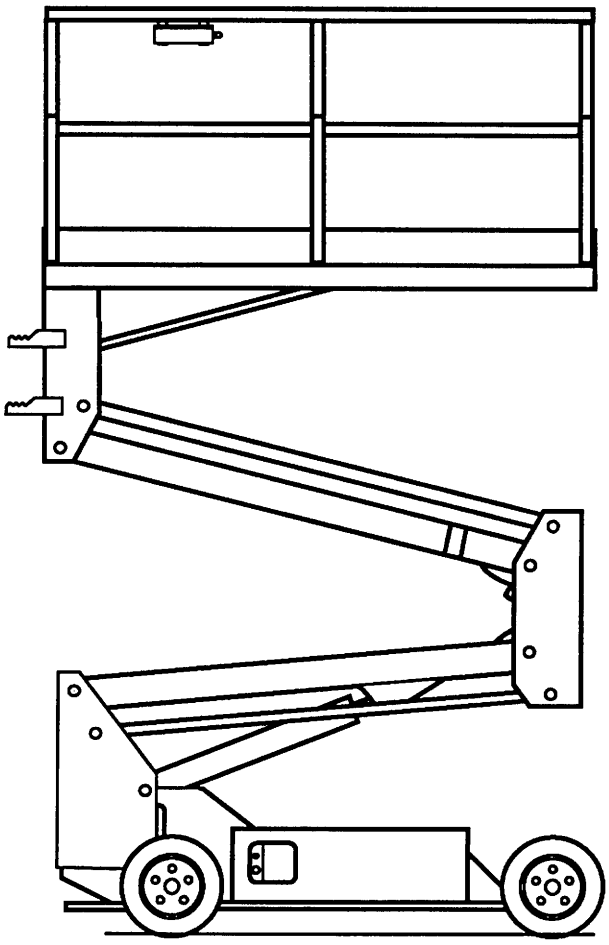
FALCON
2034
VERTICAL LIFT

SERVICE MANUAL

For Service Concerns Only:
Direct Phone Line to
Service Department,
8:00 AM to 5:00 PM
Central Time,
Monday thru Friday.

Phone (414) 355-3181



Part No. 89-750007 • Initial Issue, dated November, 1992 •

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INTRODUCTION

This Service Manual is designed to provide you with the instructions needed to properly maintain the SIMON AERIALS INC. FALCON 2034. When used in conjunction with the Operators and Parts manuals (provided separately) this Service Manual will assist you in making necessary adjustments or repairs.

Simon Aerial Veritcal Lifts are designed and built to provide many years of safe, dependable service. To obtain full benefits from your FALCON, 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 and Parts Manuals in order to gain a thorough understanding of the unit prior to making any repairs. Exercise all necessary safety precautions when performing maintenance not covered in this manual.

To help you recognize important safety information, we have identified warnings and instructions that directly impact on safety with the following signals:

⚠ DANGER

DANGER INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY.

⚠WARNING

WARNING INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY.

⚠ CAUTION

Caution indicates a potentially hazardous situation or alerts against unsafe practices. It is also used for "property damage only" hazards.

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 controls and platform control console.

⚠ DANGER

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

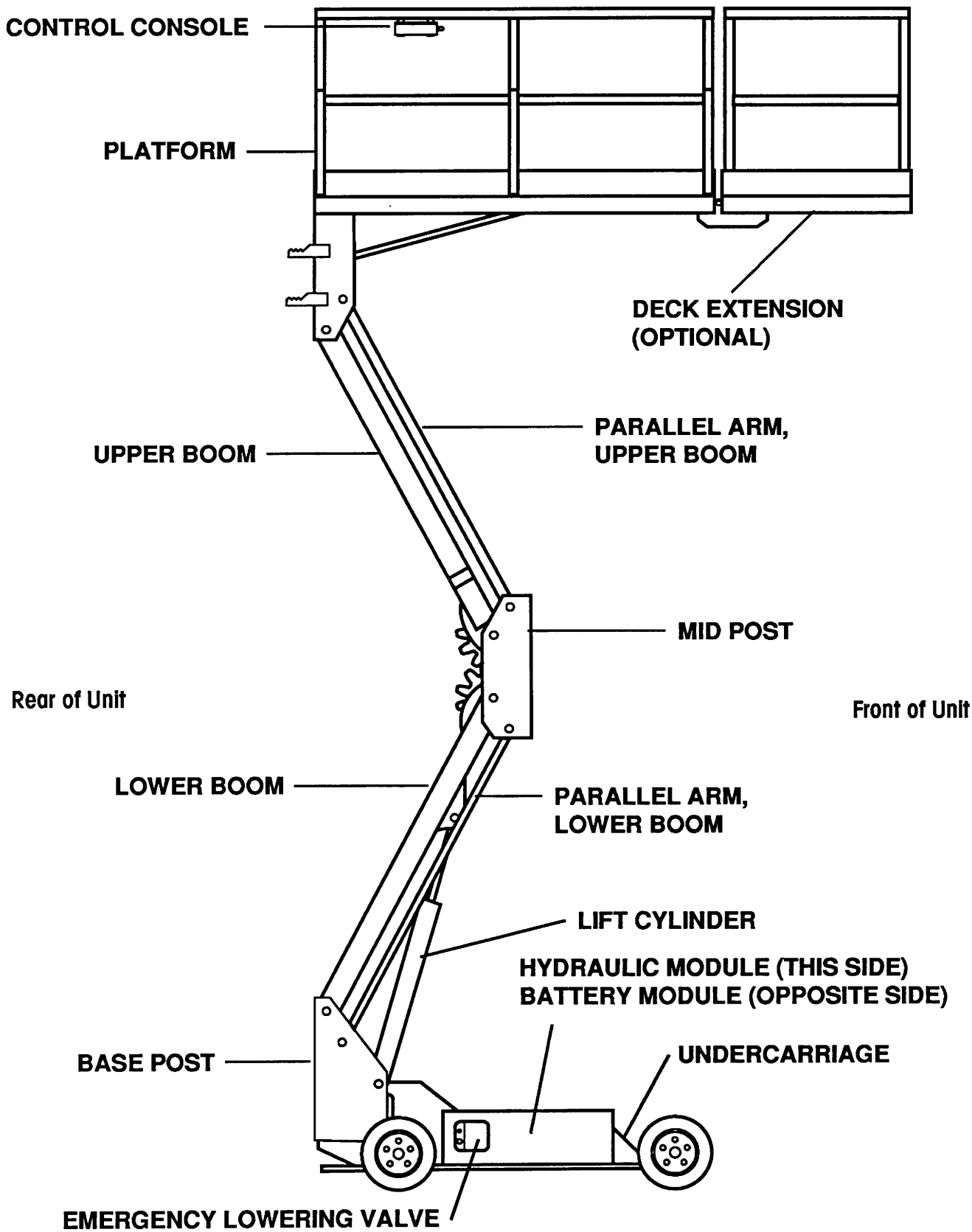
SIMON AERIALS INC. reserves the right to change, improve, modify or expand features of its equipment. Therefore, specifications, models or equipment are subject to change without notice, and without incurring obligations.

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.

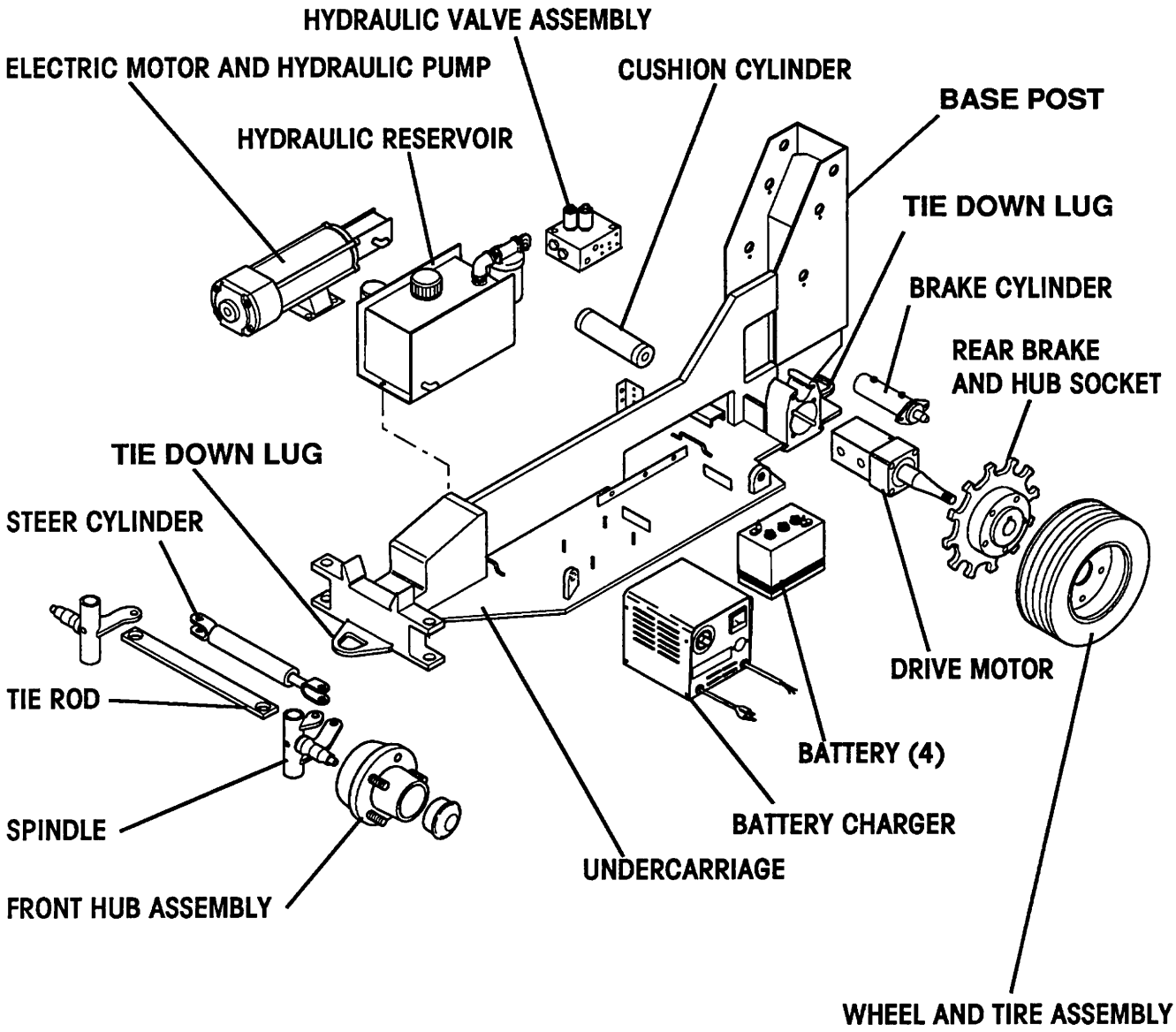
MACHINE SPECIFICATIONS

Working Height	**26 Ft/** 7.93 M
Platform Height	**20 Ft/** 6.10 M
Stowed Height:	
Guard Rails in Place	**89.6 In./** 2.28 M
Guard Rails Lowered	
WithStandard Deck	**75.2 In./** 1.91 M
With Optional Deck Extension	**78.0 In./** 1.98 M
Platform Capacity (unrestricted):	
With Standard Deck	**750 Lbs./** 340 Kg
With Optional Deck Extension	**650 Lbs./** 295 Kg
Deck Extension Capacity	**250 Lbs./** 115 KG
Platform Dimensions:	
With Standard Deck (or with Optional Deck Stowed)	**30.5 In. x 96 In./** 0.77 M x 2.44 M
With Optional Deck Extended	**30.5 In. x 128.5 In./** 0.77 M x 3.26 M
Length	
Without Optional Deck Extension	**96 In./** 2.44 M
With Optional Deck Extension	**100.2 In./** 2.54 M
Width	**34 In./** 0.86 M
Wheelbase	**66 In./** 1.67 M
Track	**28.6 In./** 0.73 M
Outside Turning Radius	**8 Ft 6 In./** 2.59 M
Inside Turning Radius	**3 Ft 5 In./** 1.04 M
Ground Clearance	**4 In./** 0.10 M
Gross Weight (approx.)	**3,200 Lbs./** 1,452 Kg
Travel Speed	
Platform Stowed	**2 MPH/** 3.2 KPH
Platform Elevated	**0.5 MPH/** 0.8 KPH
Gradeability (on Hard Surface)	**11.3°/** 20%
Tires (Solid Rubber)	**4" X 8" x 16" Solid/** 102 mm x 204 mm x 408 mm
Hydraulic Fluid Capacity	**4 Gal./** 15.1 Liter
Hydraulic Operating Pressure	**2600 PSI/** 179 BAR
Wheel Lug Nut Torque	**65-70 Ft Lbs./** 88-95 Nm
Power System	
Electric	**24 Volt DC** (Four 6 Volt, 220 AMP/ Hr. Lead-Acid Batteries in Series.)

PRIMARY MACHINE COMPONENTS



UNDERCARRIAGE COMPONENTS



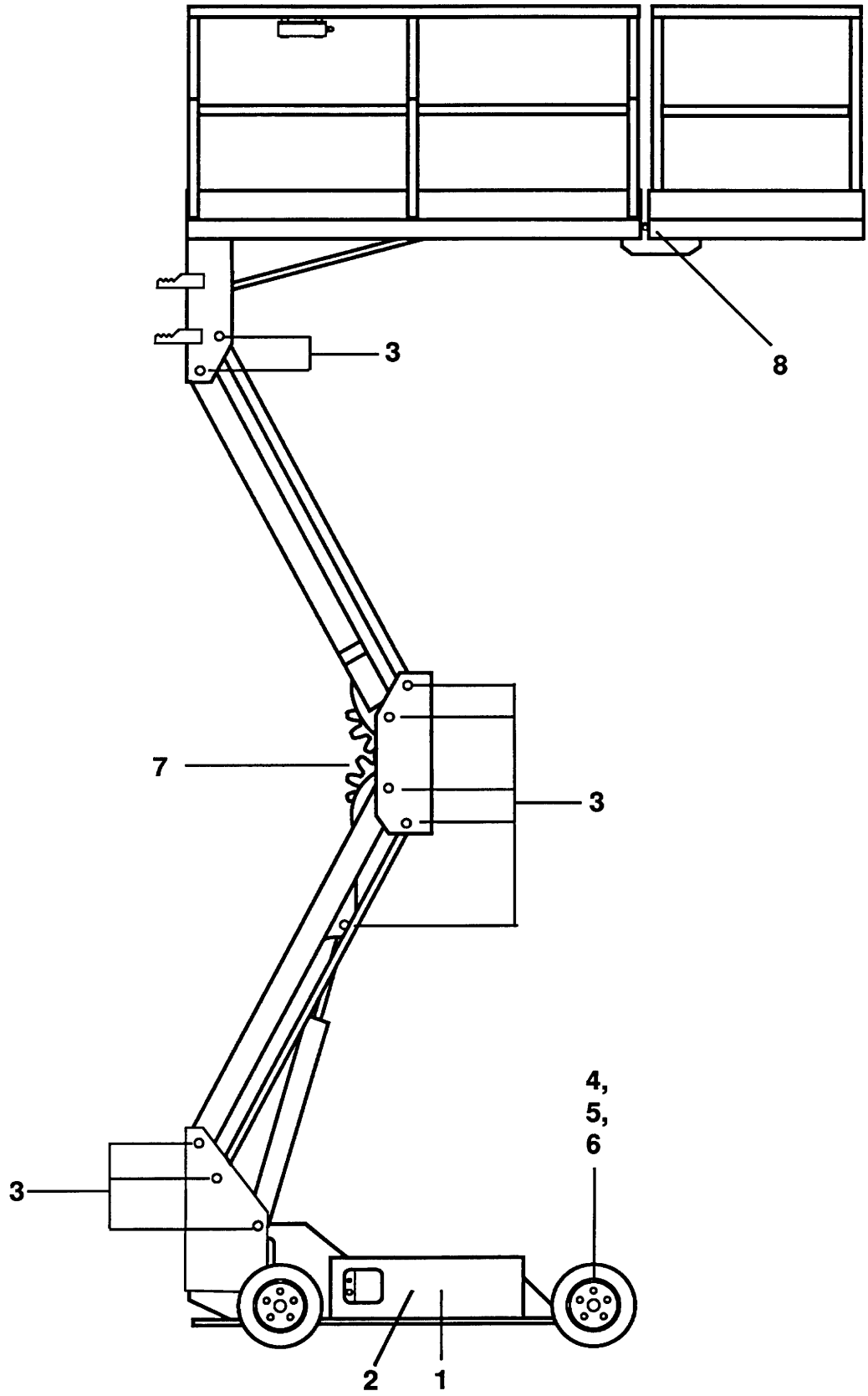
LUBRICATION CHART

NO.	ITEM	SPECIFICATION AND QUANTITY	FREQUENCY OF LUBRICATION
1.	Hydraulic reservoir	Mobil DTE-15 to 2" from top of tank with platform lowered.	Check daily, Analyze every 6 months or 500 hours.*† Change yearly or every 1,000 hours.*†
2.	Hydraulic return filter	Filter element.	Change every 6 months or 500 hours.*†
3.	Pivot pins	Mobilgrease Special or equivalent (NLGI #2 Lithium plus EP & Moly). Purge old grease.	Weekly or every 25 hours.*†
4.	Steering spindles	Lithium N.L.G.I. #2 EP. Purge old grease.	Monthly or every 100 hours.*†
5.	Steering hubs	Lithium N.L.G.I. #2 EP. Clean and repack.	Every 6 months or 500 hours.*
6.	Steering linkage	Silicone spray or penetrating oil.	Monthly or every 100 hours.*†
7.	Boom gears	"Keystone - Moly 29 Open Gear Compound". Coat gear faces.	Weekly or every 25 hours.*†
8.	Deck extension pivot pin	Silicone spray or penetrating oil.	Monthly or every 100 hours.*†

* Whichever occurs first.

† Different requirements for severe duty applications. See check lists.

LUBRICATION DIAGRAM



SECTION 1:
TRANSPORTATION
AND
EMERGENCY PROCEDURES

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TRANSPORTING THE UNIT

Platform should be in the stowed position when the unit is being transported. Do not raise the unit while it is being transported or towed.

TOWING OF THE FALCON 2034

If your FALCON is equipped with the TOW PACKAGE OPTION, it can be towed. MAXIMUM TOWING SPEED IS 6 MPH (9.6 KPH). The tow brake and motor release valves are located below the lift cylinder. To tow the unit:

- Fully close the brake release valve by turning the knob clockwise. Fully open the motor release valve by turning the knob counterclockwise.
- Momentarily operate the drive function to disengage the brake cylinder. The unit is now ready to tow.

To return to normal operation, fully open the brake release valve by turning the knob counterclockwise. Fully close the motor release valve by turning the knob clockwise.

⚠ CAUTION

Do not use tie down lugs to lift the FALCON.

FORK LIFTING OF THE FALCON 2034

- Lift the Simon FALCON 2034 from the sides only. Position forks under the modules, between the front and rear wheels and as near to the rear (driving) wheels as possible. Ensure that lift truck used has adequate capacity to lift the machine (see "Machine Specifications" for weight).

TRUCK TRANSPORT OF THE FALCON 2034

- The FALCON 2034 may be winched onto a transporting vehicle IF THE UNIT IS EQUIPPED WITH THE TOW PACKAGE OPTION. Return both tow valves to normal operating position (engaging the brake) when the unit is on the transporting vehicle.
- Always chock the wheels of the unit while on the transporting vehicle.
- Securely attach the machine to the transporting vehicle using the tie down lugs, located at the center front and center rear of the undercarriage. Ensure that chains or straps have adequate load capacity, and DO NOT OVERTIGHTEN.
- Disconnect negative battery cables for long distance transport.

UNLOADING PROCEDURES

- Inspect the outside of the unit for damage (including the underside). Inspect all hoses, boom sections and cables for chafing or road damage. Confirm that all wheel lug nuts are tight.

- Open both side compartments. Inspect all electrical and hydraulic connections for damage and security.

- Connect battery cables to batteries if required. Check electrolyte level.

- Check fluid level is 2" from the top of the hydraulic tank, and add fluid as required (see Lubrication Chart).

- Close side compartment covers.

- Attach the unit to a winch for the unloading procedure.

⚠WARNING

ALWAYS ATTACH THE UNIT TO A WINCH WHEN LOADING OR UNLOADING FROM A TRUCK OR TRAILER. WE DO NOT RECOMMEND UNASSISTED LOADING OR UNLOADING OF ANY MOBILE PLATFORM.

READ AND UNDERSTAND ALL SAFETY, CONTROL AND OPERATING INFORMATION FOUND ON THE MACHINE AND IN THIS MANUAL BEFORE OPERATING THE UNIT.

- Remove all machine tie downs. Remove wheel chocks.

- Enter the platform, and start the hydraulic motor using the platform controls. Select the "HIGH" speed, and test all platform functions.

- Carefully drive the unit off the truck or trailer with the assistance of a winch.

- Before placing the unit into service, all operators must read and understand the contents of the Operator's Manual.

  Upon initial unloading of the machine the Predelivery Inspection Report must be completed and returned in order to activate the Simon Limited Warranty.

  An Operator's Manual and a Predelivery Inspection Report are included with each machine leaving the factory.

EMERGENCY SYSTEM AND PROCEDURES

⚠ DANGER

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

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

THIS MACHINE IS NOT INSULATED AND EXTREME CARE MUST BE TAKEN WHEN WORKING AROUND POWER LINES.

DO NOT TOUCH THE UNIT IF THERE IS A CHANCE IT IS IN CONTACT WITH POWER LINES. WAIT UNTIL THE POWER TO THE LINES HAS BEEN SHUT OFF.

EMERGENCY LOWERING

⚠WARNING

ON EARLIER UNITS, DO NOT REMOVE THE VELOCITY FUSE WHILE THE PLATFORM IS RAISED.

- Remove wire #7 from the high speed valve. The high speed valve is located to the left of the emergency lowering valve inside and below the ground control opening.
- Hold the lift/ lower toggle in the "LIFT" position. The pump will run.
- Open the emergency lowering valve by pushing the knurled red "manual override" knob in. Turn knob counterclockwise approximately 180°, then release. The knob will pop out, you should hear pressure being relieved, and the platform will lower to the stowed position.

NOTE: Drive and steer functions should not be used when using the emergency lowering valve.

IMPORTANT: The emergency lowering system is designed to be used only for emergency descent.

- Once the platform has been fully lowered, close the emergency lowering valve. Push red knob in, turn clockwise approximately 180° and release. The knob will be held in by a detent.

NOTE: Platform will not elevate if this valve is open.

- Reconnect wire #7 to the high speed valve.
- **Report the incident to your supervisor immediately.**

EMERGENCY DRIVE

The emergency lowering system will not provide control or operation of the drive or steering functions. Should it be necessary to move the unit, see "Transporting the Unit", earlier in this section.

EMERGENCY PROCEDURES

It is not possible for us to foresee every emergency situation that could arise during operation of this machine. The following information describes three such emergency situations, and lists appropriate actions that can be taken.

When faced with an emergency, above all please remember:

- Stay calm.
- Think through the situation before operating the machine.
- Get help if necessary.

SITUATION ONE: Platform elevated, operator not incapacitated, but unit will not respond to control console.

⚠ DANGER

DO NOT TRY TO CLIMB DOWN THE BOOM ASSEMBLY.
SERIOUS INJURY MAY RESULT

POSSIBLE CONDITION:

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

CORRECTIVE ACTION

1. Hit the emergency stop button.
2. Contact an experienced operator to lower (and reposition, if necessary) the machine using the emergency lowering procedure.
3. **Report the incident to your supervisor immediately.**

SITUATION TWO: Unit elevated, with operator incapacitated at 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, or would be endangered if platform is moved, before attempting emergency lowering procedure.**
4. After establishing that the machine is not in contact with live power lines, lower the platform and reposition the unit, if necessary, using the emergency procedure.
5. Render first aid to the operator.

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

⚠ DANGER

DO NOT TOUCH UNIT !!!

ELECTROCUTION HAZARD!!!

CORRECTIVE ACTION

1. Have someone summon first aid or rescue squad.
2. Contact authorized personnel to disconnect power supply touching unit.
3. If operator is unconscious, check to see if he is in a pinned position, or would be endangered if platform is moved.
4. AFTER POWER IS CUT, use the emergency lowering procedure to bring platform with operator to a safe location to render first aid.

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

SECTION 2:
HYDRAULIC SYSTEM

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HYDRAULIC FLUID

HANDLING PRECAUTIONS

⚠WARNING

PERSONS IN REGULAR CONTACT WITH MINERAL-BASED HYDRAULIC FLUID 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, WITHIN A FEW HOURS, BY A DOCTOR FAMILIAR WITH THIS TYPE OF INJURY.

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), use of MOBIL DTE-13 or DTE-11 FLUID is satisfactory. For tropical climates use Mobile DTE-16.

HYDRAULIC FLUID ANALYSIS

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

- Any time the 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 contamination.
- Once every six months, under normal operating conditions.
- Every 3 months, in extremely dusty or dirty operating conditions.

The hydraulic fluid analysis must be done by a qualified laboratory. To ensure 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: pump failure, discoloration, etc.
- Type of analysis: complete to show additive breakdown, acid buildup, viscosity, type and percent of contaminants; also, comparison to new fluid and recommendations.

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

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

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

SYSTEM FLUSHING PROCEDURE

1. With platform fully down, drain hydraulic fluid from hydraulic tank into a clean, empty container. Use an oil filter cart so the fluid may be reused if analysis is good.
2. When the hydraulic tank is empty, remove suction hoses and return line hose.
3. Remove all hoses.
4. Flush the hoses.
5. Discard old return filter element and replace.
6. With hoses removed from the hydraulic tank, flush out the tank.
7. Reinstall all hoses removed in the previous steps.
8. If the hydraulic fluid removed from the reservoir is good, pump it through a filter cart back into the tank. If fluid is not usable, dispose of it properly. Fill hydraulic tank with filtered, fresh hydraulic fluid (refer to Lubrication Chart).
9. Loosen hose fittings at pump (and rod end of lift cylinder, if so equipped) to allow pump to flood with hydraulic fluid. Tighten fittings.
10. Start up the unit. Briefly operate all functions. Two or three full lift cycles may be necessary to purge all air from lift cylinder.
11. When the above procedures have been completed, fill hydraulic tank to full mark on sight gauge (if so equipped) or to within 2" from top of tank.
12. Check for leaks and correct as necessary. Unit is now ready to be placed back in operation.

HYDRAULIC SYSTEM COMPONENTS

HYDRAULIC FLUID RESERVOIR

The hydraulic fluid reservoir consists of the tank, a filler cap with strainer and breather, and a drain plug.

Perform the following steps on a weekly basis.

- Check tank for signs of leakage.
- Inspect tank securing bolts for tightness.
- Clean cap filter by flushing with clean water and dry.

HYDRAULIC PUMP

A 24 VOLT DC, 150 AMP permanent magnet motor rated at 4 HP (2.98 Kw)3600 RPM drives the two section gear pump. The pump provides hydraulic fluid flow to the functions. There are no adjustments on the pump.

CONTROL VALVE ASSEMBLY

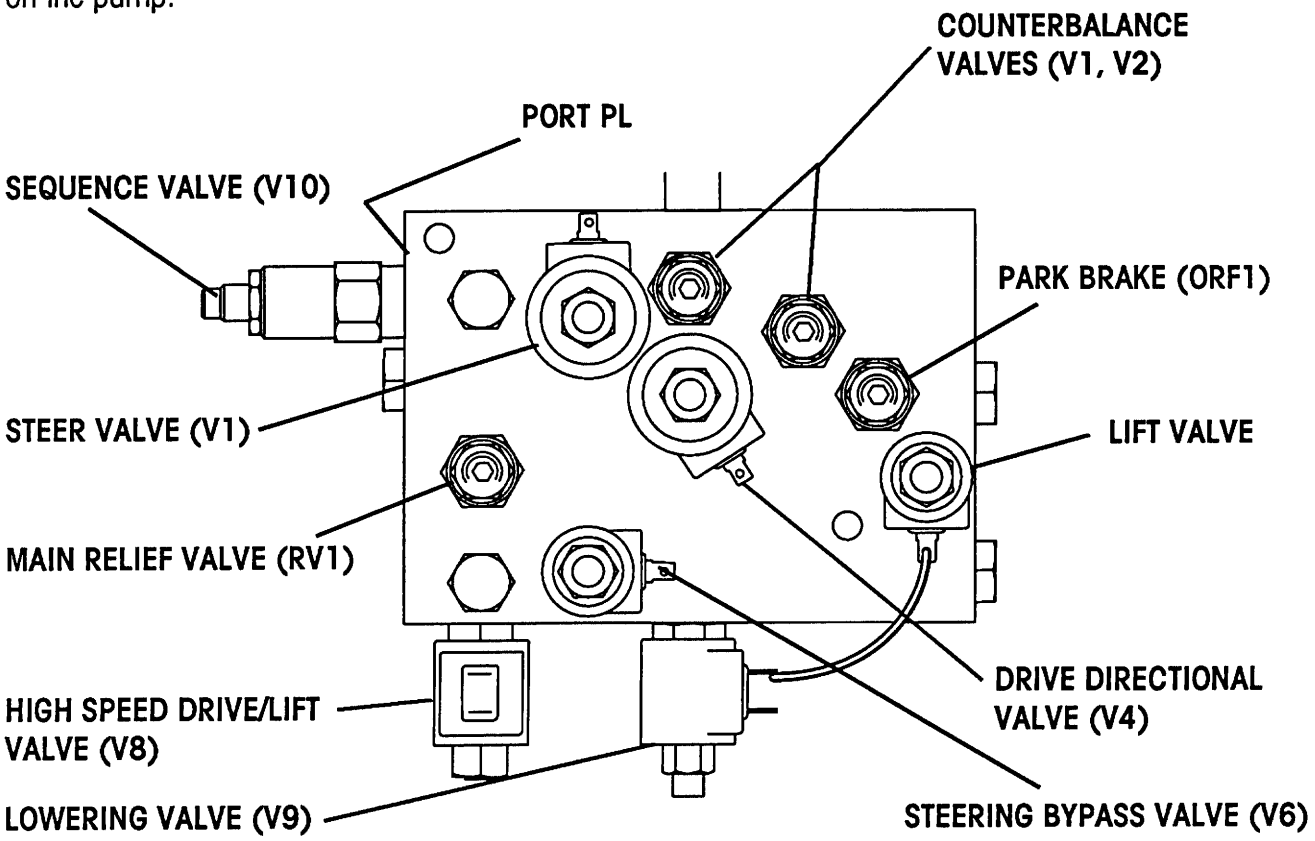
The control valve assembly is a combination valve which controls the hydraulic fluid flow from the pump to the functions. It consists of a valve block and various type of valves which are detailed in this section. Seal kits are available for all of the following valves.

MAIN RELIEF VALVE

This valve, located in port RV1 on the control valve assembly, is a differential area poppet relief valve. It is a screw-in, cartridge-style, direct-acting, spool type valve used as a pressure limiting device. The relief valve opens at 2600 psi, and is factory set.

To adjust the valve:

1. Install a pressure gauge in Port PL.



Control Valve Assembly

2. Loosen lock nut.

3. Lift the platform fully in low speed, while continuing to dead head lift, and use a hex key to adjust pressure. Backing out hex socket screw decreases pressure set to unlock valve.

4. Tighten lock nut.

SEQUENCE VALVE

This valve, located in port V10 on the control assembly, is an internal pilot and drain sequence valve. It is a screw-in, cartridge-style, direct-acting valve used to divert pressure to the drive circuit when the steer cylinder is fully extended. The sequence valve shifts at 1800 psi (on earlier units) and 2500 psi on later units. The valve is factory set.

To adjust the valve:

1. Install a pressure gauge in Port PL.

2. Loosen lock nut.

3. Steer fully in either direction, continuing to dead head steering, and use a hex key to adjust pressure. Backing out hex socket screw decreases pressure set to unlock valve.

4. Tighten lock nut.

STEER VALVE

This valve, located in socket V1 on the control assembly, is a solenoid-operated, 4-way, 3-position, tandem center valve. It is screw-in, cartridge-style, and direct-acting, for use to open and close flow to the steer cylinder. The steer valve opens when the steer toggle is pressed in either direction to allow steer right and left functions. There are no adjustments to this valve, but the solenoids can be replaced if it malfunctions.

STEER BYPASS VALVE

This valve, located in port V6 on the control assembly, is a solenoid-operated, 2-way, normally open valve. It is a screw-in, cartridge-style, and poppet valve used to allow hydraulic fluid to return to the reservoir when not steering. When steering, this valve remains open. When driving or lifting, this valve closes. There are no adjustments to this valve, but the solenoid can be replaced if it malfunctions.

DRIVE VALVE

This valve is located in port V4 on control assembly, is a solenoid-operated, 4-way, 3-position, motor spool valve. It is a screw-in, cartridge-style, and spool-type valve used to allow hydraulic fluid to drive rear hydraulic motors. When moving forward coil #1 is energized and coil #2 is de-energized. When moving in reverse coil #2 is energized and coil #1 is de-energized. It requires no adjustments, but solenoids can be replaced if they malfunction.

COUNTERBALANCE VALVES (DRIVE)

These identical valves are located in ports V2 and V3 on the control assembly. They are used for overrunning load control and hydraulic load locking, and restrain flow from the pump to prevent cavitation. They also function as deceleration controls when driving down hill, and act as a dynamic brake stopping the machine before the parking brake is applied. They are factory set at 200 psi pilot pressure and 2000 psi load induced pressure. Under normal use, this valve requires no adjustment. Consult with Simon Service, if necessary,

LIFT VALVE (NORMALLY CLOSED)

This valve, located in port V7 on the control assembly, is a solenoid-operated, 2-way, normally closed valve. It is a screw-in, cartridge-style, and piloted poppet valve. When lifting this valve is open. There are no adjustments to this valve, but the solenoid can be replaced if it malfunctions.

LIFT VALVE (NORMALLY OPEN)

This valve, located in port V9 on the control assembly, is a solenoid-operated, 2-way, normally open valve. It is screw-in, cartridge-style, and piloted poppet-type. When lifting, this valve is closed. This valve is equipped with a 100 mesh screen which may be cleaned. Located beneath ihis valve, in Port V9, is an orifice disc which controls the oil flow when lowering. There are no adjustments to this valve, but the solenoid can be replaced if it malfunctions.

BRAKE RELEASE SHUTTLE VALVE

This valve, located in port CV5 on the control assembly, is a variable orifice hydraulic flow control valve. It is a screw-in, cartridge-style valve with reverse flow check used to regulate hydraulic fluid flow from the brake cylinder, which sets the time it takes the brake cylinder to engage. To adjust this valve close it completely and then back off 1/2 turn.

HI SPEED VALVE

This valve, located in port V8 on the control assembly, is a solenoid-operated, 2-way, normally open valve. It is a screw-in, cartridge-style, poppet valve, fused to allow hydraulic fluid from the high speed inlet to be combined with the fluid from the low speed inlet. When at high speed, this valve is closed. There are no adjustments to this valve, but the solenoid can be replaced if it malfunctions.

CHECK VALVES

These valves are located at ports CV1, CV2, CV3, and CV4. Replacement seal kits for each are available.

LOWERING VALVE

This valve, located on the lift cylinder, is a solenoid-operated, 2-way, normally closed valve. It is a screw-in, cartridge-style, piloted poppet valve used to block hydraulic fluid flow as a load-holding device. This valve is equipped with a 100 mesh screen, which may be cleaned. There are no adjustments to this valve, but the solenoid can be replaced if it malfunctions. This valve has a manual release (red) button. When it is open, the cylinder will not lift.

⚠WARNING

When the manual release button is pressed, the platform will rapidly descend. Stand clear of unit.

VELOCITY FUSE

The velocity fuse, which is on the lift cylinder for early units only, allows for a gradual descent of the platform when lowering.

PRESSURE SWITCH

The pressure switch, located on the lift cylinder of later units (those that do not have a velocity fuse) detectshydraulic pressure (350 psi) as the platform is lowered so a gradual descent is achieved. There are no adjustments to this switch.

CYLINDERS

There are four (4) hydraulic cylinders in the Falcon 2034 circuit, including the steering, drive cushion, brake, and lift cylinders. On later units all cylinders are of the double acting type. On earlier units, all cylinders are of the double acting type except the lift cylinder, which is single acting type. Refer to the Mechanical Section of this manual for assembly and disassembly, repair or replacement procedures.

DRIVE MOTORS

There is a seal kit available if a drive motor leaks hydraulic fluid.

HYDRAULIC SYSTEM FUNCTIONAL DESCRIPTION

The two section hydraulic gear pump pulls fluid from the reservoir, and outputs it to the hydraulic valve assembly through both a high flow and low flow port.

The hydraulic pump only pumps while a function is being operated. When pressure builds up to 2600 psi, such as when a function is dead headed, the pressure relief valve triggers, returning hydraulic fluid back to the reservoir.

When the steering toggle is pressed on the control, the normally closed steer valve opens, allowing hydraulic fluid to flow to one of the steer ports for steer left or steer right. When the steer cylinder is fully extended, the sequence valve shifts at 1800 psi to allow hydraulic fluid to flow to the drive circuit or return to the reservoir.

When the drive toggle is pressed on the control, the normally closed drive valve opens and the steer bypass valve closes, allowing hydraulic fluid to flow to the two drive motors which propel the Falcon 2034 forward or reverse. The valve has two solenoids: one for forward movement and the other for reverse movement. If high speed is selected on the control, the high speed valve closes and additional fluid flow goes to the drive motors via the high flow inlet. The counter balance valves perform three functions: they keep the drive motors from over running when driving down hill, slowing the machine; they act as a dynamic brake when stopping, stopping the machine before the parking brake engages; and, they act as a parking brake until an induced load of 2000 psi is reached. The cushion cylinder evens the acceleration and deceleration in the drive circuit, providing smoother starts and stops. The brake release shuttle valve directs fluid flow to the brake cylinder, releasing it, which functions as a parking brake, arresting motion while the unit is parked.

When the lift toggle is activated, the platform rises as both the lift valves (normally open and normally closed) are energized, and the steer bypass valve closes, allowing fluid to flow to the lift cylinder. When high speed is selected, the high speed valve closes, allowing additional hydraulic flow from the high flow port, which raises the platform at a faster rate. When the platform is lowered the pump does not operate. The normally closed holding valve is energized to permit fluid to return to the reservoir through the lift valve with the orifice disc which controls the rate of descent. (On the early units, the velocity fuse functions similar to the holding valve.)

SECTION 3:
ELECTRICAL SYSTEM

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ELECTRICAL SYSTEM

The following section is a description of maintenance for the major components of the Falcon 2034 electrical system.

BATTERY

Four 6 volt batteries supply the electrical current required to operate the electrical circuits for the Falcon 2034.

BATTERY MAINTENANCE (IN STORAGE)

Follow these procedures for maintenance of batteries on a machine not in use:

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, because 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 battery and surrounding area 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 battery clean. Wash the top of the battery, 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 battery if there is an accumulation of acid.

BATTERY PREVENTIVE MAINTENANCE

Once a month, after battery has been charged, spot check the specific gravity of two or more cells. A fully charged battery should indicate 1.28 specific gravity. If low readings are noted, check the following:

- 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.

Always disconnect the negative battery cables first.

Remove bolts holding battery to undercarriage.

Lift the batteries from the undercarriage. Put the batteries to the side and dispose of properly.

⚠ CAUTION

Always connect the positive battery cable first.

To install batteries lift and position them on undercarriage. Secure batteries in position with wing nuts and battery hold downs. Connect battery cables.

BATTERY CHARGER

The battery charger supplied with the Falcon 2034 is designed to recharge deep-cycle, lead-acid batteries. It is a highly reliable unit with a minimum of moving parts.

To operate, connect the power supply cord to a 115 volt, 60 hertz outlet. Set the charging timer. 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.

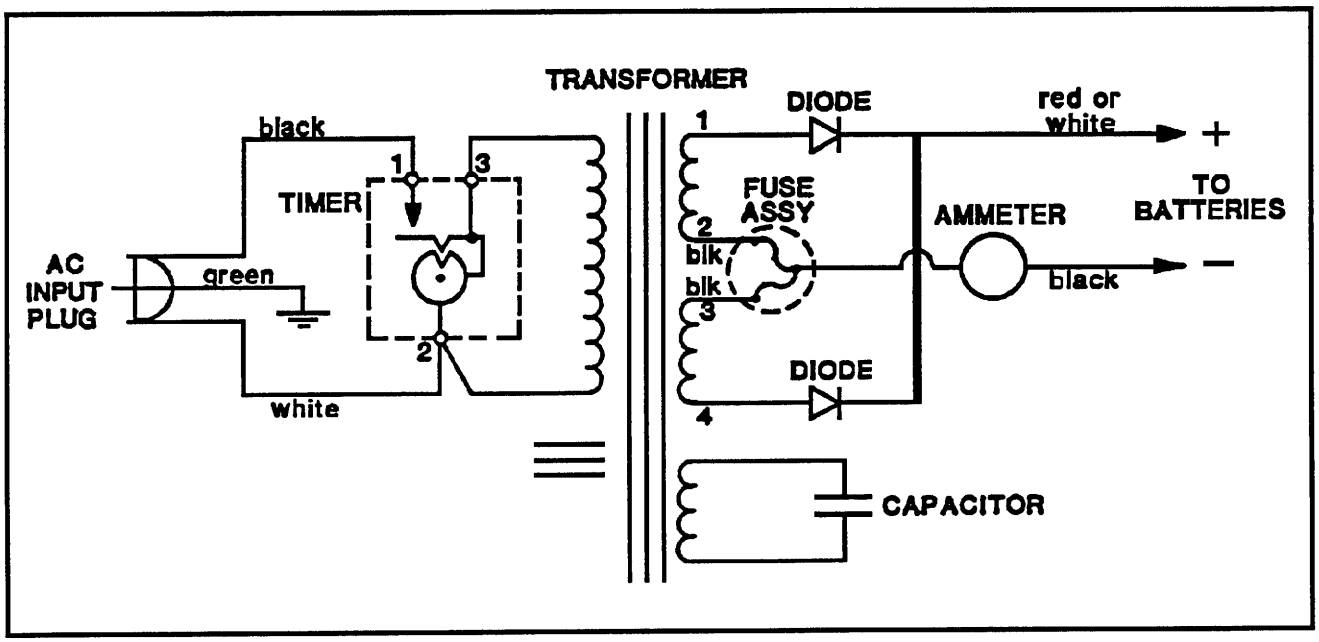
BATTERY CHARGER TROUBLESHOOTING

⚠WARNING

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

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

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.



Battery Charger Schematic

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

NO TRANSFORMER HUM AND AMMETER DOES NOT REGISTER

In the event no hum is detected from the transformer, check the AC cord to be sure it is securely plugged into a live AC outlet. If the cord connection is secure and still no hum is noticed, a continuity test of the AC circuit is necessary. Turn the timer to "ON" and with a suitable continuity tester, check circuit across the AC plug prongs. Circuit should be complete. If not complete, individually check the AC cord, timer, primary transformer coil and all connections.

TRANSFORMER HUMS BUT NO AMMETER INDICATION

Inspect the charger DC output connection to the batteries and also check to ensure that the batteries are connected properly. If there is still no ammeter indication, a continuity test of the charger DC circuit must be performed. Turn the timer to "OFF" and disconnect the AC and DC plugs. Perform the following tests, using a low voltage test light, to check the continuity of the DC circuit.

- Connect tester clip to negative (-) blade and probe to positive (+) blade. Circuit should be complete. If not complete, first check the DC fuse link. If one or both fuses have blown, the link will be broken and usually the clear plastic fuse cover will be discolored. Refer to "Fuse Link Blows" for test procedures. If fuses are good, individually check the fuse connections, DC cord, and diode connections (each may be checked with the continuity test light).

- If the circuit is complete, reverse test light leads. Circuit should not be complete. If circuit is complete, check DC cord for a "short" between the two wires. More probably, one or both diodes have "shorted". Refer to "Fuse Link Blows", second bullet, for continuity test of diodes.

- If the preceding two checks are good, assume the capacitor is shorted. Remove one wire from a capacitor terminal and place continuity tester clip to one terminal and probe to other. If circuit is complete, capacitor is "shorted" and must be replaced.

CHARGER DC FUSE LINK(S) BLOWS

This condition may be caused by:

- Reverse polarity between charger and batteries, such as incorrect installation of batteries, wiring of DC connector or charger plug.

- A short circuit failure of one or both diodes. First disconnect one diode. Using a low voltage continuity tester, check each diode. Then reverse the tester leads and check each diode again. If the diode conducts current in both directions the diode is shorted and must be replaced. Replace either the entire heat-sink assembly or the defective diode. When replacing a single diode, be sure the new diode is pressed squarely into the hold and that it does not extend beyond the rear surface of the heat sink plate.

- If the two preceding checks fail to reveal the malfunction, check wiring of both charger and battery connections against their respective wiring diagrams.

CHARGER OUTPUT IS LOW

The most probable cause is one diode shorting and blowing one fuse. Refer to "Fuse Link Blows", second bullet to check the diodes. If a diode is shorted both the defective diode/heat sink and the defective fuse assembly must be replaced.

CHARGER DOES NOT TURN OFF

This is caused by an inoperative timer. Replace timer assembly.

AC LINE FUSE OR CIRCUIT BREAKER BLOWS

If this occurs when charger is turned on without being plugged into the vehicle, the AC cord, timer motor coil, or the transformer may be shorted. To check the AC cord, ensure that the timer is "OFF" and connect the continuity tester across the AC plug prongs. If circuit is complete, the AC cord is shorted and must be replaced. To check the timer motor coil, disconnect one of the timer motor wires and connect continuity tester to the motor coil leads. If the lamp glows, the coil is shorted. To test the transformer, first disconnect all the secondary leads to the diodes. Then reconnect the AC cord and turn timer "ON". If the AC fuse or circuit breaker still blows, the transformer is probably shorted internally and must be replaced.

MOVEMENT ALARM (OPTIONAL)

The movement alarm is activated as soon as the platform console drive toggle is moved off the center "Neutral" position.

⚠WARNING

THE MOVEMENT ALARM IS PROVIDED FOR YOUR PROTECTION, AND THE PROTECTION OF PERSONS WORKING IN THE IMMEDIATE AREA. DISABLING THIS IMPORTANT SAFETY DEVICE MAY RESULT IN DEATH OR SERIOUS INJURY.

The movement alarm is supported by a weldment above the hydraulic pump. To replace it, remove the movement alarm from the weldment and disconnect the wires.

TILT ALARM (OPTIONAL)

The tilt alarm gives an audible warning when the machine is five degrees or more out of level. It is supported by a weldment above the hydraulic pump. To replace the tilt alarm, remove it from the support and disconnect the wires.

TILT ALARM TEST

The alarm can be tested by manually tipping the alarm sensor. This "Push-to-Test" feature enables tilt alarm to be tested without losing its adjustment.

Individually push down on each of the three fastened corners of the tilt alarm. There should be enough travel to cause the alarm to sound as each corner is pressed (there is approximately a three second delay).

If the alarm does not sound, the flange nuts have been tightened too far. Loosen the nut on the 90° corner and repeat this test procedure.

TILT ALARM ADJUSTMENT

The tilt alarm can be adjusted. Before attempting to adjust the alarm, park the machine on a flat, level surface.

Level the base of the alarm by tightening each of the three flange nuts to take up approximately one half of its spring's travel. During the remainder of the adjustment procedure, DO NOT ADJUST THE NUT ON THE 90° CORNER.

Check to be sure the electrical connections are correct. Slowly tighten the nut on one of the two corners ADJACENT to the 90° corner until the light-emitting diode (LED) just turns on, indicating that the circuit is closed. Note the position of the nut.

Loosen the nut (LED will go out), carefully counting the number and fraction of turns until the LED lights up again. Divide that number by two and tighten the nut by this number of turns.

Adjust the nut on the OTHER corner adjacent to the 90° corner in the same manner. The alarm is now level, to the degree of accuracy determined by the nut adjustments and the surface on which the machine is sitting. Test the tilt alarm for proper function.

DESCENT ALARM (OPTIONAL)

The descent alarm gives an audible warning when the platform is being lowered. It is supported by a weldment on the hydraulic module. To replace the descent alarm, remove it from the support and disconnect the wires.

AUTOMATIC WARNING BEACON (OPTIONAL)

The optional warning beacon has a rotating reflector with an amber light. The beacon activates whenever thekey is on. During drive or lift, when the emergency stop button is pressed, the beacon deactivates.

RELAYS

There are relays located in the hydraulic module. (Refer to the schematic at the end of this manual for relay functions and interconnect.)

EMERGENCY STOP BUTTON

There is an emergency stop button on the control console.

When the emergency stop button is pressed, all functions stop immediately and the wheel brake is automatically applied. Turn the button clockwise to reset.

To replace the emergency stop button, remove the four control console cover screws to gain access for button removal. Remove the appropriate button mounting screws and wires.

SECTION 4:
MECHANICAL COMPONENTS

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MECHANICAL COMPONENTS

Following is a description of the major mechanical components of the Falcon 2034.

UNDERCARRIAGE

Two removable covers are used to protect the items mounted on the undercarriage.

⚠ CAUTION

When steam cleaning the undercarriage, cover the battery charger and other electrical components, to prevent water damage.

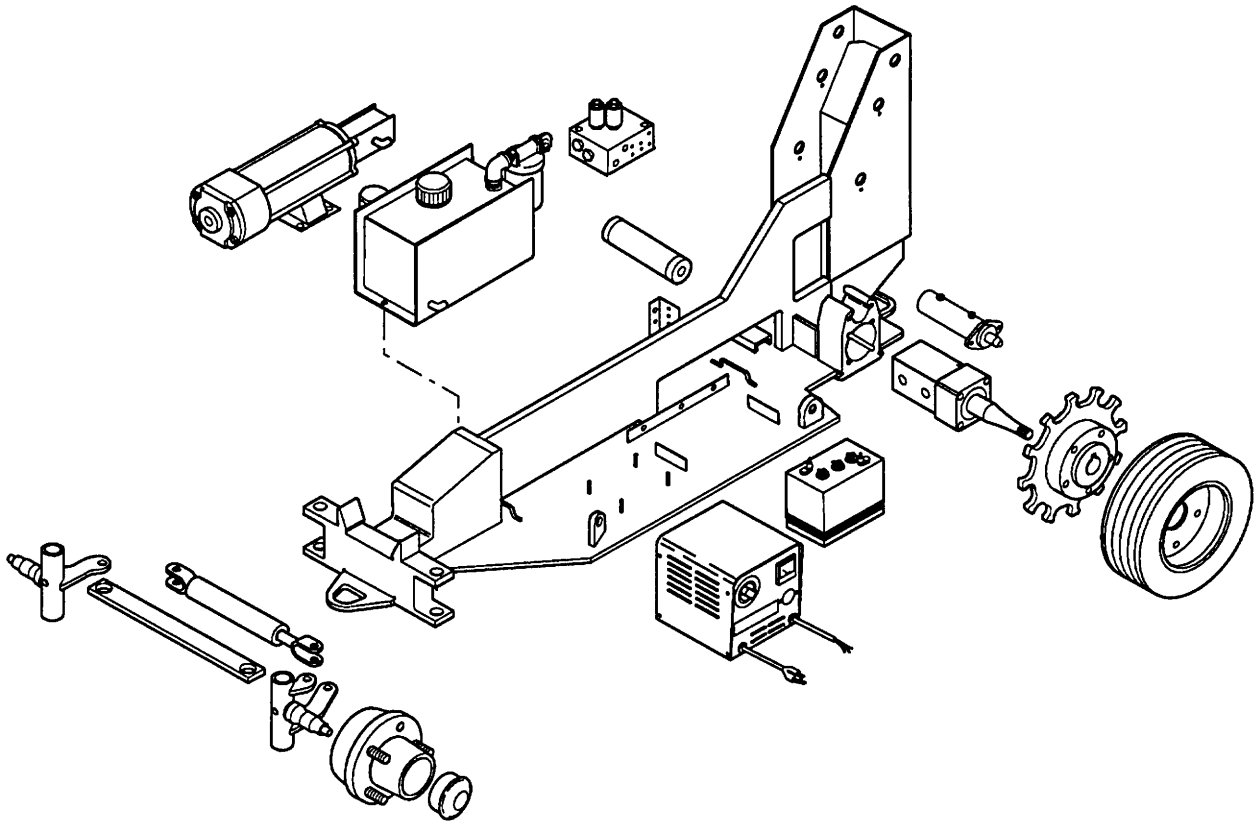
Steam clean the undercarriage once a year, and inspect all welds and brackets. Check for cylinder pins that turn in their mountings, which will indicate sheared pin lock pins.

TIRES

The Falcon 2034 uses 8" x 4" (204 mm x 102 mm) solid rubber tires with 3.75" split rims. Inspect tires for cuts, chunking, sidewall damage or abnormal wear. Any tire faults MUST BE CORRECTED before further machine operation.

CHANGING TIRES

When a tire change is necessary, ALWAYS BLOCK THE WHEELS before you raise the machine. Loosen and remove lug nuts (bolts on rear tires), and pull off the wheel. nstall the replacement wheel. Fasten lug nuts or bolts, and tighten to proper torque (see Machine Specifications). Lower the machine and remove the blocks.



Components Found on the Undercarriage.

WHEELS AND LUG NUTS

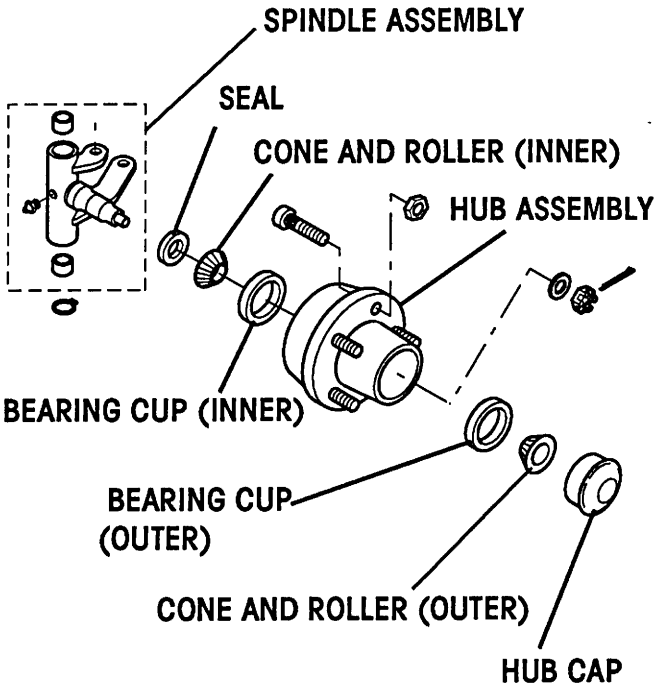
Check the torque of the wheel lug nuts or bolts (see Machine Specification for proper torque) and examine the split wheel rims for tightness and damage.

FRONT HUB ASSEMBLY

The front hub assemblies for the right and left side are identical, but should not be interchanged. Each consists of an inner and outer cup bearing, a wheel mounting stud, seal, and inner and outer cone and roller bearing, as well as associated hardware.

REPACKING FRONT WHEEL BEARINGS

1. Block the rear tires and raise the front end of undercarriage.
2. Remove front wheels.
3. Remove hub cap.
4. Remove cotterpin, 3/4"-16 castle nut and flat washer from each hub assembly.



Front Hub Assembly.

5. Pull the front hub assembly from the spindle assembly.
6. Remove the seal, and the inner and outer cone and roller bearings.
7. Inspect the inner and outer bearing cups for wear. If they are excessively worn or damaged, replace the appropriate front hub assembly.
8. Thoroughly clean the inner and outer cone and roller bearings. Inspect them for signs of wear. If they are excessively worn or damaged, replace the front hub assembly.
9. Pack the inner and outer cone and roller bearings with grease. (Refer to lubrication chart, earlier in this manual.)
10. Assemble the front hub and install it on the spindle assembly.
11. Replace the wheels and tighten to proper torque. (Refer to "Machine Specifications".)

DRIVE MOTORS

The drive motors are not field repairable. If they are leaking or damaged, replace them.

STEER CYLINDER SEAL REPLACEMENT

The steer cylinder is of the double acting type. During operation, the cylinder should not leak, but a slight dampness at the rod seal is acceptable. The pins should be checked for wear.

1. Disconnect and plug the two hydraulic hoses.

⚠ CAUTION

To prevent damaging the internal components of the steer cylinder, keep the hydraulic hose ends free from contamination.

Take care not to damage rod surface and guard against dirt entering system.

2. Take the steer cylinder from the undercarriage by removing the two pins that hold it in place.
3. Remove rod gland.
4. Remove cylinder rod and piston.
5. Replace seals.
6. Carefully, slide the cylinder rod and piston into the cylinder body assembly.
7. Secure the rod gland in place.
8. Secure the steer cylinder in place with the two pins.
9. Unplug and reconnect the two hydraulic hoses.

BRAKE CYLINDER SEAL REPLACEMENT

The brake cylinder is of the double acting type. The rod is extended by an internal spring, and retracted hydraulically. During operation, the cylinder should not leak, but a slight dampness at the rod seal - is acceptable.

1. Disconnect and plug the two hydraulic hoses.

⚠ CAUTION

To prevent damaging the internal components of the brake cylinder, keep the hydraulic hose ends free from contamination.

Take care not to damage the rod surface and guard against dirt entering the system.

2. Take off the brake cylinder from undercarriage by removing the two bolts that hold it in place.
3. Remove gland nut. (Internal spring may be under tension.)
4. Remove cylinder rod, spring and piston.
5. Inspect spring for damage.
6. Replace seals.
7. Carefully, slide the cylinder rod sprinf, and piston into the cylinder body assembly.
8. Secure the gland nut in place.
9. Secure the brake cylinder in place with the two bolts.
10. Unplug and reconnect the two hydraulic hoses.

HOSES AND CABLES

Inspect all hoses and electrical cables for security and damage. Cables and hoses should be examined for rubbing and chafing. Check for leaks at fittings. REPLACE ANY DAMAGED HOSES OR CABLES.

BOOM

Clean the boom once a year and inspect along the boom structure, especially all welds and brackets.

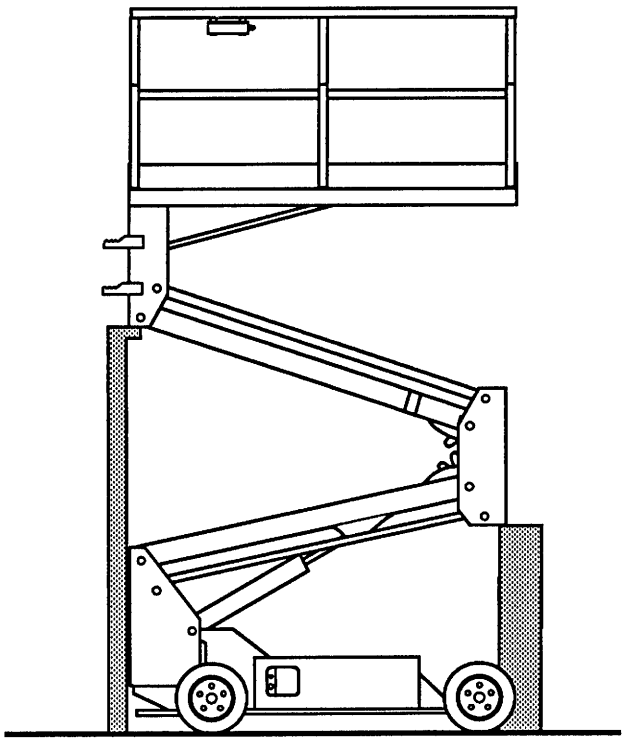
BOOM LIFT CYLINDER

The boom lift cylinder is of the single acting type for the earlier units and double acting type for later units. During operation, the cylinder should not leak, but a slight dampness at the rod seal - is acceptable. The pins should be checked for wear. Check the pin locking bolts for tightness. The cylinder and holding valve should be inspected for fluid leakage, damage and security.

BOOM LIFT CYLINDER REMOVAL

1. Support the booms.

IMPORTANT: When performing repairs to the cylinder, the must be supported at both the front and rear ends. Install blocking to support mid and upper posts. Support should be positioned so that the lower parallel arm does not interfere with support when pin is removed to lower parallel arm. Supports should be capable of holding 2,500 lbs.



Supporting the Boom.

⚠WARNING

MID POST SHOULD BE LOWERED ONTO SUPPORT UNTIL POSITIVE CONTACT IS MADE, BUT NOT TO A POINT THAT THE STEER TIRES LOSE CONTACT WITH THE GROUND.

2. Remove sheet metal covers from both sides of undercarriage.

3. Disconnect and plug the hydraulic hoses.

⚠ CAUTION

To prevent damaging internal components of boom lift cylinder, keep hydraulic hose ends free from contamination.

4. Disconnect the valve and pressure switch wire.

5. Remove the cylinder base pin.

6. Remove the front lower parallel arm pin, supporting the arm to eliminate the weight on the cylinder.

7. Support the cylinder and remove the cylinder rod end pin.

8. Remove the cylinder.

BOOM LIFT CYLINDER REPLACEMENT

1. Carefully position the new cylinder in the machine with the holding valve and hose connections (velocity fuse, earlier units) facing downward.

2. Connect the base end of cylinder to the machine by reinstalling the pin and all retainers.

3. Support the rod end of the cylinder and reconnect the hoses and wires to the cylinder.

4. Use the controls to extend or retract the cylinder to align the cylinder so the rod end pin can be installed. Install the pin and retainers.

5. Reconnect the lower parallel arm and retainers.

6. Use plastic wire ties to fasten the hose to the cylinder as it was prior to this installation.

7. Grease both ends of the cylinder at the two (2) grease fittings.

8. Raise the platform with the lower controls and remove any blocking, straps, or chains which were used to support the platform.

9. For later units, raise and lower the platform several times to confirm correct operation and purge all air from the cylinder. Initially, there may be a hesitation due to the presence of air in the cylinder.

   For earlier units (single acting type cylinder) bleed air from cylinder using plug near rod end of cylinder. Open plug carefully, about 1-1/2 turns. Raise cylinder slightly until clear fluid leaks out. Tighten plug.

BOOM LIFT CYLINCER SEAL REPLACEMENT

1. Remove lift cylinder.

⚠ CAUTION

Take care not to damage the rod surface and guard against dirt entering the system.

2. Remove end gland from lift cylinder.

3. Remove cylinder shaft and piston.

4. Remove seals.

5. Replace boom lift cylinder seals.

6. Replace cylinder shaft and piston.

7. Secure end gland to lift cylinder.

8. Replace boom lift cylinder in the unit.

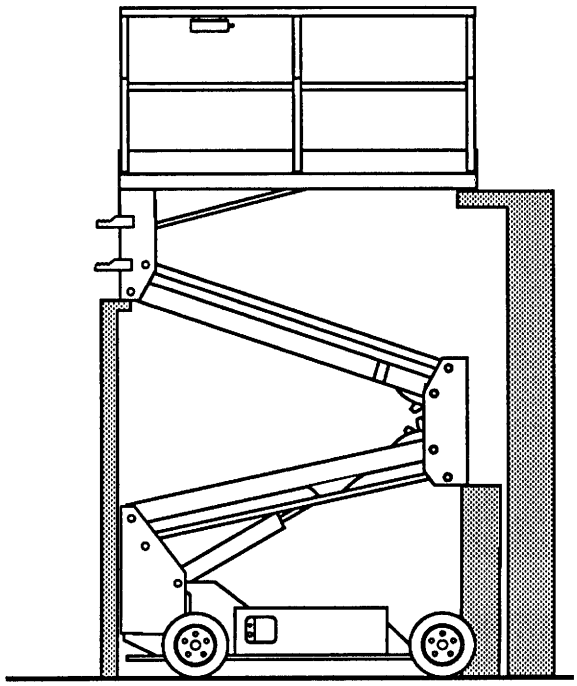
BOOM AND PARALLEL ARM PIVOT PIN REPLACEMENT

Pivot pin removal from the boom is required if they are worn or damaged.

1. Support boom.

   - If replacing pivot pins on the mid post, have the unit fully lowered. No need for support but chock the tires.

   - If replacing pivot pins on upper or lower posts, support the unit as shown in following illustration, and chock tires.



Supporting the Boom.

⚠ WARNING

MID POST SHOULD BE LOWERED ONTO SUPPORT UNTIL POSITIVE CONTACT IS MADE, BUT NOT TO A POINT THAT THE STEER TIRES LOSE CONTACT WITH THE GROUND. RAISE THE FRONT PLATFORM SUPPORT LAST UNTIL POSITIVE CONTACT IS MADE WITH THE PLATFORM BASE.

2. Remove retaining rings and lock pin.

3. Remove the boom pivot pin.

4. Lubricate the new boom pin with a light grade of oil, and slide it in place.

5. Replace retaining rings and lock pin.

6. Grease the bearing surface through the grease fitting with the appropriate lubricant (refer to lubrication chart).

7. Remove boom supports and tire chocks.

BOOM AND PARALLEL ARM PIVOT PIN BUSHING REPLACEMENT

1. Disassemble the boom.

   Remove the appropriate sections of the boom to allow access to the bushings. This step should only be attempted in a well-equipped shop by experienced mechanics.

2. Split the bushings with a hammer and chisel, and remove them.

3. Seat replacement bushings, using an arbor press.

4. Reassemble the boom and grease the bushing fittings (refer to lubrication chart).

LIFT CYLINDER HOLDING VALVE REPLACEMENT

For earlier versions of the lift cylinder, the holding valve is secured in place to the underside of the lift cylinder by a band clamp. Only the pressure switch should be installed using Teflon tape or hydraulic sealant. The solenoid valve cartridge has a 100 mesh screen and solenoid valve coil. Make certain that all power is off and that the lift cylinder bears no load before proceeding with repairs. (Refer to illustration on facing page for disassembly and components.)

For later versions of the lift cylinder, the holding valve is integrated into the underside of the lift cylinder and the pressure switch is located on the holding valve.

LIFT CYLINDER VELOCITY FUSE REPLACEMENT

A velocity fuse was used as a descent mechanism on only the earliest lift cylinders. Order Service Bulletin 095-121390 to upgrade the lift cylinder velocity fuse. Also, a kit is available for lift cylinders with a velocity fuse to upgrade them with a holding valve. Contact Simon Service for the upgrade kit.

CUSHION CYLINDER REPLACEMENT

The cushion cylinder is a rodless double acting type which acts as an accumulator to provide smooth starting and stopping when driving.

1. Disconnect and plug the two hydraulic hoses.

⚠ CAUTION

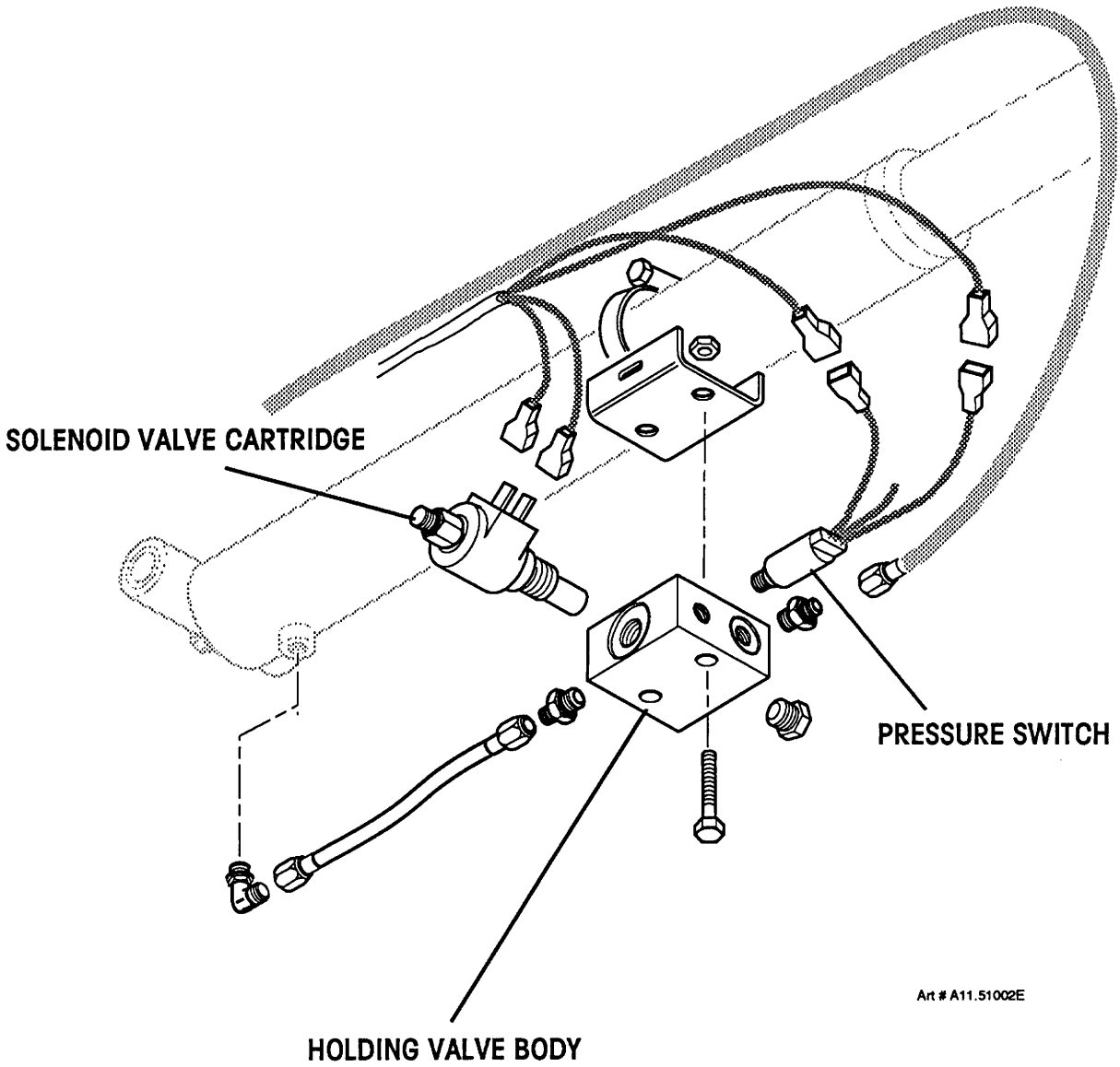
To prevent damaging internal components of cushion cylinder, keep hydraulic hose ends free from contamination.

Take care not to damage the rod surface and guard against dirt entering the system.

2. Take the cushion cylinder from the undercarriage by removing the two hose clamps that hold it in place.

3. Remove both end glands.

4. Remove spring and piston.
5. Replace seals.
6. Carefully, slide the piston and springs into the cylinder body assembly.
7. Secure the end glands in place.
8. Secure the cushion cylinder in place with the two hose clamps.
9. Unplug and reconnect the two hydraulic hoses.



Lift Cylinder Holding Valve (Earlier Units).

SECTION: 5
TROUBLESHOOTING

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GENERAL TROUBLESHOOTING TIPS

Before investigating a malfunction, check the following items:

- The Main Power Key Switch should be in the "ON" position.
- Check that battery connections are secure and battery is fully charged.
- Check that the Emergency Stop Button is released.
- Check that hydraulic fluid is at the correct level.

Common Causes of Hydraulic System Malfunctions:

- Incompatible hydraulic fluids mixed, destroying the additives and causing varnish build up resulting in the valves to stick.
- Water in the hydraulic fluid due to a damp climate.
- Improper hydraulic fluid used; viscosity too high cold climates, viscosity too low warm climates.

  NOTE: Mobil DTE-15 is a multiple viscosity oil that is light enough for cold climates and resists thinning in warm climates.

- Fuel in the hydraulic fluid, lowers the viscosity and lubricity of the fluid.

TROUBLESHOOTING CHART

Problem	Probable Cause	Solution
• Execssive heat will cause excessive wear on seals and metal parts due to lowered viscosity. Symptoms to watch for are: pump case turns brown, hydraulic fluid darkens and premature pump failure.	• Excessive water in the hydraulic fluid. • Improper oil viscosity. • Improper lubrication and hydraulic fluid.	• Drain and flush hydraulic system. • Replace hydraulic fluid with the correct fluid. • Drain and flush hydraulic system.
• Water in hydraulic fluid. Symptoms to watch for are: pitting and etching of pump gear causing heat build up and premature pump failure.	• Damp climate or condensation in the reservoir. • Hydraulic fitting or port open to contaminants.	• Drain and flush hydraulic system. • Drain and flush hydraulic system. Replace worn pump components.
• Varnish, the dark brownish residue left from oxidation of hydraulic fluids. Symptoms to watch for are: residue will cause spools to stick and will hang up moving parts with close tolerances.	• Incompatible fluids or poor quality fluids. • Excessive heating of the fluids.	• Drain and flush hydraulic system, then fill with recommended hydraulic fluid and lubricant. • Drain and flush hydraulic system, then fill with recommended hydraulic fluid.
• Poor lubrication, parts break through lubricant causing metal to metal contact. Symptoms to watch for are: pump gear wear and side gear clearance and excessive heat build up.	• Hydraulic fluid viscosity low. • Improper or poor grade hydraulic fluid or lubricant without proper anti wear additives.	• Drain and flush hydraulic system, then fill with recommended hydraulic fluid. • Drain and flush hydraulic system, then fill with recommended hydraulic fluid and lubricant.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Cavitation, a gaseous condition within the fluid stream where the pressure is reduced to the vapor pressure of the fluid. The higher the system pressure the more violent the reaction will be. Symptoms to watch for are: catastrophic pump failure or loss of pump pressure.	• Low reservoir fluid level. • Air leaks in suction line. • Improper hydraulic fluid. • Vaporization of water.	• Add hydraulic fluid. • Repair any suction hose leaks. • Have fluid analyzed regularly and drain and flush hydraulic system, then fill with recommended hydraulic fluid. • Have fluid analyzed regularly and drain and flush hydraulic system, then fill with recommended hydraulic fluid.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No high speed function for lift or drive.	• Emergency Stop Button, Key Switch, Drive/Lift Selector Switch, high speed coil, high speed valve, no pump output.	• A breakdown of any one of these components will cause the high speed function to be inoperable.
• No high speed function for drive only.	• Pressure switch.	• Check pressure switch by wiring around component, and replace if faulty.
• Movement alarm will not sound.	• Forward or reverse diodes, movement alarm relay, or the travel alarm itself is faulty.	• A breakdown in any one of these components will cause the alarm not to function. Trace the available voltage to the horn. Replace the component(s) that are bad.
• Lift cylinder drifts down.	1. Holding valve cartridge dirty or faulty. 2. Cylinder packing is damaged. 3. Manual release knob not fully engaged.	1. Clean, repair or replace the holding valve. 2. Replace cylinder packing. 3. Reseat manual release knob.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No pump output.	• Broken pump drive shaft.	• Check for broken pump drive shaft and replace if broken.
	• Fluid leaks.	• Check for excessive charge circuit leakage and fluid at pump inlet.
	• Motor not turning.	• Low battery voltage.
		• Check that motor functions properly.
	• Motor relay not engaging	• Faulty diode on the strip fanning diode.
		• Low battery voltage
		• Check for proper motor relay operation and replace if broken.
• Hydraulic functions slow.	• Low pressure.	• Check for low system pressure and adjust to correct pressure.
	• Component failure.	• Bench test pump output.
	• Excessive side gear clearance.	• Replace pump.
	• Slow motor speed.	• Low battery voltage.
		• Loose wire connections.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Excessive pump pressure.	• Main relief valve.	• Readjust main relief valve.
• Pump noise or squeal.	• Low pressure.	• Check for low system pressure and adjust for correct pressure.
	• Pump cavitation.	• Check hydraulic reservoir oil level.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No steer function.	1. Steer toggle switch is bad. 2. Directional valve not shifting. 3. Faulty diodes. 4. Faulty sequence valve.	1. Check voltage available to the toggle switch. 2. Check voltage supply to valve and replace if necessary. 3. Check diodes and replace if necessary. 4. Check pressure setting.
• Steers left, but not right.	• Solenoid 1 malfunction in steer valve.	• Replace coil in solenoid 1.
• Steers right, but not left.	• Solenoid 2 malfunction in steer valve. • Sequence valve	• Replace coil in solenoid 2. • Replace sequence valve.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Unit will not steer; all other functions operate.	1. Mechanical malfunction.	1. Steer cylinder may not be mechanically connected to steering linkage. Check for disconnected or damaged steering linkage; connect steering linkage and/ or replace.
	2. Steering directional control valve.	2. The steering directional control valve may not be shifting. The valve spools may be stuck. The directional control valve is defective or a valve spool is obstructed. Remove valve and inspect, clean, repair or replace as needed.
	3. Faulty diodes (open circuit).	3. Check diodes.
	4. Faulty sequence valve (low pressure setting)	4. Adjust pressure. 5. Replace valve.
	5. Toggle switch or directional coils have no voltage.	6. Check voltage available to the toggle switch and directional coils.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No drive function.	1. Brakes do not release.	1. Check pressure supply to brakes. If no pressure, consult factory.
	2. No hydraulic fluid flow available to the drive motors.	2. Test for available fluid flow at the wheel motors.
	3. Motor shaft key is sheared.	3. Inspect, repair or replace.
	4. Drive directional control valve.	4 The drive directional control valve may not be shifting. The valve spools may be stuck. The directional control valve is defective or a valve spool is obstructed. Remove valve and inspect, clean, repair or replace as needed.
	5. Toggle switch or directional coils has no voltage.	5. Check voltage available to the toggle switches and directional coils.
	6. Steer by-pass valve not shifting.	6. Check steer by-pass valve.
	7. Faulty diodes (open circuit).	7. Check diodes.
• Drives forward, but not reverse.	• Solenoid 3 malfunction in drive valve.	• Replace coil in solenoid 3.
	• Low voltage at coils 3.	• Check battery charge.
• Drives reverse, but not forward.	• Solenoid 4 malfunction in drive valve.	• Replace coil in solenoid 2.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Wheel drive motor failure.	• Hydraulic Fluid.	• Check for contamination of hydraulic fluid; drain and replace. • Check that the hydraulic system has been flushed after component failure in the drive system. • Check that the correct grade of hydraulic fluid is used.
	• Wheel drive motor.	• Wheel drive motor failure; replace motor.
	• Motor shaft key sheared.	• Check, and replace if failed.
• Unit will not go into high speed drive with boom lowered.	• Speed range toggle switch in low.	• Switch to high speed.
	• Faulty pressure switch.	• Check pressure switch by wiring around and replace if faulty
	• Faulty high speed drive valve.	• Check for a bad high speed drive valve; replace if necessary.
	• No/low voltage at coil.	• Check battery charge.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No lift (hoist) function.	1. Toggle switch or lift coils have no voltage.	1. Check voltage available to toggle switch and lift coils.
	2. Faulty cylinder.	2. Possibly plugged lines, cylinder ports or damaged cylinder packings. Inspect, repair or replace cylinder.
	3. Manual override knob released.	3. Check manual override knob position.
	4. Main relief pressure setting too low.	4. Readjust pressure.
	5. Faulty diode (open circuit)	5. Check diode.
	6. Steer by-pass valve not shifting.	6. Check steer by-pass valve.
	7. No/low voltage at valve(s).	7. Check battery charge.
• No lower function.	• Electrical problem.	• Check for electrical problem by operating manual lower knob. If machine lowers, problem is electrical.
	• Toggle switch or lower coils have no voltage.	• Check voltage available to toggle switch and lower coils.
	• Lower valve.	• With platform fully down, remove, inspect, clean, or replace as needed.
	• Lift valve.	• With platform fully down, remove, inspect, clean, or replace as needed.
	• Orifice disc.	• With platform fully down, remove, inspect, clean, or replace as needed.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Abrupt start or stop.	• Cushion cylinder.	• Check cushion cylinder for piston seal leakage. Repair as necessary.
• Parking brake doesn't release.	• Brake release shuttle not sealing.	• Replace brake shuttle release valve.
	• Brake cylinder piston seal leaking.	• Check brake cylinder for piston seal leakage. Replace as necessary.
• Parking brake doesn't engage.	• Brake release needle valve (ORF1) is closed.	• Adjust brake needle valve.
	• Brake cylinder spring failure.	• Check brake cylinder for broken spring. Repair or replace as necessary.

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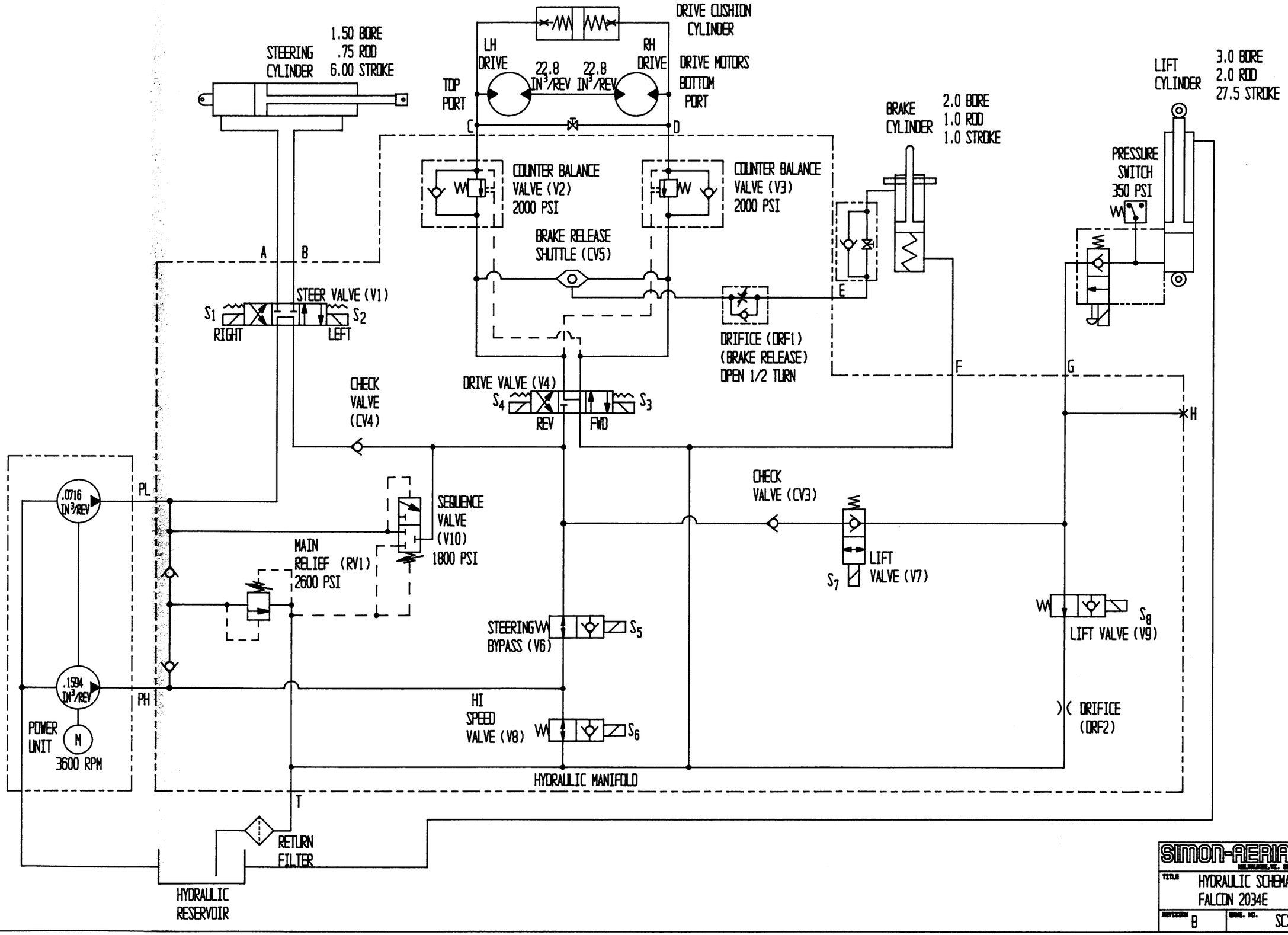
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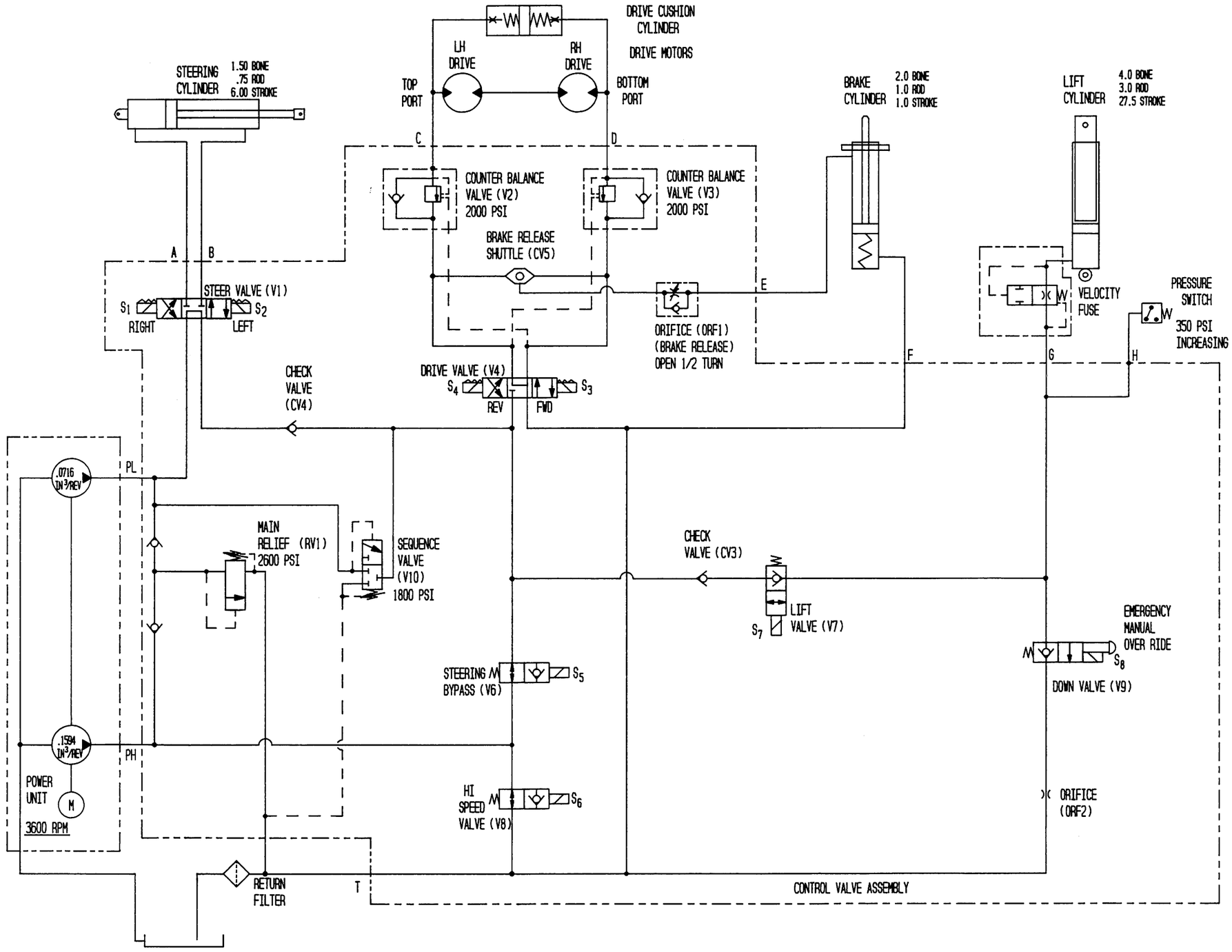
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APPENDIX



SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE	HYDRAULIC SCHEMATIC FALCON 2034E	
REVISION	B	DRWG. NO. SCS-218951-0



SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE	
HYDRAULIC SCHEMATIC FOR L2034E MODEL	
REVISION B / 7-26-90	DRAW. NO. SDS-216190-0

CABLE WIRE NO.

DIODE FANNING STRIP

TERMINAL STRIP

STEER SWITCH

KEY SWITCH

DRIVE

OFF

LIFT

N.C.

EMERG. STOP SWITCH

DRIVE LIFT SWITCH

RT 1

LT 3

FWD 4

REV 6

UP 7

DOWN 10

HIGH 9

SPEED RANGE SWITCH

LOW 8

PLATFORM CONTROLLER

11

12 5

"NOT USED" 2

CONTROL CABLE 16ga/12 COND.

ROTATING BEACON

RED

BATTERY CONDITION INDICATOR

VM

110 VAC DUPLEX OUTLET

"NOT USED"

OPTION CABLE-12Ga / 3 COND

POWER CABLE 12Ga / 3 COND.

LIFT SWITCH

DOWN

UP

15 AMP FUSE

1 2 3 4 5 6 7 8 9 10 11 12 13 14

BLACK

RED

GREEN

N.C.

PRESSURE SW.

HM HOURMETER

MOTOR CR1 START RELAY

CR3 TRAVEL ALARM RELAY

STEERING

STEER-R COIL (S1)

STEER-L COIL (S2)

FWD COIL (S3)

BYPASS COIL (S5)

REV COIL (S4)

UP COIL (S7)

UP COIL (S8)

HIGH-SPEED COIL (S6)

DOWN COIL

DESENT ALARM

RED

BLACK

CR2 SOURCE RELAY

CR3

TRAVEL ALARM

CR2

RED

BLACK

SENSOR RELAY

WHITE

TILT ALARM

CR1 MOTOR START RELAY

M ELECTRIC MOTOR

24 V.D.C.

BATTERIES 6 V.D.C.

+ - + - + - + -

BATTERY CHARGER

MACHINE LOWER

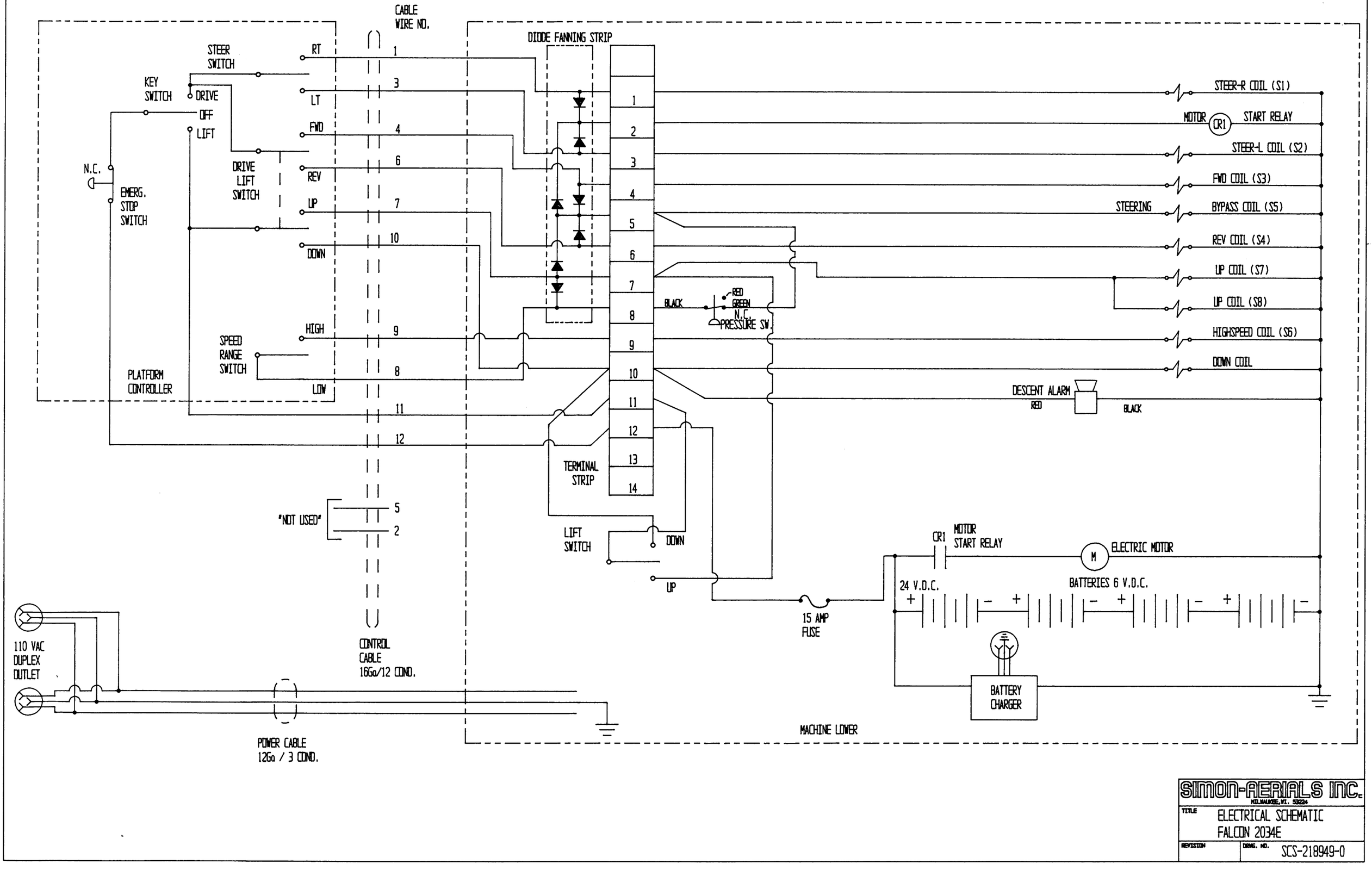
SIMON-AERIALS INC.

MILWAUKEE, WI. 53224

TITLE ELECTRICAL SCHEMATIC
FALCON 2034E WITH OPTIONS

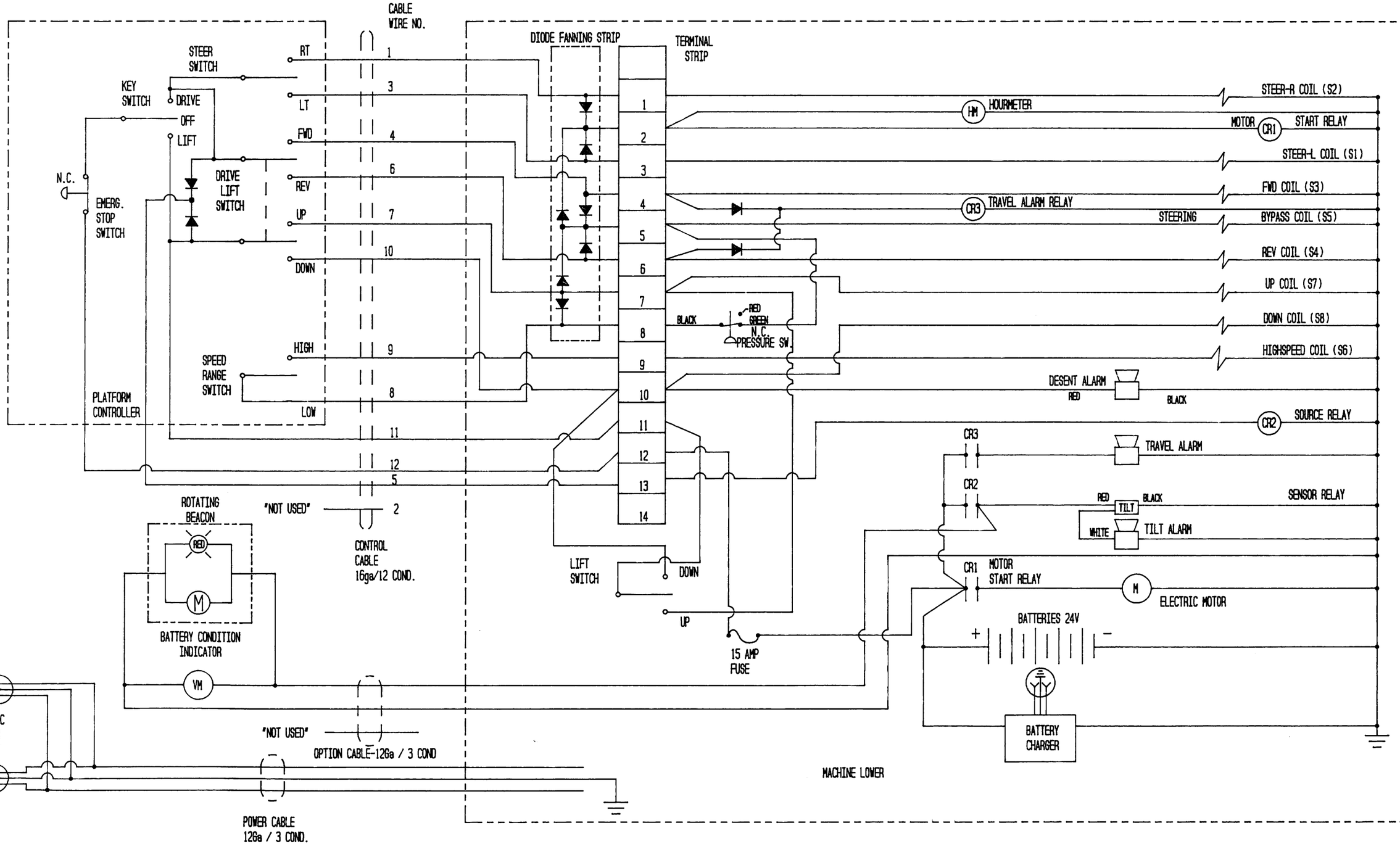
REVISION

DRWG. NO. SCS-218950-0



SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE	ELECTRICAL SCHEMATIC FALCON 2034E
REVISION	DRWG. NO. SCS-218949-0



SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE: ELECTRICAL SCHEMATIC FOR L2034E W/ OPTIONS

REVISION

DRWG. NO. SDS-216779-0