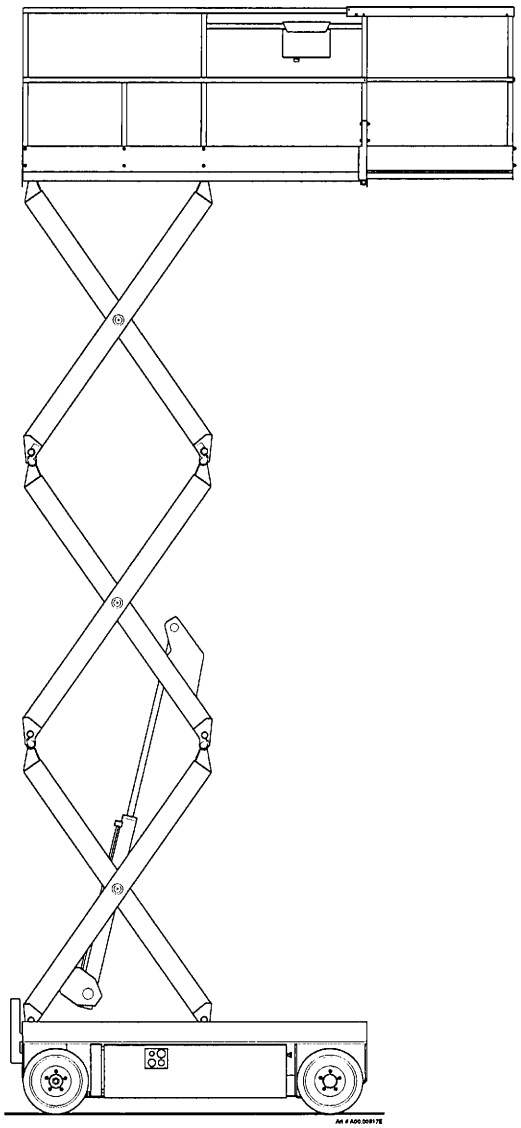
X-2032 SCISSORS

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. 89-994707 • Initial Issue dated Feb. 1995 •

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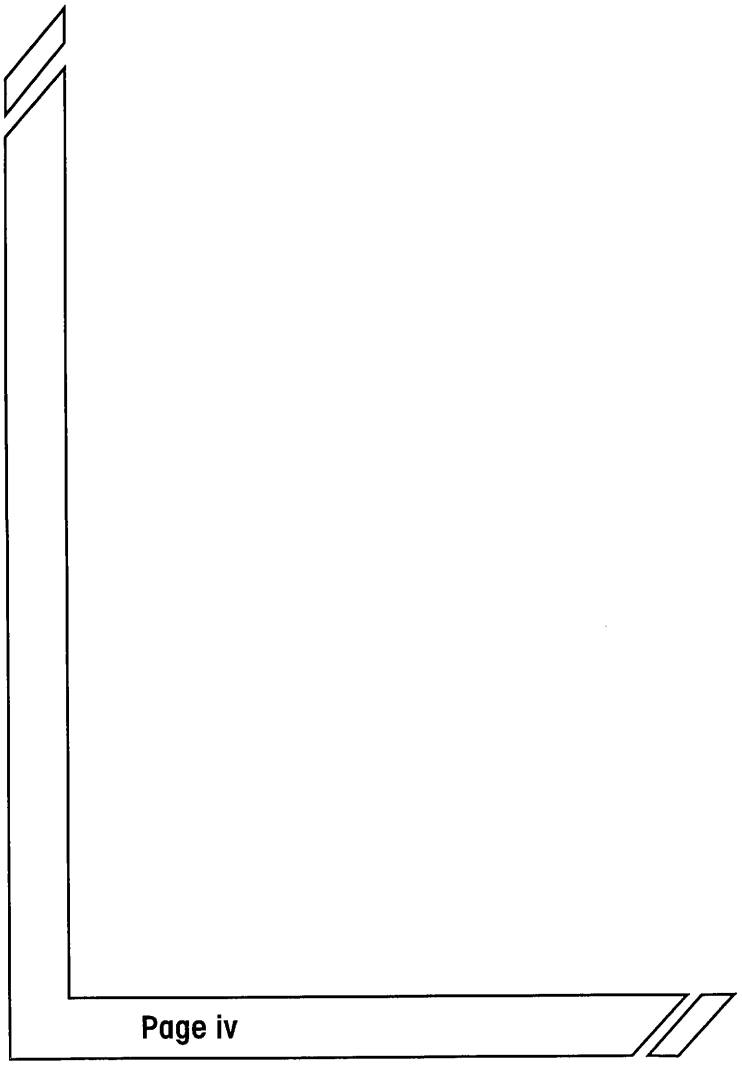
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INTRODUCTION

This Service Manual is designed to provide you with the instructions needed to properly maintain the SIMON AERIALS INC. X-2032 Scissors Lift. When used in conjunction with the Operator's and Parts Manuals (provided separately) this Service Manual will assist you in making necessary adjustments or repairs.

Simon Aerial Scissors Lifts are designed and built to provide many years of safe, dependable service. To obtain full benefits from your X-2032 Scissors Lift, 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 Operator's, 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. THIS SIGNAL WORD IS TO BE LIMITED TO THE MOST EXTREME SITUATIONS.

⚠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 which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. Caution is permitted for property-damage-only accidents.

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.

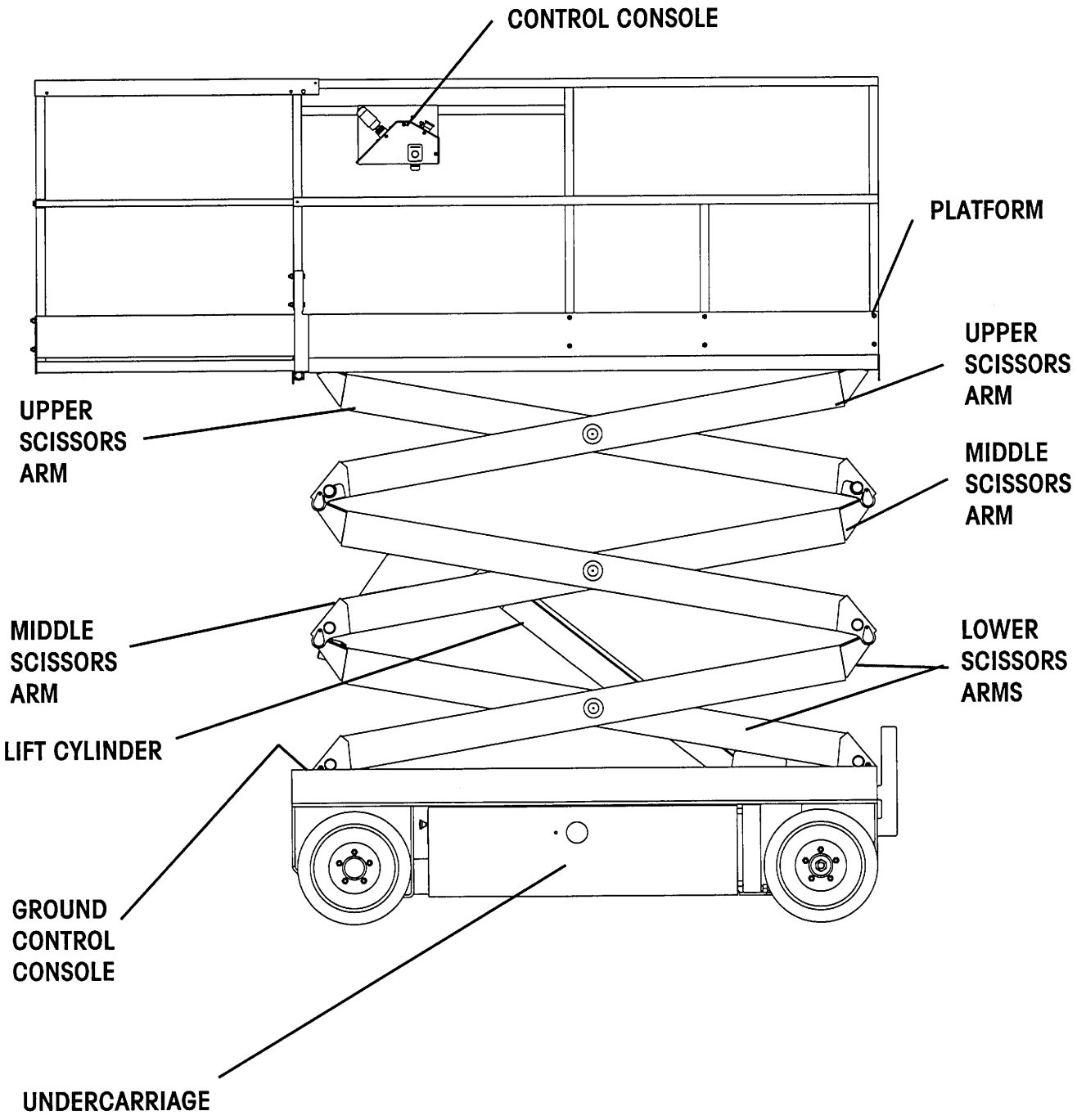
Any procedures not found within this manual must be evaluated by the individual to assure himself that they are "proper and safe", because it is not possible to cover all potential procedures.

All SIMON AERIALS INC. manuals are periodically updated to reflect changes that occur in the equipment. Please contact the factory for information regarding changes to your machine which may not be included in the manual.

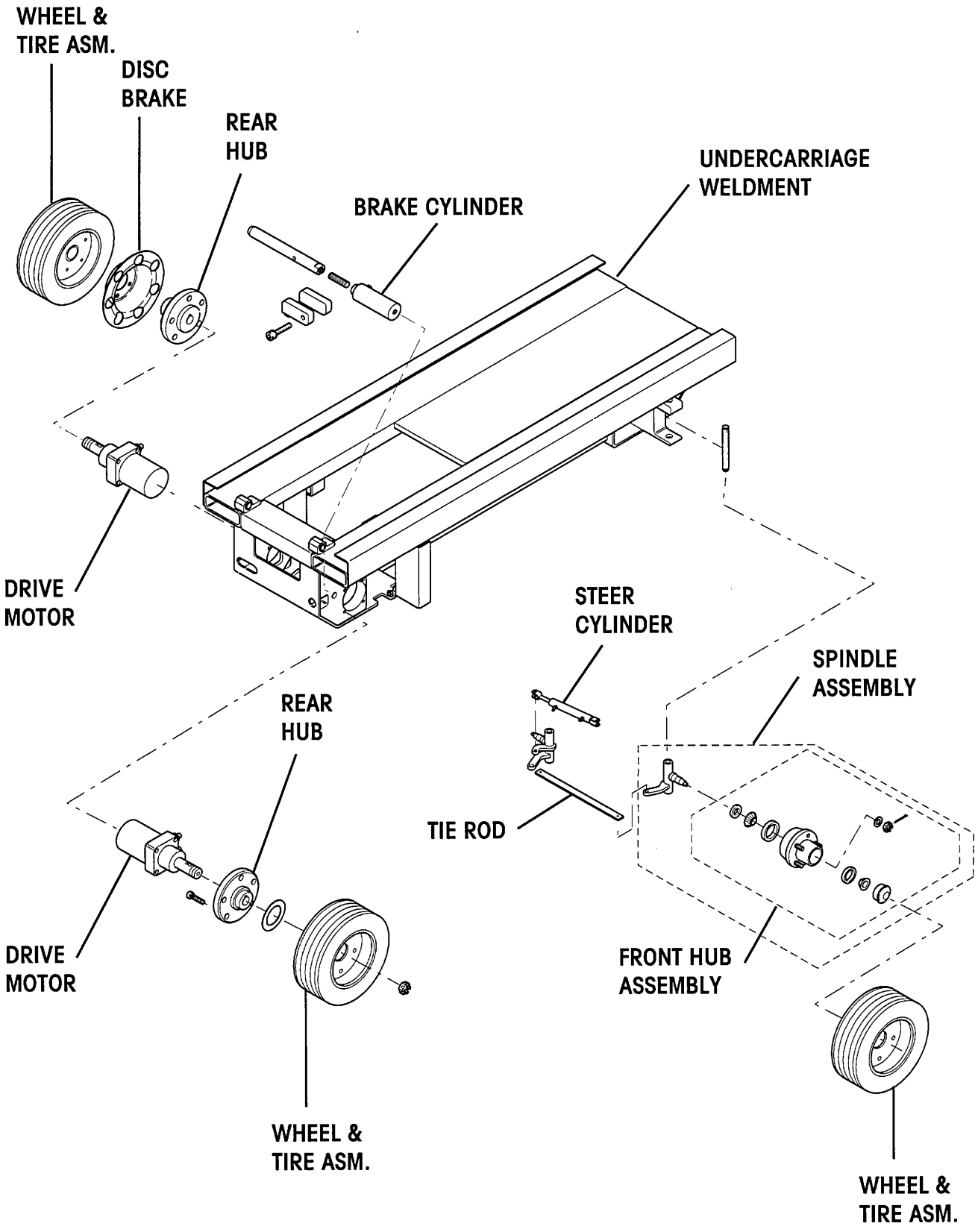
MACHINE SPECIFICATIONS

Working Height (Maximum)	**26 Ft /** 6.92 M
Platform Height (Maximum)	**20 Ft /** 6.27 M
Stowed Platform Height	**40 In. /** 1.01 M
Stowed Height with Rails Up	**79 In. /** 2.01 M
Platform Capacity (Unrestricted):	
With Standard Deck	**750 Lbs. /** 340 kg
With Optional Deck Extension	**750 Lbs. /** 340 kg
Deck Extension Capacity	**250 Lbs./** 110 kg
Platform Dimensions:	
With Standard Deck.	**31.0 x 83 x 39 In. /** 0.78 x 2.10 x 0.99 M
With Optional Deck (Extended)	**31.0 x 119.0 x 39 In. /** 0.78 x 3.02 x 0.99 M
Length:	
With Standard Deck	**86 In./** 2.39 M
With Optional Deck (Extended)	**122 In./** 3.10 M
Width	**32 In./** 0.81 M
Wheelbase	**66 In./** 1.68 M
Wheel Track	**28 In./** 0.71 M
Outside Turning Radius	**101 In./** 2.57 M
Inside Turning Radius	**43 In./** 1.09 M
Ground Clearance	**4 In./** 0.10 M
Gross Vehicle Weight (Approx.):	
With Standard Deck	**3600 LBS/** 1633 kg
With Optional Deck	**3700 LBS/** 1678 kg
Travel Speed:	
Platform Stowed	**2.3 MPH /** 3.7 KPH
Platform Elevated	**0.5 MPH /** 0.8 KPH
Gradeability (on hard surface)	**14° (2 5%)**
Tires	**4.00 x 8-3.75 Solid**
Hydraulic Fluid Capacity	**7.5 Gal. /** 28 L
Hydraulic Operating Pressure:	
Lift and Drive Circuits	**2900 PSI/** 200 Bar/ 203.9 kg/cm^2
Steer	**1500 PSI/** 103.4 Bar/ 105.4 kg/cm^2
Wheel Lug Nut Torque	**65-70 Ft Lbs./** 88-95 Nm/ 8.9-9.7 kg-m
Battery Charger	**40 Amp (Auto)**
Power System (Electric)	**24 Volt DC (Four 6 Volt 217 Amp/Hr. Lead-Acid Batteries in Series)**
Electrical Motor	**4 HP/** 2.98 KW

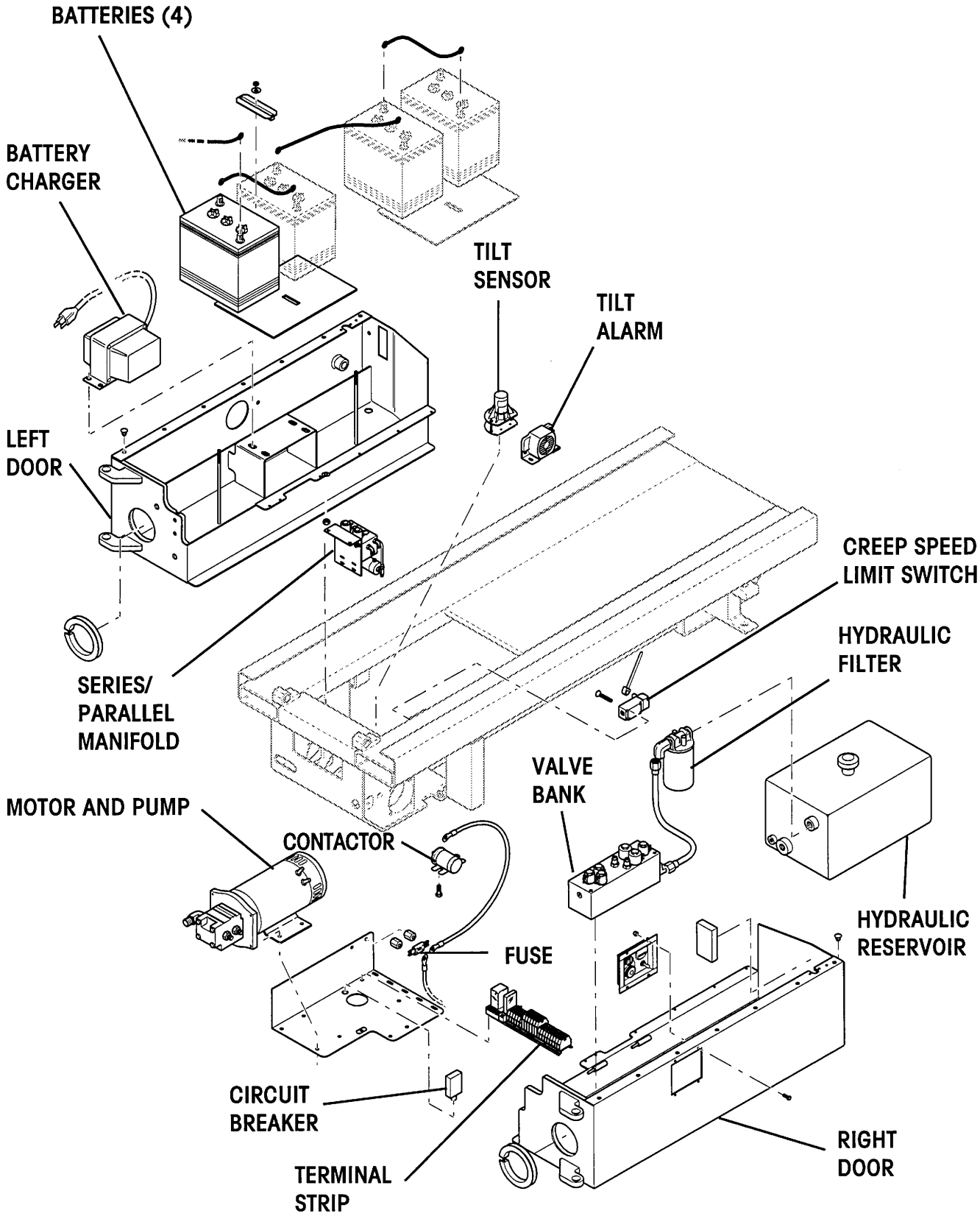
PRIMARY MACHINE COMPONENTS



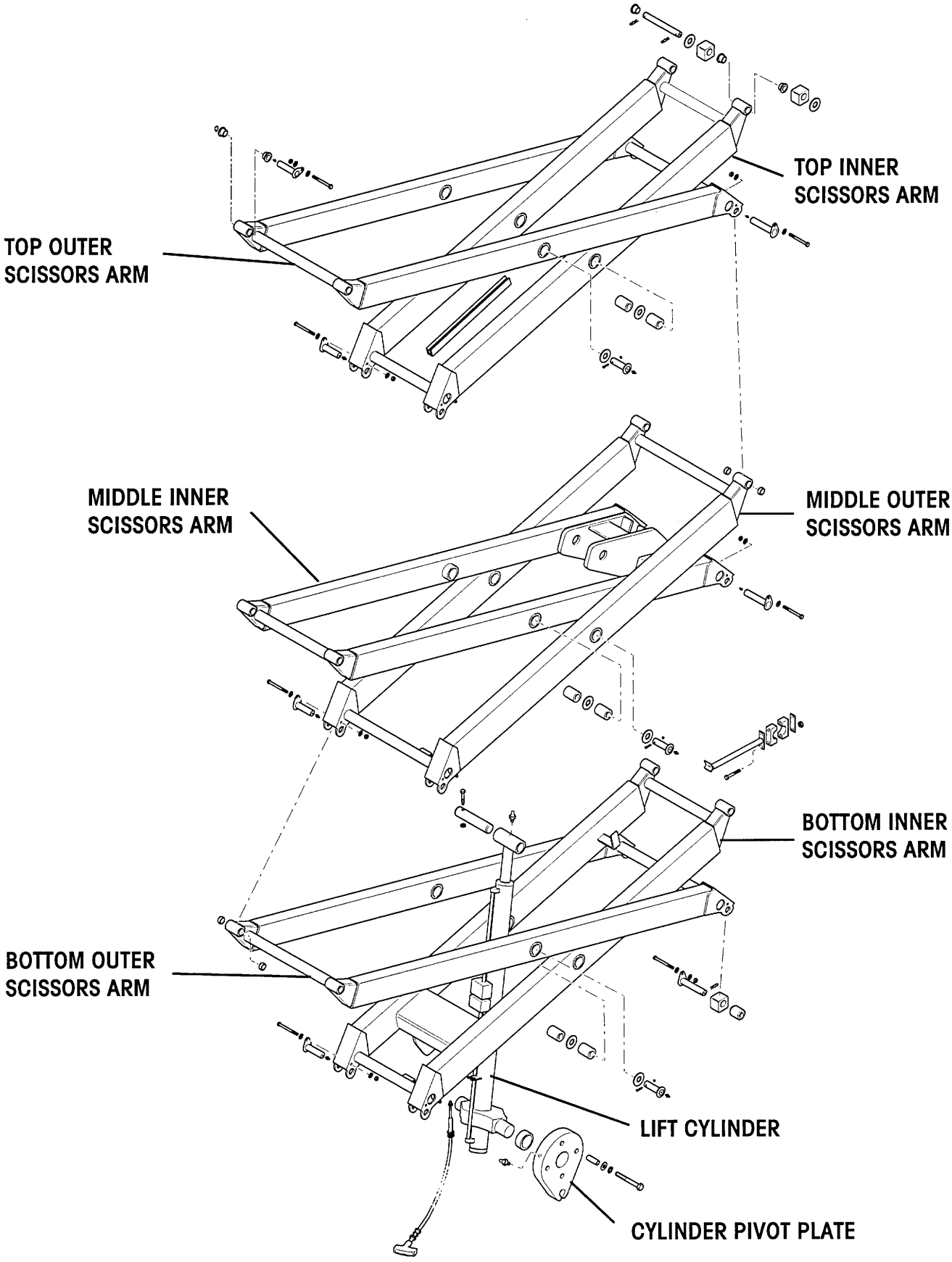
UNDERCARRIAGE COMPONENTS



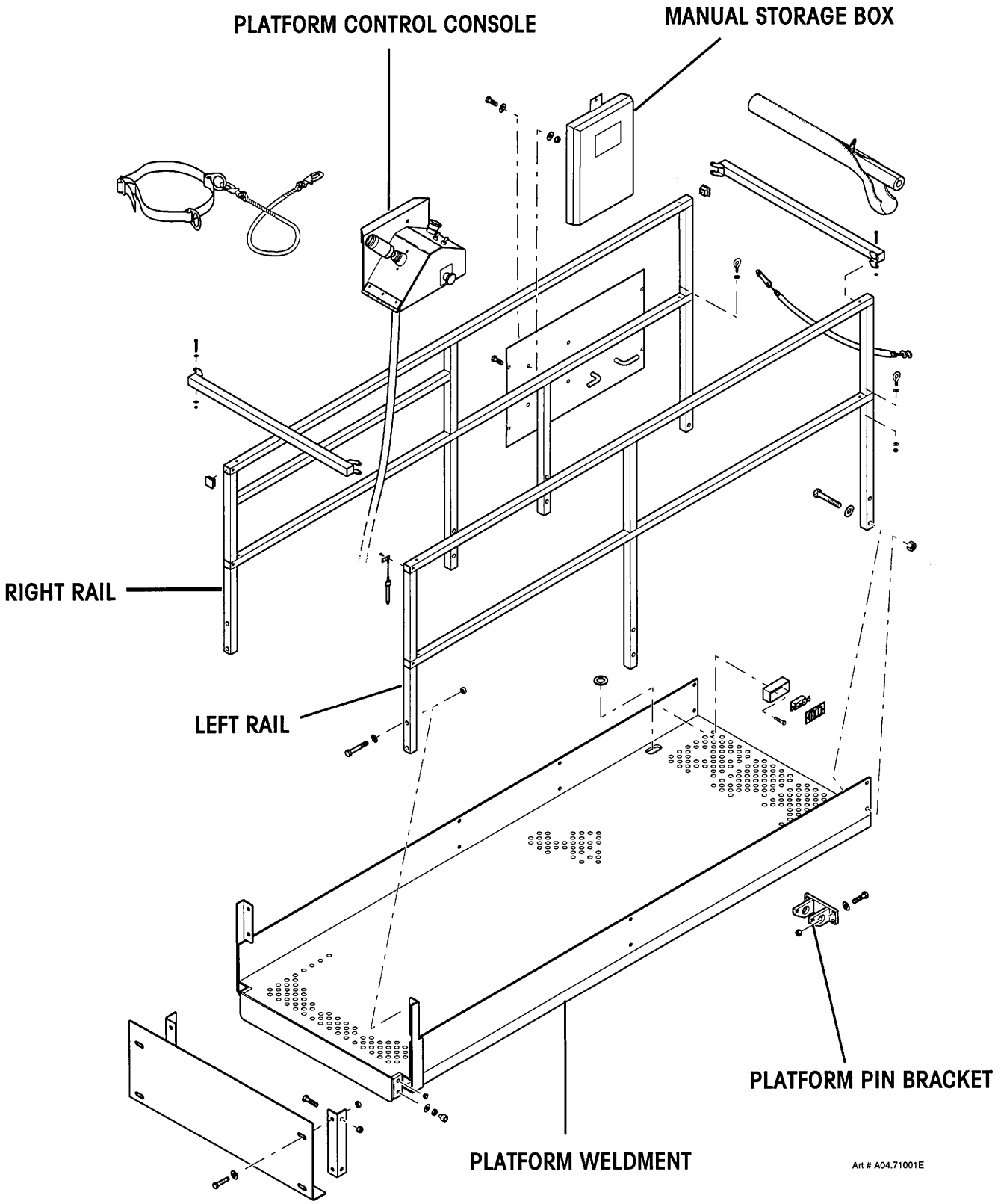
UNDERCARRIAGE COMPONENTS



SCISSORS ARM COMPONENTS



PLATFORM COMPONENTS

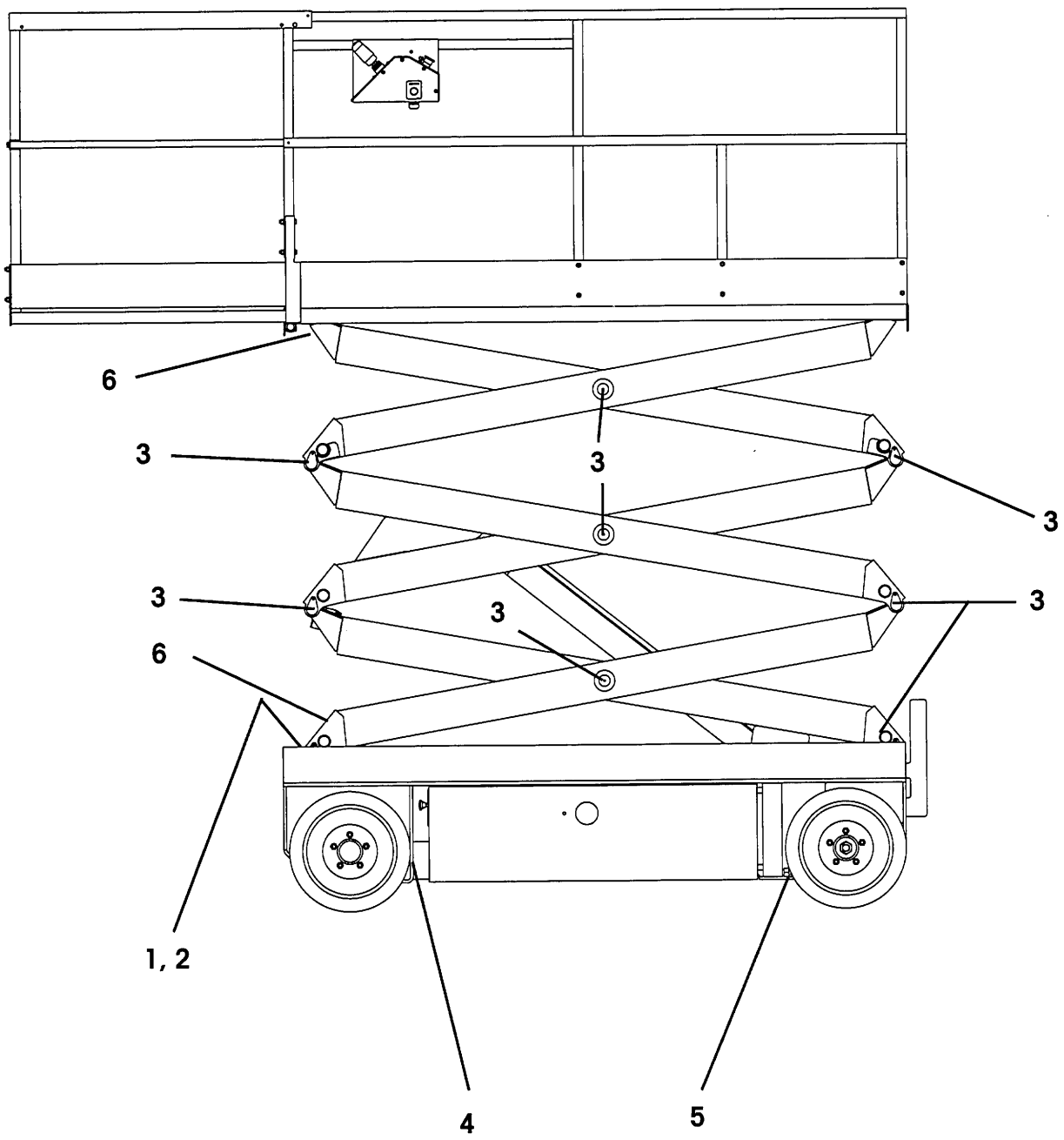


LUBRICATION CHART

NO.	ITEM	SPECIFICATION AND QUANTITY	FREQUENCY OF LUBRICATION
1.	Hydraulic reservoir	Mobil DTE-13M with platform fully lowered to full mark on dip stick or sight gauge.	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 (N.L.G.I. #2 EP Lithium, plus EP & Moly) Purge old grease.	Monthly or every 100 hours.*† Lubricate at every 3 feet (1M) of vertical displacement.
4.	Steering linkage	Lithium N.L.G.I. #2 EP. Purge old grease.	Monthly or every 100 hours.*†
5.	Front hubs and brake pins	Lithium N.L.G.I. #2 EP. Clean and repack.	Change every 6 months or every 500 hours.*†
6.	Glide pads	Petroleum jelly.	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 operate the unit while it is being transported.

MOVING OF THE SCISSORS LIFT

The scissors lift can be winched or moved short distances in case of power failure.

To move the unit:

- Turn the emergency brake release cam 90° clockwise to the release position with brake wrench (provided).
- Open the free-wheeling valve, if so equipped.
- The unit is now ready to move.

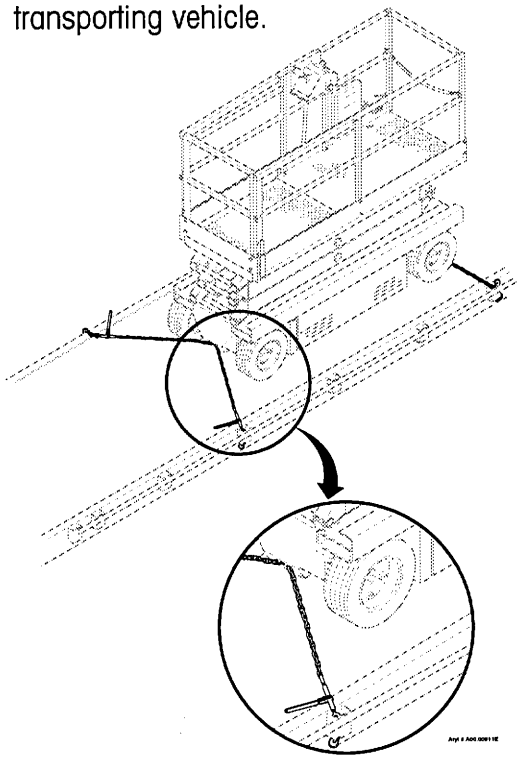
To return to normal operation, turn the emergency brake release cam counterclockwise 90° to the normal operation position, and close the free-wheeling valve.

FORK LIFTING OF THE SCISSORS LIFT

Lift the Simon Scissors Lift from the sides, front or rear. Position forks under the unit, between the front and rear wheels. Ensure that lift truck used has adequate capacity to lift the machine (see "Machine Specifications" for gross vehicle weight).

TRUCK TRANSPORT OF THE SCISSORS LIFT

- The Scissors Lift may be loaded onto a transporting vehicle with a fork lift.
- The Scissors Lift may be winched onto a transporting vehicle IF THE UNIT IS EQUIPPED WITH THE FREE-WHEELING VALVE OPTION. Return emergency brake release cam to operating position (engaging the brake), and close the free-wheeling valve, when the unit is on the transporting vehicle.
- Secure ends of chains or straps to bed of transporter ahead or behind the scissors lift to provide better stability and prevent front and rear paint damage. Ensure that chains or straps have adequate load capacity, and DO NOT OVERTIGHTEN.
- Always chock the wheels of the unit while on the transporting vehicle.



Tie-down (Recommended).

UNLOADING PROCEDURES

- Inspect the outside of the unit for damage (including the underside). Inspect all hoses, scissors sections and cables for chafing or road damage. Confirm that all wheel lug nuts are tight.
- Open side doors, and inspect all electrical and hydraulic connections for damage and security.
- Perform "Shift Checks" and "Machine Startup" in the X-2032 Operator's Manual.
- Ensure that side doors are closed.
- Attach the unit to a winch to unload the unit.
- Remove all machine tie downs. Remove wheel chocks.
- 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.

⚠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 THE OPERATOR'S MANUAL BEFORE OPERATING THE UNIT.

EMERGENCY SYSTEM AND PROCEDURES

⚠ DANGER

IF PLATFORM SHOULD FAIL TO LOWER, DO NOT ATTEMPT TO CLIMB DOWN THE SCISSORS 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

IF DECK IS EXTENDED, AVOID LOWERING WORK PLATFORM ON TO STATIONARY OBJECTS OR POWER LINES.

- Pull emergency lowering T-handle and hold until lowered to desired position.

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

- Once the platform has been fully lowered, push T-handle back to operating position.
- **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 SCISSORS 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 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, if necessary, using the emergency procedure.
5. Render first aid to the operator.
6. **Report the incident to your supervisor immediately.**

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

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.
5. **Report the incident to your supervisor immediately.**

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

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.
- If, after the first 50 hours of operation, the hydraulic filter element is plugged.
- Any time the hydraulic filter element shows 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 ends of all hoses.
4. Flush the hoses with clean hydraulic fluid.
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 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 cylinders.
11. When the above procedures have been completed, fill hydraulic tank to full mark on sight gauge (if so equipped) or to full mark on dip stick.
12. Check for leaks and correct as necessary. Unit is now ready to be placed back in operation.

HYDRAULIC SYSTEM FUNCTIONAL DESCRIPTION

The tandem rotary pump pulls fluid from the reservoir, and outputs it to the hydraulic valve assembly through both high flow and low flow ports. The high flow section supplies flow to the lift and drive circuits, while the low flow section supplies flow to the steer circuit.

The hydraulic pump only works while a function is being operated. When pressure builds up to 2900 psi in the lift and drive circuit, such as when a function is dead headed, the drive/ lift pressure relief valve triggers, returning hydraulic fluid back to the reservoir. For the steer function, a pressure relief valve triggers at 1500 psi.

When the steering toggle is pressed on the control, the tandem center steer valve shifts, 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 pressure relief valve shifts at 1500 psi to allow hydraulic fluid to return to the reservoir.

When the drive controller is moved, the drive valve allows hydraulic fluid to flow to the drive motors which propels the scissors lift forward or reverse. There are two drive valves: one for forward movement and the other for reverse movement. The counter balance valves perform two functions: they keep the drive motor from over running when driving down hill, slowing the machine; and, they act as a dynamic brake when stopping, stopping the machine before the parking brake engages. The series/ parallel valve manifold provides two speed drive operation at a maximum pressure of 2900 PSI. 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 by allowing fluid to flow to the lift cylinder. When the platform is lowered the pump does not operate. The normally closed holding valves are energized to permit fluid to return to the reservoir through the lift valve with the flow orifice controlling the rate of descent.

HYDRAULIC SYSTEM COMPONENTS

HYDRAULIC FLUID RESERVOIR

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

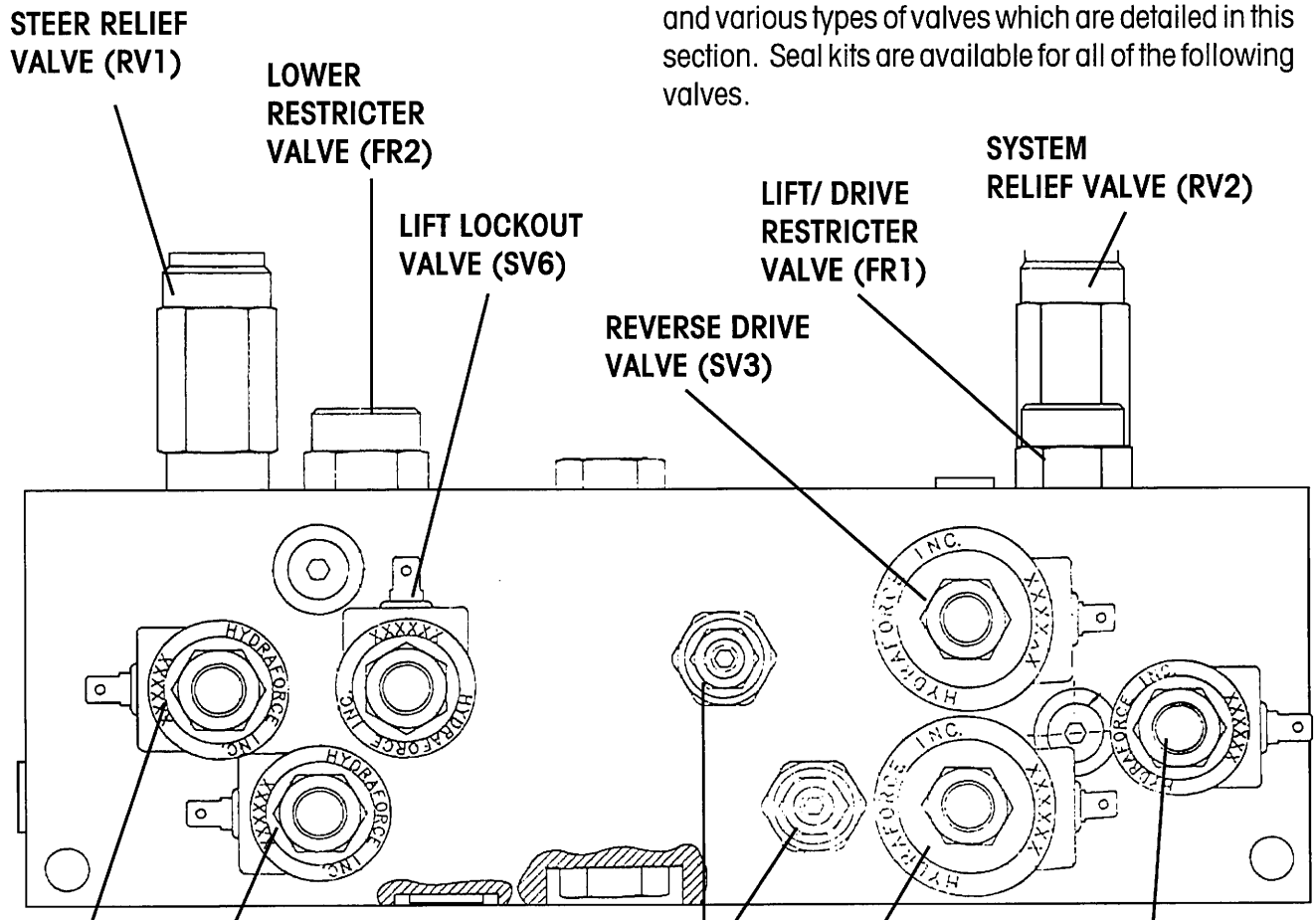
Check tank for signs of leakage on a weekly basis.

HYDRAULIC PUMP

One 24 VOLT DC, 150 AMP permanent magnet motor rated at 4 HP (2.98 Kw) at 3600 RPM drives the tandem rotary 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 types of valves which are detailed in this section. Seal kits are available for all of the following valves.



Control Valve Assembly.

SYSTEM AND STEER RELIEF VALVES

These valves, located in port RV2 (System) and RV1 (Steer) on the control valve assembly, are differential poppet relief valves. They are screw-in, cartridge-style, direct-acting valves used as pressure limiting devices. The System relief valve opens at 2900 PSI (200 Bar, 204 kg/ cm^2) and is factory set. The Steer relief valve opens at 1500 PSI (103.4 Bar, 105.5 kg/ cm^2), and also is factory set. A seal kit is also available (Refer to Illustrated Parts Catalog).

To adjust the system relief valve:

1. Install a pressure gauge in Port G2.
2. Loosen seal 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.
4. Tighten seal nut.

To set the steer relief valve:

1. Install a pressure gauge in Port G1.
2. Loosen seal nut.
3. Steer fully in either direction. While continuing to dead head steer, use a hex key to adjust pressure. Backing out hex socket screw decreases pressure.
4. Tighten seal nut.

To clean valve:

- Rinse in clean solvent and blow dry with air.

LIFT VALVE

This valve, located in port SV7, is a solenoid-operated, 2-way, normally open valve. It is a screw-in, cartridge-style, and poppet-type valve. There are no adjustments to this valve, but the solenoid can be replaced if it malfunctions. A seal kit is also available (Refer to Illustrated Parts Catalog).

LIFT LOCKOUT VALVE

This valve, located in port SV6, is a solenoid-operated, 2-way, normally open valve. It is screw-in, cartridge-style, and piloted poppet-type valve. This valve is open when lifting and closed while driving and steering. There are no adjustments to this valve, but the solenoid can be replaced if it malfunctions. A seal kit is also available (Refer to Illustrated Parts Catalog).

STEER VALVE

This valve, located in port SV1 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 they malfunction. A seal kit is also available (Refer to Illustrated Parts Catalog).

HIGH SPEED VALVE

This valve, located in port SV4 on control assembly, is a solenoid-operated, 2-way, normally closed valve. It is a screw-in, cartridge-style piloted poppet-type valve used to allow hydraulic fluid to drive rear hydraulic motors and lift cylinders. In one position it allows high speed, while in the other position it directs flow through a restricter (FR1) which decreases flow to 0.8 GPM (creep speed). It requires no adjustments, but the solenoid can be replaced if it malfunctions. A seal kit is also available (Refer to Illustrated Parts Catalog).

FORWARD AND REVERSE DRIVE VALVES

These valves, located in ports SV2 and SV3, are solenoid-operated, 3-way, spool-type valves. They allow hydraulic fluid to drive rear hydraulic motors. Directional valve SV2 drives the hydraulic motors in the forward direction, while SV3 drives the hydraulic motors in reverse. They require no adjustments, but the solenoids can be replaced if they malfunction. A seal kit is also available (Refer to Illustrated Parts Catalog).

COUNTERBALANCE VALVES (DRIVE)

These identical valves are located in ports CB1 and CB2. They are used for overrunning the load control and hydraulic load locking, and restrain flow through the motors to prevent cavitation. They also function as deceleration controls when driving down hill. They are factory set at 3700 PSI (255 Bar, 260 kg/ cm^2) load induced pressure. Under normal use, these valves require no adjustment. Consult with Simon Service, if necessary. A seal kit is also available (Refer to Illustrated Parts Catalog).

To clean valve:

- Rinse in clean solvent and blow dry with air.

SERIES/ PARALLEL VALVE MANIFOLD

This valve manifold controls the hydraulic fluid flow from the control valve assembly to the drive motors. It consists of a valve block and various types of valves which are detailed in this section.

SERIES/ PARALLEL VALVES

These valves, located in ports SV1 and SV2 of the series/ parallel valve manifold, are solenoid-operated, 3-way, spool-type valves. They allow hydraulic fluid to drive rear hydraulic motors in either parallel or series. In the de-energized mode the valves allow for parallel fluid flow to the motors. In the energized mode the valves allow for series fluid flow to the motors. They require no adjustments, but the cartridges can be cleaned and the solenoids can be replaced if they malfunction. A seal kit is also available (Refer to Illustrated Parts Catalog).

SERIES/ PARALLEL RELIEF VALVE

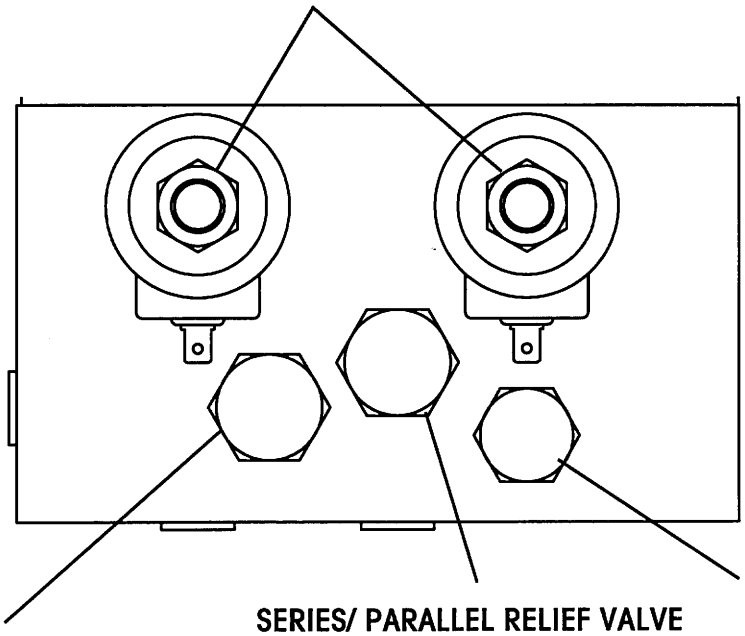
This valve, located in port RV1 on the series/ parallel valve manifold, is a differential poppet relief valve. It is screw-in, cartridge-style, direct-acting valve used as pressure limiting device. This relief valve opens at 2900 PSI (200 Bar, 204 kg/ cm^2) and is factory set. Call Simon Service for adjustment procedures. A seal kit is also available (Refer to Illustrated Parts Catalog).

To clean valve:

- Rinse in clean solvent and blow dry with air.

SERIES/ PARALLEL FLOW DIVIDER

This valve, located in port FD1 of the series/ parallel valve manifold, is a screw-in, cartridge-style, pressure compensated, flow divider/ combiner. In the dividing mode, it equally splits input flow (D1) to each drive motor in parallel mode to provide constant drive for both motors. A seal kit is also available (Refer to Illustrated Parts Catalog).



Series/ Parallel Valve Manifold.

LIFT CYLINDER HOLDING VALVES

The holding valves are integrated into the upper side of the lift cylinders. The solenoid valve cartridges have a solenoid valve coil. Make certain that all power is off and that lift cylinder bears no load before repairing. Use maintenance prop attached to middle scissor arm.

CYLINDERS

There are four (4) hydraulic cylinders in this scissors lift circuit, including the steering, drive cushion, brake, and lift cylinder. All cylinders are of the double acting type, except the lift cylinder. Refer to the Mechanical Section of this manual for cylinder assembly and disassembly, repair or replacement procedures.

DRIVE MOTORS

There is a seal kit available if a drive motor leaks hydraulic fluid (Refer to Illustrated Parts Catalog).

SOLENOID VALVE CHECKS

To check solenoid operation:

1. Disconnect wires to solenoid.
2. Test resistance of coil. If resistance of coil is greater than 40 ohms, replace coil.

To check valve spool operation:

1. Connect one terminal or lead to battery ground source.
2. Connect power to other terminal or lead. When power is applied, you should be able to feel the spool shift while holding it in your hand. When current is removed, similarly, you should be able to feel the spool shift while holding it in your hand. If spool does not shift clean and/or replace.

To clean valve:

- Rinse in clean solvent and blow dry with air.

SECTION 3:
ELECTRICAL SYSTEM

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ELECTRICAL SYSTEM

The following section is a description of maintenance for the major components of this scissors lift electrical system.

BATTERY

Four 6 volt batteries supply the electrical current required to operate the electrical circuits for this scissors lift . They are composed of one set of four batteries each hooked up in series to supply 24 VDC.

BATTERY MAINTENANCE (IN STORAGE)

Follow these procedures for maintenance of batteries 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 batteries clean. Wash the top of each 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 batteries if there is an accumulation of acid.

BATTERY PREVENTIVE MAINTENANCE

Once a month, after batteries have been charged, spot check the specific gravity of two or more cells. A fully charged battery should indicate 1.265

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 KEYSWITCH. THERE SHOULD BE NO POWER TO THE MACHINE.
Always disconnect the negative battery cables first.

Open battery door. Remove battery hold downs. 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 battery door. Secure batteries in position with wing nuts and battery hold downs. Connect battery cables. Close door.

BATTERY CHARGER

The battery charger supplied with this scissors lift 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 the proper electrical outlet. A green light turns on while charging the batteries. As they approach being fully charged, the green light dims, and the charger outputs a trickle charge. The charger DC output cord should remain connected to the batteries. Required charge time varies with depth of discharge.

⚠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.

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.

Due to the way these chargers are constructed, only basic troubleshooting is practical. Perform the following checks:

1. Make sure battery connections are electrically and mechanically sound.

2. Check AC source for power.

3. For models that have an exterior fuse, check it and replace it, if required, with one having the same rating.

4. Check battery condition. A highly sulfated battery may take some additional time before current begins to flow through it.

MOVEMENT ALARM (OPTIONAL)

The movement alarm is activated when any function is operated.

⚠WARNING

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

The movement alarm is mounted on the main electrical panel. To replace it, remove the movement alarm from the panel 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 mounted on the frame underneath the arm set. To replace the tilt sensor, remove it 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). The platform must be raised for tilt sensor to be energized.

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 tuntil the level bubble is centered.

DESCENT ALARM (OPTIONAL)

The descent alarm gives an audible warning when the platform is being lowered. It is located in the ground electrical box. To replace the descent alarm, remove it from the ground electrical box and disconnect the wires.

AUTOMATIC WARNING BEACON

The optional warning beacon has a strobe with an amber light. The beacon activates whenever the key is turned to the platform position. When the emergency stop button is pressed, the beacon deactivates.

RELAYS

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

LIMIT SWITCH

There is a limit switch located inside the undercarriage weldment. It limits drive functions to creep speed when the platform is raised.

ELECTRIC MOTOR

There is one electric motor (24 VDC, 4 HP, 3600 RPM). The motor only runs while operating the unit. It does not run while lowering the boom. It is not field reparable, and power should be traced to the motor. If there is power to the motor and it still does not run, replace it.

ELECTRICAL AND CONTINUITY CHECKS

To check continuity of a toggle switch:

1. Disconnect wires and connect one probe of ohm meter to connection on toggle switch and other probe on other connection.
2. When toggle is open, there should be no reading, and when closed there should be a low reading.

To check continuity of key switch:

1. Disconnect wires and connect one probe to common of key switch and the other probe to normally open terminal.
2. When switch is flipped, there should be a low resistance.

To check continuity of emergency stop button:

1. Disconnect wires and connect one probe of ohm meter to connection on button and other probe on other connection.
2. There should be no reading with the button pressed and a low resistance with it reset.

To check relay operation:

1. With one connection grounded, apply voltage to other relay connection.
2. Confirm normally closed contacts are opening, or normally open contacts are closing.

To check limit switch operation.

1. Disconnect wires.
2. With one probe of ohm meter to common and other probe to open contact, move limit switch arm. Low resistance should be seen.
3. With one probe of ohm meter to common and other probe to closed contact. Low resistance should be seen. Move limit switch arm and no resistance should be seen.

SECTION 4:
MECHANICAL COMPONENTS

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MECHANICAL COMPONENTS

Following is a description of the major mechanical components of this scissors lift. Refer to Undercarriage Component Locator for illustrations of the undercarriage.

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

This scissors lift uses 4.0" x 8"-3.75" solid rubber tires. Inspect tires for cuts, chunking, sidewall damage or abnormal wear. Any tire faults MUST BE CORRECTED before further machine operation.

CHANGING TIRES

1. Block tires on one end of unit and raise the other end of unit.
2. Loosen and remove lug nuts, and pull wheel.
3. Install the replacement wheel.
4. Fasten lug nuts, and tighten to proper torque (see Machine Specifications).
5. Lower the machine and remove the blocks.

WHEELS AND LUG NUTS

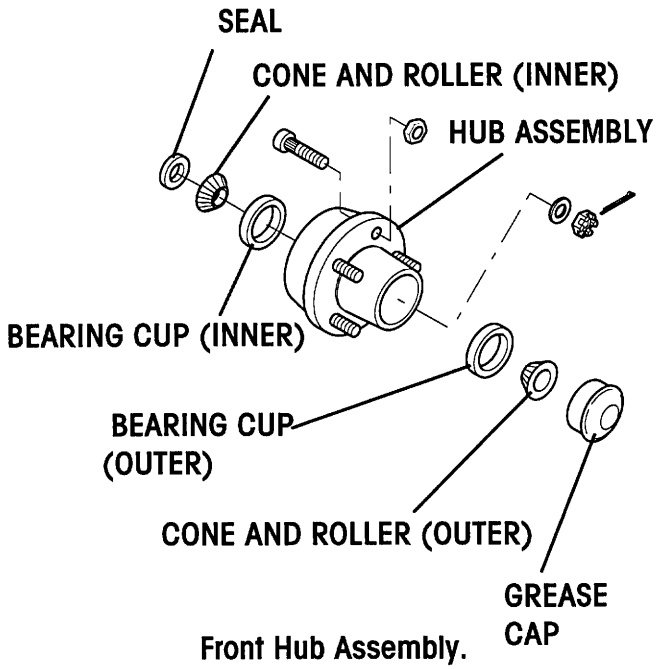
Check the torque of the wheel lug nuts (see Machine Specification for proper torque) and examine the wheel rims for tightness and damage.

FRONT HUB ASSEMBLY

The front hub assemblies for the right and left side are identical, but should not be interchanged. Each consists of a hub, an inner and outer bearing, wheel mounting studs, and seal, 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 grease cap.
4. Remove cotter pin, 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 bearing cone and roller .

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 bearings. Inspect them for signs of wear. If they are excessively worn or damaged, replace them.

9. Pack the inner and outer bearings with grease. (Refer to lubrication chart, earlier in this manual.)

10. Assemble the front hub and install it on the spindle assembly with cotter pin, castle nut and flat washer. Install grease cap.

11. Replace the wheels and tighten to proper torque. (Refer to "Machine Specifications".)

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.

⚠ CAUTION

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

1. Disconnect and plug the two hydraulic hoses and cylinder ports.

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. Connect the cylinder rods to the jackspindle assembly.

10. Unplug and reconnect the two hydraulic hoses.

BRAKE CYLINDER REPAIR

1. Disconnect and plug the hydraulic hose and cylinder port.

2. Unbolt cylinder base.

3. Disconnect brake shaft from brake cylinder rod by unscrewing it. Remove brake cylinder.

⚠ CAUTION

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

4. Remove rod end gland, as well as spring and piston.

5. Replace seals.

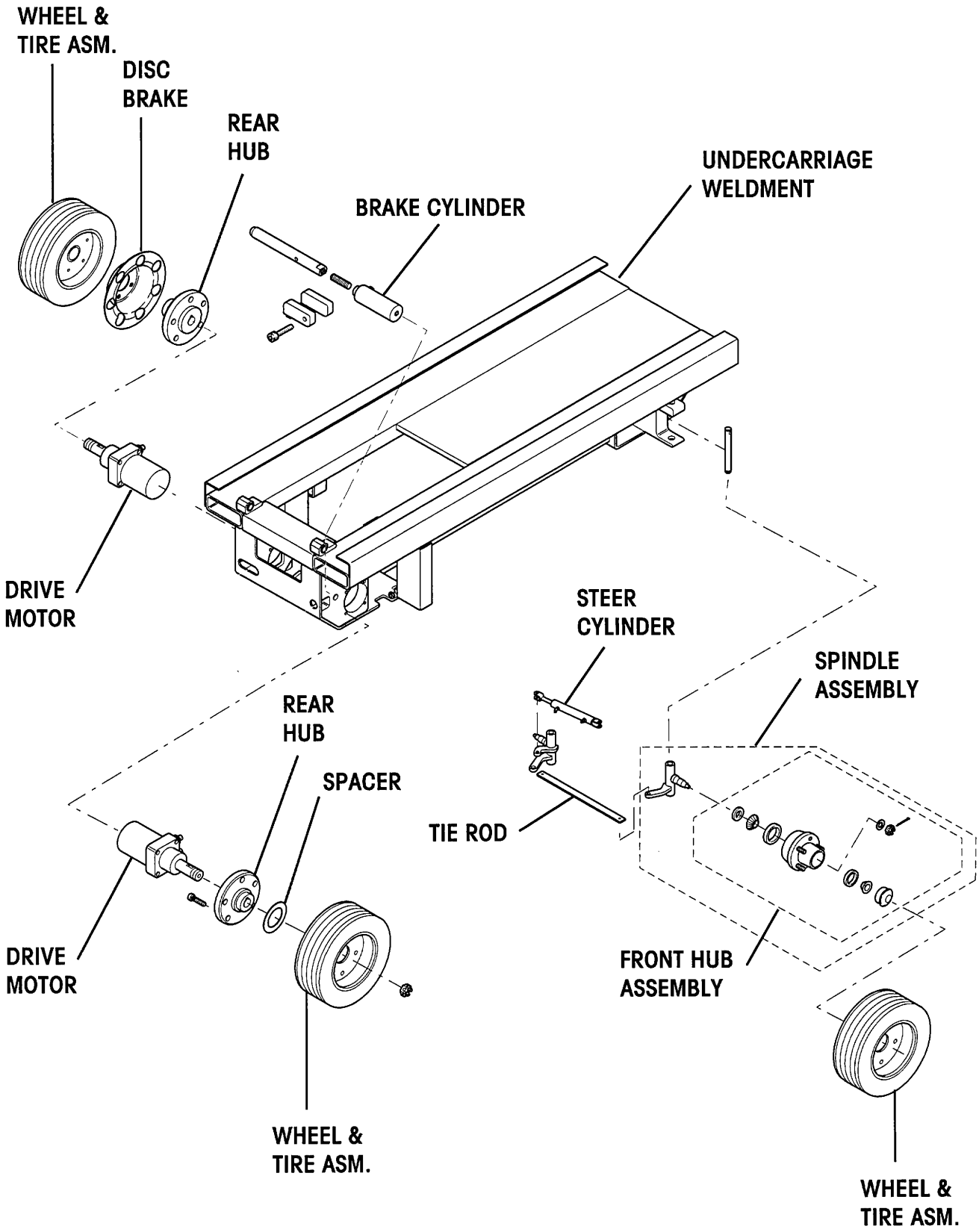
6. Carefully, slide the piston and springs into the cylinder body assembly.

7. Secure the end gland in place.

8. Bolt cylinder to chassis.

10. Screw in the brake shaft onto the brake cylinder rod.

11. Reconnect hydraulic hose.



Steer Assembly.

DRIVE MOTORS

The drive motors are not field repairable. If they are leaking or damaged, replace them. To remove them, the wheels must be removed before unbolting drive motors.

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.

PLATFORM REMOVAL

1. Raise platform about five feet and block the arms in the up position. Also, connect hoist to platform.

2. Disconnect 110 V cord (option) and platform control console.

3. Remove all platform electrical cabling from the platform by threading it through the access holes in the floor.

4. Remove the four (4) bolts from each platform pin bracket.

PLATFORM INSTALLATION

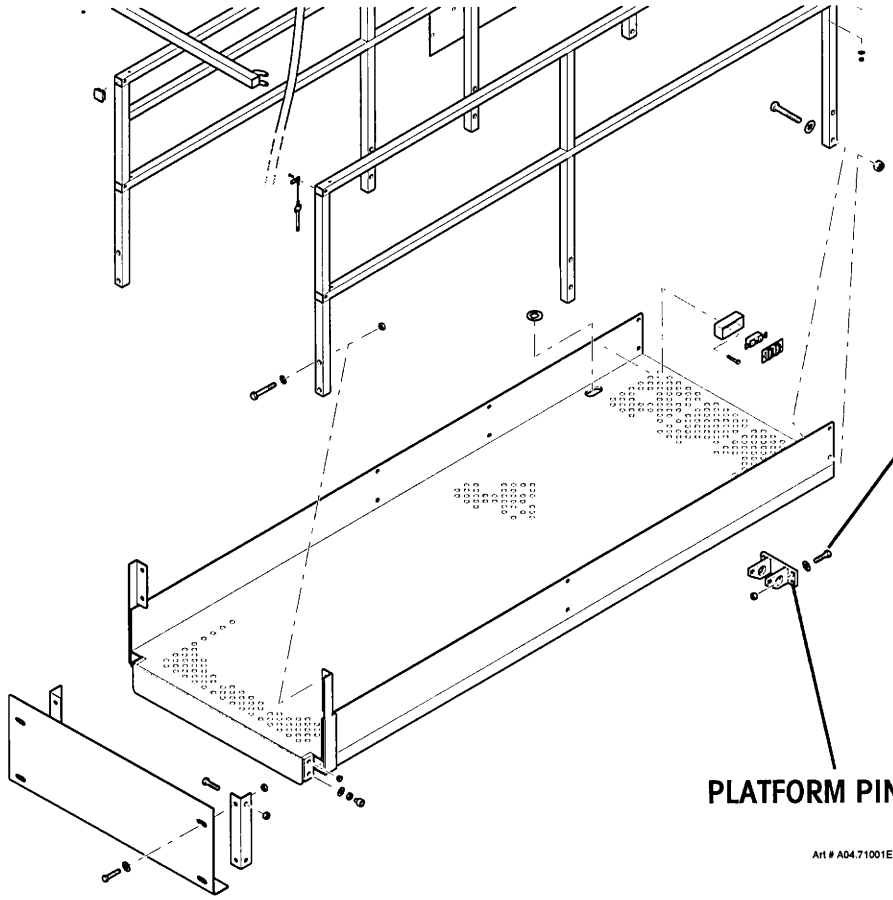
1. Secure platform pin brackets onto upper scissors arm.

2. Slide platform to back of machine.

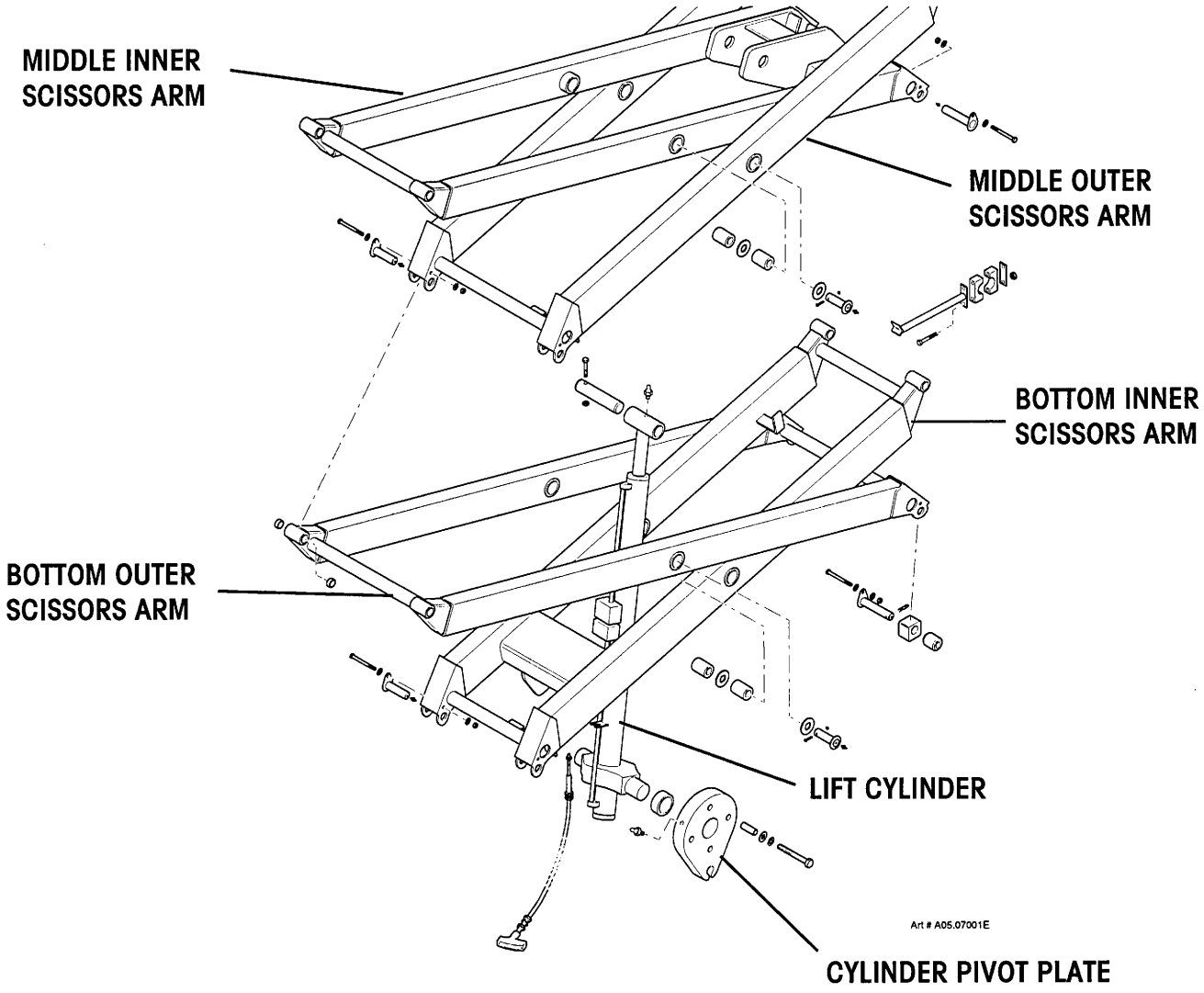
3. Secure platform to pin brackets with four (4) bolts, each.

PLATFORM ASSEMBLY/ DISASSEMBLY

Refer to Illustrated Parts Catalog for assembly and disassembly of the platform.



Platform Removal/ Installation.



Lift Cylinder Removal/ Installation.

LIFT CYLINDER REMOVAL

1. Support extended scissors arm assembly.
2. Disconnect hoses and wires to the lift cylinder.
3. Remove retaining bolt and rod end pin, and rest rod end of lift cylinder.
4. Remove bolts that attach lift cylinder pivot plates to lift cylinder and scissor arm assembly.
5. The lift cylinder is now free to be removed from the unit.

LIFT CYLINDER INSTALLATION

NOTE: Scissors arm assembly must be installed in the unit to perform this procedure.

1. Support extended scissors arm assembly.
2. Slide lift cylinder pivot plates onto lift cylinder and secure them to the lower scissors arm assembly with bolts.
3. Slide rod end of lift cylinder into position and secure it in place with pin and bolt.
4. Reconnect wires and hoses.

SCISSORS LIFT CYLINDER SEAL REPLACEMENT

1. Remove scissors lift cylinder.

⚠ CAUTION

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

2. Remove end gland from lift cylinder.
3. Remove cylinder shaft and piston.
4. Remove seals.
5. Replace scissors lift cylinder seals.
6. Replace cylinder shaft and piston.
7. Secure end gland to lift cylinder.
8. Replace scissors lift cylinder in the unit.

LIFT CYLINDER HOLDING VALVE REPLACEMENT

The holding valve is integrated into the upper side of the lift cylinder. The solenoid valve cartridge may require replacement. Make certain that all power is off and that lift cylinder bears no load before repairing.

SCISSORS

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

SCISSORS ARM REMOVAL

1. Remove platform.
2. Disconnect hoses and wires between scissors arms and undercarriage.
3. Remove lift cylinder completely.
4. Remove pin bolts from inner lower scissors arm and remove pivot pins (at rear of machine).
5. Slide scissors arm assembly about two inches before lifting it off of undercarriage.

NOTE: The scissors arm assembly need only be slid a short distance to free it. Be careful not to slide the bottom of the assembly into the exposed parts of the undercarriage.

SCISSORS ARM INSTALLATION

1. Slide outer scissors arm glides onto undercarriage rail.
2. Attach inner lower scissors arm with pins to undercarriage and secure them in place with pin bolts.
3. Install lift cylinder and platform.
4. Connect hoses and wires between scissors arms and undercarriage.

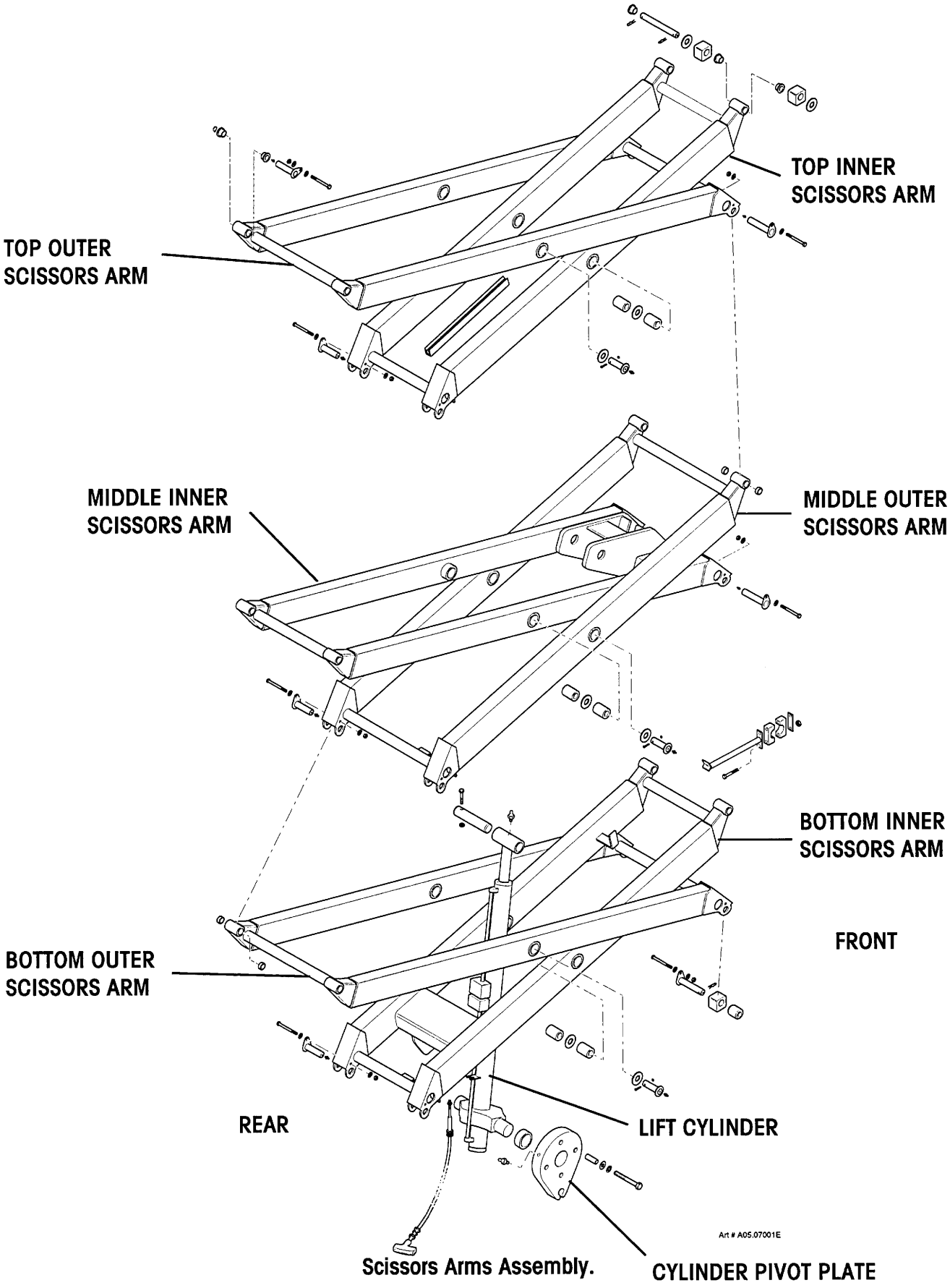
SCISSORS ARM DISASSEMBLY

There are three sets of arms that comprise the vertical lifting mechanism. Each set is to be replaced as a pair. If one scissors pin or bushing is suspect, check all pins and bushings for wear or damage.

1. Remove platform from scissors arms. (Refer to Platform Removal in this section.)
2. Remove scissors arm assembly from undercarriage. (Refer to Scissors Arm Removal in this section.)

NOTE: The scissors arm assembly should be fully lowered and standing on a firm, level surface.

3. Remove electrical cables and corresponding hardware from scissors arm assembly.
4. Remove retaining bolt and tap out center pivot pins from upper scissors arm.
5. Remove base pivot pin retaining bolts from outer top scissors arm assembly and pivot pins, and lift off outer top scissor arm.
6. Remove base pivot pin retaining bolts from inner top scissors arm assembly and pivot pins, and lift off inner top scissor arm.
7. Remove retaining bolt and tap out center pivot pins from middle scissors arm.
8. Remove base pivot pin retaining bolts from outer middle scissors arm assembly and pivot pins, and lift off outer middle scissor arm.
9. Remove base pivot pin retaining bolts from inner middle scissors arm assembly and pivot pins, and lift off inner middle scissor arm.
10. Remove retaining bolt and tap out center pivot pins from bottom scissors arm.


TOP INNER SCISSORS ARM
TOP OUTER SCISSORS ARM
MIDDLE INNER SCISSORS ARM
MIDDLE OUTER SCISSORS ARM
BOTTOM INNER SCISSORS ARM
FRONT
BOTTOM OUTER SCISSORS ARM
REAR
LIFT CYLINDER
Art # A05.07001E
Scissors Arms Assembly.
CYLINDER PIVOT PLATE

SCISSORS ARM ASSEMBLY

NOTE: For ease of assembly, coat the bushings and pivot pins with a thin coat of a high viscosity oil.

1. Inspect all pivot pins and bushings for wear or damage.

   - Replace bushings by splitting them and installing replacements with an arbor press, as required.

   - If any scissors arm is damaged or worn, it is necessary to replace inner and outer as a set.

   NOTE: Front end of outer lower scissors arm must be positioned below front end of inner lower scissors arm. Back end of outer lower scissors arm must be positioned above back end of inner lower scissor arm.

2. Tap in center pivot pins for bottom scissors arm and secure them in place with retaining bolts.

   NOTE: Front end of outer middle scissors arm must be positioned above front end of inner middle scissors arm. Back end of outer middle scissors arm must be positioned below back end of inner lower scissor arm.

3. Lift inner middle scissor arm onto bottom scissor arm assembly and install base pivot pins and retaining bolts for inner middle scissors arm assembly.

4. Lift outer middle scissor arm onto lower scissor arm assembly and install base pivot pins and retaining bolts for outer middle scissors arm assembly

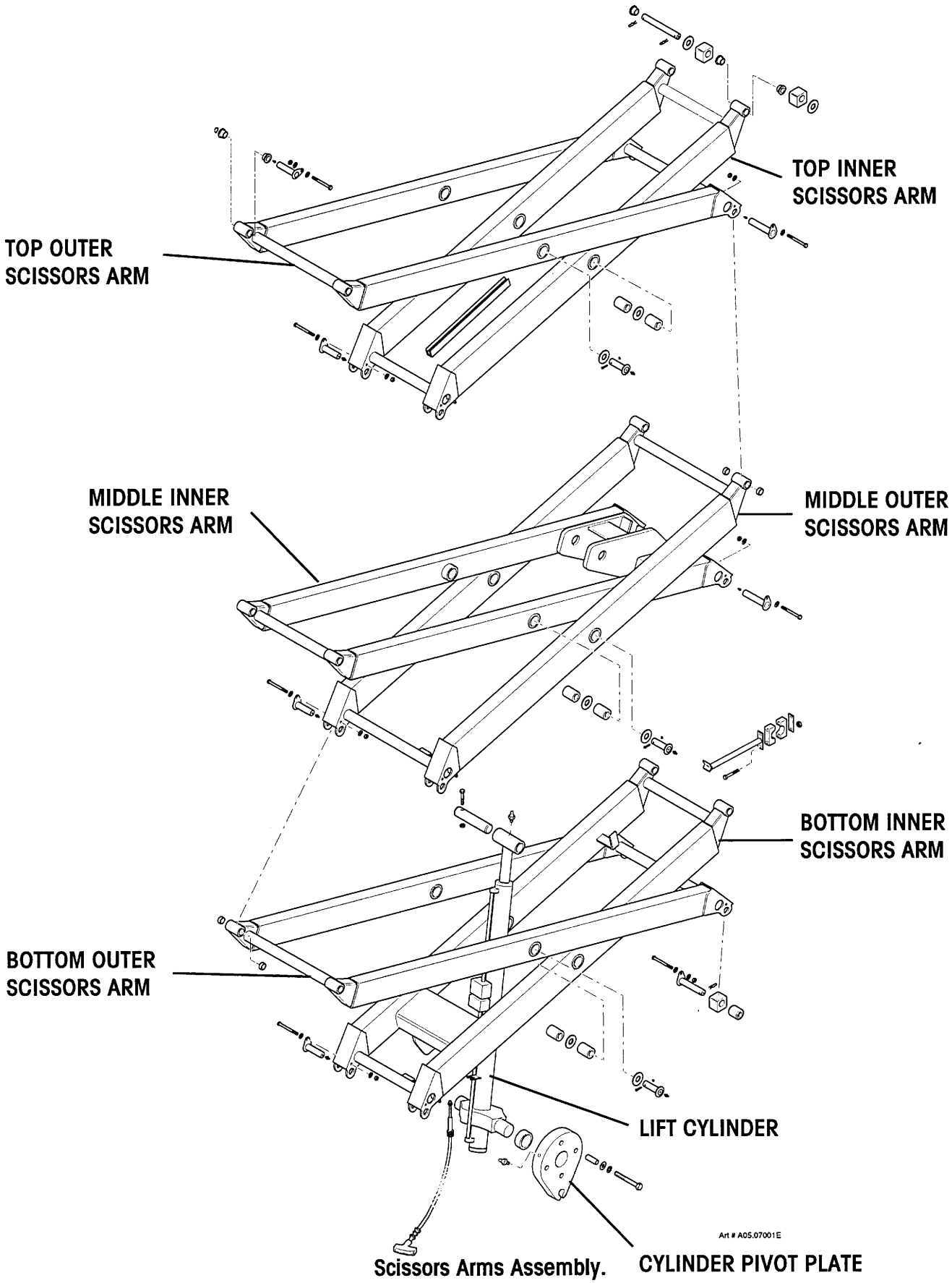
5. Tap in center pivot pins for middle scissors arm and secure them in place with retaining bolts.

   NOTE: Front end of outer upper scissors arm must be positioned below front end of inner upper scissors arm. Back end of outer upper scissors arm must be positioned above back end of inner upper scissor arm.

6. Lift inner upper scissor arm onto middle scissor arm assembly and install base pivot pins and retaining bolts for inner top scissors arm assembly.

7. Lift outer upper scissor arm onto middle scissor arm assembly and install base pivot pins and retaining bolts for outer top scissors arm assembly

8. Tap in center pivot pins for top scissors arm and secure them in place with retaining bolts.


TOP INNER SCISSORS ARM
TOP OUTER SCISSORS ARM
MIDDLE INNER SCISSORS ARM
MIDDLE OUTER SCISSORS ARM
BOTTOM INNER SCISSORS ARM
BOTTOM OUTER SCISSORS ARM
LIFT CYLINDER
Art # A05.07001E
Scissors Arms Assembly.
CYLINDER PIVOT PLATE

PIVOT PIN BUSHING REPLACEMENT

1. Disassemble the scissors.
2. Split the bushings with a hammer and chisel, and remove them.
3. Seat replacement bushings, using an arbor press.
4. Reassemble the scissors and grease the bushings (refer to lubrication chart).

CUSHION CYLINDER REPAIR

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 and 2 tubes.

⚠ CAUTION

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 springs 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. Reinstall cushion cylinder by connecting hydraulic lines and securing it in place with hose clamp.

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 "PLATFORM" or "GROUND" position, as appropriate.
- Check that battery connections are secure and battery is fully charged.
- Check that both Emergency Stop Buttons are released.
- Check that hydraulic fluid is at the correct level.
- Check that batteries are fully charged by power indicator.

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-13M is a multiple viscosity oil that is light enough for cold climates and resists thinning in warm climates.

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.	1. Excessive water in the hydraulic fluid.	1. Drain and flush hydraulic system. See Section 2, System Flushing Procedure.
	2. Improper oil viscosity.	2. Replace hydraulic fluid with the correct fluid. See Section 2, Fluid Recommendations.
	3. Improper lubrication and hydraulic fluid.	3. Drain and flush hydraulic system. See Section 2, System Flushing Procedure.
• Water in hydraulic fluid. Symptoms to watch for are: pitting and etching of pump gear causing heat build up and premature pump failure.	1. Damp climate or condensation in the reservoir.	1. Drain and flush hydraulic system. See Section 2, System Flushing Procedure.
	2. Hydraulic fitting or port open to contaminants.	2. Drain and flush hydraulic system. See Section 2, System Flushing Procedure. Replace worn pump. See Illustrated Parts Catalog.
• 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.	1. Incompatible fluids or poor quality fluids.	1. Drain and flush hydraulic system, then fill with recommended hydraulic fluid. See Section 2, System Flushing Procedure.
	2. Excessive heating of the fluids.	2. Drain and flush hydraulic system, then fill with recommended hydraulic fluid. See Section 2, System Flushing Procedure.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• 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.	1. Hydraulic fluid viscosity low.	1. Drain and flush hydraulic system, then fill with recommended hydraulic fluid. See Section 2, System Flushing Procedure.
	2. Improper or poor grade hydraulic fluid or lubricant without proper anti wear additives.	2. Drain and flush hydraulic system, then fill with recommended hydraulic fluid and lubricant. See Section 2, System Flushing Procedure.
• 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.	1. Low reservoir fluid level.	1. Add hydraulic fluid. See Section 2, Fluid Recommendations.
	2. Air leaks in suction line.	2. Tighten hose clamps on suction line.
	3. Improper hydraulic fluid.	3. Have fluid analyzed regularly and drain and flush hydraulic system, then fill with recommended hydraulic fluid. See Section 2, System Flushing Procedure.
	4. Vaporization of water.	4. Have fluid analyzed regularly and drain and flush hydraulic system, then fill with recommended hydraulic fluid. See Section 2, System Flushing Procedure.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No high speed function for lift or drive.	• Emergency stop button, key switch, high/ low speed toggle switch, high speed valve or coil (SV4), lift valve (SV7).	• Run continuity check on electrical components. See Section 3, Electrical and Continuity Checks. See High Speed Valve, and Lift Valve in Section 2, as well as Solenoid Valve Checks
	• No pump output.	• Replace pump. Refer to Illustrated Parts Catalog.
• No high speed function for drive only.	• High speed switch, limit switch, high speed valve or coil (SV4), or Series/ Parallel Valves faulty.	• Run continuity check on electrical components. See Electrical and Continuity Checks in Section 3, and High Speed Valve, Series/ Parallel Valves and Solenoid Valve Checks in Section 2.
• Movement alarm will not sound.	• Movement alarm, diodes or wiring faulty.	• Trace the available voltage to the horn. Replace the component(s) that are faulty. See electrical schematic in Appendix.
• Lift cylinders drift down.	1. Holding valve cartridge dirty or faulty.	1. Clean, repair or replace the holding valve. See Section 2, Lift Cylinder Holding Valves, and Solenoid Valve Checks.
	2. Cylinder packing is damaged.	2. Replace cylinder packing. Refer to Illustrated Parts Catalog.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No pump output.	1. Broken pump drive shaft.	1. Replace pump. Refer to Illustrated Parts Catalog.
	2. Fluid leaks.	2. Tighten hose clamps at pump inlet.
	3. Motor not turning.	3. Check battery voltage. • Disconnect motor from pump and check to see if it runs.
	4 Motor relay not engaging.	4. Check battery voltage. • Check for proper motor relay operation and replace if broken. See Electrical and Continuity Checks, Section 3.
• Hydraulic functions slow.	1. Low pressure.	1. Check for low system pressure and adjust to correct pressure. Refer to System and Steer Relief Valves in Section 2.
	2. Pump component failure.	2. Replace pump. Refer to Illustrated Parts Catalog.
	3. Excessive side gear clearance.	3. Replace pump. Refer to Illustrated Parts Catalog.
	4. Slow motor speed.	4. Check battery voltage. • Check for loose wire connections.
	5. Damaged pump.	5. Replace pump. Refer to Illustrated Parts Catalog.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Excessive pump pressure.	• Main relief valve.	• Readjust main relief valve. See System and Steer Relief Valves in Section 2.
• Pump noise or squeal.	1. Low pressure.	1. Check for low system pressure and adjust for correct pressure. See System and Steer Relief Valves in Section 2.
	2. Pump cavitation.	2. Check hydraulic reservoir oil level.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No steer function.	1. Steer toggle switch is bad.	1. See Electrical and Continuity Checks, Section 3.
	2. Directional valve (SV1) not shifting.	2. See Steer Valve, and Solenoid Valve Checks in Section 2.
	3. Faulty steer relief valve (RV1).	3. See System and Steer Relief Valves in Section 2.

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. Refer to Illustrated Parts Catalog.
	2. Steering directional control valve.	2. See Solenoid Valve Checks in Section 2.
	3. Toggle switch or directional coils have no voltage.	3. See Electrical and Continuity Checks in Section 3, and Directional Control Valve and Solenoid Valve Checks in Section 2.
	4. Faulty steer relief valve.	4. See System and Steer Relief Valves in Section 2.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No drive function.	1. Brake cylinder does not release.	1. Check pressure supply to brake cylinder. Install gauge in line at brake cylinder. If no pressure, consult factory.
	2. Series/ parallel valve(s) faulty.	2. See Electrical and Continuity Checks, Section 3. See Series/ Parallel Valves, and Solenoid Valve Checks, Section 2.
	3. Motor shaft key is sheared.	3. Inspect, repair or replace. Refer to Illustrated Parts Catalog.
	4. Drive directional control valves.	4 See Forward and Reverse Drive Valves, and Solenoid Valve Checks in Section 2.
	5. Toggle switch or directional coils have no voltage.	5. See Electrical and Continuity Checks in Section 3. See Forward and Reverse Drive Valves, and Solenoid Valve Checks in Section 2.
	6. Lift lockout valve (SV6) stuck in lift position.	6. See Lift Lockout Valve, and Solenoid Valve Checks in Section 2.
• Drives forward, but not reverse.	1. Faulty drive valve (SV2).	1. See Forward and Reverse Drive Valves, and Solenoid Valve Checks in Section 2.
	2. Low voltage at coils (SV2).	2. Check battery charge.
• Drives reverse, but not forward.	1. Faulty drive valve (SV3).	1. See Forward and Reverse Drive Valves, and Solenoid Valve Checks in Section 2.
	2. Low voltage at SV3.	2. Check battery charge

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Wheel drive motor failure.	1. Hydraulic Fluid.	1. Check for contamination of hydraulic fluid. See Hydraulic Fluid Analysis, Section 2. • 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. See Fluid Recommendations, Section 2.
	2. Wheel drive motor.	2. Wheel drive motor failure; replace motor. Refer to Illustrated Parts Catalog.
	3. Motor shaft key sheared.	3. Check, and replace if failed. Refer to Illustrated Parts Catalog.
• Unit will not go into high speed drive with boom lowered.	1. Speed range toggle switch in low.	1. Switch to high speed.
	2. Faulty limit switch.	2. Check switch. See Electrical and Continuity Checks, Section 3.
	3. Faulty high speed drive valve (SV4).	3. See High Speed Valve, and Solenoid Valve Checks in Section 2.
	4. No/low voltage at high speed drive coil.	4. Check battery charge.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No lift (hoist) function.	1. Toggle switch has no voltage.	1. Check voltage available to toggle switch. See Electrical and Continuity Checks, Section 3.
	2. Faulty cylinder.	2. Possibly plugged lines, cylinder ports or damaged cylinder packings. Inspect, repair or replace cylinder. Refer to Illustrated Parts Catalog.
	3. Main relief pressure setting too low.	3. See System and Steer Relief Valves in Section 2.
	4. Lift valve (SV7) stuck in open position.	4. See Lift Valve, and Solenoid Valve Checks in Section 2.
	5. No/low voltage at valve.	5. Check battery charge.
• No lower function.	1. Electrical problem.	1. Check for electrical problem by operating manual lower knob. If machine lowers, problem is electrical. See Electrical and Continuity Checks, Section 3, and electrical schematic in Appendix.
	2. Toggle switch or holding valve coil have no voltage.	2. Check voltage available to toggle switch. See Electrical and Continuity Checks, Section 3. See Solenoid Valve Checks in Section 2.
	3. Lift or holding valves.	3. See Lift Valve, Lift Cylinder Holding Valve, and Solenoid Valve Checks in Section 2.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Abrupt start or stop.	• Cushion cylinder.	• Check cushion cylinder for piston seal leakage. Repair as necessary. Refer to Illustrated Parts Catalog.
• Parking brake doesn't release.	1. Brake release shuttle not sealing. 2. Brake cylinder piston seal leaking.	1. Replace brake shuttle release valve. How????? 2. Check brake cylinder for piston seal leakage. Replace as necessary. Refer to Illustrated Parts Catalog.
• Parking brake doesn't engage.	1. Brake cylinder spring failure.	1. Check brake cylinder for broken spring. Repair or replace as necessary. Refer to Illustrated Parts Catalog.

SECTION 6:
MAINTENANCE SCHEDULE

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MAINTENANCE SCHEDULE

The Simon Scissors Lift control system 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.

⚠ DANGER

DEATH OR SERVERE INJURY MAY RESULT IF MACHINE OPERATED IN AN UNSAFE CONDITION. DO NOT OPERATE ANY MACHINE IF UNSAFE OPERATING CONDITION.

GENERAL MAINTENANCE TIPS

⚠ DANGER

NEVER PERFORM SERVICE ON PLATFORM-ELEVATED UNIT WITHOUT USING THE SELF-CONTAINED MAINTENANCE STAND!

ALLOW MAINTENANCE STAND TO DROP FROM END SCISSOR ARM AND LOWER PLATFORM UNTIL STAND IS SADDLED SECURELY ON CROSS TUBE.

- ALWAYS clean the surrounding area before opening hydraulic components.
- Never open a hydraulic system when there are contaminants in the air.
- Never leave components or hoses open. They must be protected from contamination (including rain) at all times.
- Use only recommended lubricants (see Lubrication Chart in front of this machine). Improper lubricants or incompatible lubricants may be as harmful as no lubrication.
- 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.

UNPOWERED RAISING OF PLATFORM

To repair or maintain many of the parts on the undercarriage, it is necessary to raise the platform. This procedure is to be followed in the event that the hydraulics don't raise the platform. The unit is not field repairable in this case.

1. Secure platform to an overhead lifting device with strap.
2. Raise the platform with an overhead lifting device and brace scissors arms.

FIRST THREE MONTHS OF OPERATION

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.

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

ROUTINE SERVICING

NOTE: The following recommendations are based on 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.

IMPORTANT: Make certain that the unit is inspected per the operational checklists at the end of this section.

SHIFT SERVICE

Hydraulic System

Before checking the hydraulic fluid level, ensure that the scissors arms are stowed in the traveling position, and the machine is standing on level ground. Fluid level must be to one inch from top of tank. Refer to Lubrication Chart for correct grade of hydraulic fluid.

After checking the hydraulic 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 tires are not damaged.

Platform Rails and Safety Gate

Check security of platform top rail and safety gate.

Steering

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

Pivot Pins

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

Test All Machine Systems

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

Test the operation of all lift/ lowerfunctions.

Checklist

Perform all items on the Shift Checklist found later in this section.

WEEKLY SERVICE

Hydraulic System

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

Check hydraulic 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.

Checklist

Perform all items on the Weekly Checklist found later in this section.

MONTHLY SERVICE

Chassis Bolts

Check all bolts for signs of looseness.

Cylinders

Check all cylinders for hydraulic fluid leakage.

Pivot Pins and Grease Fittings

Lubricate all pivot pins and grease fittings.

Platform Mounting

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

Checklist

Perform all items on the Monthly Checklist found later in this section.

SEMI-ANNUAL SERVICE

Lift Cylinder

Fully lower, then raise the platform. At each extreme position, check that there is no movement between cylinder rod and bearing housing, or between cylinder cap and tube.

Checklist

Perform all items on the Semi-Annual Checklist found later in this section.

ANNUAL SERVICE

Flexible Hoses

Inspect all hoses over their complete length. Replace any hoses showing looseness or corrosion at end fittings. Replace hoses with 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.

Clean or replace the suction hose, and close the drain tap. 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.

FOUR YEAR INTERVAL SERVICE

Pivot Pins and Bearings

Remove all pivot pins for examination. Check the pivot pin bearings with the pivot pins removed. Replace with the correct type of pins and bearings, as necessary.

SHIFT OPERATIONAL CHECKLIST

All checks must be completed before operation of the Simon Scissors Lift.

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 Scissors clean!!

⚠WARNING

THIS CHECKLIST MUST BE USED AT THE BEGINNING OF EACH SHIFT. 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 for missing parts, cracked or broken welds, torn or loose hoses, hydraulic fluid leaks, torn or disconnected wires and damaged tires. Replace components as necessary.
_____	2. Inspect the entire machine for signs of damage, broken welds, loose bolts, improper or makeshift repairs.
_____	3. Open battery covers on both sides. Check battery charge level and connections.
_____	4. Check hydraulic fluid level with the unit in stowed position.
_____	5. Check tires for damage.
_____	6. Check if wheel lug nuts are tight.
_____	7. Check hoses and cables for worn areas.
_____	8. Check platform rails and safety gate for damage.

Continued on following page . . .

SHIFT OPERATIONAL CHECKLIST (CONTINUED)

INITIAL	DESCRIPTION
_____	9. Check pivot pin covers for security.
_____	10. Check that all warning and instructional labels are legible and secure.
_____	11. Check that the tilt alarm is working properly (if so equipped).
_____	12. Check the ground controls for proper operation.
_____	13. Check the emergency lowering system for proper operation.
_____	14. Check the platform controls for proper operation.

ADDITIONAL MAINTENANCE REQUIREMENTS FOR HARSH ENVIRONMENTS

INITIAL	DESCRIPTION
_____	15. Check hydraulic system for leaks every 8 hours of operation.

WEEKLY OPERATIONAL CHECKLIST

All checks must be completed before operation of the Simon Scissors Lift.

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 Scissors clean!!

⚠WARNING

THIS CHECKLIST MUST BE USED AT WEEKLY INTERVALS OR EVERY 25 HOURS, WHICHEVER OCCURS FIRST. 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 Shift Operational Checklist.
_____	2. Check battery electrolyte level and specific gravity. A fully charged battery should have a specific gravity of 1.265.
_____	3. Check wheel lug nuts for proper torque.

ADDITIONAL MAINTENANCE REQUIREMENTS FOR HARSH ENVIRONMENTS

INITIAL	DESCRIPTION
_____	4. Lubricate all grease fittings (see Lubrication Chart).
_____	5. Lubricate all steering linkages and pivot points.

MONTHLY OPERATIONAL CHECKLIST

All checks must be completed before operation of the Simon Scissors Lift.

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 Scissors clean!!

⚠WARNING

THIS CHECKLIST MUST BE USED AT MONTHLY INTERVALS OR EVERY 100 HOURS, WHICHEVER OCCURS FIRST. 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 Shift and Weekly Operational Checklists.
_____	2. Lubricate all grease fittings (see Lubrication Chart).
_____	3. Lubricate all steering linkages and pivot points.
_____	4. Inspect condition of hydraulic fluid in the reservoir. Oil should have a clear amber color.
_____	5. Check the electric motor brushes.
_____	6. Check pin joints and retaining bolts for security.
_____	7. Check hydraulic system pressure.
_____	8. Visually inspect power wheel mounting bolts. Bolts should be flush to retainer, with no gap between retainer and hub flange.

SEMI - ANNUAL OPERATIONAL CHECKLIST

All checks must be completed before operation of the Simon Scissors Lift.

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 Scissors clean!!

⚠WARNING

THIS CHECKLIST MUST BE USED AT SIX MONTH INTERVALS OR EVERY 500 HOURS, WHICHEVER IS SOONER. 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 Shift, Weekly and Monthly Operational Checklists.
_____	2. Have hydraulic fluid sample analyzed at a test laboratory. Comply with test results and recommendations to ensure long, trouble free operation. **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 overall platform stability.
_____	4. Clean and lubricate all electrical switches with an electrical contact cleaner and ensure that the switches operate freely in all positions.
_____	5. Check the electrical mounting and hardware connections through arms and within undercarriage for security.
_____	6. Replace return filter element.
_____	7. Repack rear wheel bearings.

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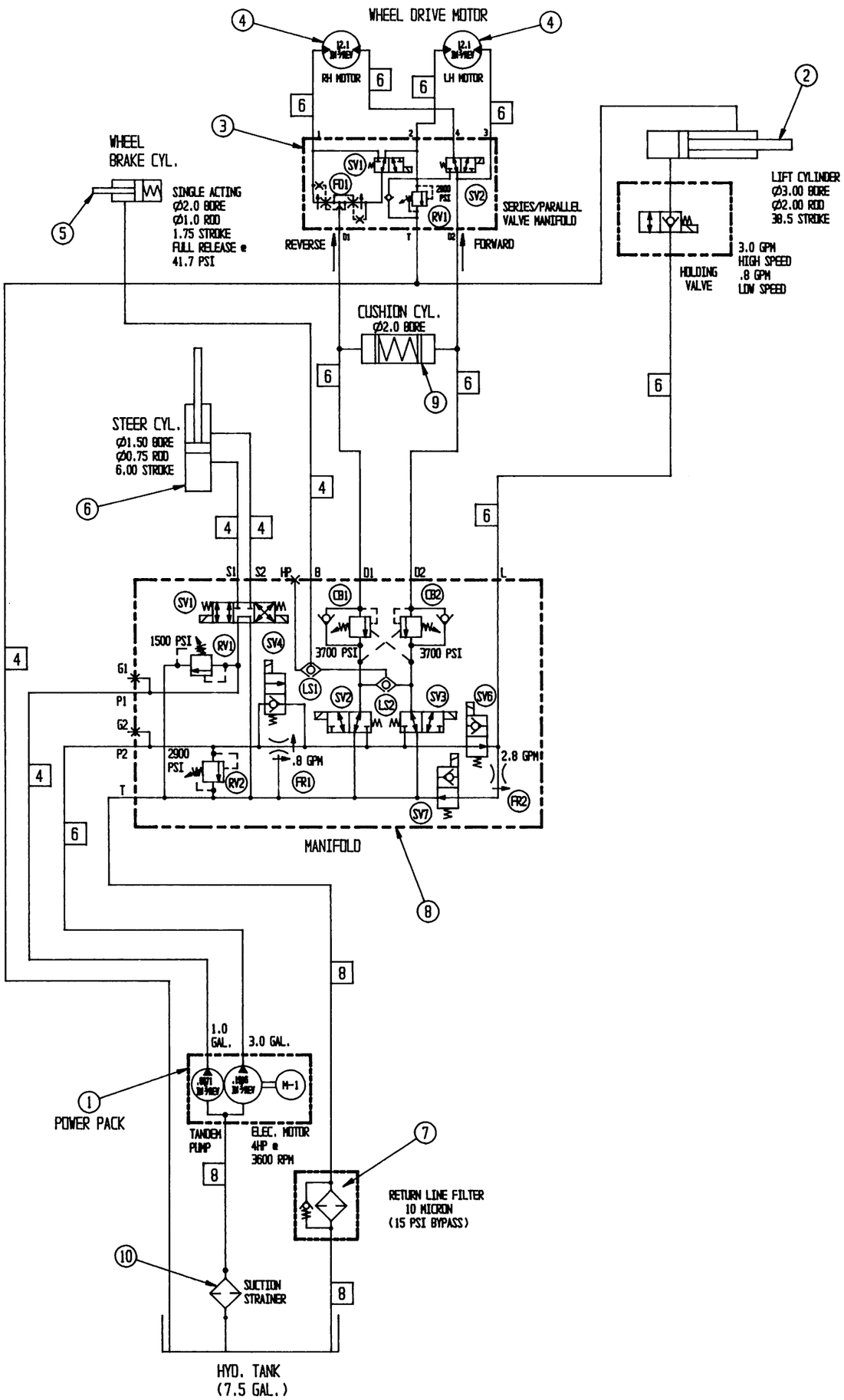
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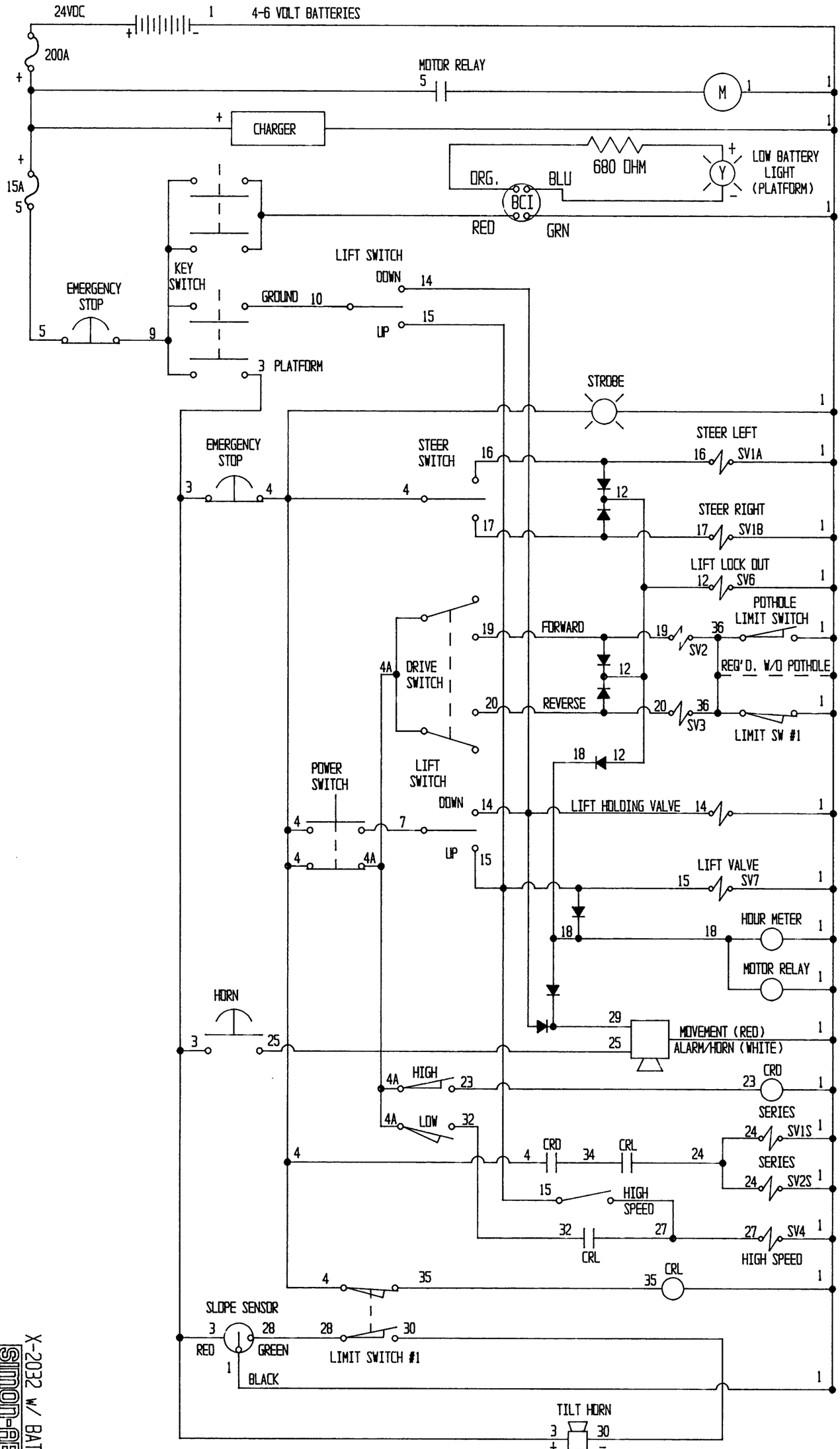
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REVISION	TITLE	SIMON-AERIALS INC. MILWAUKEE, WI. 53224
DRWG. NO. D-2340980	HYDRAULIC SCHEMATIC	X-2032



X-2032 W/ BATT. COND. IND.

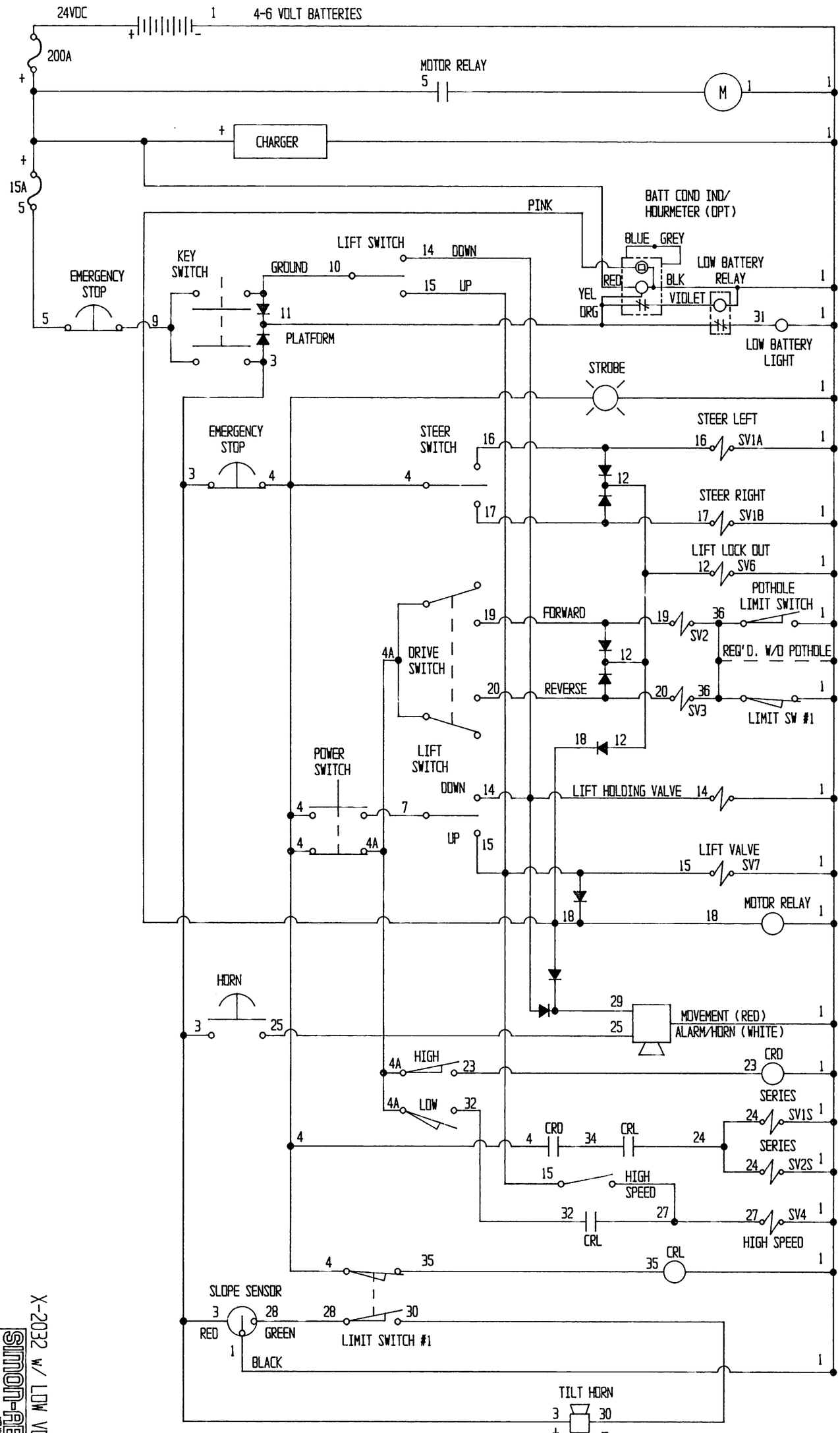
SIMON-AERIALS INC.

MILWAUKEE, WI. 53209

TITLE: ELECTRICAL SCHEMATIC

REVISION: B

DRWG. NO.: B-2340620



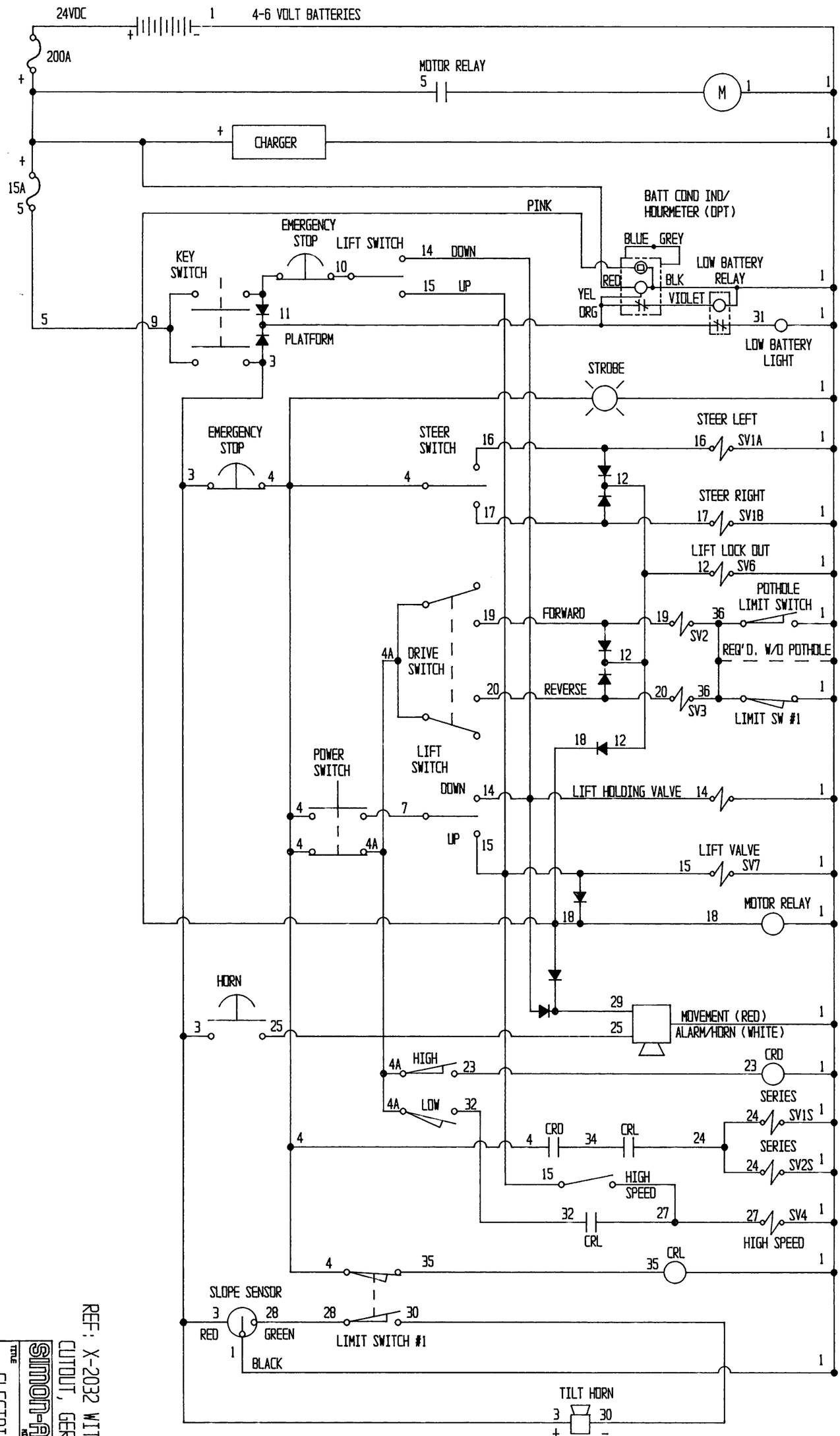
X-2032 w/ LOW VOLTAGE CUTOUT

SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE: ELECTRICAL SCHEMATIC

REVISION: B

DRWG. NO.: B-2347220

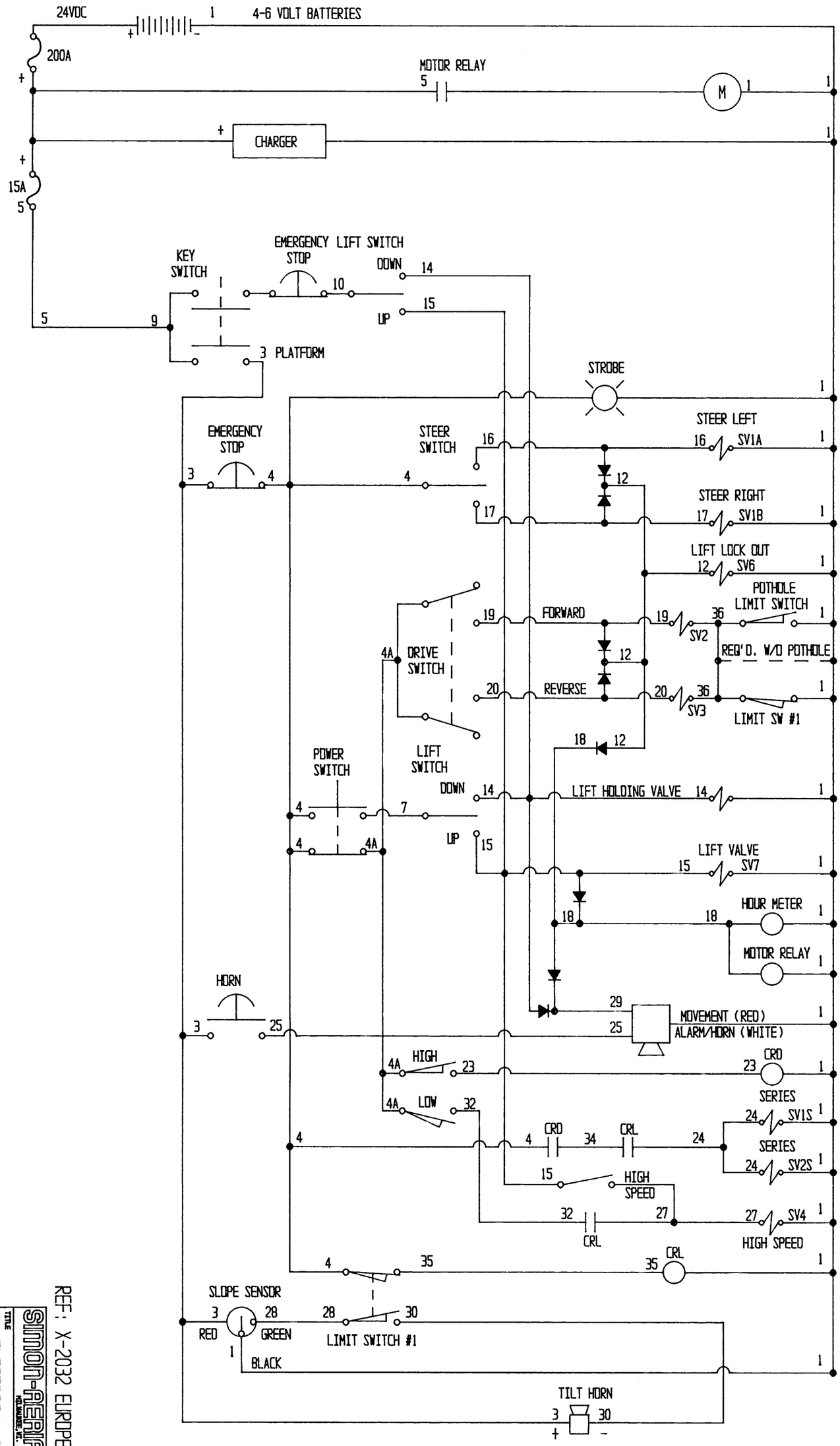


REF: X-2032 WITH LOW VOLTAGE CUTOUT, GERMAN SPEC.

REVISION	DRWG. NO.
A	B-2290060

SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE
ELECTRICAL SCHEMATIC



REF: X-2032 EUROPEAN SPEC.

REVISION	A
DRWG. NO.	B-2290070
TITLE	ELECTRICAL SCHEMATIC

SIMON-AERIALS INC.
NO. MILWAUKEE, WI. 53224