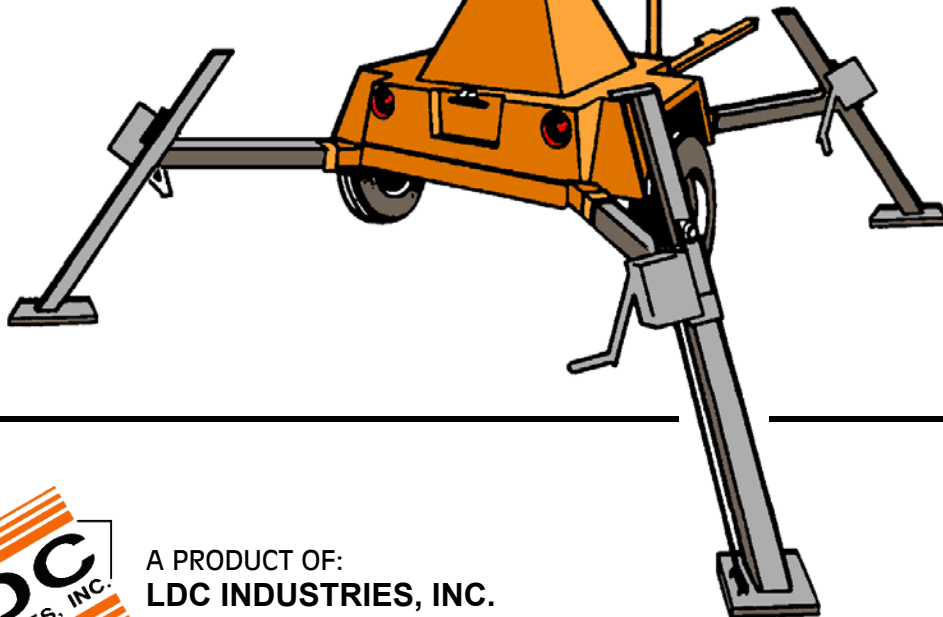


Universal Crane and
Personnel Lift
**PARTS AND
MAINTENANCE
MANUAL**

UNILIFT
MODEL 542KB



A PRODUCT OF:
LDC INDUSTRIES, INC.
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DISASSEMBLY INSTRUCTIONS

PILOT OPERATED CHECK VALVE

Refer to Figure 8-8

1. Lower both booms to the stored position. Pressure may be relieved by activating the emergency down switch.
2. Remove the sheet metal cover (16) from the upper cylinder assembly.
3. Remove the hydraulic line (13) connected to the valve.
4. Mark connection ends and remove the Up and Down return hoses.
5. Remove pilot operated check valve (9).

HYDRAULIC UNIT AND CYLINDER ASSEMBLY REMOVAL

Refer to Figures 8-2 and 8-9

1. Lower both booms to the stored position.
2. Mark connection ends and disconnect hydraulic hoses slowly. Use a clean container to catch hydraulic oil which is lost.
3. Mark locations and remove 4 solenoids at the valve and tape to hose bundle. (Figure 8-9)
4. Disconnect power cable from the motor stud.
5. Sling hydraulic tank with an appropriate hoisting device and remove pins (19) and (3). (Figure 8-2)
6. Remove hydraulic pump and cylinder assembly. (10).
7. Disconnect two hydraulic lines. Remove lower cylinder from the hydraulic unit.
8. Reverse procedure to reassemble.

ROTATIONAL DRIVE ADJUSTMENT

Refer to Figure 8-4

1. Adjust main chain around 30-inch wheel (See Figure 8-3), by tightening set screw (1), located in periphery of wheel, until chain is snug but not stretched on rim. Chain should be centered on rim through 360°.
2. Sprocket (5) tension is maintained by bolt (7) and spring (8). Stop screw with adjusting nut (6) is only used when removal of the sprocket is necessary. When properly adjusted, there will be about 1/16" clearance between the stop screw and the adjacent mounting bracket. Rotate drive through 355°, making sure proper engagement is maintained through full rotation.

ROTATIONAL DRIVE ADJUSTMENT (continued)

Refer to figure 8-4

3. Adjust second stage drive (20), using adjustment bolt (12) at item (23) until chain is snug, but not stretched.
4. Adjust third and fourth stage belts by tightening adjusting screw (13) nut against tension spring (11) by three full revolutions of the nut after the nut first contacts the spring. Two belts will be adjusted by one adjuster. A belt deflection of $\frac{1}{2}$ " is correct.
5. The motor drive belt must only be adjusted tight enough to operate the rotation drive. Use adjusting bolt (12) at item (5). When properly adjusted, correct belt deflection is 1". NOTE: Motor drive belt will appear loose; over tightening will cause damage to the motor bearings and premature wear to the rotation drive mechanism.

SHROUD ASSEMBLY REMOVAL

Refer to Figures 8-5 and 8-7

1. For ease of disassembly, rotate boom to one electrical stop.
2. Disconnect power cables to both batteries. (9) & (10) (Figure 8-7)
3. Remove the four screws holding the control panel (1) to the shroud (5) and set the control panel down onto the rotation assembly. (Figure 8-5)
4. Remove lower and upper fiberglass inserts (3) and (4).
5. Remove all bolts at skirt of shroud (5).
6. Lift shroud (5) until trailer running light harness can be unplugged (plug located inside shroud at right side of shroud).
7. Reverse procedure to reassemble.

INSPECTION AND MAINTENANCE

Safe, reliable and economical service will be achieved if these preventative maintenance instructions are carefully followed. It is suggested that the preventative maintenance schedule included in this manual be used and kept current. Failure to provide proper maintenance will void the warranty. If an unsatisfactory condition is found, obtain immediate repair and adjustment. Failure to do so could result in unsafe operation and further damage to the unit.

DAILY

It is recommended that the following checks be performed each day before the unit is put into operation. A careful "walk around" is usually sufficient for the check.

1. Check the condition and operation of both the upper and lower control stations. Operate all control functions at both stations and verify proper operation.
2. Keep batteries fully charged. Batteries which are not kept at full charge will shorten operating time. Operating lift with low voltage will cause damage to solenoids.
3. Check for hydraulic leaks as evidenced by hydraulic fluid leaking from under the hydraulic pump, at the hoses, or out of the boom.
4. Visually check for loose bolts and nuts. Verify that the Operator's Manual is stored on the machine.
5. Visually check body harness, 6 ft. lanyard, and lanyard ring for wear or damage. Store body harness in a dry area, away from direct sunlight when not in use.
6. Visually check retainers on cylinder pins, mast to boom pivot bolts, and the bucket and bucket yoke hinge & lock pins.
7. Check warning and operating instruction decals for condition. Replace defaced decals immediately. Replacement decals available from the service parts department.
8. Check outrigger indicator lamp for operation (lamp should be on only when unit is set-up, ready to be operated).
9. Each time the lift is towed, check the ball coupler for proper adjustment and secure fit. If adjustment is needed, tighten the adjusting knob on top of the coupler. Fit to the ball should be as tight as possible. Be sure that the towing vehicle has a 2" hitch ball. **DO NOT ATTEMPT TO TOW THIS LIFT WITH A MULTI-PIECE HITCH BALL OR A HITCH BALL OTHER THAN 2"**. Check condition of safety chains and trailer light connector.
10. Verify proper operation of the Emergency Down Switches at the bucket and the base (See page 1-9).

WEEKLY

It is recommended that the following checks, along with the daily checks, be made once a week on a given day of the week, such as Monday.

1. Check hydraulic fluid level by removing fill cap. Oil should be within 3" of the cap hole when boom is in the stored position. If necessary, add oil (Dexron III automatic transmission fluid).
2. Check battery conditions. If specific gravity is less than 1.175 or the voltage is less than 11 volts, recharge or replace battery. Add distilled water when necessary.
3. Check rotation chain and belt for proper tension. See "Rotation Drive Adjustment" on Page 3-1.
4. Carefully check all bolt tightness and re-tighten if necessary. Pay special attention to sub-frame bolts, lift mounting bolts, rotation drive bolts, and bucket mount bolts.
5. Check outriggers for functioning locking pins and signs of wear.

MONTHLY

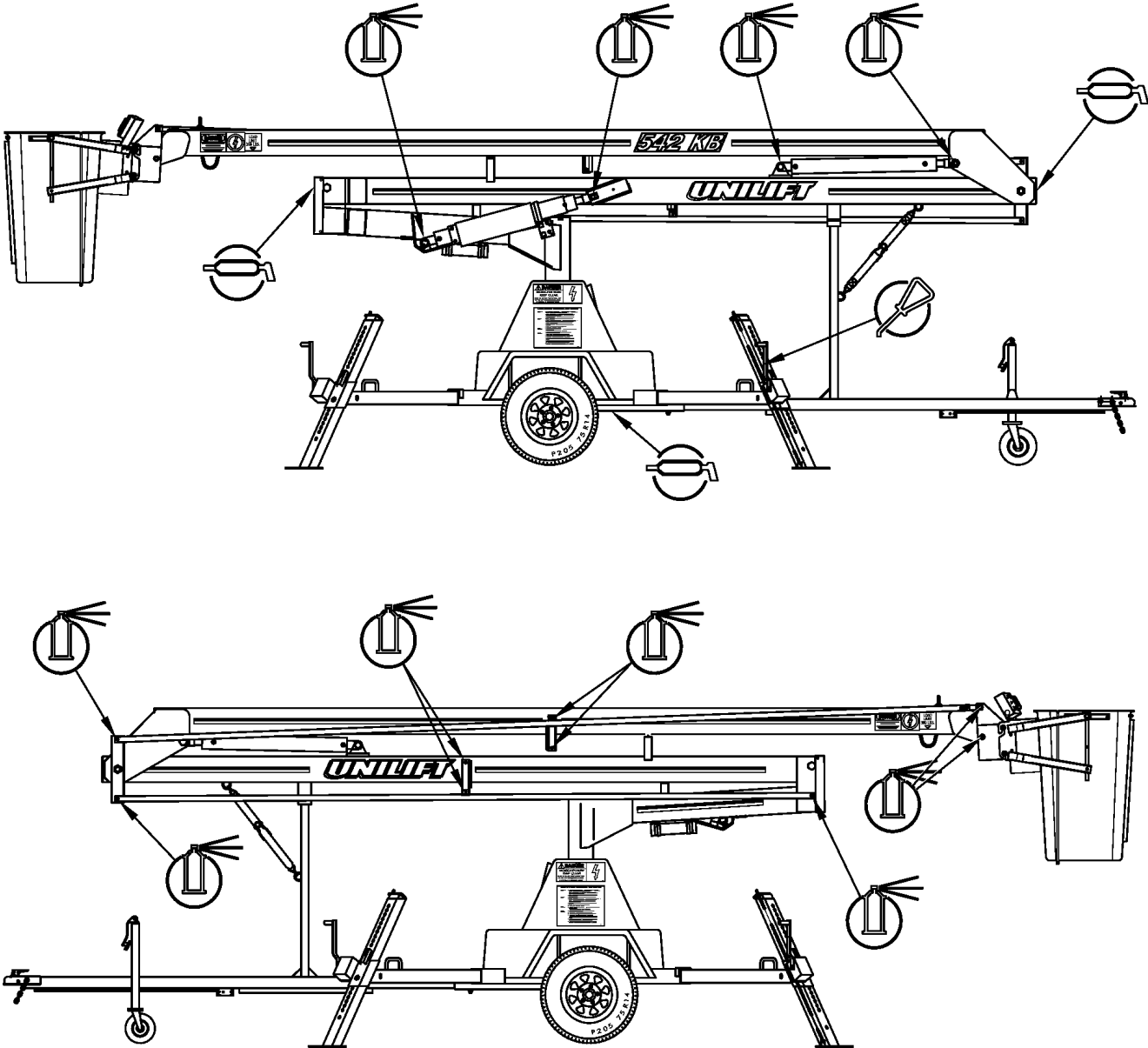
It is recommended that the following checks be made every month, along with the checks listed in the daily and weekly lists. A good time to perform these checks would be the first Monday in each month.

1. Check the lift for structural soundness. Check all welds, booms, and cylinder end fittings for cracks or other signs of structural fatigue.
2. Check operation of the Emergency Down battery and replace if necessary.
3. Check proper function of **ALL SAFETY SWITCHES**. (Refer to "SAFETY SWITCHES" & Figures 5-1, 5-2, 5-3, 5-4, 5-5, & 5-7 in the TROUBLE SHOOTING Section.)
4. Check steel portion of the lift for rust. Rust spots should be cleaned, primed, and painted.
5. Check hoses and wiring harness carefully at wear points and all entry points going to another component. Replace or repair as necessary.
6. Check for proper function of rotation limit switches.
7. Remove access cover at the pivot points and check upper and lower harnesses for worn or frayed insulation.
8. Inspect hydraulic oil for cleanliness. If cloudy or dirty, drain and replace with recommended oil.
9. Lubricate grease fitting points. (See Figure 4-1.)
10. Check tires for proper inflation (35 psi), wear, and damage.
11. Check brake fluid level in surge brake coupler

ANNUALLY

1. Perform a hydraulic system load check according to the "Hydraulic Pressure Adjusting Procedure" (Figure 5-6) in the TROUBLE SHOOTING Section.
2. Perform a boom angle and lift limit switch check. Refer to "Boom Angle And Limit Switch Adjustment Procedure" (Figure 5-7) in the TROUBLE SHOOTING Section.
3. Remove the shroud. Clean the frame, and inspect the welds and structure. Check axle cap screws, and column and roller cap screws for tightness. Paint rusty areas as required.

Figure 4 - 1
Lift/Crane Lubrication



 Dexron III ATF  Multi-Lube Lithium Grease  WD40® or equal

Table 4-1 - Inspection and Maintenance Schedule

	Daily	Weekly	Monthly	Yearly
MECHANICAL				
Bolts, Nuts, and Pins (1)	T			T
Body Harness, Lanyard, & Lanyard Ring (1)	T			T
Cylinder Pin Retainers (1) and Boom Pivot Bolts (1)	T			T
Bucket Hinge Pins (1) and Yoke Lock Pins (3)	T			T
Warning and Operating Instruction Decals (1)	T			T
Ball Coupler (1)(3) and Safety Chains (1)	T			T
Rotation Drive Chain (1)(3) and Drive Belt (1)(2)		T		T
Outriggers (1)(2)(5)		T		T
Structure and Welds (1)(5)			T	T
Lubrication (See Figure 4-1)			T	T
Tires (1)(5)(6)			T	T
Axle Cap Screws, Column & Roller Cap Screws (1) (3)				T
Rust (1)				T
ELECTRICAL				
All Functions and Control Switches (1)(2)	T			T
Emergency Down Function (2)	T			T
Emergency Down Battery (2)			T	T
Boom Safety Switch (2)			T	T
Outrigger Indicator Lamp (2)	T			T
Battery Charged (2)	T			T
Battery Water Level (1)		T		T
Battery Electrolyte Condition (4)(7)				T
Base Wiring and Boom Pivot Wiring (1)(5)			T	T
Rotation Limit Switches and Outrigger Switches (1)(5)			T	T
Battery Charger and Receptacle (1)(2)(5)			T	T
Terminals and Plugs (1)(3)			T	T
Lower-Boom Lift Limit Switch (1)(2)			T	T
HYDRAULIC				
Hydraulic Fluid Leaks (1)	T			T
Hydraulic Fluid Level (1)		T		T
Hydraulic Hoses (1)(3)(5)			T	T
Hydraulic Fluid Condition (1)(5)			T	T
Notes:	(1) Visual Inspection (2) Check Operation (3) Tightness and Secure Fit (4) Test Specific Gravity	(5) Signs of Wear and Fatigue (6) Inflation - 35 psi (7) Refer To Table 4-2		

HYDRAULIC FLUID

The fluid in the hydraulic system serves as the means for power transmission, lubrication and cooling. Proper inspection and maintenance of the hydraulic system and fluid will have an important effect on how the system performs and on the life of the components.

IN-OPERATION CARE - Proper in-operation care of the hydraulic fluid includes:

1. Prevent contamination by keeping the system tight.
2. Follow the hydraulic fluid inspection intervals outlined in this manual as a minimum. Dirty and dusty operating conditions will require more frequent inspections.
3. Keep the reservoir filled properly to take advantage of the fluid's heat-dissipating properties and to prevent moisture from condensing on the inside tank walls.
4. Repair all leaks immediately.
5. If the fluid becomes "burnt" or breaks down, or if the system becomes contaminated, change the fluid immediately.

DRAINING & REFILLING THE HYDRAULIC TANK

To Drain the Hydraulic Tank:

1. Disconnect the upper cylinder lower hose from the valve body. (see Figure 8-9, Item 10).
2. Place the hose in a suitable recovery container (5-gallon minimum) below the valve body.
3. Using the Lower Control Station, activate the "Upper Boom Lower" function to turn on the pump and drain the hydraulic tank.
4. Release the switch immediately when the drain flow stops. This indicates that the fluid level is below the pickup-tube inlet.

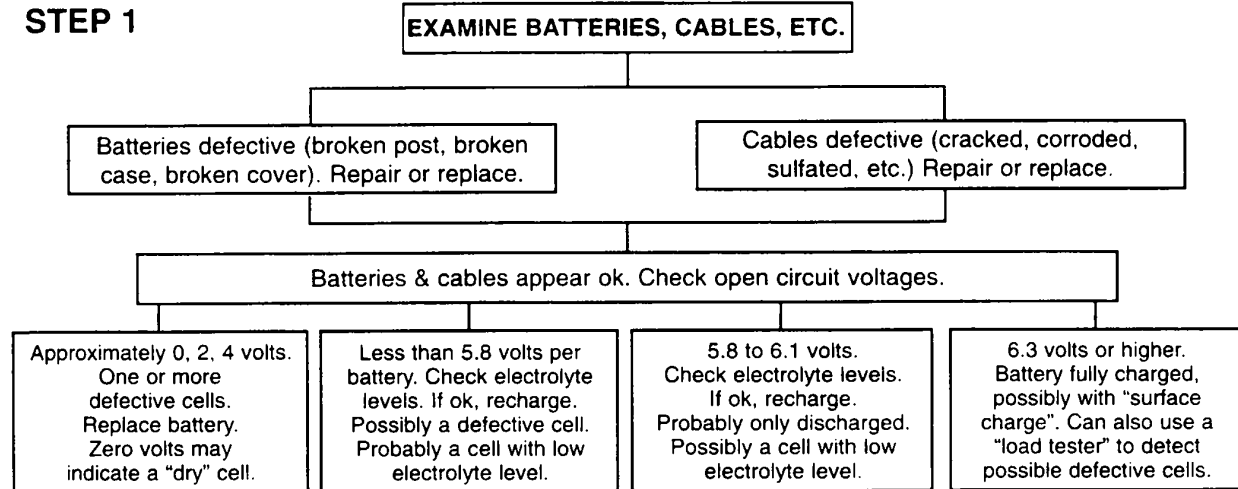
WARNING: DO NOT RUN THE HYDRAULIC PUMP WHILE THE TANK IS EMPTY. OPERATING THE MACHINE WITHOUT OIL IN THE SYSTEM WILL DAMAGE THE HYDRAULIC PUMP.

To Refill the Hydraulic Tank:

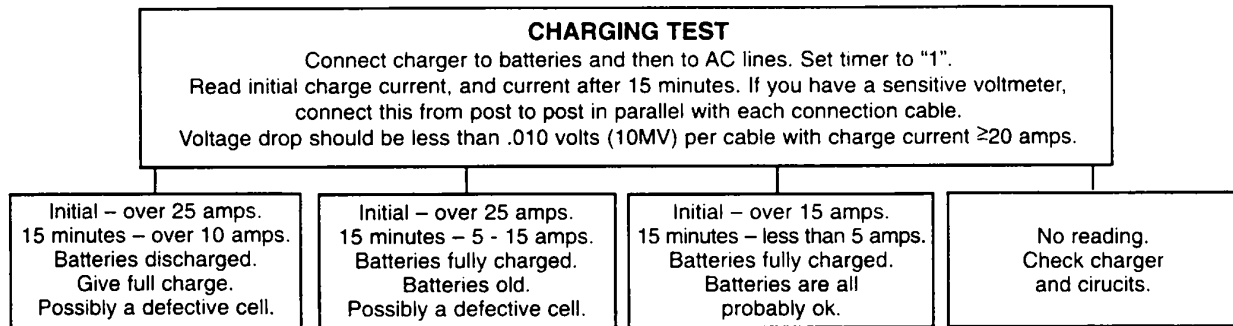
1. Reinstall the upper cylinder lower hose.
2. Remove the filler cap and add approximately 11-12 quarts of Dexron III automatic transmission fluid.
3. Replace the filler cap and cycle both cylinders completely.
4. Check the fluid level and add as necessary. Fluid level should be approximately 1-1/2" below the bottom of the filler neck.

Deep Cycle Batteries Diagnosis Chart

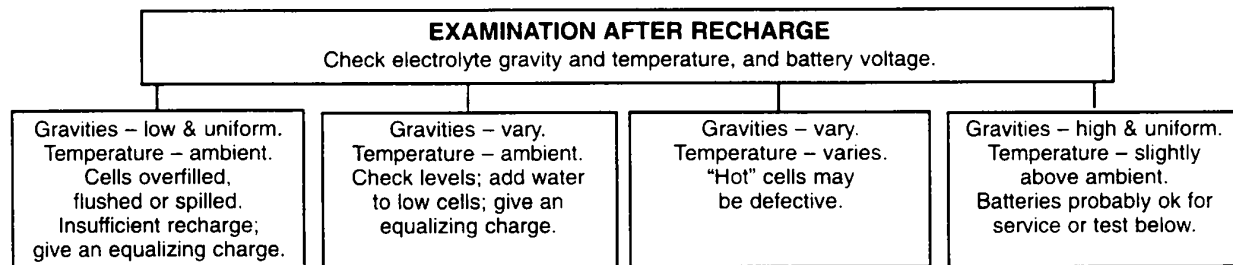
STEP 1



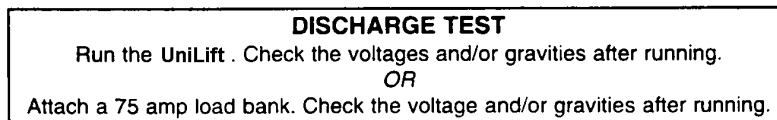
STEP 2



STEP 3



STEP 4



6 Volt UniLift Battery Discharge Test - Normal Readings		
VOLTAGE UNDER LOAD	SPECIFIC GRAVITY	INTERPRETATION
5.95 to 6.10	1.255 to 1.280	Fully charged batteries at beginning of discharge
5.60	1.200 to 1.210	Batteries 50% discharged (after 40 or more minutes at 75 amps)
5.20 to 5.35	1.140 to 1.165	Batteries at end of discharge (after 80 or more minutes at 75 amps)

STORAGE OF BATTERIES

Deep cycle batteries should be fully charged, clean and dry if they are to be stored for any length of time. Store in an unheated, dry area. Check the specific gravity of the electrolyte periodically with a hydrometer or boost charge every three months. If the specific gravity is being checked, recharge the battery when it reaches 1.220. The time it takes the battery to reach 1.220 depends on its condition and the temperature. The colder the storage area, the slower the battery will self-discharge. A normal time between charges is three months.

CAUTION: New deep cycle batteries do not have their full capacity until they have been cycled several times (somewhere between 5 and 40 cycles). Therefore, they can be excessively discharged early in their application, thereby shortening their service life. Accordingly, it is advisable to limit operation of new lifts or older lifts with new batteries to well below their advertised range for at least the first 5 cycles and then gradually increase the range.

Table 4-2 - Battery Charge State

APPROXIMATE STATE OF CHARGE			
Specific Gravity			
CHARGED	1.300 INITIAL FULL CHARGE	1.280 INITIAL FULL CHARGE	1.265 INITIAL FULL CHARGE
100%	1.300	1.280	1.265
75%	1.255	1.240	1.225
50%	1.215	1.200	1.190
25%	1.180	1.170	1.155
DISCHARGED	1.160	1.140	1.120

NOTE: Cell Temperature 80° F (26.7° C)

DANGER: SEE SAFETY PRECAUTIONS ON PAGE 4-8 BEFORE SERVICING BATTERIES

CAUTION: Although battery products do contain lead, the products - in their finished, packaged condition - do not pose any significant risk to individuals who are exposed to battery products being utilized in a proper manner. The batteries should be secured in an upright position and plastic vent caps should be secured to the batteries at all times. If the batteries become damaged or need to be replaced, dispose of the batteries through a licensed scrap battery agent.

BATTERY REPLACEMENT

519607 6V Deep Cycle 250 Amp Hr

SAFETY PRECAUTIONS

DANGER OF EXPLODING BATTERIES

Batteries contain sulfuric acid and produce explosive mixtures of hydrogen and oxygen. Because self-discharge action generates hydrogen gas even when the battery is not in operation, make sure batteries are stored and worked on in a well-ventilated area. ALWAYS wear ANSI Z87.1 (U.S. standard) approved safety glasses and face shield or splash proof goggles when working on or near batteries:

- Always wear proper eye, face and hand protection.
- Keep all sparks, flames and cigarettes away from the battery.
- Never try to open a battery with non-removable vents. (See Fig. 1 for the wording and symbols currently used on vent caps.)
- Keep removable vents tight and level except when servicing electrolyte.
- Make sure work area is well ventilated.
- Never lean over battery while boosting, testing or charging.
- Exercise caution when working with metallic tools or conductors to prevent short circuits and sparks.

SAFE CHARGING

Never attempt to charge a battery without first reviewing the instructions for the charger being used. In addition to the charger manufacturer's instructions, these general precautions should be followed:

- Always wear proper eye, face and hand protection.
- Always charge batteries in a well-ventilated area.
- Keep vents tight and level.
- Turn the charger and timer "OFF" before connecting the leads to the battery to avoid dangerous sparks.
- Never try to charge a visibly damaged or frozen battery.
- Connect the charger leads to the battery; red positive (+) lead to the positive (+) terminal and black negative (-) lead to the negative (-) terminal. If the battery is still in the vehicle, connect the negative lead to the engine block to serve as a ground. Be sure the ignition and all electrical accessories are turned off. (If the vehicle has a positive ground, connect the positive lead to the engine block.)

- Make sure that the charger leads to the battery are not broken, frayed or loose.
- Set the timer, turn the charger on and slowly increase the charging rate until the desired amperage value is reached.
- If the battery becomes hot, or if violent gassing or spewing of electrolyte occurs, reduce the charging rate or turn off the charger temporarily.
- Always turn the charger "OFF" before removing charger leads from the battery to avoid dangerous sparks.

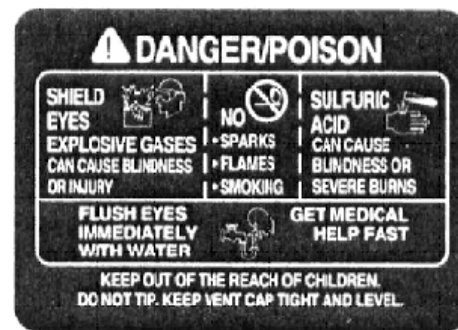


Figure 4-2 - Danger/Poison Warning Message

HANDLING BATTERY ACID

Battery acid, or electrolyte, is a solution of sulfuric acid and water that can destroy clothing and burn the skin. Use extreme caution when handling electrolyte and keep an acid neutralizing solution - such as baking soda or household ammonia mixed with water - readily available. When handling batteries:

- Always wear proper eye, face and hand protection.
- If the electrolyte is splashed into an eye, immediately force the eye open and flood it with clean, cool water for at least 15 minutes. Get prompt medical attention.
- If electrolyte is taken internally, drink large quantities of water or milk. DO NOT induce vomiting. Get prompt medical attention.
- Neutralize with baking soda any electrolyte that spills on a vehicle or in the work area. After neutralizing, rinse contaminated area clean with water.

To prepare electrolyte of a specific gravity, always pour the concentrated acid slowly into the water; DO NOT pour water into the acid. Always stir the water while adding small amounts of acid. If noticeable heat develops, allow the solution to cool before continuing to add acid.

TROUBLESHOOTING

Before beginning any trouble shooting procedures, check and make sure the batteries are at the proper voltage level. Low battery voltage can cause erratic operation and difficulty in trouble shooting the electrical system.

PROBLEM	PROBABLE CAUSE	POSSIBLE SOLUTION
Dead controls at both base and platform.	<p>Dead batteries.</p> <p>Base keyswitch (1KS) turned OFF or defective.</p> <p>Lower Control Station Emergency Stop pushed in or defective.</p> <p>Circuit breaker (1CR) tripped or defective.</p> <p>Outriggers not properly set.</p> <p>Outrigger switch(es) defective.</p> <p>Blown fuse (1FU) in 5° switch circuit.</p> <p>5° switch (8LS) activated or defective.</p> <p>Leveling switch relay (7CR) defective.</p>	<p>Recharge or replace batteries.</p> <p>Turn switch to ENABLE or replace defective keyswitch.</p> <p>Twist knob to release or replace defective switch.</p> <p>Reset or replace circuit breaker.</p> <p>Reset outriggers - green light will come on.</p> <p>Replace defective switch(es).</p> <p>Replace fuse</p> <p>Level unit or replace defective switch.</p> <p>Replace defective leveling switch relay.</p>
Controls at base OK, Platform Control Station dead.	<p>Emergency Stop switch at Platform Control Station disabled or defective.</p> <p>Platform Control Station ENABLE-OFF-DOWN OVERRIDE switch not actuated.</p> <p>Platform Control-Lower Control switch at base defective.</p> <p>Batteries low. Broken wiring or loose connection from base to platform control station.</p>	<p>Activate switch to ENABLE or replace defective switch.</p> <p>Hold switch to ENABLE and use controls.</p> <p>Replace switch.</p> <p>Charge batteries. Repair or replace wiring (run continuity check).</p>
Controls at base OK, Platform Control Station intermittent.	<p>Batteries low.</p> <p>Defective wiring in upper or lower boom.</p> <p>Defective wiring from base to lower boom terminal strip.</p>	<p>Charge batteries.</p> <p>Repair or replace upper control cable.</p> <p>Repair or replace lower control cable.</p>
No rotation - all other controls OK.	<p>Defective rotation motor.</p> <p>Rotation Interlock Relay (5CR) defective.</p> <p>Bad diode assembly.</p> <p>Rotation switch (4S) defective.</p> <p>Belt or chain slipping or broken.</p> <p>Worn or broken drive sprocket.</p> <p>Broken wiring or loose connection.</p>	<p>Repair or replace rotation motor.</p> <p>Replace relay.</p> <p>Replace diode assembly.</p> <p>Replace switch.</p> <p>Adjust or replace broken parts.</p> <p>Replace drive sprocket.</p> <p>Repair or replace wiring.</p>
No CW rotation - all other controls OK.	<p>CW rotation solenoid (2CR) defective.</p> <p>CW limit switch (2LS) defective.</p> <p>Rotation switch (4S) defective.</p> <p>Rotation motor (1M) defective.</p> <p>Broken, loose or shorted wiring.</p>	<p>Replace solenoid.</p> <p>Replace CW limit switch.</p> <p>Replace switch.</p> <p>Repair or replace motor.</p> <p>Repair or replace defective wiring.</p>

PROBLEM	PROBABLE CAUSE	POSSIBLE SOLUTION
No CCW rotation - all other controls OK.	CCW rotation solenoid (1CR) defective. CCW limit switch (1LS) defective. Rotation switch (4S) defective. Rotation motor (1M) defective. Broken, loose or shorted wiring.	Replace solenoid. Replace CCW limit switch. Replace switch. Repair or replace motor. Repair or replace defective wiring.
Rotation intermittent.	Loose belt in rotation drive. Drive pulley on rotation motor loose. Poor engagement of the drive sprocket. Defective rotation motor. Loose connection on the rotation motor.	Rotate boom to point of intermittent rotation. Determine which belt is slipping and tighten that belt. Tighten drive pulley setscrew. Adjust or replace drive sprocket. Replace rotation motor. Tighten connections on rotation motor.
Rotation OK, but no RAISE or LOWER functions.	Battery shut-off solenoid defective. (3CR) Pump solenoid (4CR) defective. Hydraulic pump or pump motor defective. Defective diode assembly. Loose, broken, or shorted wiring.	Replace solenoid. Replace solenoid. Repair or replace hydraulic pump. Replace diode assembly. Repair or replace defective wiring.
Platform Control Station- no RAISE and/or LOWER.	RAISE/LOWER switch at Platform Control Station defective. Loose, broken, or shorted wiring.	Replace switch. Repair or replace defective wiring.
Platform Control Station - no CW and/or CCW rotation.	Rotation switch at Platform Control Station defective. Loose, broken, or shorted wiring.	Replace switch. Repair or replace defective wiring.
Platform Control station OK, base controls dead or intermittent.	Platform Control/Lower Control switch (2S) at base defective. Loose, broken, or shorted wiring.	Replace switch. Repair or replace defective wiring.
Pump runs - no RAISE or LOWER functions.	Defective diode assembly. Pump solenoid (4CR) defective.	Replace diode assembly. Repair or replace defective wiring.
Base only - no RAISE and/or LOWER. (Lower Boom)	Lower boom RAISE/LOWER switch at base defective. Loose, broken, or shorted wiring.	Replace switch. Repair or replace defective wiring.
Base only - no RAISE and/or LOWER. (Upper Boom)	Upper boom RAISE/LOWER switch at base defective. Loose, broken, or shorted wiring.	Replace switch. Repair or replace defective wiring.
Base only - no CW and/or CCW rotation.	Rotation switch at base defective. Loose, broken, or shorted wiring.	Replace switch. Repair or replace defective wiring.

PROBLEM	PROBABLE CAUSE	POSSIBLE SOLUTION
No lower boom RAISE at Platform Control Station or base - all other functions OK.	Up limit switch (7LS) activated or defective. Defective diode assembly. Defective RAISE solenoid valve in pump assembly. Loose, broken, or shorted wiring.	Reposition boom, adjust or replace limit switch (7LS). Replace diode assembly. Repair or replace solenoid valve or pump assembly. Repair or replace defective wiring.
No lower boom LOWER at Platform Control Station or base - all other functions OK.	Boom safety switch (20LS) actuated or defective. Defective time delay relay. Defective diode assembly. Defective LOWER solenoid valve in pump assembly. Loose, broken, or shorted wiring.	Reposition upper boom, repair or replace boom safety switch (20LS). Replace relay. Replace diode assembly. Repair or replace solenoid valve or pump assembly. Repair or replace defective wiring.
No upper boom RAISE at Platform Control Station or base - all other functions OK.	Boom safety switch (20LS) actuated or defective. Defective time delay relay. Defective diode assembly. Defective RAISE solenoid valve in pump assembly. Loose, broken, or shorted wiring.	Reposition upper boom, repair or replace boom safety switch (20LS). Replace relay. Replace diode assembly. Repair or replace solenoid valve or pump assembly. Repair or replace defective wiring.
No upper boom LOWER at Platform Control Station or base - all other functions OK.	Defective diode assembly. Defective LOWER solenoid valve in pump assembly. Pilot operated check valve defective. Loose, broken, or shorted wiring.	Replace diode assembly. Repair or replace solenoid valve or pump assembly. Repair or replace check valve. Repair or replace defective wiring.
Slow start and stop of RAISE/LOWER movements.	Low hydraulic fluid. Dirt or foreign material in hydraulic system. Pressure relief valve set too low. Batteries low. Defective pump/motor assembly.	Replace lost fluid and repair leak(s). Drain and replace hydraulic fluid. Adjust pressure relief valve to 1400 psi maximum. Recharge batteries. Repair or replace pump/motor assembly.
Two movements occur when only one switch is activated	Shorted wiring. Defective diode(s).	Repair or replace defective wiring. Replace diode assembly.

ELECTRICAL SYSTEM DESCRIPTION

The following section contains detailed explanations of the control panel and other electrical components. This information will be very helpful when used with the trouble shooting chart beginning on Page 5-1.

CONTROL PANEL

The standard control panel has 5 solenoids mounted on it (units equipped with an optional 5° leveling switch will have another solenoid mounted on the back of the lower control). The solenoids are designated 1CR, 2CR, 3CR, 4CR, & 5CR. The solenoids are identified on the Electrical Diagram, and the physical locations are shown in Figure 8-15 - Lower Control Panel Assembly, in the Parts Section.

3CR - Battery Shut-off Solenoid

The battery shut-off solenoid (3CR) switches the battery power going to the hydraulic pump and rotation motor. 3C is off (contact open) until a function (raise, lower, rotation) is activated. When the solenoid is energized, the contact closes, supplying battery current to the hydraulic pump and/or rotation motor. When the function switch is released the solenoid de-energizes and the contact opens.

4CR - Pump Relay

The pump relay (4CR) turns on the hydraulic pump motor during raise, and lower functions on both cylinders.

5CR - Rotation Interlock Relay

The rotation interlock relay (5CR) supplies electrical power to the rotation motor circuit when either CW or CCW rotation is activated. The 5CR contact serves as a safety interlock in that it breaks positive (+) current going to either 1CR or 2CR when the rotation switch is released.

1CR & 2CR - Rotation Positive Switching Relays

1CR controls CCW rotation, while 2CR controls CW rotation. The direction of travel is determined by switching the polarity of the rotation motor wires using 1CR & 2CR relays.

7CR - Leveling Switch Relay *Optional*

The leveling switch relay (7CR) is used as a relay with the optional 5° safety switch. The 7CR contact is normally closed, allowing the unit to operate. Whenever the 5° switch is activated, 7CR energizes and opens the contact prohibiting raise, and rotation functions. The machine will allow lower functions only.

BATTERY CHARGER CONTROL CIRCUIT

The battery charger is powered by 110 VAC. The receptacle is located directly beneath the ammeter assembly on the shroud. The black lead from the battery charger is connected to the ground terminal on the battery. The red lead from the battery charger is connected to the battery charger cutout relay (6CR). From 6CR the circuit connects to the ammeter then continues on to the positive battery terminal. The purpose of the battery charger cutout relay (6CR) is to protect the battery charger while the batteries are charging and the lift is in use. Whenever a function is activated, 6CR is energized and opens the contact on the positive feed to the batteries until the function is discontinued.

DIODE ASSEMBLIES

The unit is equipped with three diode assemblies. The description, location, and function of the diode assemblies follows.

Diode Assembly on Pump Relay (4CR)

The red and green wires from the lower cylinder RAISE/LOWER switch, and the blue wire from the upper cylinder RAISE/LOWER switch each have a diode soldered in line. The three diodes form a single line with a ring terminal that connects to the small coil terminal on 4CR (pump relay). Depending on which function is being used, 4CR is energized which allows the hydraulic motor and pump to operate with the corresponding solenoid valve in the pump valve assembly. The purpose of the diode assembly on 4CR is to insure that only one solenoid valve is open in the pump valve assembly at any given time.

Diode Assemblies cont'd.

Any time a pump problem is encountered, such as erratic operation or incorrect up or down functions, the diode assembly is the first component to check. Remember, a diode should only allow current flow in one direction, otherwise it is defective.

Diode Assembly on Battery Charger Cutout Relay (6CR)

The white wire from 1CR (ccw rotation), the orange wire from 2CR (cw rotation), and the brown wire from 4CR (pump relay) each have a diode soldered in line. The three diodes form a single line with a ring terminal that connects to the small coil terminal on 6CR (battery charger cutout relay). Whenever the cw or ccw rotation switch is activated, or a function that runs the hydraulic pump is used, the 6CR (battery charger cutout relay) contact opens.

If the diode in the brown wire from 4CR (pump relay) is defective, the hydraulic pump will also turn on when the rotation switch is activated. If a diode in the orange or white wires is defective, the unit will also rotate when a hydraulic pump function (up or down) is used.

Diode Assembly on Rotation Interlock Relay (5CR)

The white wire from 1CR (ccw rotation relay) and the orange wire from 2CR (cw rotation relay) have a diode soldered in line. The two diodes form a single line with a ring terminal that connects to the small coil terminal on 5CR (rotation interlock relay). Whenever the cw or ccw directional switch is activated 5CR is energized, closing the contact and allowing power to reach the 1CR and 2CR contacts that control direction in the rotation motor circuit.

If either of these diodes are defective, current will reach both 1CR (ccw rotation relay) and 2CR (cw rotation relay). This will cause the rotation motor to lock-up and not move either direction.

SAFETY SWITCHES**Outrigger Safety Switches**

The unit is equipped with four outrigger safety switches wired in series. The switches are mounted on the frame, underneath each horizontal outrigger. The switches are activated when all four outriggers are pulled out to the locked position and cranked up. When properly set, the outrigger places pressure on the safety switch arm, causing the contact to close. When all four outriggers are properly set, the green light on the control panel will be on, and the unit is operable. When the outriggers are not properly set (wheels not ½" off the ground), boom movements can cause an outrigger to "unload" and open the switch contact, resulting in intermittent operation.

To test the set-up: Put on the body harness, enter the bucket, and attach the lanyard. Raise the upper boom 2-3 feet. Activate and hold the upper boom "LOWER" switch until the boom is completely lowered, contacting the boom stop block (a slight bouncing may occur in the bucket). Repeat this procedure throughout the full range of rotation. Any intermittent motion, or blinking of the green light, indicates that the outriggers need to be reset (refer to Page 1-2 & 1-3 in the Operator's Manual).

Boom (Over-Center) Safety Switch

The boom (over-center) safety switch is located on the inside surface of the upper boom pivot plate. The boom (over-center) safety switch continuously monitors the angle of the upper boom and prevents the platform from being raised, or lowered, into an unsafe position.

Lower Boom Lift Limit Switch

The lower boom lift limit switch is mounted at the rear of the lower boom, behind the platform-end cover plate (Refer to Fig 5-3.) This switch prevents the lower boom from being raised too high, causing an over-center condition. If this switch becomes defective, the pump motor will still run, but the lower boom will not raise.

Rotation Limit Switch

The unit is equipped with two rotation limit switches. (Fig 5-4) The rotation limit switches are mounted below the rotation wheel behind the batteries. When one of the switches is activated, travel in that direction is stopped. The machine will still rotate the opposite way. If a rotation limit switch is defective, it will prevent rotation in that direction.

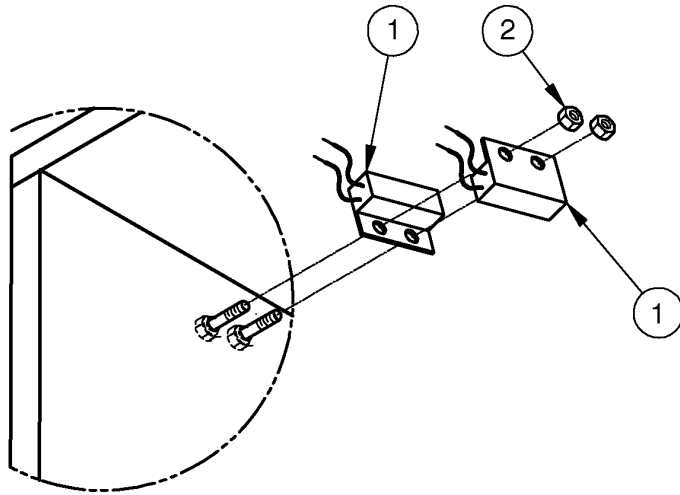
Boom (Over-Center) Safety Switch

The Boom (over-center) Safety Switch is located on the inside surface of the upper boom pivot plate (see Figure 5-7.) The safety switch continuously monitors the angle of the upper boom and prevents the platform from being raised, or lowered, into an unsafe position, by locking-out the upper boom RAISE and lower boom LOWER functions. The Boom (over-center) Safety Switch position is factory pre-set and has no adjustment. The safety switch system should be checked for proper operation monthly as a minimum.

To check for proper operation:

1. Using the Lower Control Station, raise the lower boom approximately 5 feet.
2. Raise the upper boom until movement stops.
3. Verify that upper boom movement stops before the platform goes past center, and that the upper boom RAISE, and the lower boom LOWER controls DO NOT operate after the upper boom stops.

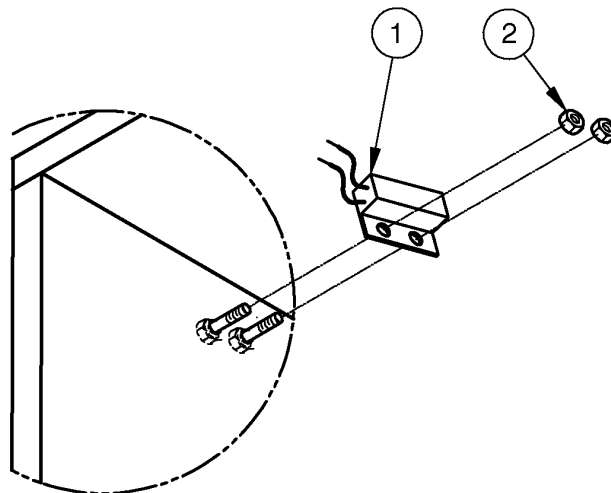
Warning - If platform goes past center, or the upper boom RAISE or lower boom LOWER controls continue to operate, the unit must not be operated until the defective switch is replaced.



**Figure 5-1
Boom (Over-Center) Safety
Switches
Up to S/N 42015**

**Figure 5-2
Boom (Over-Center) Safety Switches
S/N: 42016 -**

KEY NO.	PART NO.	DESCRIPTION
1	513985	Switch
2	50408	1/4-20 Locknut



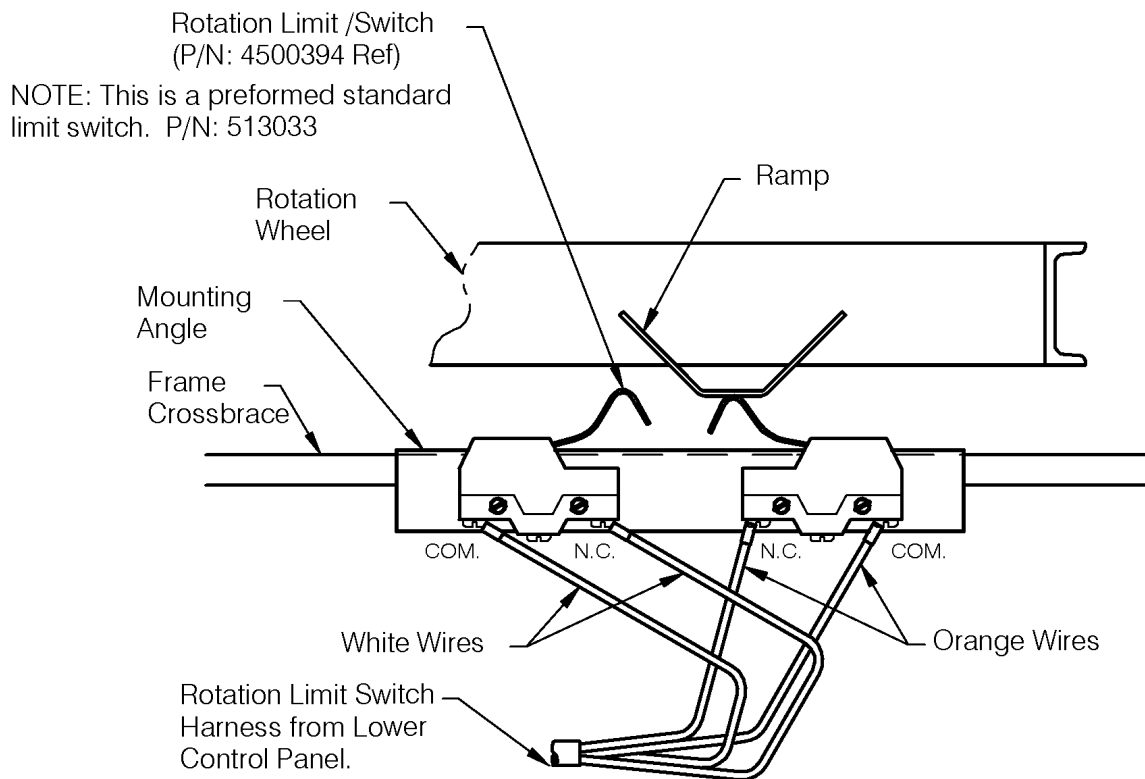


Figure 5-4
Rotation Limit Switch Wiring

Outrigger shown in loaded or set up position. Switch is actuated, closing the circuit, allowing operation of the unit. Green light on lower control panel should be ON.

Outrigger tube shown in unloaded position. Switch is not actuated. The circuit is open, not allowing operation of the unit. Green light on lower control panel should be OFF.

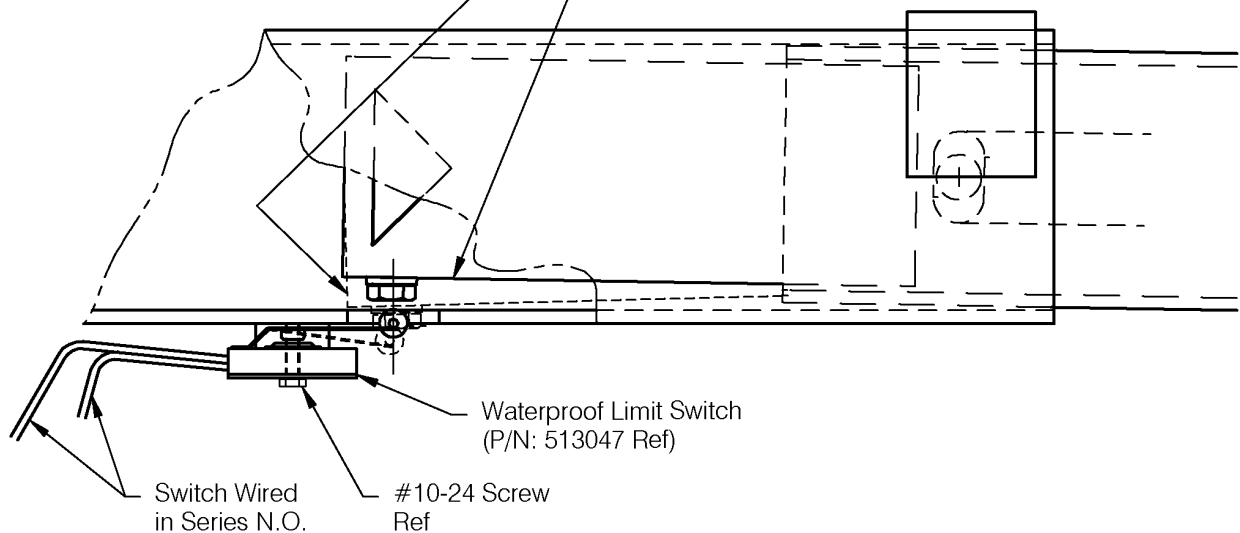
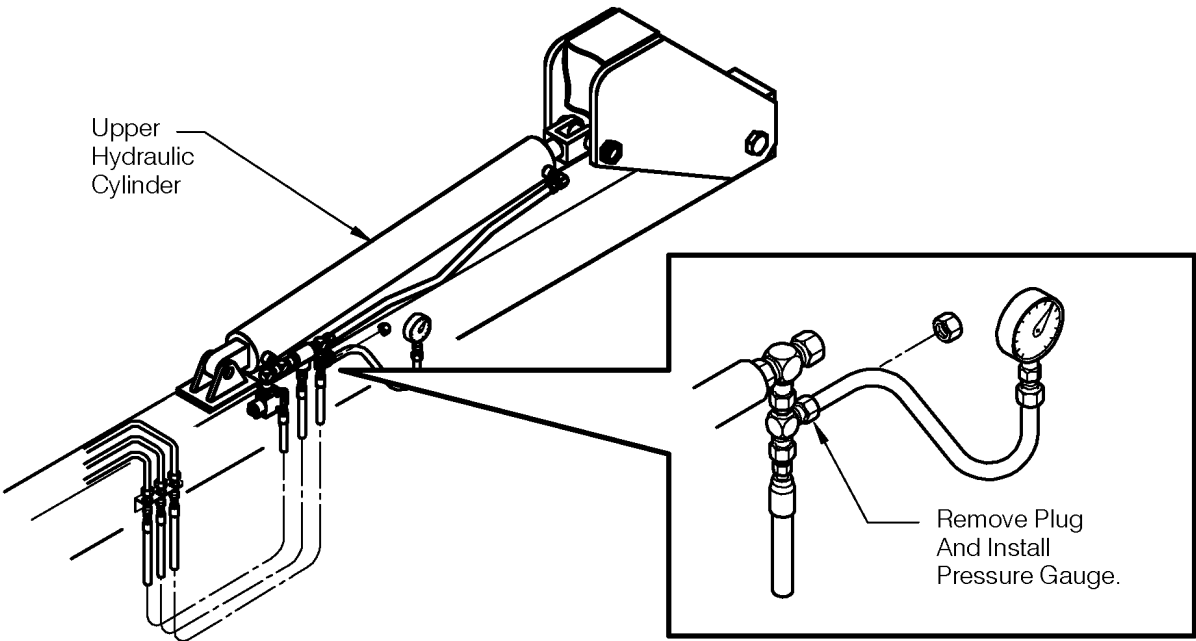


Figure 5-5
Outrigger Limit Switch Wiring



1. Remove the plug and install the pressure gauge. Suggested gauge is a liquid filled gauge, with a range of 2000 PSI, and a 1/4" NPTF fitting. *NOTE: Fluid must be cold when setting the hydraulic system pressure.*
2. At the Lower Control Station, activate the upper boom LOWER and note the system pressure indicated on the gauge. System pressure should be set at 1400-1450 PSI. If the pressure reading is not within that range, the system pressure must be reset.
3. The hydraulic pressure adjustment screw is located on the pump-mount flange, next to the hydraulic cylinder. To adjust the pressure, loosen the jam nut and turn the socket-head set screw **CLOCKWISE** to **INCREASE** the pressure, or **COUNTER - CLOCKWISE** to **DECREASE** the pressure. Re-tighten the jam nut and re-check the pressure as outlined in step 2. The system pressure must be set at 1400-1450 PSI.
4. When the system pressure is properly set, remove the gauge and reinstall the plug.

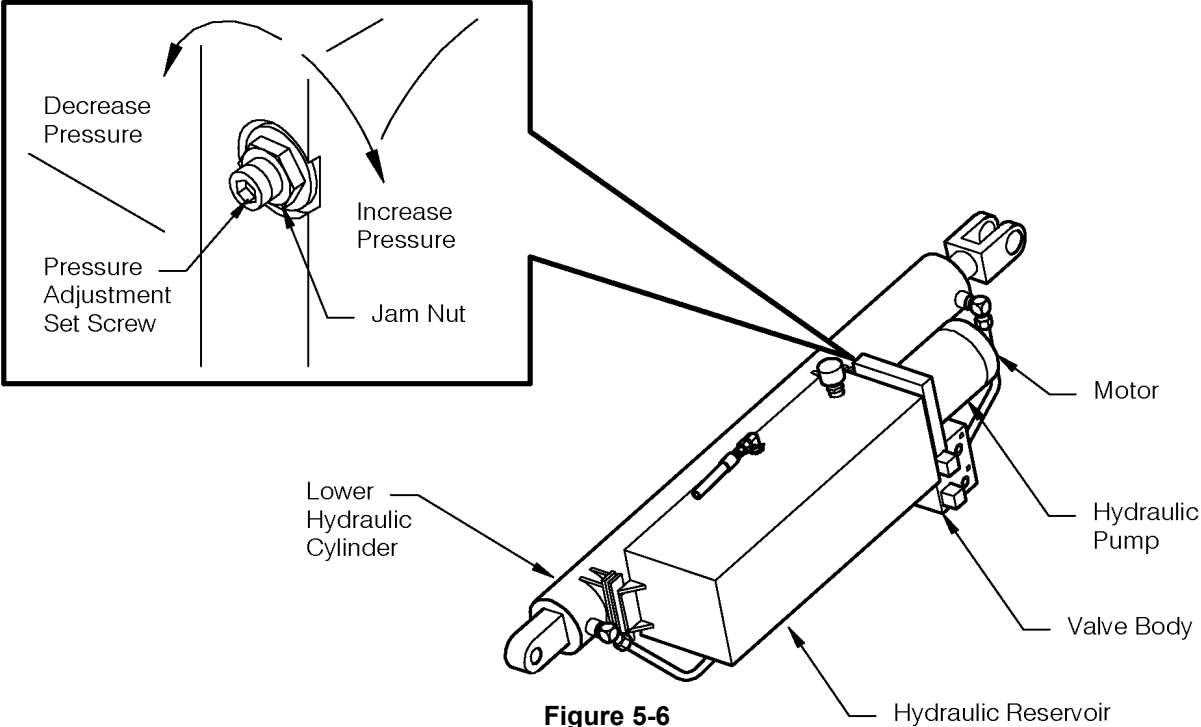


Figure 5-6 Hydraulic Pressure Adjusting Procedure

1. Secure a measuring tape to the bottom of the platform. Using the Lower Control Station, raise the platform to approximately 10'.
2. Raise the middle boom until movement stops. The middle boom should be at an angle of 68E. If an angle finder is not available, the length of exposed piston rod may be measured. The exposed rod length should be 33-1/2" (851 mm). If the boom angle does not measure 68E, or the rod length does not measure 33-1/2" (851 mm), the lift limit actuating tab must be adjusted.

To adjust the Lift Limit Actuating Tab:

Raise the middle boom to an angle of 68E, or until the length of exposed rod is 33-1/2" (851 mm). Loosen the actuating tab and reposition the tab so the lift limit switch is just activated. Retighten the tab. Lower and raise the boom again to verify proper operation of the lift limit switch and recheck the (68E) boom angle.

NOTE: If the middle-boom angle is set too shallow, it maybe necessary to loosen and reposition the actuating tab before resetting the angle. Use extreme caution, and check the angle or exposed rod length frequently. DO NOT raise the middle boom past center when resetting the boom angle.

3. With the middle boom at 68E, use the Lower Control Station and raise the upper boom until movement stops. The measurement from the bottom of the platform to the ground should be 36'-6" (11.13 m). The upper boom movement is limited by an over-center switch. This switch is factory pre-set, and is not adjustable. If the upper boom movement does not stop automatically or if the platform to ground measurement exceeds 36'-6" (11.13 m), the switch must be replaced.

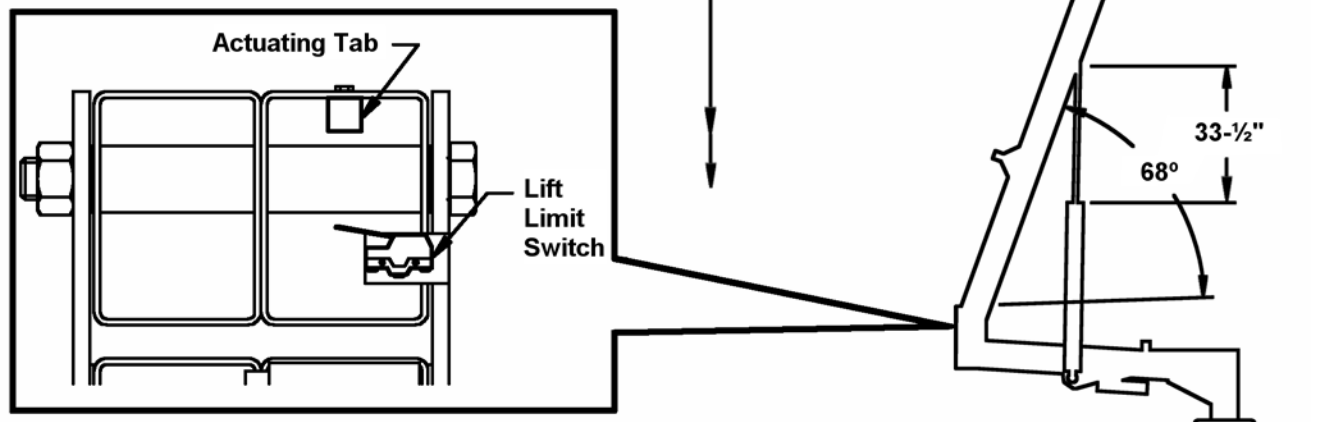


Figure 5-7
Boom Angle & Limit Switch Adjustment Procedure

ELECTRICAL DIAGRAM

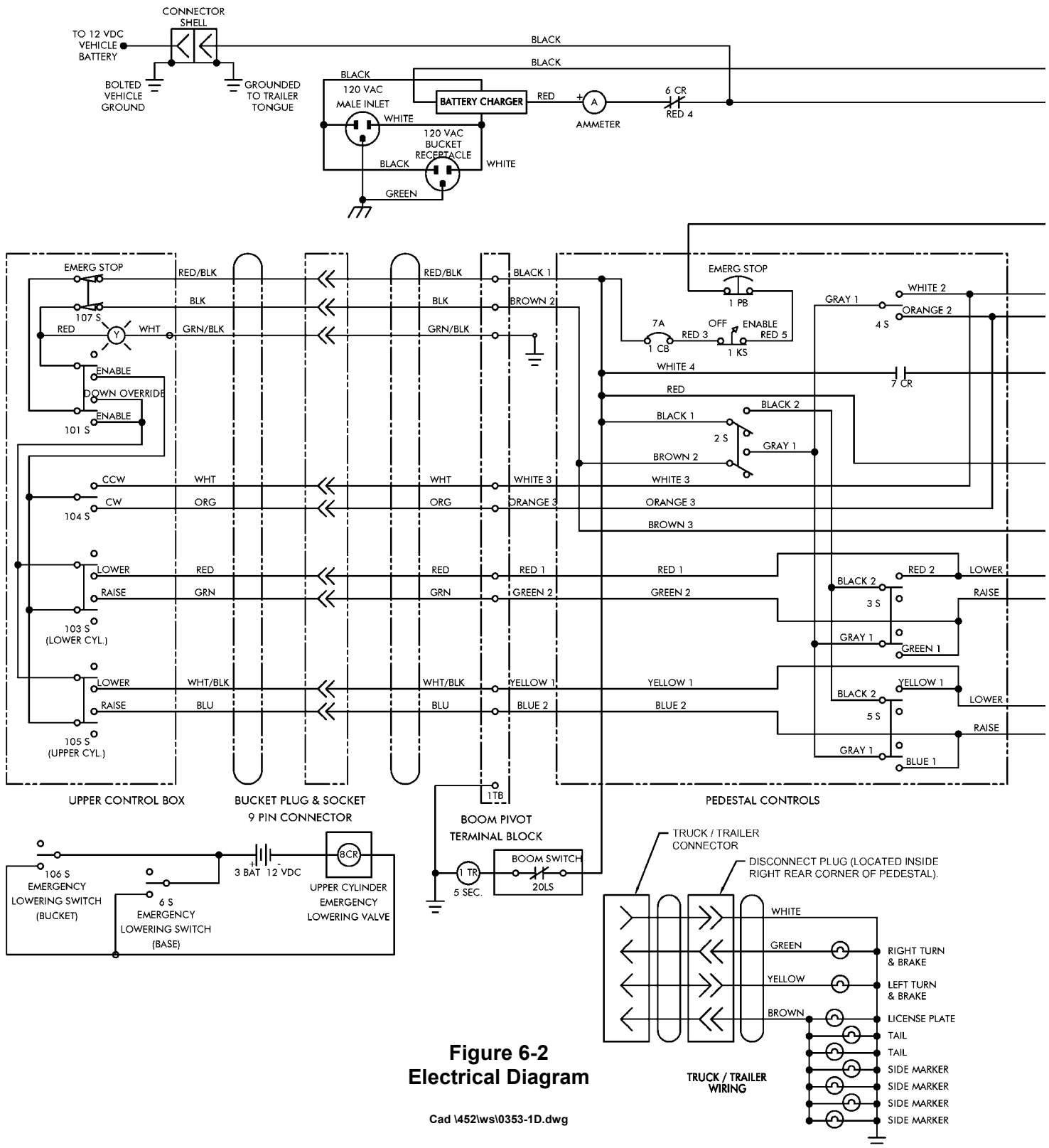
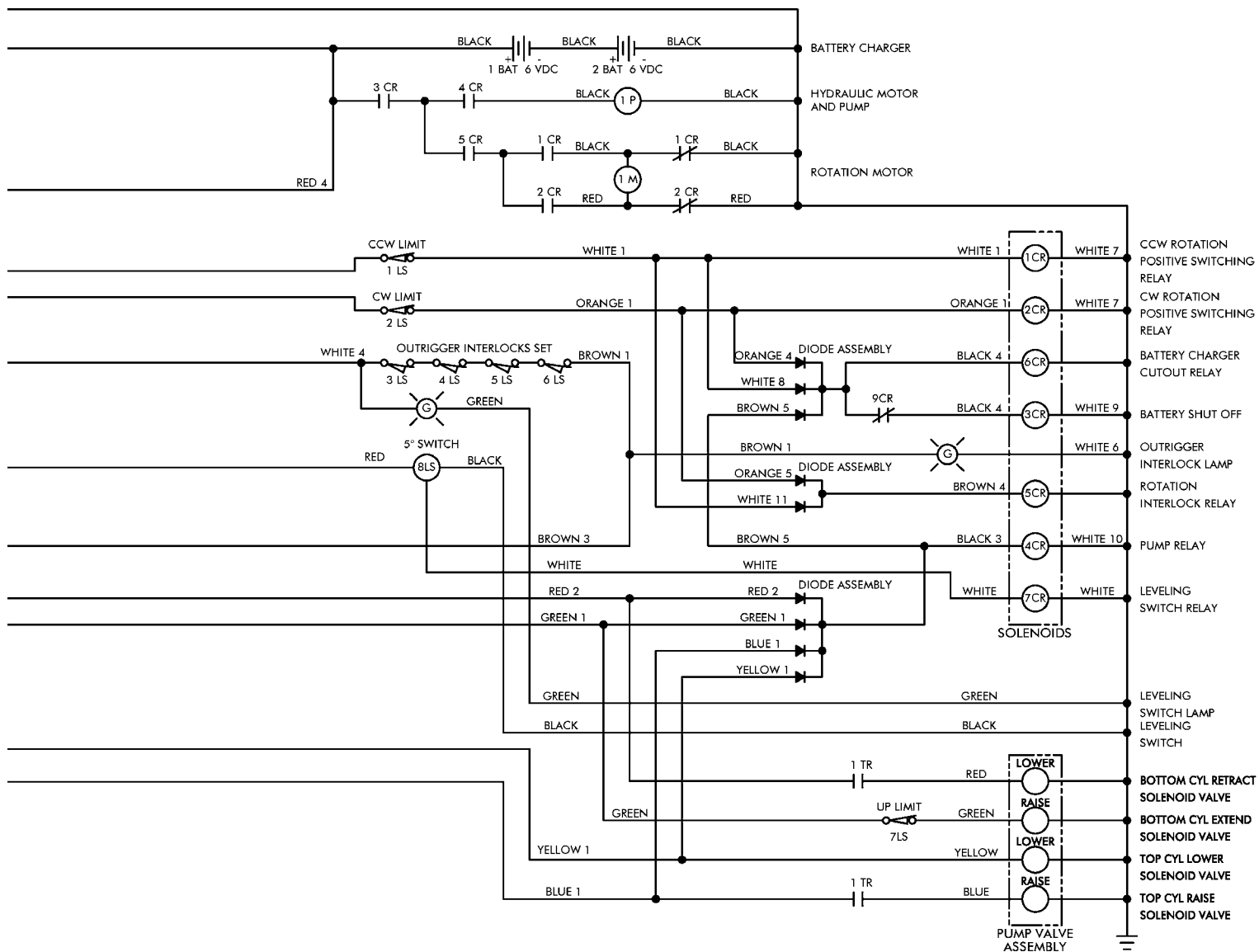


Figure 6-2
Electrical Diagram

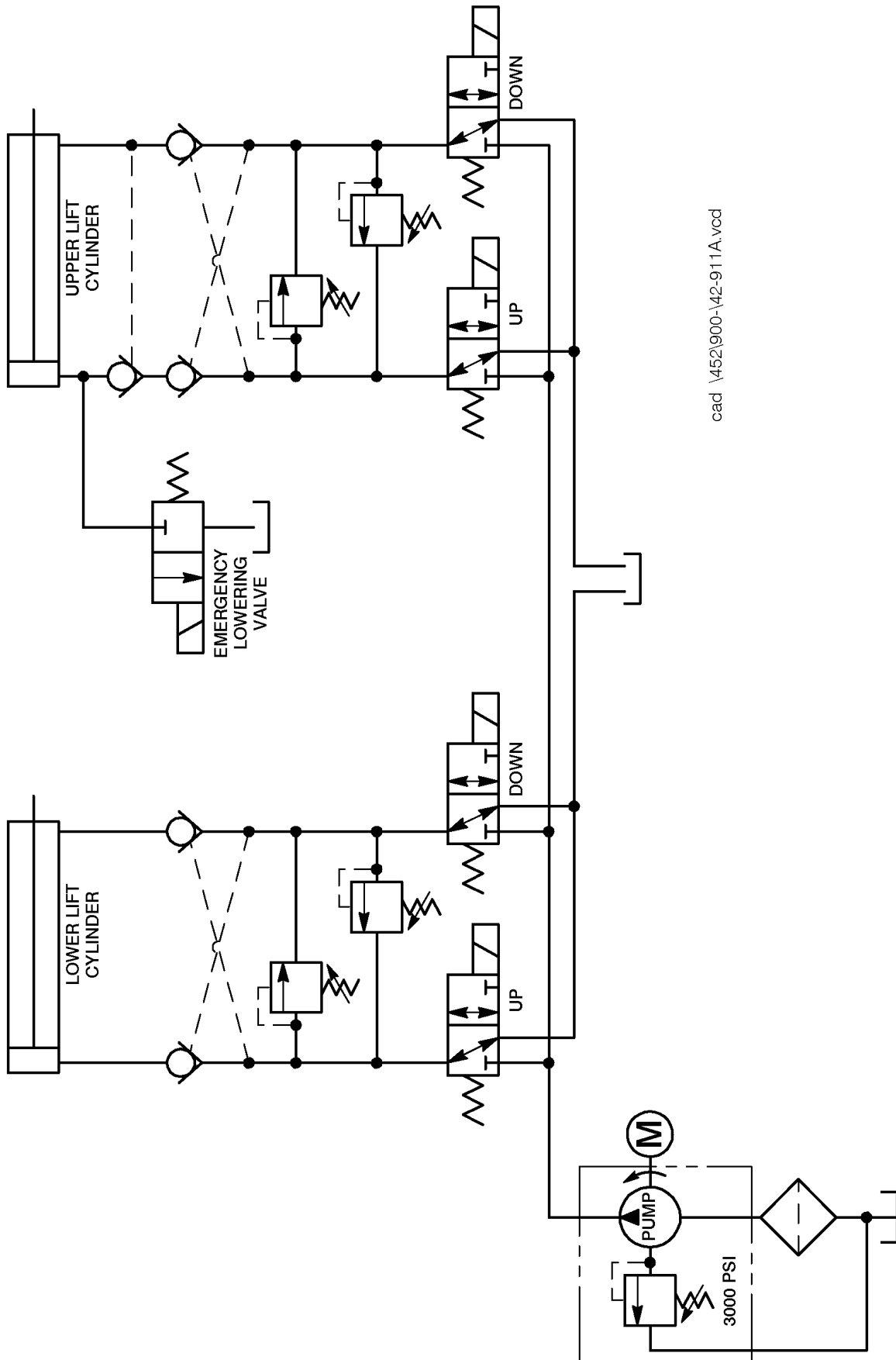
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- NOTE:
1. ALL DIODES ARE IN5402 3 AMP 200 PIV OR IN5408 3 AMP 1000 PIV (9) PLACES.
 2. USED ON S/N 42060 & UP.

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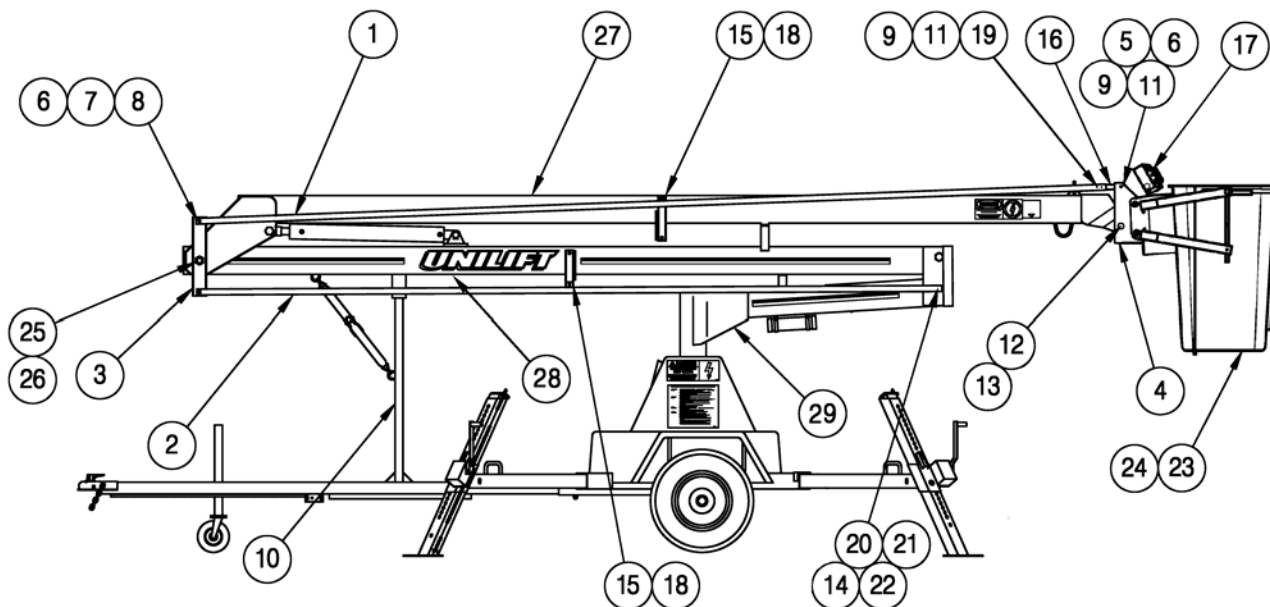
HYDRAULIC DIAGRAM



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PARTS

Figure 8 - 1
Unit Assembly Self Leveling
(S/N:42300-...)

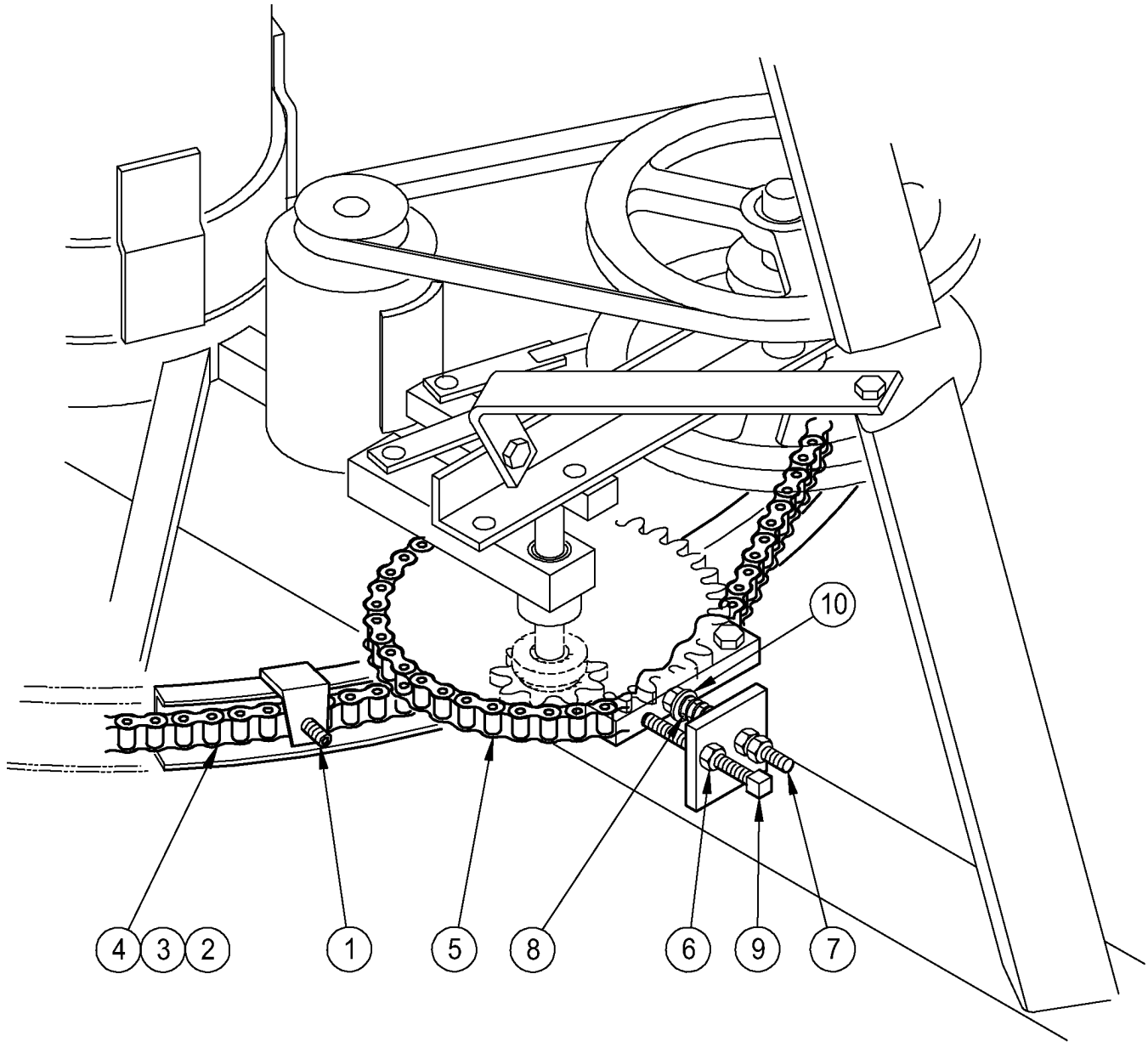


KEY NO.	PART NO.	DESCRIPTION
1	.....	Boom Assembly (See Fig. 8-2)
2	.....	Main Drive Chain Assembly (See Fig. 8-3)
3	4500200	Rotation Drive Assembly (See Fig. 8-4)
4	4500335KB	Shroud Assembly (See Fig. 8-5)
5	.....	Bucket Assembly (See Fig. 8-6a & 6b)
6	.....	Main Frame Assembly (See Fig. 8-7)
7	.....	Upper Cylinder Assembly (See Fig. 8-8)
8	.....	Hyd. Pump/Lower Cyl. Assembly . (See Fig. 8-9)
9	.....	Hydraulic System Assembly (See Fig. 8-10)
10	.....	Emergency Lowering Switch (See Fig. 8-11)
11	.....	Upper Control Assembly (See Fig. 8-13)
12	4520117	Upper Control Connection (See Fig. 8-14)
13	4520953	Lower Control Panel Assembly ... (See Fig. 8-15)
14	.....	Bucket Level Linkage (See Fig. 8-16a & 16b)
15	4520883	Crank Outrigger Installation (See Fig. 8-17)
16	.....	Outrigger Crank Assembly (See Fig. 8-18)
17	.....	Lift Limit and Time Delay (See Fig. 8-19)
18	4500908	Leveling Safety Switch Option (See Fig. 8-20)
	4520296	Decal Kit (Not Shown)

**Figure 8 - 2
Boom Assembly**

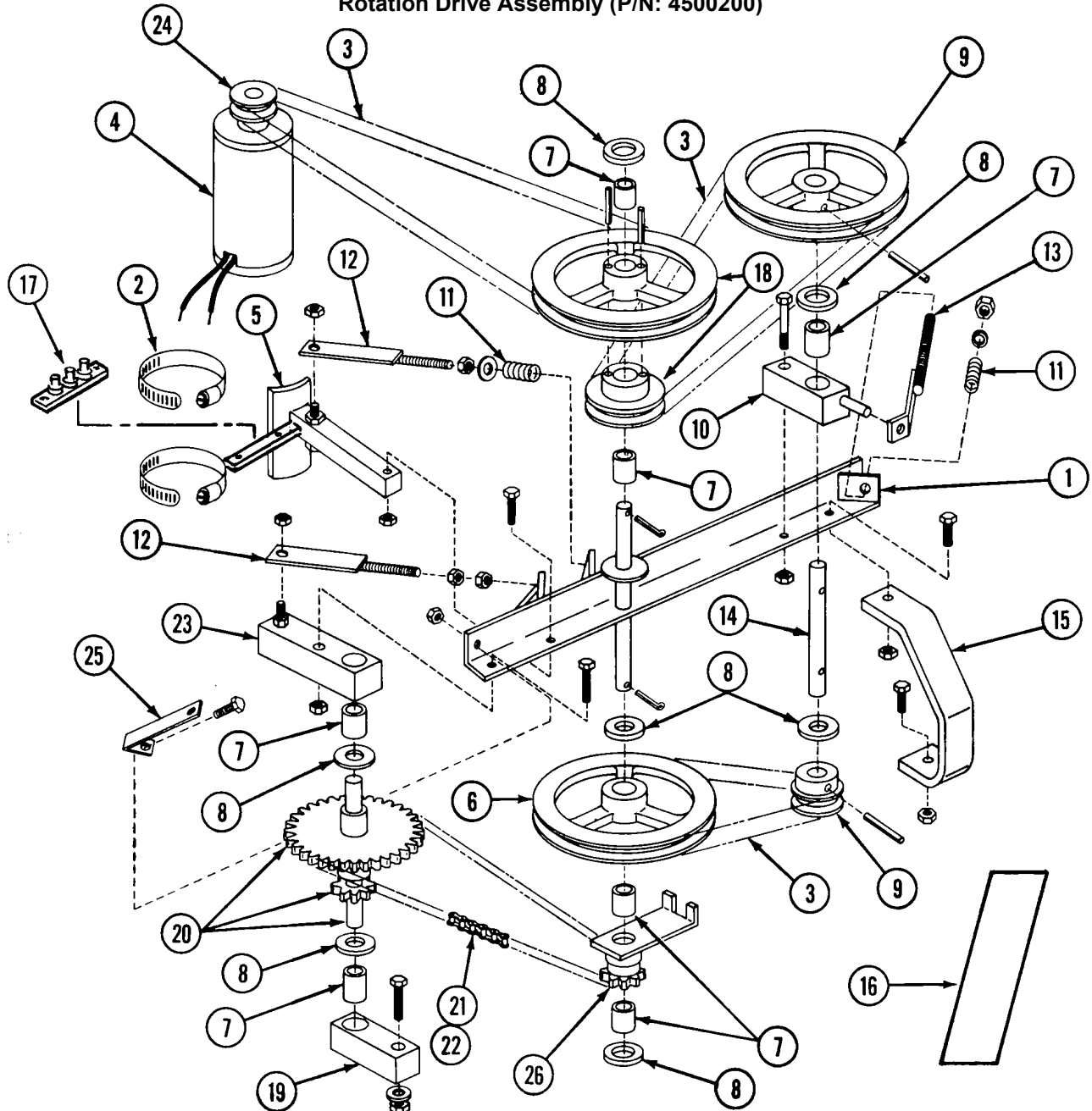
KEY NO.	PART NO.	DESCRIPTION
1	4500022	7-1/8" Spacer
2	4500391	Lock Screw
3	4520020	Cylinder Pin
4	-	
5	-	
6	4520022-4	2-1/8" Spacer
7	40910H	1¼"-7 X10" Gr 8 Bolt
8	40917	1¼"-7 X 14" Gr 5 Bolt
9	596022	Rubber Pad
10	4520223	Hydraulic Unit
11	4520974	Upper Boom (s/n 42300-42399)
	4520707	Upper Boom (s/n 42400-...)
12	4520975	Middle Boom (s/n 42300-42399)
	4520708	Middle Boom (s/n 42400-...)
13	4520004A	Lower Boom & Column
14	4500957	Lock Plate
15	4520965	Bellcrank (s/n 42300-42399)
	4520711	Bellcrank (s/n 42400-...)
16	3192	#10-24 X 1¼" Bolt
17	40006	1/4"-20 X 1¼" Bolt
18	40825H	1"-8 X 8" Gr 8 Bolt
19	40815	1"-8 X 3-1/2" Gr 5 Bolt
20	40817	1"-8 X 4" Gr 5 Bolt
21	-	
22	50224	1"-8 Locknut
23	50406	#10-24 Locknut
24	-	
25	51626	1¼"-7 Locknut
26	55002	#10 Washer
27	55264	1" SAE Flat Washer
28	524024	Hydraulic Cylinder (See Figure 8-3)
29	531123	.031" X 1" Washer
30	531124	.031" X 1¼" Washer
31	535086	1-1/4" Bearing
32	-	
33	-	
34	535630	Grease Fitting
35	-	
36	539259	Utility Wire
37	590564	Danger Decal
38	590576	Danger Decal
39	590577	Danger Decal
40	590578	Caution Decal
41	590773	UniLift Decal
42	590775	542 KB Decal
43	-	
44	-	
45	-	
46	-	
47	590630	300# Decal

Figure 8 - 3
Main Drive Chain Assembly



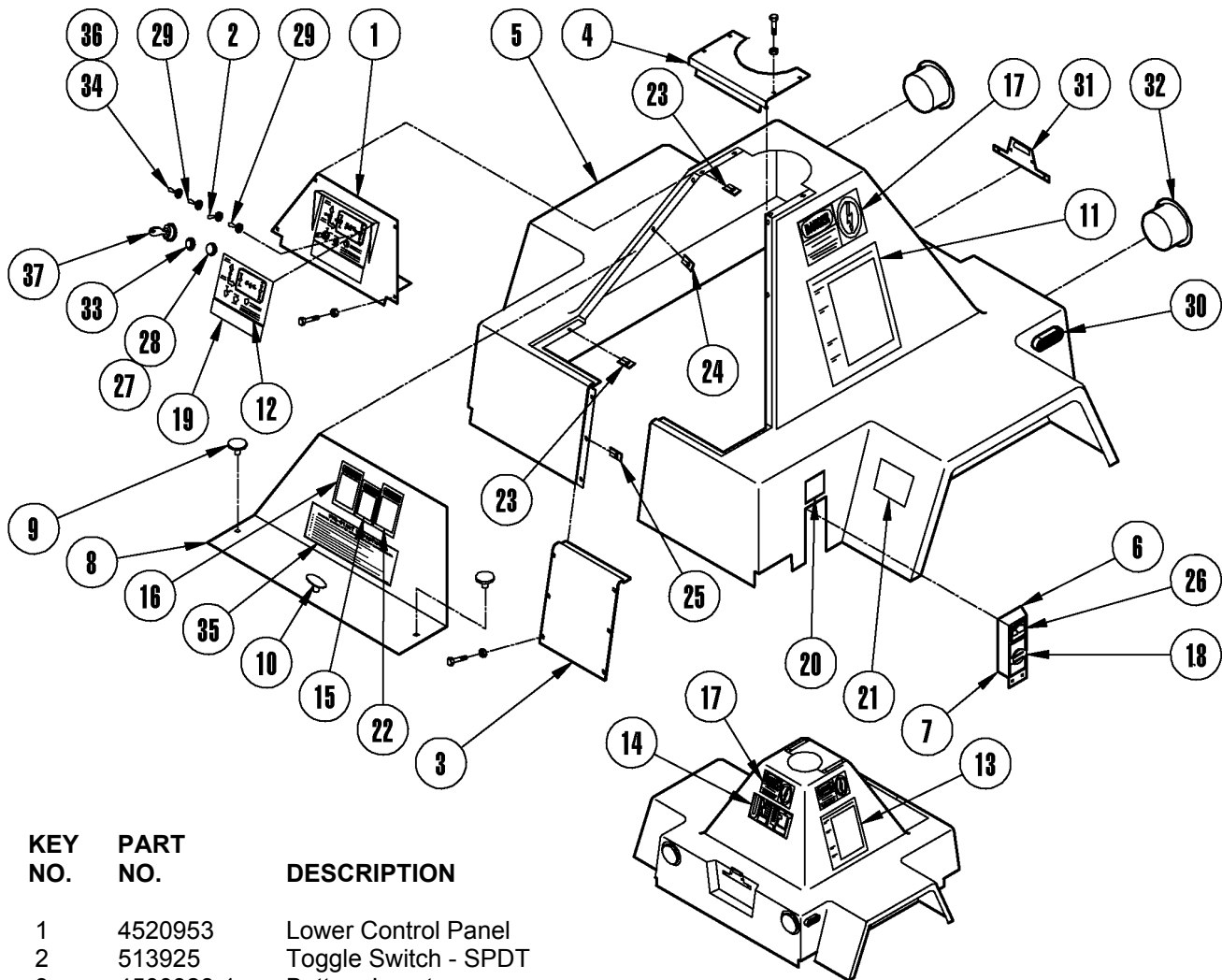
KEY NO.	PART NO.	DESCRIPTION
1	90047	1/2"-13 x 2" Bolt
2	534313	Chain, No. 50
3	534314	Connecting Link, No. 50
4	534315	1/2" Link, No. 50
5	4500182	Drive Sprocket
6	50010	5/16"-18 Nut
7	40111	5/16"-18 x 2-1/4" Bolt
8	537033	Spring
9	30079	5/16"-18 x 2-3/4" Bolt
10	55255	5/16" SAE Flat Washer

Figure 8 - 4
Rotation Drive Assembly (P/N: 4500200)



KEY NO.	PART NO.	DESCRIPTION	KEY NO.	PART NO.	DESCRIPTION
1	4500180	Rotation Bracket	14	.....	Shaft (Part of Item 9)
2	531313	Motor Clamp	15	4500412	Brace
3	509004	Belt (3 reqd.)	16	590702	Belt Adjustment Decal
4	4500961	Rotation Motor w/Pulley	17	514080	Terminal Strip
5	4500924	Motor Mount	18	4500228	Double Pulley
6	509005	Pulley	19	4500231A	Block w/Bearing
7	535087	Bearing	20	4500182	Drive Sprocket Wldmt
8	531112	Washer	21	534308	No. 40 Chain
9	4500185	Pulley Assembly w/ Block	22	534309	No. 40 Connecting Link
10	.....	Block w/ Bearing (Part of Item 9)	23	4500189A	Mount Block w/Bearing
11	537029	Spring	24	509008	Pulley
12	4500186	Adjusting Screw	25	4500278	Strap
13	4500197	Adjusting Screw	26	4500187A	Sprocket, Bracket & Bearing

Figure 8 - 5
Shroud Assembly

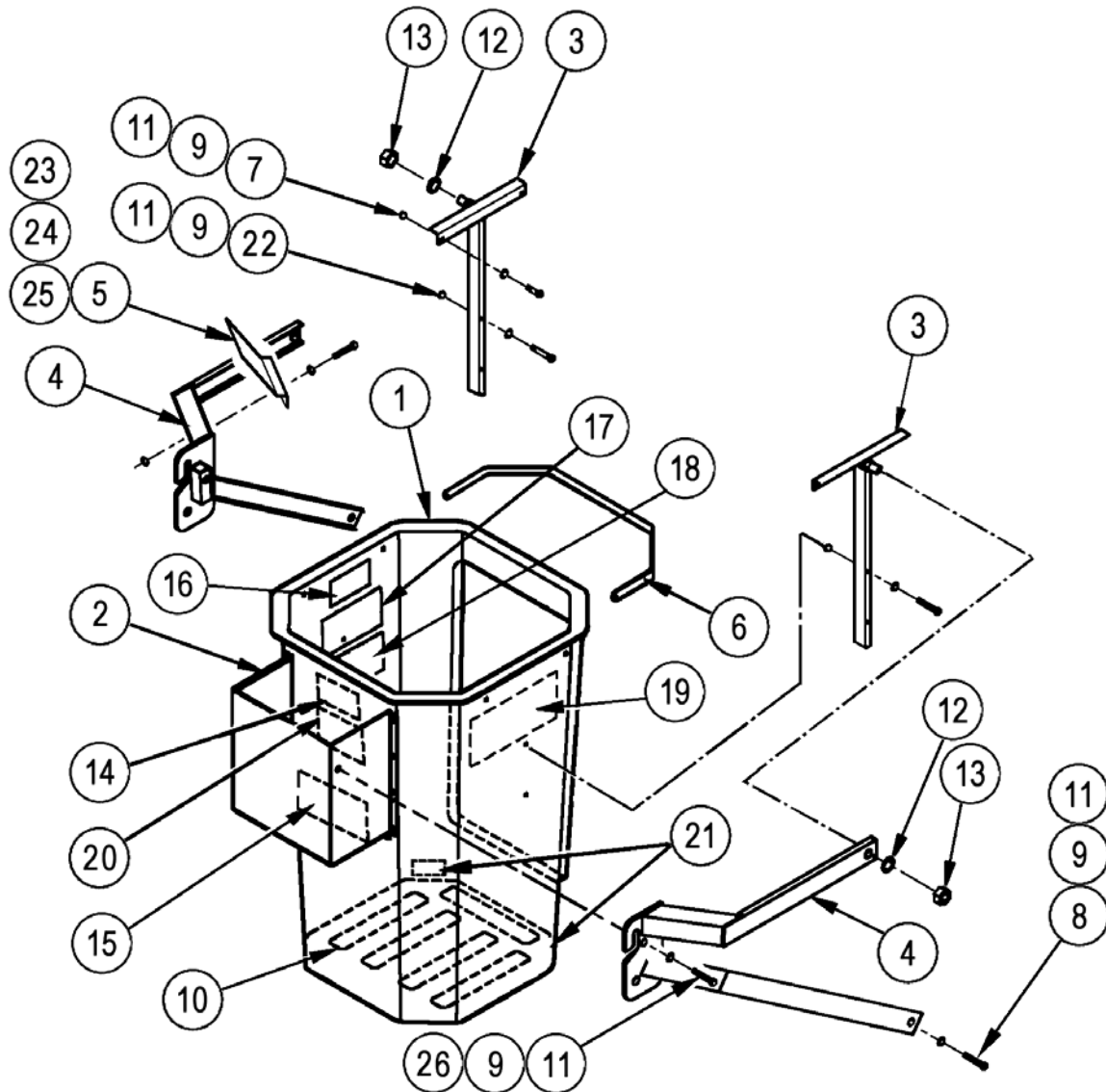


KEY NO.	PART NO.	DESCRIPTION
1	4520953	Lower Control Panel
2	513925	Toggle Switch - SPDT
3	4500328-1	Bottom Insert
4	4500327-1	Top Insert
5	4500335KB	Shroud Assembly
6	4500289	Ammeter & Receptacle Assy
7	4500288	Panel
8	4500283	Access Cover w/ Knob
9	596002	Access Cover Knob
10	596001	Handle
11	590760	Crane Decal (L.H. Side)
12	590756	Switch Plate - Lower Control
13	590755	Bucket Decal (R.H. Side)
14	590700	UniLift Decal
15	590578	Caution Decal
16	590577	Danger Decal
17	590576	Danger Decal
18	512250	Receptacle
19	590575	Interlock Decal
20	590574	Charger Decal
21	590570	Outrigger Decal (Jack Type)
22	590564	Danger Decal

KEY NO.	PART NO.	DESCRIPTION
23	533077	5/16"-18 Caged Nut
24	533076	1/4"-20 Caged Nut
25	533075	#8 Caged Nut
26	519570	Ammeter
27	519552	Bulb
28	519551	Lampholder
29	513980	Toggle Switch DPDT
30	519609	Red Side Light
31	519529	License Plate Bracket
32	519528	Tail Light
33	519027	7A Circuit Breaker
34	513981	Toggle Switch - DPDT
35	590770	Pre-Start Decal
36	513927	Rubber Switch Boot
37	513928	Key Switch

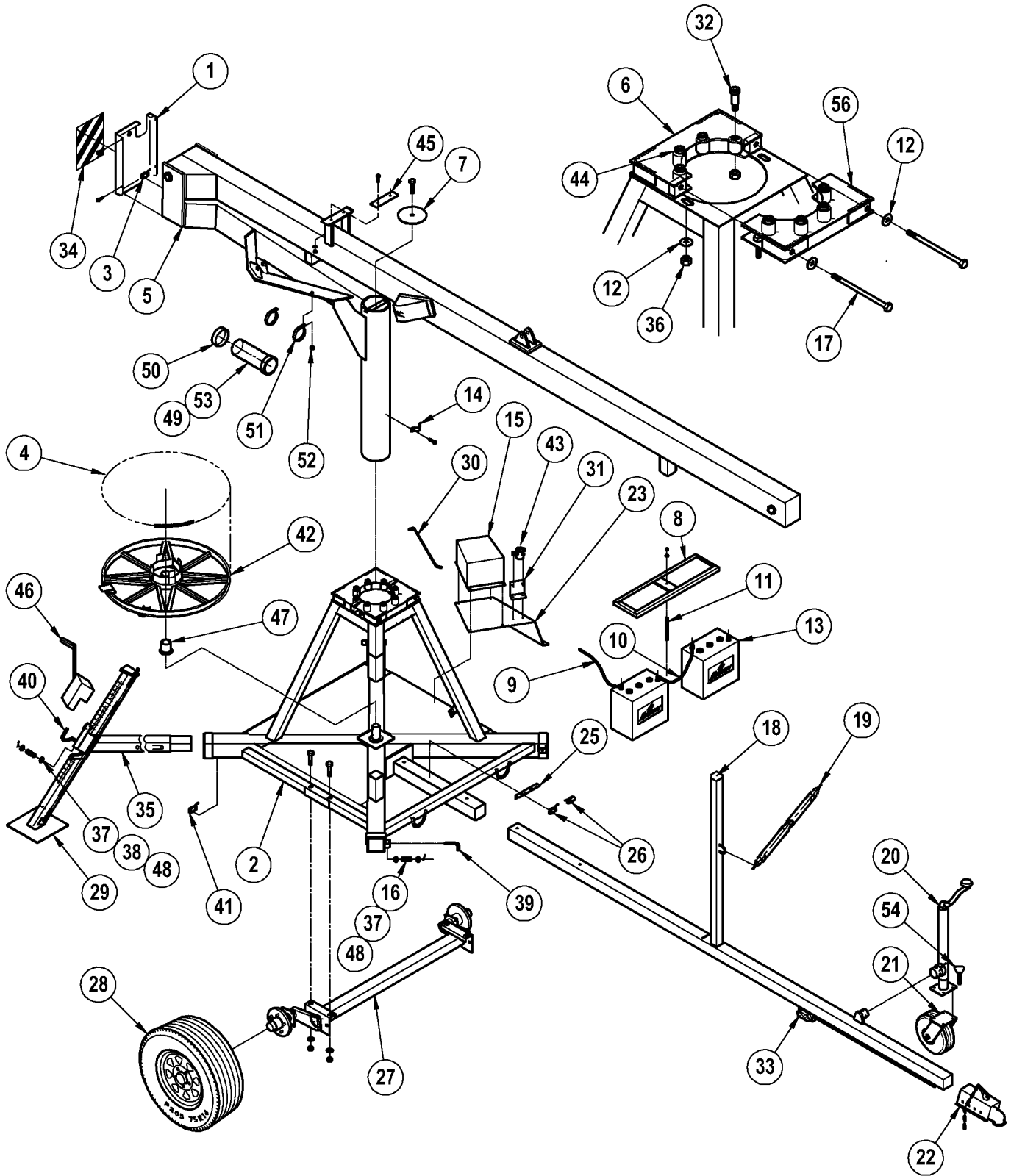
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Figure 8 - 6a
 Bucket Assembly
 (P/N 4520946A - S/N 42300 - 42399)



KEY NO.	PART NO.	DESCRIPTION	KEY NO.	PART NO.	DESCRIPTION
1	4520947A	Bucket - with Tool Tray	14	590776	Body Harness Decal
2	4520479A	Tool Tray	15	590752	Parking & Oper Instr Decal
3	4520983	Side Support	16	590565	Warning Non Insulated Decal
4	4520981	Bucket Yoke	17	590566	Set Outriggers Decal
5	4520118	Control Mount Plate	18	590575	Elect. Interlocked Decal
6	4520723	Bumper bar	19	590576	Danger Elect Hazard Decal
7	40205	3/8"-16 X 1" Bolt	20	590703	Caution 300 Lbs Load Decal
8	40213	3/8"-16 X 3" Bolt	21	519533-2	Red Reflector
9	50412	3/8"-16 Locknut	22	40210	3/8-16 X 2-1/4" Bolt
10	569019	Anti-slip Strip	23	40112	5/16-18 X 2-3/4" Bolt
11	55005	Flat 3/8" Flatwasher	24	50410	5/16-18 Locknut
12	55262	3/4" SAE Flatwasher	25	55004	5/16 Flatwasher
13	51720	3/4-10 Locknut	26	40211	3/8-16 X 2-1/2" Bolt
			-	532053	Body Harness (Not Shown)

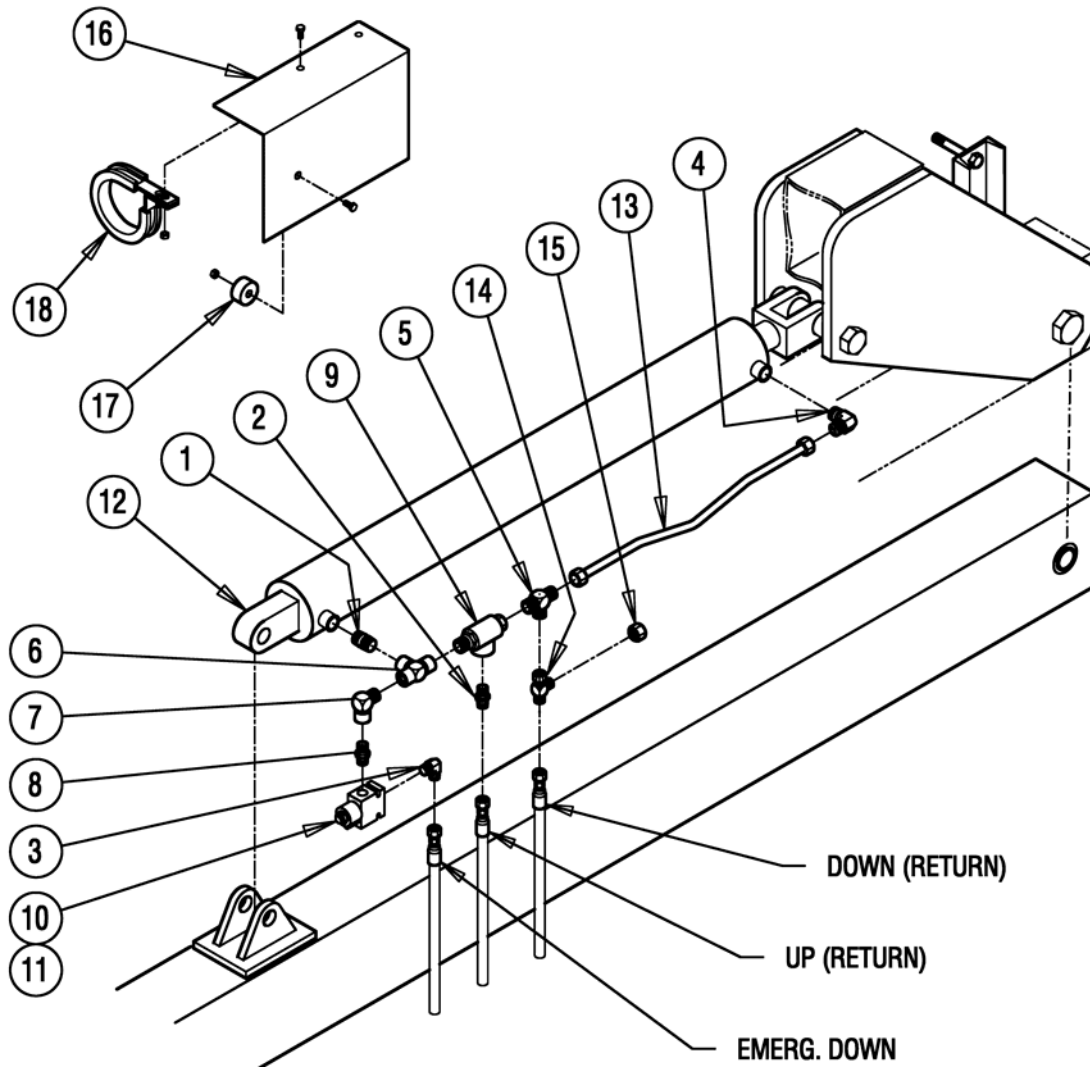
Figure 8 - 7
Main Frame Assembly



**Figure 8 - 7
Main Frame Assembly**

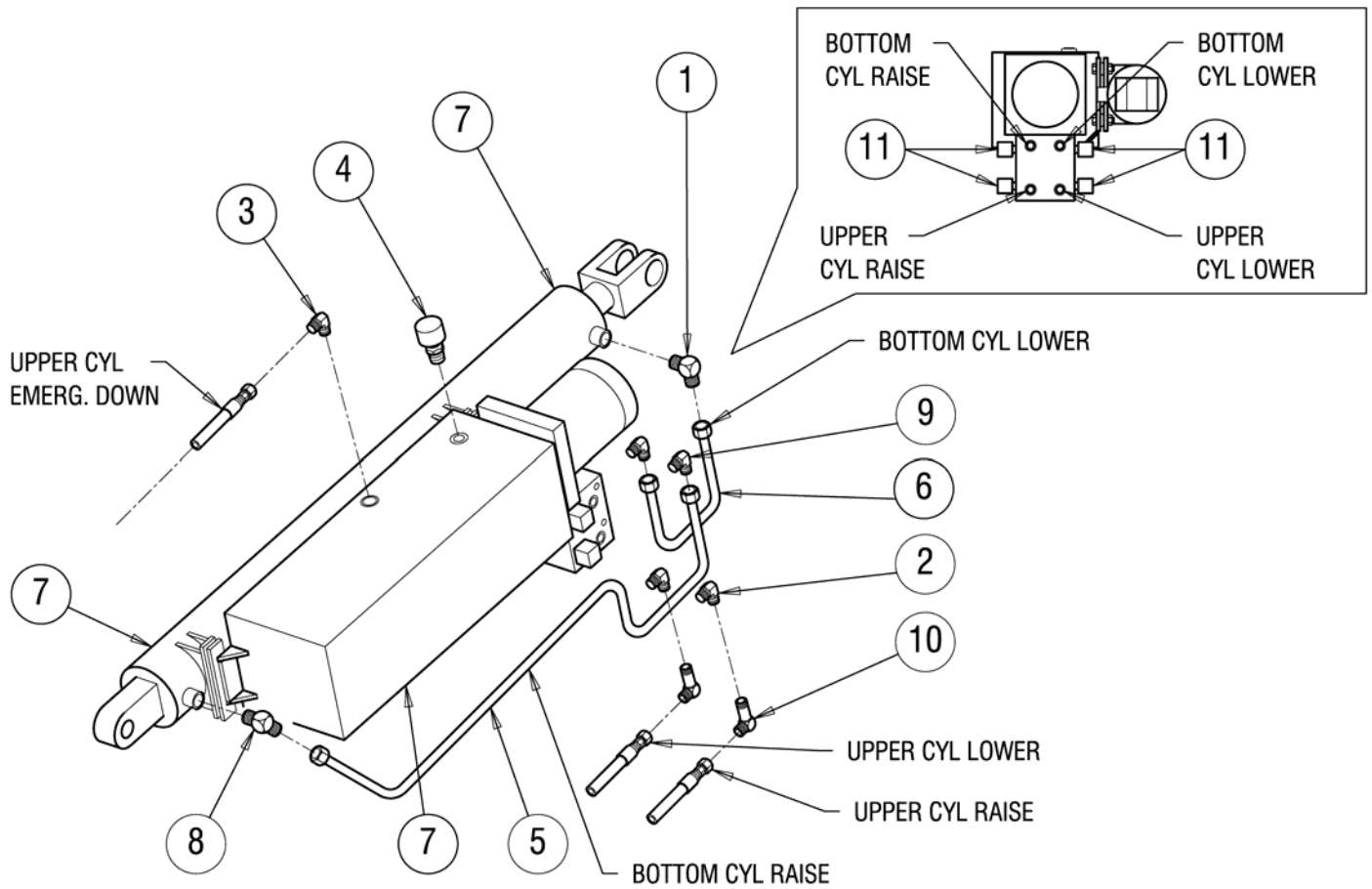
KEY NO.	PART NO.	DESCRIPTION	KEY NO.	PART NO.	DESCRIPTION
1	4520222A	Access Cover	26	4500394	Rotation Limit Switch
	590590	Grease Fitting Decal	27	4520084	Axle w/ Hubs
2	.....	Trailer Weldment	28	4500333	Tire & Rim
3	513033	Limit Switch	29	4500065	Vertical Outrigger
4	.....	Drive Chain (See Figure 8-3)	30	4500499	Charger Strap
5	.....	Middle & Lower Boom	31	4500864	Relay Mounting Bracket
6	.....	A-Frame	32	533092-3	5/8" x 1-1/4" Shoulder Bolt
7	4500126	Column Cover	33	519608	Amber Light
8	4500912	Battery Hold Down	34	590586	Red/White Decal
9	4500300-4	6" Cable	35	4520888	Horizontal Outrigger (Crank Type)
10	4500300-3	12" Cable	36	50216	1/2"-13 Locknut
11	4500284-2	Threaded Rod	37	531112	Nylon Washer
12	55207	1/2" Lock Washer	38	537032	Spring
13	519607	Battery (2 Req'd.)	39	4500151-1	Lock Pin - Horizontal Outrigger
14	514525	Cable Clamp	40	4500886	Lock Pin - Vertical Outrigger
15	519616	Battery Charger, S/N 42413-...	41	513047	Outrigger Switch
16	537030	Spring	42	4500050A	Rotation Drive Wheel
17	40423	1/2"-13 x 7" Bolt	43	515140	Cut-Out Relay
18	539074	Rubber Bumper	44	4500047	Column Guide Roller (8 Req'd.)
19	532042	Tie-Down Strap	45	596022	Rubber Pad
20	4500732	Screw Jack	46	.....	Crank Installation (See Figure 8-16)
21	539339	10" Caster	47	535088	Main Pivot Bearing
22	539329	2" Ball Surge Actuator	48	56566	1/8" x 1" Cotter Pin
	4500293	Safety Chain	49	539062	Clear Tube
23	4500498	Charger Bracket	50	539063	Cap
24	4520120	Tongue	51	531122	Clamp
25	4500937	Switch Bracket	52	50412	3/8"-16 Locknut
			53	4520360	Operator's & Parts Manual
			54	539064	Pin & Ring (Part of Item 20)
			55	590699	Tongue Load Decal
			56	4520035	Front Column Guide

Figure 8 - 8
Upper Cylinder Assembly



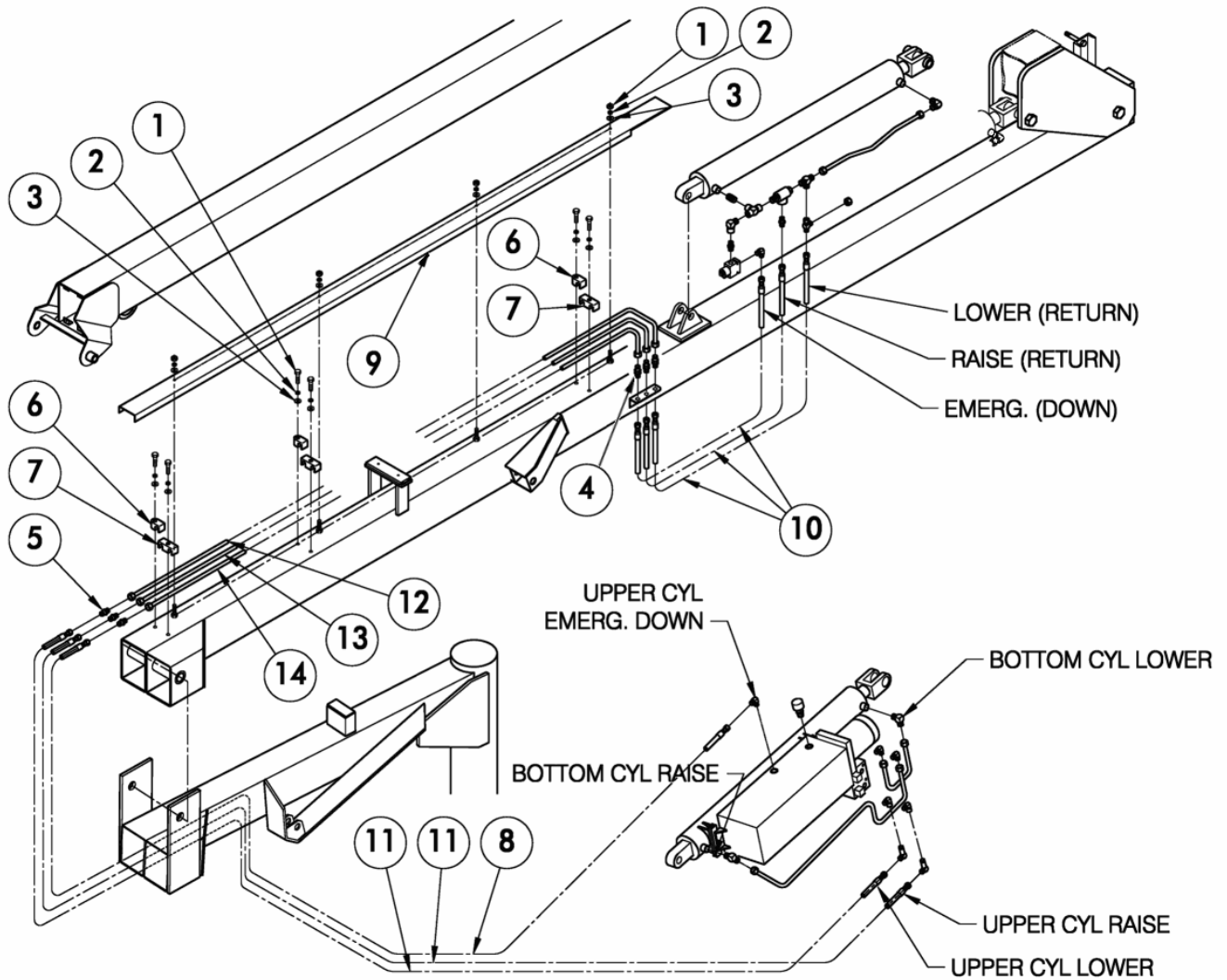
KEY NO.	PART NO.	DESCRIPTION
1	522529	3/8" Close Nipple
2	522646	6MJ X 6MP Restrictor
3	522609-8	90° 6MJ X 6M SAE Elbow
4	522625-12	90° 6MP X 6MJ Elbow
5	522626	4MP X 6MJ X 6MJ Male Tee
6	522641	3/8" Female Pipe Tee
7	522643	90° Street Elbow 3/8" Pipe
8	522644	6MP X 6M SAE Connector
9	523029	Pilot Check Valve
10	523072	Solenoid Valve
11	523073	Solenoid Valve Wire Connector
12	524024	Hydraulic Cylinder (See Figure 8-2)
13	4520064	Upper Cylinder Tube
14	522614-5	6FJX x 6MJ x 6MJ Tee
15	522647	Cap - 6FJ
16	4520212	Cover Plate Assy (Includes Items 17 & 18)
17	539074	Rubber Bumper
18	531122	Clamp

Figure 8 - 9
Hydraulic Pump / Lower Cyl. Assembly



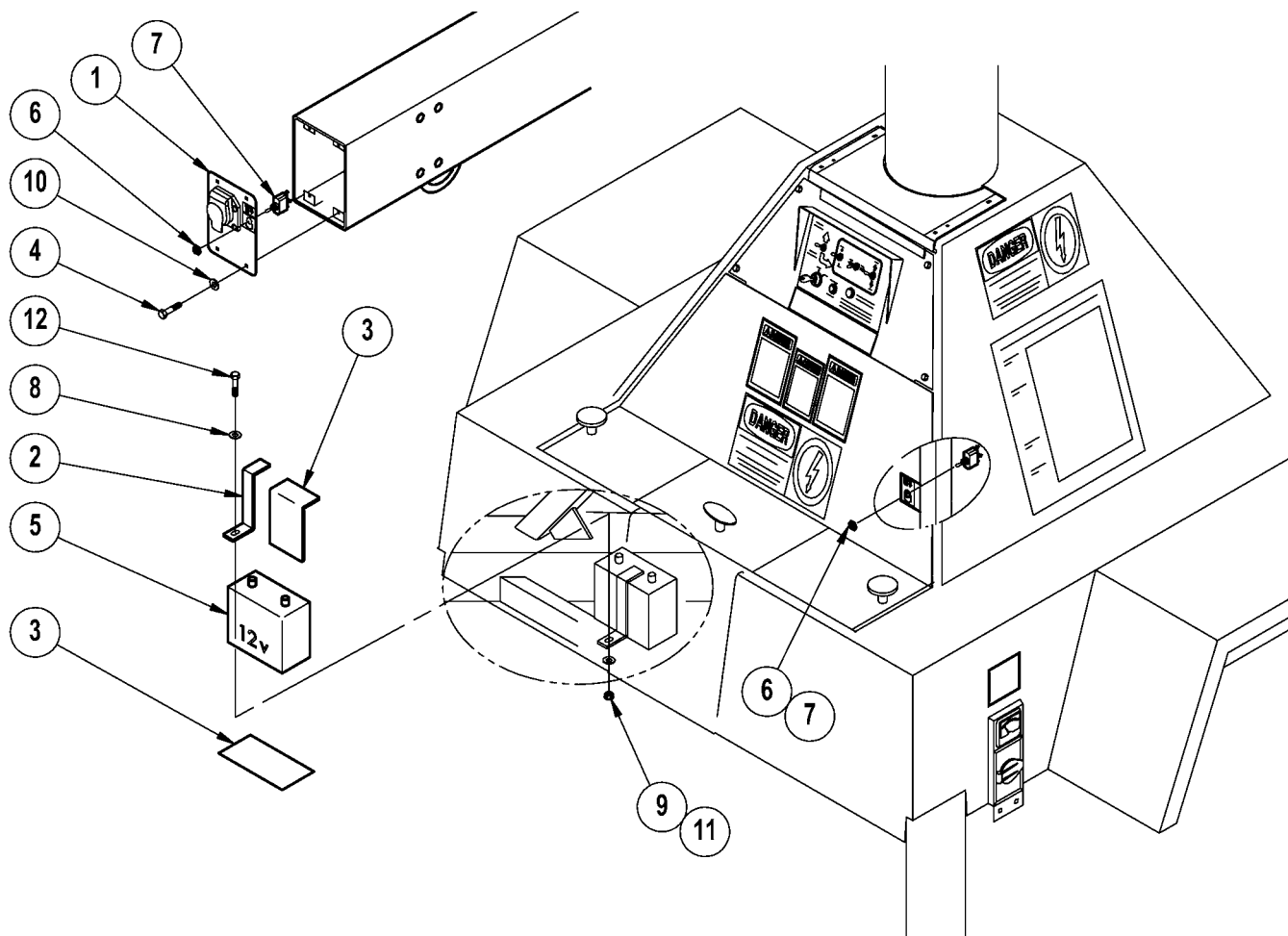
KEY NO.	PART NO.	DESCRIPTION
1	522625-12	90° 6MP X 6MJ Elbow
2	522648	90° 6MSAE x 6FP Elbow
3	522639	90° 6MP x 6MJ Elbow Restrictor
4	529015	Fill Breather Cap
5	4520065	Lower Boom Up Tube
6	4520066	Lower Boom Down Tube
7	4520223	Hydraulic Unit & Cylinder
	524024A	Hydraulic Pump
	524025A	Hydraulic Cylinder
	524025-30	Upper Cylinder Valve
	524025-31	Lower Cylinder Valve
8	522639-2	90° 6MP X 6MJ Elbow w/ .062" Restrictor
9	522609-8	90° 6MSAE X 6MJ Elbow
10	522625-12L	90° 6MJ X 6MP Long Elbow
11	524025-32	Cartridge Valve W/ Coil

Figure 8 - 10
Hydraulic System Assembly



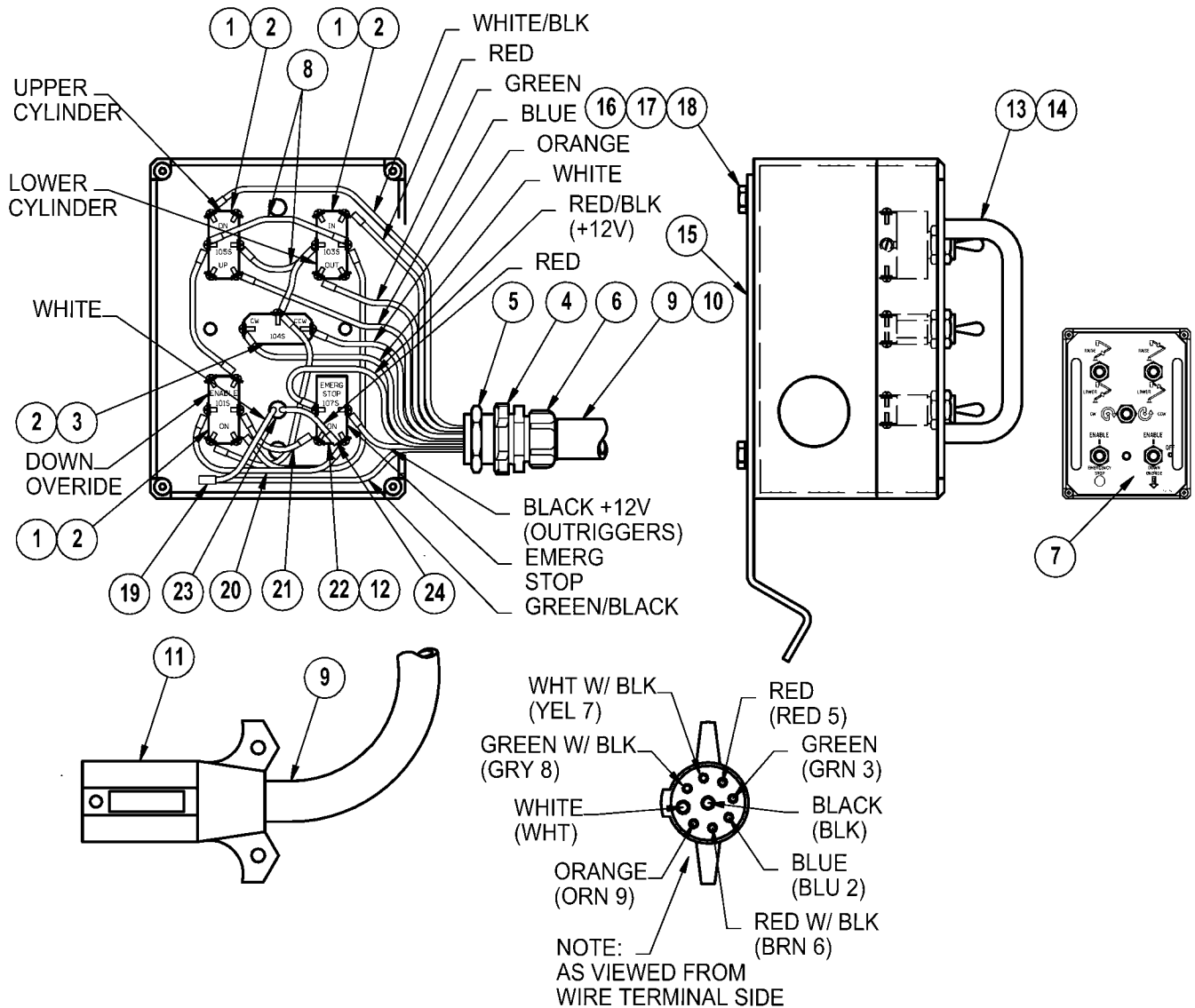
KEY NO.	PART NO.	DESCRIPTION
1	40005	1/4"-20 X 1" Bolt
2	55203	1/4" Lockwasher
3	55254	1/4" SAE Flat Washer
4	522605-5	6MJ Bulkhead Union
5	522645	6MJ X 6MJ Connector
6	531334	Single Slot Tube Clamp
7	531335	Double Slot Tube Clamp
8	4500689-10	3/8" X 89" Hose
9	4520997	Tube Cover
10	4500689-6	3/8" X 27" Hose
11	4500689-9	3/8" X 108" Hose
12	4520994	Upper Boom Down Tube (S/N 42200-...)
13	4520995	Upper Boom Up Tube (S/N 42200-...)
14	4520996	Upper Boom Emerg Dn Tube (S/N 42200-...)

Figure 8 - 11
Emergency Lowering Switch Installation



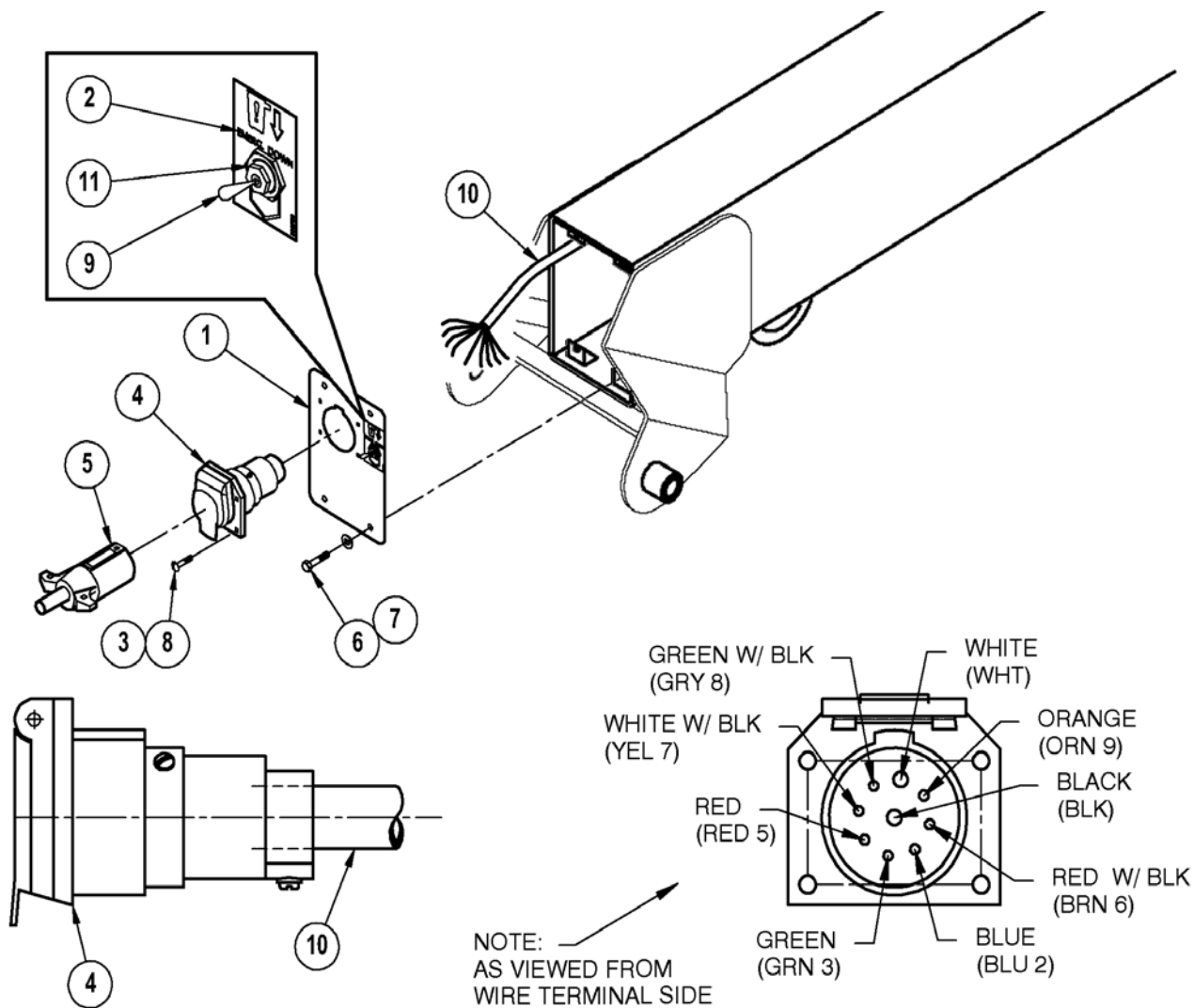
KEY NO.	PART NO.	DESCRIPTION
1	.....	Upper Control Plate (See Figure 8-14)
2	4520278	Battery Hold Down Strap
3	4520279	3" X 6" Rubber Pad
4	40003	1/4"-20 X 3/4" Bolt
5	519613	Battery
6	513927	Switch Boot
7	513929	Toggle Switch SPDT
8	55255	5/16" Flatwasher
9	55204	5/16" Lockwasher
10	55203	1/4" Lockwasher
11	50410	5/16"-18 Nut
12	40106	5/16"-18 X 1-1/4" Bolt

Figure 8 - 13
Upper Control Station
 (P/N: 4520714) S/N: 42300 - . . .



KEY NO.	PART NO.	DESCRIPTION	KEY NO.	PART NO.	DESCRIPTION
1	513980	Toggle Switch DPDT	14	14107	#8 x 5/8" Screw
2	513927	Rubber Boot	15	4520118	Control Mounting Plate
3	513925	Toggle Switch SPDT	16	40005	1/4-20 x 1" Bolt
4	514289-3	1" Sealing Locknut	17	50408	1/4-20 ESNA Nut
5	514298-3	1" Locknut	18	55003	1/4" Std Flat Washer
6	514383	1" Strain Relief Connector	19	514442	Closed End Connector
7	590769	Upper Control Decal	20	4500954	Black Wire
8	4500840	Gray Wire Assy	21	4500955	Brown Wire
9	510220	#16-9 SO Cord, 27"	22	513986	ON-OFF Toggle Switch
10	514458-3	#6 Locking Spade	23	519615	Yellow Lamp
11	512297	9-Pin Connector Plug	24	514454	#6 Snap Fork
12	513927R	Red Rubber Boot			
13	539265	Switch Guard			

Figure 8 - 14
Upper Control Connection



KEY NO.	PART NO.	DESCRIPTION
1	4520115	Mounting Plate
2	590764	Emergency Down Decal
3	50406	#10-24 ESNA Nut
4	512296	9-Pin Connector Socket
5	512297	9-Pin Connector Plug
6	55203	1/4" Lockwasher
7	40003	1/4"-20 x 3/4" Bolt
8	3188	#10-24 x 3/4" Bolt
9	513927	Switch Boot
10	510220	#16-9 SO Cord
11	513929	Toggle Switch SPDT

Figure 8 - 15
Lower Control Panel Assembly
 (P/N:4520953) S/N: 42060 - . . .

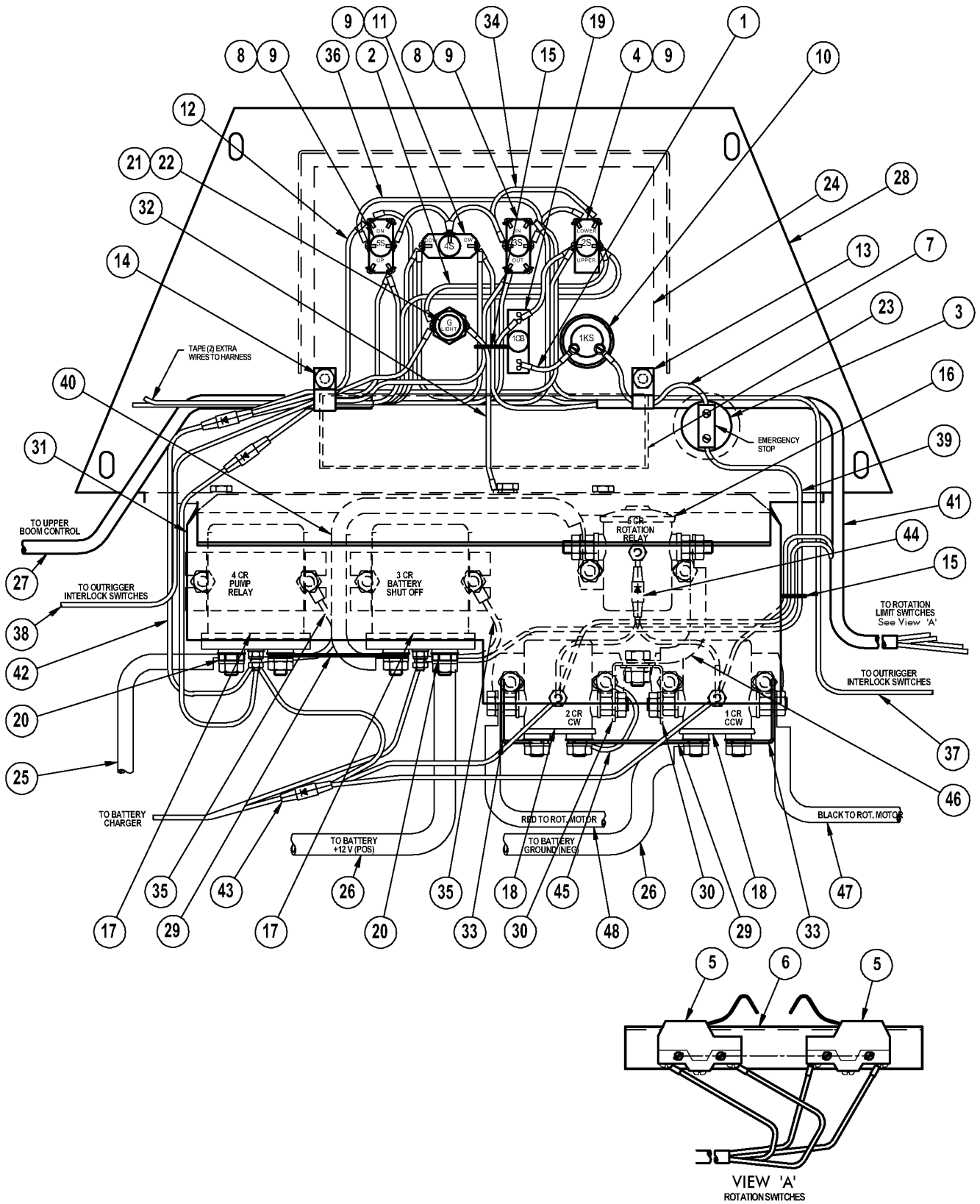
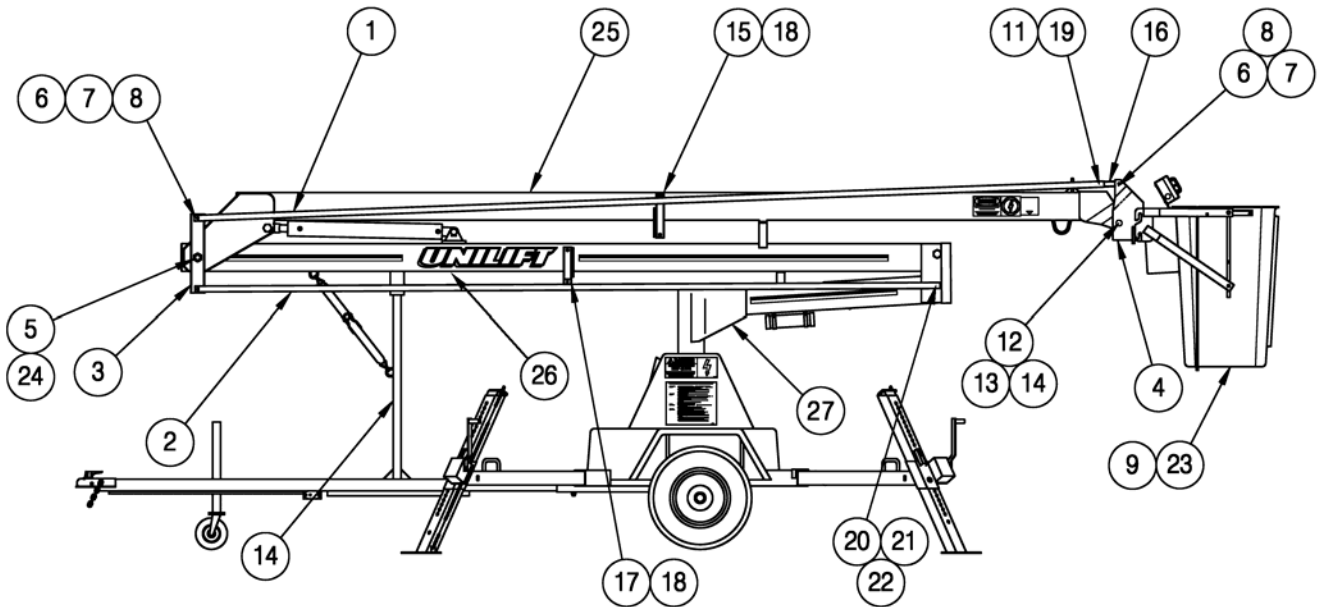


Figure 8 - 15
Lower Control Panel Assembly

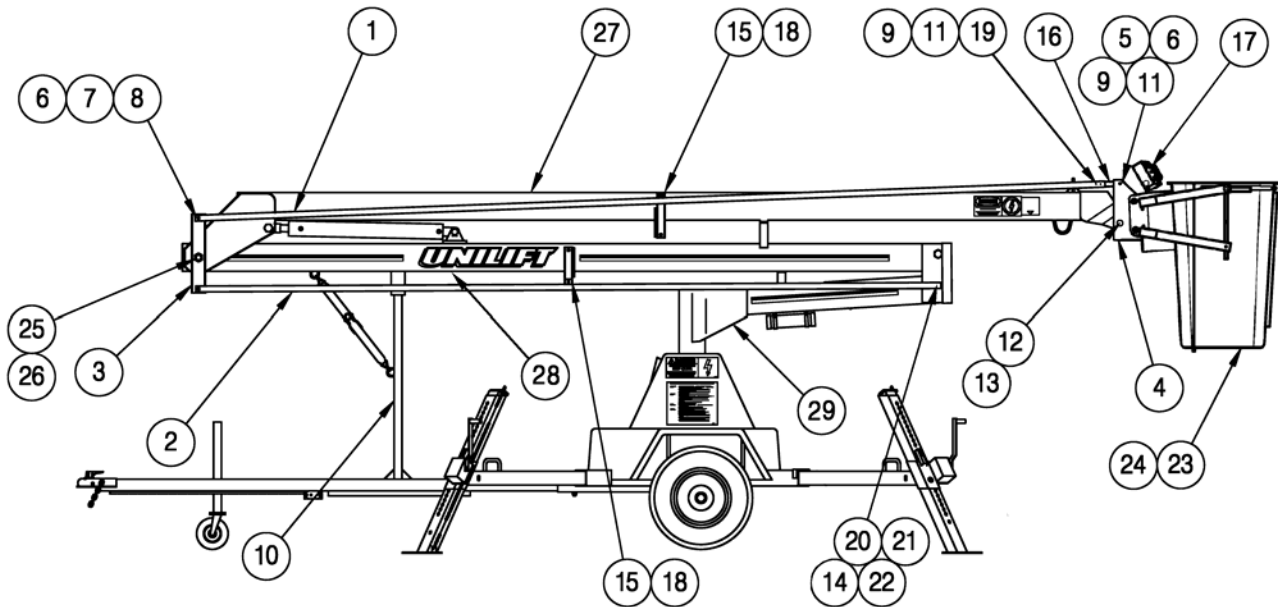
KEY NO.	PART NO.	DESCRIPTION
1	4500855	Wire - (Red)
2	4500866	Wire - (Brown)
3	513938	Emergency Stop Switch
4	513981	MOM-ON Toggle Switch
5	4500394	Limit Switch
6	4500937	Switch Mounting Bracket
7	4500956	Wire - (Red)
8	513980	Toggle Switch DPDT
9	513927	Toggle Switch Boot
10	513928	Key Switch
11	513925	Toggle Switch SPDT
12	4520849	Diode Assembly
13	514522	5/16" Cable Clamp
14	514525	½" Cable Clamp
15	514527	Black Tie
16	515029	Solenoid
17	515062	Solenoid
18	515140	Solenoid
19	519027	Circuit Breaker
20	519258	Brass Spacer
21	519551	Lamp Holder with Lens
22	519552	Lamp
23	590575	2 x 8 Electrical Interlock Decal
24	590768	Lower Control Plate
25	4500300-2	Black Pump Cable
26	4500300-1	24-1/2" Cable
27	4500310	Lower Control Loom Cable
28	4500679	Lower Control Panel
29	4500834	Buss Bar
30	4500835	Inner Angle Buss Bar
31	4500836	Panel Mounting Plate
32	4500837	Wire - (White)
33	4500838	Outer Angle Buss Bar
34	4500840	Wire - (Gray)
35	4500841	Wire - (White)
36	4500842	Wire - (Black)
37	4500843	Wire - (White)
38	4500844	Wire - (Brown)
39	4500845	Wire - (Red)
40	4500846	Cable - (Red 4 AWG) 3CR, 5CR
41	4500847	Cable - Rotation Limit
42	4500849	Wire - Diode (RGB)
43	4500850	Wire - Diode (OBW)
44	4500851	Wire - Diode (OW)
45	4500852	Wire - Diode (White)
46	4500853	Cable - (Red 4 AWG) 5CR, 1CR & 2CR
47	4500854-1	Cable - (Black) Rotation Motor
48	4500854-2	Cable - (Red) Rotation Motor
49	4520849	Diode Assembly

Figure 8 - 16a
Self Leveling Linkage
(S/N 42300 - 42399)



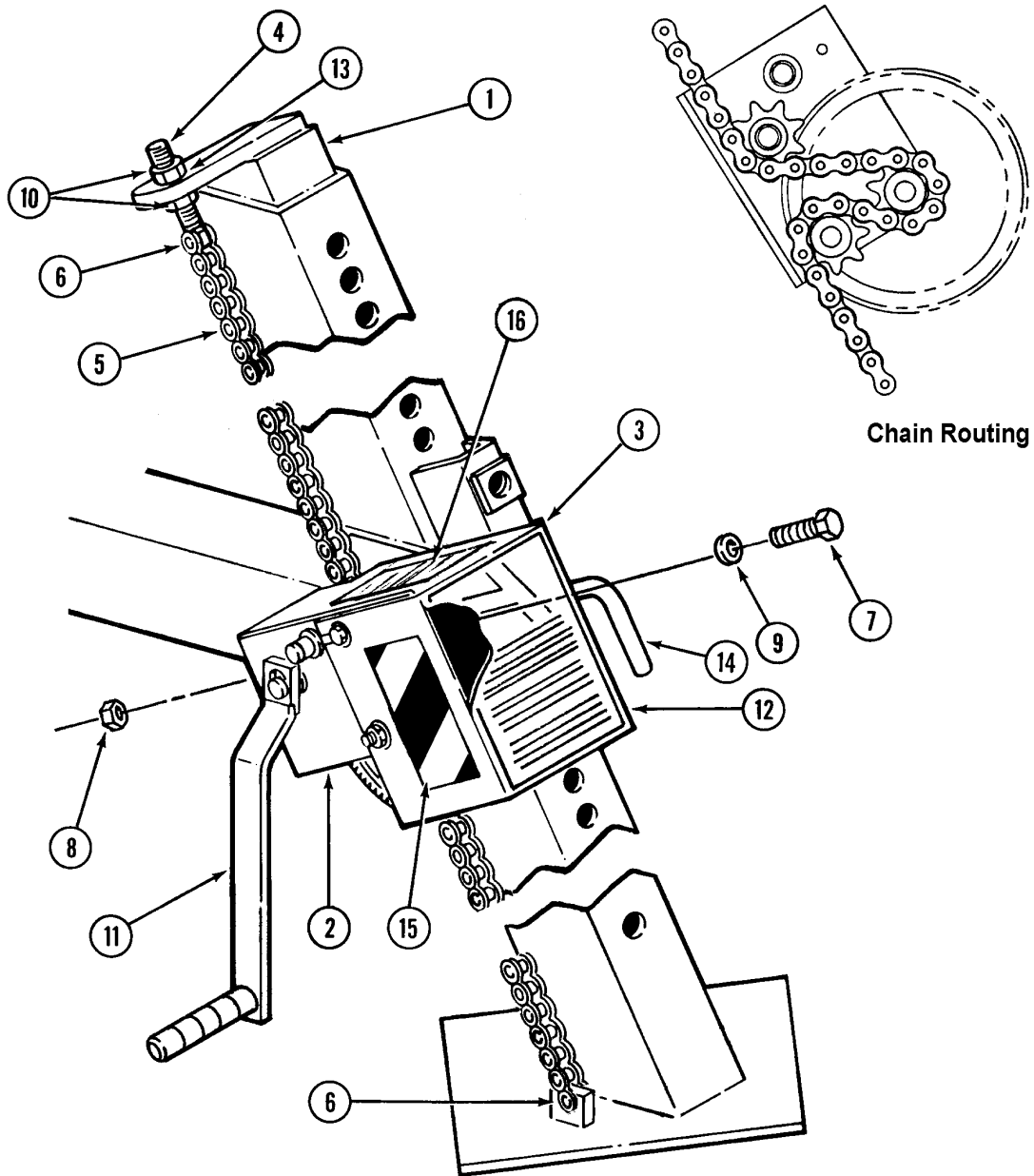
KEY NO.	PART NO.	DESCRIPTION	KEY NO.	PART NO.	DESCRIPTION
1	4520959	Top Tube	14	4500048-1	Spacer
2	4520999	Bottom Tube	15	4520188	10" Swivel Idler
3	4520965	Bell Crank	16	4520187	Link Bar
4	4520982	Pivot Box	17	4520189	8" Swivel Idler
5	40910	1-1/4-7 x10 Bolt	18	4520192	Zee Bracket
6	55258	1/2" SAE Flatwasher	19	40207	3/8-16 x 1-1/2" Bolt
7	40409	1/2-13 x 2" Bolt	20	40513	5/8-11 x 3" Bolt
8	50216	1/2-13 Locknut	21	51718	5/8-11 Locknut
9	4520947A	Bucket w/ Tool Box	22	55260	5/8" SAE Flatwasher
10	4520131	Boom Rest /w	23	4520946A	Bucket and Yoke Assy
11	50212	3/8-16 Locknut	24	51626	Locknut 1-1/4
12	40617	3/4-10 x 4" Bolt	25	4520974	Upper Boom
13	51720	3/4-10 Locknut	26	4520975A	Middle Boom
			27	4520004A	Lower Boom & Column

Figure 8 - 16b
Self Leveling Linkage
 (S/N 42400 - . . .)



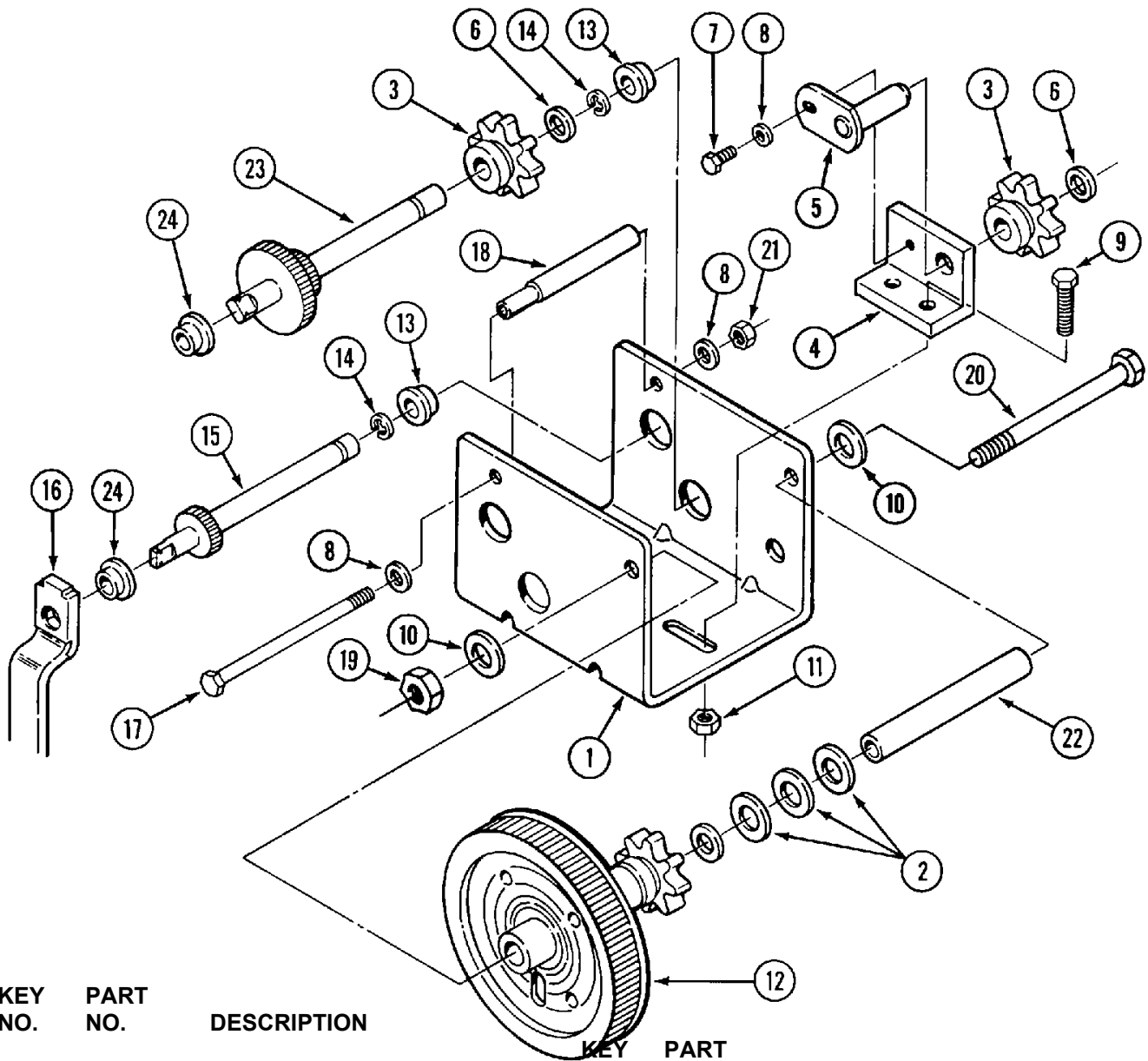
KEY NO.	PART NO.	DESCRIPTION	KEY NO.	PART NO.	DESCRIPTION
1	4520959	Top Tube	16	4520201	Link Bar (S/N 42400- . . .)
2	4520999	Bottom Tube	17	4520714	Control Assy
3	4520711	Bell Crank	18	4520192	Zee Bracket
4	4520694	Pivot Box	19	40207	3/8-16 x 1-1/2" Bolt
5	6074	1/2" x 1-1/4" Shoulder Bolt	20	40513	5/8-11 x 3" Bolt
6	55258	1/2" SAE Flatwasher	21	51718	5/8-11 Locknut
7	40409	1/2-13 x 2" Bolt	22	55260	5/8" SAE Flatwasher
8	50216	1/2-13 Locknut	23	4500177A	Bucket w/ Tool Box
9	55256	3/8" SAE Flat Washer	24	4520715A	Bucket and Yoke Assy
10	4520131	Boom Rest	25	51626	Locknut 1-1/4-7
11	50212	3/8-16 Locknut	26	40910	1-1/4-7 x10 Bolt
12	40613	3/4-10 x 3" Bolt	27	4520707	Upper Boom
13	51720	3/4-10 Locknut	28	4520708	Middle Boom
14	4500195	Spacer	29	4520004A	Lower Boom & Column
15	4520189	8" Swivel Idler			

Figure 8 - 17
Crank Outrigger Installation



KEY NO.	PART NO.	DESCRIPTION	KEY NO.	PART NO.	DESCRIPTION
1	4500879	Tube Weldment	9	55005	Flat Washer, 3/8"
2	4500943	Crank Assembly	10	50618	Hex Jam nut, 5/8"-11
3	4500882A	Crank Guard w/Decals	11	539066	Crank Handle
4	4500887	Screw Modified	12	590701	Instruction Decal
5	534327	Chain, No. 50	13	55205	Lockwasher, 5/8"
6	534314	Connecting Link, No. 50	14	4500886	Lock Pin (See Figure 8-7)
7	40206	Screw, 3/8"-16 x 1-1/4"	15	590765	Release Lock Pin Decal
8	50412	Hex Esna Nut, 3/8"-16	16	590587	Yellow/Black Stripe Decal

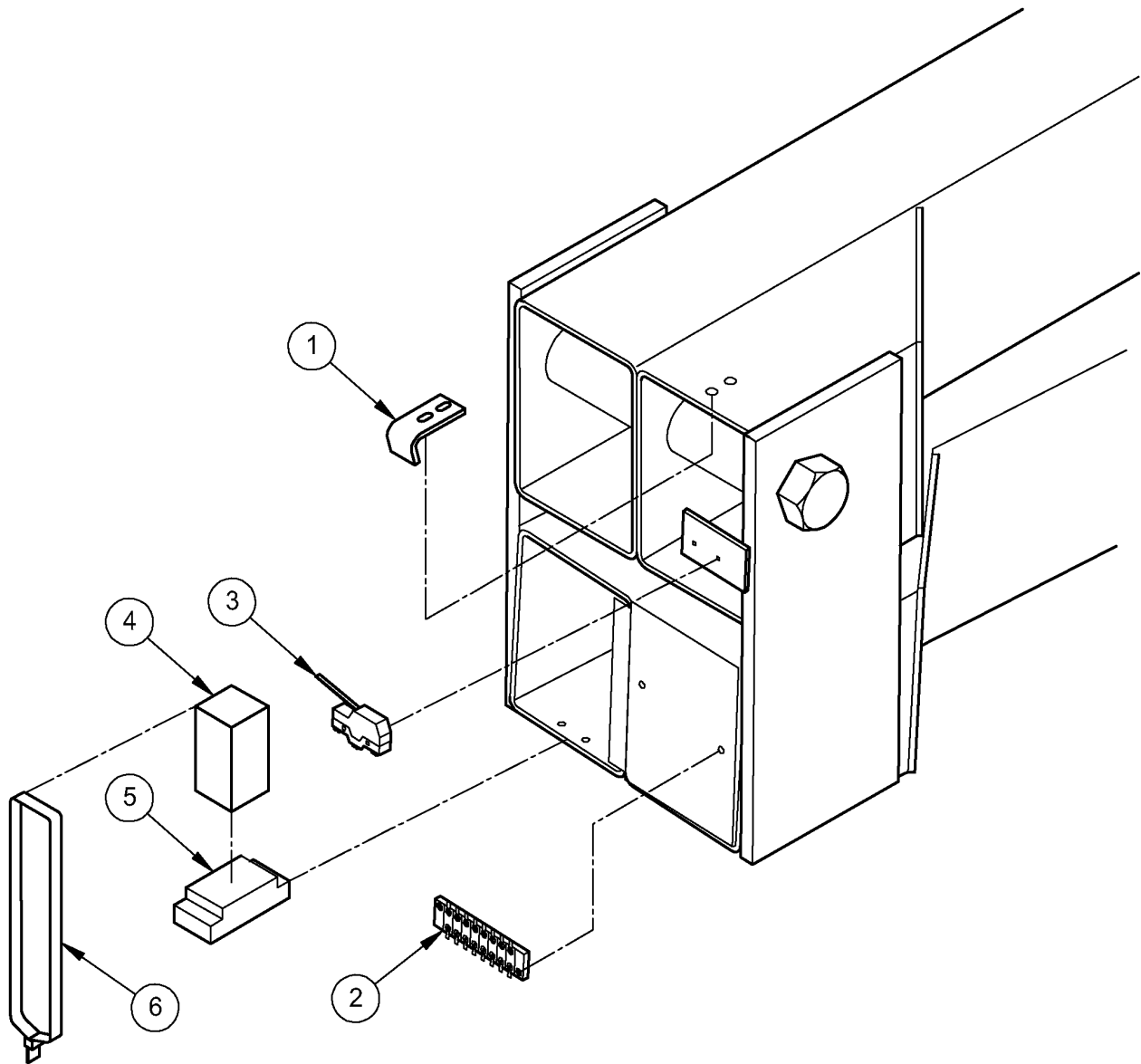
Figure 8 - 18
Outrigger Crank Assembly



KEY NO.	PART NO.	DESCRIPTION
1	4500946	Winch Base
2	55258	1/2" SAE Flat Washer
3	4500881	Sprocket Modified
4	4500876	Mounting Angle
5	4500885	Pin & Paddle Weldment
6	533122	Thrust Washer
7	40001	1/4"-20 x 1/2" Bolt
8	55003	1/4" Flat Washer
9	40207	3/8"-16 x 1-1/2" Bolt
10	55005	3/8" Flat Washer
11	50412	3/8"-16 Locknut
12	4500945	Reel Weldment
13	539065-30	Shaft Bushing

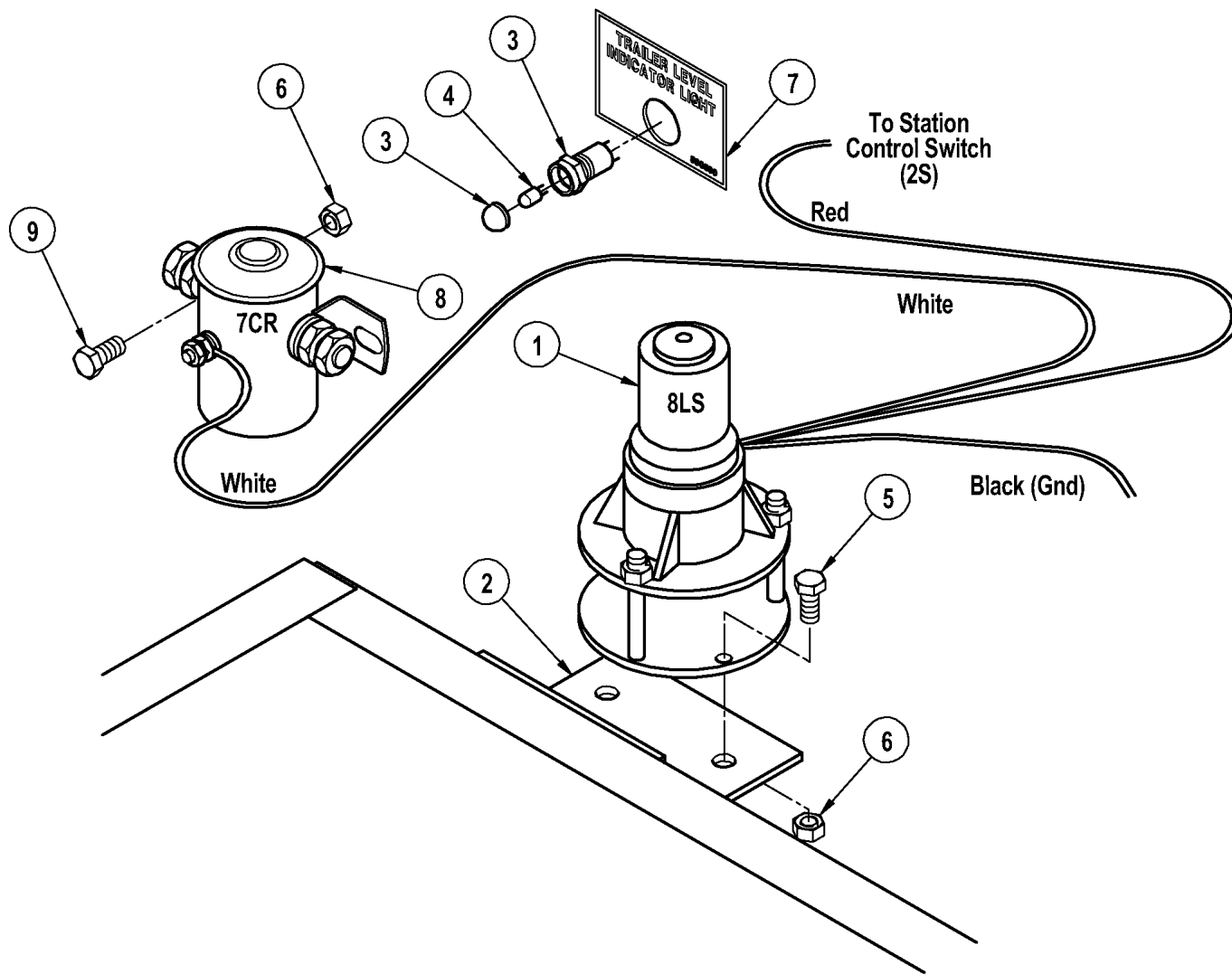
KEY NO.	PART NO.	DESCRIPTION
14	539065-31	E-Ring
15	539075-50	Primary Drive Shaft
16	539066	Crank Handle
17	539065-34	Ratchet Bolt
18	539065-35	Ratchet Sleeve
19	539065-36	Locknut
20	40220H	High-Strength Bolt
21	539065-38	Locknut
22	539065-39	Reel Spacer
23	539075-40	Intermediate Drive Shaft,
24	539065-41	Shaft Bushing

Figure 8 - 19
Lift Limit & Time Delay



KEY NO.	PART NO.	DESCRIPTION
1	4500415	Lift Limit Tab
2	514043-1	Terminal Block
3	513033	Lift Limit Switch
4	515076A	Time Delay with Tie Wrap
5	515077	Time Delay Mount
6	514502	Long Nylon Tie

Figure 8 - 20
Leveling Safety Switch Option
(P/N: 4500908 Ref.)



KEY NO.	PART NO.	DESCRIPTION
1	513979	5° Safety Switch
2	4500864	Switch Mounting Bracket
3	519551	Lamp Holder
4	519552	Lamp
5	40003	1/4-20 x 3/4" Bolt
6	50408	1/4-20 ESNA Nut
7	590690	Decal, "Level Indicator Light"
8	515029	Solenoid
9	40005	1/4-20 x 1" Bolt