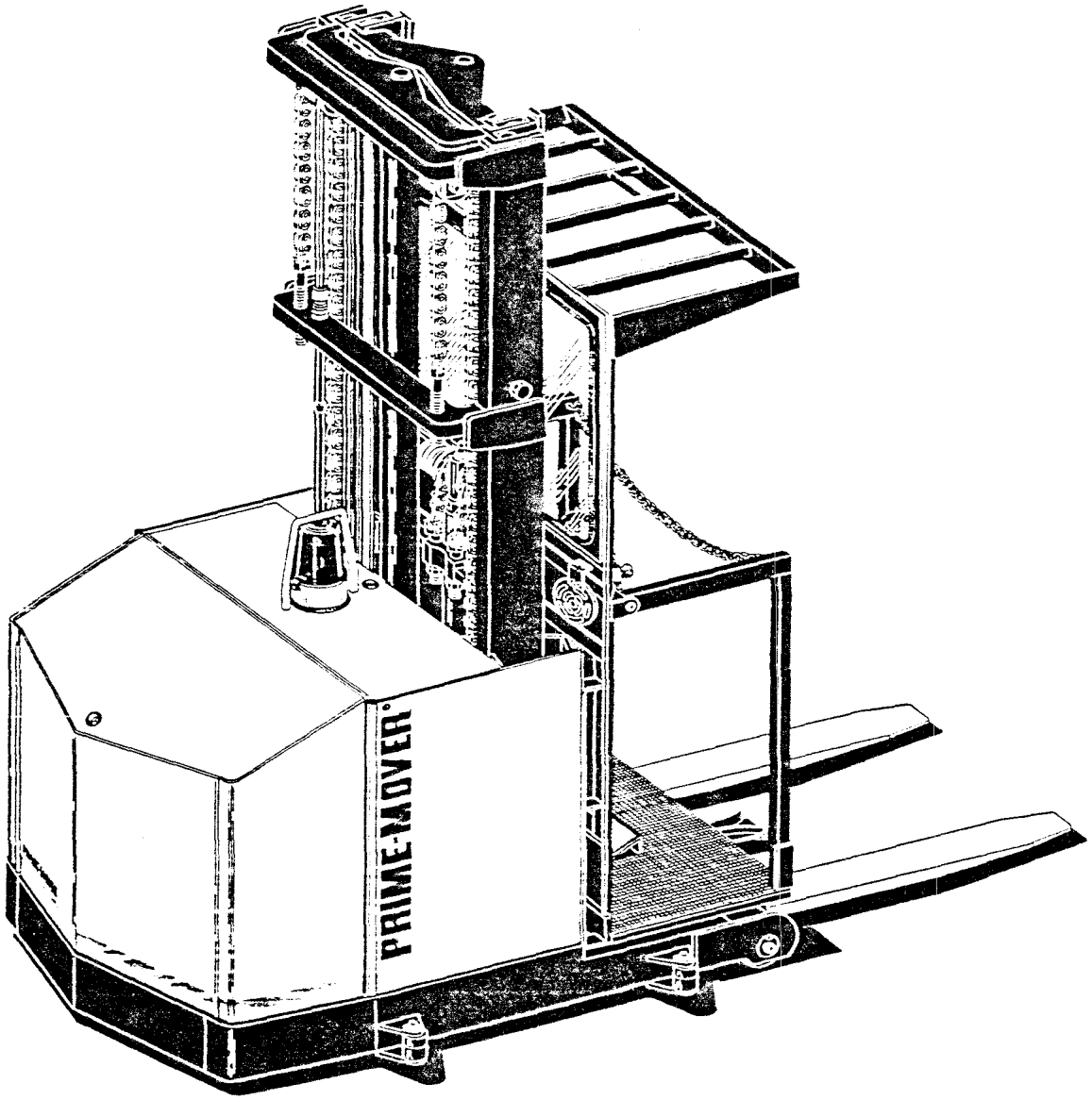
OE-30C REPAIR MANUAL

OE-30C ELECTRIC ORDER SELECTOR OE-30C

Effective Serial Number OE30C 170179



⚠ WARNING Read and observe all warnings on the unit before operating it. Do not operate this equipment unless all factory installed guards and shields are properly secured in place.

ISSUED OCTOBER 1988

PRIME-MOVER®

Return

DATE _____

PRIME-MOVER ORDER SELECTOR (OE30C)
PLANNED MAINTENANCE SCHEDULE

Year _____ Serial No._____

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
100 Hour or Monthly PM												
1. Check machine operation; all functions and safety switches												
2. Check level of hydraulic oil												
3. Service all grease fittings												
4. Lubricate door hinges												
5. Check transmission lubricant fluid level												
6. Clean and lubricate lift chains												
7. Check lift chain adjustment												
8. Inspect and adjust steering control cable												
9. Check brake adjustment and stopping distance												
10. Inspect fittings and valves for leaks												
11. Inspect all tires and wheels												
12. Check battery water level and equalize charge												
13. Lubricate side guide rollers												
14. Clean with compressed air												
500 Hour or Semi-Annual PM												
1. Change hydraulic oil filter												
2. Clean and lubricate battery rollers												
1000 Hour or Annual PM												
1. Steam clean machine												
2. Drain, flush, and refill gear case												
3. Drain, flush, and refil hydraulic reservoir												
4. Clean hydraulic reservoir outlet screens												
5. Check hydraulic pressure relief settings												
6. Inspect condition of lift chains												
7. Inspect contactor tips												
8. Inspect motor; brushes (length) & commutator												
9. Check mast and carriage - lube & adjust as needed												

Lubrication Specification

Grease - Tex. Ref. C&C #880
Hydraulic reservoir - SAE 10-40W oil
(Cold storage - ATF Dexron II)

Pivot Points - Heavy weight oil
Battery roller bearings - Tex. Ref. C&C #880
Lift chains - Heavy weight oil

Transmission Gear Case - 80W - 90/API GL-5
Cold Storage - ATF Dextron II

3. Install clamps through lift platform and on pins. Install one flat washer on pin between clamp and lift platform. Install second flat washer and secure with hairpin cotter pins.

4. Connect cable end to one each of the bracket on clamps and secure with nuts.

5. Thread cable up through lift platform to install lever.

6. Install cable to lever and secure with pin and cotter pin.

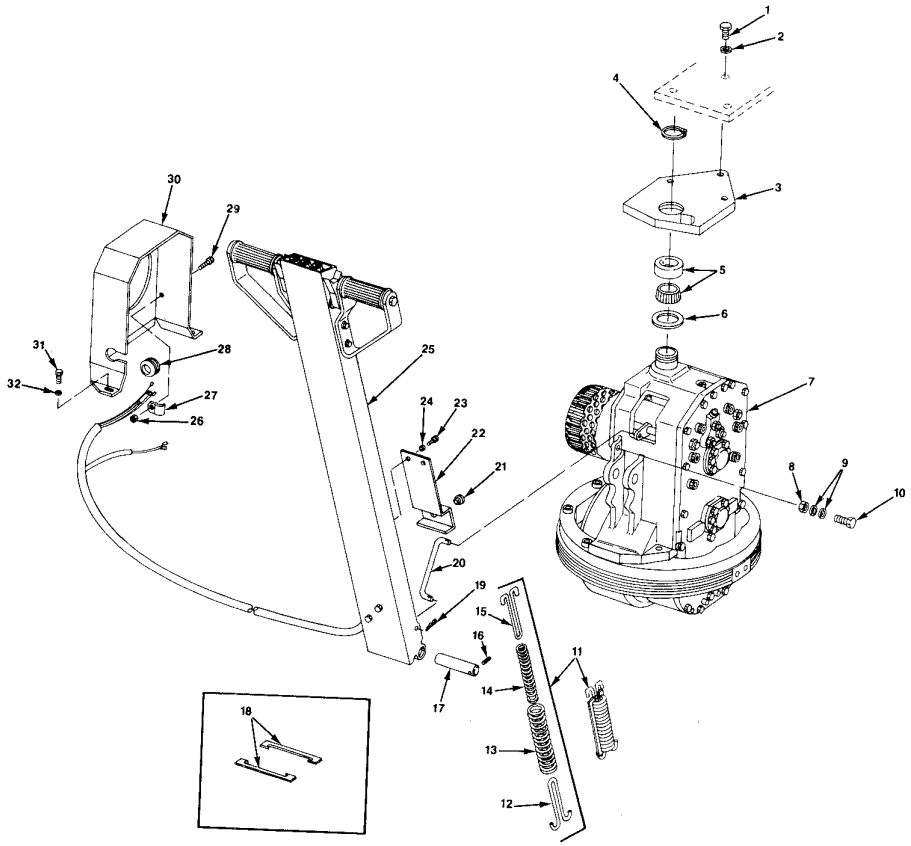
7. Install lever to lift platform as shown in illustration and secure with two (2) cap screws. Tighten screw just enough to keep lever tight but will not hinder levers action.

8. Test operation of pallet clamps and adjust to achieve proper action.

9. Remove blocks and lower lift platform.

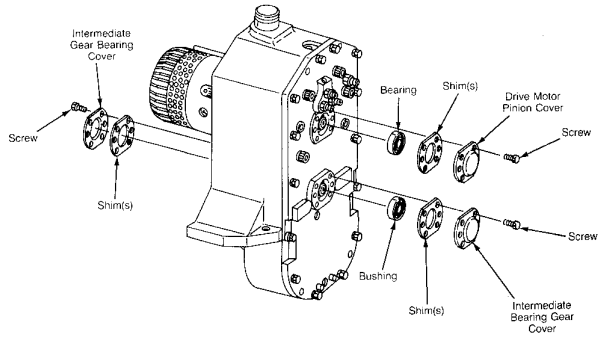
10. Connect battery and test operation of unit.

HT-45/60 TRANSMISSION AND HANDLE ASSEMBLY

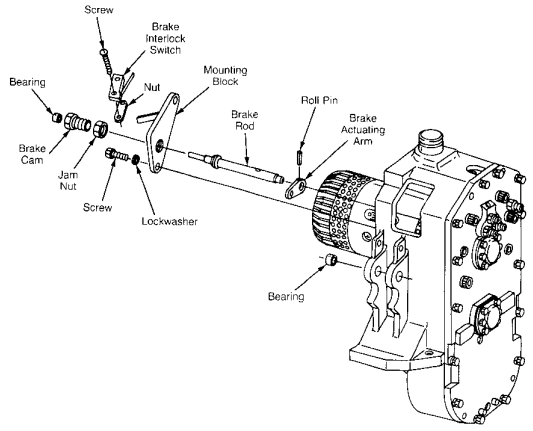


Item #	Part #	Name	# for Assy.
1	P-14994-08	Screw, cap	3
2	P-11009-08	Lockwasher	3
3	B-20970	Plate, mounting	1
4	P-11025-14	Ring, retainer	1
5	P-20070-01	Bearing	1
6	P-20069-01	Washer	1
7	W-1560004	14:1 Transmission assembly (see fig. #25)	1
8	P-11261-05	Nut, jam	1
9	P-11016-02	Washer	2
10	P-11854-05	Screw, cap	1
11	P-20405-02	Spring assembly	1
12	A-20398-02	Retainer, spring	1
13	A-27542	Spring	1
14	A-20400	Spring	1
15	A-20398-01	Retainer, spring	1
16	P-11073-04	Pin, roll	1
17	A-13813-19	Pin, handle pivot	1
17	A-20287-19	Pin, handle pivot (cold storage)	1
18	A-20393	Holder, spring	2
19	P-11429-04	Pin, spring clip	2
20	A-27529-01	Rod, brake	1
21	A-49788	Bumper	1
22	B-27535	Cover	1
23	A-14892-01	Screw, cap	2
24	P-11009-06	Lockwasher	2
25	W-1060004	Handle assembly	1
25	P-11009-05	Lockwasher	4
25	W-1060007	EV-1 SCR handle assembly (see fig. #8)	1
26	P-11170-04	Nut	1
27	A-20497	Clamp	1
28	P-11813-06	Grommet, rubber	1
29	P-11045-02	Screw, cap	1
30	C-27046	Shield, motor	1
31	P-11854-03	Screw, cap	4
32	P-11009-05	Lockwasher	4

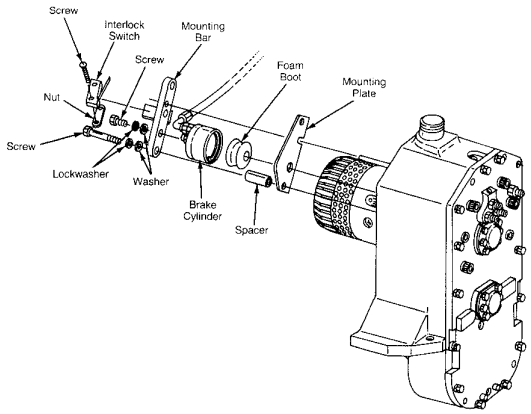
1. If it is below the outer cover, install the bearing cover using "Loctite Gasket Eliminator No. 504". **Use sparingly.** Use thread sealant "Loctite No. 601 on the bolts.
2. If it is flush with the outer cover, install on .010" shim gasket and the bearing cover using "Loctite Gasket Eliminator No. 504". **Use sparingly.** Use thread sealant "Loctite No. 601" on the bolts.
3. If it is above the outer cover, install enough shims to be even with the outer race. Install one more .010" shim and the bearing. Cover using "Loctite Gasket Eliminator No. 504" shim and the bearing. Cover using "Loctite Gasket Eliminator No. 504". **Use sparingly.** Use thread sealant "Loctite No. 601" on the bolts.



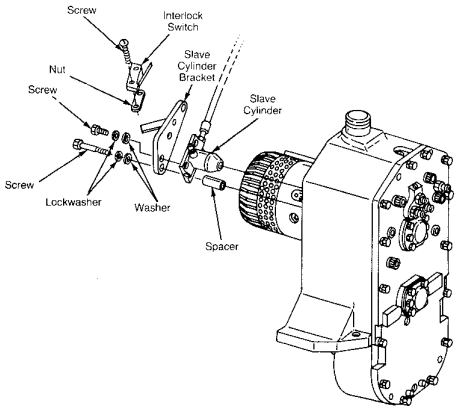
50. Install the mounting bar.
    A. TE-70, HT: Install the mounting block, brake acutating arm, brake cam rod, jam nut, adjusting cam screw, and bushings to the gear case. Be sure the brake acutator rod lines up correctly.



    B. OE-30 B: Install the mounting plate, foam, arm and mounting bar to the gear case. Be sure the brake acutator rod lines up correctly with the center of brake cylinder.



    C. RS, RC, RR (except RR-40): Install the slave cylinder bracket, spacer, and slave cylinder to gear case. Be sure the brake acutator rod lines up correctly with the center of the slave cylinder.



51. Fill the gear case with AMOCO 1000 oil or SAE 80 Transmission Grease (for cold storage use ATF Type "A" or Dextron II) up to the check plug shown under the lower bearing cover.
52. Install the air vent, magnetic pipe plug, and pipe plug in the gear case cover.

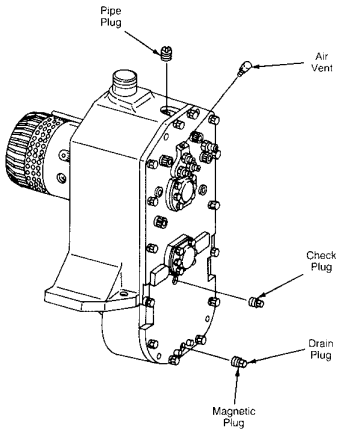
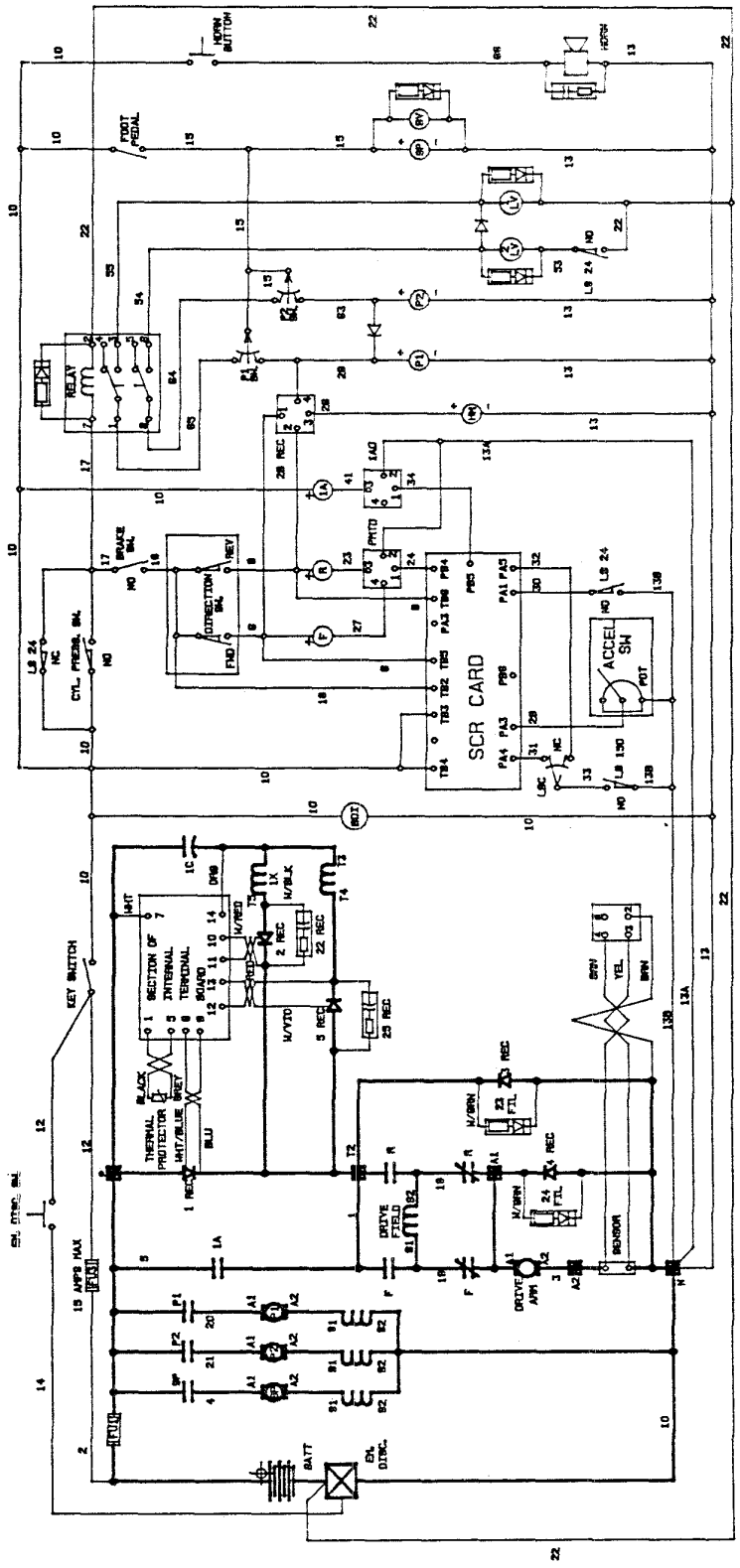


FIGURE # ELECTRICAL SCHEMATIC



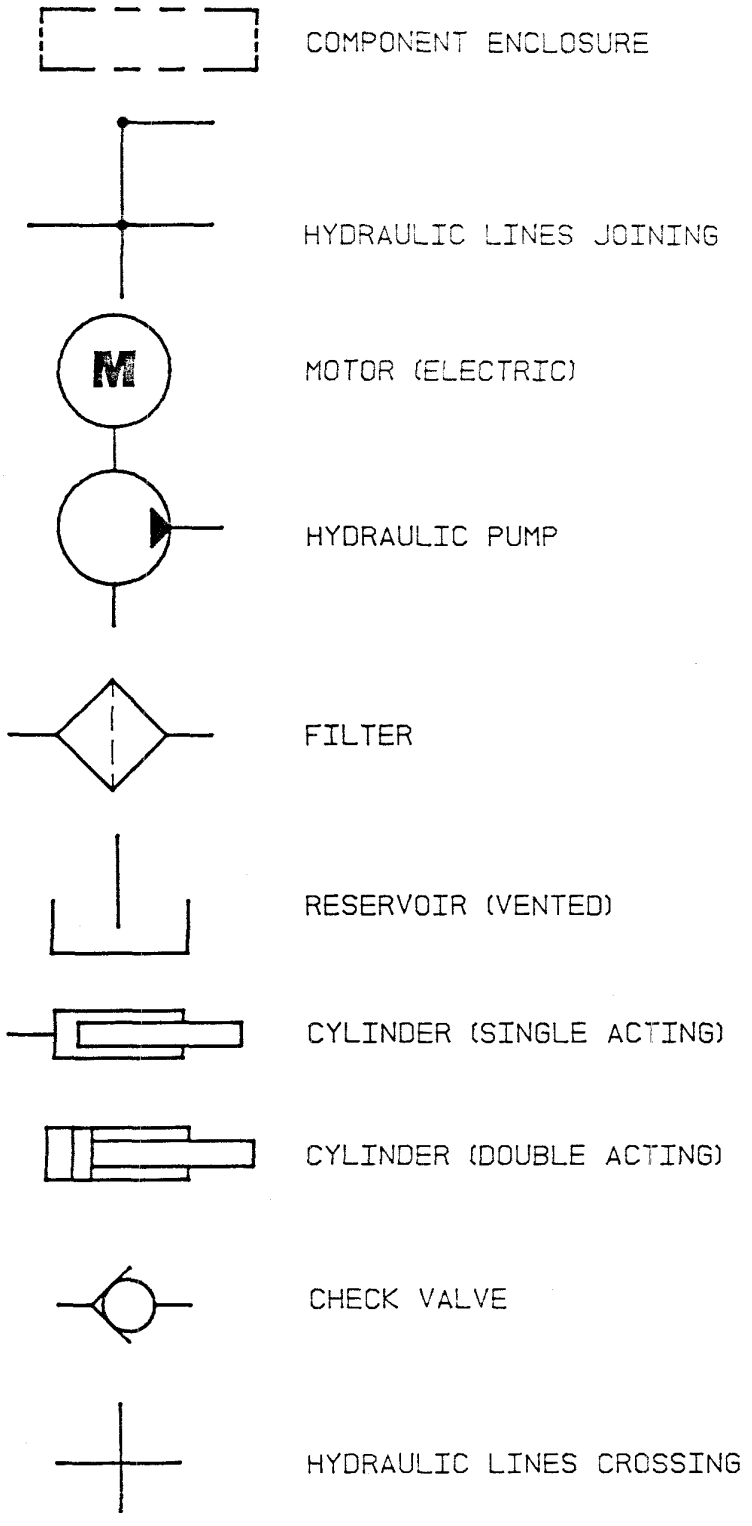
EV-100 OE-30C ELECTRICAL SCHEMATIC

SERVICE REFERENCE #

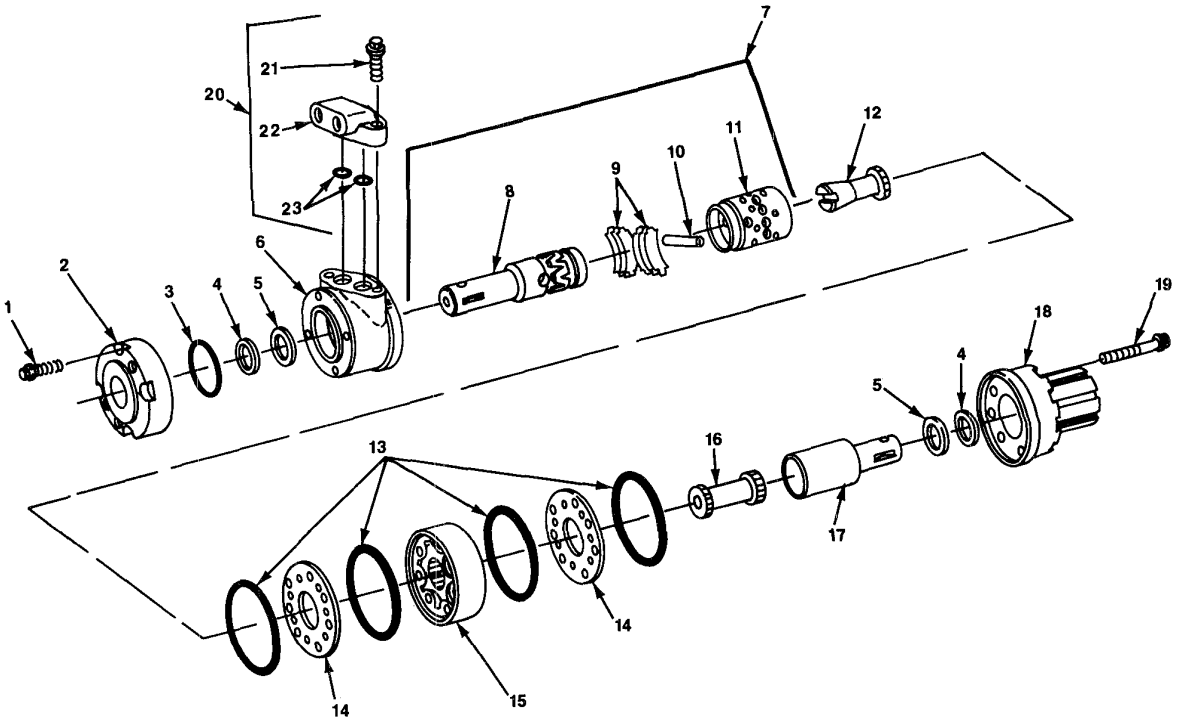
OE30BP- PRIME-MOVER DATE

	SYMPTOM	PROBABLE CAUSE
3H	FW contactor will not drop out with increasing load.	* Check drop out setting on control card. * Check for shorted FWD driver. * Replace control card.(4A)
3J	Stiff plug. (Severe reversal)	* Check plug adjustment setting on control card. * Check yellow wire on current sensor for open. * Check 4REC for open circuit.(4H) * Replace control card. (4A)
3K	Hourmeter feed faults:	
(1)	Pump contactor closes when direction is selected.	* Diode shorted HMD3 to HMD4. (4H) Replace hourmeter block.
(2)	One direction okay; opposite direction picks up both directional contactors.	* Diode shorted HMD1 to HMD4 or HMD2 to HMD4.(4H) Replace hourmeter block.
(3)	Either direction picks up both directional contactors.	* Diode shorted HMD1 to HMD4 of HMD2 to HMD4.(4H) Replace hourmeter block.
3L	Very soft reversal	* Check plug adjustment setting on control card. * Replace control card. (4A)
3M	Blown power fuse. Very hot power cables	* Check 3REC for short.(4H) (Possible damage also to 1REC.)

FIGURE # HYDRAULIC SCHEMATIC SYMBOLS



TORQUE GENERATOR (207-1018-001)



Item #	Part #	Name	# for Assy.
1	G21045-7	Screw, cap	4
2	G21108	Cap, end	1
3K	NSS	O ring	1
4K	NSS	Seal	2
5	G13	Washer	2
6	G21310-1	Housing, control	1
7	G21477	Spool and sleeve	1
8	NSS	Spool, control	1
9	G370	Spring, centering	6
10	G15	Pin	1
11	NSS	Sleeve, control	1
12	G147	Drive, control end	1
13K	NSS	O ring	4
14	G7358	Plate, spacer	2
15	G8980-3	Gerotor	1
16	G148	Drive, power end	1
17	G142	Shaft, power end	1
18	G21312-1	Housing, power end	1
19	G5389-15	Screw, cap	7
20	G208-1015-001	Kit, adapter	1
21	NSS	Screw, cap	2
22	NSS	Block, port	1
23K	NSS	O ring	2
K	G21122	Kit, seal (Contains parts indicated by letter "K")	1

NOTE: After every 100 hours of truck operation, lift chains should be inspected and lubricated. When operating in unfamiliar corrosive environment, inspect chains every 50 hours.

4. Connect lift cylinder hydraulic lines.

5. Remove hoist and connect battery. Test operation of truck and system.

STAGING CYLINDER ASSEMBLY (D-28131)

ROUTINE MAINTENANCE

No routine maintenance is necessary other than periodic check for tightness of the mounting bolts and a visual check for oil leakage. Keep the cylinder clean externally, especially in the area of the shaft oil seal.

NOTE: Dirt can wear seals and cause leakage.

The cylinder must be operated only with clean oil and the system oil filter element must be replaced according to the maintenance chart in your manual.

Do not dismantle the cylinder unnecessarily. If a loss of performance occurs, the system as a whole must be investigated before assuming that the cylinder is at fault.

DISASSEMBLY

1. Plug ports and thoroughly clean outside of cylinders.

2. Remove bearing head by turning counterclockwise.

3. Remove bearing head from rod and disassemble. Discard wiper, oil seal, wear ring, back-up ring, and O ring. Replace with new from seal kit.

4. Remove the cylinder rod from tube with piston on rod.

5. Remove retainer nut from bottom of rod.

DISASSEMBLY

1. Make certain that hydraulic pressure is at zero. Piston will then be against hydraulic end cap or at bottom of accumulator body because of gas pressure on opposite side of piston.

2. Disconnect the battery.

3. Remove guard from over gas valve.

4. To release gas, unscrew gas valve part way until gas beings to escape through safety hole drilled through side of gas valve.

   NOTE: Wait until all gas pressure is relieved, then remove gas valve.

5. Remove acculator from hydraulic system.

6. With accumulator laying horizontal, hold accumulator body with a strap wrench, or vise gripping over hydraulic end cap.

7. Install pins into holes of cap at gas end, then remove gas cap using a long bar working against the pins.

8. Remove O ring and back-up ring from end cap.

9. Remove piston using pliers on cast web and while pulling, rotate piston slightly to aid in removal.

10. Remove teflon rings.

11. To remove V O ring from piston, lift ring with small, smooth, screwdriver or similar tool, moving the tool around the piston several times while using other hand to work ring off the piston.

9. Raise lift platform up intermediate column as far as it will go under normal opertion. Check bearing shimming as the lift platform is raised. Remove shims as required. If tight spots are encounted where assembler cannot roll lift platform smoothly, check for excessive bearing clearance with platform in fully closed position by prying platform to one side and checking with a 0.060" shim. Maximum clearance must not exceed 0.060". Check for excessive bearing clearance with lift platform in the fully raised position by prying platform to one side and checking with a 0.030" shim. Maximum clearance must not exceed 0.030".

10. Lower lift platform to install lift chain anchor pins, steering wheel chain, and electrical cable. When installing lift chains, chains are to be free of twists and adjusted for equal tension with adjusting nuts (wheel nuts) and locknuts (jam nuts) torqued to 200 ft./lbs. Chains are to be centered on sheave within 1/32".

11. Remove hoist from lift platform and test operation of unit.

    Shimming mast with lift platform removed.

    The lift platform must be removed to shim the mast.

12. Attach hoist to top if intermediate column (see Hoisting Instructions in this manual) and hoist to loosen lift chain. This will allow removal of lift chain anchor pins.

13. Before disconnecting hoses and fittings from inner column, thoroughly clean off all outside dirt around fittings. After disconnecting hoses immediately cap ports on tubes and hoses to prevent contaminates from entering the hydraulic system.

    NOTE: Take note as to which port the hoses are from for easier installation.

23. Grease the grease fittings with Tex. Ref. C & C No. 880 using a standard lube gun.

FREELIFT CYLINDER ASSEMBLY

ROUTINE MAINTENANCE

CYLINDER

No routine maintenance is necessary other than periodic checks for tightness of the mounting pins and a visual check for oil leakage. Keep the cylinder clean externally, especially in the area of the rod oil seal.

NOTE: Dirt can wear seals and cause leakage.

The cylinder must be operated only with clean oil and the system oil filter element must be replaced according to the maintenance chart in this manual.

Do not dismantle the cylinder unnecessarily. If a loss of performance occurs, the system as a whole must be investigated before assuming that the cylinder is at fault.

SHEAVE SHAFT

Routine maintenance consists of periodic checks for tightness of the mounting nut and a visual check for wear. Keeping the bearings greased will prolong life and decrease wear. Cleanliness is extremely important in the area of the bearing roller surface.

NOTE: Dirt can wear bearings and cause failure.

The maintenance chart in this manual will guide you in your preventative maintenance.

LIFT CHAIN

See lift chain maintenance instructions in this section.

21. Place hinge plate in vice with rod horizontal.

22. Drive roll pins out of roller chain sprockets and remove sprockets and retainer from rod.

    WARNING: Always wear safety glass or face shield when using a hammer.

23. Rod may be removed from pillow block by pulling by hand or driven with soft metal (lead) hammer.

    WARNING: Always wear safety glass or face shield when using a hammer.

24. Remove pillow blocks from plate by removing two (2) nuts and lock-washers from each of the two (2) pillow blocks.

25. Loosen the two (2) cap screws securing the chain anchors on transmission gear case ring and loosen turnbuckle.

26. Remove chain from lower sprocket on torque generator from under frame.

27. Remove torque generator from frame by removing three (2) cap screws and lockwashers from under frame.

    Service of torque generator may be found in this manual under the "Hydraulic Section".

28. Gear case ring chain can be removed by removing the two (2) cap screws, lockwasher, and flatwashers from transmission gear case ring.

    Service on this chain can be done on work bench.

OE-30C TROUBLE SHOOTING GUIDE

1.0 HYDRAULIC

1.1 Lift

1.11 No Lift; both pump motors run

1.111 Hydraulic fluid reservoir low or empty.
Check hydraulic fluid level, fill to within 2" of filler tube with 10W40 oil (ATF in cold storage).

1.112 Manual lowering valve open. Close or repair manual lowering valve.

1.113 Lowering solenoids stuck open. Clean and repair or replace.

1.114 Load check valve open. Clean and repair or replace.

1.115 Relief pressure too low. Check pressure relief valve - set to 2400 +/- 100 PSI.

1.116 No oil flow or pressure from pumps.

a. Check flow from pumps.
3.7 gpm @ 2000 psi

b. Check supply oil to pump; hoses and strainer

c. Check pump to motor couplings.

d. Check internal pump parts.

1.12 No high speed lift; low speed lift okay.
Both lift pump motors operate.

1.121 No flow or pressure from 2nd pump. Check flow from pump. Check pump couplings. Check internal pump parts.

1.13 No low speed lift; high speed lift appears okay.

1.131 Load check on #2 pump open. Clean and repair or replace load check.

1.132 No flow or pressure from #1 pump. Check flow from pump. Check pump coupling. Check internal pump parts.

1.14 Drifts down - will not hold load

1.141 System leaks hydraulic fluid to outside. Inspect hoses, fittings, & cylinders for leaks. Repair leaks.

1.142 Load check leaks by. Clean and repair or replace load check valve.

2.322 Conditions for testing: Remove 24" limit switch from mounting base for switch test.

Test switch for continuity

a) With switch in normal position test continuity across terminals 1 to 2 and 5 to 6 on switch assembly.

b) Operate lever to actuate switch. Test for continuity across terminals 3 to 4 and 7 to 8 on switch assembly.

c) If the switch shows open in any position, replace switch.

2.323 Test continuity of wire 22 on 24" limit switch mounting base to battery negative.

Open circuit, repair open wire 22 to battery negative.

Closed circuit, reassess failure.

2.33 No low speed lowering; high speed lowering - okay.

2.331 Conditions for testing: Battery plug connected, key switch closed, foot pedal switch closed, low speed lowering switch (P1) closed.

Check for battery volts at:

a) Common terminal of P1 switch

0 volts, repair open wire 15 from foot pedal switch

b) Wire 65 terminal of P1 switch

0 volts, replace P1 switch

c) Terminal #1 on lowering control relay

0 volts, replace open wire 65 from P1 switch

d) Terminal 3 on lowering control relay.

0 volts, replace lowering control relay

e) Positive side of #1 lowering valve coil

0 volts, replace open wire 55 from lowering control relay

f) Negative side of #1 lowering valve coil

Battery volts, repair open wire 22 to battery negative

0 volts, replace #1 lowering valve coil, reassess failure

d) S2 terminals on lift pump motors

0 volts, repair lift pump motors

e) Repair open cable 13 to battery negative

3.22 No high speed lift; low speed lift okay.

3.221 Conditions for test: High speed lift switch closed, both pump contactors closed.

Test for battery volts at:

a) Positive side of P2 contactor buss bar

0 volts, repair open cable 5 from fuse 3

b) Motor side of P2 contactor buss bar

0 volts, repair P2 contactor, replace tips

c) A1 terminal of P2 motor

0 volts, repair open cable 21 from P2 contactor

d) S2 terminal of P2 motor

0 volts, repair P2 motor

e) Repair open cable 13 to battery negative

3.23 No low speed lift - contactor closes. Lift operates with high speed switch but raises slowly.

3.231 Condition of test: Low speed lift switch closed and P1 contactor closed

Check for battery volts at:

a) Positive buss bar on P1 contactor

0 volts, repair open cable 5 from fuse 3

b) Motor side buss bar on P1 contactor

0 volts, repair P1 contactor, replace tips

c) A1 terminal on P1 motor

0 volts, replace open cable 20 from contactor

Section III - Planned Maintenance Procedure

The Prime-Mover OE30C order selector has been built, engineered and built to exacting specifications and tolerances. It is a heavy-duty industrial truck that will afford the user many years of reliable service. As with any mechanical equipment, periodic maintenance is normal, and necessary, to keep this truck operating safely and effeciently. In general, this periodic maintenance consists of visual and operational inspections and lubrication performed at planned intervals. It also includes adjustments and replacement of wear items as dictated by the results of the inspection.

The planned maintenance schedule is compiled of four (4) parts:

1. Daily inspection - to be performed by the operator at the beginning of each operating shift.
2. 100 hour or monthly service - to be performed by a qualified service technician.
3. 500 hour or semi-annual service.
4. 1000 hour or annual service.

At each successive interval the previous intervals services should also be performed, i.e. at the 500 hr/semi-annual service, the monthly service and daily inspection should also be performed.

If any discrepencies are found they should be corrected at the time of the planned maintenance service.

If any safety device is found to be malfunctioning or if the truck is found to be unsafe in any manner than the truck should not be used until such deficiencies are corrected.

Adhering to this schedule of planned maintenance should give the user many years of satisfactory service. If there is a problem or the truck requires repairs your Prime-Mover dealer is well equipped to handle the situation.

Daily inspection:

A. Battery - inspect for water level, state of charge, conditions of cables and general cleanliness. Wash battery top and case with baking soda and water to remove any spilled acid or corrosion.

B. Load wheels - visually inspect for condition of tire material and rolling capabilities.

C. Drive tire - visually inspect for condition of tire material; string, or other material, wrapped around drive tire and axle; lug bolts tight.

D. Lift chains - visually and physically check for broken or damaged links; insure that lift chain anchors are tight.

E. Main frame - visually inspect for damage, loose or missing hardware and leaks.

F. Operating functions - Physically check that all switches and operating features funtion properly: - high and low speed lift - high and low speed lowering - brake release and application - steering - horn - travel - speed limiting switches - meters and gauges

100 hour or monthly service - in addition to the daily inspection, the following items should be inpsected and/or serviced.

A. Hydraulic fluid level - fluid level should be within 2-3 inches of bottom of filler neck with all cylinders lowered or retracted.

B. Lubrication points - all lubrication points to be serviced.

Points requiring grease gun application:
- lift chain sheave bearings on free lift crosshead and at top of mast rails - transmission guide ring rollers - load wheel bearings - transmission pivot bearing - steering jackshaft bearings
Points requiring application of oil from oil squirt can:
- all door hinges - lift chains - steering chains and cable sheaves

C. Transmission fluid level - physically check that the transmission has the proper, 80W90, gear oil to within of check plug on side of case over close to steering guide ring.

D. Lift chain adjustment - with lift cylinders fully lowered the mast channels should be approximately level as sighted across the top of rails, the bottoms of the forks should be off the ground.

E. Steering cable adjustment - steering chains around tranmission and torque generator should have ⅛" to ¼" of slack. Steering cable tensioner springs should have only one full coil of compression lift before hitting inner guide tube.

F. Brakes - vehicle should stop in 90 inches maximum with full load at top speed.

G. Clean entire machine with compressed air flow gun.

500 hour or semi-annual service - In addition to the daily inspection and the 100 hour service, the following items should be inspected and/or serviced.

A. Hydraulic filter - replace filter.

1000 hour or annual service - In addition to the daily inpsection, 100 hour service and 500 hour service, the following items should be inspected and/or serviced.

A. Transimssion - drain, flush and refill.

B. Hydraulic reservoir - drain, flush and refill.

C. Hydraulic pressure reliefs - test relief valve settings.

D. Contactors - inspect contactor tips for signs of arcing, or other signs of wear indicating need for repair.

E. Electric motors - inspect brush lengths and replace if close to minimum.

F. Lift chains - inspect chain wear using a chain wear guide.

G. Mast rollers - inspect roller in mast and carriage for damage and proper shimming.

H. Cleaning - if necessary, steam clean entire machine, being careful not to get electrical components wet.

10. Readjust the interlock switch.

The second brake adjustment controls the aggressiveness of the brake. To make this adjustment

1. Put brake in operating position.
   A. HT: Lower the handle halfway to release the brake.
   B. TE-70: Pull the handle all the way toward compartment to release the brake.
2. Turn each of the brake pressure adjusting screws (located in the front cover of the transmission) clockwise at the same amount. This creates more spring pressure against the brake actuator lever causing it to grasp the brake disc more positively.
3. Operate the truck and readjust if necessary until the satisfactory stopping range is achieved.

   NOTE: Overadjustment of the brake pressure screws may cause excessive brake wear.

OE30C

In order to maintain satisfactory operation of your machine, it is important that the brake is properly adjusted. In general, adjustments are made either to correct too little brake or too much brake.

If the problem is not aggressive enough, the corrective action is to increase brake spring tension. This is done by turning the three (3) brake adjusting screws clockwise.

IMPORTANT: The brake pedal should be depressed when making this adjustment to avoid overadjustment.

If increased brake tension does not remedy the problem, the brake pads and/or separators should be inspected and replaced if necessary. Check also that the brakes are not overadjusted.

A brake which works properly but is too aggressive can be toned down by turning the brake adjusting screws counterclockwise. This decreases spring tension and therefore makes braking less severe.

After adjusting the brake, be sure to check the operation of the brake and the brake interlock switch.

RC, RS, RR (old style)

In order to maintain satisfactory operation of your machine, it is important that the brake is properly adjusted. In general, adjustments are made either to correct too little brake or too much brake.

If the problem is too little brake, the corrective action is to increase brake spring tension. This is done by turning the three (3) brake adjusting screws clockwise.

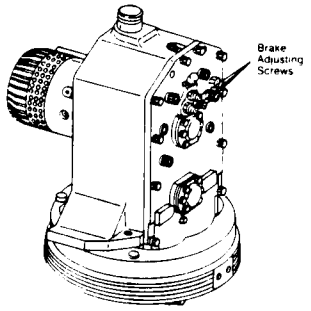
IMPORTANT: The brake pedal should be depressed when making this adjustment to avoid overadjustment.

If increased brake tension does not remedy the problem, the brake pads and/or separators should be inspected and replaced if necessary. Check also that the brakes are not overadjusted.

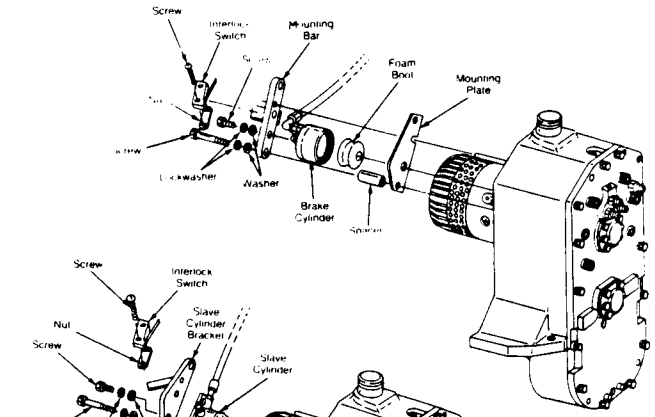
Too much brake can usually be remedied by adjusting the brake pedal position. The following steps describe this adjustment.

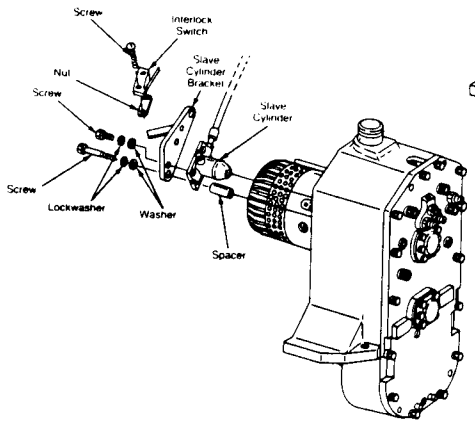
1. Loosen the return spring lock nut behind the pedal. Loosen the three allen head spring tension bolts on the cover side of the transmission.
2. Adjust the pedal to approximately 4" above the floor. This adjustment is made by turning the nut on the stud on the back side of the pedal.
3. With the brake pedal in the fully raised position, adjust the master rod length so that there is ⅛ inch clearance between the end of the rod and the brake pedal linkage in the transmission compartment.
4. Depress the brake pedal and observe the movement of the brake rod. Proper movement is between ¼" and ⅜" with the movement being toward the transmission. This movement should release the brake.
5. With the pedal completely depressed tighten the three allen head spring tension screws. They should be finger tightened until they contact the spring pilot. Once they reach this point a definate turning resistance will be felt. Turn them in ¼ turn more and lock in place.
6. Readjust the interlock switch.

A brake which works properly but is too agressive can be toned down by turning the brake adjusting screws counterclockwise. This decreases spring tension and therefore makes braking less severe.

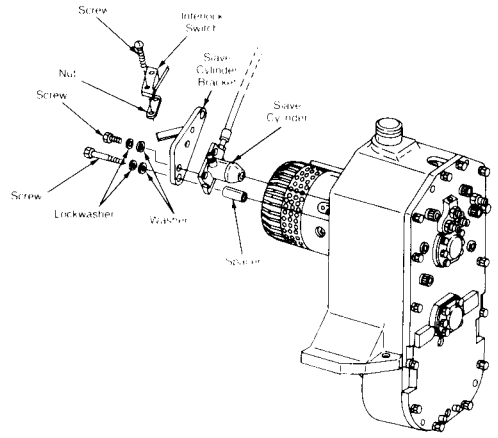


Brake Adjustment



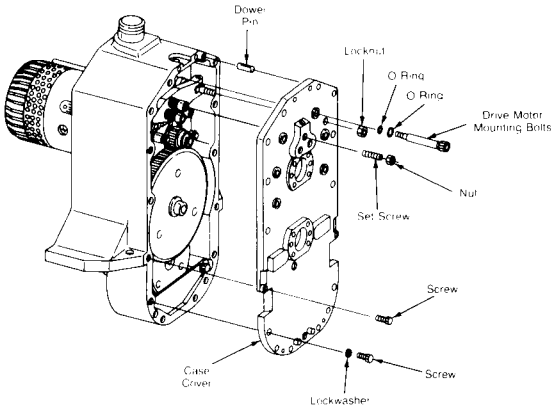


C. RS, RC, RR (except RR-40): Remove the slave cylinder bracket and spacer from gear case.

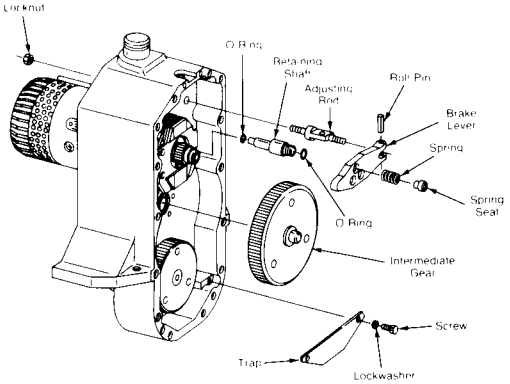


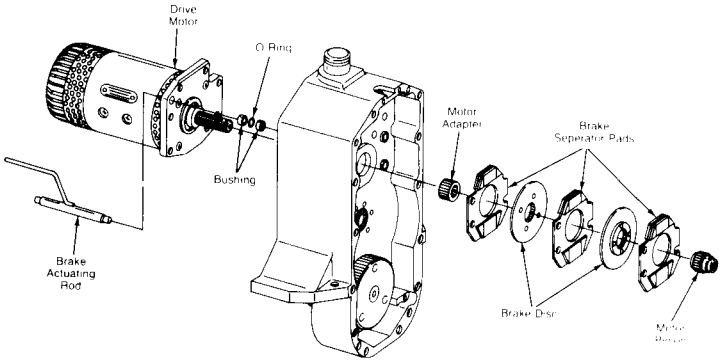
4. Remove the four (4) motor mounting bolts and motor can be removed.
5. Remove gear case cover mounting hardware. With transmission on bench with cover side up, use four threaded holes in cover w/cover bolts to raise cover straight up.
6. Finish disassembling the gear case cover and remove any gasket material left on cover.

   NOTE: Removing of the gear case cover dowel pins are not necessary but helps to clean off old gasket material.



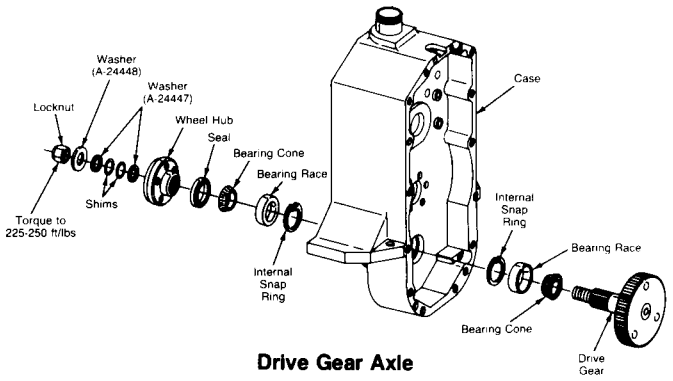
7. Remove trap in the bottom of gear case.
8. Remove intermediate gear from gear case.
9. Remove adjusting rod and lever from over top the brake separator pads.
10. Remove retaining shafts and brake discs and separator pads.



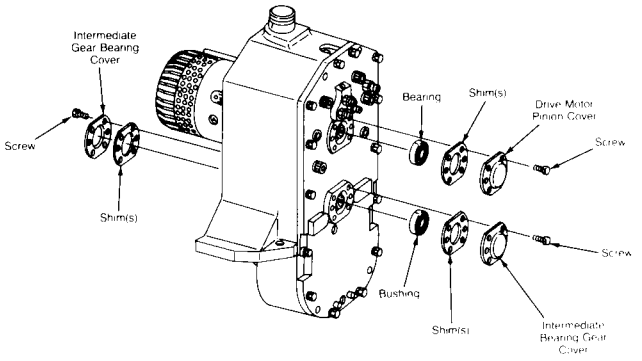


11. Remove locknut, washers, shims and wheel hub from drive gear.

    NOTE: Remove old gasket material from wheel hub.
12. Place nut back on drive gear thread so damage is not done to threads when tapped with a soft metal (lead) hammer to remove drive gear from gear case.
13. Remove and replace bearing and snap ring if worn.
14. Remove intermediate gear bearing and cover with shim(s) (if used) from drive motor side of case.



Drive Gear Axle



Gear Case Bearing Covers

BASICS OF CIRCUIT OPERATIONS

The control circuit is energized by closing the key switch, seat switch and moving the forward or reverse lever to either position and then depressing the accelerator closing the start switch. This applies power to the control card turning on the PMT driver, which will close the selected directional contactor and complete the circuits to the drive motor. (See elementary drawing.)

The control card then supplies a gate pulse to 2REC turning it on to a conducting state, allowing current to flow from the battery through 1C, 1X, 2REC, motor field, motor armature, sensor, and back to the battery. After 1C charges, 2REC shuts off, due to lack of holding current. The control card checks that 1C is charged and unlocks the gate to 1REC and 5REC.

The control card then supplies a gate pulse to 1REC turning it on to a conducting state, allowing current to flow from the battery through 1REC, and allows current to flow T4-T3, 1C, 1REC, 5REC, to T4-T3. This current charges the bottom of 1C positive with respect to the battery positive bus. This charging cycle occurs in less than 1 millisecond (.001 sec.) and 5REC shuts off. This charge is now stored on the capacitor until it is time to turn off 1REC.

Current continues to flow in 1REC until the control card fires 2REC. When 2REC conducts, capacitor 1C discharges around the circuit composed of 1C, 2REC, 1X, and 1REC. This discharge current opposes the battery current through 1REC so that the resultant current is zero. With reverse voltage across 1REC, 1REC is turned off. Current continues to flow in the 2REC, 1C, motor and battery loop until the capacitor (card terminal 14) is fully charged negative. This charge exceeds battery voltage by an amount which is a function of peak motor current, and 2REC turns off.

During the off time, the energy stored in the motor, by virtue of the motor's inductance, will cause current to circulate through the motor around the loop formed by 3REC. Thus, providing what is called flyback current. It should be noted that the average motor current measured will be greater than the average battery current. The SCR control, in effect, converts battery current at battery volts into a higher motor current and a lower motor volts.

The time for the next ON and OFF cycle to start is determined by the time that the control card takes to oscillate. This frequency of oscillation is controlled by the potentiometer in the accelerator and automatic circuitry in the card. Slow speed is obtained by having maximum ohms in the potentiometer. As the resistance in the potentiometer decreases, the speed of the motor increases. The SCR circuit is capable of delivering approximately 95% speed. For full speed operation, the 1A contactor is closed to apply full battery voltage across the motor.

CONTROL FEATURES

OSCILLATOR - the oscillator section of the card has two adjustable features and one fixed feature. With the accelerator potentiometer at maximum ohms, the creep speed can be adjusted by the creep trimpot on the card. Top speed is fixed by card design, and is obtained with the accelerator potentiometer at minimum ohms. The % ON time has a range of approximately 5 to 95 percent. The center operating condition of the oscillator is at 50 percent ON time with a nominal 1.8 milliseconds ON time and 1.8 millisecond OFF time. This corresponds to a maximum operating frequency of about 300 hertz. At creep the ON time will decrease to approximately 0.8 milliseconds while OFF time will become in the order of 20 milliseconds. At full SCR operation, this condition will be reversed (short OFF time, long ON time). This variation of ON and OFF time of the oscillator produces the optimum frequencies through the SCR range.

The rate at which the oscillator may increase its percent ON time is limited by Controlled Acceleration. The minimum time required to go from creep speed to 80-85% on time point may be varied by trimpot (C/A) on the card, adjustable from approximately 0.5 seconds to 3.5-4.5 seconds.

CURRENT LIMIT - This circuit monitors motor current by utilizing a sensor in series with the armature. The information detected across the sensor is fed back to the card so current may be limited to a preset value. If heavy load currents are detected, this circuit overrides oscillator and limits the average current to a value set by the C/L adjustment pot. The C/L setting is based on the maximum thermal rating of 1REC and the peak voltage on the capacitor. Because of the flyback current through 3REC, the motor current usually runs 2 to 3 times battery current. The current limit is set with the C/L trimpot on the card.

PLUGGING - Slow down is accomplished when reversing by providing a small amount of retarding torque for deceleration. If the vehicle is moving the directional lever is moved from one direction to the other, the motor field is reversed. The plug signal is initiated by the fact that the directional switch has moved from one direction to the other. The motor armature, driven by the inertia of the vehicle, acts as generator. This generated current passes through 4REC and the sensor. The oscillator circuit regulates at a plug current limit level as set by the plug trimpot on the control card. This controls the pulse rate 1REC to regulate the generated motor current and bring the truck to a smooth stop and reversal. The accelerator potentiometer input will modulate plugging current. With the accelerator potentiometer at minimum resistance, the plugging trimpot will enable adjustment of plugging current from max to min. current level. With the accelerator potentiometer at maximum resistance, the plugging current will be reduced.

RAMP START - this feature provides full SCR torque to restart a vheicle on an incline. The memory for this function is the directional switch. When stopping on an incline, the directional switch must be left in its original or off position to allow the control to assure full power when restarted. The accelerator potentiometer input will modulate ramp start current.

SYMPTOM	PROBABLE CAUSE
3F 1A will not open until start switch is opened.	* Check volts at TB1. Should be near 3 volts when accelerator is released. If not check accelerator output.
3G FW contactor will not close after 1A pickup.	* Open lead to FWD1 and connect millimeter from FWD1 to FWD2. When control signals FW to pick up, should read 5-10 milliamps. If near zero, turn FW PU trimpot fully CW and recheck. If remains zero, replace control card. (4A) If reads 5-10 ma, reset FW PU trimpot. * Reconnect lead to FWD1 and check volts at FWD1 when the FW contactor should pick up. If near 8 volts, check lead FWD2 to negative for an open, then replace driver. If about 2 volts, check volts at FWD3. Should be battery volts dropping to 2 volts or less when FW contactor should pick up. If volts are near zero, check wiring from positive to FW coil, FW coil and wiring to FWD3. If volts remain greater than 4 volts, replace driver.
3H FW contactor will not drop out with increasing load.	* Check drop out setting on control card. * Check for shorted FWD driver. * Replace control card.(4A)
3J Stiff plug. (Severe reversal)	* Check plug adjustment setting on control card. * Check yellow wire on current sensor for open. * Check 4REC for open circuit.(4H) * Replace control card. (4A)
3K Hourmeter feed faults:	
(1) Pump contactor closes when direction is selected.	* Diode shorted HMD3 to HMD4. (4H) direction is selected. Replace hourmeter block.
(2) One direction okay; opposite direction picks up both directional contactors.	* Diode shorted HMD1 to HMD4 or direction picks up both HMD2 to HMD4.(4H) directional contactors. Replace hourmeter block.
(3) Either direction picks up both directional contactors	* Diode shorted HMD1 to HMD4 of HMD2 to HMD4.(4H) Replace hourmeter block.
3L Very soft reversal	* Check plug adjustment setting on control card. * Replace control card. (4A)
3M Blown power fuse. Very hot power cables.	* Check 3REC for short.(4H) (Possible damage also to 1REC.)

Date Issued Revised April, 1989

REFERENCE: Torque Generator On All Models So Equipped

Our supplier has informed us that the torque generator has been changed. The whole torque generator is interchangeable, however, some of the components are not. Please refer to the drawings in this Service Reference for the correct parts.

Which torque generator you have can be identified on the Char-Lynn name plate. This name plate is physically located on the opposite side of the hydraulic ports.

If you wish to update your trucks, use the conversion chart below. The chart will list the parts required to update your truck to what is currently manufactured.

Contents

New Item No.	New Part No.	Old Item No.	Old Part No.	Name
6	G21310-1	11	G574	Housing, Control
7	G21477	10	G8	Spool and Sleeve
13	G9086-2	N o t U s e d		O Ring
14	G7358	17	G594	Plate
15	G8980-3	18	G106	Gerotor
18	G21312-1	23	G141	Housing, Power End
19	G5389-15	20	G21045-5	Screw, Cap

POSSIBLE PUMP TROUBLE	CAUSES	REMEDIES
7. Output shaft attempting to operate in reverse of input shaft rotation or extreme chatter of input wheel. (After unit has been repaired)	1. Incorrect reassembly of control sleeve and gerotor inner star orientation	1. Disassemble unit and reposition inner star one splined tooth on control end drive spline

DISASSEMBLY

1. Lower mast assembly to a horizontal position before work can begin.
2. Remove lift chain anchors, lift chain, steering cables, and electrical cable from mast.
3. Remove four (4) screws and nuts from inner column and remove free lift cylinder assembly by pulling straight up.

   NOTE: Lift cylinder can be repaired at this time, if needed.
4. Remove chain sheaves and cable sheaves from all columns.
5. Remove column stops from outer column.
6. Pull inner column straight forward until it stops (hits bearings) and then 90' straight up from intermediate column.
7. Remove cap screw from top of intermediate column and remove staging cylinder assembly by pushing intermediate column forward.

   NOTE: Lift cylinder can be repaired at this time, if needed.
8. Pull intermediate column straight forward until it stops (hits bearings) and then 90° straight up from outer column.
9. Remove mast bearings and shim washers from all columns.
10. Thoroughly clean all parts.

ASSEMBLY

1. Thoroughly clean all parts and air dry.

   WARNING: Be extremely careful when working with solvent. Even a small explosion or fire could cause injury or death.

   WARNING: Wear eye protection and be sure to comply with OSHA or other maximum air pressure requirements.
2. Install mast roller bearing on both the inner and outer columns.
3. Assemble inner column in the outer column and slide columns together.
4. Determine the amount of shims required by prying the inner column to one side and slipping shims between the bearing and web on the mast. Add shims by hand until no more can be added.
5. Divide shims as equally as possible between the two (2) bearings and install under bearings.
6. Extend inner column through outer column as far as it will go under normal operation. Check bearing shimming as column is extended. Remove shims as required, if tight spots are encountered where assembler cannot roll mast by hand.

   Check for excessive clearness with columns in the fully closed position by prying column to one side and checking with a 0.060" shim. Maximum clearance must not exceed 0.060".

   Check for excessive bearing clearance with columns in the fully extended position by prying column to one side and checking with a 0.030" shim. Maximum clearance must not exceed 0.030".
7. Assemble inner column in the intermediate column and slide columns together.
8. Determine the amount of shims required by prying the inner column to one side and slipping shims between the bearing and web on the mast. Add shims by hand until no more can be added.
9. Divide shims as equally as possible between the two (2) bearings and install under bearings.
10. Extend inner column through intermediate column as far as it will go under normal operation. Check bearing shimming as column is extended. Remove shims as required, if tight spots are encountered where assembler cannot roll mast by hand.

    Check for excessive clearness with columns in the fully closed position by prying column to one side and checking with a 0.060" shim. Maximum clearance must not exceed 0.060".

    Check for excessive bearing clearance with columns in the fully extended position by prying column to one side and checking with a 0.030" shim. Maximum clearance must not exceed 0.030".
11. Install column stops in outer column and torque to 260 ft./lbs.
12. Install staging lift cylinder assembly in intermediate column lower end.
13. Install grease fittings in lift chain pins, if removed.
14. Press roller bearings in lift chain sheaves, grease roller bearings, and slide inner races in roller bearings.
15. Install shim washers on either side of lift chain sheaves and install in intermediate column. Slide pins through sheaves and secure pins with two (2) cap screws and lockwashers, do this to both chain sheave pins.
16. Install bearing in electrical sheave, grease bearing and install spacers on either side of bearing.
17. Install electrical sheave in proper location (see illustration) on intermediate column and secure with one (1) cap screw and lockwasher.
18. Install bearings in steering cable sheaves, grease bearing. Install spacer between sheaves and on outside of sheaves.
19. Install steering sheaves in proper location (see illustration) on intermediate column and secure with one (1) cap screw and lockwasher.
20. Push intermediate and outer columns together and install cap screw in intermediate column to secure staging lift cylinder.

OE-30C TROUBLE SHOOTING GUIDE

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