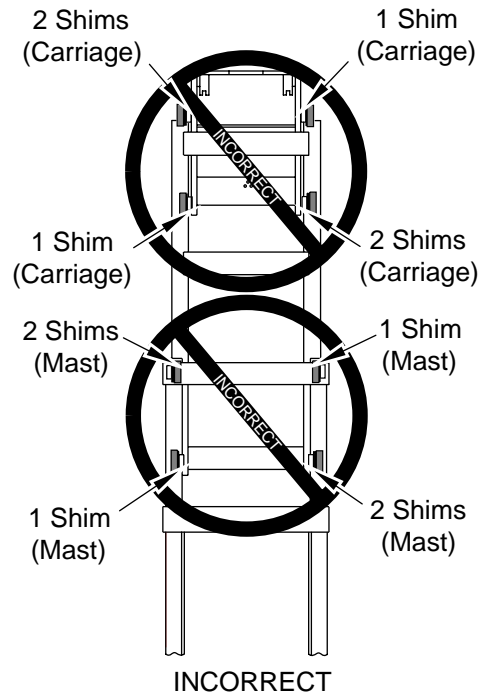
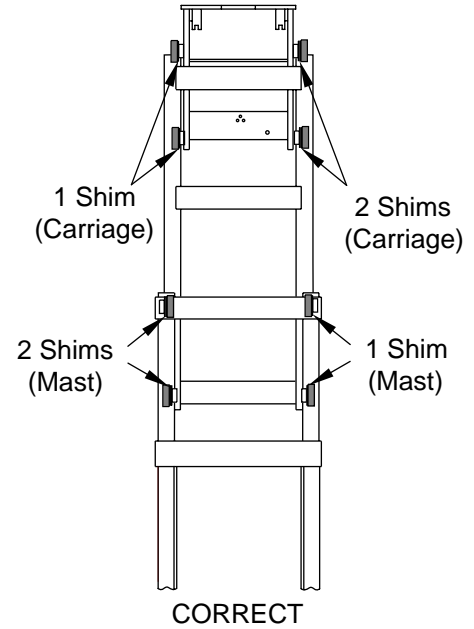


ILLUSTRATION 4

Replacing the lift chain

1. Find the part number for the lift chain in the service and parts manual. Make sure that the replacement lift chain is applicable to the lift truck.

Note: The lift chains must be replaced as a pair. Equal lift chain tension cannot easily be kept between the new lift chain and the existing lift chain.

2. If the lubricant dried or there is no lubricant, soak the new lift chains in heavy engine oil for a minimum of 30 min before installing.
3. After removing the existing lift chains from the mast, carefully examine the chain anchors and pulleys.
4. Replace the chain anchors that are broken, cracked, or are worn.
5. Replace the pulleys that are worn and examine the pulley bearings for wear.
6. Do not paint the new lift chains.
7. Install the new lift chains with new pins. Do not use the existing pins.
8. After connecting the new lift chains to the chain anchors, adjust the lift chain tension for the correct fork or platform height.
 - The correct lift chain installation and mast adjustment increase the service life.

Disconnecting a chain leaf

See Figure 4.

Special tools and equipment:

- A stable work surface with an opening that is larger than the pin diameter. The work surface must be of sufficient thickness to let the pin (4) extend below the work surface to push it through the pin link plate (1) on the bottom.
- A flat washer (2) with an inside diameter more than the pin diameter and a height that is equal to the head height of the pin.
- A grinding wheel (3).
- A punch with a diameter that is less than the pin diameter.
- A hammer or press.

1. Use the grinding wheel to remove the top head of the pin (4) flush with the pin link plate (1). Be careful not to damage the pin link plate.
2. Put the flat washer (2) above the opening of the work surface.
 - The flat washer holds the bottom pin link plate (1) and prevents damage to the lift chain components while pushing the pin through the lift chain.
3. Put the lift chain on its side and seat the pin in the flat washer (2).
4. Remove the pin from the lift chain through the top pin link plate (1).

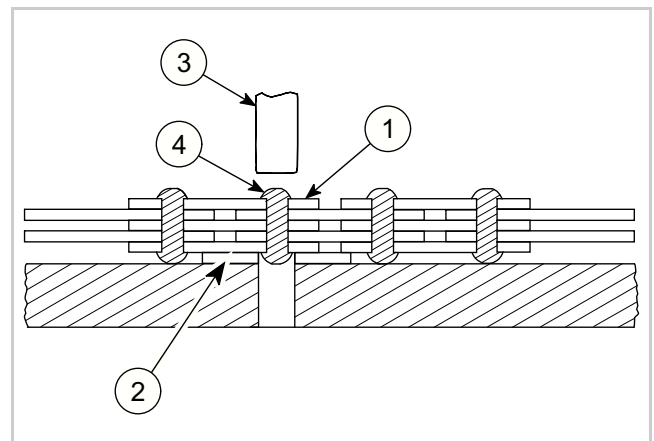
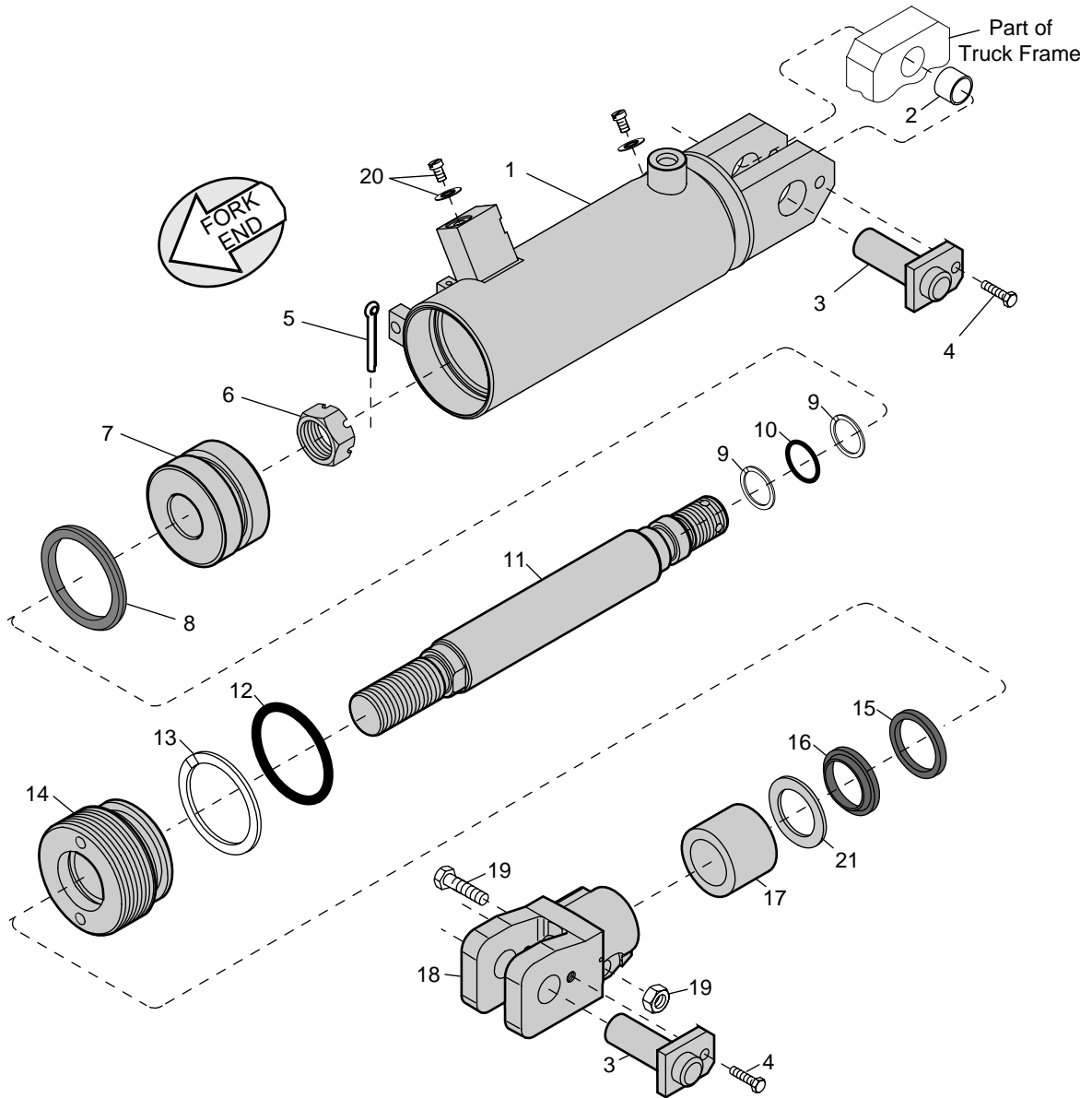


Fig. 4 (33505)



7550

TILT CYLINDER

The tilt cylinder is mounted at the base of the front frame. This tilt cylinder is a double acting piston type cylinder. Extreme care should be taken when performing any type of repair. In the event of excessive oil leakage around the cap end of the cylinder or its inability to tilt the load, the cylinder will have to be removed from the truck and repaired.

Disassembly

Before proceeding with disassembly, thoroughly clean the outside of the cylinder to remove all grease and dirt build-up. Place the cylinder in a vise. Care should be taken to avoid overtightening, as the tube assembly (item 1) may be easily damaged. The use of an adjustable spanner wrench, similar to the one shown in Illustration 1, is required for disassembly.

A face spanner wrench with 3/16" pins and a spread of at least 2.625" is sufficient.

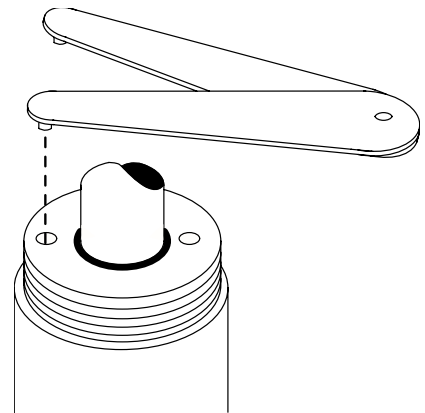


ILLUSTRATION 1

990906

Crown 1999 PF11696-1 Rev. 11/99

7551

6309

Printed in U.S.A.

Components of the SC 4000 truck have been listed in chart form to assist the maintenance mechanic in locating these components on the Electrical Diagrams and Parts Breakdown forms.

The chart is in columns: *COMPONENT*; *LOCATION*; *FUNCTION*; *DIAGRAM*; *PARTS BREAKDOWN*. The *COMPONENT* column contains the abbreviation of the component as it appears on the Diagrams and in the Maintenance Section. The *LOCATION* column gives the general location

on the truck such as on mast or in power unit. The *FUNCTION* column then explains the function or circuit of that device. The *DIAGRAM* column gives the page number of the diagram on which the component can be found. The callout in parenthesis following the page number corresponds to the grid callouts on that diagram, locating the component. The *PARTS BREAKDOWN* column includes the parts breakdown page number on which the component is located along with the index number, in parenthesis, if applicable.

AUDIBLE INDICATORS

	Location	Function	Diagram	Parts Breakdown
--	-----------------	-----------------	----------------	------------------------

ALM1	Distribution Board	Seat/Parking Brake Alarm	DIA-1140-015 (C1) DIA-1140-016 (C1) DIA-1140-017 (B3)	04.3-1140-001 (4)
ALM2	Power Unit Frame (By Drive Units)	Travel Alarm	DIA-1140-016 (B2) DIA-1140-021 (C1)	01.0-1140-013 (109)
HN1	Power Unit (Rear Left Side)	Truck Horn	DIA-1140-015 (C1) DIA-1140-016 (C1) DIA-1140-020 (B2)	01.0-1140-011 (8)

BATTERY

	Location	Function	Diagram	Parts Breakdown
--	-----------------	-----------------	----------------	------------------------

Battery	Power Unit (Batt. Comp.)	Power Supply	DIA-1140-015 (B4) DIA-1140-016 (B4) DIA-1140-025 (A4)	01.2-1140-001 (9)
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CONNECTIONS

	Location	Function	Diagram	Parts Breakdown
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CA201	Distribution Board	Slave Module Power	DIA-1140-017 (A1)	04.3-1140-001 (3)
CA202	Distribution Board	Master Module Power	DIA-1140-017 (A2)	04.3-1140-001 (3)
CA203	Distribution Board	Pump Contactor/Batt. V.	DIA-1140-017 (C2)	04.3-1140-001 (3)
CA204	Distribution Board	Master Controller Display	DIA-1140-017 (C2)	04.3-1140-001 (3)
CA205	Distribution Board	FS/RS, SES, STR, ACC	DIA-1140-017 (A3)	04.3-1140-001 (3)
CA206	Distribution Board	Dash Display	DIA-1140-017 (C2)	04.3-1140-001 (3)
CA207	Distribution Board	SES, HBS, Tilt, ALM2	DIA-1140-017 (C3)	04.3-1140-001 (3)
CA208	Distribution Board	BRS, LGS1, LGS2, IGN	DIA-1140-017 (B3)	04.3-1140-001 (3)
CA401	Master Module	Power, FS/RS, ACC, L, S	DIA-1140-018 (B1)	04.1-1140-003 (18)
CA402	Master Module	Handset, RS232 Conn.	DIA-1140-018 (B3)	04.1-1140-003 (18)
CA403	Slave Module	Power, FS/RS, SES, ACS	DIA-1140-019 (B1)	04.1-1140-003 (16)
CA404	Slave Module	Handset, RS232 Conn.	DIA-1140-018 (B3)	04.1-1140-003 (16)
CA405	Contacto Panel	ALM1, SES, HBS, ALM2	DIA-1140-017 (C3)	04.3-1140-001 (4)
CA406	Contacto Panel	STR, FS/RS, ACC, ACS	DIA-1140-017 (C3)	
CA407	Contacto Panel	Main Harness	DIA-1140-017 (B2)	
CA408	Contacto Panel	BATT NEG./BDI	DIA-1140-017 (C2) DIA-1140-017 (B1) DIA-1140-018 (B1)	

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