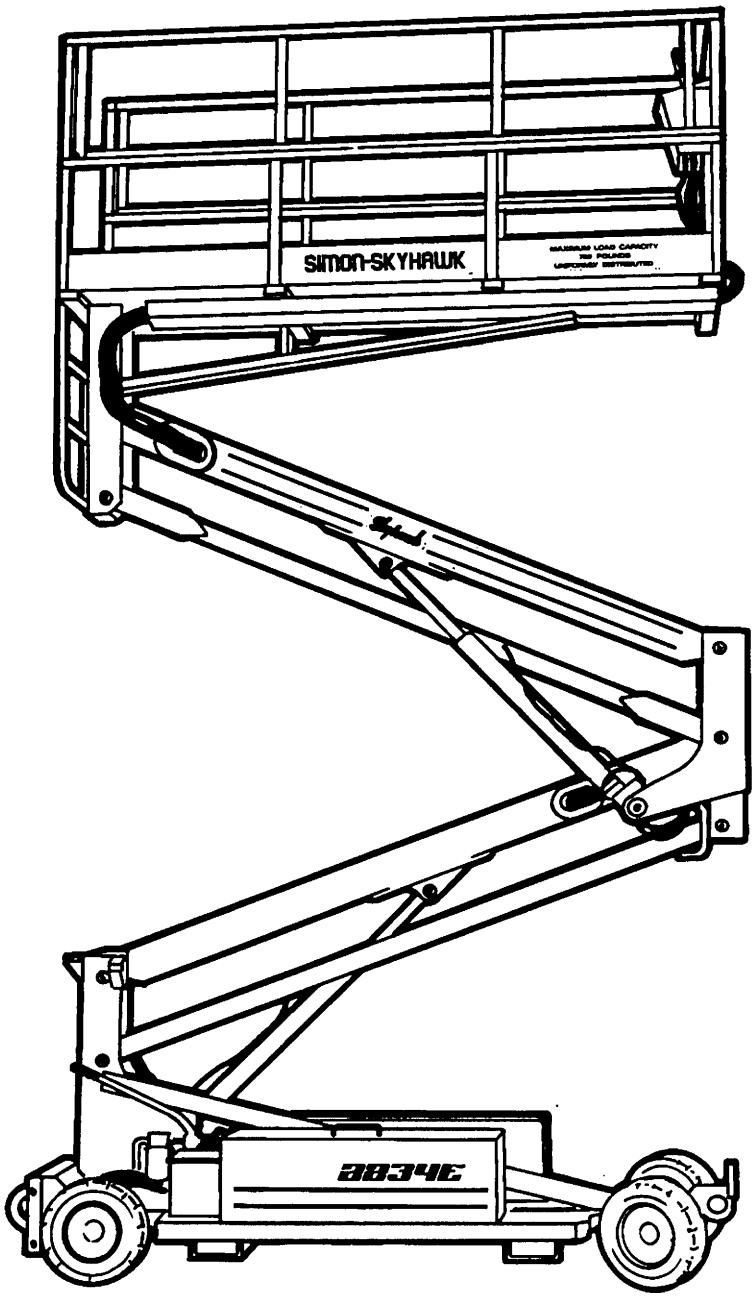
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SIMON

SERVICE MANUAL

SKYHAWK SERIES VERTICAL LIFT

2031E
2234E
2248E



PART NO. 89-790007

REVISION A
APRIL, 1990

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INTRODUCTION

This Service Manual is designed to provide you with the instructions needed to properly maintain the SIMON AERIALS INC. SKYHAWK Z-Type Work Platform. When used in conjunction with the Operators, Parts and Component Repair manuals (provided separately) this Service Manual will assist you in making necessary adjustments or repairs.

Simon Aerial Mobile Platforms are designed and built to provide many years of safe, dependable service. To obtain full benefits from your SKYHAWK, always follow the proper operating and maintenance procedures. Only trained, authorized personnel should be allowed to operate or service this machine. Service personnel should read and study the Operators, Service, Parts and Component Repair Manuals in order to gain a thorough understanding of the unit prior to making any repairs.

Service personnel and machine operators must understand and comply with all warnings and instructional decals on the body of the machine, and at the ground and platform control console.

MODIFICATIONS OF THIS MACHINE FROM THE ORIGINAL DESIGN ARE STRICTLY FORBIDDEN WITHOUT WRITTEN PERMISSION FROM SIMON AERIALS INC., AND WILL VOID ANY REMAINING WARRANTY.

SIMON AERIALS INC. reserves the right to change, improve, modify or expand features of its equipment. Therefore, specifications, models or equipment are subject to change without notice, and without incurring obligations.

All SIMON AERIALS INC. manuals are periodically updated to reflect changes that occur in the equipment. Please contact the factory for information regarding changes which may affect your machine.

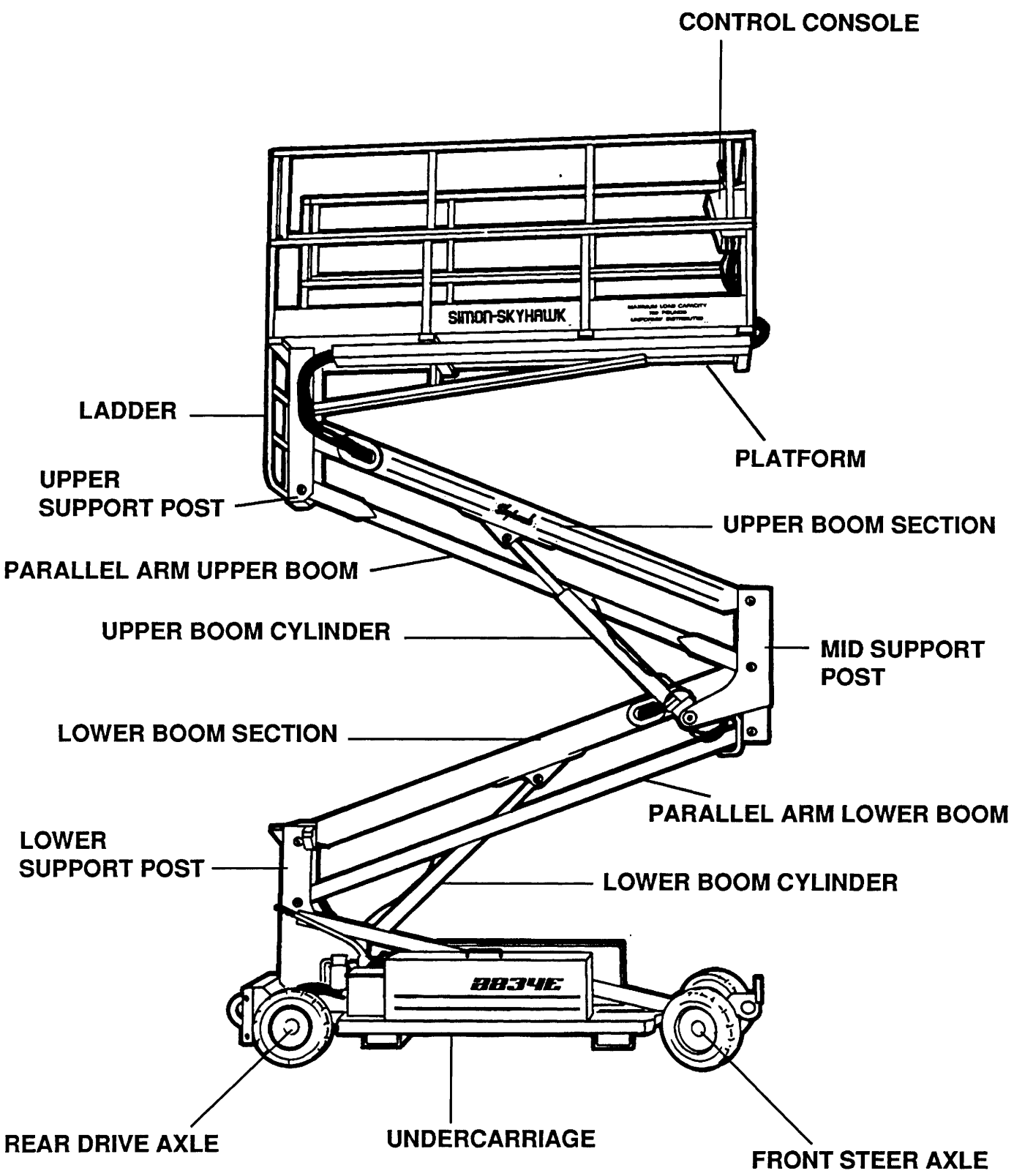
MACHINE SPECIFICATIONS
SKYHAWK SERIES

	2031E	2234E	2248E
WORKING HEIGHT	25 FT 6 IN. (7.77 M)	27 FT 6 IN. (8.38 M)	27 FT 6 IN. (8.38 M)
PLATFORM HEIGHT	19 FT 6 IN. (6.10 M)	21 FT 6 IN. (6.55 M)	21 FT 6 IN. (6.55 M)
STOWED HEIGHT:			
GUARD RAILS IN PLACE	95 IN. (2.41 M)	95 IN. (2.41 M)	95 IN. (2.41 M)
GUARD RAILS LOWERED	74 IN. (1.88 M)	74 IN. (1.88 M)	74 IN. (1.88 M)
GUARD RAILS REMOVED	56.5 IN. (1.43 M)	56.5 IN. (1.43 M)	56.5 IN. (1.43 M)
PLATFORM CAPACITY (UNRESTRICTED)	750 LBS. (340 KG)	750 LBS. (340 KG)	1000 LBS. (454 KG)
PLATFORM DIMENSIONS	26 IN. x 95 IN. (0.66 M x 2.41 M)	29 IN. x 104 IN. (0.74 M x 2.64 M)	48 IN. x 104 IN. (1.22 M x 2.64 M)
LENGTH	101 IN. (2.57 M)	118 IN. (3.00 M)	118 IN. (3.00 M)
WIDTH	31 IN. (0.79 M)	34 IN. (0.86 M)	48 IN. (1.22 M)
WHEELBASE	84 IN. (2.13 M)	87 IN. (2.21 M)	87 IN. (2.21 M)
TRACK	26 IN. (0.66 M)	29.5 IN. (0.75 M)	42 IN. (1.07 M)
GROUND CLEARANCE	7 IN. (0.18 M)	7 IN. (0.18 M)	7 IN. (0.18 M)
GROSS WEIGHT	4,200 LBS (1,905 KG)	4,400 LBS (1,995 KG)	4,600 LBS (2,086 KG)
OUTSIDE TURNING RADIUS	12 FT (3.66 M)	12 FT 9 IN. (3.89 M)	13 FT 6 IN. (4.12 M)
INSIDE TURNING RADIUS	7 FT (2.13 M)	7 FT 9 IN. (2.36 M)	7 FT 9 IN. (2.36 M)
TRAVEL SPEED-STOWED	2 MPH (3.2 KPH)	2 MPH (3.2 KPH)	2 MPH (3.2 KPH)
TRAVEL SPEED-ELEVATED	0.5 MPH (0.8 KPH)	0.5 MPH (0.8 KPH)	0.5 MPH (0.8 KPH)
GRADEABILITY (ON HARD SURFACE)	8 ° (14%)	8 ° (14%)	8 ° (14%)
POWER SYSTEM-ELECTRIC	24 VOLT DC (FOUR 6 VOLT, 220 AMP/HR. LEAD-ACID BATTERIES IN SERIES.)	24 VOLT DC (FOUR 6 VOLT, 220 AMP/HR. LEAD-ACID BATTERIES IN SERIES.)	24 VOLT DC (FOUR 6 VOLT, 220 AMP/HR. LEAD-ACID BATTERIES IN SERIES.)
BATTERY CHARGER	25 AMP	25 AMP	25 AMP

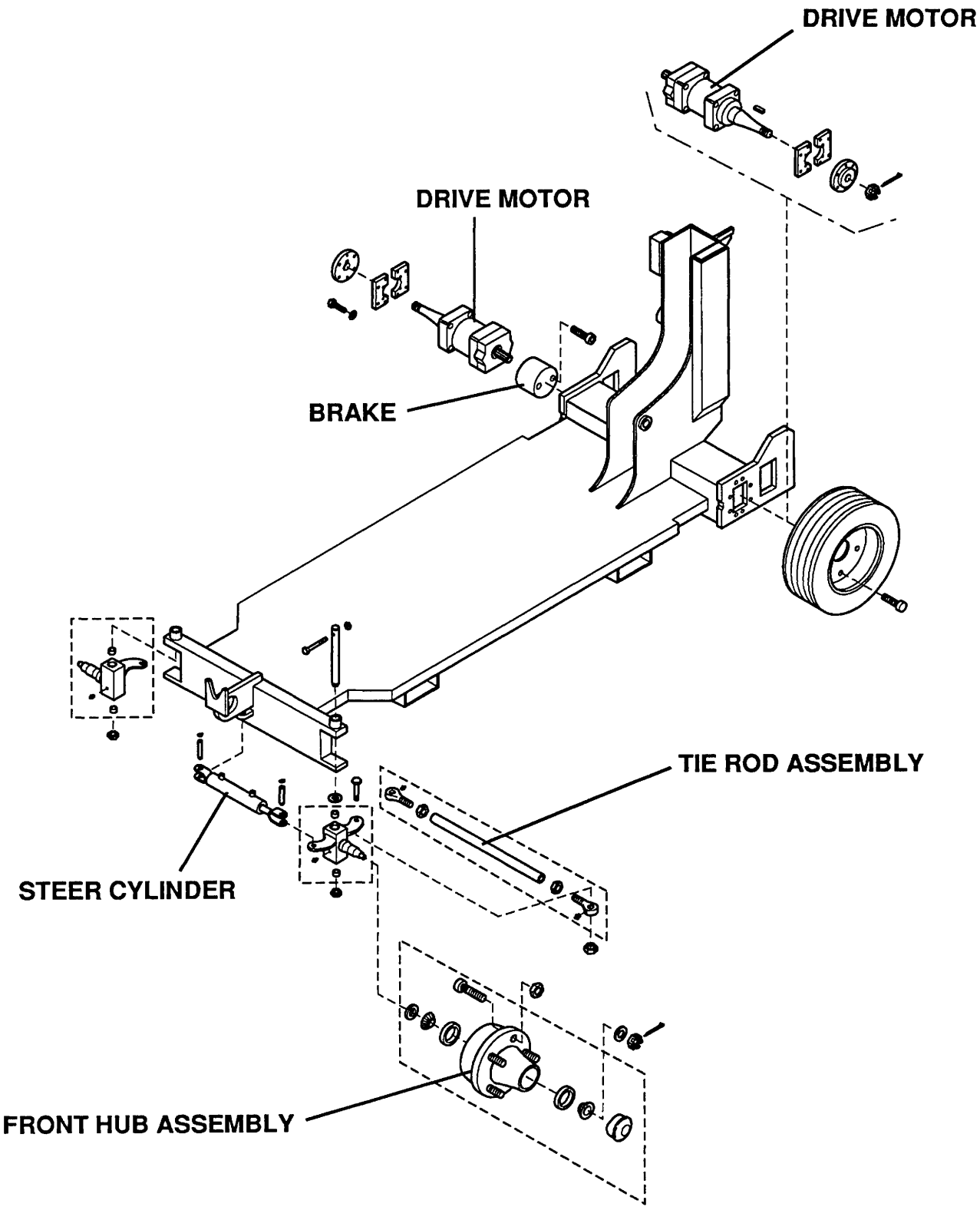
MACHINE SPECIFICATIONS (CONTINUED)

	2031E	2234E	2248E
TIRES (SOLID)	4" x 8" x 16"	4" x 8" x 16"	4" x 8" x 16"
HYDRAULIC FLUID CAPACITY	7.5 GAL. (28 L)	7.5 GAL. (28 L)	7.5 GAL. (28 L)
HYD. OPERATING PRESSURE:			
LIFT/ HIGH DRIVE	2600 PSI (179 BAR)	2600 PSI (179 BAR)	2600 PSI (179 BAR)
LOW DRIVE	1600 PSI (110 BAR)	1600 PSI (110 BAR)	1600 PSI (110 BAR)
WHEEL LUG TORQUE	75 FT LBS.	75 FT LBS.	75 FT LBS.

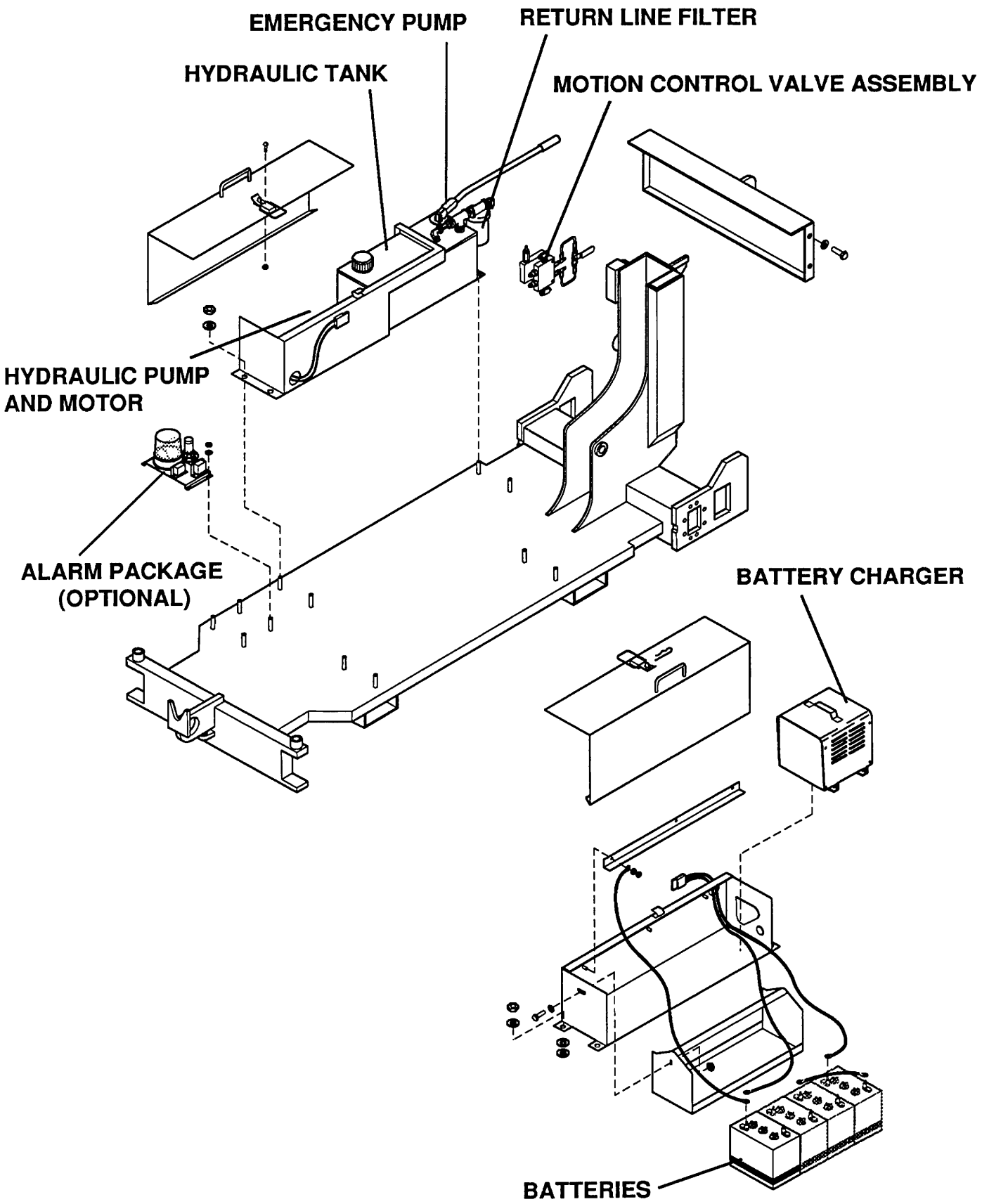
MACHINE COMPONENT LOCATOR



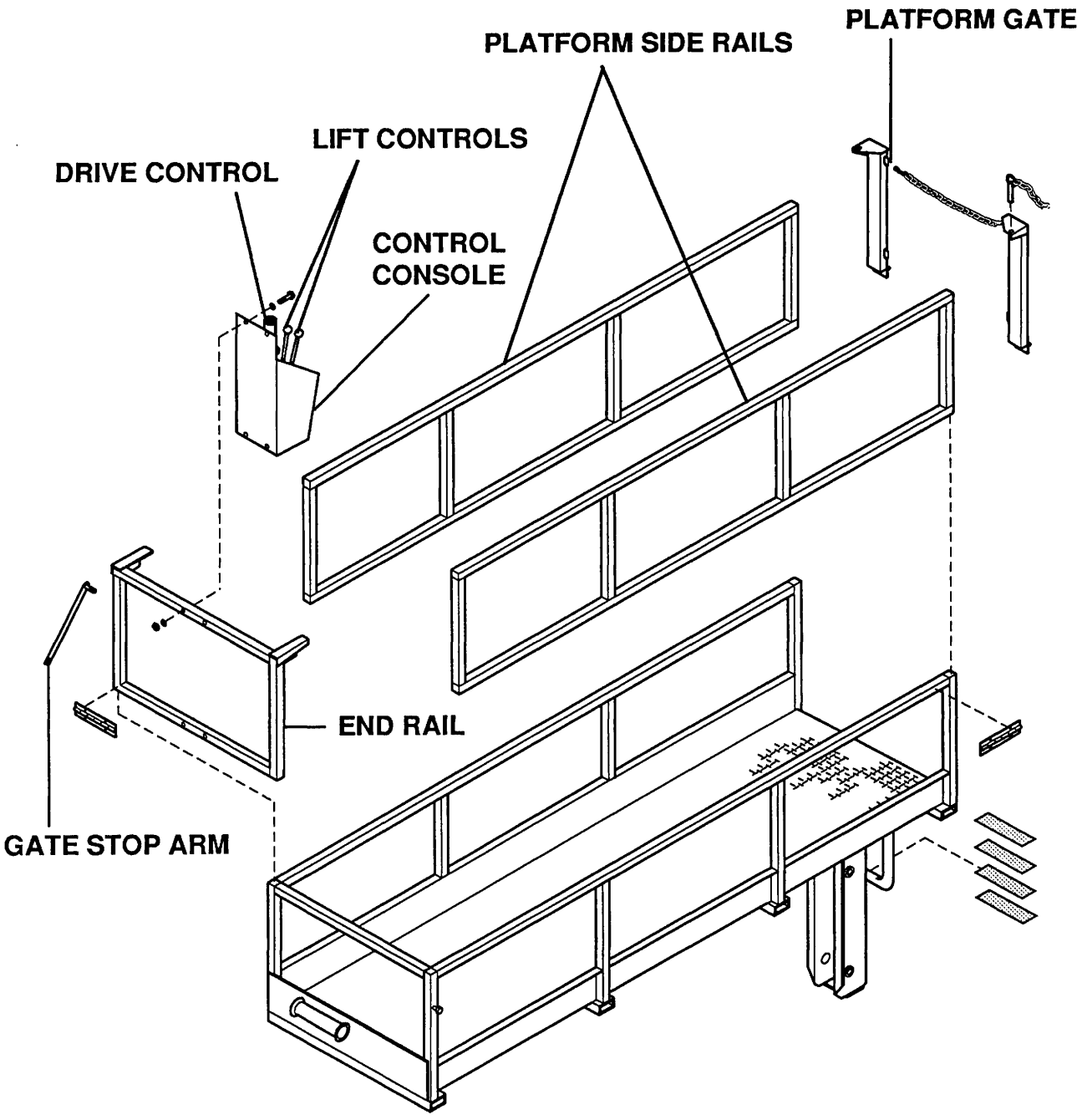
UNDERCARRIAGE COMPONENT LOCATOR



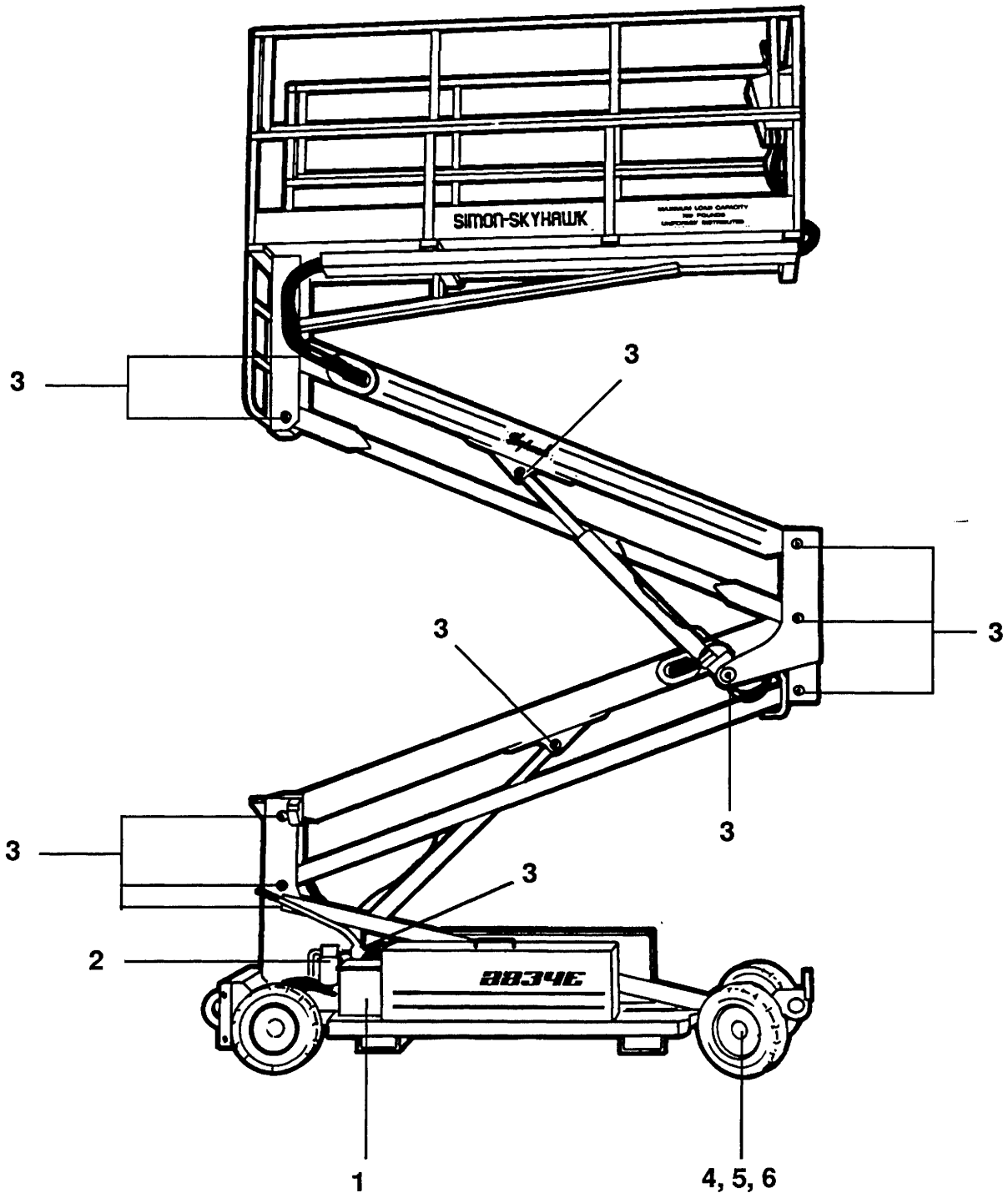
HYDRAULIC AND ELECTRICAL COMPONENT LOCATOR



PLATFORM COMPONENT LOCATOR



LUBRICATION DIAGRAM



LUBRICATION CHART

NO. ON DIAGRAM	ITEM	SPECIFICATION AND QUANTITY	FREQUENCY OF LUBRICATION
1	HYDRAULIC RESERVOIR	MOBIL DTE-15 TO FULL MARK W / PLATFORM RETRACTED	CHECK DAILY, ANALYZE EVERY 6 MONTHS, CHANGE YEARLY.
2	HYDRAULIC RETURN FILTER	FILTER ELEMENT	CHANGE EVERY 6 MONTHS
3	PIVOT PINS	LITHIUM N.L.G.I. #2 EP PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*
4	STEERING SPINDLES	LITHIUM N.L.G.I. #2 EP PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*
5	STEERING HUB	LITHIUM N.L.G.I. #2 EP CLEAN AND REPACK	EVERY 6 MONTHS.
6	STEERING LINKAGE	LITHIUM N.L.G.I. #2 EP PURGE OLD GREASE	MONTHLY OR EVERY 100 HRS.*

* WHICHEVER OCCURS FIRST.

EMERGENCY PROCEDURES

WARNING!!!

IF THE PLATFORM SHOULD FAIL TO LOWER, DO NOT ATTEMPT TO CLIMB DOWN THE BOOM ASSEMBLY. SERIOUS INJURY MAY RESULT.

EMERGENCY HAND PUMP

Each SKYHAWK has an emergency hand pump which can be operated from the ground. The pump is located on the side of the hydraulic reservoir.

To safely return the platform to the ground position, close the control valve on top of the pump, open the desired boom control and pump the handle.

Always use caution in selecting the correct boom control to bring the operator to safety.

EMERGENCY MOVEMENT

The emergency pump will not provide control or operation of the drive or steering functions. Should it be necessary to move or steer the unit, you must do the following:

NOTE

Platform should be in the stowed position when the unit is being transported.

FORK LIFTING OF THE WORK PLATFORM:

CAUTION

Do not use tie down lugs to lift the Work Platform.

Lift the SKYHAWK Work Platform from the sides only. Position forks in the forklift pockets. Ensure that lift truck used has adequate capacity to lift the machine (see "Machine Specifications" for weight).

TRUCK TRANSPORT OF THE WORK PLATFORM:

CAUTION

Always block up the unit while transporting to keep weight off of the front (steering) wheels.

Securely attach the machine to the transporting vehicle using the tie down lugs provided. Lugs are located at the center front and center rear of the undercarriage. Ensure that chains or straps have adequate load capacity, and DO NOT OVERTIGHTEN.

CAUTION

Do not use tie down lugs to lift the Work Platform.

Always chock the wheels of the unit while on the transporting vehicle.

EMERGENCY LOWERING

SITUATION: Platform elevated, operator not incapacitated, but unit will not respond to platform controls.



DO NOT TRY TO CLIMB DOWN THE BOOM.

HAVE AN EXPERIENCED OPERATOR USE THE EMERGENCY PUMP TO SAFELY LOWER THE PLATFORM.

POSSIBLE CONDITION:

- One or more functions not operating correctly.
- Unit movement from unselected control lever or switch.
- Unit function will not stop unless power is switched off.

CORRECTIVE ACTION:

1. Release the power control switch.
2. Evaluate the nature of the failure. Return to the ground if possible. If the condition will not allow you to return to the ground, contact an experienced operator to lower the machine using the emergency hand pump lowering procedure.
3. **Report the incident to your supervisor immediately.**

SITUATION: Unit elevated with operator incapacitated at platform controls.



DANGER!!! DO NOT TOUCH UNIT!!! DETERMINE THE CAUSE OF THE PROBLEM BEFORE YOU TOUCH THE MACHINE.

CORRECTIVE ACTION:

1. Have someone summon first aid or rescue squad.
2. Attempt to talk to operator before taking any rescue measures.
3. **Check to see if operator is in a pinned position before attempting emergency lowering procedure.**
4. After establishing that the machine is not in contact with live power lines, lower the platform using the emergency lowering procedure .
5. Render first aid to the operator.

SITUATION: Platform in contact with live power lines, operator incapacitated.

⚠ WARNING!!!

DANGER!!! DO NOT TOUCH UNIT!!!!

CORRECTIVE ACTION:

1. Contact authorized personnel to disconnect power supply touching unit.

2. Have someone summon first aid or rescue squad.

3. If operator is unconscious, check to see if he is in a pinned position or would be endangered if machine is moved.

4. AFTER POWER IS CUT, use the emergency hand pump lowering procedure to bring platform with operator to a safe location to render first aid.

⚠ NOTE

Any incident involving personal injury must be immediately reported to the local Simon Aerials Distributorship as well as to Simon Aerials, Inc.

HYDRAULIC FLUID

HANDLING PRECAUTIONS

⚠ WARNING!!!

PERSONS IN REGULAR CONTACT WITH MINERAL OILS NEED TO BE AWARE OF THE IMPORTANCE OF THOROUGH HYGIENE, AND THE PROPER METHODS FOR HANDLING MINERAL OILS IN ORDER TO AVOID POTENTIAL HAZARDS TO HEALTH.

If mineral-based hydraulic fluid is SPLASHED INTO THE EYES, it must be WASHED OUT THOROUGHLY using abundant quantities of water. If irritation persists, medical advice should be sought.

Mineral oils act as solvents on the natural oils in the skin. FREQUENT AND PROLONGED SKIN CONTACT CAN CAUSE DERMATITIS OR SEVERE IRRITATION. Mineral-based hydraulic fluids normally present no health hazard when used properly. Protective clothing and proper washing facilities should be provided or be accessible.

⚠ WARNING!!!

HYDRAULIC FLUID UNDER PRESSURE CAN PENETRATE AND BURN THE SKIN, DAMAGE EYES, AND MAY CAUSE SERIOUS INJURY, BLINDNESS, AND EVEN DEATH.

FLUID LEAKS UNDER PRESSURE MAY NOT ALWAYS BE VISIBLE.

IF MINERAL-BASED HYDRAULIC FLUID HAS PENETRATED THE SKIN, IT MUST BE MEDICALLY TREATED, BY A DOCTOR FAMILIAR WITH THIS TYPE OF INJURY, WITHIN A FEW HOURS.

FLUID RECOMMENDATIONS

We strongly recommend the use of MOBIL DTE-15 HYDRAULIC FLUID. An EQUIVALENT substitute can be used if absolutely necessary. Mineral-based hydraulic fluids produced by different companies will USUALLY mix with each other satisfactorily, but this IS NOT RECOMMENDED. When in doubt, consult your supplier.

MOBIL DTE-15 has proven to be suitable for use in all climates. For continued operation in temperatures below 32° F (0° C), the use of MOBIL DTE-13 or DTE-11 FLUID may prove satisfactory.

For operation in tropical climates, the use of MOBIL DTE-16 is allowable.

FLUID CONTAMINATION CHECKS

Use the following as a guide to determine when analysis of the hydraulic fluid is necessary.

- Any time the motor driven hydraulic pump is replaced.
- If fluid discoloration is noticed in the hydraulic reservoir sight tube.
- If, after the first 50 hours of operation, the hydraulic filter elements are plugged.
- Any time the hydraulic filter elements show signs of metal content.
- If valve spools at either operator's station have continuous sticking problems which are not corrected by lubrication.
- Once a year, under normal operating conditions.
- Every 6 months, in extremely dusty or dirty operating conditions.

The hydraulic fluid analysis must be done by a qualified laboratory. To insure that you receive accurate recommendations about the fluid being analyzed, always provide the following information with the test sample.

- Type of hydraulic fluid. (See lubrication chart)
- Model and serial number of unit from which sample was taken.
- Purpose of analysis: i.e. pump failure, discoloration, etc.
- Type of analysis: i.e. complete to show additive breakdown, acid buildup, viscosity, type and percent of contaminants. Comparison to new fluid and recommendations.

Comply with contamination analysis and recommendations to achieve a clean, contamination free hydraulic system.

Following the above guide will prevent premature failure of pumps, cylinder seals and drive motors, and will prevent unnecessary down time.

If system flushing and replacement of fluid is recommended, refer to the following flushing procedure.

SYSTEM FLUSHING PROCEDURE

With BOOMS DOWN AND FULLY RETRACTED (in stowed position), drain hydraulic fluid from hydraulic tank into a clean, empty container. This can be done with an oil filter cart so the fluid may be reused if analysis is good.

When the hydraulic tank is empty, remove suction hoses between tank and pump. Remove hoses between pump and flow divider. Flush the hoses. Remove hydraulic fluid filter, and flush the filter body and attaching hoses. Discard old filter element and replace.

With hoses removed from the hydraulic tank, flush out the tank. When this is completed, all the hoses removed in the previous steps should be properly reinstalled EXCEPT the system return line to tank. This hose should be lengthened to drain into the container used for the reservoir fluid.

If the hydraulic fluid removed from the reservoir is good, it can now be pumped (through a filter cart) back into the tank. If fluid is not usable, fill hydraulic tank with filtered, fresh hydraulic fluid (refer to Lubrication Chart).

Make sure the suction line is open to allow fluid to flow to the hydraulic pump. Loosen hose fittings at pump to allow pump to flood with hydraulic fluid, then tighten pump fittings.

Turn main power key switch "ON". Press "Power Switch" to engage pump. Use care when doing this as hydraulic fluid is now being returned to container provided above. This will remove old fluid from the rest of the hydraulic system as each boom is cycled to its maximum limits.



Monitor the hydraulic reservoir fluid level when cycling the unit functions, adding fluid as necessary to replace that being discharged to container at system return line. This fluid may be returned to the reservoir through a filter cart, if good.

Three cycles of ALL hydraulic cylinder functions should remove old hydraulic fluid.

When the above procedures have been completed, re-connect system return hose to tank. Fill the hydraulic reservoir to full mark on sight gauge.

Operate all functions to their full extreme positions to insure proper operation.

Check for leaks and correct as necessary. Unit is now ready to be placed back in operation.

HYDRAULIC SYSTEM

Following is a description of the major components of the SKYHAWK hydraulic system.

HYDRAULIC MOTOR PUMP

A 24 volt DC motor, started by a heavy duty contactor, drives the hydraulic gear pump. The pump provides hydraulic fluid flow to the functions via the flow divider and then control valves. The flow divider directs fluid flow to the steer cylinder and the control valve assembly. If no control valve is actuated, the hydraulic fluid is ported through the open center control valves directly back to the tank.

VALVES



Refer to "Machine Specifications" to determine maximum system pressure for your SKYHAWK.

SYSTEM RELIEF VALVE

The system relief valve is located next to the drive control valve in the directional control valve assembly.



Assistance is required in order to check the system relief. One person is required to operate the controls and adjust the valve, while the second person reads the pressure gauge.

To check system relief valve setting, operate one of the boom cylinders making sure that the valve is completely shifted. While operating boom, note pressure reading.

To adjust system relief valve, turn adjusting bolt on the end of the valve CLOCKWISE TO INCREASE PRESSURE and COUNTERCLOCKWISE TO DECREASE PRESSURE. Operate the boom lever, while turning adjusting bolt until proper reading is achieved. Lock the adjusting bolt.

LOW SPEED FLOW CONTROL VALVE

The low speed flow control valve is located on the front end of the hydraulic tank and is part of the solenoid valve assembly.



Assistance is required in order to check the low speed flow control valve. One person is required to operate the controls, while the second person reads the pressure gauge and adjusts the valve.



BLOCK THE WHEELS TO PREVENT THE UNIT FROM MOVING WHEN OPERATING THE DRIVE FUNCTION FOR CHECKING LOW SPEED FLOW CONTROL VALVE PRESSURE. TO PREVENT INJURY OPERATE DRIVE FUNCTION ONLY IN THE DIRECTION OF THE WHEEL BLOCK.

To check low speed flow control valve, elevate the platform to release the limit switch and operate the drive function in the direction of the wheel stop. While operating the drive function, note the pressure reading.

To adjust low speed flow control valve, elevate the platform to release the limit switch and loosen the locknut on the low speed drive valve adjuster. Operate the drive function in the direction of the wheel stop, while adjusting the pressure. Turn the adjustment knob CLOCKWISE TO INCREASE PRESSURE and COUNTERCLOCKWISE TO DECREASE PRESSURE. Tighten the locknut on the drive valve adjuster.

BOOM LIFT VALVES

The boom lift valves may be adjusted to vary the boom cycle time. Loosen the set screw on top of the boom lift lever to increase lever movement. Tighten the set screw to decrease lever movement.

HYDRAULIC FLUID RESERVOIR

The hydraulic fluid reservoir consists of the tank, a filler cap with filter, breather and strainer, and a return line filter. An emergency hand pump is also included as a permanent part of the hydraulic circuit, for emergency use.

HYDRAULIC RESERVOIR MAINTENANCE

Check tank for signs of leakage. Inspect tank securing bolts for tightness. Clean cap filter by flushing with clean water and dry. Check hand pump operation by closing the pump control, opening one of the boom controls and operating the pump handle.

EMERGENCY HAND PUMP

The emergency hand pump is located on side of the hydraulic tank. It is meant to be used only when the console controls are inoperative due to motor, pump or control system failure.

A pump control, mounted on the pump, must be closed and a boom control must be opened before operating the hand pump.

There are also two check valves in the system. One prevents hydraulic fluid from entering the hand pump from the hydraulic pump. The other allows the fluid to flow from the hand pump to the boom control valves.

Check the operation of the emergency hand pump (see "Hydraulic reservoir maintenance").

Check for leaks around the pump gasket. If the hand pump will not operate, the internal filter may be clogged. Remove the filter and clean it by backwashing.

BOOM LIFT SYSTEM

When the power control toggle switch on the control console is pressed and held, fluid is sent from the hydraulic tank to the open center control valves to the boom function.

All boom functions are then controlled by moving the proper control lever in the desired direction. THE SPEED OF BOOM MOVEMENT IS PROPORTIONAL TO THE AMOUNT OF CONTROL LEVER THROW.

Each boom function is controlled by a double acting cylinder. Each cylinder contains a counterbalance (holding) valve, which will prevent unintended movement of the cylinder should a hose or fitting develop a leak. When a boom section is lowered, fluid flows to the rod end cylinder port and to the counterbalance valve, opening this valve and allowing fluid in the base end of the cylinder to flow back to the tank.

BOOM LIFT SYSTEM TROUBLESHOOTING

Problem: No boom functions operate from control console.

Check boom functions using emergency pump system.

If ALL BOOM SECTIONS CAN BE LOWERED slightly with the emergency pump, the control console valve bank is good, and it will be necessary to investigate the hydraulic system, or electrical control system ahead of the control valve banks.

If any boom section FAILS TO OPERATE, using the emergency pump, the problem may be in the control console valve bank.

If any boom function FAILS TO OPERATE FROM THE CONTROL CONSOLE, using the emergency pump, the problem may be a defective holding valve. Remove the holding valve to check for foreign material or internal damage. If faulty, the holding valve must be replaced.



Always support the boom before removing the holding valve.

STEER SYSTEM

The steering system is controlled by two solenoid operated directional control valves mounted on the hydraulic tank assembly. These valves are activated by a thumb button on top of the drive control lever. When the thumb button is pressed to steer "LEFT" or "RIGHT", the valve spools shift to allow fluid flow to either the rod end or blank end of the steer cylinder. The blank end of the steer cylinder is attached to the undercarriage, while the rod end is connected to the steering axle linkage. There is a relief valve (shared with the lift system) at the valve bank.

STEER SYSTEM MAINTENANCE

Check all pins on steering linkage for excessive play, and ensure that all clips are in place and secure. Lubricate linkage as necessary. Check steering cylinder pins for excessive play. Check cylinder and hoses for hydraulic fluid leakage and security.

STEER SYSTEM TROUBLESHOOTING

Problem: Unit will not steer; all other functions operate.

Steer cylinders may not be mechanically connected to steering linkage. Check for disconnected or damaged steering linkage.

The steering solenoid valves may not be shifting. The valve spools may be stuck, the solenoid may not be energizing, or there may be open wires in the steering circuit.

Locate steering valves on hydraulic tank assembly. Check to see if the solenoids located on these valves are being energized. If power is reaching the solenoids, either one or both solenoids are defective or a valve spool is obstructed. Remove valve and inspect, clean, repair or replace as needed. If solenoids are not being energized, check for continuity in the wire harness to the steering control switch on the drive lever.



On units with the Tow Package option, check the brake actuation lever, emergency pump control valve and the motor cross port valve lever for proper position.

DRIVE SYSTEM

The SKYHAWK is propelled by two hydraulic drive motors. The drive circuit runs through a normally open dump valve which allows a preset amount of fluid to go directly to tank. When using the control console platform power switch and having the boom fully lowered, the dump valve is shut off allowing full flow to the drive motors resulting in high speed drive. By raising the booms or using the ground power switch, the machine is restricted to low speed.

BRAKE

The brake system on the SKYHAWK is spring applied with hydraulic release. Should any type of power failure occur, the brake is automatically applied. The brake is released as pressure is applied to either the forward or reverse line in the drive motor circuitry.

ELECTRICAL SYSTEM

Following is a description of the major components of the SKYHAWK electrical system.

The electrical circuit consists of two duplicate circuits, controlling lift, telescope and swing functions from either the ground or platform control panel, and selected by a switch on the ground control panel.

BATTERIES

Four 6 volt lead-acid batteries connected in series are used to provide the power to operate all functions on the electric powered SKYHAWK.

BATTERY MAINTENANCE (IN STORAGE)

Follow these procedures for maintenance of stored batteries:

Keep batteries clean. Electrolyte of "wet" batteries should be checked regularly, and kept at proper levels.

Never stack one battery directly on top of another, as post or container damage can result. If batteries are stored individually, place supporting boards between layers. Do not stack more than three high, and rotate stock so that the oldest batteries are used first.

"Wet" batteries should be kept fully charged. A "wet" battery, while in storage, should be recharged to full charge at the following intervals:

IF STORED AT:	RECHARGE:
Below 40° F (4° C)	None required
40° to 60° F (4° to 15° C)	Every 2 months
Above 60° F (15° C)	Every month

BATTERY MAINTENANCE (IN USE)

Check batteries and mounting frame for signs of damage or corrosion.

Check battery terminals for:

- **Corrosion.** Regularly clean connections and apply a non-metallic grease or protective spray to retard corrosion.
- **Loose connections.** Be sure all cable connections are tight, and that good contact is made to terminals.
- **Broken or frayed cables.** Be sure all cable connections are good, and that no loose or broken wires are exposed. Replace as needed.

Check battery electrolyte level. Replenish the electrolyte, if necessary. Remove vent caps before filling, and USE ONLY DISTILLED WATER. Fill all cells to the proper level. Do not overfill. Fill to level indicator (or 1/2 inch over the top of the separators if there is no level indicator). Fill after charging to prevent overflow of acid due to expansion. Do not use a hose to add water to batteries.

Allowing the electrolyte level to drop below the top of the separators will lead to shortened battery life. Excessive water usage can indicate that a battery has been overcharged, has been subjected to excessively high temperatures, or is nearing the end of its service life.

Keep batteries clean. Wash the tops of the batteries, making sure all vent caps are in place. Do not allow cleaning water or other foreign matter to enter the cells. Use a solution of bicarbonate of soda and water to wash the batteries if there is an accumulation of acid.

BATTERY TROUBLESHOOTING

Once a week, after the batteries have been charged, spot check the specific gravity of two or more cells. A fully charged battery should indicate between 1.25 and 1.28. If low readings are noted, check the following:

- Check battery charger to insure that a proper charge is being returned to the batteries.
- Check terminals for corrosion, loose connections and broken or frayed cables.
- Check all cells with a hydrometer for variation in specific gravity. A variation of 0.03 points or more between cells is cause for concern. Mark the low cells.

Recheck specific gravity of all cells after recharging.

BATTERY REPLACEMENT

To remove the batteries, follow these procedures:

! WARNING !!!

BEFORE REMOVING BATTERIES FROM THE UNIT, TURN OFF THE IGNITION SWITCH. THERE SHOULD BE NO POWER TO THE MACHINE.

Be sure all power is shut off to the machine. Disconnect the battery cables.

! CAUTION

Always disconnect the negative battery cable first.

Release the battery retaining bar, and carefully remove the battery from the tray. LEAD-ACID BATTERIES ARE HEAVY. DO NOT DROP.

To install, carefully lower the battery into the tray. Connect the battery retaining bar, and the battery cables.

! CAUTION

Always connect the positive battery cable first.

BATTERY CHARGER

The battery charger supplied with the SKYHAWK is designed to recharge deep-cycle, lead-acid batteries. It is a highly reliable unit with a minimum of moving parts. A patented electronic timer determines full battery charge by measuring the rate of battery voltage increase during charge. When the voltage stops rising, the battery is fully charged and the charger automatically turns off.

To operate, connect the power supply cord to a 115 volt, 60 hertz outlet. The charger DC output cord should remain connected to the batteries.

! WARNING !!!

CONNECT ONLY TO A PROPERLY GROUNDED THREE-PRONG, SINGLE PHASE OUTLET.

TO AVOID ELECTRIC SHOCK, DO NOT TOUCH UNINSULATED PARTS OF THE CHARGER DC OUTPUT CONNECTOR, BATTERY CONNECTOR OR TERMINALS.

BE SURE CHARGER IS IN GOOD CONDITION, AND THAT BATTERY CONNECTORS MAKE ADEQUATE ELECTRICAL CONTACT AND ARE NOT CRACKED OR CORRODED. OVERHEATING AND PROPERTY DAMAGE MAY RESULT.

Monitor the ammeter for the correct charge rate, which should vary from 20 to 29 amps, depending upon the condition and depth of discharge of the batteries.

⚠ CAUTION

To prevent damage from overheating, do not allow the charger to operate for more than thirty minutes with an ammeter reading of 30 amps or more.

Required charge time varies with depth of discharge.

⚠ WARNING!!!

LEAD-ACID BATTERIES GENERATE EXPLOSIVE GASES. NO SMOKING! KEEP SPARKS AND FLAME AWAY FROM BATTERIES.

NEVER DISCONNECT THE DC OUTPUT CONNECTOR FROM THE BATTERIES WHILE THE CHARGER IS OPERATING.

IF THE CHARGE CYCLE MUST BE INTERRUPTED, DISCONNECT THE POWER SUPPLY CORD FROM ITS OUTLET; DO NOT DISCONNECT THE DC OUTPUT CONNECTOR FROM THE BATTERY CONNECTOR.

BATTERY CHARGER TROUBLESHOOTING

⚠ CAUTION

Always unplug the electrical cords from the AC outlet and the batteries before attempting any repairs to the charger.

⚠ WARNING!!!

HIGH VOLTAGE! WITH THE CHARGER ON, THE INTERNAL CHARGER CAPACITOR VOLTAGE IS APPROXIMATELY 650 VOLTS.

⚠ NOTE

Modifying the charger for use other than that for which it was specifically intended, repairs by unqualified persons or use of other than original equipment replacement parts will void the warranty.

If the charger malfunctions, identify the symptoms and refer to the following procedures.

Problem: Charger does not turn on.

The charger DC output cord normally remains connected to the batteries. When the charger is turned on, a time delay of two to five seconds is provided before the charger switches on. After this time delay, the POWER RELAY CLOSES WITH AN AUDIBLE " CLICK", and AC power is supplied to the transformer.

When operating properly, the TRANSFORMER HUMS and the AMMETER INDICATES THE CHARGE RATE. If the charger does not turn on properly, one of three situations will exist:

1. Relay DOES NOT CLOSE, Transformer DOES NOT HUM, and Ammeter DOES NOT REGISTER.

2. Relay CLOSES, but Transformer DOES NOT HUM, and Ammeter DOES NOT REGISTER.

3. Relay CLOSES and Transformer HUMS, but Ammeter DOES NOT REGISTER.

Following are the procedures to be used in each of the above circumstances.

1. If Relay DOES NOT CLOSE, Transformer DOES NOT HUM, and Ammeter DOES NOT REGISTER:

   Check that both the power supply cord and DC output connector are securely connected. If so, disconnect the power supply cord from the

power outlet. Measure the voltage at the battery connector using a suitable DC voltmeter.

The voltage reading SHOULD BE THE SAME as the battery terminal voltage (between 20 and 50 volts DC). If the DC voltage is within these limits, remove the charger cover and check the wiring against the wiring diagram. If correct, a malfunction in the electronic timer has probably occurred.

To verify a malfunction in the electronic timer, bypass the timer, then check for transformer hum and normal charging current.

To bypass the timer, disconnect the charger power supply cord from the outlet, and the DC output connector from the battery connector. Place a jumper wire between terminals "1" and "3". The transformer should hum when the power supply cord is reconnected to the outlet.

If the transformer HUMS, disconnect the power cord. Reconnect the DC output connector to the battery connector. Reconnect the cord. If ammeter shows normal charging current , the timer is defective and must be replaced.



DO NOT CHARGE BATTERIES WITH THE TIMER BYPASSED. The charger will remain on as long as the power supply cord is connected to a power source, and severe damage to batteries will result.

If the transformer DOES NOT HUM and the ammeter does not register with the timer bypassed, check the continuity of the charger AC circuit. Disconnect the power cord from the outlet, and the DC output connector from the battery connector. With a suitable Continuity Tester, check the circuit across the power cord prongs. If the circuit is not complete, check the continuity of the power supply cord, primary transformer coil and all connections.

2. If Relay CLOSES, but Transformer DOES NOT HUM, and Ammeter DOES NOT REGISTER:

   Check to be sure the power supply cord is securely connected to a live outlet.

   Disconnect the cord from the outlet, and the DC output connector from the battery connector. Bypass the electronic timer (refer to situation #1), and with a suitable Continuity Tester, check the circuit across the power cord prongs. If the circuit is complete, check the relay wiring and all connections. If the circuit is not complete, check the wiring of the power supply cord, transformer primary coil leads and the electronic timer.

   Remove the charger cover, and check the wiring against the diagram. If correct, individually check the continuity of the power supply cord, transformer primary coil and relay.

3. If Relay CLOSES and Transformer HUMS, but Ammeter DOES NOT REGISTER:

   In this situation, the charger AC circuit and electronic timer are functioning properly, and a fault in the charger DC circuit exists. A continuity check must be performed.

Disconnect the power cord from the outlet and the DC output connector from the battery connector. Check the charger fuse. If a fuse link is blown, further testing is required (see "Charger Fuse Blows", later in this section). If the fuse is good, use a low voltage Continuity Tester to perform the following tests:

3A. Connect the Tester leads to the charger DC output connector and note the reading. Reverse the Tester leads and check the reading again. The circuit should be complete IN ONLY ONE DIRECTION.

If the circuit DOES NOT CONDUCT IN EITHER DIRECTION and the fuse is good, check the continuity of the DC output cord, ammeter, diodes and all connections.

If the circuit CONDUCTS IN BOTH DIRECTIONS, a short exists in the charger DC circuit. Check the DC output cord. Check if one or both diodes have shorted (see "Charger Fuse Blows").

3B. Check the capacitor. Disconnect the power cord from the outlet and the DC output connector from the battery connector. Disconnect both transformer coil leads from the capacitor terminals, taking care that the wires do not break. Connect an Ohmmeter (with the scale set to R x 10K ohms) to the capacitor terminals, and test the capacitor.

If, when the Ohmmeter leads are connected to the capacitor terminals:

- the meter needle JUMPS TO MID-SCALE and RAPIDLY MOVES TO HIGH RESISTANCE, the capacitor is GOOD.
- the meter needle DOES NOT MOVE, and instead stays at high resistance, the capacitor is OPEN. A bulge in the top of the capacitor may be visible.
- the meter needle JUMPS IMMEDIATELY TO ZERO OHMS and stays there, the capacitor is SHORTED.

If the capacitor is "open" or "shorted", it must be replaced.



Use only a "6 mfd, 660 volt ac" rated capacitor for replacement. The use of a capacitor of a different value may result in improper charging, capacitor failure, transformer burnout or battery damage.

3C. If the charger DC circuit and capacitor are good, test the transformer (see "Transformer Short or Burn-Out", later in this section).

Problem: Charger fuse blows.

The charger fuse consists of two fusible links mounted as a single assembly on the charger front panel. Each link is connected in series with one diode to provide protection for the transformer in the event of diode failure. Visually check the fuse to determine if one or both links are blown.



Replace the complete fuse assembly if blown. DO NOT ATTEMPT TO REPAIR THE FUSIBLE LINK, as inadequate charger protection may result.

If a SINGLE FUSIBLE LINK BLOWS, the cause is normally a short circuit failure of one diode. The link will blow when the charger DC output connector is connected to the battery connector, whether or not the power cord is connected.

To check the diodes, disconnect the power cord and the DC output connector. Disconnect one transformer secondary coil lead from the diode terminal. Using a low voltage Continuity Tester, connect one Tester lead to the diode mounting plate and the other to a diode terminal. Note the reading and then reverse the Tester leads and check each diode again. If a diode CONDUCTS CURRENT IN BOTH DIRECTIONS, it is SHORTED. The complete heat sink assembly with diodes must be replaced.

Occasionally, a single fusible link may melt due to excessive heat caused by a loose internal fuse connection. Check that all three fuse connections inside the charger are clean and tight. Tighten the fuse connector nuts to the proper torque (see "Machine Specifications").

If BOTH FUSE LINKS BLOW, the cause is normally a reverse polarity connection between the charger DC output connector and the battery connector. Check the battery pack and connections. Check the voltage and polarity at the battery connector with a DC voltmeter.

Check the charger DC output connector for correct polarity. The white wire should be connected to the positive (+) blade, and the black wire to the negative (-) blade. If polarity is reversed between the charger and batteries, BOTH FUSIBLE LINKS WILL BLOW whether or not the power supply cord is connected to an outlet.

BOTH FUSIBLE LINKS MAY ALSO BLOW due to a short circuit failure of both diodes. A lightning strike at the charging location can be a cause. Excessive heat due to a loose connection may also cause both fusible links to melt.

Problem: Ammeter reads 30 amps for more than 30 minutes.

If the charger is connected to a battery system of less than 24 volts, the charge rate may not go below 30 amps within 30 minutes. Check that all batteries are correctly wired, and also check the battery pack voltage at the battery connector using a DC Voltmeter. For a 24 volt battery system, the charging voltage should be 22.5 to 25.5 volts DC.

This condition could also result if there is a shorted cell in one of the batteries.



Do not connect the charger to battery systems of other than 24 volts. Overheating and transformer burnout will result.

Problem: Charger output is low.

Low charger output is normally caused by a single fusible link blowing as the result of a short circuit failure of one diode (refer to "Charger Fuse Blows", in this section), or the transformer coils (refer to "Transformer Short or Burnout", in this section).



Do not use the charger if the output is low. Batteries will not reach full charge, and the possibility of a harmful deep discharge exists in subsequent usage.

Problem: Charger does not turn off.

The electronic timer turns the charger on and off. Proper charge time is determined by many factors, but larger, severely discharged batteries require more time to reach full charge than do smaller, lightly discharged batteries. Charge time should not exceed 18 hours.

If the charger remains on longer than that, verify that the green wire from the electronic timer and the secondary transformer coil lead are securely connected to the diode lead. The charger will not turn off if this wire is loose or disconnected. If the green wire is secure, the timer has malfunctioned and must be replaced (see "Electronic Timer needs replacement", later in this section).

Problem: Electronic timer needs replacement.

The electronic timer kit should always be replaced as a complete assembly. Tools required are a Phillips Head Screwdriver, Pliers, a 3/8" Wrench, and an 11/32" Wrench. To replace the timer kit, follow the procedures listed below:

- Disconnect the charger power cord from the outlet, and the DC output connector from the battery connector. Remove the charger cover.
- Disconnect the green, black and red wires of the timer kit. Remove the black and white leads of the power cord and both primary transformer coil leads from the timer kit terminals. Remove the three mounting screws on the charger front panel, and the entire timer kit. Save all hardware for reassembly.
- Install the replacement timer kit by reversing the above steps. When reconnecting the wires to the timer terminals, YOU SHOULD SUPPORT THE TERMINAL BOARD TO PREVENT DAMAGE TO THE ELECTRONIC CIRCUIT BOARD.
- Connect one transformer primary lead to terminal "2", and the remaining lead to terminal "3".
- Connect the black lead of the power supply cord to terminal "1" on the timer kit, and the white lead to terminal "2".
- Connect the red wire of the timer kit and the white lead of the DC output cord to the heat sink assembly.
- Connect the black wire of the timer kit and the black lead of the DC output cord to the ammeter post. DO NOT ALLOW THE POST TO TURN WHEN TIGHTENING THE NUT.
- Connect the green wire of the timer kit and the transformer secondary lead to the diode lead terminal.



Be sure all connections are clean and tight. Insure that all wires and terminals are positioned so they do not short to the charger case or each other.

- Replace the charger cover and check the timer kit for proper operation as follows:
  - With the DC output connector disconnected from the battery connector, plug the power cord into a suitable outlet. A DC Voltmeter connected across the DC output connector should indicate zero volts.
  - Disconnect the power cord from the outlet, and connect the DC output connector to the battery connector. The relay on the timer kit should close with an audible click after a two to five second delay.

- If the timer does not operate as indicated above, refer to the wiring diagram to insure the charger is wired correctly. If the timer operates properly, the charger is ready for use. Monitor the first charge cycle to verify that the charger turns off properly.

Problem: AC fuse or circuit breaker blows.

If this occurs when the charger is connected to an AC power source, but not to the batteries, the power cord may be shorted. Disconnect the cord from the outlet and the DC output connector from the battery connector. Check that the electronic timer kit has not been bypassed.

With a suitable Continuity Tester, check the circuit across the power cord prongs. The circuit should be open. If the circuit is complete, check the relay contacts to be sure they are open, and have not welded closed. If the relay contacts are open, the power cord is shorted and must be replaced.

If the power cord is good, the transformer coils may be shorted.

Problem: Transformer shorted or burned out.

Transformer failure may be caused by natural aging, or shorting of adjacent coil turns. A low or complete lack of output will be observed on the ammeter, while the transformer may hum. The AC line fuse or circuit breaker may blow when the charger is turned on.

To test the transformer, disconnect the power cord from its outlet and the DC output connector from the battery connector. Disconnect transformer secondary coil leads "1" and "4" from the diode terminals, and the transformer capacitor coil leads from the capacitor terminals. When disconnecting capacitor leads, use care to avoid breaking wires .

⚠ WARNING!!!

HIGH VOLTAGE!

WITH THE CHARGER ON, THE INTERNAL CHARGER CAPACITOR VOLTAGE IS APPROXIMATELY 650 VOLTS. USE EXTREME CAUTION WHEN WORKING NEAR CAPACITOR TERMINALS.

In order to apply AC power directly to the transformer primary coil, the timer must be bypassed. With the timer bypassed, and TAKING CARE FOR PERSONAL SAFETY, connect the power cord to a proper outlet. If the AC line fuse or circuit breaker blows, the transformer is shorted internally and must be replaced. If the fuse or breaker does not blow, check the transformer secondary and capacitor coil voltages using a suitable AC voltmeter. If the measured voltages are substantially lower than those shown, the transformer is shorted internally and must be replaced.

If the transformer output voltages are good, disconnect the power cord from the outlet. Check the capacitor rating (should be 6 Mfd, 660 volts AC), then carefully reconnect the capacitor coil leads to the capacitor terminals. Then, TAKING CARE FOR PERSONAL SAFETY, reconnect the power cord to the outlet and again measure the transformer secondary and capacitor coil voltages.

If both read 88 volts AC, the transformer and capacitor are good (see DC Circuit Test Procedures under "Charger does not turn on"). If the secondary coil voltage reading is 61 V AC, and capacitor coil 455 V AC, the capacitor may be defective (see Capacitor Test Procedures under "Charger does not turn on", earlier in this section) or the capacitor coil leads may not be making proper electrical contact .

If replacement of a transformer lead terminal is required, the new terminal MUST be crimped and soldered.



Some transformer lead wires may be aluminum, and a solder intended for aluminum MUST be used.

FUSE

The only fuse in the SKYHAWK circuitry is a "Klixon" fuse located in the motor compartment. The "Klixon" fuse is a 150 amp fuse which will reset itself once the fuse element cools down. If you are frequently causing the fuse to open, you may have a problem with the electric motor, clogged filter or a short in the wiring.

TROUBLESHOOTING

Before investigating a malfunction, check the following items:

- The key switch should be in the "ON" position.
- When attempting to operate any function from the control console, the power switch must be pressed and held.
- Check that battery connections are secure, and batteries have sufficient charge.
- Ball valve in pump supply line is open.
- Hydraulic fluid should be at the correct level.

Problem: Pump motor will not operate.

Operate pump and check voltage at batteries.

Check voltage at pump.

Examine electrical circuit for loose connections.

Check the relay for proper operation.

Inspect pump motor brushes.

Check pump motor for mechanical defect

Problem: Pump motor operates, but does not generate hydraulic pressure.

Check for hydraulic fluid leaks.

Examine pump assembly for mechanical defect.

Check pressure relief valve for correct pressure setting.

Examine check valve at emergency hand pump.

Check lower and upper boom control valves on hydraulic tank.

Problem: Pump motor is slow in operation.

Check that the safe working load has not been exceeded.

Check pressure relief valve for correct pressure setting.

Verify that the correct grade of hydraulic fluid is being used.

Check for sufficient battery output.

Check electrical circuit for bad or loose connections.

Problem: Pump motor will not stop when machine is switched to DRIVE.

Check that the contactor contacts have not welded.



Do not attempt to clean contacts with abrasive material. Replace contactor.

Check the power toggle switch or wiring for a short.

Problem: Booms will not raise or lower.

Check for sufficient battery output.

Check for hydraulic fluid leaks.

Check holding valves for sticking or damage.

Problem: Machine steers sluggishly, or not at all.

Check cross port relief valves for correct pressure settings.

Check solenoid valve assembly for correct operation.

Inspect steer cylinder seals for leaks.

Check for loose or damaged steering linkage.

Examine electrical connections on steering control switch (thumb button located on drive control lever).

Problem: Drive motor will not operate.

Check contactors for proper operation.

Check drive motor electrical circuit for broken or loose connections.

Problem: Machine only operates in LOW SPEED mode.

Check ground power switch.

Inspect boom limit switches for proper adjustment.

Check that booms are in stowed position.

Problem: HIGH SPEED mode is available with booms elevated.

Check ground power switch for correct operation.

Inspect boom limit switches for proper adjustment.

Problem: Battery charger does not operate.

See troubleshooting section under "Battery Charger".

MAINTENANCE SCHEDULE

The Simon SKYHAWK is designed to require a minimum amount of maintenance. However, it is essential that the specified services be performed at the indicated intervals, and that the instructions contained in this manual are followed to ensure safety and reliability.

The hydraulic pump, electric motor, cylinders and pressure valves are self-lubricating.

NOTE

As with any new machine, minor fluid leaks may occur until the various hydraulic components and pipe fittings are fully seated. It is particularly important that, for the first three months of operation, all hydraulic components, hoses and pipe fittings be checked regularly for leaks and tightness, and corrective action taken as required. Correction of minor fluid leaks and general tightening of machine components during this initial period are not considered as reimbursible expenses under the Simon Limited Warranty.

General Maintenance Tips

Never leave components or hoses open. They must be protected from contamination (including rain) at all times.

Never open a hydraulic system when there are contaminants in the air.

Use only recommended lubricants. Improper lubricants or incompatible lubricants may be as harmful as no lubrication.

ALWAYS clean the surrounding area before attempting to open hydraulic components.

Watch for makeshift "fixes", which can jeapordize safety as well as lead to more costly repairs.

Any work platform found not to be in safe operating condition should be removed from service until repaired. All repairs should be made by authorized personnel in conformance with the manufacturer's operating, maintenance, and repair manuals.

ROUTINE SERVICING

NOTE

The following recommendations are based on the advice of suppliers, and the requirements of various safety regulations. They should be followed with discretion based on factors such as amount and type of machine usage, environmental conditions, and local safety regulations.

DAILY SERVICE

Hydraulic System

Before checking the hydraulic fluid level, ensure that the machine booms are stowed in the traveling position, and the machine is standing on level ground. Fluid level must be to full mark on sight gauge, located on the side of the tank. If the reservoir requires additional fluid, refer to the Lubrication Chart for the correct grade.

After checking the fluid level, ensure that the filler cap is secure to prevent entry of water or other impurities into the tank.

Tire Condition

Check that the machine tires are in good condition.

Platform Rails and Safety Chains

Check the security of the platform rails safety chains.

WEEKLY SERVICE

Control Valves

Control valves must be checked for correct operation. Check that all control valve handles automatically return to the center (neutral) position.

Hydraulic System

Pressurize the hydraulic circuit and inspect the system for any signs of leakage, particularly at flexible hoses, connections and hydraulic components.

Steering

Check the steering cylinder for fluid leakage. Inspect steering linkage for signs of wear.

Batteries

Check the electrolyte level in battery cells. Replenish with distilled water, if necessary.

MONTHLY SERVICE

Hydraulic System

Check fluid color. If the hydraulic fluid does not flow clear amber, but has a cloudy appearance, it is usually an indication that water is present. A dark brown color, accompanied by a strong "burnt" smell, indicates that the fluid has overheated. If either condition occurs, a complete hydraulic fluid and filter change will be necessary.

The cause of hydraulic fluid deterioration should be investigated and rectified. Have fluid analyzed by a qualified laboratory.

Check for hydraulic system leaks.

Chassis Bolts

Check all bolts for signs of looseness.

Pivot Pins

Examine all pivot pins on booms and cylinders to ensure that they are positively secured in position.

Lubricate all pivot pins.

SEMI-ANNUAL SERVICE

Boom Cylinders

Fully retract, then extend each boom lift cylinder. At each extreme position, check that there is no movement between cylinder rod and bearing housing, or between cylinder cap and tube.

Check all cylinders for hydraulic fluid leakage.

Hydraulic Line Filter

Change the return line filter element.

In severe use applications, more frequent filter changes will be necessary.

Test All Machine Systems

Test the operation of the drive assembly, including drive motor and steering.

Test the operation of all machine boom functions.

ANNUAL SERVICE

Flexible Hoses

Inspect all hoses over their complete length. Replace any hoses showing looseness or corrosion at the end fittings. Replace hoses exhibiting cracking, blistering or excessive wear of outer protective covering.

Hydraulic Fluid

If the hydraulic system has been properly maintained, the fluid should only need to be changed once each year. This, of course, will depend on machine application, amount of use, temperature, atmospheric conditions and other factors.

Hydraulic Fluid Tank

Carefully check the condition of the fluid inside the tank to ensure that it flows easily and is of clear, amber color. In cases of gross contamination, it will be necessary to completely drain and refill the entire hydraulic system.

Place a suitable waste oil container under the drain tap, or attach a suitable hose from the drain tap to the container.

Open the drain tap, and completely drain the fluid from the tank. Remove the tank top plate for internal inspection and cleaning.

Clean or replace the suction hose, and close the drain tap. Reinstall the tank top plate, replacing the gasket if necessary, and refill the tank to the correct level.

Structural Examination

A thorough examination of the machine should be carried out for signs of corrosion, misalignment, material fractures, and other damage. Particular attention should be given to the condition of welded joints.

Platform Mounting

Check that platform weldments are in good condition. Check that platform frame members are in good condition.

FOUR YEAR INTERVAL SERVICE

Pivot Pins and Bearings

Remove the pivot pins for examination. Check the pivot pin bearings with the pivot pins removed. Replace bearings as necessary. Pivot pins are treated with an oil absorbing, corrosion resistant coating. The bearings are steel backed, and copolymer lined. Replace with the correct type of pins and bearings.

DAILY OPERATIONAL CHECKLIST

All checks must be completed before operation of the Simon SKYHAWK.

DATE _____ **INSPECTED BY** _____

MODEL NUMBER _____ **SERIAL NUMBER** _____

GENERAL INFORMATION

1. Keep inspection records up-to-date.
2. Record and report all discrepancies to your supervisor.
3. A dirty machine cannot be properly inspected.
   Keep your Simon SKYHAWK clean!!

⚠ WARNING!!!

THIS CHECKLIST MUST BE USED DAILY. FAILURE TO DO SO COULD ENDANGER THE LIFE OF THE OPERATOR. ALWAYS REMEMBER, A LITTLE PREVENTIVE MAINTENANCE CAN SAVE MUCH MORE THAN IT COSTS.

INITIAL	DESCRIPTION
_____	1. Perform a visual inspection of all machine components, i.e. missing parts, torn or loose hoses, hydraulic oil leaks, torn or disconnected wires, damaged tires etc. Replace components as necessary. The module covers on both sides can be removed to inspect components inside.
_____	2. Check battery charge level and connections.
_____	3. Check hydraulic fluid level with platform fully lowered.
_____	4. Check tires for damage.
_____	5. Check hoses for worn areas.
_____	6. Check platform rails and safety chains for damage.
_____	7. Check pivot pins for security.
_____	8. Check that all warning and instructional labels are legible and secure.
_____	9. Check that hydraulic pressure is as stated on the data plate.
_____	10. Check controls for proper operation.
_____	11. With platform raised, check for the smooth operation of low speed drive.
_____	12. Check operation of emergency hand pump.

ADDITIONAL MAINTENANCE REQUIREMENTS FOR SEVERE USAGE APPLICATIONS

_____	13. Check hydraulic system for leakage after every eight hours of operation.

WEEKLY OPERATIONAL CHECKLIST

DATE _____ **INSPECTED BY** _____

MODEL NUMBER _____ **SERIAL NUMBER** _____

GENERAL INFORMATION

1. Keep inspection records up-to-date.
2. Record and report all discrepancies to your supervisor.
3. A dirty machine cannot be properly inspected.
   Keep your Simon SKYHAWK clean!!



THIS CHECKLIST MUST BE USED WEEKLY. FAILURE TO DO SO COULD ENDANGER THE LIFE OF THE OPERATOR. ALWAYS REMEMBER, A LITTLE PREVENTIVE MAINTENANCE CAN SAVE MUCH MORE THAN IT COSTS.

INITIAL	DESCRIPTION
_____	1. Perform all checks listed on Daily Operational Checklist.
_____	2. Check battery electrolyte level and specific gravity (fully charged specific gravity should be 1.265).
_____	3. Check wheel lug nuts for proper torque (75 ft. lbs.).

ADDITIONAL MAINTENANCE REQUIREMENTS FOR SEVERE USAGE APPLICATIONS

INITIAL	DESCRIPTION
_____	4. Inspect condition of hydraulic fluid. Oil should have a clear amber color.
_____	5. Lubricate all grease fittings.
_____	6. Lubricate all steering linkages and pivot points.

MONTHLY OPERATIONAL CHECKLIST

DATE _____ **INSPECTED BY** _____

MODEL NUMBER _____ **SERIAL NUMBER** _____

GENERAL INFORMATION

1. Keep inspection records up-to-date.
2. Record and report all discrepancies to your supervisor.
3. A dirty machine cannot be properly inspected.
   Keep your Simon SKYHAWK clean!!

⚠ WARNING!!!

THIS CHECKLIST MUST BE USED MONTHLY. FAILURE TO DO SO COULD ENDANGER THE LIFE OF THE OPERATOR. ALWAYS REMEMBER, A LITTLE PREVENTIVE MAINTENANCE CAN SAVE MUCH MORE THAN IT COSTS.

INITIAL	DESCRIPTION
_____	1. Perform all checks listed on Daily and Weekly Operational Checklists.
_____	2. Lubricate all grease fittings.
_____	3. Inspect condition of hydraulic fluid in the reservoir. Oil should have a clear amber color.
_____	4. Lubricate all steering linkages and pivot points.
_____	5. Inspect the entire machine for signs of damage, broken welds, improper or makeshift repairs..
_____	6. Check the electric motor brushes.
_____	7. Check all decals for legibility.
_____	8. Clean and lubricate all valve spool linkages.
_____	9. Check pin joints and retaining bolts for security.
_____	10. Check hydraulic system pressure.
_____	11. Check left and right spindles for free turning with no end play.
_____	12. Visually inspect power wheel mounting bolts. Bolts should be flush to retainer, with no gap between retainer and hub flange.

ADDITIONAL MAINTENANCE REQUIREMENTS FOR SEVERE USAGE APPLICATION

_____	13. Change hydraulic filter element.

SEMI - ANNUAL OPERATIONAL CHECKLIST

DATE _____ **INSPECTED BY** _____

MODEL NUMBER _____ **SERIAL NUMBER** _____

GENERAL INFORMATION

1. Keep inspection records up-to-date.
2. Record and report all discrepancies to your supervisor.
3. A dirty machine cannot be properly inspected.
   Keep your Simon SKYHAWK clean!!

⚠ WARNING!!!

THIS CHECKLIST MUST BE USED AT 6 MONTH INTERVALS. FAILURE TO DO SO COULD ENDANGER THE LIFE OF THE OPERATOR. ALWAYS REMEMBER, A LITTLE PREVENTIVE MAINTENANCE CAN SAVE MUCH MORE THAN IT COSTS.

INITIAL	DESCRIPTION
_____	1. Perform all checks listed on Daily, Weekly and Monthly Operational Checklists.
_____	2. Have hydraulic fluid sample analyzed at a test laboratory. Follow the recommendations of test results.

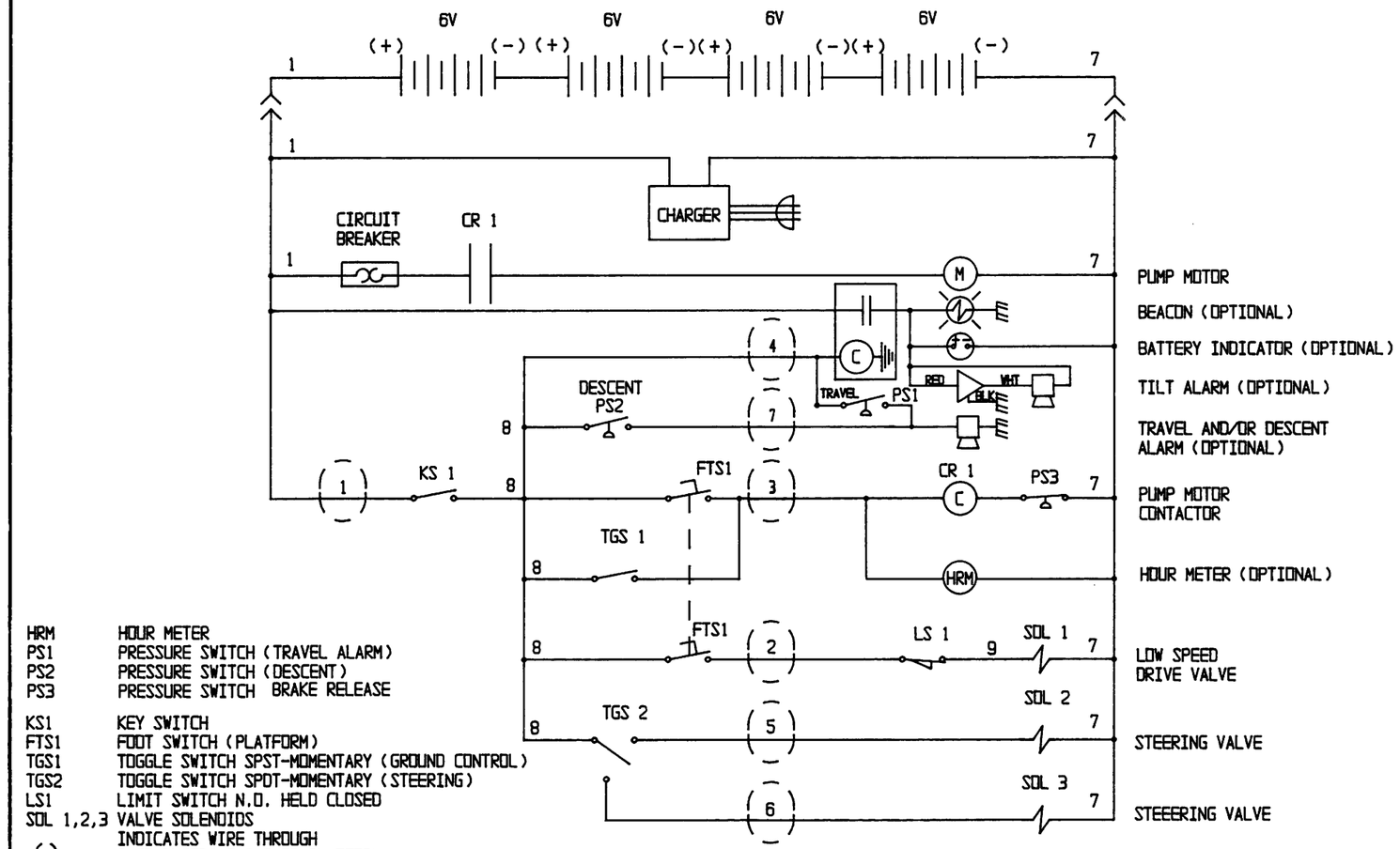
⚠ NOTE

If hydraulic fluid has been regularly maintained, it should only require changing once every year, depending on maintenance, temperature, application, duty cycle, and atmospheric conditions.

_____	3. Check tightness of upper frame and linkage pins.
_____	4. Check overall platform stability.
_____	5. Ensure that all switches operate freely in all positions.
_____	6. Check the electrical mounting and hardware connections for security.
_____	7. Replace return filter element.
_____	8. Repack front wheel bearings.

ELECTRICAL AND HYDRAULIC SCHEMATICS

ELECTRICAL SCHEMATIC FOOT SWITCH ..... REF. DWG. NO. SCS-212509-0
ELECTRICAL SCHEMATIC TOGGLE SWITCH ..... REF. DWG. NO. SCS-218169-0
HYDRAULIC SCHEMATIC (REV. D) ..... REF. DWG. NO. SDS-212414-0
HYDRAULIC SCHEMATIC (REV. G) ..... REF. DWG. NO. SDS-212414-0



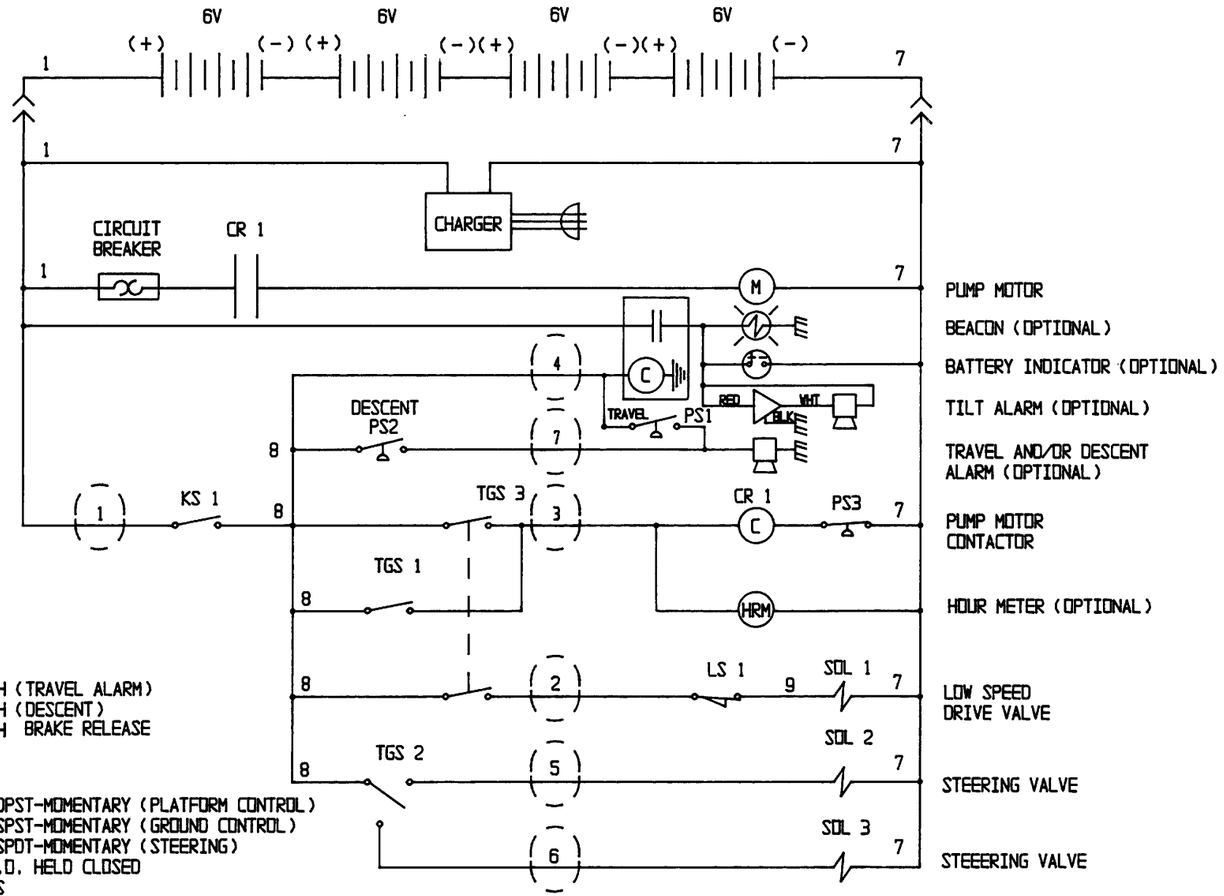
HRM	HOUR METER
PS1	PRESSURE SWITCH (TRAVEL ALARM)
PS2	PRESSURE SWITCH (DESCENT)
PS3	PRESSURE SWITCH BRAKE RELEASE
KS1	KEY SWITCH
FTS1	FOOT SWITCH (PLATFORM)
TGS1	TOGGLE SWITCH SPST-MOMENTARY (GROUND CONTROL)
TGS2	TOGGLE SWITCH SPDT-MOMENTARY (STEERING)
LS1	LIMIT SWITCH N.O. HELD CLOSED
SOL 1,2,3	VALVE SOLENOIDS
	INDICATES WIRE THROUGH
(X)	6 CONDUCTOR CABLE TO PLATFORM

	1 BLACK	COLOR CODE
	2 RED	
	3 BLUE	
(SPARE)	4 ORANGE	
	5 YELLOW	
	6 BROWN	

SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE
ELECTRICAL SCHEMATIC
SKYHAWK FOOT SWITCH

REVISION	DRWG. NO.
D 01-03-91	SCS-212509-0



HRM HOUR METER
PS1 PRESSURE SWITCH (TRAVEL ALARM)
PS2 PRESSURE SWITCH (DESCENT)
PS3 PRESSURE SWITCH BRAKE RELEASE

KS1 KEY SWITCH
TGS3 TOGGLE SWITCH DPST-MOMENTARY (PLATFORM CONTROL)
TGS1 TOGGLE SWITCH SPST-MOMENTARY (GROUND CONTROL)
TGS2 TOGGLE SWITCH SPDT-MOMENTARY (STEERING)
LS1 LIMIT SWITCH N.O. HELD CLOSED
SOL 1,2,3 VALVE SOLENOIDS
INDICATES WIRE THROUGH
(X) 6 CONDUCTOR CABLE TO PLATFORM

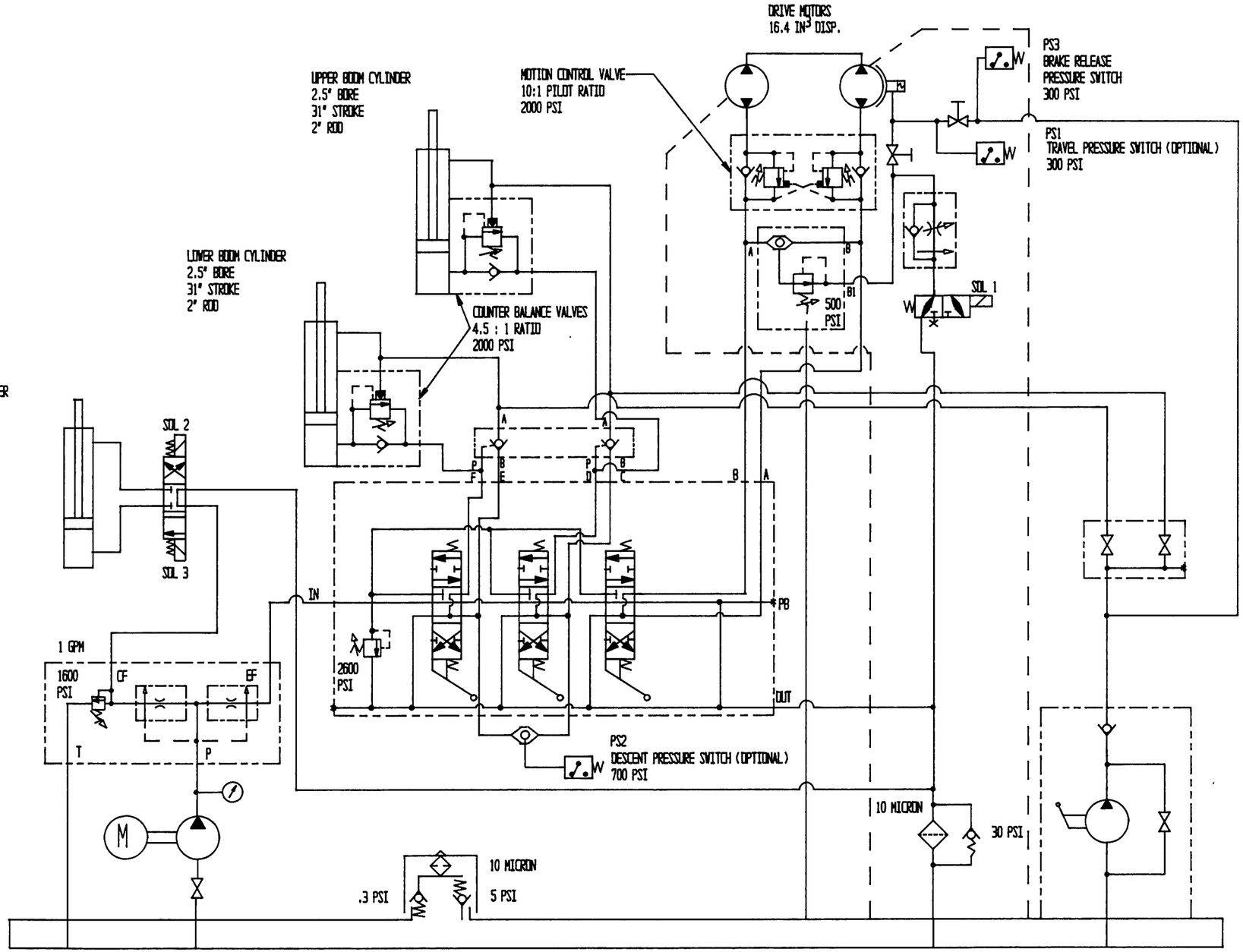
1 BLACK
2 RED
3 BLUE
(SPARE) 4 ORANGE
5 YELLOW
6 BROWN
COLOR CODE

SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE
ELECTRICAL SCHEMATIC
SKYHAWK TOGGLE SWITCH

REVISION

DRWG. NO.
SCS-218169-0

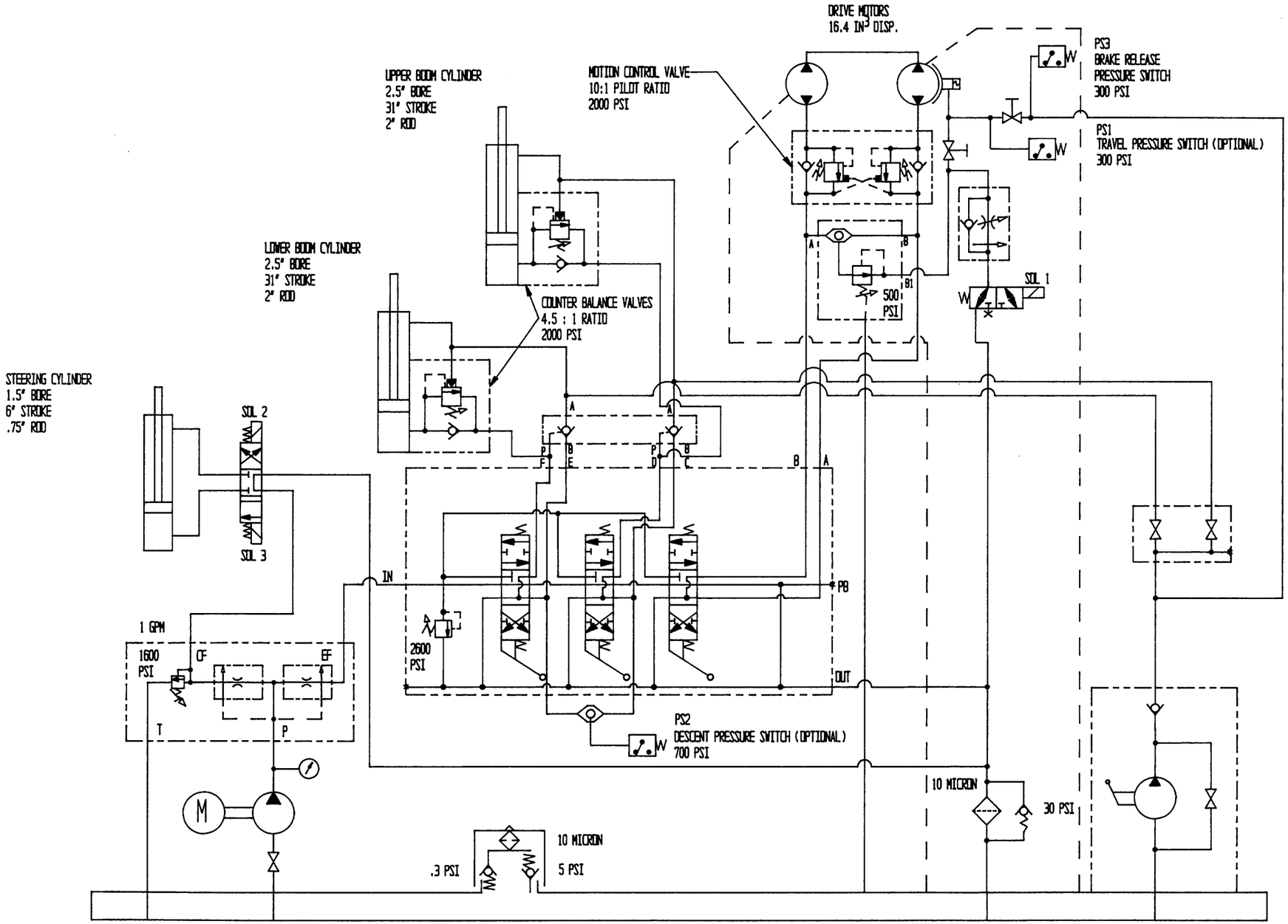


SIMON AERIALS INC.
MILWAUKEE, WI. 53224

TITLE: HYDRAULIC SCHEMATIC
SKYHAWK

REVISION: D 01-03-91

DWG. NO.: SDS-212414-0



FOR SINGLE PUMP MACHINES

SIMON AERIALS INC.
MILWAUKEE, WI. 53224

TITLE: HYDRAULIC SCHEMATIC
SKYHAWK

REVISION: G 10-25-91

DRWG. NO.: SDS-212414-0