This manual is intended for the service mechanic who is seeking information about maintenance and service replacement parts. It contains a section on trouble shooting 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 rider straddle 3000 series operator instructions, refer to Crown publication, "You and Your Crown Narrow Aisle Stand-up Rider" (PF-9659).

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 Narrow Aisle Rider".

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.

REPLACEMENT PARTS

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 RS capacities, technical information and dimensional specifications, please refer to the following sales literature:

RS Literature	SF-12109
RS Specifications	SF-12119

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

Crown Equipment Corporation
40-44 S. Washington Street
New Bremen, OH 45869

An index for this manual is located on the following pages. The 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. These sections are indicated by a grid bar at the right hand edge of the page. The higher the number of the section, the farther down the page it is located. The first portion of the manual covers the written maintenance. The later portion covers replacement parts. The sectional descriptions are as follows:

MAINTENANCE

SECTION	DESCRIPTION
M1	Lubrication and Adjustments
M2	Hydraulics
M3	Drive Unit
M4	Electrical
M5	Brake
M6	Steering
M7	Mast and Main Frame
M8	Cylinder
M9	Reach Assembly
M10	Glossary

REPLACEMENT PARTS

SECTION	DESCRIPTION
1	Basic Chassis or Power Unit
2	Hydraulic System and Components
3	Drive Unit and Components
4	Electrical Components
5	Brake Assemblies and Brake Systems
6	Steering System and Components
7	Main Frame and Mast Assemblies
8	Cylinders
9	Reach Assembly
10	Accessories

ITD - 1530 - 001

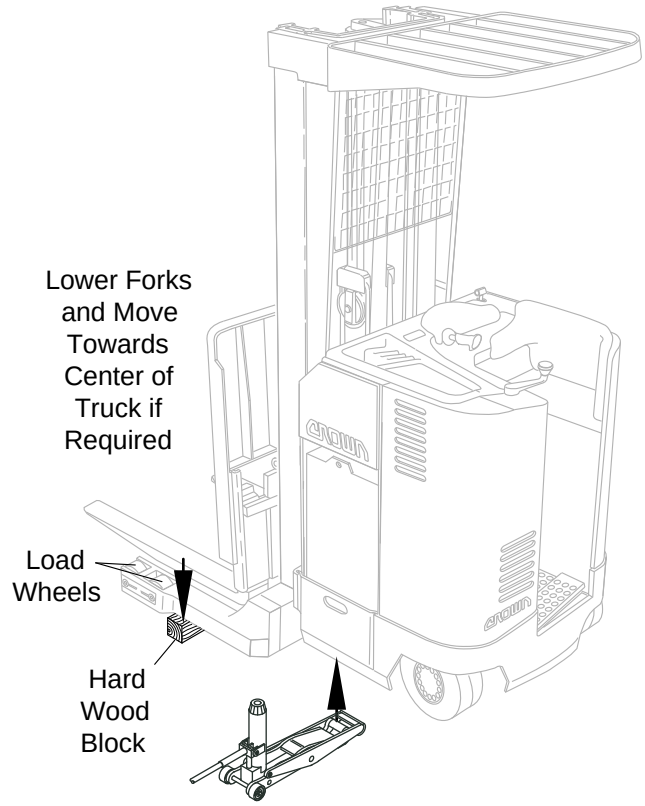
5532

LIFTING & BLOCKING POINTS
RR, RS, RD, & RR3000, RS3000, RD3000 SERIES TRUCKS

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. (57 mm)
  Raised Height Maximum: 16 in. (405 mm)
- Jack Stand - Capacity 10,000 LBS.
  Commercially Available

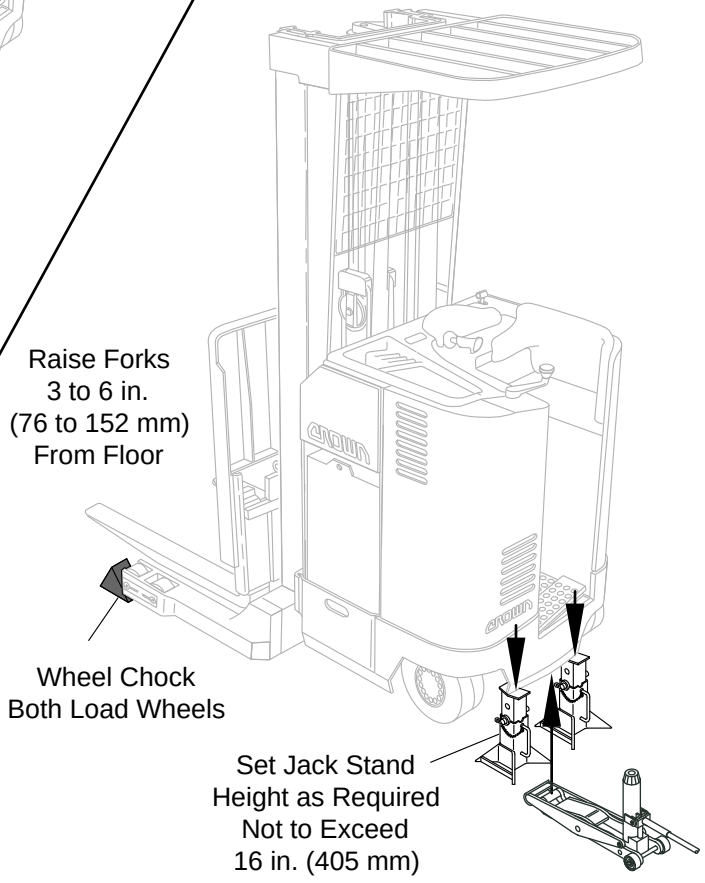
Side



WARNING

Do Not Raise Load Wheels More Than 0.5 in. (13 mm) from Floor to Position Hard Wood Block.

Steer Wheel



1777-02

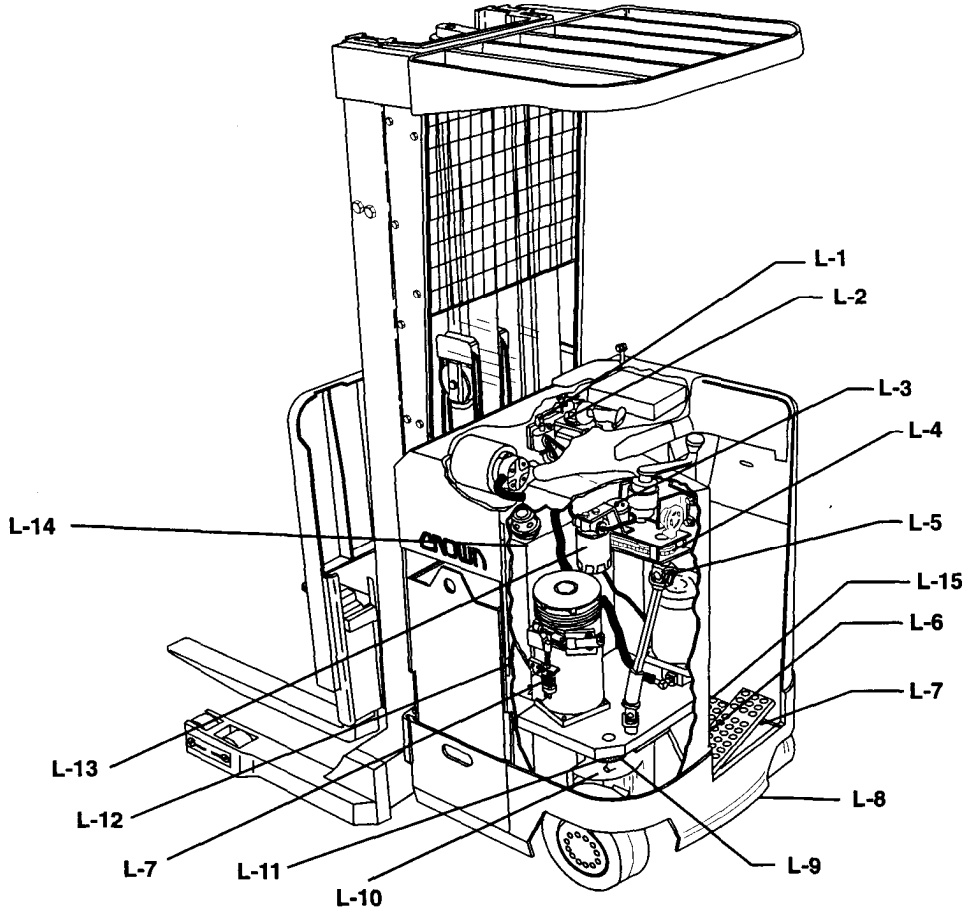


ILLUSTRATION 1-2

LUBRICATION CHART †† Pertains to MODEL 3500 Trucks Only

INDEX	COMPONENT	LUBE TYPE	QTY.	30 da. 100 hr.	60 da. 250 hr.	90 da. 500 hr.	6 mo. 1000 hr.	12 mo. 2000 hr.
L-1	Multi-function linkage	C	AR		†			
L-2	Multi-function gears	B	AR		†			
L-3	Brake Reservoir	F	AR		†			
L-4	Steering Chain	C	AR		†			
L-5	Steering Shaft	B	AR		L			
L-6	Pedal Pivot	C	AR		†			
L-7	Brake Linkage	C	AR		†			
L-8	Undercarriage Pivot	B	AR		L			
L-9	Steering Gears	B	AR			†		
L-10	Drive Unit–Level	A	1.5 pt. (.7 l)		†			Chg.
L-11	Drive Unit–Pivot	B	AR		†			
L-12	Door Hinge Pin	C	AR		†			
L-13	Hydraulic Filter					*Chg.		Chg.
L-14	Hydraulic Reservoir	D	5 gal. (19 l)		†			Chg.
††L-15	Floorboard Springs	B	AR		†			

See Chart 1-2 for Lube Type designation explanation (M1.0-04-002). Lubrication intervals for Freezer/Corrosion trucks must be changed to a frequent that will minimize corrosion and wear on moving shafts and parts.

* Change first time only, thereafter check at 250 hr./60 da. intervals and change at longer interval as noted.

†-Check Chg.-Change L-Lubricate AR-As Required

CHART 1-3

HYDRAULIC SYSTEM

HYDRAULIC LINES AND FITTINGS

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

2. Flexible hose shall be replaced if it collapses in its normal operating position.

3. All hoses and lines are to be clear of any surface or edge which will cause damaging wear and cuts, or on which they can become caught.

4. All connections are to be leak free.

5. The beaded elbows in suction ports of all pumps must be positioned such that the suction hose retains its full volume flow, and does not collapse.

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.

FILTER

The spin on filter cartridge *has* been tightened by Crown. When replacing filter, apply a film of oil 063001-001 to the seal and *hand* tighten until seal snugly contacts filter head.

NOTE

Do not tighten filter with a wrench. A wrench should only be used for removal of the filter.

Use only a good grade of hydraulic oil such as Mobil DTE 24 (Crown No. 063001-001) or equal. On trucks equipped to operate in below freezing temperatures, Mobil Aero HFA or equal is recommended (Crown No. 063001-006).

NOTE

Do not use hydraulic brake fluid.

RESERVOIR

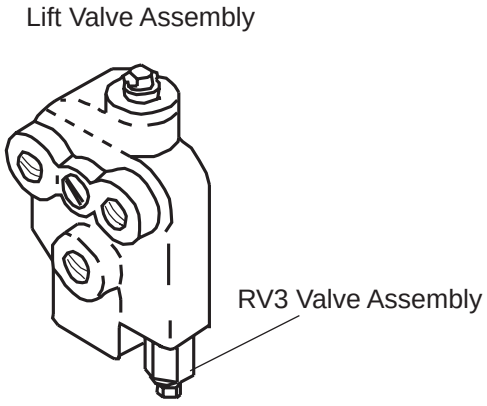
With all cylinders in the retracted position and after all air has been bled from the hydraulic system, fill reservoir so that the oil level is between 0.5 in. (13 mm) to 1.0 in. (25 mm) above bottom of fill strainer. The total capacity of the hydraulic system at this level should be approximately:

- Trucks with 39 in. (990 MM) power unit: 5 gal. (20 liters)
- Trucks with 45 in. (1145 mm) power unit & “A”, “B”, “C” & “D” size battery compartment: 6 gal. (23 liters)
- Trucks with 45 in. (1145 mm) power unit & “E” size battery compartment: 7 gal. (27 liters)

LIFT/LOWER CONTROL VALVE

RELIEF VALVE #3 (RV3)
Operation

The lift system is protected from excessive oil pressure by RV3. RV3 senses pressure at the valve inlet. If the pressure within the system exceeds RV3 preset level, RV3 will open and relieve pressure by directing oil to the reservoir thus maintaining a maximum pressure limit for the system.



1909 ILLUSTRATION 2.3-1

Adjustment

To adjust RV3, refer to Illustration 2.3-1 and proceed as follows:

1. Connect a 0-5000 psi. (0-35000kPa) pressure gauge to the test port (Quick Disconnect) between lift manifold and valve.

2. If the truck is capable of two pump operation, place a jumper between test points TP9 and TP11 on the distribution panel that is located just above the SCR panel on the power unit. This is to insure that both pumps are running when the relief valve is being set.

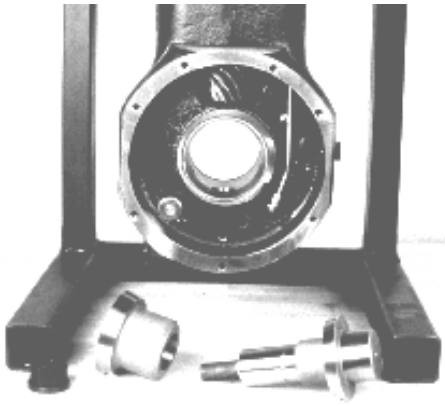
3. Operate the hydraulic system so that the oil temperature is 110-130 degrees F (45-55 C).

4. Loosen the jam nut so that RV3 can be adjusted. Raise the fork carriage until it stops. Hold the control lever in the RAISE position and check the indication of the pressure gauge when the relief valve opens. Turn the adjustment screw to change the setting. Refer to Chart 1 for correct pressure settings.Tighten the jam nut when the adjustment is correct. Recheck setting after the jam nut has been tightened. Readjust if necessary.

Truck Voltage	Model	Set Pressure (psi)	Set Pressure (kPa)
24V	TL	2570 - 2620	17720 - 18065
	TT	2410 - 2460	16615 - 16960
	TF	2210 - 2260	15240- 15820
36V	TL	2590 - 2640	17860 - 18200
	TF	2385 - 2435	16445 -16790
	TT30RD	2640 - 2690	18200 -18545
	TT45RR	2850 - 2900	19650 - 19995
	TT35RR, 40RS	2490 - 2540	17170 -17515

1948 CHART 1

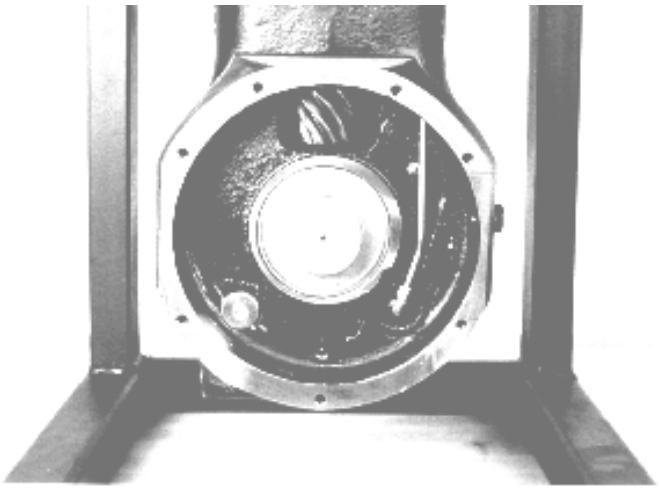
M2.3 - 1430 - 001



3065P

4. PINION HEIGHT ADJUSTMENT TOOL PART NUMBER 116207

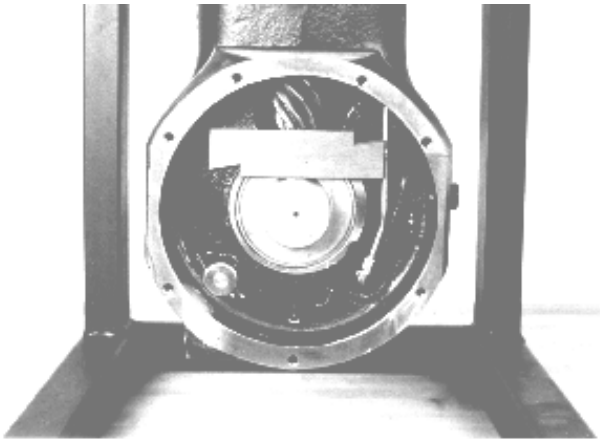
   The tool shown is required to accurately determine the correct pinion gear height or pinion gear to spiral gear relation. After the bearing cups are installed insert the tool with the nut side toward the axle seal retainer. Tighten the nut until it is snug.



3066P

5. TOOL INSTALLED

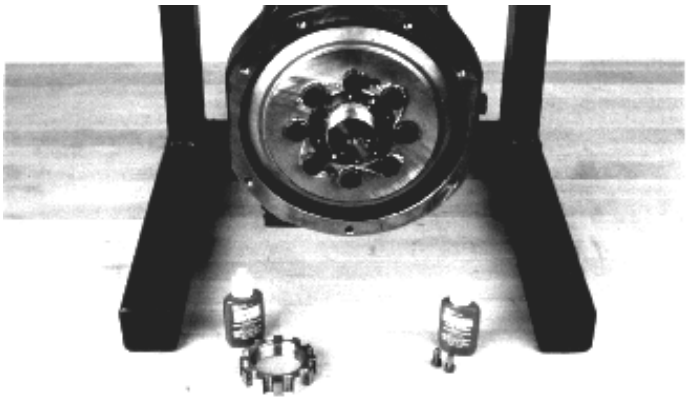
   The face of the tool shown has a radius of exactly 1 in. (25mm) from the center of the axle bore.



3067P

6. SLIDING PARALLEL

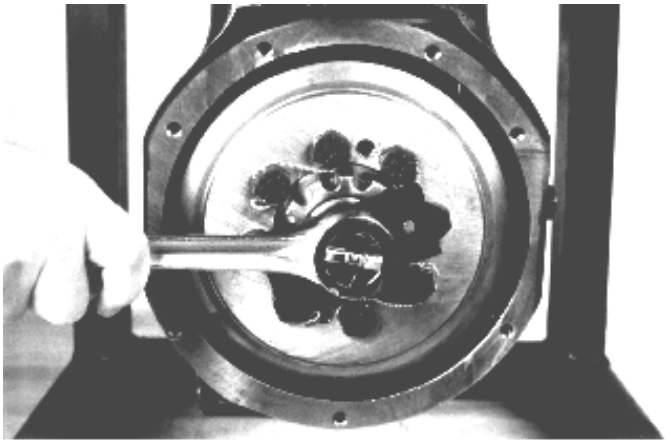
   Place the sliding parallel supplied in the kit between the tool and the pinion gear. Squeeze the sliding parallel firmly together and tighten down the screws.



3092P

33. AXLE NUT INSTALLATION

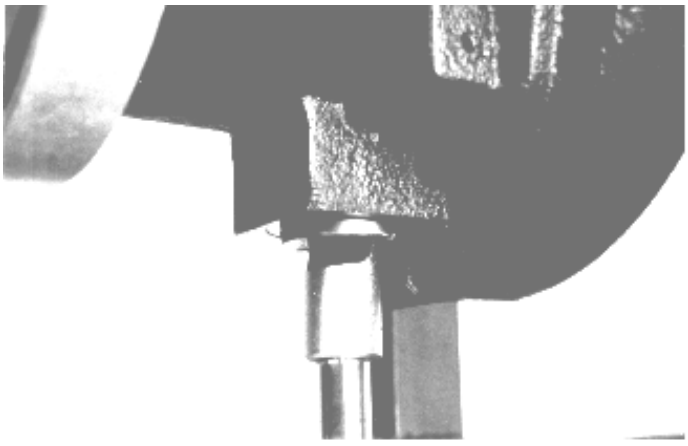
    Remove the axle nut and apply red thread lock adhesive to the axle threads.



3093P

34. NUT INSTALLED

    Install and torque the axle nut to a 100 ft. lbs. (135Nm).



3094P

35. OIL PUMP INSTALLATION

    Install the oil pump. Install the lower cover and gasket.

M3.0–1430–068

Notes:

EV100 LX TROUBLESHOOTING
RR, RS, RD Trucks with TC Traction Card
RC, RC 3000, SC Trucks with MT Traction Card

GENERAL

This section provides troubleshooting aids to facilitate analysis of truck failures. Power components are easily accessible and can be checked with a volt-ohmmeter (i.e. Simpson 260, or equivalent). If power components are believed to be faulty, or in need of replacement, refer to Power Component Test and Replacement Section.

By using the appropriate troubleshooting aids (based on status codes displayed through the use of the handset or display module), truck wiring diagram, and information provided in this manual; most problems should be easily detected and corrected.

CAUTION

Care must be taken when replacing the EV100 control card. Installation of the wrong control card may cause misoperation. Refer to subtitle and parts breakdown for card type and part number.

STATUS CODES 1 through 76 are for the traction SCR control, **STATUS CODES 90 through 95** are for the truck management module (TMM).

STATUS CODES
RR, RS, RD (Pre 3000 Series Trucks)
RC, RC 3000, SC

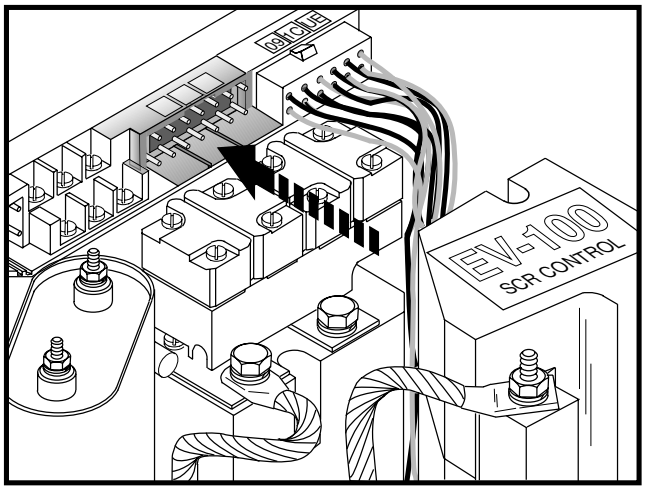
The EV100 LX/LXT SCR control utilizes an on board microprocessor to monitor the SCR control system. By monitoring circuit voltages and system timing, the microprocessor can isolate malfunctions in specific circuits. The malfunctions are categorized by status codes, and on RR, RS, RD trucks will be displayed on the display located in the overhead guard. Faults which interrupt truck operation (PMT conditions which can be reset by cycling the keyswitch) are stored in the traction SCR control card microprocessor and are accessed by use of a “plug in” handset (112209). The last fault to occur is the status code in storage. Listed in this section are the status codes which will be displayed and the possible causes of the malfunction.

Trucks not equipped with a display panel can use the GE handset as described in the following information. Use of the truck display is described following handset operation.

HANDSET OPERATION

WARNING

Before connecting or disconnecting the handset, lift the drive wheels clear of floor and place hardwood blocks under truck frame. Turn keyswitch “OFF”, disconnect battery and discharge capacitor 1C of the traction control.



1049

ILLUSTRATION 1

When the term “press key” or “depress key” is used, press the appropriate key on the handset keypad for approximately 1 second.

The control card memory is accessed by disconnecting plug in the “Y” receptacle of the traction control card and connecting the handset. When the handset is plugged in, turn the truck keyswitch to the “on” position. *Do not depress any of the handset buttons before, during or after power up.*

When the handset is being used during troubleshooting, there are three different types of information accessible; Fault Codes, Battery State of Charge, and Hour Meters.

STATUS CODE
DIR or 06

This status code is displayed when TB11-5 or TB11-6 are less than 60% of battery volts and TB11-1 is less than 2.5 volts.

Symptom: Forward or reverse contactor will not energize.

Possible Cause

- Traction speed control signal present at TB11-1 before input signal present at TB11-5 (forward) or TB11-6 (reverse).

  - Select direction before requesting traction.
  - Check input signals to TB11-5 and TB11-6.
  - Check input signal to TB11-1.

STATUS CODE
07

This status code is displayed when the accelerator input voltage at TB11-1 is higher than 3.7 volts when a directional contactor is energized.

NOTE The code will only be displayed when attempting travel in one direction. When opposite direction is selected, code will disappear.

Symptom: Forward or reverse contactor energize but control does not operate when speed command is increased or status code is displayed until the truck starts to accelerate.

Possible Cause

- Accelerator control associated wiring short or open circuited. Check signal path for TB11-1.

- Accelerator control defective.

  - Accelerator input at TB11-1 should be 3.7 volts with the key “on” and the accelerator released. As speed request is increased, voltage should decrease smoothly to .5 volts with top speed requested. Repair or replace accelerator control.

This status code is displayed when the 5 REC fails to turn on.

STATUS CODE 49

Symptom: Forward or reverse contactors open momentarily, close and open again (PMT trip).

Possible Cause

- Defective 5 REC circuit.

  - Check that 5 REC will gate on.
  - Check for shorted 5 REC.
  - Check for shorted 5 REC snubber (25 REC).
  - Check for open circuit or loose connection of white stripe/ violet wire between 5 REC gate and control card plug PCZ position 12.

- Shorted 2 REC circuit.

  - Check for shorted 2 REC.
  - Check for shorted 2 REC snubber (22 REC).

- Defective capacitor 1C circuit.

  - Check for loose connections at capacitor terminals.
  - Check capacitor 1C for open circuit.With meter an the R x 10,000 ohm scale, Measure resistance through the capacitor. Meter should indicate zero ohms, then swing slowly to above 100,000 ohms. Replace capacitor if this action is not obtained.

Not Used. Reserved for power steering pump motor temperature sensor.

STATUS CODE 91

This status code is displayed when voltage at terminal 4 of Truck Management Module (TMM) is zero volts.

STATUS CODE 92

Symptom: Status code flashes on and off.

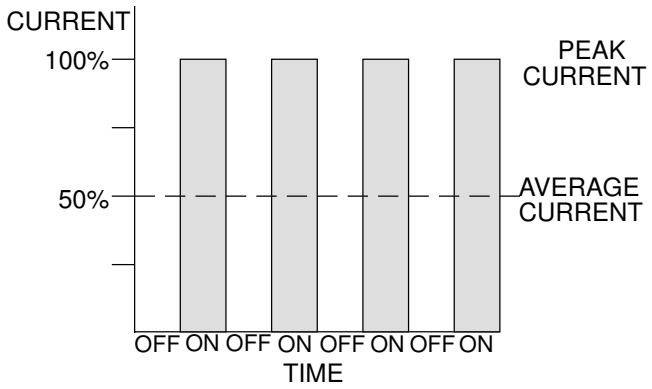
Possible Cause

- Traction motor temperature high.

  - Any condition which will cause the motor to draw excessive current will increase the operating temperature. Check mechanical condition of motor, drive unit, brakes etc. Check motor armature and field windings for short circuits.

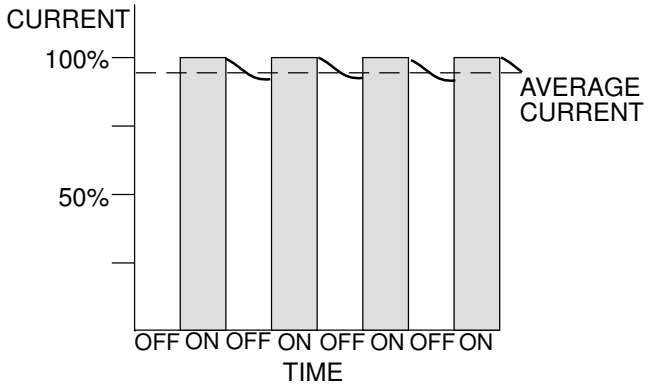
- Traction motor temperature normal.

  - Terminal 4 of TMM short circuited to battery negative.
  - Thermostat on traction motor shorted.
  - Defective TMM control card.



0165 ILLUSTRATION 4.2-9

During the off time, the energy stored in the motor, by virtue of its inductance, will cause current to circulate through the motor around the loop formed by 3 REC. Thus providing what is called “flyback current”. Illustration 4.2-10 shows the nature of the motor current which is composed of both battery current and the inductive flyback current. It should be noted that the average motor current measured will be greater than the average battery current used.



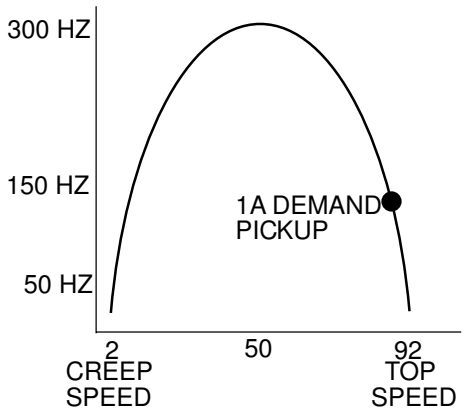
0166 ILLUSTRATION 4.2-10

The time for the next cycle to start is determined by the time that the control card takes to oscillate. This frequency of oscillation is controlled by the accelerator control and circuitry in the card. The accelerator control applies a variable voltage to the control card. Creep speed is obtained by applying approximately 3.5 volts and closing start switch. As voltage input decreases to near zero volts, speed increases. The SCR circuit is capable of delivering approximately 92 percent of full speed. For full speed operation, the 1A contactor is closed to apply full battery voltage to the motor.

Control Features

OSCILLATOR

The oscillator section of the control card has two adjustable features (Controlled Acceleration and Creep Speed) and one fixed feature (Top SCR Speed). The adjustable features are adjusted through use of the plug-in handset. Creep speed sets the minimum speed the control will operate the motor. Controlled Acceleration controls the rate (time) it takes to reach top SCR speed. Top SCR Speed is fixed by card design. The control will provide 2 to 92 percent of available voltage to the motor in the SCR mode.



0167-01 ILLUSTRATION 4.2-11

The percent “on” time has a range of approximately 5 to 95 percent. The center operating condition of the oscillator is at 50 percent “on” time and 50 percent “off” time with a nominal 1.8 milliseconds “on” time and 1.8 milliseconds “off” time. This corresponds to a maximum operating frequency of about 300 hertz. At creep speed, the “on” time will decrease to approximately 0.6 milliseconds while “off” time will become in the order of 28 milliseconds. At full SCR operation, this conditon will be reversed (short “off” time, long “on” time) as shown in Illustration 4.2-12.

Component Replacement

CONTROL CARD

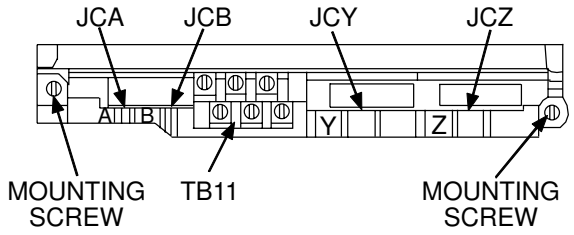
CAUTION

Make certain replacement card is same type as card being replaced.

1. Disconnect battery and discharge capacitor (1C).
2. Remove wires from screw terminals TB11-1 through TB11-6.
3. Unplug connectors by pressing down on tab with wide blade screwdriver and rotating 90°.
4. Remove two mounting screws at ends of card and lift card from assembly.

NOTE

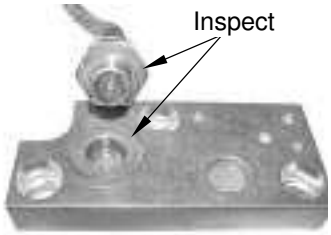
Reverse procedure for card installation.



0175 ILLUSTRATION 4.2-20

Diodes (3, 4, 7 REC)

1. Disconnect battery and discharge capacitor (1C).
2. Remove all electrical connections, noting location for proper installation.
3. Remove rectifier/diode. Inspect rectifier/diode and heatsink mating surfaces for pitting and corrosion. Also check thread condition. Replace if pitting and corrosion or cross threading is present.



10291 ILLUSTRATION 4.2-21

4. When installing, apply lubricant 063002-043 to threads and mating surfaces. Torque to 6.0 Nm (50 inch/lbs).
5. Make sure the braided pigtail is twisted clockwise to tighten the braid and secure in place.

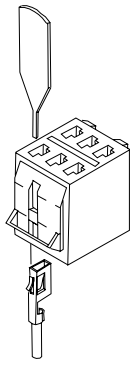
SCR's (2 REC, 5 REC)

1. Disconnect battery and discharge capacitor (1C).
2. Remove all electrical connections, noting location for proper installation.
3. Remove two mounting screws and lift SCR from assembly.
4. Clean heat sink with clean rag and isopropyl alcohol.
5. Apply thin layer of silicone grease (Crown no. 93983) on heat sink.
6. Position replacement SCR on heat sink and install mounting screws, "finger tight".
7. Make certain SCR lies flat against heat sink and alternately tighten the two mounting screws in one-quarter turn increments.
8. Connect all electrical connections as noted at removal.

CONTACTS (PCA, PCB, PCY, PCZ)

Use extraction tool (Crown no. 100522) to unlatch locking tab on individual contacts and pull from plug by wire. Replacement contacts are Crown no. 104737. Use crimping tool (Crown no. 90118) to crimp replacement contacts to wire.

Plug repair kits are available which include the plug, gasket, hole plugs and terminals. Order Crown No. 108934 for plug PCA repair kit, Crown No. 108935 for plug PCB repair kit, Crown No. 112528 for plug PCY repair kit and Crown No.108936 for plug PCZ repair kit.



0176 ILLUSTRATION 4.2-21

FUNCTION ADJUSTMENTS FOR TRUCK APPLICATION

The following function settings may be modified if necessary, to optimize truck performance to the application. Whenever modifing the function settings, the following procedures must be used.

Battery Discharge Interrupt FUNCTION 14

This adjustment allows the battery discharge interrupt to accurately compensate for the actual battery being used. The preset value represents a typical battery for a particular compartment size and is satisfactory in most cases. However, if the indicator is showing 100% discharge, or the interrupt is locking out the lift fumction, at too high (greater than 1175) or too low (less than 1140) specific gravity, the compensation adjustment value is not suited to the actual battery being used.

If several different batteries are used in the truck and the range in capacity is greater than 200 AH, The largest battery should be used for the adjustment procedure. Normally the value for function 14 will be set between 19 and 28 for 24 volt batteries and between 12 and 19 for 36 volt batteries.

The truck should be operated under normal working conditions to obtain an accurate indication. While performing these steps, either observe the handset connected to the "Y" plug of the SCR traction control and reading the % charge or observe the bars in the BDI display of the overhead guard console. Start with a fully charged and equalized battery of the size and condition that will normally be used in the truck.

1. Cycle the battery by disconnecting and then reconnecting the emergency disconnect.

2. Proceed with normal duty cycle operation until the BDI shows that the battery has discharged to the point that between 2 to 5 bars are lit (22 to 61% charge if using handset).

3. This step should be completed within 5 to 10 minutes after the completion of the duty cycle. Note the number of bars lit (% charge on handset). Cycle the battery using the battery disconnect, leaving the battery disconnected for at least 30 seconds.

4. Connect the battery and note the number of bars lit (% charge on handset).

5. If the number of bars lit increased (% charge on handset increased more than 6%) after connecting the battery, the BDI is overcompensating and the truck will lock out at too high a specific gravity. The value of function 14 (IR compensation) should be lowered by 1 set point. e.g. change from 15 to 14.

6. If the number of bars lit decreased (% charge on handset decreased more than 6%), the BDI is undercompensating and will lock out at too low a specific gravity. The value of function 14 (IR compensation) should be raised by 1 set point. e.g. change from 14 to 15.

7. Repeat procedure to verify accuracy of new settings. If function 14 has been adjusted per this procedure and lock out still occurs at too high a specific gravity, the value may need to be lowered further until lockout occurs at the desired specific gravity. When this occurs, it is possible that the duty cycle discharge rate is too high for the battery size (AH capacity) being used. It is also likely that this adjustment will cause lockout to occur at discharge levels beyond 80%.

Plug Braking FUNCTIONS 5 and 16

The braking effort by the plug braking function is dependent on plugging current limit (C/L), function 5 and pedal plug, function 16. For plug braking to function correctly, the function 16 setting must be 30 greater than function 5. e.g. Function 5 setting is 83, function 16 setting must be 83 + 30 for a setting of 113. In certain applications it may be desirable to either increase or decrease the braking effort from plug braking.

1. Use the handset and determine the present values of functions 5 and 16. Should match settings in charts for truck model and voltage.

2. To increase the braking effect (decrease stopping distance), add 3 to **both** function 5 and function 16 to maintain 30 as the difference between the functions. To decrease the braking effect (increase stopping distance), subtract 3 from **both** functions.

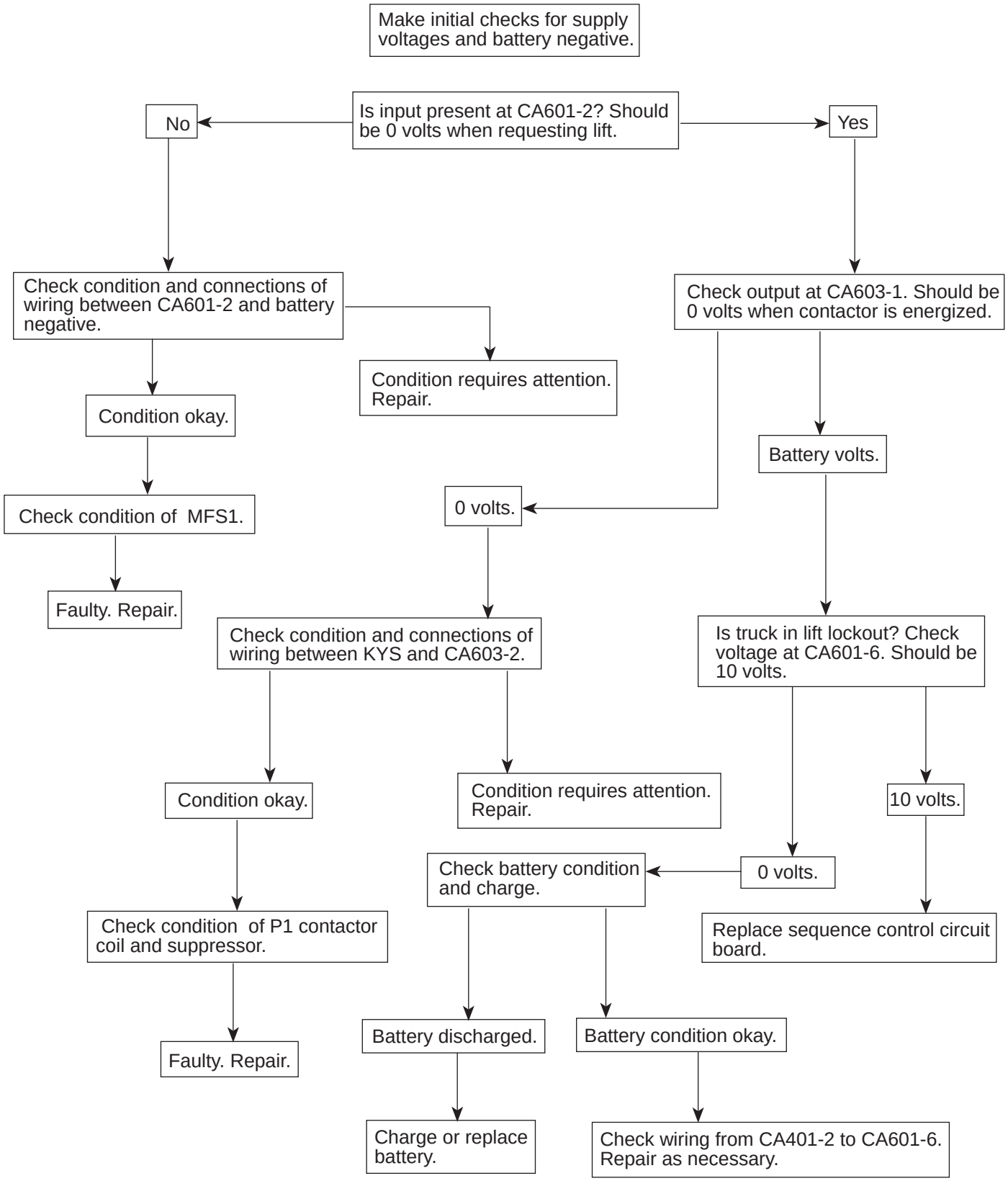
3. Operate truck and use plug braking to determine if performance is adequate. If not, adjust as necessary.

NOTE

Operating the truck in the forks first direction, with a capacity load and too severe of a plug braking setting may result in drive tire slide. It is recommended that a setting be selected that results in no tire slide.

1868-01

2. Low Speed Lift Does Not Operate.



ADDITIONAL MESSAGES

When the operator is not standing on the power on pedal and the truck is “powered up”, the display will show the message PWR.

1797

After power up, if the operator is not standing on the brake pedal and selects a direction of travel, the display will show the message BRAK.

1798

LANGUAGE SELECTION

The display is a multilingual device capable of six languages. Language selection is made through the use of the display and clear switches located under a ledge below the steering tiller. After the hour meters are displayed during truck power down, actuate the display and clear switches simultaneously and release. The message ENGL will be displayed. This is not necessarily the language that is active in the display module. Within four seconds, actuate the display switch to scroll through the available languages in the order listed.

LANGUAGE	DISPLAY
English	ENGL
Spanish	SPAN
German	GERM
Italian	ITAL
Dutch	DUTC
French	FREN

When the language that is wanted is displayed, actuate the clear switch within four seconds of the last switch actuation. This action will make the selected language active. If the display goes blank before a selection is made, the language that was active before the inquiry will still be the active language.

MULTILINGUAL MESSAGES

MESSAGE	**LANGUAGE**					
	ENGLISH	**SPANISH**	**GERMAN**	**ITALIAN**	**DUTCH**	**FRENCH**
BRAKE	BRAK	FRNO	BREM	FRNO	REM	FRN
NONE	NONE	NADA	KEIN	ZERO	GEEN	RIEN
CLEAR	CLR?	CANC	LSEN	CANC	WIS	EFFC
TEST	TEST	PRBA	TEST	TEST	TEST	TEST
KEY	KEY	LLAV	SCHL	KEY	SLEV	CLE
POWER	PWR	POT	ANTR	ENER	STRM	ALIM

NOTES:

1. LLAV is short for LLAVE.
2. The Italian word for key is CHIAVE. The abbreviation of this word either does not make sense or could give the impression that the translation is incorrect. The word would be best understood if it is left in English.

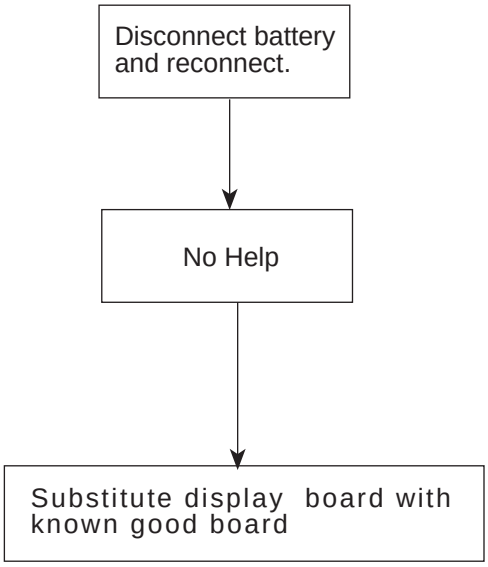
M4.3 - 1430 - 101

1889

12. SYMPTOM: Fault codes not saved. Hour meter or language version not saved.

1890

13. SYMPTOM: Display not showing rational information. LED's illuminating sporadically.



Multi-function switch No. 2 is located above multi-function switch No. 1. The switch is activated by the same actuator that activates switch No. 1. It is adjusted to actuate with just slight down movement in the control handle, follow same adjusting procedure as stated above.

Multi-Function Switch(es) (RC only)

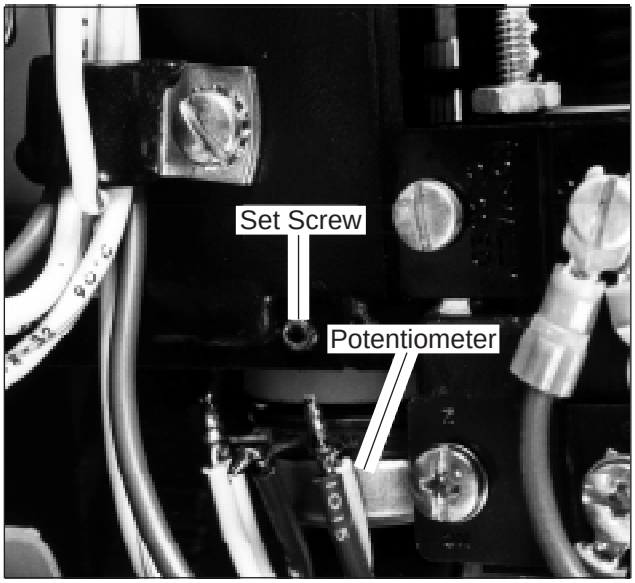
On all “RC” trucks, the multi-function switches are adjusted the same as Raise Switches. Refer to Raise Switches (RR, RS, RS only) for adjustment procedure.

SCR SPEED CONTROL (POTENTIOMETER)

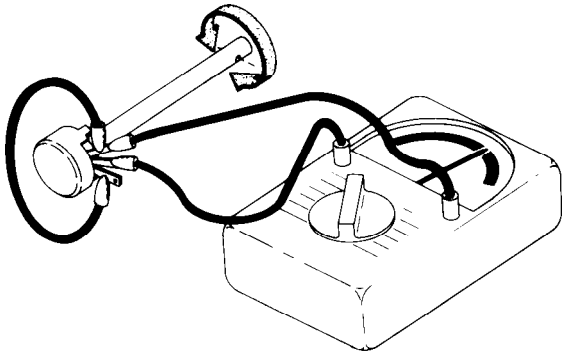
Before adjustment the entire multi-function control handle must be completely assembled and wired except for the gear (Index 25) and cotter pin (Index 26). The cotter pin secures the gear to the “pot”. The “pot” is securely fastened to its mounting bracket by use of a set screw (Index 30). (REFER TO ILLUSTRATION 4-23 and ILLUSTRATION 4-28)

Adjustment

By placing leads of an ohmmeter between the center terminal and either end terminal of the “pot”, rotate the “pot” shaft so that a maximum ohms is read on the meter. With the “pot” in this position and the handle grip in the neutral position, slide the gear (Index 25) onto the pot shaft so that the hole in the “pot” shaft, the hole in the gear and the mating gear teeth all “line up”. Now pin the gear to the pot shaft with cotter pin (Index 26).



1985P ILLUSTRATION 4-28



0271S ILLUSTRATION 4-29

The potentiometer can be adjusted or positioned at its maximum ohm reading outside the multi-function assembly in the following manner: Attach a jumper to outside terminals, place leads of ohm meter to either of the outside terminals and center terminal of “pot”. Rotate the “pot” shaft to obtain maximum ohm reading on meter, disconnect meter leads and place “pot” in the multi-function assembly. (REFER TO ILLUSTRATION 4-29)

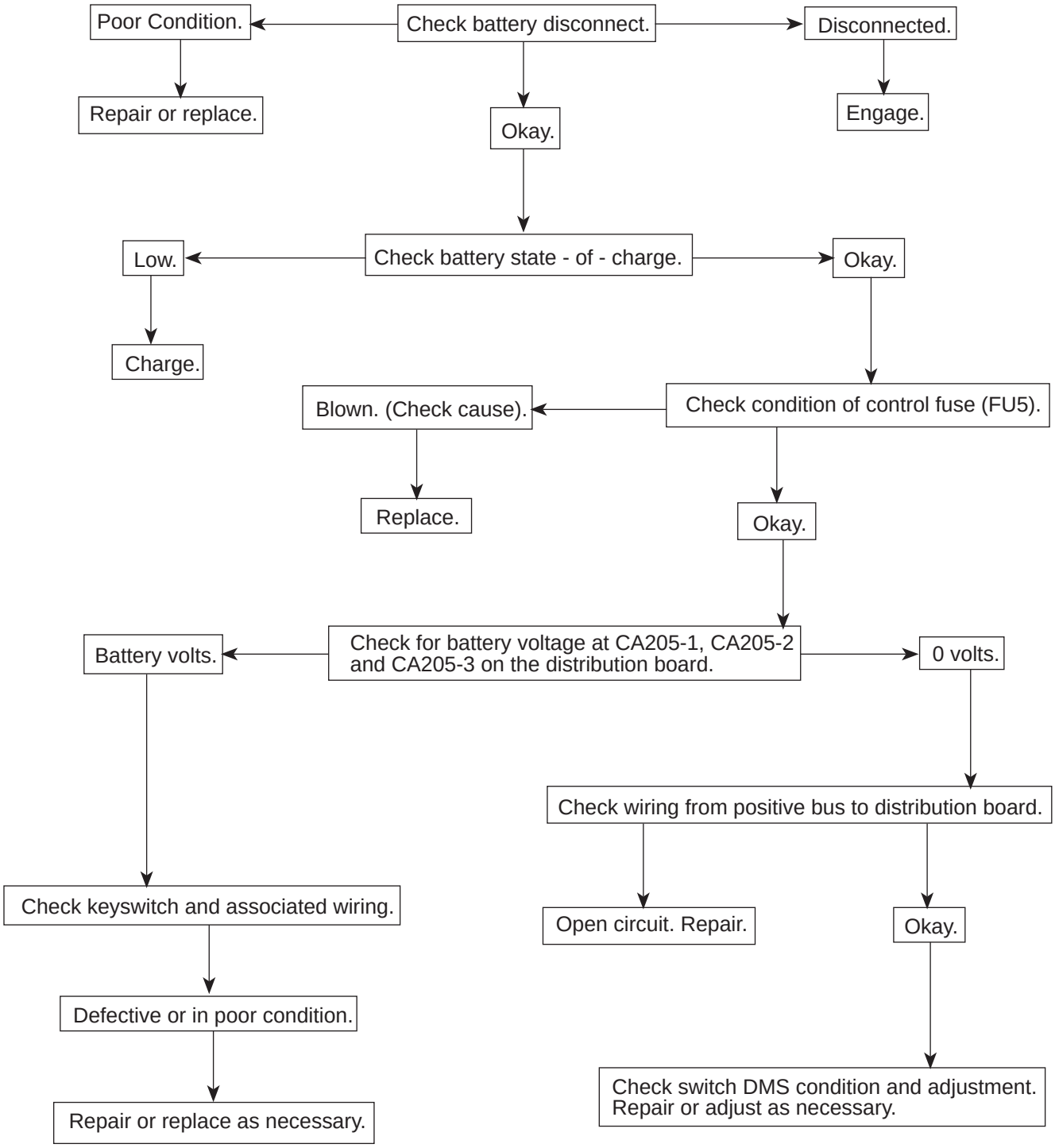
For fine adjustment, again attach ohmmeter leads so that a reading is taken between the center terminal of the “pot” and either end terminal. Loosen pot mounting screw (Index 30, Illustration 4-23) so that the “pot” can be rotated slightly to obtain a maximum ohm reading on the meter. Once this reading is obtained, tighten set screw (30) securely.

To check adjustment of pot assembly in multi-function control attach leads of ohm meter to green and brown wires. The meter should read from 4300 to 4600 ohms when forward or reverse switches close. Now move the handle grip in either direction; meter reading should drop to between 0 and 200 ohms just before 1A switch closes.

Replacement

To replace the potentiometer, remove the cotter pin holding the gear to the top of the “pot” shaft. The set screw holding the pot mounting secure needs to be loosened to allow the pot to be removed from the bottom of the bracket. Install new potentiometer; align tab on pot with notch in lower flanged bearing. The adjustment procedure can be followed now as described in “adjustment”.

(1) TRUCK COMPLETELY INOPERATIVE.



FLUID LEVEL

Brake fluid is added to the reservoir mounted on the steering bracket to the right of the oil filter. Use Dow Corning Q2-1141 Silicone Brake Fluid. The silicone brake fluid currently being used in all brake systems and available from Crown is compatible with all other types, non-corrosive and doesn't react with painted surfaces. Order 063004-002 for 12 ounces (0.35 liter) of brake fluid or 063004-003 for 1 gallon (3.8 liter).

- The reservoir level should be 1/2 to 3/4 in. (15 to 20 mm) from the top.

BRAKE LINES

- Use care to avoid kinking any brake lines. Permanent damage to the line will result if this occurs.

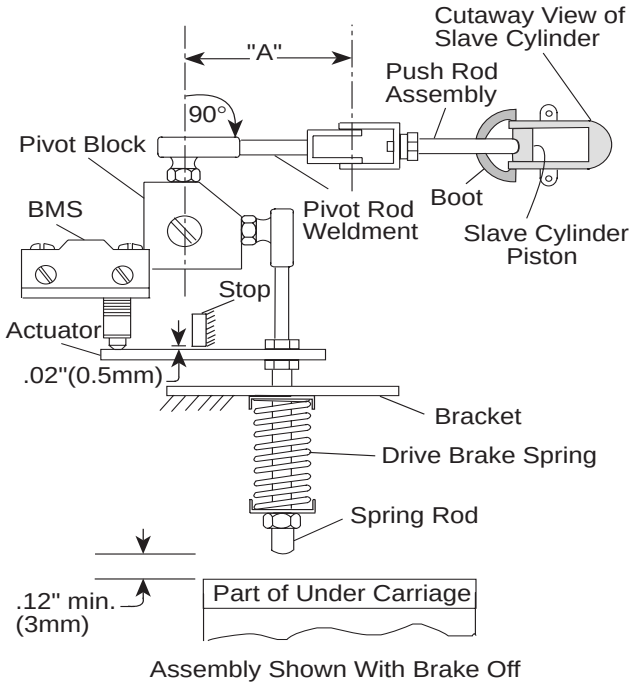
BRAKE ADJUSTMENT and LINING REPLACEMENT

Drive Brake

NOTE

Drive brakes must be readjusted when braking is insufficient, or linings are wore to the extent that the return "off" stroke of slave cylinder does not actuate the switch to permit truck operation. Readjust drive brake by repositioning the switch actuator and drive brake spring.

If linings are worn to the extent that the distance between the end of the spring rod and the undercarriage decreases to .12 inch (3 mm) (illustration 5-3) when brakes are applied, the lever arm on the drive brake must be repositioned clockwise one notch (approximately 26° or 0.69 inch [17 mm]) on serrated pin (illustration 5-4) or new shoes should be installed.



1976 ILLUSTRATION 5-3

PREPARATION

1. Raise the rear of the truck until the drive wheel and caster are off floor, approximately 6 inches. Place a hardwood block under the center pivot of the undercarriage and lower truck onto block.

2. Unlatch door, remove hinge pin and set door aside.

3. Remove the fan (index 17) from brake drum (index 32). (See Illustration 5-1)

4. Remove bolt (index 16) and lockwasher (index 33) located in the center of the brake drum; depress brake pedal and remove brake drum.

5. Inspect condition of drum, especially for grooves worn in the inside by worn linings.

LINING INSPECTION and REPLACEMENT

1. Inspect linings and replace if necessary.

2. Remove the two springs connecting the brake shoes and remove the two nuts, lockwashers and flatwashers holding the shoes to the backing plate.

3. Place new linings in position and secure to the backing plate. Attach springs connecting the linings.

LINING INSPECTION AND REPLACEMENT

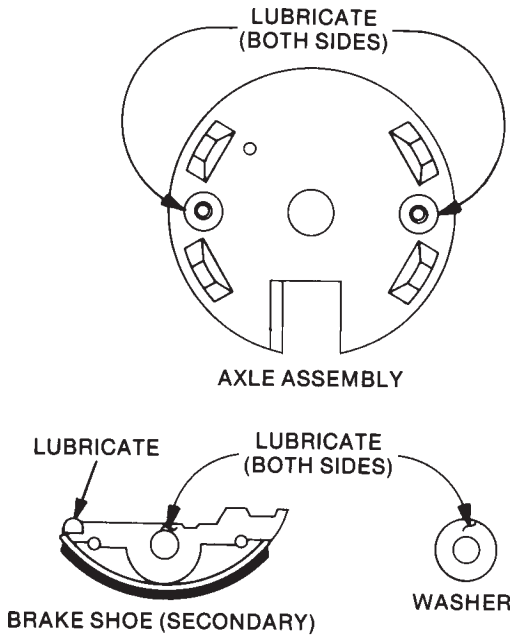
1. Inspect linings and replace if necessary.

2. Remove adjustor spring (index 27) and piston spring (index 28). Remove adjusting screw with components (index 22, 23, 24). Remove bolt (index 30) securing linings to axle assembly and remove secondary brake shoe (index 26) and primary brake shoe (index 25).

3. Place new linings in position and bolt to axle assembly (backing plate). The primary and secondary shoes will only fit properly if positioned to the correct side of the manifold block (index 36). The primary shoe will mate with the plunger (index 41) and the secondary shoe will mate with the end cap (index 55).

NOTE

When spraying the pivot areas of the caster secondary brake shoes, washers, & axle with dry lubricant, Crown part no. 063002-021, (Refer To Illustration 5-6) do not allow any lubricant to come in contact with the lining material or braking surfaces of the brake assembly.



1926S ILLUSTRATION 5-6

4. Turn adjustors (index 23, illustration 5-2) to obtain shortest possible length. Position adjustor at top of shoes.

NOTE

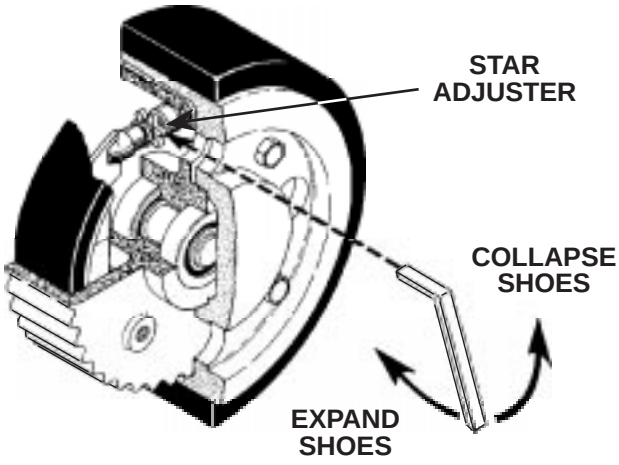
The adjustor on each side must be positioned as shown in Illustration 5-2, or proper adjustment cannot be made.

Install springs (index 27, 28) on brake shoes.

5. Place brake drum on axle assembly and attach retaining ring to axle end. Bolt caster wheel to brake drum (45 to 55 ft. lbs. [61 to 75 Nm]).

SHOE CLEARANCE ADJUSTMENT

1. To adjust brake shoe clearance, align the access hole in the caster wheel and brake drum with the adjusting screw (star adjuster). Insert brake adjusting spoon and rotate (downward) star adjuster to expand shoes until they contact drum and then back off 3 to 4 clicks.



1927S ILLUSTRATION 5-7

2. Release the brake pedal and remove the blocks from under the rear of the truck.

MAST STAGING BUMPER REPLACEMENT (TT Only)

1. Reference Illustration 7-1.

2. Prior to bumper installation (item 49), lower mast and measure any gap at the meeting of mast and mainframe.

3. To fill the gap determine the proper shim combination using shims 060030-266 (0.063 in. [1.6mm] thick) and/or 060030-277 (0.031 in. [0.8mm] thick). Raise mast and assemble shims and bumper.

4. Lower mast and check to be sure all mast bumpers contact their stops at the same time. Re-adjust if necessary.

5. Apply thread locking adhesive to bumper screws and torque screws to 28 - 32 in. lbs. (3.16 - 3.62 Nm).

DISASSEMBLY

(REFER TO ILLUSTRATION 7-1)

1. Unplug and remove battery.

2. Remove load backrest and forks from carriage.

3. Remove safety shield.

4. Connect a hoist to the carriage assembly and raise to get slack in chains and remove yoke assemblies from side cylinders, TF or TT; remove the roller bar if TL.

NOTE

If your unit is equipped with a reach assembly, extend the reach when removing from the mast assembly. The reach assembly can be kept in an upright position much easier if it is extended. Block pantograph to prevent premature retraction. If your unit is not equipped with a reach assembly, use a hardwood block under the fork plate to keep the carriage upright.

5. Unhook chains and hydraulic lines on carriage assembly, and lower carriage to the floor.

6. Connect a hoist to the top crossbrace of the mast and raise the mast until the reach assembly or forkplate can be slid forward to clear the mast, then lower to collapsed position.

Steps 7 thru 15 cover TT Mast

7. Remove cylinder (Cluster Cylinder, TT)

   A. Remove flow control valve with connector (Have container in position to catch oil from cylinder at this time).

   B. Connect hoist to top crossbrace on third stage mast; raise mast high enough to disconnect hydraulic lines and cables from the base of the third stage mast. Block mast. Disconnect the hydraulic line connecting the two center cylinders; do not disconnect at base of the single cylinder.

   C. Remove the lift chains from the side cylinders.

   D. Remove the nut and stud holding the cylinder cluster to the top of the third stage mast; loosen, do not remove at this time, the two 3/8 in. bolts holding the cylinder cluster at the base of the second stage.

   E. Raise the third stage mast approximately 6 inches (13mm) and place a hardwood block below the third stage, place the block under the channel of the third stage, support the cylinder cluster while blocking the mast.

   F. Install a forged 5/8 in.-18 eye-bolt in the top of the center cylinder cluster; connect a hoist to the eye-bolt and support the cylinder in an upright position. Remove the two 3/8 in. bolts holding the ram of the center cylinder to the bottom of the second stage.

   G. With a pry bar positioned under the ram of the center cylinder, pry up and out at the same time. As the ram clears the base of the second stage gently lower the ram and cylinder cluster assembly. As the cylinder cluster is lowered the guides at the top of the center cylinders will disengage allowing the cylinder cluster to be moved to a clean work area if cylinder disassembly is necessary.

CAUTION

Be sure to avoid any damage to rams or hydraulic lines during cylinder removal.

8. Connect a hoist to the top of the third stage and raise, remove hardwood block under the channel of the third stage. Remove the two retaining bolts at the bottom of the third stage mast; disconnect lift chains and hydraulic lines from the base of the third stage.

16. Block the third stage mast 6 to 8 in. (150 to 200 mm) above the second stage with a hardwood block, 2x4x8 in. (50x100x200 mm) approximate size. Place hardwood block under channel of third stage.

17. Install a 5/8 in.-18 forged eye-bolt in the top of the center cylinder cluster, connect to hoist and raise cylinder cluster to a vertical position.

18. Engage the cylinder wear pad at the top of the single center cylinder with the support channel at the rear of the main cylinder of the cluster assembly.

19. Guide the cylinder cluster, while raising, and bring the ram of the center cylinder into position at the base of the second stage; position the button rest under the ram and with two 3/8 in. bolts, bolt ram loosely to second stage.

20. Lower cylinder cluster and align the hydraulic line from the ram of center cylinder in the cluster; connection of the hydraulic line to the single main cylinder will be made later, (See step 24).

21. Remove the eye-bolt in top of cylinder cluster; attach hoist to the top crossbrace of the third stage; raise third stage and remove hardwood block.

22. Lower third stage mast and guide the roll pin in top of center cylinder into the hole in the mounting bracket on third stage; assemble the cylinder cluster assembly to the top of third stage with a stud and nut. Thread locking adhesive should be applied to the stud at assembly. Tighten the two 3/8 in. bolts at the bottom of the cylinder cluster.

23. Connect hoist to top of both the second and third stage, raise until the pulley assemblies, (ITEM 34 AND 38, ILLUSTRATION 7-1) can be installed near the base of the second stage; route the lift chains from top of main frame through pulleys and connect to third stage; route the hydraulic lines (ITEM 3, ILLUSTRATION 7-3) through pulleys and connect to bulkheads on third stage.

24. Connect the hydraulic line from front center cylinder ram to rear cylinder tube.

25. Lower the second and third stage masts to collapsed position.

26. Attach lift chains to the two side cylinders; an access hole is provided through the battery compartment wall. (TF and TT Models only)

27. Connect hoist to the top crossbrace of third stage; raise mast and connect hydraulic lines to bulkheads near base of third stage; lower third stage mast to its home position. (TT Models only)

28. Install yoke assemblies on rams of both side cylinders; route lift chains, hydraulic lines, and cable through yokes. (TF and TT Models only)

29. Prepare carriage assembly in the same manner as used to install a mast. (See steps 1 thru 4)

30. Connect hoist to top crossbrace of second stage (TF, TL) or third stage (TT), and raise mast. Position carriage assembly beneath the mast assembly; lower mast and guide the column rollers on carriage into mast assembly.

31. Connect the hoist to the carriage assembly; raise carriage assembly in mast assembly; remove the yoke assemblies from the side cylinders (TF, TT, only), lay the yokes on top of power unit, continue to raise carriage until the lift chains, hydraulic lines, and cables can be connected to the carriage assembly.

32. Lower carriage assembly and replace yoke assemblies on side cylinders (TF, TT only).

If the amount of room overhead will not allow the masts to be raised enough for assembly into the mainframe, lay the mainframe down. The preceding reassembly procedure can be used as such. Hook-ups should be made at the center of the mast and cylinder assemblies for balance.

When bolting the mainframe to power unit refer to disassembly procedure in this section and reverse the steps.

33. Install flow control valve with connector; connect all hydraulic lines and cables to power unit from mast assembly.

34. Bolt on overhead guard, install safety shield.

35. Secure forks and load backrest on carriage assembly.

36. Place battery in compartment and run operational check.

CAUTION

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

M7.0–1435–006

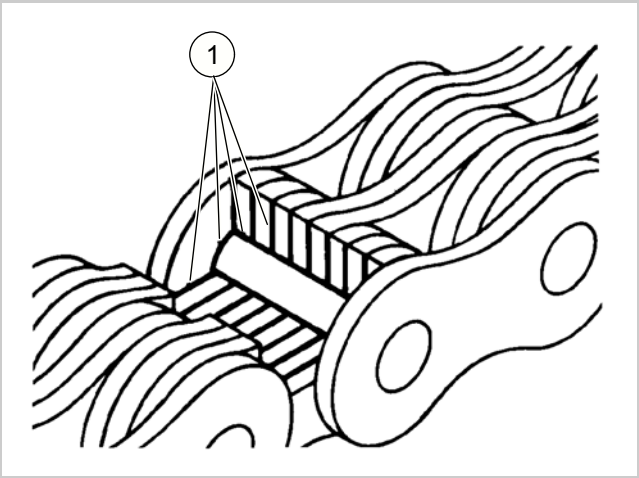


Fig. 1 (33490)

Inspecting the lift chain

See the INSPECTION AND LUBRICATION section for the applicable lubricant and planned maintenance intervals for the lift truck.

Checking the lift chains for wear

Special tools and equipment:

– Chain wear scale, P/N 106440, or steel tape measure

As the lift chain bends on and off the pulleys, the joints gradually wear. Material wears off the outside diameter of the pin and the inside diameter of the holes for the pins on the inner plates. This wear causes the lift chain to elongate.

Measuring the lift chains for wear with a chain wear scale

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 2. Measure the lift chain with a chain wear scale (1).
   – Use Scale A for lift chains with a pitch of 19 mm (0.75 in) or 25 mm (1.0 in)
   – Use Scale B for lift chains with a pitch of 16 mm (0.625 in)

Note: The pitch is the distance between the pins.

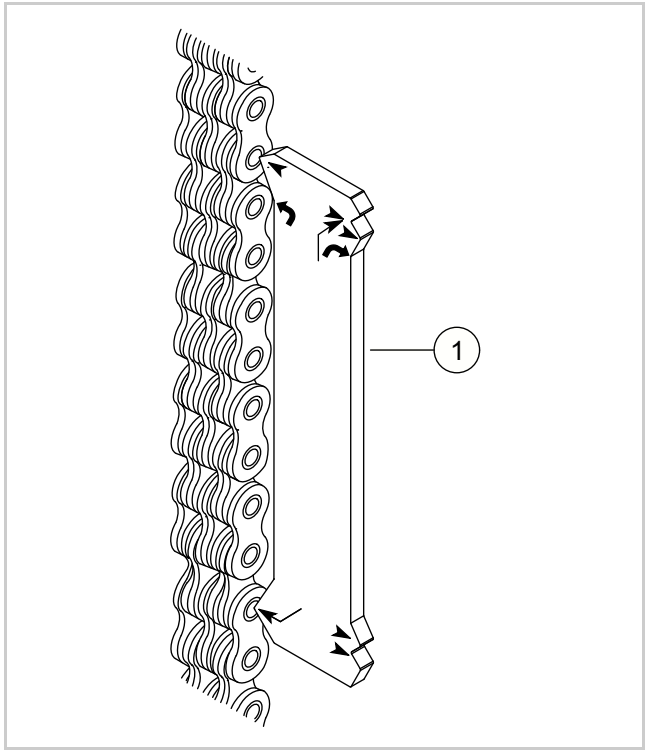


Fig. 2 (33491)

4. Replace the lift chain if the elongation is more than 3% or will be more than 3% before the next maintenance interval.
   – Do not repair a chain link 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 at the same time.

Bent or Twisted Forks

Overloading, hitting solid objects, or picking up loads that are uneven can bend or twist the fork, resulting in replacing the fork. The maximum allowable difference in fork tip height from one fork to another is 3% of the fork length.

See Figure 8. The angle (1) between the top of the fork blade to the back surface of the shank must be less than 93°. Replace the fork if the angle is greater than 93°. Contact a Crown Equipment Corporation representative for additional information on repairing the forks.

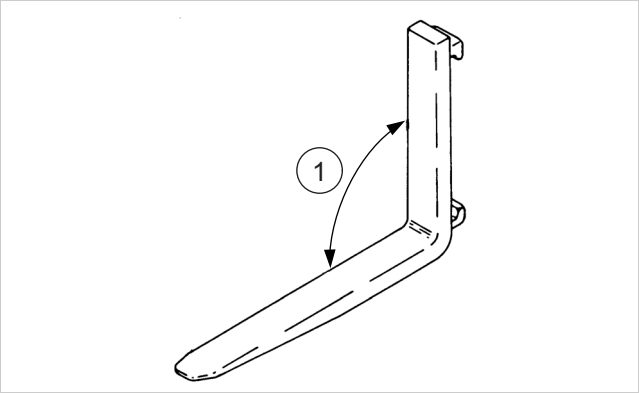


Fig. 8 (16861-02)

Using a carpenters square to check the fork

1. See Figure 9. Hold the square (1) against the shank above the radius of the fork heel.

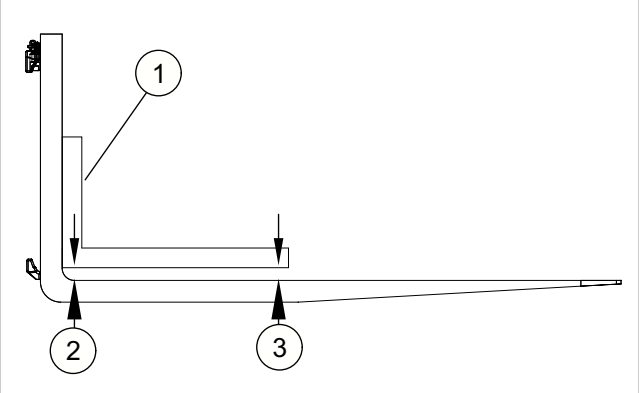


Fig. 9 (16862-02)

2. Measure the distance (2) closest to the radius of the fork heel of the fork blade and square.
3. Add 31.8 mm (1.25 in) to this measurement and note the dimension.
4. Measure the distance (3) between the end of the square and blade. If the distance is greater than the result in step 3, replace the fork. The dimension indicates that the fork is bent more than 93°.

Hanger

See Figure 10.

1. Check for cracks or damage to the fork pins, spring, handle, and roll pin (1).
2. Check for cracks or damage to the area of fork attachment (2).
3. Check the fork carriage for excessive wear or cracks. Repair or replace parts if necessary.

WARNING

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

4. Check the condition of the fork locking pin, spring, handle, and roll pin for proper operation, if the forks have these parts installed.

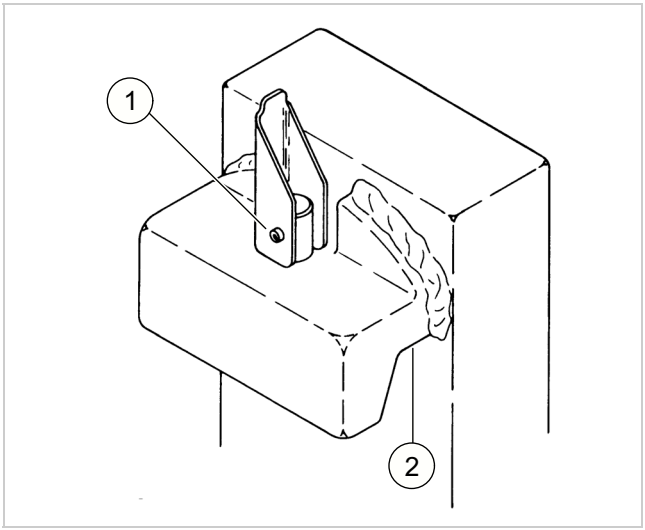


Fig. 10 (16863-02)

This electrical diagram index, for the RR, RS, RD Rider Reach/Straddle Series Trucks, lists the diagrams with portion of truck covered by each diagram.

POWER CABLES

NOTES:	PUMPS	BATT	COMP
1. PC 1/0-010	2	36V	'B'
PC 1/0-025	2	36V	C,D,E
2. PC 2/0-162	1	24V	'A'
PC 2/0-142	1	24V	'B'
PC 2/0-149	1	24V	'C'
PC 1/0-010	1	36V	'A'
PC 1/0-010	2	36V	'B'
PC 1/0-025	1	36V	'B'
PC 1/0-024	1	36V	'C'
PC 1/0-025	2	36V	C,D,E
3. PC 4-042	X	X	X
*PC 4-097	X	X	X
4. PC 1/0-023	X	X	X
*PC 1/0-181	X	X	X
5. PC 1/0-024	X	X	X
*PC 1/0-023	X	X	X
6. PC 1/0-026	X	X	X
*PC 1/0-180	X	X	X
7. PC 3/0-007	1	24V	'A'
PC 3/0-005	1	24V	'B'
PC 3/0-001	1	24V	'C'
PC 2/0-011	1	36V	'A'
PC 2/0-009	1 OR 2	36V	'B'
PC 2/0-007	1 OR 2	36V	'C'
*PC 2/0-024	2	36V	'D'
*PC 2/0-005	2	36V	'E'

	PUMPS	BATT	COMP
8. PC 3/0-004	1	24V	'A' THRU 'E'
PC 2/0-145	1	36V	'A' THRU 'E'
PC 2/0-146	2	36V	'B' THRU 'E'
9. PC 3/0-014	1	24V	'A'
PC 3/0-015	1	24V	'B'
PC 3/0-008	1	24V	'C'
PC 2/0-035	1	36V	'A'
PC 2/0-036	1 OR 2	36V	'B'
PC 2/0-012	1 OR 2	36V	'C'
*PC 2/0-008	2	36V	'C'
*PC 2/0-037	2	36V	'D'
*PC 2/0-025	2	36V	'E'
10. PC 4-099	X	x	'A'
*PC 4-098	X	X	'B'
PC 4-167	X	x	'C,D,E'
11. PC 1/0-182	X	X	X
*PC 1/0-111	X	X	X
12. PC 1/0-182	X	X	X
*PC 1/0-111	X	X	X
13. PC 1/0-018	X	X	X
*PC 1/0-019	X	X	X
14. PC 1/0-023	X	X	X
15. PC 1/0-020	X	X	X

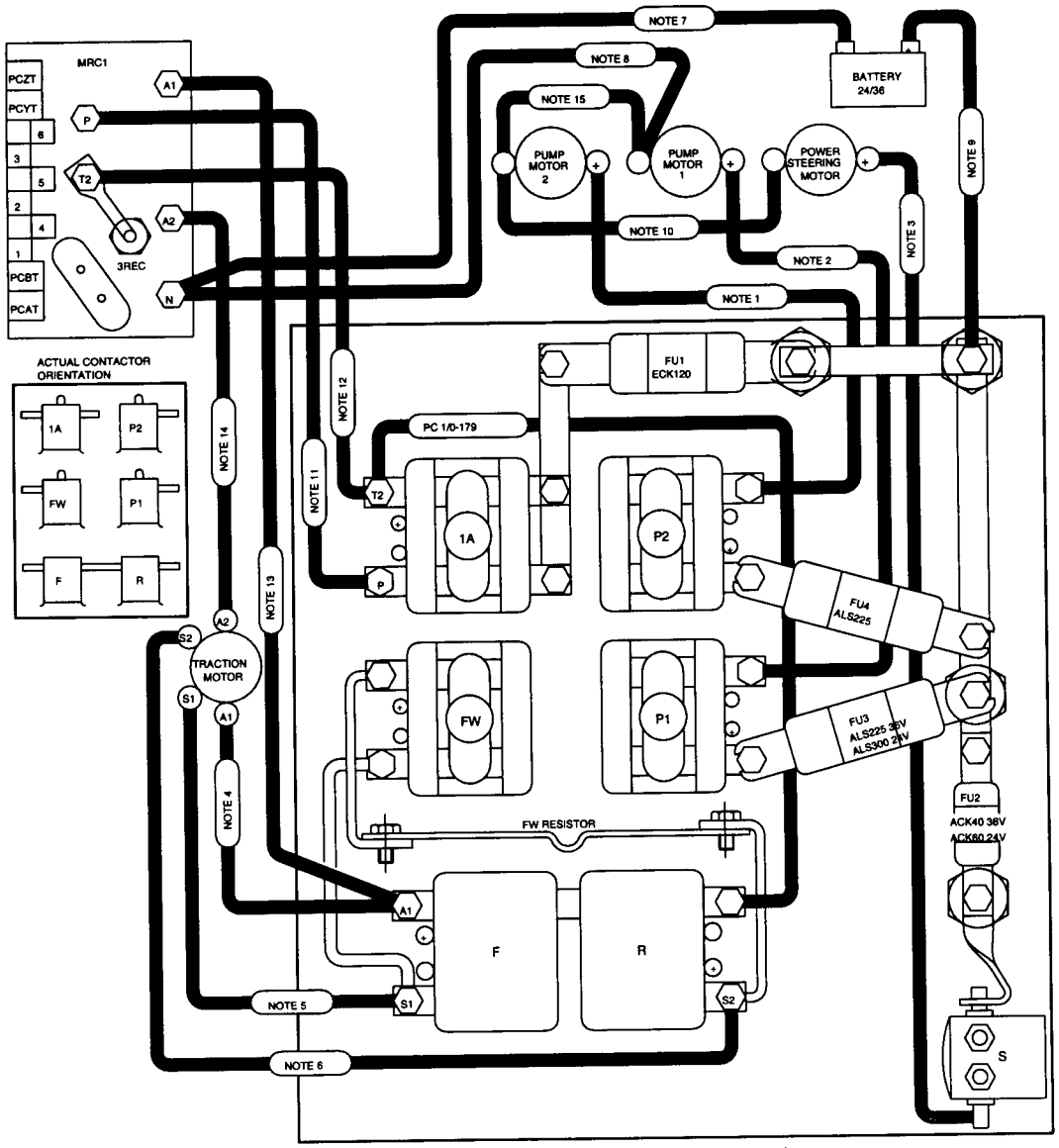
16. * DENOTES USE ONLY ON 45" (1143mm) POWER UNITS
17. X DENOTES "USED ON ALL VARIATIONS "

18. POWER CABLES ARE DESIGNATED USING ONE OF THE FOLLOWING ABBREVIATIONS FOLLOWED BY A DASH NUMBER.

ABBREVIATION	PART NO.
PC 1	084571
PC 2	084570
PC 4	084569
PC 6	084568
PC 10	090963
PC 1/0	084572
PC 2/0	084573
PC 3/0	086749

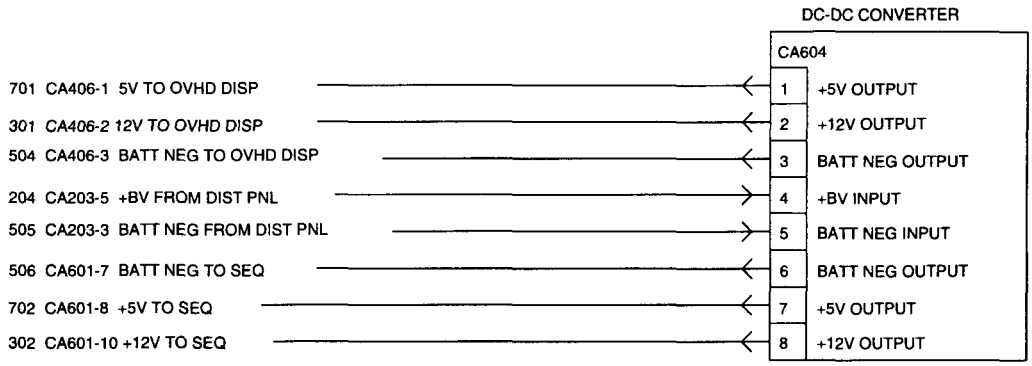
EXAMPLE: CABLE PC 1/0-010 ORDER CABLE 084572-010

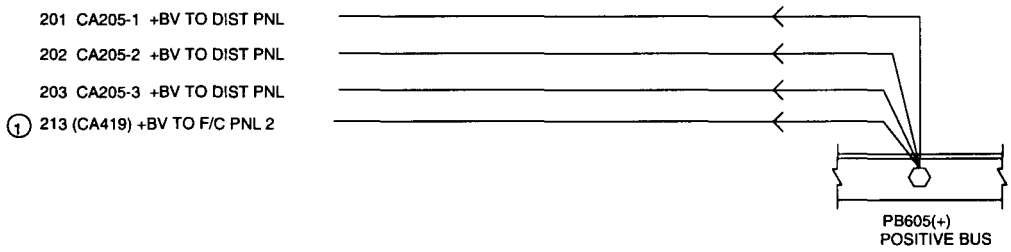
19. FW CONTACTOR AND FW RESISTOR AND ASSOCIATED HARDWARE PRESENT ONLY ON 36V TRUCKS.
20. TRUCKS WITH 1 PUMP MOTOR:
-P2, PUMP MOTOR 2, FU4, AND MOTOR CABLES SPECIFIED IN NOTES 1 AND 15, ARE NOT PRESENT.
-THE POWER STEERING MOTOR WILL GET ITS GROUND USING MOTOR CABLE SPECIFIED IN NOTE 10 CONNECTED TO PUMP MOTOR 1 NEGATIVE.

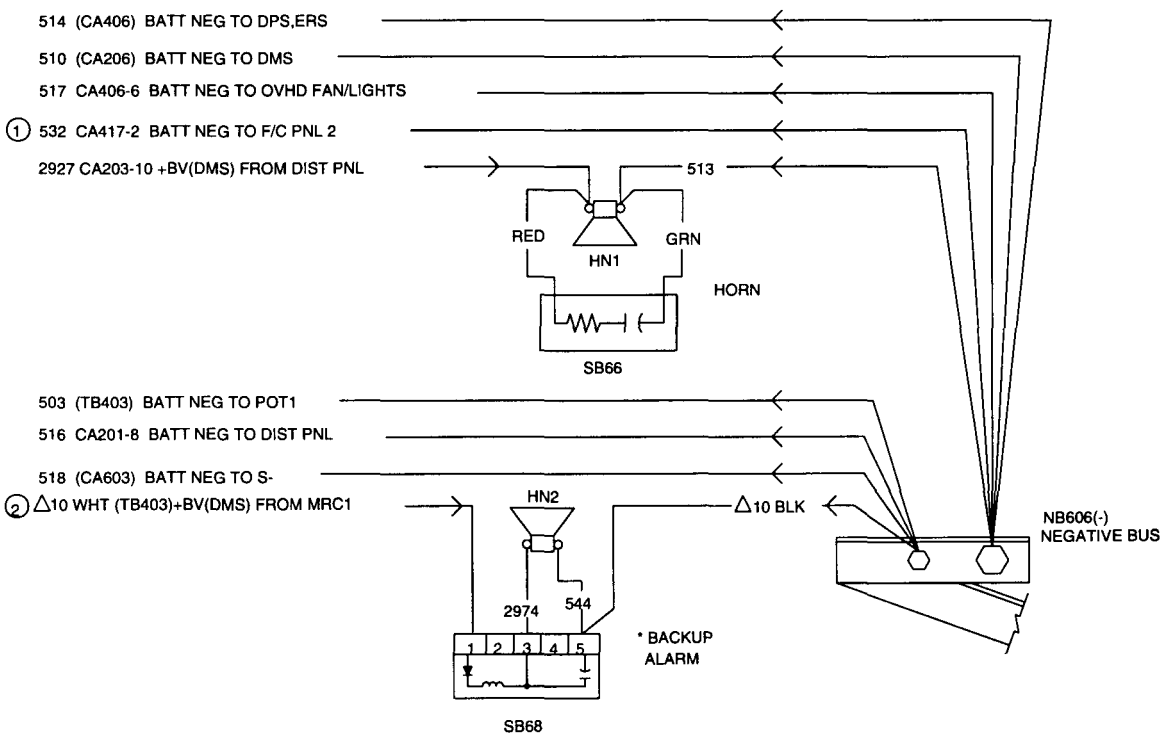


A | B | C

DC-DC CONVERTER, POS BUS, NEG BUS, HORN







NOTE:
(1) 213 AND 532 PRESENT ONLY WITH F/C
(2) △10 ONLY PRESENT WITH HN2 (BACKUP ALARM)

* OPTIONAL

A | B | C