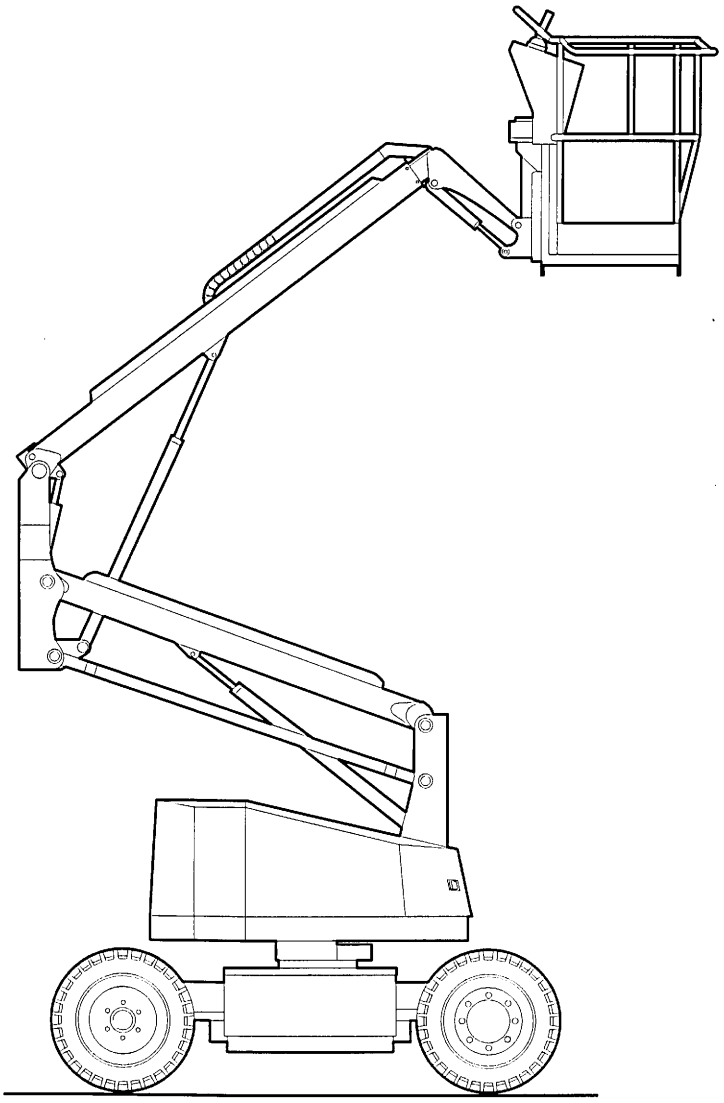
EAGLE 32/21E

TECHNICAL MANUAL



(U.S.) Part No. 89-411778 • Rev. A, March 1996 •

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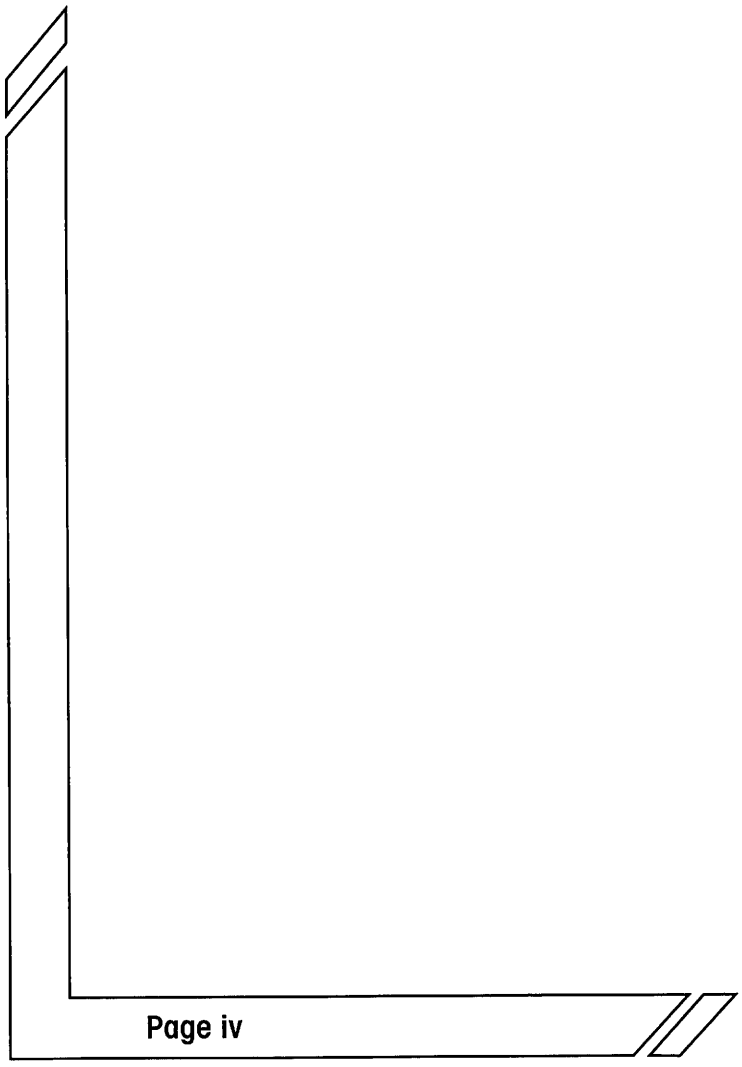
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INTRODUCTION

This Technical Manual has been designed to provide you with the instructions needed to properly and safely maintain your Simon 32/21E.

⚠ DANGER

THIS TECHNICAL MANUAL MUST BE READ AND UNDERSTOOD PRIOR TO SERVICING YOUR SIMON 32/21E.

OPERATORS MUST BE AWARE OF AND COMPLY WITH ALL MANUFACTURER'S INSTRUCTIONS AND APPLICABLE OSHA/ANSI (OR APPROPRIATE GOVERNMENT) SAFETY GUIDELINES.

FAILURE TO COMPLY WITH MANUFACTURER'S INSTRUCTIONS AND OSHA/ANSI (OR APPROPRIATE GOVERNMENT) SAFETY GUIDELINES WILL RESULT IN SERIOUS INJURY OR DEATH.

Your Simon 32/21E has been designed, built, and tested to provide many years of safe, dependable service. To obtain the full benefit of your machine, always follow the proper operating and maintenance procedures as outlined in this manual. Only trained, authorized personnel should be allowed to operate or service this machine. Service personnel should read and study this manual and the Operator's Manual in order to gain a thorough understanding of the functions of the machine prior to making any repairs.

⚠ DANGER

MODIFICATIONS TO THIS MACHINE FROM THE ORIGINAL DESIGN AND SPECIFICATION WITHOUT WRITTEN PERMISSION FROM SIMON ARE STRICTLY FORBIDDEN. A MODIFICATION MAY COMPROMISE THE SAFETY OF THE MACHINE, SUBJECTING USERS TO SERIOUS INJURY OR DEATH. ANY SUCH MODIFICATION WILL VOID ANY REMAINING WARRANTY.

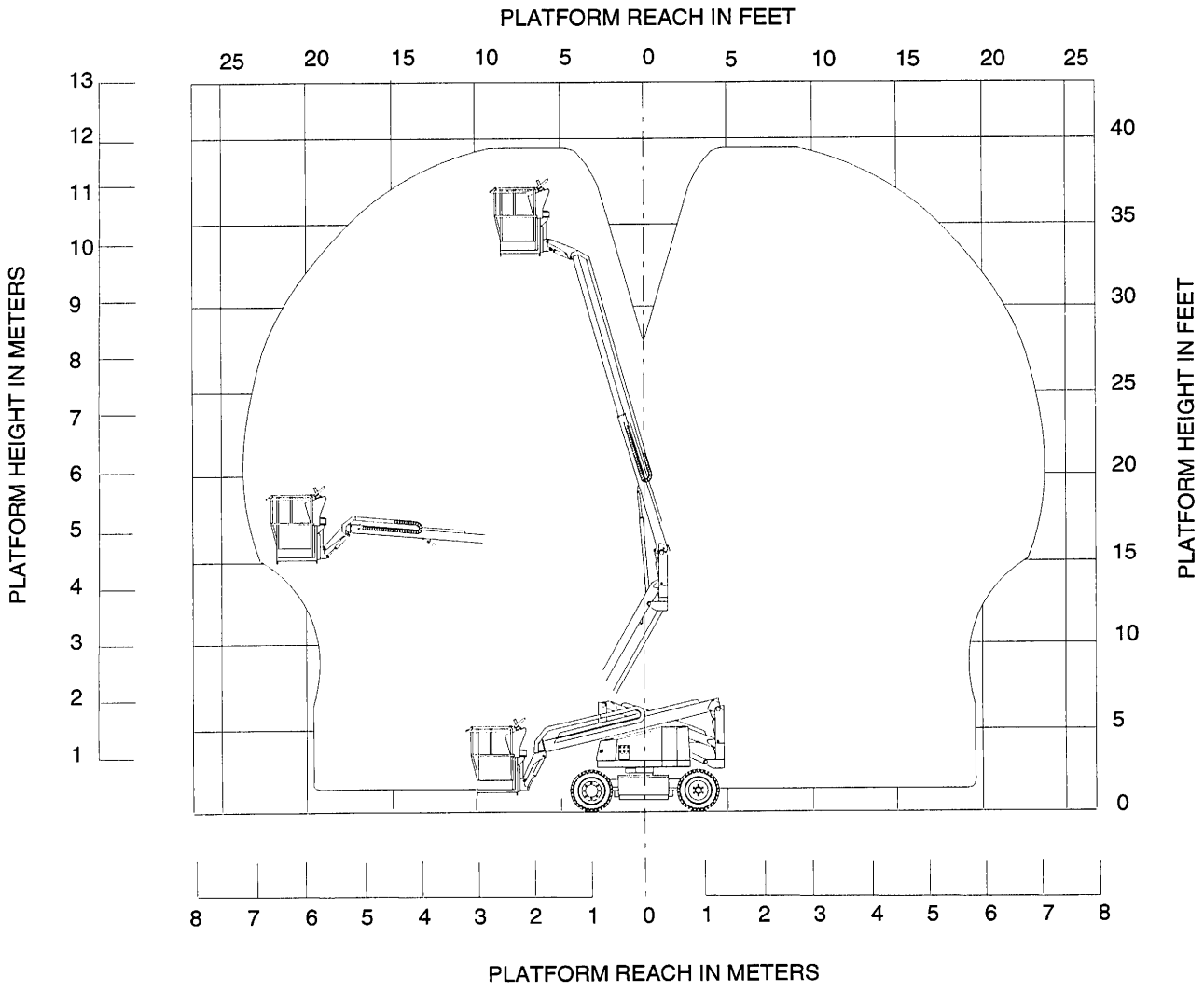
Simon reserves the right to change, improve, modify or expand features of its equipment at any time. Specifications, models or equipment are subject to change without notice, and without incurring any obligations to change, improve, modify or expand features of previously delivered equipment. All Simon manuals are periodically updated to reflect changes that occur in the equipment. Please contact the factory with any questions you may have regarding your machine, or the availability of more recent manuals.

MACHINE SPECIFICATIONS

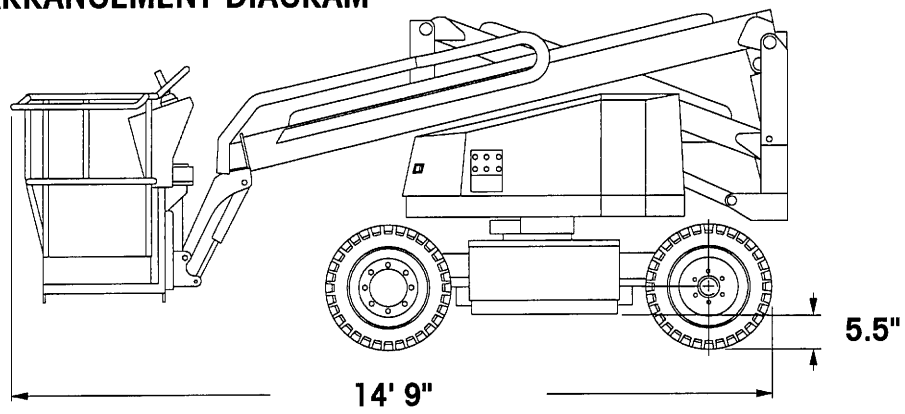
Working Height	**39 Ft 3 In./** 12.00 M
Platform Height	**32 Ft 10 In./** 10.00 M
Horizontal Reach	**23 Ft 3 In./** 7.10 M
Stowed Height	**6 Ft 6 In./** 1.97 M
Stowed Length	**14 Ft 9 In./** 4.50 M
Platform Capacity (Unrestricted)	**500 LBs./** 225 kg
Platform Dimensions (Standard)	**47 In. X 24 In./** 1.20 M X 0.60 M
Platform Dimensions (Optional)	**59 In. X 24 In./** 1.5 M X 0.60 M
Width	**5 Ft 11 In./** 1.80 M
Outside Turning Radius	**12 Ft 9 In./** 3.90 M
Ground Clearance	**5.5 In./** 14 cm
Gross Vehicle Weight (Approx.)	**10,163 LBs./** 4,610 kg
Superstructure Rotation	**360 ° Non-Continuous**
Travel Speed-Platform Stowed	**3.0 MPH/** 5.0 KPH
Travel Speed-Platform Elevated	**0.5 MPH/** 0.8 KPH
Gradeability (on hard surface) (ref. page vi)	**14°/ 25%**
Tires	**250 - 15 (Solid)**
Hydraulic Fluid Capacity	**6.9 GAL./** 26.0 Liters
Hydraulic Operating Pressure	**2610 PSI/** 180 Bar/ 183 kg-cm^2
Hydraulic Pump Output	**2.6 GPM/** 10 LPM
Power System (Electric)	**Eight 6-Volt Batteries (48VDC) @ 217 Amp/ Hr**
Battery Charger	**40 Amp, Automatic**
Electric Pump Motor	**5.0 HP/** 3.7 kw
Steer Wheel Nut Torque	**275 Ft-LBs/** 203 Nm/ 38 kg-m
Drive Wheel Nut Torque	**194 Ft-LBs/** 143 Nm/ 26.8 kg-m
Swing Bearing Bolt Torque	**163 Ft-LBs/** 120 Nm/ 22.5 kg-m

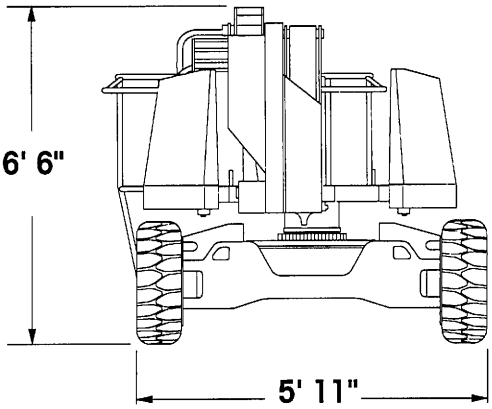
MACHINE DIAGRAMS

RANGE DIAGRAM

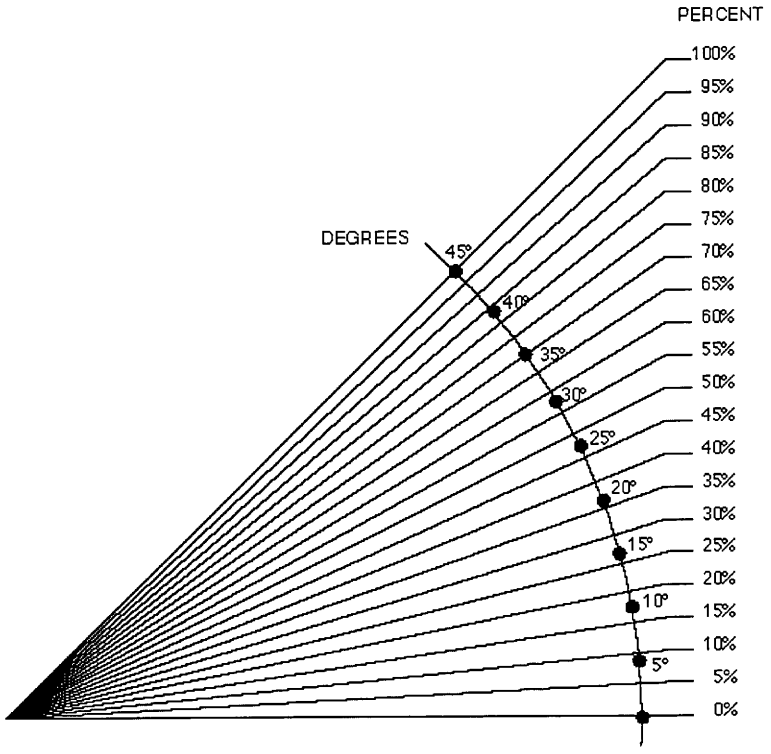


GENERAL ARRANGEMENT DIAGRAM





GRADEABILITY CONVERSION CHART



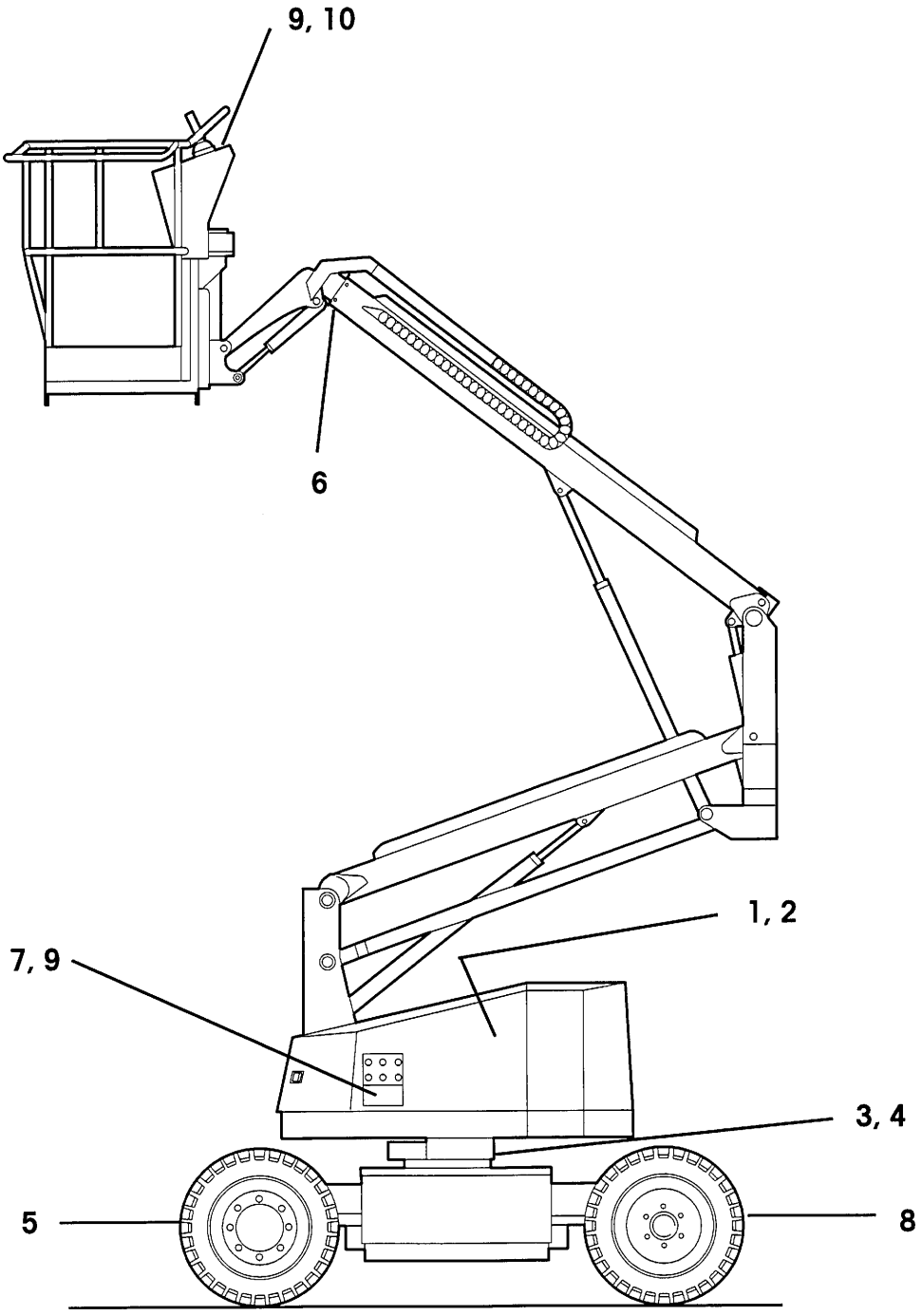
LUBRICATION CHART

NO.	ITEM	SPECIFICATION AND QUANTITY	FREQUENCY OF LUBRICATION
1.	Hydraulic reservoir	Shell TELLUS 32 to "Full" mark with all cylinders retracted.	Check each shift. Analyze every six (6) months or 500 hours*†. Change yearly or every 1,000 hours.*†
2.	Hydraulic filters	Filter elements.	Change every six (6) months or 500 hours.*†
3.	Swing bearing (grease outside of swing gear at 180°)	Lithium N.L.G.I. #2 EP. Purge old grease.	Monthly or every 100 hours.*†
4.	Swing bearing gear teeth	"Keystone-Moly 29 Open Gear Compound" Coat gear faces.	Monthly or every 100 hours.*† Clean every six (6) months or 500 hours.*
5.	Axle, drive gearbox, disconnect, and planetary ends	SAE 80/ 90 APIGL5.	Check monthly or every 100 hours.*† Change yearly or 1,000 hours.*
6.	Boom wear pads	Silicone spray.	Monthly or every 100 hours.*†
7.	Hydraulic control handle pivot pins	WD 40 Spray or equivalent penetrating oil.	Monthly or every 100 hours.*
8.	Steering spindles (king pin bearings)	Lithium N.L.G.I. #2 EP. Disassemble and pack.	Monthly or every 100 hours.*†
9.	Valve spool linkage	WD 40 Spray or equivalent penetrating oil.	Monthly or every 100 hours.*
10.	Electrical switches	Electrical Contact Cleaner	Clean and Lubricate every six (6) months or 500 hours*.

* Whichever occurs first.

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

LUBRICATION DIAGRAM



SECTION 1: TRANSPORTATION AND EMERGENCY PROCEDURES

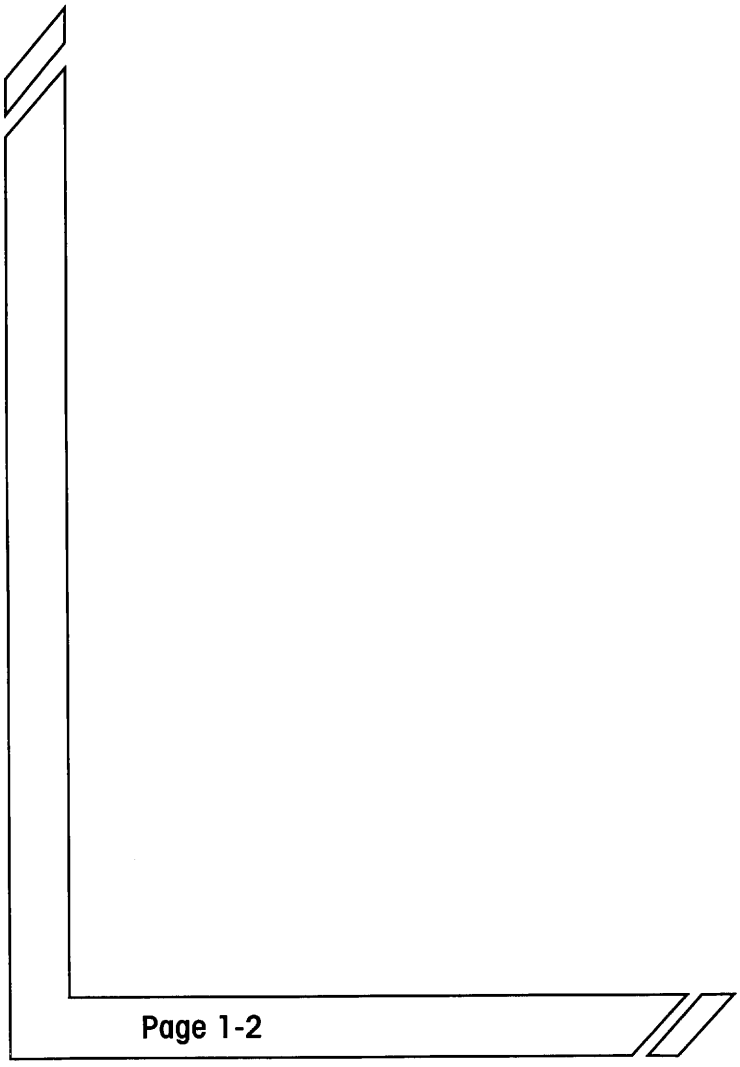


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TRANSPORTING THE UNIT

TRUCK OR TRAILER TRANSPORT

⚠WARNING

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

THE WINCH OPERATOR AND UNIT OPERATOR MUST COORDINATE MOVEMENT WHILE LOADING THE UNIT. AVOID THE POSSIBILITY OF THE WINCH TRYING TO PULL A STATIONARY MACHINE.

1. Enter the platform.

2. Raise the boom so that the platform will clear any obstacles as the machine is driven up the loading ramp. It may be necessary to raise the boom to allow greater ground clearance.

3. Carefully maneuver the unit onto the truck or trailer with the aid of a winch.

4. Confirm that the boom sections are fully retracted, and that the platform will not contact any other item, including the bed of the truck or trailer.

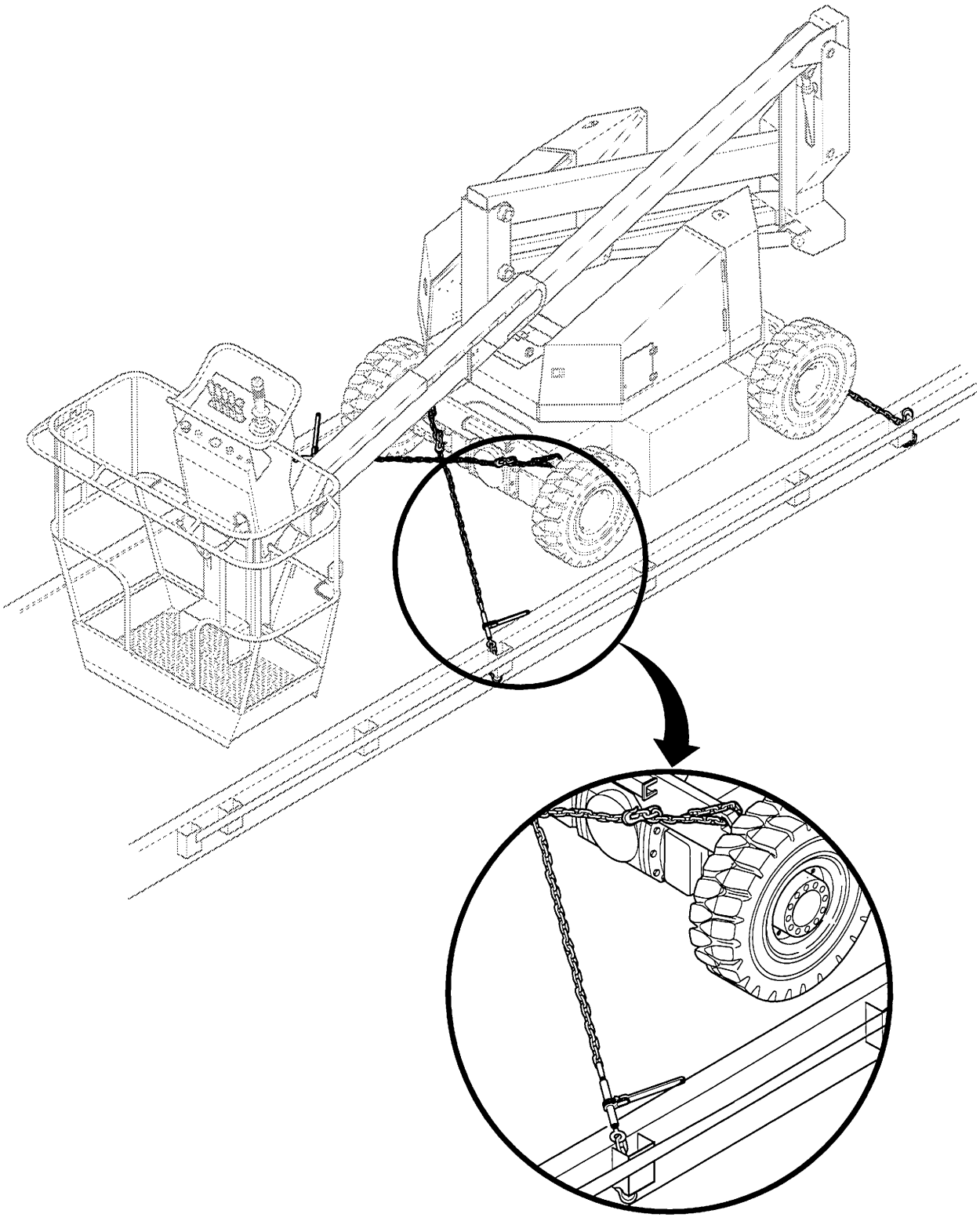
⚠ CAUTION

The platform or boom must not be tied down to the truck or trailer bed in any way.

5. The negative battery cables should be disconnected for long distance transport.

6. Tie down locations are located on all four corners of the undercarriage. Use four (4) 1/2 inch, "Grade 7" chains from each of the tie down lugs, and run the chains as shown in the diagram. (Refer to illustration on facing page.)

   Ratchet type load binders are recommended. If using lever type load binders, wire or strap them shut, or wrap chains around them to prevent opening.



Tie Down of Unit (Recommended Method).

UNLOADING PROCEDURES

⚠WARNING

TO AVOID SERIOUS PERSONAL INJURY OR DEATH, ENSURE THAT THE MACHINE IS IN "CREEP" DRIVE SPEED WHILE UNLOADING FROM A TRUCK OR TRAILER.

- 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 swing bearing bolts are tight (refer to Machine Specifications).
- Unlock and open rear compartment. Inspect all electrical and hydraulic connections for damage and security.
- Connect battery cables to batteries if required. Check electrolyte level.
- Check fluid level of the hydraulic tank, and add fluid as required (see Lubrication Chart).
- Close rear compartment cover.
- 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. CONNECT WINCH CABLE TO THE TIE DOWN LUGS ON THE UNDERCARRIAGE. UNASSISTED LOADING OR UNLOADING OF ANY MOBILE PLATFORM IS NOT RECOMMENDED.

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

UNLOADING PROCEDURES (CONTINUED)

- Remove all machine tie downs. Remove wheel chocks, if used. Switch the Ground/ Platform keyswitch to "PLATFORM CONTROLS".

- Enter the platform. Test all platform functions.

- Raise the boom so that the platform will clear any obstacles as the machine is driven down the loading ramp.

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

  NOTE: The brakes are automatically released for driving, and will automatically apply when the unit stops.

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

EMERGENCY SYSTEM AND PROCEDURES

⚠ DANGER

IF THE MACHINE FAILS WHILE THE OPERATOR'S PLATFORM IS RAISED OR EXTENDED, DO NOT ATTEMPT TO CLIMB DOWN THE BOOM ASSEMBLY. SERIOUS INJURY MAY RESULT.

EMERGENCY PUMP

This machine has an emergency pump which can be operated from the ground control station to briefly operate the machine when the unit has lost power.

Ground Operation:

- Screw in (turn clockwise) appropriate knob on manifold to shift valve.
- Pump emergency hand pump located on top of the hydraulic tank to perform the desired function.

EMERGENCY ROTATION

The emergency rotation system is performed by a mechanical override or the emergency pump.

For the mechanical override procedure, use a 30 mm socket, extension and ratchet handle attached to the hexagon extension shaft of the rotate drive gearbox.

For the emergency pump procedure, activate the emergency pump and engage the valve closest to the platform on the superstructure valve control bank.

⚠ CAUTION

Care should be taken not to override the electrical rotation stop to avoid damaging the hoses which pass through the rotation ring. Always rotate the machine to the normal stowed position by the shortest route. After using emergency rotation, check hoses for damage.

UNPOWERED EMERGENCY VEHICLE MOVEMENT

- Every attempt should be made to restore primary power to the unit before using this procedure.

⚠ DANGER

THIS PROCEDURE REQUIRES RELEASING THE MACHINE BRAKES, WHICH RESULTS IN NO MEANS TO STOP THE UNIT'S TRAVEL. SIMON RECOMMENDS USING THIS PROCEDURE ONLY IN CASES OF EMERGENCY, AND ONLY FOR A SHORT DISTANCE.

BE AWARE OF UNIT RUNAWAY ON SLOPING SURFACES. MOVEMENT SPEED SHALL NOT EXCEED 3 M.P.H. (5 K.P.H.).

1. Secure the unit to the tow vehicle with chains or ropes.

   This machine is equipped with tie down lugs (front and rear) that can be used for towing the unit. The chains or ropes must be of sufficient capacity to move the unit.

⚠WARNING

ALWAYS CHOCK THE WHEELS BEFORE YOU RELEASE THE BRAKES TO PREVENT UNEXPECTED MACHINE MOVEMENT ON SLOPES.

2. Block/chock wheels.

3. Release brakes and disconnect transmission by fully screwing in (turning clockwise) the disengage plug located in the center of both rear wheel hubs. Use a 6 mm hexagon key.

   After unblocking the wheels, the machine will be ready to be moved: however, there is no provision for steering the vehicle.

- After primary power has been restored to the vehicle, fully unscrew (turning counter-clockwise) the disengage plug with a 6 mm hexagon key.

- The machine is now ready for normal operation.

EMERGENCY PROCEDURES

It is not possible for us to foresee every emergency situation that could arise during operation of this machine. Information on the following pages describes three typical 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: Platform elevated, operator not incapacitated, but machine will not operate properly using the platform controls.

POSSIBLE CONDITION:

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

CORRECTIVE ACTION

1. Remove foot from foot switch.
2. Press the red emergency stop button.
3. Evaluate the nature of the failure.
4. If unable to return to the ground using the platform controls, contact an experienced operator to lower the machine using the emergency pump and lowering procedure (see "Emergency Pump" earlier in this section).

⚠ DANGER

DO NOT TRY TO CLIMB DOWN THE BOOM.

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

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

SITUATION: Unit elevated, with operator incapacitated at platform controls.

⚠ DANGER

DO NOT TOUCH UNIT !!!

TRY TO 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. **Before attempting emergency lowering procedure, check to see if the operator is:**
   - **in a pinned position, or**
   - **would be endangered if platform is moved.**
4. After establishing that the machine is not in contact with live power lines, lower the platform or move the unit as necessary, using emergency procedures (see "Emergency Pump", earlier in this section).
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: Platform in contact with live power lines and operator incapacitated.

⚠ DANGER

DO NOT TOUCH UNIT !!!!

CORRECTIVE ACTION

1. Have someone summon first aid or rescue squad.
2. Contact authorized personnel to disconnect power supply touching machine.
3. **Before attempting emergency lowering, check to see if the operator is:**
   - **in a pinned position, or**
   - **would be endangered if platform is moved.**
4. AFTER POWER IS CUT, lower the platform or move the unit as necessary, using emergency procedures (see "Emergency Pump", earlier in this section).
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, BY A DOCTOR FAMILIAR WITH THIS TYPE OF INJURY, WITHIN A FEW HOURS.

FLUID RECOMMENDATIONS

We strongly recommend the use of SHELL TELLUS T22 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.

FLUID CONTAMINATION CHECKS

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 content.
- 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 insure that you receive accurate recommendations about the fluid being analyzed, always provide the following information with the test sample.

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

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

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

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

SYSTEM FLUSHING PROCEDURE

⚠WARNING

BLOCK THE WHEELS TO PREVENT UNEXPECTED MOVEMENT OF THE MACHINE.

1. With BOOMS DOWN AND FULLY RETRACTED (in stowed position), 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 hose to pump, emergency pump hose, telescope retract return hose, vent (return) hose for telescope cylinder, manifold return hose, drive hose from pump with the tee for motor drain.
3. Remove all hoses between pump and high pressure filter.
4. Flush the hoses.
5. Remove hydraulic fluid filter, and flush the filter body and attaching hoses. Discard old filter element and replace.
6. With hoses removed from the hydraulic tank, flush out the tank.
7. Reinstall all the hoses removed in the previous steps EXCEPT the return lines to tank. Temporarily tie hoses together and position these hoses so that they will drain into a clean container.
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 and fill the hydraulic tank with filtered, fresh hydraulic fluid (refer to Lubrication Chart).
9. Open the suction line valve to allow fluid to flow to the hydraulic pump.
10. Loosen hose fittings at pump to allow pump to flood with hydraulic fluid. Tighten pump fittings.
11. Turn main power key switch to "ON" and the selector switch to the "GROUND" position.

⚠ CAUTION

Use care when operating functions as return hydraulic fluid is now being returned to container provided.

12. Cycle all cylinder functions to flush the hydraulic components of the hydraulic fluid. This will remove old fluid from the hydraulic system as the cylinder is cycled to its maximum limits.

⚠ CAUTION

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

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

13. Disconnect the return hoses for the drive motors. Tie the hoses together and let them drain into a clean container.

⚠ CAUTION

ALWAYS BLOCK THE WHEELS before you raise the machine.

14. Jack the front end of the unit so the front drive wheels are off the ground.

15. Turn the selector switch to "CAGE" and enter platform.

16. Activate the drive joystick to flush the drive circuit hydraulic components of the hydraulic fluid.

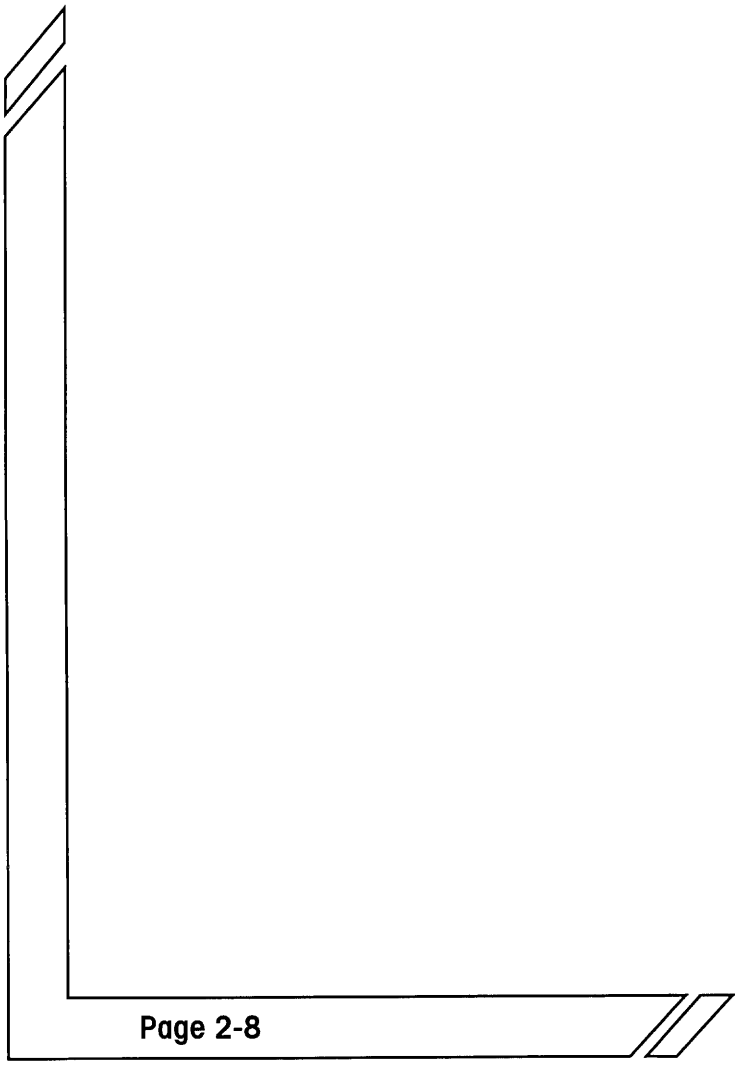
17. Activate the steer toggle switch to flush the steer cylinder of the hydraulic fluid.

18. When the above procedures have been completed, re-connect system return hose to tank.

19. Fill hydraulic tank to full mark on sight gauge.

20. Operate all functions to their full extreme positions to ensure proper operation.

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



HYDRAULIC SYSTEM COMPONENTS

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

HYDRAULIC PUMP

There are two pumps on the machine; the main hydraulic pump and the emergency pump.

MAIN HYDRAULIC PUMP

The main hydraulic pump is powered by a 48 VDC, 5 HP (3.7 kW) motor. The pump is rated at 2.6 gallons/ minute (10 liters/ minute) with a pressure of 2,611 PSI (180 bar).

EMERGENCY PUMP

The emergency pump is located on top of the hydraulic reservoir and is operated by hand. This pump delivers hydraulic fluid, under pressure, to the manifold assembly.

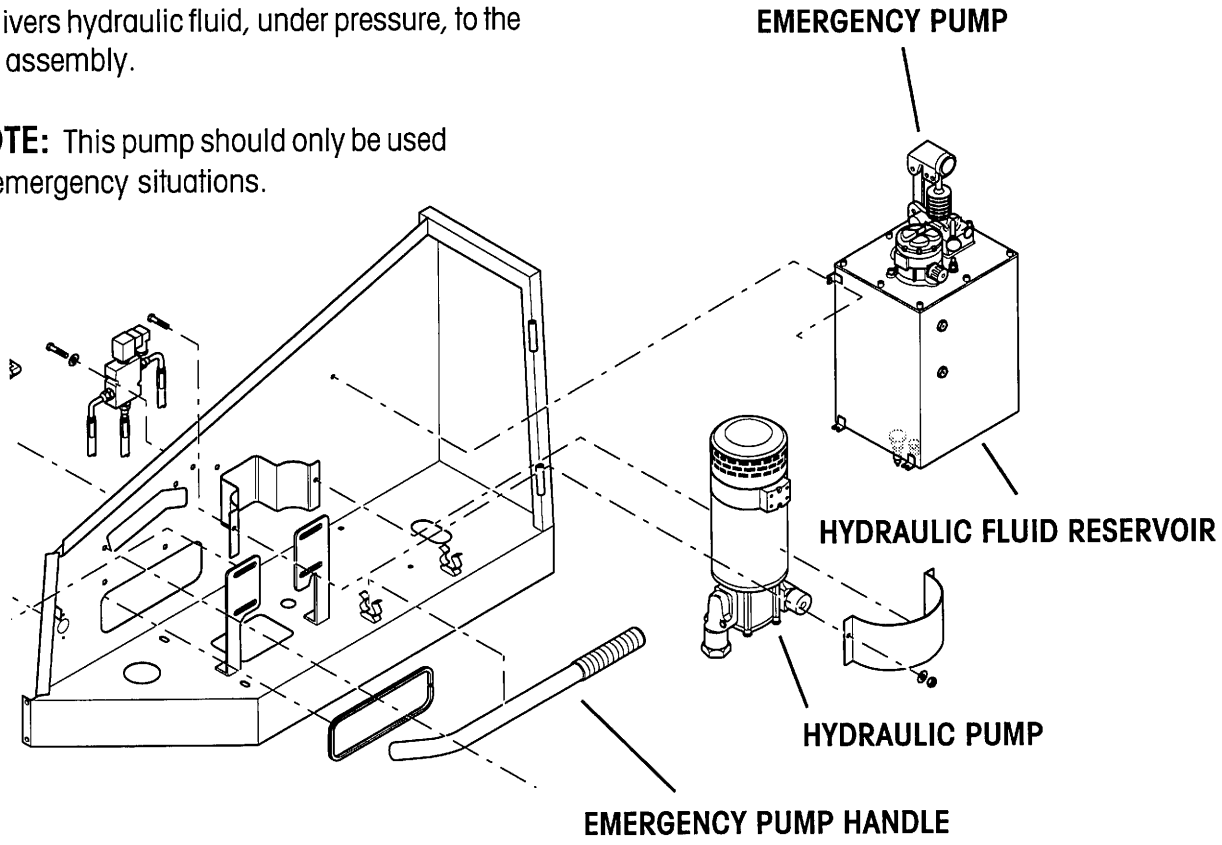
NOTE: This pump should only be used in emergency situations.

HYDRAULIC FLUID RESERVOIR

The hydraulic fluid reservoir is comprised of a filler cap with built-in strainer, a return line diffuser, a suction filter and an emergency hand pump. The hand pump is permanently connected into the hydraulic circuit for emergency use.

HYDRAULIC RESERVOIR MAINTENANCE

Check tank for signs of leakage. Clean cap filter by flushing with clean solvent and drying. Condensation should be drained from the tank monthly through the "drain cock'.



Hydraulic Components Location.

BOOM LIFT SYSTEM

The boom lift system consists of two hydraulic valve segments on the ground valve bank and at the platform controls with two levers (one for each boom segment), two lift cylinders with counterbalance (holding) valves.

PLATFORM DIRECTIONAL CONTROL VALVES

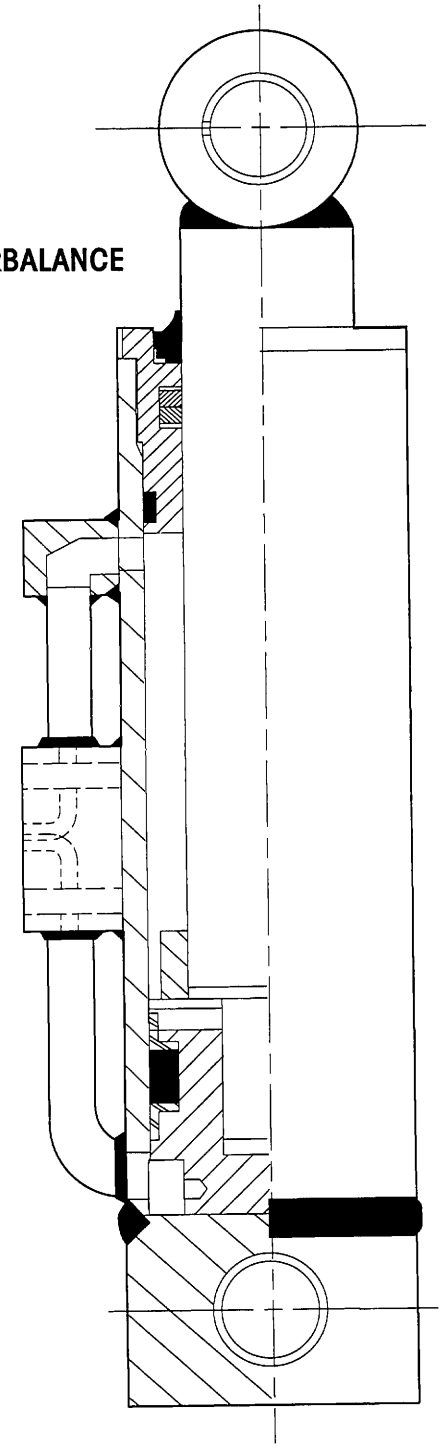
The platform directional control valves direct fluid to flow to the boom lift cylinders (for stage one or stage two) to provide hydraulic power for raising or lowering the booms. These valves are 3 position, 4 way manually operated valves. They can be cleaned with a solvent and blown dry with air. There is a seal kit available, but the valves cannot be adjusted.

GROUND DIRECTIONAL CONTROL VALVES

The ground directional control valves direct fluid to flow to the boom lift cylinders (for stage one or stage two) to provide hydraulic power for raising or lowering the booms. These valves are 3 position, 4 way manually operated valves. They can be cleaned with a solvent and blown dry with air. There is a seal kit available, but the valves cannot be adjusted.

LIFT CYLINDER

The two boom lift functions are controlled by double acting cylinders. Each cylinder contains a counterbalance (holding) valve, which will prevent unintended movement of the cylinder should a hose or fitting develop a leak. When a boom is lowered, fluid flows to the rod end cylinder port and to the counterbalance valve, opening this valve and allowing fluid in the base end of the cylinder to flow back to the hydraulic reservoir. When the boom section is raised, fluid flows to the base end cylinder port through a check valve.



Lift Cylinder.

BOOM TELESCOPE (EXTEND) SYSTEM

The boom telescope system consists of a hydraulic valve segment on the ground valve bank and platform controls, and a telescope cylinder with double-piloted check valves.

PLATFORM DIRECTIONAL CONTROL VALVE

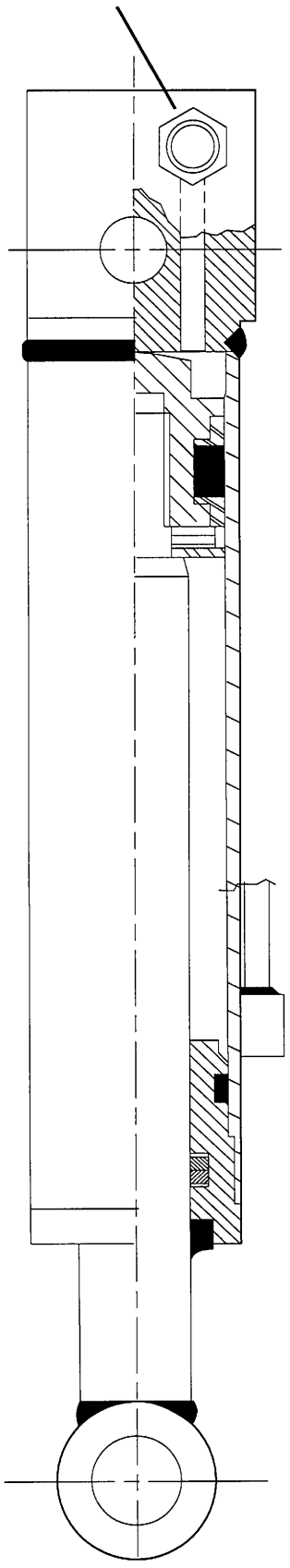
The platform directional control valve directs fluid to flow to the telescope cylinder to provide hydraulic power for extending or retracting the upper boom. This valve is a 3 position, 4 way manually operated valve. It can be cleaned with a solvent and blown dry with air. There is a seal kit available, but the valve cannot be adjusted.

GROUND DIRECTIONAL CONTROL VALVE

The ground directional control valve directs fluid to flow to the boom lift cylinders (for stage one or stage two) to provide hydraulic power for raising or lowering the booms. This valve is a 3 position, 4 way manually operated valve. It can be cleaned with a solvent and blown dry with air. There is a seal kit available, but the valve cannot be adjusted.

TELESCOPE (EXTEND) CYLINDER

A double acting telescope cylinder performs the extension and retraction of the boom. This cylinder contains double-piloted check valves, which prevent unintended movement of the cylinder should a hose or fitting develop a leak. When the boom is extended, fluid flows to the base end cylinder port and to the double-piloted check valves, piloting open one side of the valves and allowing fluid from the rod end of the cylinder to flow back to the reservoir.



Telescope (Extend) Cylinder.

SUPERSTRUCTURE SWING SYSTEM

The superstructure swing system consists of a hydraulic directional control valve in the platform valve bank assembly, a control main valve in the ground valve bank assembly, two directional flow control valves, and swing motor/ reducer and bearing.

PLATFORM DIRECTIONAL CONTROL VALVE

The platform directional control valve directs fluid to flow to the swing motor/ reducer to provide hydraulic power for rotating the superstructure. This valve is a 3 position, 4 way manually operated valve. It can be cleaned with a solvent and blown dry with air. There is a seal kit available, but the valve cannot be adjusted.

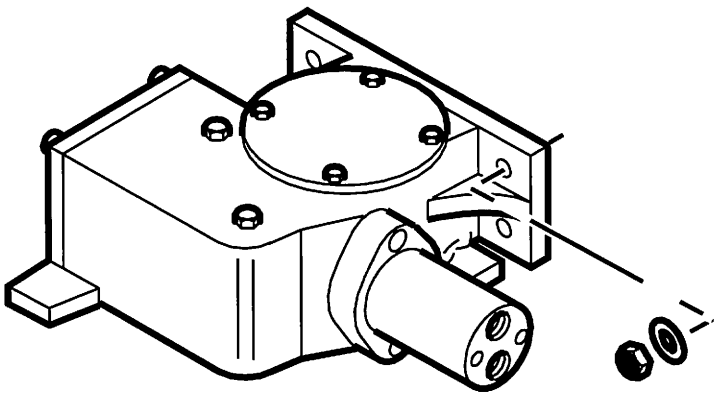
GROUND DIRECTIONAL CONTROL VALVE

The ground directional control valve directs fluid to flow to the swing motor/ reducer to provide hydraulic power for rotating the superstructure. This valve is a 3 position, 4 way manually operated valve. It can be cleaned with a solvent and blown dry with air. There is a seal kit available, but the valve cannot be adjusted.

SWING DRIVE MOTOR/ REDUCER ASSEMBLY

The worm gear swing reducer used allows the motor output to be reduced to a fractional speed and greatly reduces swing drive torque. This allows the superstructure to rotate at a slow controlled speed when fluid power is applied to the swing drive motor.

The swing reducer has an automatic built in lock to prevent superstructure rotation when the swing function is not desired.



Swing Drive Motor/ Reducer Assembly.

PLATFORM LEVEL SYSTEM

The platform level system consists of a level control valve, slave leveling cylinder with a counterbalance (holding) valve, master leveling cylinder.

The platform leveling system automatically keeps the platform level, using a master/ slave cylinder arrangement. As the boom is raised or lowered, fluid is forced from one cylinder to the other in a closed loop, which keeps the platform parallel to the ground in any boom position. Due to slight internal leakage, fluid may at times need to be added to the leveling circuit through the platform level control valve.

The platform level system is only controlled from the platform.

LEVEL CONTROL VALVE

This valve is a 3 position, 4 way valve which is manually operated. This control valve directs fluid flow to the level functions.

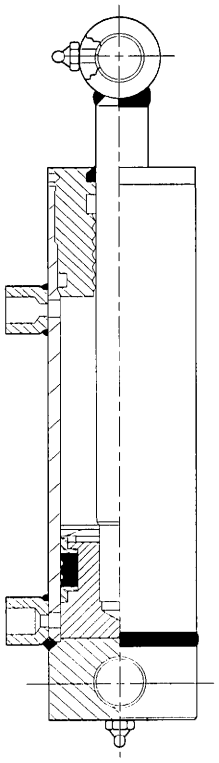
MASTER LEVEL CYLINDER

The master level cylinder is a double acting cylinder located between the upper frame of the superstructure and the boom. Whenever the boom is raised or lowered, the master cylinder is forced to extend or retract. The fluid displacement from the master level cylinder is in turn sent up the boom to the slave level cylinder. This forces the slave level cylinder to move the same distance as the master level cylinder.

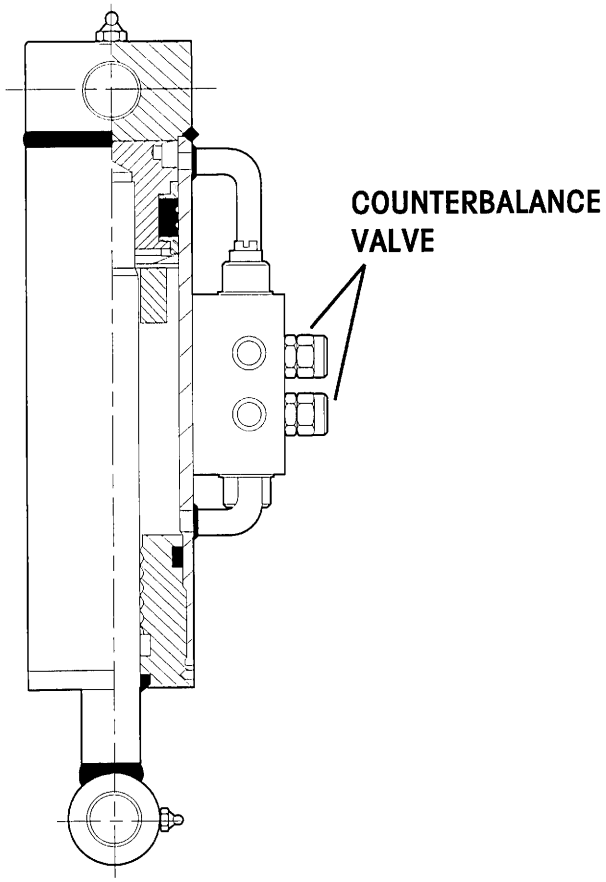
SLAVE LEVEL CYLINDER

The slave level cylinder is a double acting cylinder located between the tip boom and the platform. This cylinder controls the position of the platform relative to the tip boom.

The slave level cylinder contains two holding valves. The holding valves prevent platform movement in the event of hose failure.



Master Levelling Cylinder.



Slave Levelling Cylinder.

STEER SYSTEM

The steering system consists of a steer valve segment, a steer cylinder, a steer toggle switch on the pendant control and a steer rocker switch on the drive lever at the platform control console.

STEER VALVE SEGMENT

When the steer control rocker switch on the platform control or the steer control toggle switch on the control pendant, is activated an electrical signal is transmitted to the valve cartridge in the steer segment. This allows hydraulic fluid to be sent to the steer cylinder.

STEER CYLINDER

The cylinder is double acting and is directly connected to the steering linkage assembly. This cylinder powers all steering movements.

STEER SYSTEM MAINTENANCE

Check all pins on steering linkage and steer cylinder for excessive play, and ensure that all clips are in place and secure.

Lubricate linkage as required (see Lubrication Chart).

Check cylinder and hoses for hydraulic fluid leakage and security.

PLATFORM ROTATION SYSTEM (OPTION)

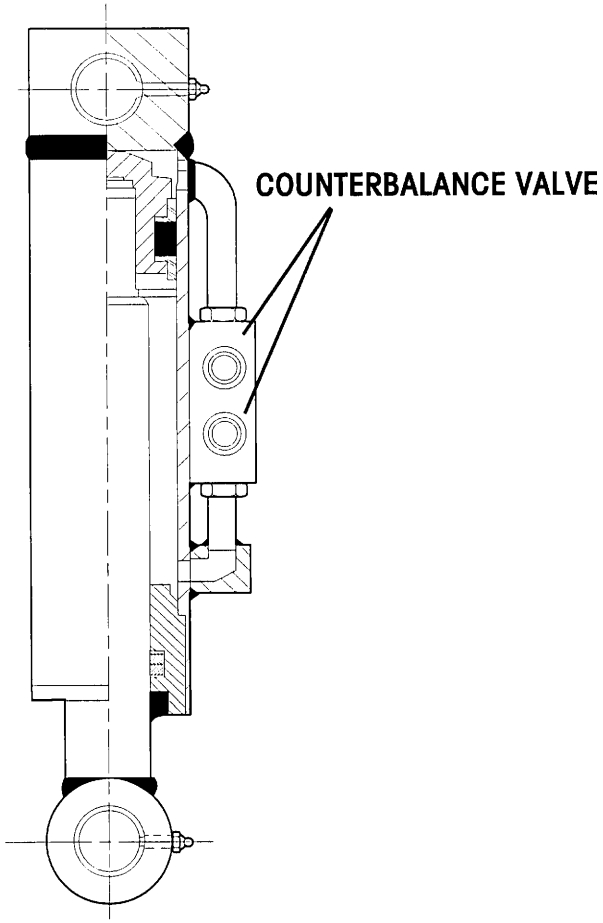
The platform rotation system consists of a platform rotation valve segment at the platform controls, a rotation cylinder, and associated hardware.

PLATFORM ROTATION VALVE SEGMENT

When the ratation valve lever at the platform controls is activated hydraulic fluid is sent to one or the other side of the rotation cylinder for left or right platform rotation.

ROTATION CYLINDER

The cylinder is double acting and is directly connected to the platform assembly. This cylinder powers all platform rotation movements through a double counterbalance valve.



Rotation Cylinder.

SECTION 3:
ELECTRICAL SYSTEM

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ELECTRICAL SYSTEM

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

BATTERY

Eight 6 volt batteries supply the electrical current required to operate the electrical circuits. They are composed of two sets of four batteries each hooked up in series to supply 48 VDC.

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 battery hold downs. Connect battery cables.

BATTERY CHARGER

The battery charger supplied with the 32/21E 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. 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. Check all fuses and replace , if required, with those having the same rating.
4. Check battery condition. A highly sulfated battery may take some additional time before current begins to flow through it.
5. For further information on troubleshooting the charger, contact the battery charger manufacturer, as indicated on the charger nameplate.

MOVEMENT ALARM (OPTIONAL)

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

⚠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.

TILT ALARM (OPTIONAL)

The tilt alarm gives an audible warning when the machine is five degrees or more out of level. To replace the tilt alarm, remove it from its support and disconnect the wires.

TILT ALARM TEST

The alarm can be tested by raising the platform above the high speed limit switch, and 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 on top of the spring loaded assembly until the level bubble is centered on the tilt alarm.

Check to be sure the electrical connections are correct.

DESCENT ALARM (OPTIONAL)

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

RELAYS

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

ELECTRIC MOTOR

There are two electric motors: pump motor and drive motor. The pump motor is 48 VDC fixed speed motor, rated at 5 HP (3.7 kW) at 1200 rpm, and the drive motor is 48VDC series-wound reversible motor controlled by a transistor circuit, and rated at 6.7 HP (5kW). The pump motor is started by a heavy duty contactor. They are not field repairable, and power should be traced to the motor for troubleshooting. If there is power to one of the motors and it still does not run, replace it.

DRIVE MOTOR CONTROLLER

The drive motor controller is located in the electric module to the right of the battery charger. It is a sealed transistorized unit which contains no user serviceable parts.

EMERGENCY STOP BUTTONS

There are two emergency stop buttons: one on the platform control and the other at ground controls.

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 control console cover screws to gain access for button removal. Remove the appropriate button mounting screws and wires.

BATTERY MONITOR AND HOUR METER

The battery condition or level of charge is indicated by an LED display in the form of 2 red, 3 yellow and 5 green illuminated bands. At full charge all the LED's are illuminated. As the batteries discharge, green LED's are progressively extinguished from right to left. When the first red LED begins to flash, this is a warning to the operator that the batteries are heavily discharged. Both red LED's flashing alternately indicates that the batteries require charging and that the machine's lift functions are about to be interrupted. This feature offers protection by discouraging the damaging practice of using the batteries until completely discharged. The cut-out occurs at a discharge of 80%. The digital hour meter indicates the total usage of the machine. It is switched on and counting whenever the controls (either ground or platform) are turned on - key switch selected, emergency stop buttons on.

PCB BOX

The PCB box contains the functional check LED's, a set of fuses, 24VDC and 48VDC relays. It also acts as a terminal strip for the electrical system. Refer to electrical schematic at the end of this manual when servicing the unit.

SECTION 4:
MECHANICAL COMPONENTS

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MECHANICAL COMPONENTS

Following is a description of the major mechanical components of this machine.

CHASSIS

⚠ CAUTION

When steam cleaning the undercarriage, cover electrical components, to prevent water damage.

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

TIRES

Inspect the tires for cuts, chunking, sidewall damage or abnormal wear. Any tire faults MUST BE CORRECTED before further machine operation. Refer to Illustrated Parts Catalog for replacement tires.

⚠ DANGER

FAILURE TO USE APPROVED PARTS MAY CAUSE DEATH OR SERIOUS PERSONAL INJURY.

NOTE: Replace tires with the correct tires to maintain the rating of this equipment.

CHANGING TIRES

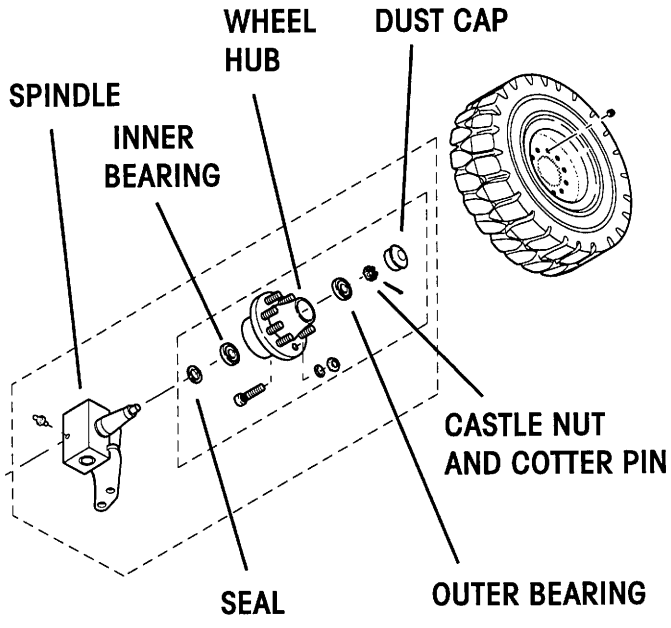
1. Chock tires on one end of unit and raise the other end of unit.
2. Loosen and remove lug nuts, and pull wheel off.
3. Install the replacement wheel.
4. Fasten lug nuts, and tighten to proper torque (see Machine Specifications).
5. Lower the machine and remove the chocks.

WHEELS AND LUG NUTS

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

REPACKING FRONT WHEEL BEARINGS

1. Block the rear tires and raise the front end of undercarriage.
2. Remove front wheels.
3. Remove dust cap.
4. Remove cotter pin, castle nut and pull the front hub assembly from the spindle assembly.
5. Remove flat washer, outer bearing from each wheel hub.



Front Wheel Bearings.

6. Remove the inner bearing.

7. Inspect the inner and outer bearings for wear. If they are excessively worn or damaged, replace the appropriate front hub assembly.

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

9. Assemble the front hub and install it on the spindle assembly. Install dust cap.

11. Replace the wheels and tighten lug nuts 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 to cylinder and cylinder ports.

2. Take the steer cylinder from the chassis 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 pins.

9. Unplug and reconnect the two hydraulic hoses.

DRIVE MOTOR

The drive motor is not field repairable. If it is determined that the drive motor is damaged, replace it.

To replace drive motor, remove the 4 socket head cap screws that secure it to the gearbox and detach wires. Install the new drive motor with the 4 socket head cap screws and attach wires with same polarity as the one that was removed.

HOSES AND CABLE

Inspect all hoses and electrical cable for security and damage. Hoses and cable should be examined for rubbing and chafing. Check for leaks at fittings. REPLACE ANY DAMAGED HOSES OR CABLE.

SUPERSTRUCTURE

Steam clean the superstructure and inspect all welds and brackets. Check all the hydraulic and electrical components.

PLATFORM

Steam clean the platform and inspect all welds and brackets. Check all the hydraulic and electrical components.

BOOM

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

LIFT CYLINDER INSTALLATION

1. Support extended boom assembly.

2. Slide base end of lift cylinder into position and secure it in place with pivot pin and retaining bolts.

3. Reconnect hoses.

4. Slide rod end of lift cylinder into position and

secure it in place with pivot pin and retaining bolts.

BOOM PIVOT PIN AND BUSHING REPLACEMENT

1. Support the boom and platform securely on a fork lift, or similar rigid device.
2. Remove the 2 pin locking bolts.
3. Carefully drive out the boom pin. Take care not to damage the inside bore during this step.
4. Inspect bushing for wear. If bushing is damaged or worn excessively remove it by driving it out with a bushing driver. Install replacement bushing also with a bushing driver.
5. Apply grease to pins (see Lubrication Diagram).
6. Fit replacement pin in place.

   NOTE: Maintain the correct mating position between the boom and side plates. Any movement between the two parts will make pin fitting more difficult.

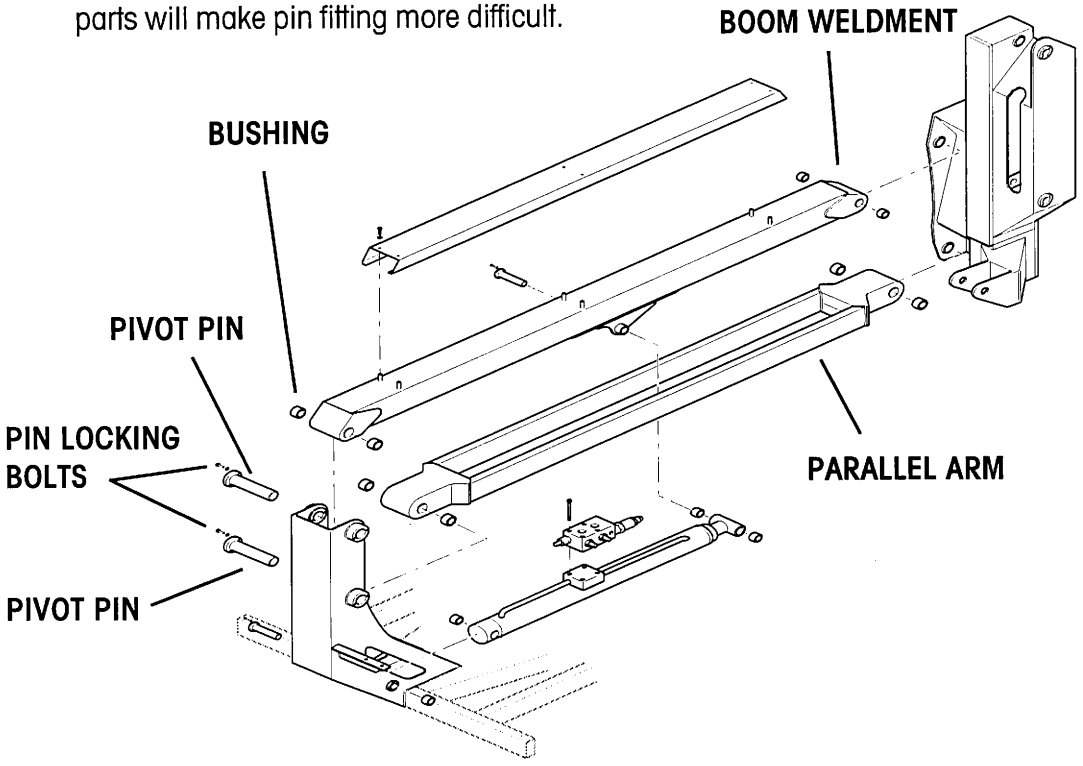
7. Lightly lubricate the 2 pin locking bolts and secure pin in place with them.

PARALLEL ARM PIVOT PIN AND BUSHING REPLACEMENT

1. Support the boom and platform securely on a fork lift, or similar rigid device.
2. Remove the 2 pin locking bolts.
3. Carefully drive out the boom pin. Take care not to damage the inside bore during this step.

   NOTE: When the pin is removed, the parallel arm will fall from position if not held. Since it is a relatively light component, it can be held in position manually while the replacement pin is fitted.

4. Inspect bushing for wear. If bushing is damaged or worn excessively remove it by driving it out with a bushing driver. Install replacement bushing also with a bushing driver.



Pivot Pin and Bushing Replacement.

5. Apply grease to pins (see Lubrication Diagram).

6. Fit replacement pin in place.

7. Lightly lubricate the 2 pin locking bolts and secure pin in place with them.

TELESCOPE CYLINDER PIVOT PIN AND BUSHING REPLACEMENT

1. Support the boom and platform securely on a fork lift, or similar rigid device.

2. Remove the 2 pin locking bolts from either the rod end or base end of the cylinder.

3. Carefully drive out the boom pin. Take care not to damage the inside bore during this step.

4. Inspect bushing for wear.

   If bushing is damaged or worn excessively remove the other pivot pin and slide out the extend cylinder. Remove the damaged bushing with a bushing driver. Install replacement bushing also with a bushing driver. Slide the extend cylinder into the boom.

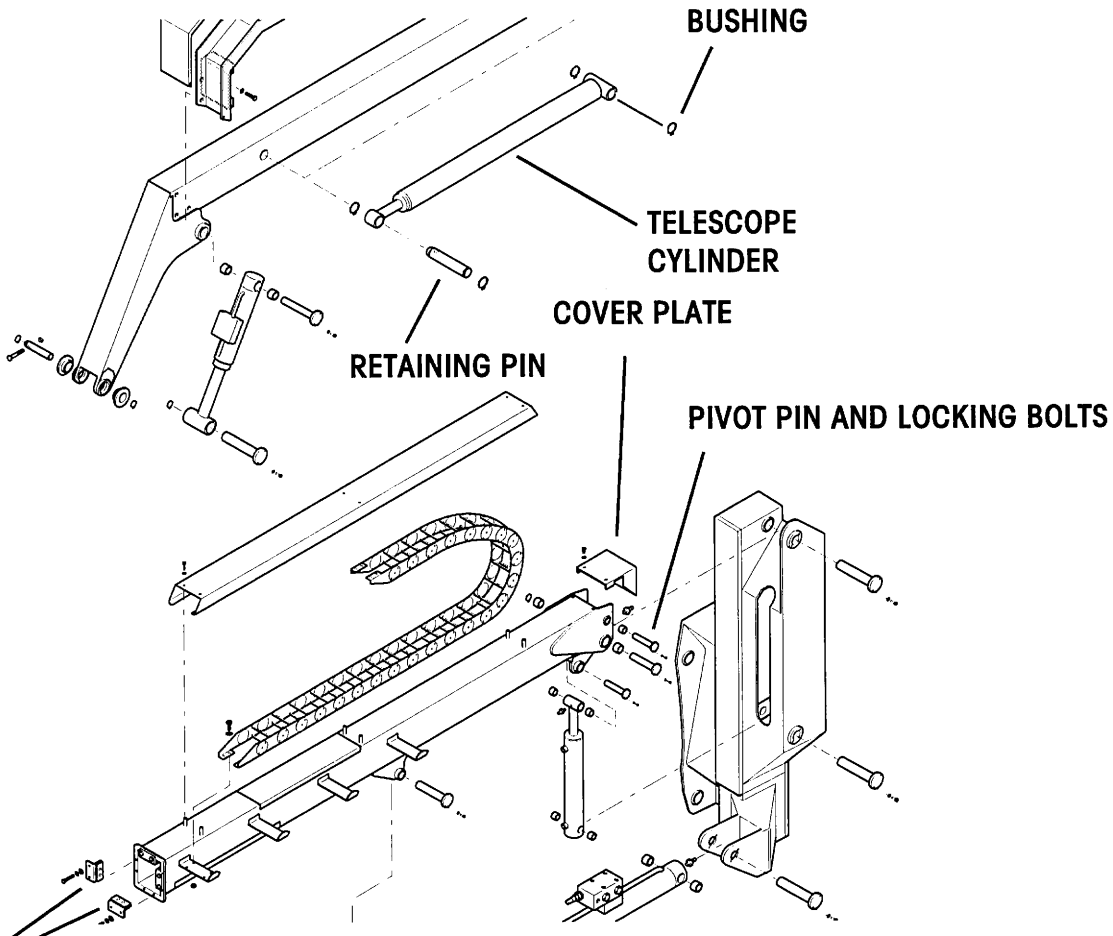
5. Apply grease to pins (see Lubrication Diagram).

6. Fit replacement pin(s) in place.

7. Lightly lubricate the 2 pin locking bolts and secure pin(s) in place with them.

TELESCOPE CYLINDER REMOVAL

1. Support the boom and platform securely on a fork lift, or similar rigid device.



Telescope Cylinder Maintenance Components.

2. Remove the 2 pin locking bolts and the cylinder pins from both the rod end and base end of the cylinder.
3. Remove the cover plate from the telescope cylinder.
4. Remove cylinder hoses.
5. Slide out the telescope cylinder from the opened end.

TELESCOPE CYLINDER INSTALLATION

1. Slide in the telescope cylinder from the opened end.
2. Install cylinder hoses.
3. Install the 2 cylinder pins and locking bolts to both the rod end and base end of the cylinder.
4. Install the cover plate to the telescope cylinder.

WEAR PAD INSPECTION

1. Fully retract the boom and check the gap at the top of the telescope boom, between the inner and outer, at the rear of the telescope boom.
2. Fully extend the boom and check the same gap at the top of the telescope boom, at the front of the outer telescope boom.
3. Replace the pads if the gap between the pad and the outer telescope boom is 3/16 " (5 mm) or more.

REAR WEAR PAD REPLACEMENT

1. Support the inner telescope boom. Unbolt the top, front wear pad cassettes, and remove pads as necessary.
2. Unbolt the bottom and side wear pad cassettes and remove pads as necessary.
3. Replace the wear pads by tapping them into place with a hammer.
4. Tap the bottom and side wear pad cassettes in place and secure them with bolts.
5. Tap the top wear pad cassette in place and secure it with bolts.

FRONT WEAR PAD REPLACEMENT

1. Unbolt and remove the telescope cylinder pins.
2. Unbolt and remove the base end slave cylinder pin.
3. Unbolt and remove the platform cylinder pin, and set the platform on the ground.
4. Unbolt the moving anchor.
5. Move the platform, slave cylinder and moving anchor to the side.
6. Pull out the telescope boom until the wear pads are accessible.
7. Unbolt and remove the wear pads.
8. Secure the replacement wear pads to the inner telescope boom.
9. Fully slide in the telescope inner boom.
10. Secure the moving anchor to the telescope boom.
11. Position the platform in place and secure it with platform cylinder pin and bolts.
12. Secure base end of slave cylinder in place with slave cylinder pin and bolts.
13. Secure the telescope cylinder (rod and base ends) in place with telescope cylinder pins and bolts.

LIFT CYLINDER

The lift cylinders are the double-acting type. During operation, the cylinders should not leak, although a slight dampness from out of the rod seal is acceptable. The pivot pins should be checked for wear and the pivot pin bolts checked for security. The cylinder and counterbalance valve should be checked and inspected for oil leakage, damage and security.

LIFT CYLINDER SEAL REPLACEMENT (CYLINDER IN-PLACE)

NOTE: Replacement of the bearing ring at the base of the piston rod is recommended when seals are replaced. Examine the rod for scoremarks and damage. This is most easily achieved by extending the cylinder and examining the protruding rod.

1. Support the boom and release the cylinder pressure.
2. Clean the cylinder end and loosen the cylinder end cap. Loosen the end cap several turns.
3. Remove the rod end pin and support the cylinder barrel.
4. Remove the end cap and withdraw it carefully over the piston rod. Ensure that no dirt enters the system.
5. Replace the seals in the end cap and replace the end cap. Ensure not to damage the rod surface.
6. Bleed the cylinder by allowing air to escape around the end cap threads.
7. Clean the counterbalance valves and examine for signs of leakage.
8. Raise and lower the boom and check the cylinder operation.

LIFT CYLINDER SEAL REPLACEMENT (CY REMOVED)

NOTE: Replacement of the bear ring at the base of the piston roc recommended when seals are replac Examine the rod for scoremarks c damage. This is most easily achie by extending the cylinder and exam ing the protruding rod.

1. Support the boom and release the pressure.
2. Remove the lift cylinder pins, disco hoses and remove lift cylinder.
3. Clean the cylinder end and loosen the end cap. Loosen the end cap severc
4. Remove the end cap and withdraw i over the piston rod. Ensure that no c the system.
5. Replace the seals in the end cap and re end cap. Ensure not to damage the ro
6. Bleed the cylinder by allowing air t around the end cap threads.
7. Clean the counterbalance valves and for signs of leakage.
8. Install the lift cylinder pins, connect t and install lift cylinder.
9. Raise and lower the boom and c cylinder operation.

LIFT CYLINDER COUNTERBALANCE VALVE CHECK

1. Fully raise one of the booms.
2. Press the emergency stop button, and activate the respective boom control lever a few times to dissipate residual pressure.

   If the boom begins to move, the valve is faulty and the cartridge should be replaced.
3. Fully raise the other boom.
4. Press the emergency stop button, and activate the respective boom control lever a few times to dissipate residual pressure.

   If the boom begins to move, the valve is faulty and the cartridge should be replaced.

IMPORTANT: When replacing the counterbalance valve cartridge, support the boom with a forklift or similar device.

LEVELLING CYLINDERS

The levelling cylinders are of the double-acting type with seals at both ends. It is recommended that the seals are replaced whenever the cylinder is serviced.

LEVELLING CYLINDER SEAL REPLACEMENT

1. Lower the booms and support the platform.
2. Disconnect hoses to the levelling cylinder (master or slave).
3. Remove retaining bolts and pins from rod and base ends of the levelling cylinder.
4. Remove the end cap from the cylinder. Pull the cap and rod straight out of the cylinder barrel.
5. Remove the split-pin and nut from the end of the rod. Slip off the collar.
6. Examine the seals and the rod for signs of damage or wear.
7. Remove the seals and install new set.
8. Slip on collar and install the split-pin and nut on the end of the rod.
9. Slide the cylinder cap and rod straight into the cylinder barrel. Install the end cap to the cylinder.
10. Install levelling pins and secure them in place with retaining bolts.
11. Connect hoses to levelling cylinder.
12. Bleed the levelling system.

BLEEDING THE LEVELLING SYSTEM

⚠ CAUTION

Release the bleed nipple slowly. Oil will be ejected at force from the bleed nipple while bleeding the system.

NOTE: One person is required to operage the platform levelling control and one to bleed the system.

1. Check the hydraulic oil level with the booms fully lowered. Add oil, if required.
2. Loosen the bleed nipple at the base of the levelling cylinder with a 4mm hex head wrench.
3. With power on, operate the platform levelling lever so that the platform moves fully backwards and fully forwards to expel air from the system. Repeat until all air is expelled from the system.
4. Tighten the bleed nipple and add hydraulic oil as needed.

SECTION: 5
TROUBLESHOOTING

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Troubleshooting Chart 5-4

GENERAL TROUBLESHOOTING TIPS

Before investigating a malfunction, check the following items:

- Check that battery connections are secure and battery is fully charged.
- Check that the Emergency Stop Button is released (pulled up).
- Check that hydraulic fluid is at the correct level.
- Check that the Emergency Lowering Valve is in normal operation position.
- Check that the Motor Release Valve is closed.

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: Shell TELLUS 22 is a multiple viscosity oil that is light enough for cold climates and resists thinning in warm climates.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No pump output.	1. Broken pump drive shaft.	1. Replace pump. Refer to Illustrated Parts Section.
	2. Fluid leaks.	2. Tighten hose clamps at pump inlet.
	3. Motor relay not engaging.	3. Check continuity to/ from relay. Check for proper motor relay operation and replace if broken.
	4. Motor not turning.	4. Check battery voltage.
	5. Improper pressure.	5. Adjust pressure relief valve for proper pressure. See Machine Specifications.
	6. Faulty steer valve.	6. Check steer valve for proper operation. Replace if required.
• Hydraulic functions slow.	1. Low pressure.	1. Check for low system pressure and adjust to correct pressure. See Machine Specifications.
	2. Pump component failure.	2. Replace pump. Refer to Illustrated Parts Section.
	3. Slow motor speed.	3. Check battery voltage.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Pump noise or squeal.	1. Low pressure.	1. Check for low system pressure and adjust, if required. See Machine Specifications.
	2. Pump cavitation.	2. Check hydraulic reservoir oil level.
• No steer function.	1. Steer valve not shifting.	1. Check steer valve for proper operation and repair or replace, as necessary.
	2. Faulty relief valve.	2. Check for low system pressure and adjust, if required. See Machine Specifications.
	3. Mechanical malfunction.	3. Steer cylinder may not be mechanically connected to steering linkage. Check for disconnected or damaged steering linkage; connect steering linkage and/ or replace.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Unit will not go into high speed drive with platform lowered.	1. Check brakes are releasing properly.	1. Check pressure supply to brake cylinder. Install gauge in line at brake cylinder. If no pressure, consult factory.
	2. Faulty limit switch on boom.	2. Check limit switch for proper operation and replace, if necessary.
• No drive function.	1. Low battery charge.	1. Check battery charge and recharge if necessary.
	2. Motor contactor faulty or faulty continuity.	2. Check contactor for operation and associated wiring for continuity.
	3. Brake cylinder does not release.	3. Check pressure supply to brake cylinder. Install gauge in line at brake cylinder. If no pressure, consult factory.
	4. Motor shaft key is sheared.	4. Inspect, repair or replace. Refer to Illustrated Parts Section.
	5. Faulty motor.	5. Replace drive motor.
	6. Faulty motor controller.	6. Replace motor controller.
• No rotate function.	1. Relief pressure setting too low.	1. Adjust system pressure. See Machine Specifications.
	2. Slew ring damaged or obstructed.	2. Check for damaged or obstructed slew ring. Repair or replace, as necessary.
	3. Faulty hydraulic rotation motor or gearbox.	3. Check hydraulic rotation motor/ gearbox operation.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No lift function.	1. Possibly plugged lines, cylinder ports or damaged cylinder packings.	1. Inspect, repair or replace cylinder. Refer to Illustrated Parts Section.
	2. Relief pressure setting too low.	2. Adjust system pressure. See Machine Specifications.
	3. Lift valve stuck in closed position or not getting voltage to open.	3. Check lift valve for proper operation.
• No lower function.	1. Faulty lift valve.	1. Check lift valve for proper operation.
	2. Faulty lift holding valve	2. Replace lift holding valve. Refer to Illustrated Parts Section.
• Lift cylinders drift down.	1. Holding valve faulty.	1. Replace holding valve. Refer to Illustrated Parts Section.
	2. Cylinder packing is damaged.	2. Replace cylinder packing. Refer to Illustrated Parts Section.
	3. Faulty emergency lowering valve.	3. Replace emergency lowering valve.
• No telescope function.	1. Relief pressure setting too low.	1. Adjust system pressure. See Machine Specifications.
	2. Telescope boom damaged or obstructed.	2. Check for damaged or obstructed telescope boom. Repair or replace, as necessary.
	3. No lubrication on telescope boom.	2. Lubricate telescope boom with penetrating oil, if necessary (WD40).

SECTION 6:
MAINTENANCE

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Maintenance

General Maintenance Tips 6-3
Machine Function Indicators 6-4
Shift Operational Checklist 6-6
Monthly Operational Checklist 6-9
Semi-Annual Operational Checklist 6-11

GENERAL MAINTENANCE TIPS

- Never leave hydraulic components or hoses open. They must be protected from contamination (including rain) at all times.
- Never open a hydraulic system when there are contaminants in the air.
- ALWAYS clean the surrounding area before opening hydraulic system.
- Use only recommended lubricants. Improper lubricants or incompatible lubricants may be as harmful as no lubrication.
- Report any makeshift "fixes" which can jeopardize 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.

MACHINE FUNCTION INDICATORS

Inside the electrical module on the PCB Box are a number of LED's that indicate the state of different functions on the machine. These LED's must be inspected each day before operating the machine.

Have the machine serviced before operation, if an LED does not indicate the appropriate state.

LED	FUNCTION DESCRIPTION
SAFE WORKING LOAD (RED)	(French Option) During precheck, this LED should be off. It it is on, it indicates an overload in the platform (cage). The indicator at the platform controls should also be lit if an overload is present. Only the safe working load should be in the platform (cage).
TILT (GREEN)	During precheck, the machine must be on level ground and this LED must be on. It indicates the tilt function circuit is operating correctly. Press one corner of the tilt sensor beyond its tilt angle range to sould tilt alarm: the LED must then turn off.
JOYSTICK MOVEMENT (RED)	During precheck, this LED must be off. When lit, it indicates that a direction has been selected by the joystick.
HORN (RED)	During preecheck, this LED should be off. When lit, it indicates the horn has been pressed.
BRAKE PRESSURE (RED)	During precheck, this LED must be off. When the brakes are released, this LED will be lit.
LOCK-OUT OVERRIDE (RED)	During precheck, this LED should be off. When drive is selected from the platform and the footswitch is pressed, this LED is lit. It indicates the battery 80% discharge cut-out is being overridden for steer and brake functions.
PUMP (RED)	During precheck, this LED should be off. When a hydraulic function is selected and the pump operates, this LED will be lit.

SHIFT OPERATIONAL CHECKLIST

All checks must be completed before operation of the unit.

These checklists can be copied as needed to aid in performing these inspections.

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 machine clean!!

⚠WARNING

THIS CHECKLIST MUST BE USED AT DAILY INTERVALS OR AFTER EVERY 6 TO 8 HOURS OF USE, 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 a visual inspection of all machine components, i.e. structural damage, missing parts, torn or loose hoses, hydraulic fluid leaks, torn or disconnected wires, or damaged tires, etc. Open rear compartment cover to inspect components inside.
_____	2. Check battery electrolyte level and connections.
_____	3. Check that the lug nuts are tight.
_____	4. Check hydraulic fluid level. The level should be at the second baffle on the cap dipstick, with the unit in stowed position.
_____	5. Check all drive motor nuts are tight.

Continued on following page . . .

SHIFT OPERATIONAL CHECKLIST (CONTINUED)

INITIAL	DESCRIPTION
_____	6. Check hoses for worn areas or chaffing.
_____	7. Check hose carrier to verify that it is not bent or sagging.
_____	8. Inspect safety belt connections, and check for worn areas on the belts.
_____	9. Check platform rails and gate latch for damage.
_____	10. Check pivot pins for security.
_____	11. Check that all warning and instructional decals are legible and secure.
_____	12. Check that the tilt alarm is working properly.
_____	13. Check that the electrical control switches are not damaged.
_____	14. When all pre-inspection checks have been completed, the operator is ready to test the ground controls for proper operation.
_____	15. Check platform controls for proper operation.
_____	16. With the platform raised, check for the smooth operation of low speed drive.

Continued on following page . . .

SHIFT OPERATIONAL CHECKLIST (CONTINUED)

ADDITIONAL MAINTENANCE REQUIREMENTS FOR SEVERE USAGE APPLICATIONS

NOTE: Do not lubricate wear pads in dusty or sandblast environments. There are boots and guards available to extend unit life in these applications. Consult Simon Aerials Service Department.

INITIAL	DESCRIPTION
_____	17. Inspect cylinder boots, valve spool boots, etc., for cuts or other damage after every eight (8) hours of service. Repair or replace if necessary.
_____	18. Check hydraulic system for leakage after every eight (8) hours of service.

WEEKLY

INITIAL	DESCRIPTION
_____	19. Lubricate swing bearing and swing bearing gear teeth.
_____	20. Check oil in reduction drive unit.
_____	21. Lubricate valve spool linkage.

MONTHLY OPERATIONAL CHECKLIST

All checks must be completed before operation of the unit.

DATE: _____ **INSPECTED BY:** _____

MODEL NUMBER: _____ **SERIAL NUMBER:** _____

These checklists can be copied as needed to aid in performing these inspections.

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 machine 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 Operational Checklist.
_____	2. Apply lubricant to swing bearing gear teeth and drive pinion gear teeth (see Lubrication Chart).
_____	3. Inspect condition of hydraulic fluid in the reservoir. Fluid should have a clear amber color.
_____	4. Check hydraulic system for leaks, examine hoses for signs of excessive wear, chafing or twisting. Adjust the hoses and/ or replace them if necessary.
_____	5. Inspect the work platform and boom structure for signs of damage and broken welds. Check all bolts (including platform rotator bolts) for tightness.
_____	6. Check for structural damage, broken welds, loose bolts, improper or makeshift repairs.
_____	7. Check torque of wheel lug nuts (see Specifications).

Continued on following page . . .

INITIAL	DESCRIPTION
_____	8. Check torque of swing bearing bolts (see Specifications).
_____	9. Check adjustment and security of swing drive. Check torque of swing drive mounting bolts (see Specifications). There should be no backlash between the turntable and undercarriage when properly adjusted.
_____	10. Check oil level in reduction drive unit (see Lubrication Chart).
_____	11. Check front wheel motors mounting bolt torque (see Specifications).
_____	12. Check that the boom does not drift with a full load, no hydraulic pressure (motor off) and the control valve in the "BOOM DOWN" position.
_____	13. Check to make sure boom sections are not dented or bent.
_____	14. Check that all adjustable flow valves are locked.
_____	15. Lubricate boom wear pads (see Lubrication Chart).
_____	16. Lubricate hydraulic control handle pivot pins (see Lubrication Chart).
_____	17. Check emergency pump operation (see Emergency Pump).

ADDITIONAL MAINTENANCE REQUIREMENTS FOR SEVERE USAGE APPLICATIONS

EVERY 90 DAYS

INITIAL	DESCRIPTION
_____	18. Replace hydraulic filter element.
_____	19. Analyze hydraulic fluid.
_____	20. Disassemble and pack steering spindles.

SEMI-ANNUAL OPERATIONAL CHECKLIST

All checks must be completed before operation of the unit.

DATE: _____ **INSPECTED BY:** _____

MODEL NUMBER: _____ **SERIAL NUMBER:** _____

These checklists can be copied as needed to aid in performing these inspections.

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 machine 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 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. Clean and lubricate all electrical switches with an electrical contact cleaner and ensure that the switches operate freely in all positions.
_____	4. Check the electrical mounting and hardware connections for security.
_____	5. Replace hydraulic filter element.

Continued on following page . . .

SEMI-ANNUAL OPERATIONAL CHECKLIST (CONTINUED)

INITIAL	DESCRIPTION
_____	6. Lubricate all valve spool linkages.
_____	7. Clean and lubricate the swing bearing gear teeth with Keystone Moly #29.
_____	8. Check that hydraulic pressure is as stated in the machine specifications. (Refer to Hydraulic Pressure Check, earlier in this section.)
_____	9. Lubricate steering spindles (see Lubrication Chart).

ADDITIONAL MAINTENANCE REQUIREMENTS FOR SEVERE USAGE APPLICATIONS

_____	10. Change hydraulic fluid.

SECTION 7:
ILLUSTRATED PARTS

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Illustrated Parts Section

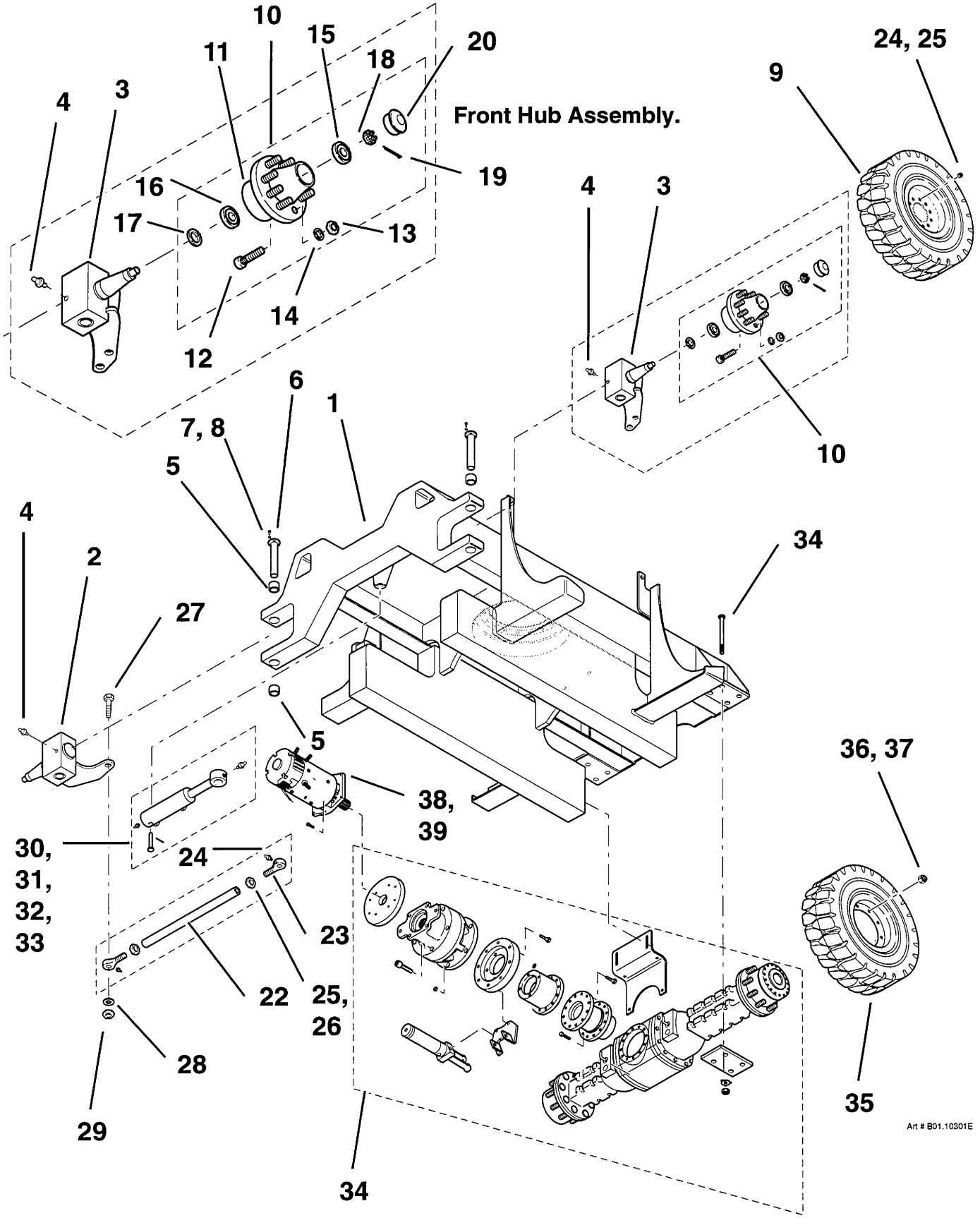
Undercarriage Assembly 01.21
Superstructure Assembly 02.31
Lower Boom Assembly 03.21
Upper Boom Assembly 03.22
Platform Assembly (Mechanical Rotate) 04.75
Platform Assembly (Hydraulic Rotate) 04.76
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Manifold Block 07.25
Hydraulic Tank 07.26
PCB Box 07.27
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Master Cylinder 11.91
Slave Cylinder 11.92
Extend Cylinder 11.93
Boom Lift Cylinder 11.94
Rotation Cylinder 11.95

PARTS LIST

ITEM	PART NO	SEE PLATE	DESCRIPTION	QTY.
1	23002-0019		UNDERCARRIAGE WELDMENT (Chassis)	1
2	GS237		STEERING ARM, FRONT (Right)	1
3	GS236		STEERING ARM, FRONT (Left)	1
4			GREASE FITTING	2
5	10288		BEARING, SPINDLE	4
6	GH550		PIN, STEERING	2
7	10989		CAP SCREW, HEX HEAD (M20-2.5 x 50 mm)	2
8	44003-0020		WASHER, SPRING (M20)	2
9	14352		WHEEL AND TIRE ASSEMBLY (Steer)	2
10	44022-0374		HUB, FRONT	1
11			HUB WELDMENT	1
12	11824		STUD, WHEEL (M16)	5
13	44029-0077		NUT, WHEEL (M16)	5
14			WASHERS, WHEEL (M16)	5
15	44022-0371		BEARING, HUB (Outer)	1
16	44022-0377		BEARING, HUB (Inner)	1
17	44022-0372		OIL SEAL	1
18	44022-0373		NUT, CASTLE	1
19	44022-0379		COTTER PIN	1
20	44022-0378		CAP	1
21			TIRE	2
22	MS206		TIE ROD (Track rod)	1
23	13170		END, TIE ROD	2
24			GREASE FITTING	2
25	44013-0070		NUT, TIE ROD END (M20-1.5)	2
26	10288		WASHER, GLACIER THRUST (WC 40 DX)	4
27	44002-0036		CAP SCREW, HEX HEAD (M8 x 20 mm)	1
28	44013-0007		WASHER, SPRING (M8)	1
29			NUT, HEX HEAD	1
30	21002-0074		CYLINDER, STEER	1
31	44031-0020		BUSHING (Rod and base end)	2
32			GREASE FITTING	2
33	GS505		PIN, STEER CYLINDER	1
34	02-045600		DRIVE ASSEMBLY	1
35	44022-0369		WHEEL AND TIRE ASSEMBLY (Drive)	2
36	44029-0076		NUT, HEX HEAD (M18-1.5)	12
37	44029-0079		WASHER, SPHERICAL (M18)	12
38	18499		MOTOR, DRIVE	1
39	15032		CAP SCREWS, SOCKET HEAD (M 8 x 50 x 10.9)	4

TITLE UNDERCARRIAGE ASSEMBLY, 32/21E (PLATE 1 OF 2)

PLATE NO. 01.21 | **SIMON AERIALS INC.** NEW FEB., 1996 | PART NO.

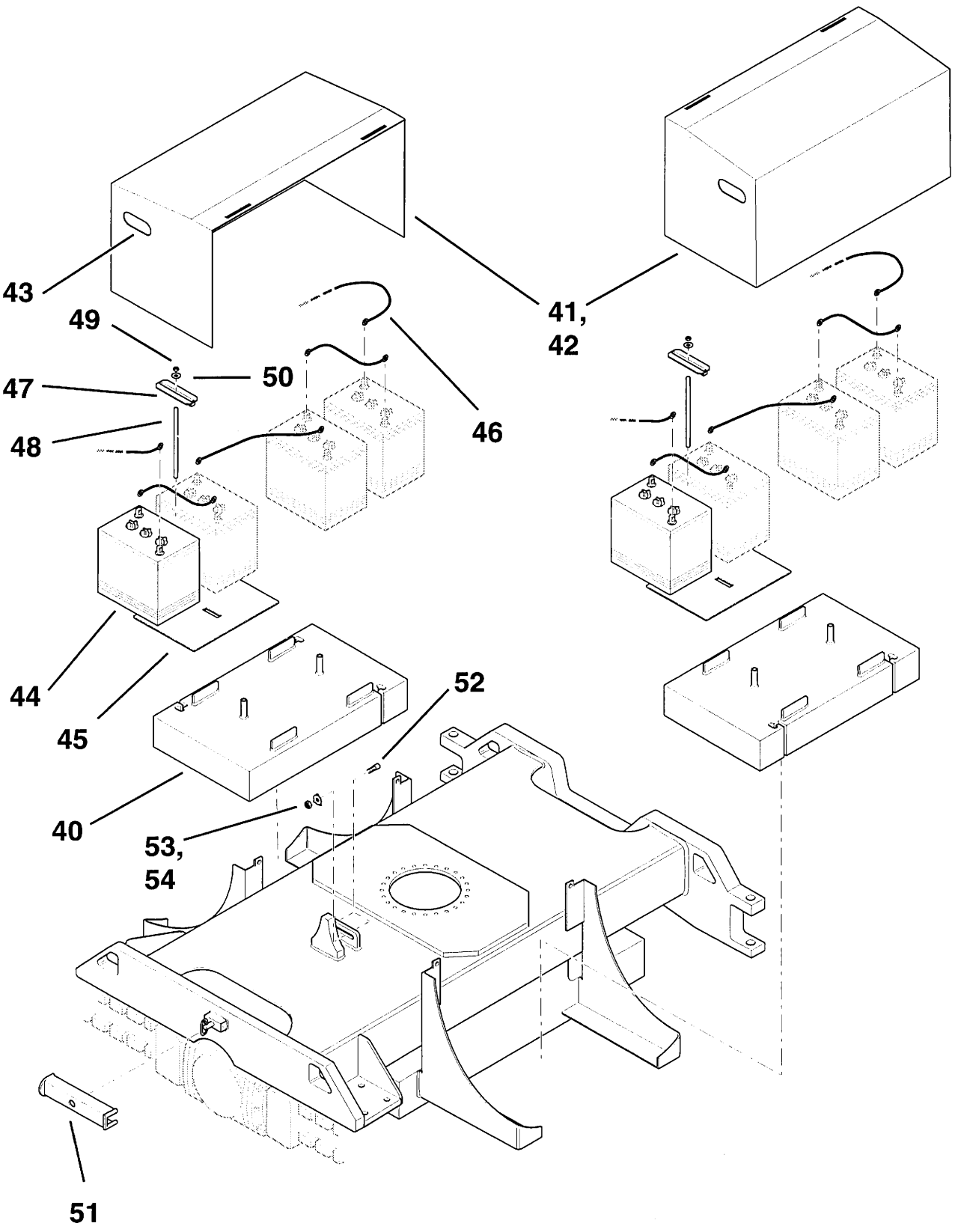


TITLE	UNDERCARRIAGE ASSEMBLY, 32/21E (PLATE 1 OF 2)		
SIMON AERIALS INC. NEW FEB., 1996		PART NO.	PLATE NO. 01.21

PARTS LIST

ITEM	PART NO	SEE PLATE	DESCRIPTION	QTY.
40	GS004		TRAY, BATTERY	2
41	GS415		COVER, BATTERY	2
42	44019-0073		CLIP, HAIRPIN	4
43	12285		HANDLE, BATTERY COVER	2
44	03-505800		BATTERY (6 Volt DC, 217 Amp/Hr)	8
45	10-065800		PROTECTOR, BATTERY (Neoprene, 10" x 28-1/2" x 1/8")	2
46			CABLE, BATTERY	
	03-731700		14-1/2 (203 mm) long	2
	03-406400		8" (203 mm) long	6
	03-731800		18" (457 mm) long (Negative to Connector)	1
	03-731900		22" (559 mm) long (Positive to Connector)	1
47	2309420		HOLD DOWN, BATTERY	4
48	2310420		ROD, BATTERY TIE DOWN	4
49	07-056016		NUT, WING (3/8"-16)	4
50	10-005600		WASHER, FLAT (3/8")	4
51	FSD001		BRACE, SAFETY CYLINDER	1
52	MS440		SCREW, HEX HEAD	2
53	44007-0016		NUT, HEX HEAD	2
54	44013-0009		WASHER, SPRING	2

TITLE	UNDERCARRIAGE ASSEMBLY, 32/21E (PLATE 2 OF 2)		
PLATE NO. 01.21	**SIMON AERIALS INC.** NEW FEB., 1996		PART NO.



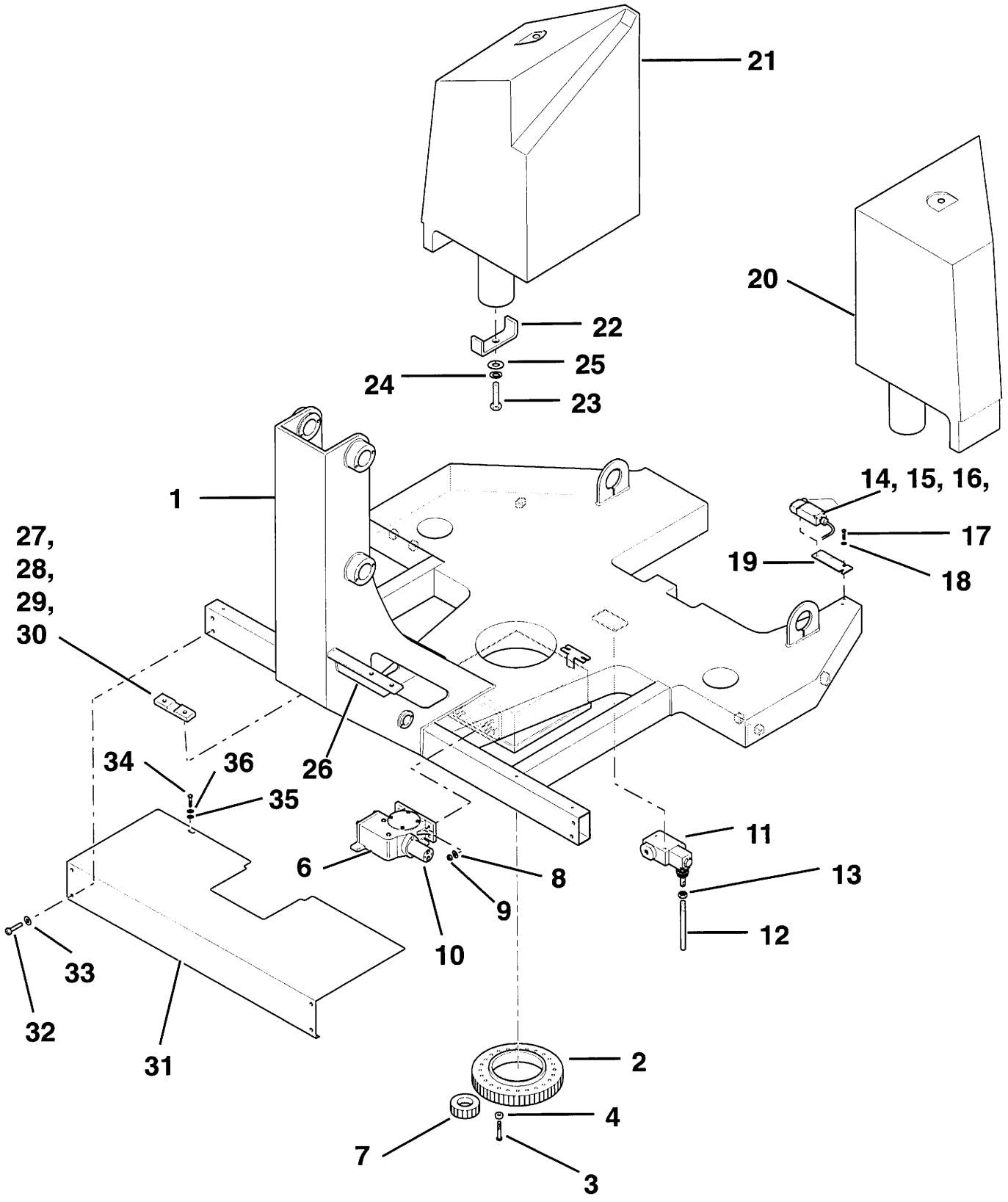
TITLE	UNDERCARRIAGE ASSEMBLY, 32/21E (PLATE 2 OF 2)		
SIMON AERIALS INC. NEW FEB., 1996		PART NO.	PLATE NO. 01.21

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1	GS140		SUPERSTRUCTURE WELDMENT (Plinth)	1
2	18247		SWING BEARING (Slew ring)	1
3	44004-0122		SCREW, HEX HEAD (M12 x 70 mm, Grade 10.9)	27
4	44013-0057		WASHER, FLAT (M12, Hardened) (Earlier models, only)	27
5	MS 614		SPACER (Earlier models, only)	15
6	14315		SWING REDUCER (Slew gearbox)	1
7	44038-0002		PINION GEAR	
8	44013-0075		WASHER, FLAT (M12, hardened)	2
9	44008-0022		NUT, NYLOC (M12)	2
10	10854		MOTOR, HYDRAULIC (Slew motor)	1
11	16474		VALVE, DIVERTER	1
12	14613		HANDLE, DIVERTER VALVE	1
13	44007-0003		NUT, HEX HEAD (M8)	6
14	11110		BODY, LIMIT SWITCH (Boom position)	1
15	10308		HEAD,LIMIT SWITCH (Boom position)	1
16	DS1009		LEVER, LIMIT SWITCH (Boom position)	1
17	44007-0024		CAP SCREW, SOCKET (M5 x 35)	
18	44013-0011		WASHER, FLAT (M5)	
19	MS357		PLATE, MOUNTING (Limit switch)	1
20	TS140		BLOCK, BALLAST, (Left Hand)	1
21	TS141		BLOCK, BALLAST, (Right Hand)	1
22	GS419		RETAINING ASSEMBLY BALLAST	2
23	44002-0097		SCREW, HEX HEAD (M12 x 60 mm)	6
24	44008-0002		NUT, HEX HEAD LOCK (M12)	6
25	44013-0011		WASHER, FLAT (M12)	6
26	GS258		REST, BOOM	1
27	MS143		PAD, BOOM REST	1
28	44002-0039		SCREW, HEX HEAD (M8-1.25 x 35 mm)	2
29	44013-0007		WASHER, FLAT (M8)	2
30	44007-0014		NUT, NYLOC (M8)	2
31	SS133		COVER, PLINTH	
32	44002		SCREW, HEX HEAD (M6)	
33	44013-0006		WASHER, FLAT (M6)	
34	44002		SCREW, HEX HEAD (M12)	
35	44007		WASHER, FLAT (M12)	
36	44013		WASHER, LOCK (M12)	

TITLE SUPERSTRUCTURE ASSEMBLY, 32/21E (PLATE 1 OF 3)

PLATE NO. 02.31 | **SIMON AERIALS INC.** NEW JAN, 1996 | PART NO.

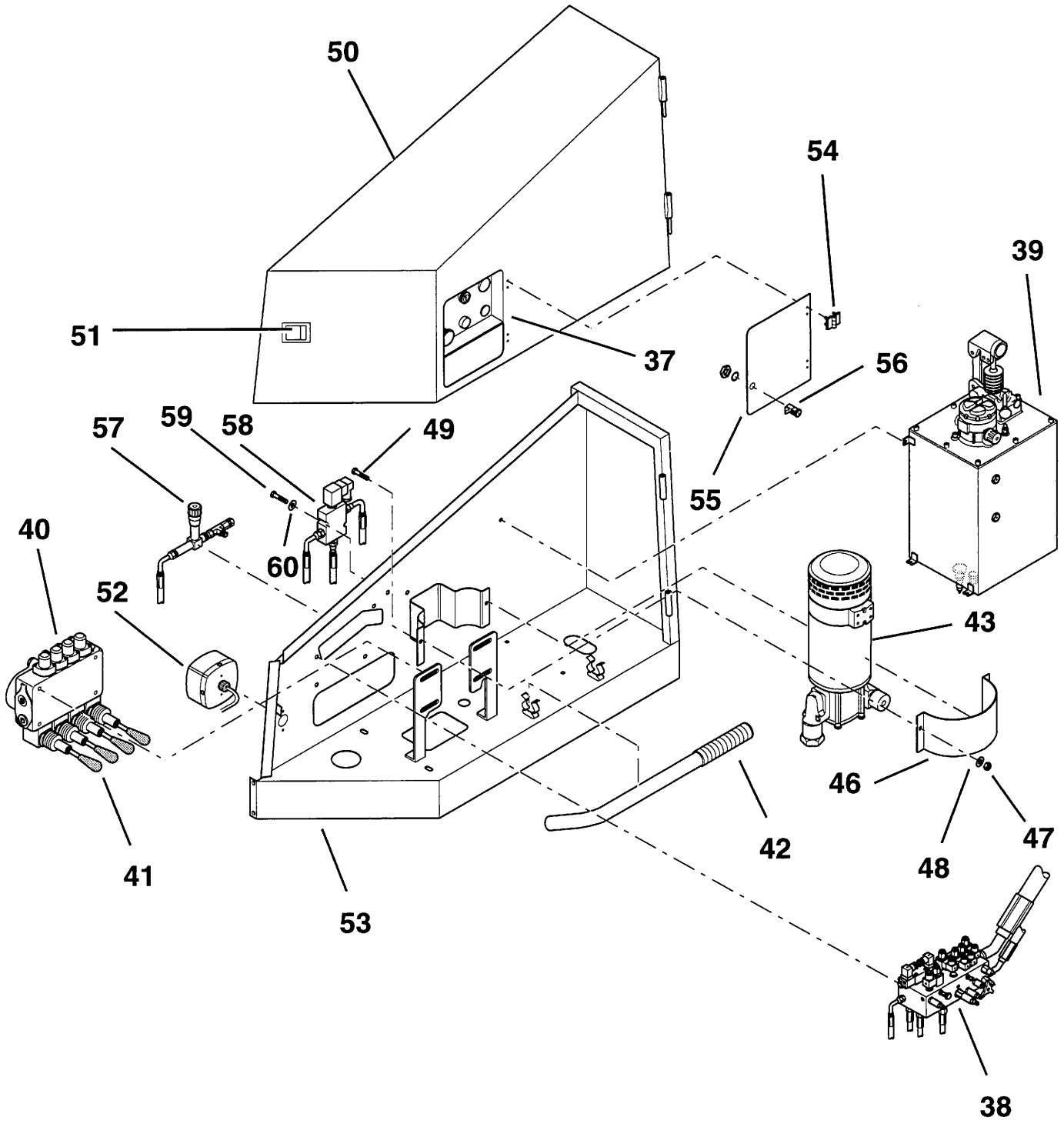


TITLE	SUPERSTRUCTURE ASSEMBLY, 32/21E (PLATE 1 OF 3)		
SIMON AERIALS INC. NEW JAN, 1996		PART NO.	PLATE NO. 02.31

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
37	See Plate . .	07.14	GROUND CONTROL ASSEMBLY	1
38	See Plate . .	07.25	BLOCK, MANIFOLD	1
39	See Plate . .	07.26	TANK, HYDRAULIC	1
40	14377		VALVE BANK ASSEMBLY, GROUND	1
41	14606		HANDLEVER (With knob)	1
42	41037-0008		HANDLE, EMERGENCY PUMP	1
43	10319		POWER UNIT	1
44			MOTOR, ELECTRIC (48 Volt DC)	1
45			PUMP, HYDRAULIC	1
46	M041		CLAMP, POWER UNIT	1
47	44007-0015		NUT, HEX HEAD LOCK (M10)	2
48	44013-0016		WASHER, FLAT (M10)	2
49	44002-0061		SCREW, HEX HEAD (M10 x 110 mm long)	2
50	13030-0041		COVER (Right hand)	1
51	44039-0013		LATCH ASSEMBLY, DOOR	1
52	12423		HORN, TILT ALARM	1
53	GS399		BASE, HYDRAULIC MODULE	1
54	49003-0087		DOOR, RIGHT HAND COMPARTMENT	1
55	44039-0013		HINGE, COVER	2
56	16003		LATCH ASSEMBLY, RIGHT HAND COMPARTMENT DOOR	1
57	41007-0004		VALVE, BRAKE ADJUST	1
58	41003-0076		VALVE, 3-WAY SOLENOID (Isolator)	1
59	44013-0025		WASHER, FLAT (M6)	2
60	44002-0007		SCREW, HEX HEAD (M6 x 50 mm long)	2

TITLE	SUPERSTRUCTURE ASSEMBLY, 32/21E (PLATE 2 OF 3)		
PLATE NO. 02.31	**SIMON AERIALS INC.** NEW JAN, 1996		PART NO.



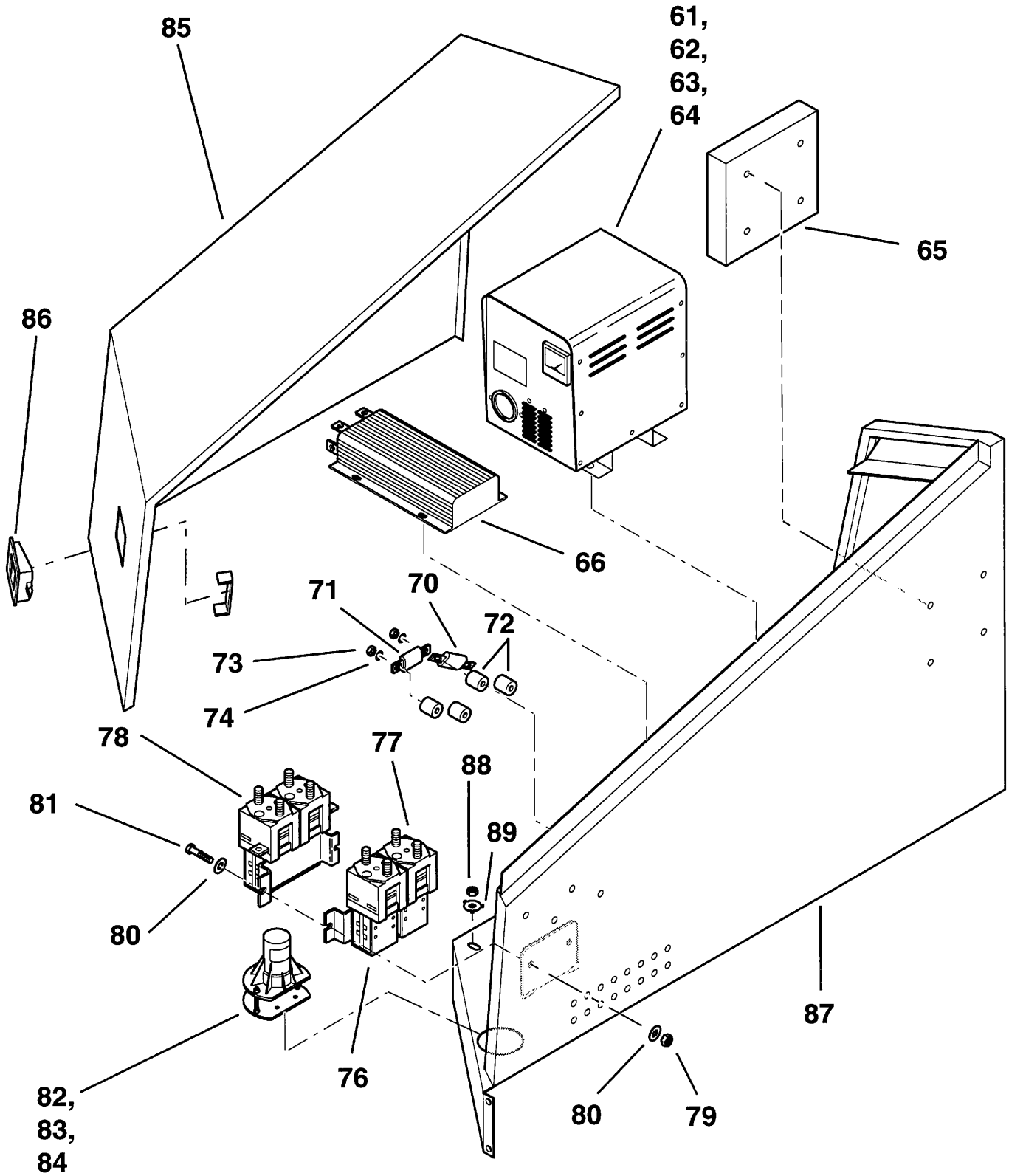
TITLE	SUPERSTRUCTURE ASSEMBLY, 32/21E (PLATE 2 OF 3)		
SIMON AERIALS INC. NEW JAN, 1996		PART NO.	PLATE NO. 02.31

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
61	03-408200		CHARGER, BATTERY (110 VAC input, 48VDC output)	1
62	07-065014		WASHER, LOCK (1/4)	2
63	07-003003		SCREW, HEX HEAD (1/4-20 x 3/4 long)	2
64	07-062014		WASHER, FLAT (1/4)	2
65	See Plate . .	07.27	BOX, PCB	1
66	16443		CONTROLLER, DRIVE MOTOR	1
67	44007-0001		NUT, HEX HEAD (M5)	4
68	44013-0011		WASHER, FLAT (M5)	4
69	44013-0026		WASHER, SPRING (M5)	4
70	18186		FUSE (100 Amp, marked "F2") (Pump)	1
71	10862		FUSE (325 Amp, marked "F1") (Drive)	1
72	10823		STAND-OFF (M8)	4
73	44007-0014		NUT, HEX HEAD (M8)	4
74	44013-0007		WASHER, FLAT (M8)	8
75	44002-0035		SCREW, HEX HEAD (M8 x 16 mm long)	4
76	11044		CONTACTOR, MOTOR (Pump)	1
77	10150		CONTACTOR, MOTOR (Drive)	1
78	12426		CONTACTOR, MOTOR (Forward/ Reverse)	1
79	44007-0013		NUT, HEX HEAD (M6)	4
80	44013-0007		WASHER, FLAT (M8)	8
81			SCREW, HEX HEAD	4
82	42013-0345		SENSOR, LEVEL (5°)	1
83	15019		SCREW, HEX HEAD (M6 x 20 mm)	4
84	15096		NUT, NYLOC (M6)	4
85	GS299		COVER, (Left hand)	1
86	44039-0013		LATCH ASSEMBLY, COVER	1
87	GS298		BASE, LEFT HAND	1
88	15098		NUT, NYLOC (M10)	3
89	15127		WASHER, DISHED (M10)	3

TITLE SUPERSTRUCTURE ASSEMBLY, 32/21E (PLATE 3 OF 3)

PLATE NO. 02.31 | **SIMON AERIALS INC.** NEW JAN, 1996 | PART NO.

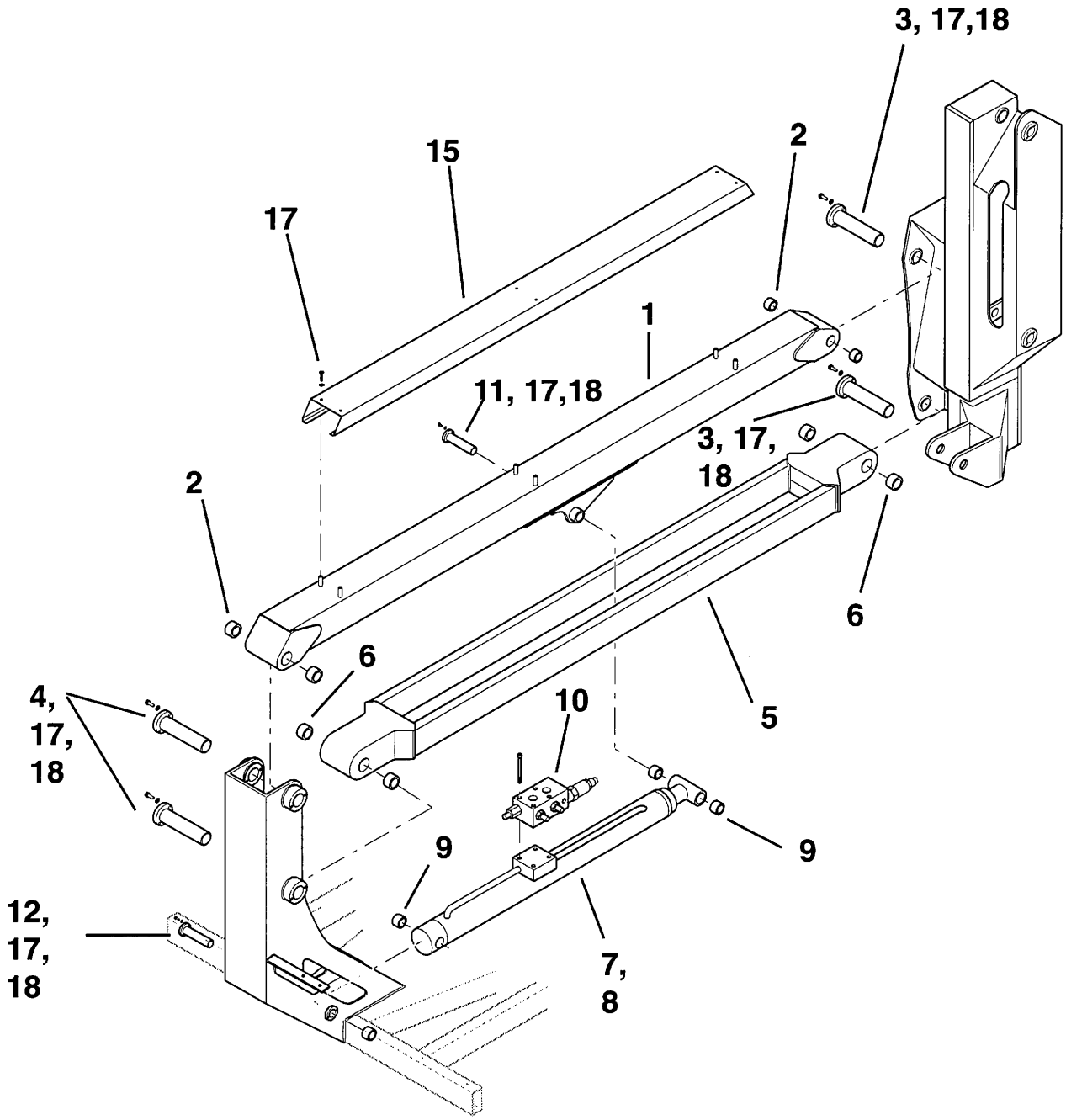


TITLE	SUPERSTRUCTURE ASSEMBLY, 32/21E (PLATE 3 OF 3)		
SIMON AERIALS INC. NEW JAN, 1996		PART NO.	PLATE NO. 02.31

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1	GS185		LOWER BOOM WELDMENT (First stage)	1
2	10288		BUSHING (40 mm x 50 mm)	4
3	GS472		PIN, BOOM PIVOT (Mid post)	2
4	GS315		PIN, BOOM PIVOT (Lower post)	2
5	GS178		ARM, PARALLEL	1
6	10288		BUSHING (40 mm x 50 mm)	4
7	21002-0075		CYLINDER, LIFT	2
8	41034-0088		SEAL KIT, LIFT CYLINDER	1
9	44031-0028		BUSHING (25 mm x 25 mm)	8
10	41031-0004		VALVE, COUNTERBALANCE (Holding / Overcenter valve)	1
11	GS474		PIN (Lower lift cylinder, rod end)	1
12	GS473		PIN (Upper lift cylinder, block end)	1
13	GS193		MID POST WELDMENT (Offset post)	1
14	GS472		PIN, BOOM PIVOT (Mid post)	2
15	SS101		COVER, CABLE	1
16	MS128		STUD, CABLE COVER	4
17	44002-0037		SCREW, HEX HEAD(M8 x 25 mm, Grade 8.8)	12
18	14541		WASHER, LOCK (M8)	24

TITLE	LOWER BOOM ASSEMBLY, 32/21E		
PLATE NO. 03.21	**SIMON AERIALS INC.** NEW APRIL, 1996	PART NO.	



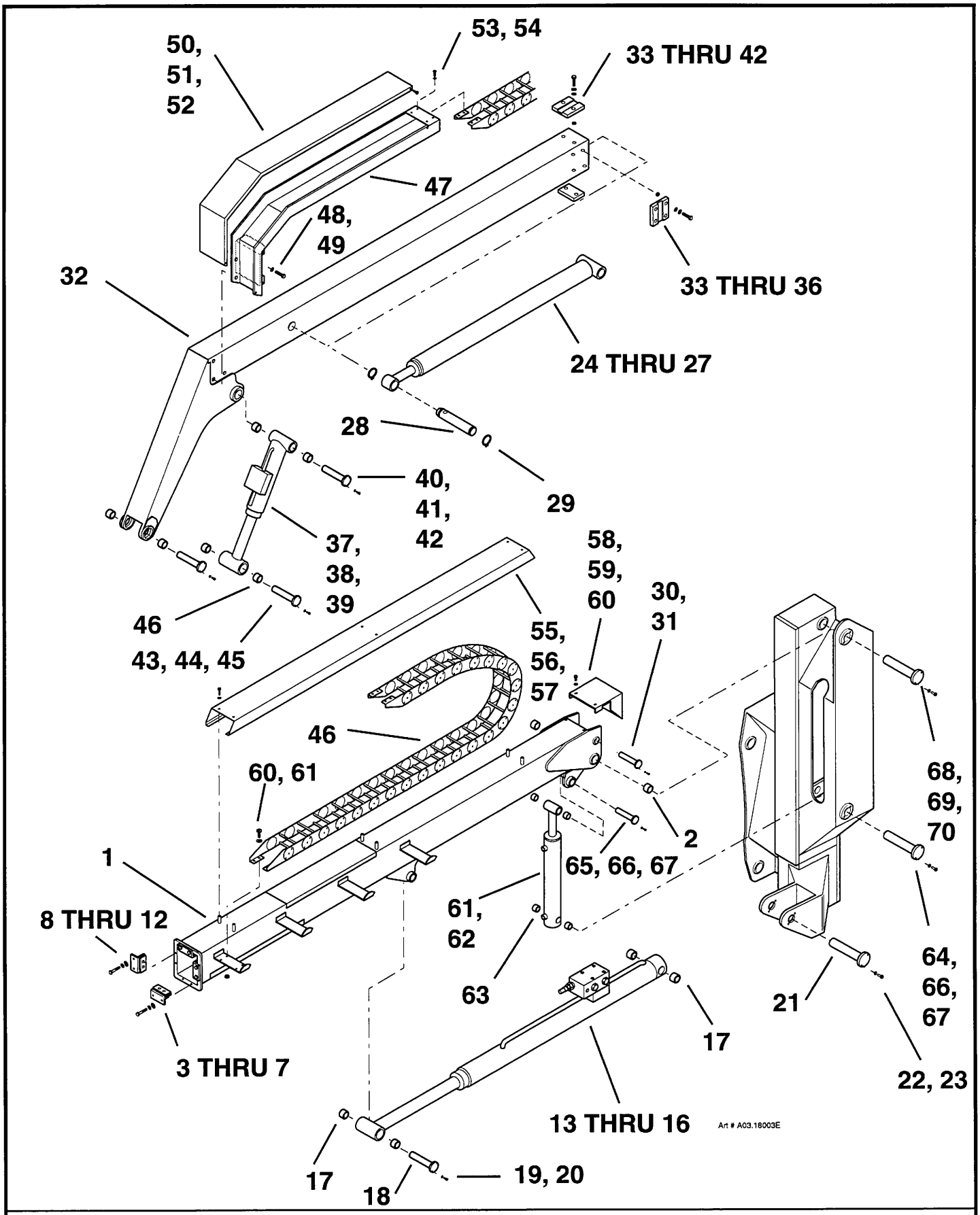
Art # A03.18001E

TITLE	LOWER BOOM ASSEMBLY, 32/21E		
SIMON AERIALS INC. NEW APRIL, 1996		PART NO.	PLATE NO. 03.21

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1	GS 207		BOOM WELDMENT, UPPER BASE	
			(Outer boom, second stage)	1
2	10288		BUSHING (40 mm x 40 mm long)	2
3	PS201		CASSETTE, WEAR PAD (Base boom, upper & lower)	2
4	44002-0066		CAP SCREW, HEX HEAD	
5	44013-0008		WASHER, FLAT	
6	44007-0015		NUT, NYLOC	
7	MS178		WEAR PAD, (Base boom, upper & lower)	2
8	PS202		CASSETTE, WEAR PAD (Base boom, side)	2
9	44002-0016		CAP SCREW, HEX HEAD	
10	44013-0008		WASHER, FLAT	
11	44009-0015		NUT, NYLOC	
12	MS179		WEAR PAD (Base boom, side)	2
13	21002-0075		CYLINDER, UPPER LIFT	1
14	41034-0088		SEAL KIT, LIFT CYLINDER	1
15	41031-0004		VALVE, COUNTERBALANCE (Holding / Overcenter valve)	1
16	44002-0036		CAP SCREW, HEX HEAD	
17	44031-0028		BUSHING (25 mm x 25 mm long)	4
18	GS474		PIN, UPPER LIFT CYLINDER (Rod end)	1
19	44002-0036		CAP SCREW, HEX HEAD	
20	44013-0022		WASHER, FLAT	
21	GS475		PIN, UPPER LIFT CYLINDER (Base end)	1
22	44002-0036		CAP SCREW, HEX HEAD	
23	44013-0022		WASHER, FLAT	
24	21002-0080		TELESCOPE CYLINDER (Extend)	1
25	41034-0089		SEAL KIT, TELESCOPE CYLINDER	1
26			VALVE,	1
27	44002-0036		CAP SCREW, HEX HEAD	
28	LS103		PIN, TELESCOPE CYLINDER (Rod end)	1
29	44019-0045		RING, RETAINING	
30	GS476		PIN, TELESCOPE CYLINDER (Base end)	1
31	44002-0036		CAP SCREW, HEX HEAD	
32	GS205		BOOM WELDMENT, TIP (Telescope boom)	1
33	MS178		WEAR PAD (Tip boom)	4

TITLE	UPPER BOOM ASSEMBLY, 32/21E		
PLATE NO. 03.22	**SIMON AERIALS INC.** NEW JAN, 1996		PART NO.

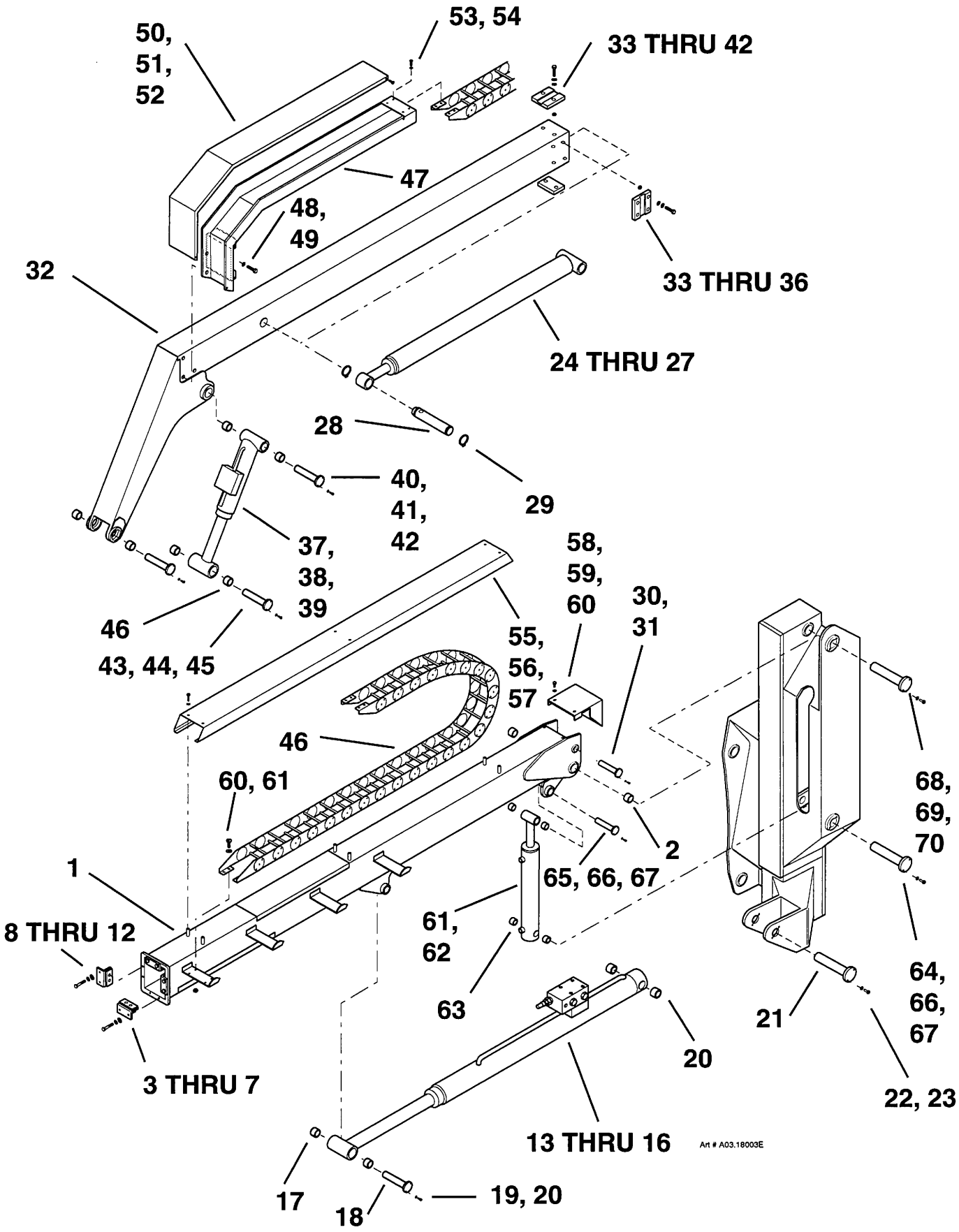


TITLE	UPPER BOOM ASSEMBLY, 32/21E		
SIMON AERIALS INC. NEW JAN, 1996		PART NO.	PLATE NO. 03.22

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
34	44002-0036		CAP SCREW, HEX HEAD	
35	44013-0022		WASHER, FLAT	
36	44007-0015		NUT, NYLOC	
37	21002-0089		SLAVE LEVEL CYLINDER	1
38	41034-0090		SEAL KIT, SLAVE LEVEL CYLINDER	1
39	44031-0020		BUSHING (20 mm x 20 mm long)	4
40	GS477		PIN, SLAVE LEVEL CYLINDER (Base end)	1
41	44002-0036		CAP SCREW, HEX HEAD	
42	44013-0022		WASHER, FLAT	
43	GS505		PIN, SLAVE LEVEL CYLINDER (Rod end)	1
44	44002-0065		CAP SCREW, HEX HEAD	
45	44013-0022		WASHER, FLAT	
46	44029-0129		CARRIER, HOSE (Flexi-track)	
			Complete assembly (26 links)	1
47	GS235		CARRIER, HOSE	1
48	44007-0016		NUT, LOCK (M12)	3
49	44013-0009		WASHER, FLAT (M12)	3
50	PS214		COVER, HOSE CARRIER	1
51	44002-0013		CAP SCREW, HEX HEAD	
52	44013-0006		WASHER, FLAT	
53	44002-0036		CAP SCREW, HEX HEAD	
54	44013-0007		WASHER, FLAT	
55	SS100		COVER, CABLE	
56	44002-0037		CAP SCREW, HEX HEAD	
57	44013-0006		WASHER, FLAT	1
58	SS271		COVER, END	1
59	44002-0013		CAP SCREW, HEX HEAD	
60	44013-0006		WASHER, FLAT	
61	21002-0086		MASTER LEVEL CYLINDER	
62	41034-0090		SEAL KIT, MASTER LEVEL CYLINDER	1
63	14285		BUSHING (20 mm x 20 mm long)	4
64	GS476		PIN, MASTER LEVEL CYLINDER (Base end)	1
65	GS476		PIN, MASTER LEVEL CYLINDER (Rod end)	1
66	44002-0036		CAP SCREW, HEX HEAD	
67	44013-0022		WASHER, FLAT	
68	GS472		PIN, UPPER BOOM (Base end)	1
69	44002-0036		CAP SCREW, HEX HEAD	
70	44013-0022		WASHER, FLAT	

TITLE	UPPER BOOM ASSEMBLY, 32/21E (2 OF 2)		
PLATE NO. 03.22	**SIMON AERIALS INC.**	PART NO.	

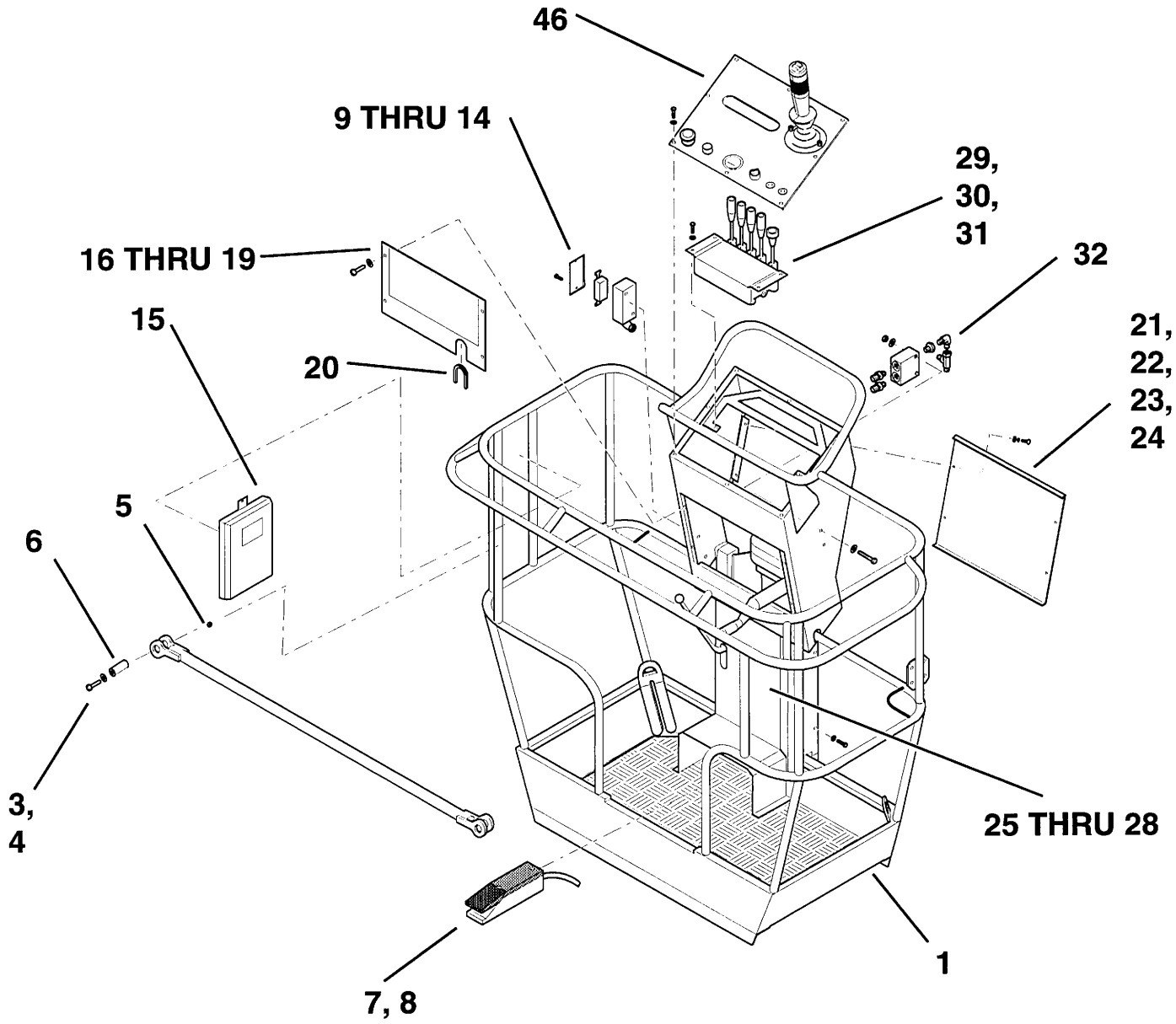


TITLE	UPPER BOOM ASSEMBLY, 32/21E (2 OF 2)		
SIMON AERIALS INC. NEW JAN, 1996		PART NO.	PLATE NO. 03.22

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1	13016-0061		PLATFORM WELDMENT	1
2	PS631		BAR, GATE	1
3	44002-0075		CAP SCREW, HEX HEAD (M6 x 65mm)	1
4	44013-0006		WASHER, FLAT(M6)	1
5	44007-0013		NUT, HEX LOCK (M6)	1
6	44016-0061		SPACER (Nylon roller)	1
7	14269		SWITCH ASSEMBLY, FOOT (Single pole, double throw)	1
8	42012-0061		CABLE, ELECTRICAL (Bulk item, 6 Ft [1.8M] required this application)	A.R.
9	03-062100		BOX, DUPLEX OUTLET (Weatherproof)	1
10	03-067000		OUTLET, DUPLEX (125 Volt AC, 20 Amp)	1
11	03-062200		COVER, DUPLEX OUTLET (Weatherproof)	1
12	07-090156		CAP SCREW, BUTTON HEAD (1/4"-20 x 5/8", Stn Stl.)	1
13	07-050014		NUT, STOP, (1/4"-20, Grade 5)	2
14	03-041000		GRIP, CORD (1/2", with 3/8" to 7/16" seal)	1
15	44029-0064		BOX, TECHNICAL MANUAL STORAGE	1
16	PS261		COVER, FRONT (Upper)	1
17	44002-0335		CAP SCREW, HEX HEAD (M5 x 16mm)	1
18	44013-0006		WASHER, FLAT (M6)	1
19	44002-0007		NUT, HEX LOCK (M5)	1
20	44029-0014		EDGE GUARD	
21	PS262		COVER, REAR	1
22	44002-0335		CAP SCREW, HEX HEAD (M5 x 16mm)	1
23	44013-0006		WASHER, FLAT (M6)	1
24	44002-0009		NUT, HEX LOCK (M5)	1
25	PS473		COVER, FRONT (Lower)	1
26	44002-0335		CAP SCREW, HEX HEAD (M5 x 16mm)	1
27	44013-0006		WASHER, FLAT(M6)	1
28	44002-0009		NUT, HEX LOCK (M5)	1
29	14378		VALVE ASSEMBLY	
30	44002-0029		CAP SCREW, HEX SOCKET (M8 x 65mm)	
31	44013-0007		WASHER, FLAT (M8)	
32	41009-0028		VALVE ASSEMBLY, DRIVE	1

TITLE	PLATFORM ASSEMBLY, 32/21E (1 OF 2)		
PLATE NO. 04.75	**SIMON AERIALS INC.** NEW MARCH, 1996	PART NO.	

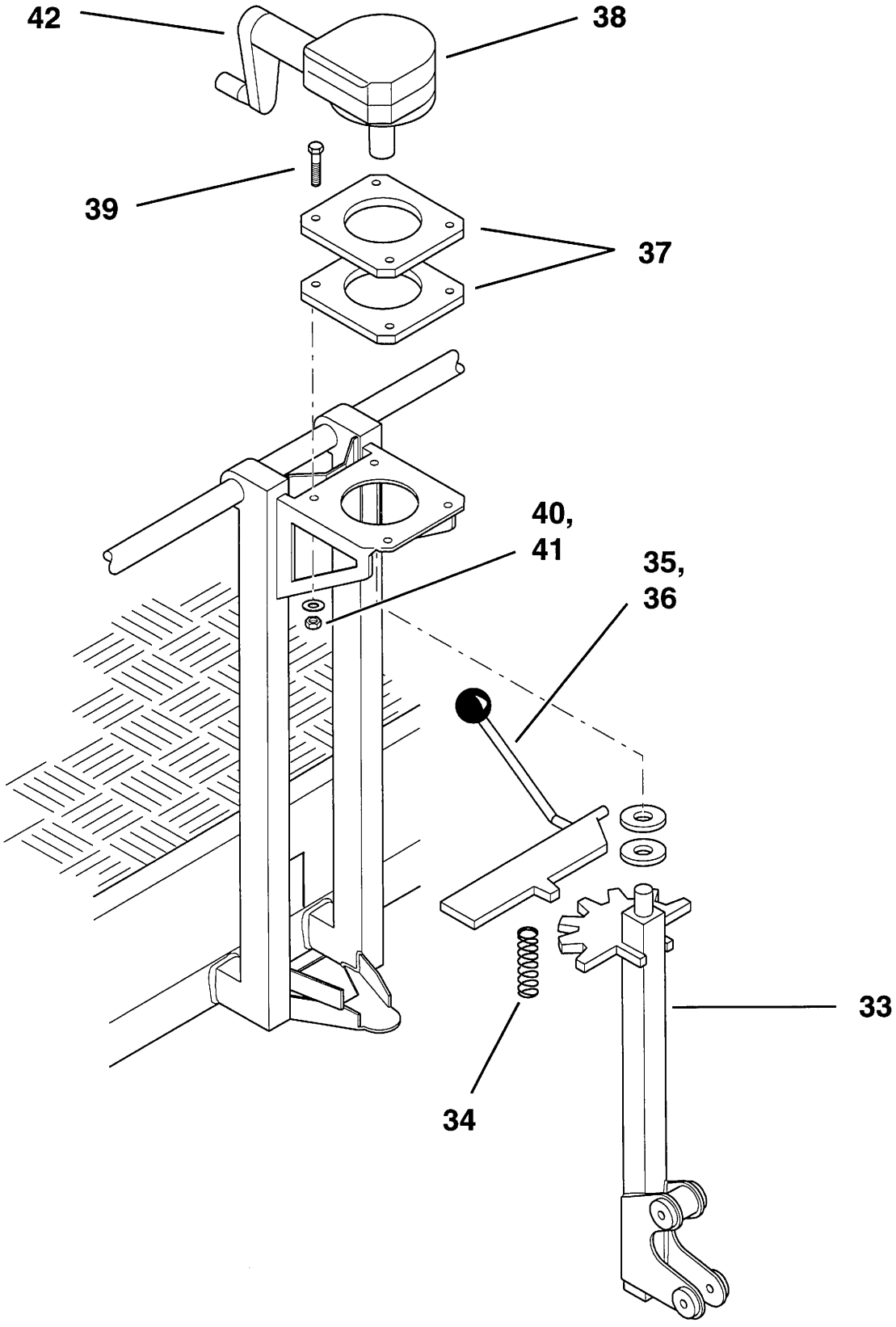


TITLE	PLATFORM ASSEMBLY, 32/21E (1 OF 2)		
SIMON AERIALS INC. NEW MARCH, 1996		PART NO.	PLATE NO. 04.75

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
43	DS336		POST, SWIVEL	1
34	10564		SPRING, TENSION	2
35	MS253		ARM, ROTATION LEVER	1
36	GS267		PLATE, TONGUE ASSEMBLY	1
37	P89/M88		PLATE, MOUNTING	1
38	41023-0118		GEARBOX, ROTATION	1
39	44002-0068		SCREW, HEX HEAD (M10 x 50mm)	4
40	44007-0015		NUT, NYLOC (M10)	4
41	44013-0008		WASHER, FLAT (M10)	8
42	18622		HANDLE, ROTATION	1
43	17716		ALARM, TILT	1
44	44031-0028		BUSHING, (25 x 25) (for level pin)	3
45	10288		BUSHING, (40 x 50) (for platform/cage mount pin)	1
			The following items **are not** included as part of the Platform Assembly::	
46		09.25	CONSOLE ASSEMBLY, PLATFORM CONTROL	1

TITLE	PLATFORM ASSEMBLY, 32/21E (2 OF 2)		
PLATE NO. 04.75	**SIMON AERIALS INC.** NEW MARCH, 1996		PART NO.

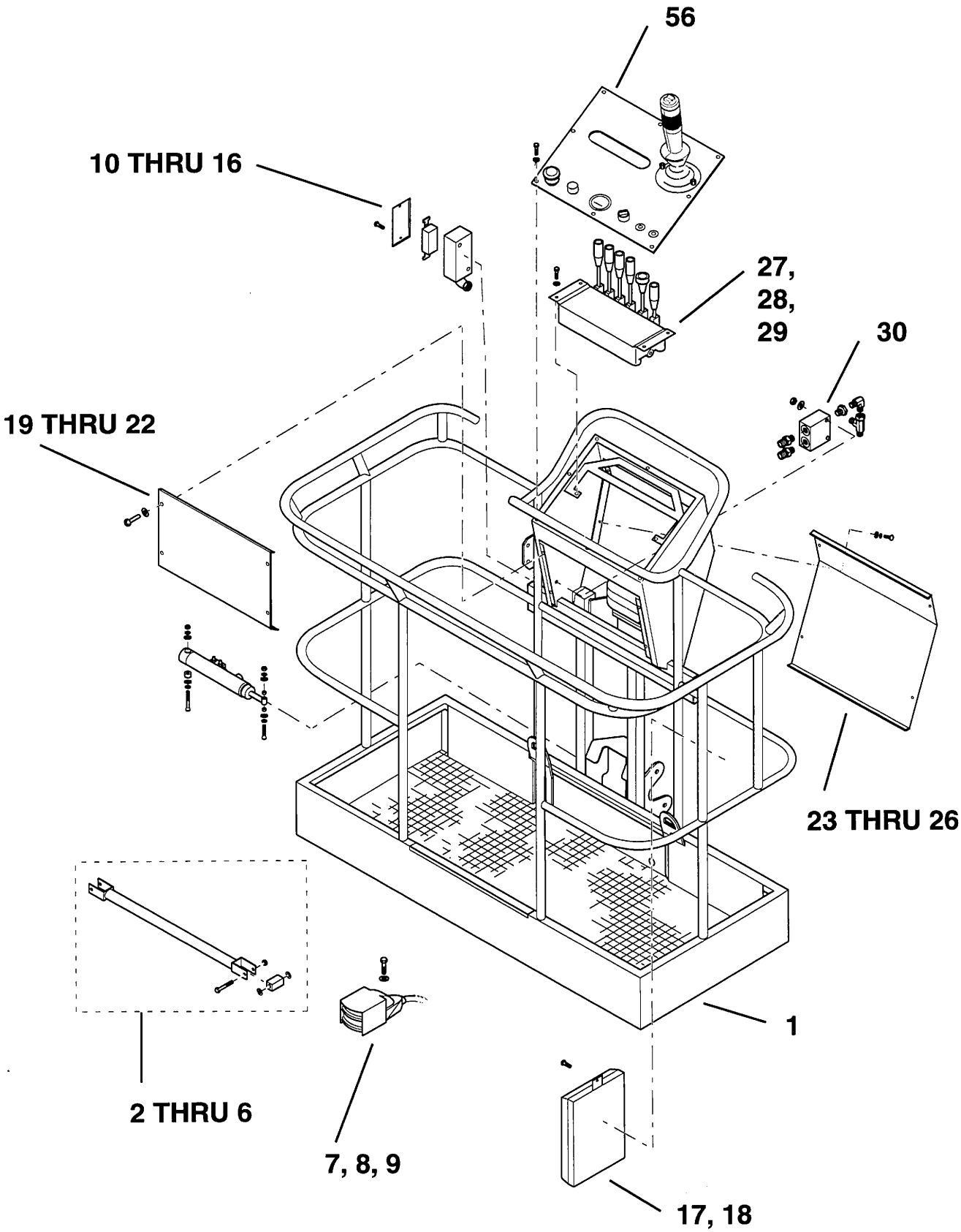


TITLE	PLATFORM ASSEMBLY, 32/21E (2 OF 2)		
SIMON AERIALS INC. NEW MARCH, 1996		PART NO.	PLATE NO. 04.75

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1	13016-0073		PLATFORM WELDMENT	1
2	33014-0075		BAR, GATE	1
3	44002-0009		CAP SCREW, HEX HEAD (M6 x 65)	1
4	44013-0006		WASHER, FLAT (M6)	1
5	44007-0013		NUT, HEX LOCK (M6)	1
6	44016-0061		SPACER (Nylon roller)	1
7	42002-0311		SWITCH ASSEMBLY, FOOT (Single pole, double throw)	1
8	44002-0315		COVER, SWITCH (Guard type)	1
9	42012-0041		CABLE, ELECTRICAL	
			(Bulk item, 6 Ft [1.8M] required this application)	A.R.
10	03-062100		BOX, DUPLEX OUTLET (Weatherproof)	1
11	03-067000		OUTLET, DUPLEX (125 Volt AC, 20 Amp)	1
12	03-062200		COVER, DUPLEX OUTLET (Weatherproof)	1
13	07-090156		CAP SCREW, BUTTON HEAD (1/4"-20 x 5/8", Stn Stl.)	1
14	07-050014		NUT, STOP, (1/4"-20, Grade 5)	2
15	03-041000		GRIP, CORD (1/2", with 3/8" to 7/16" seal)	1
16	03-055500		NUT, CONDUIT LOCK	1
17	44029-0064		BOX, TECHNICAL MANUAL STORAGE	1
18			RIVET, POP	4
19	49003-0234		COVER, FRONT	1
20	44002-0335		CAP SCREW, HEX HEAD (M5 x 16))	1
21	44013-0011		WASHER, FLAT (M5)	1
22	44007-0001		NUT, HEX LOCK (M5)	
23	49003-0236		COVER, REAR	1
24	44002-0335		CAP SCREW, HEX HEAD (M5 x 16)	1
25	44013-0011		WASHER, FLAT (M5)	1
26	44007-0001		NUT, HEX LOCK (M5)	1
27	31003-0095		VALVE ASSEMBLY	
28	44002-0029		CAP SCREW, HEX SOCKET (M8 x 65)	
29	44013-0007		WASHER, FLAT (M8)	
30	41009-0028		VALVE ASSEMBLY, DRIVE	1

TITLE	PLATFORM ASSEMBLY, 32/21E (1 OF 2)		
PLATE NO. 04.76	**SIMON AERIALS INC.** NEW MARCH, 1996	PART NO.	

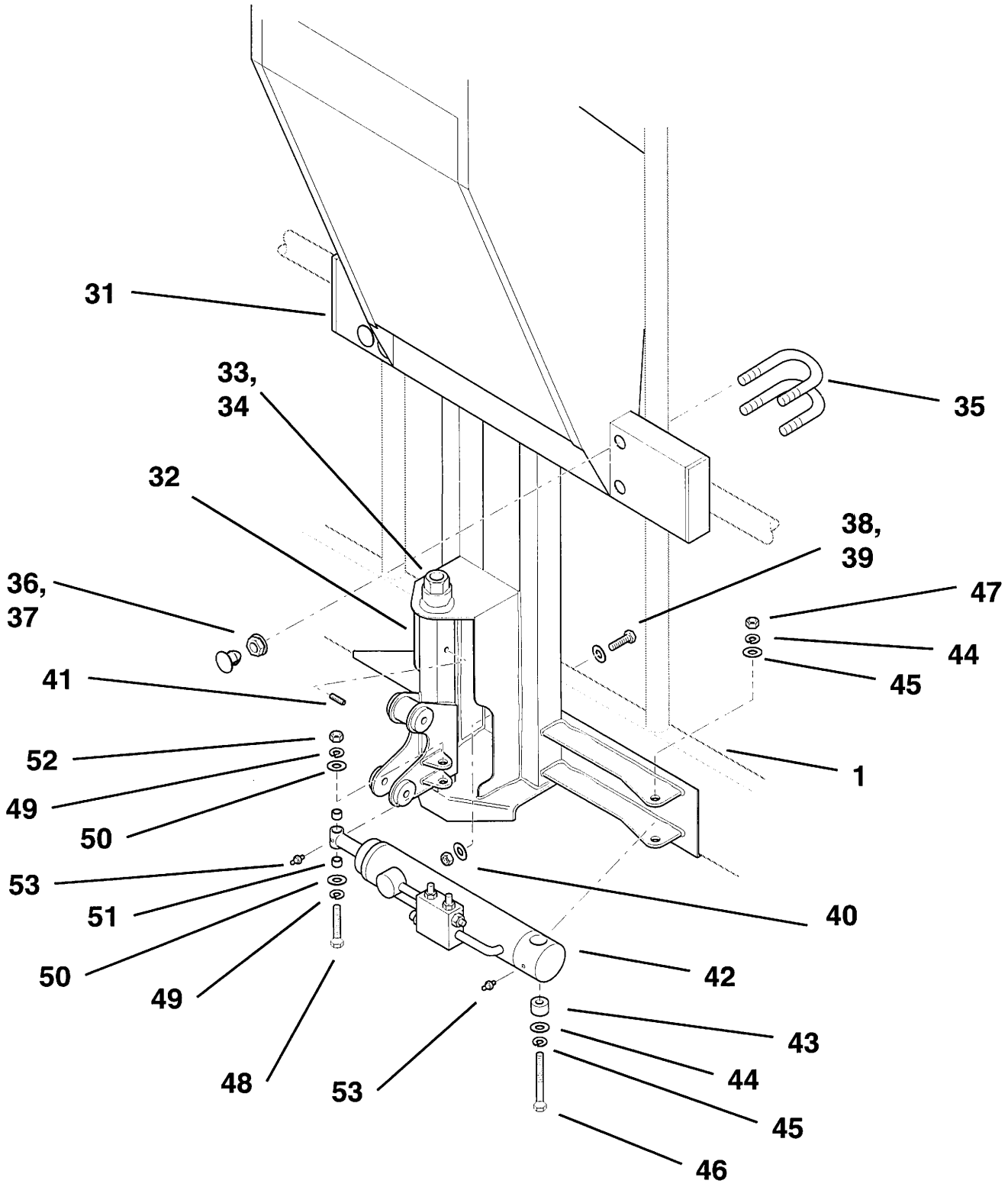


TITLE	PLATFORM ASSEMBLY, 32/21E (1 OF 2)		
SIMON AERIALS INC. NEW MARCH, 1996		PART NO.	PLATE NO. 04.76

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
31	13017-0065		CRADLE ASSEMBLY	1
32	GS628		POST, ROTATION	1
33	MS558		PIVOT PIN, ROTATION	1
34	44007-0007		NUT, HEX HEAD (M20)	1
35	44019-0088		U-BOLT	4
36	44007-0015		NUT, HEX HEAD (M10)	8
37			CAP, PLASTIC	4
38	44004-0122		CAP SCREW, HEX HEAD (M12 x 70mm)	2
39	44013-0009		WASHER, FLAT	4
40	44008-0002		NUT, HEX HEAD	2
41	44019-0093		SETSCREW	1
42	21002-0085		CYLINDER, PLATFORM (CAGE) ROTATION	1
43	CA01015		BUSHING, ROTATION CYLINDER (Base end)	??
44	44013-0007		WASHER, FLAT	2
45	44013-0022		WASHER, LOCK	2
46	44021-0717		PIN, PIVOT (Base end rotation cylinder)	1
47	44007-0014		NUT, HEX HEAD	1
48	44011-0618		PIN, PIVOT (Rod end rotation cylinder)	1
49	44013-0022		WASHER, LOCK	2
50	44013-0007		WASHER, FLAT	2
51	CA01015		BUSHING, ROTATION CYLINDER (Rod end)	2
52	44007-0014		NUT, HEX HEAD	1
53	16490		FITTING, GREASE	2
54	44031-0028		BUSHING, (25 x 25) (for level pin)	3
55	10288		BUSHING, (40 x 50) (for platform/ cage mount pin)	1
			The following item **is not** included as part of the Platform Assembly:	
56	See Plate	09.26	CONSOLE ASSEMBLY, PLATFORM CONTROL	1

TITLE	PLATFORM ASSEMBLY, 32/21E (2 OF 2)		
PLATE NO. 04.76	**SIMON AERIALS INC.** NEW MARCH, 1996	PART NO.	

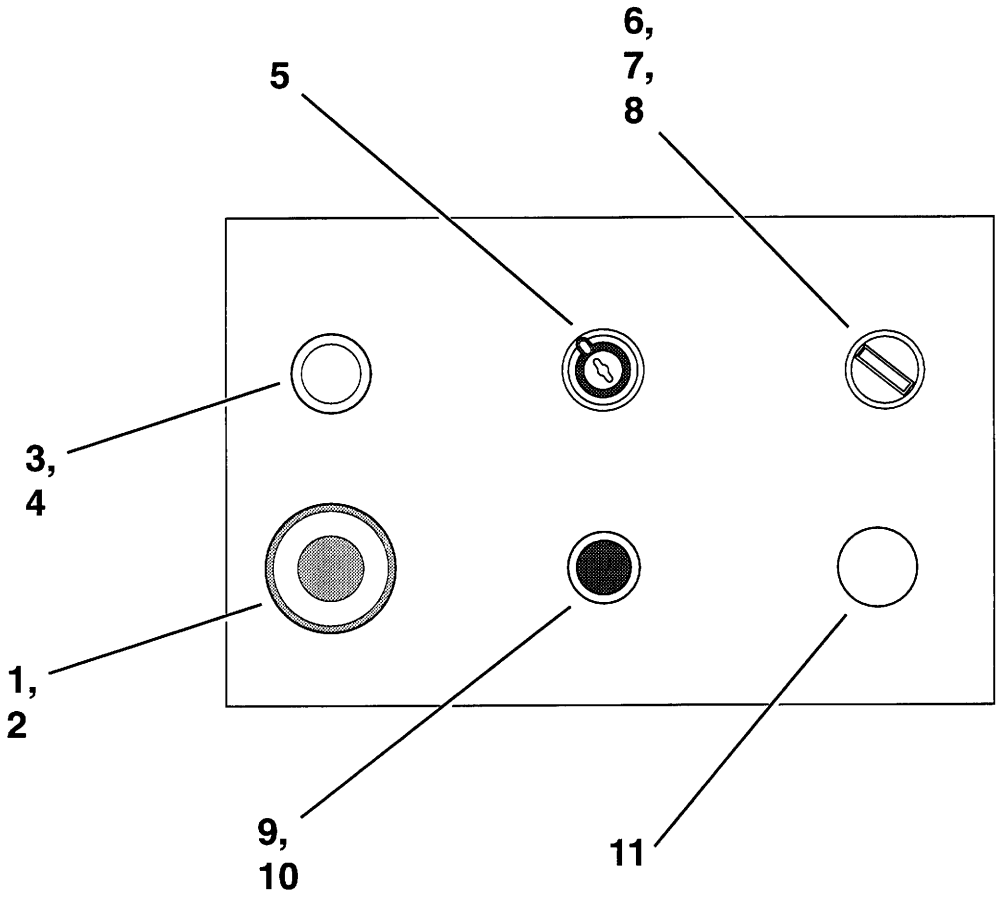


TITLE	PLATFORM ASSEMBLY, 32/21E (2 OF 2)		
SIMON AERIALS INC. NEW MARCH, 1996		PART NO.	PLATE NO. 04.76

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1	42002-0074		BUTTON, EMERGENCY STOP	1
2	42002-0217		CONTACT, NORMALLY CLOSED	1
3	11037		PUSHBUTTON, GREEN (Pump on/off)	1
4	42002-0217		CONTACT, NORMALLY OPEN	1
5	42010-0045		KEYSWITCH, POWER ON/OFF	1
6	10954		SWITCH, SELECTOR (Cage/ ground)	1
7	42002-0215		CONTACT, NORMALLY OPEN	1
8	42002-0217		CONTACT, NORMALLY CLOSED	1
9	42010-0041		LENS ASSEMBLY (Power on)	1
10	42010-0053		BULB, 24 V, 3 W	1
11	42002-0006		BLANK	1

TITLE	GROUND CONTROL ASSEMBLY, 32/21E		
PLATE NO. 07.14	**SIMON AERIALS INC.** NEW JAN, 1996		PART NO.

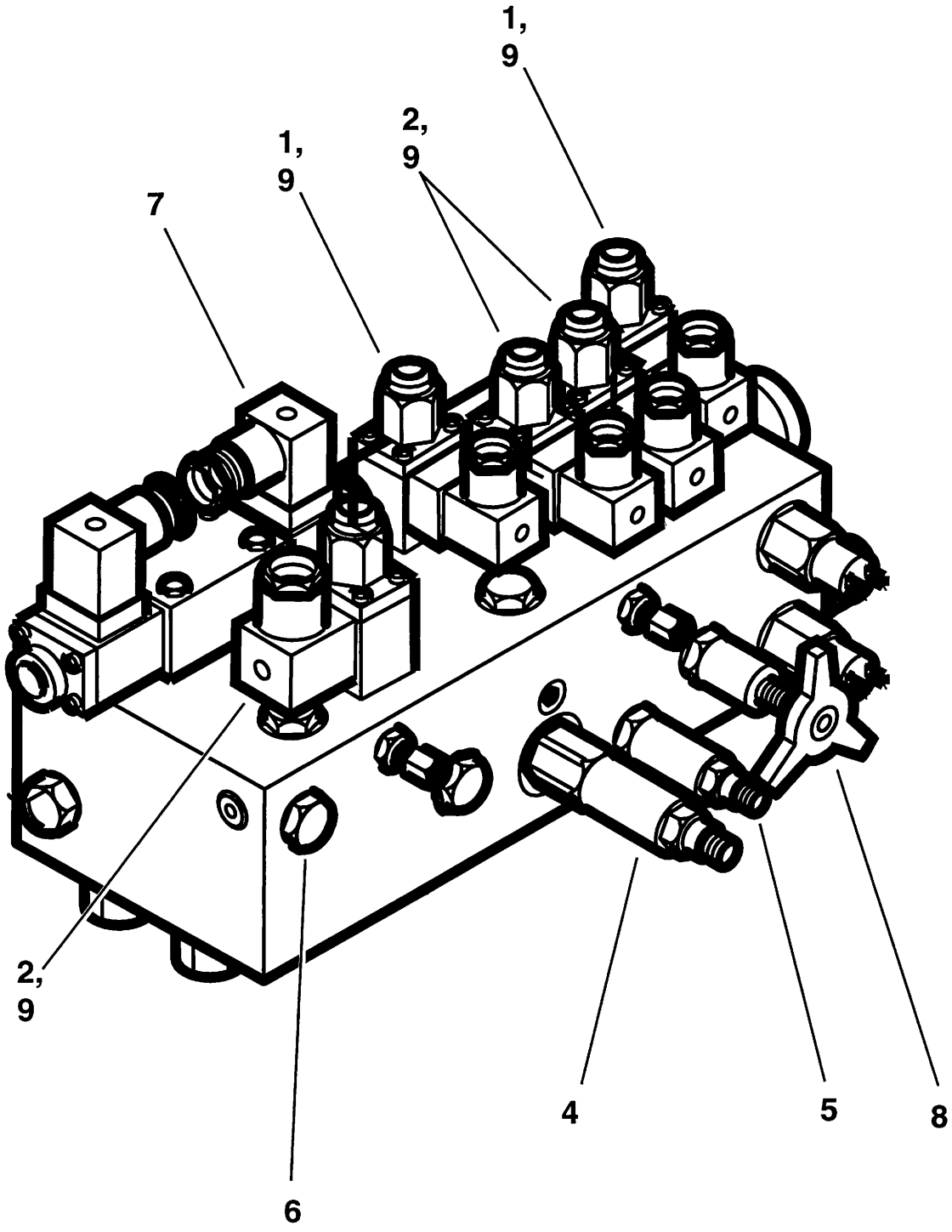


TITLE	GROUND CONTROL ASSEMBLY, 32/21E		
SIMON AERIALS INC. NEW JAN, 1996		PART NO.	PLATE NO. 07.14

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1	41003-0079		VALVE, SOLENOID OPERATED POPPET (normally closed)	2
2	41003-0080		VALVE, SOLENOID OPERATED POPPET (normally open)	3
3	41000-0031		VALVE, CHECK	4
4	41006-0033		VALVE, PRESSURE REDUCING	1
5	41006-0034		VALVE, RELIEF	1
6	41006-0035		VALVE, RELIEF	1
7	41003-0077		VALVE, 2-WAY (closed center)	1
8	41020-0322		VALVE, NEEDLE	1
9	42015-0099		COIL, 48 VDC	5

TITLE	MANIFOLD BLOCK, 32/21E		
PLATE NO. 07.25	**SIMON AERIALS INC.** NEW JAN, 1996	PART NO.	

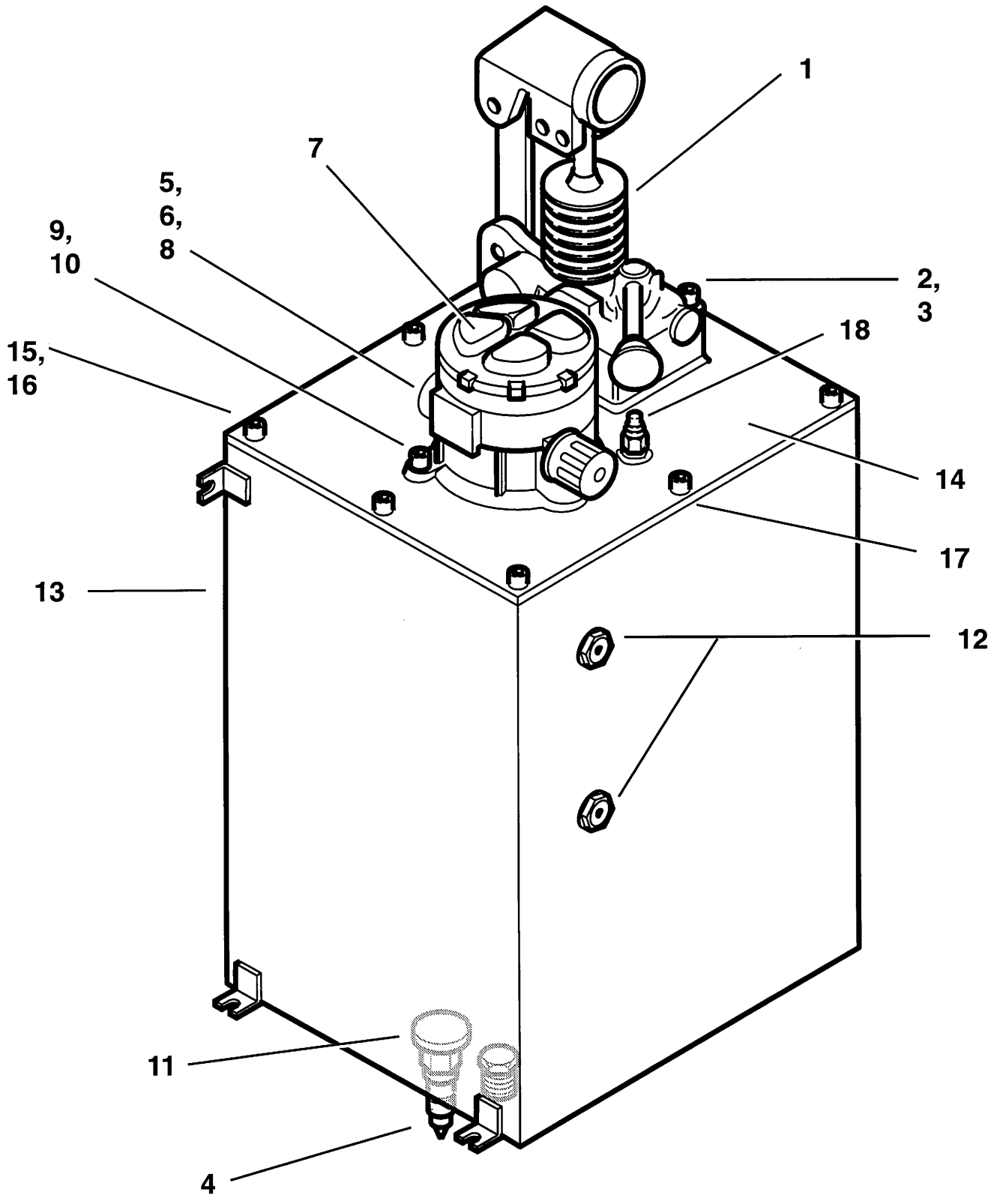


TITLE	MANIFOLD BLOCK, 32/21E		
SIMON AERIALS INC. NEW JAN, 1996		PART NO.	PLATE NO. 07.25

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1	41017-0041		PUMP ASSEMBLY, EMERGENCY (Hand operated)	1
2	44004-0087		CAPSCREW, SOCKET HEAD (M8 x 50 mm long)	2
	44004-0082		CAPSCREW, SOCKET HEAD (M8 x 20 mm long)	2
3	44013-0022		WASHER, FLAT (M8)	4
4	11141		VALVE, BALL (3/4")	1
5	41030-0041		FILTER ASSEMBLY, RETURN	1
6	41030-0039		ELEMENT, RETURN FILTER	1
7			CAP, HYDRAULIC TANK FILLER	1
8			SPRING, FILTER RETAINING	1
9	44004-0082		CAPSCREW, SOCKET HEAD (M8 x 20 mm long)	2
10	44013-0022		WASHER, LOCK (M8)	2
11	41030-0040		FILTER, SUCTION	1
12	41023-0048		GAUGE, OIL LEVEL (Sight gauge)	2
13	21027-0030		TANK WELDMENT	1
14	49006-1523		COVER, TANK TOP	1
15	44002-0354		CAPSCREW, SOCKET HEAD (M6 x 20 mm long)	8
16	44013-0022		WASHER, FLAT (M8)	8
17	44032-0050		GASKET, COVER	1
18	41032-0011		VALVE, PRESSURE RELIEF	1

TITLE	HYDRAULIC TANK, 32/21E		
PLATE NO. 07.26	**SIMON AERIALS INC.** NEW JAN, 1996		PART NO.

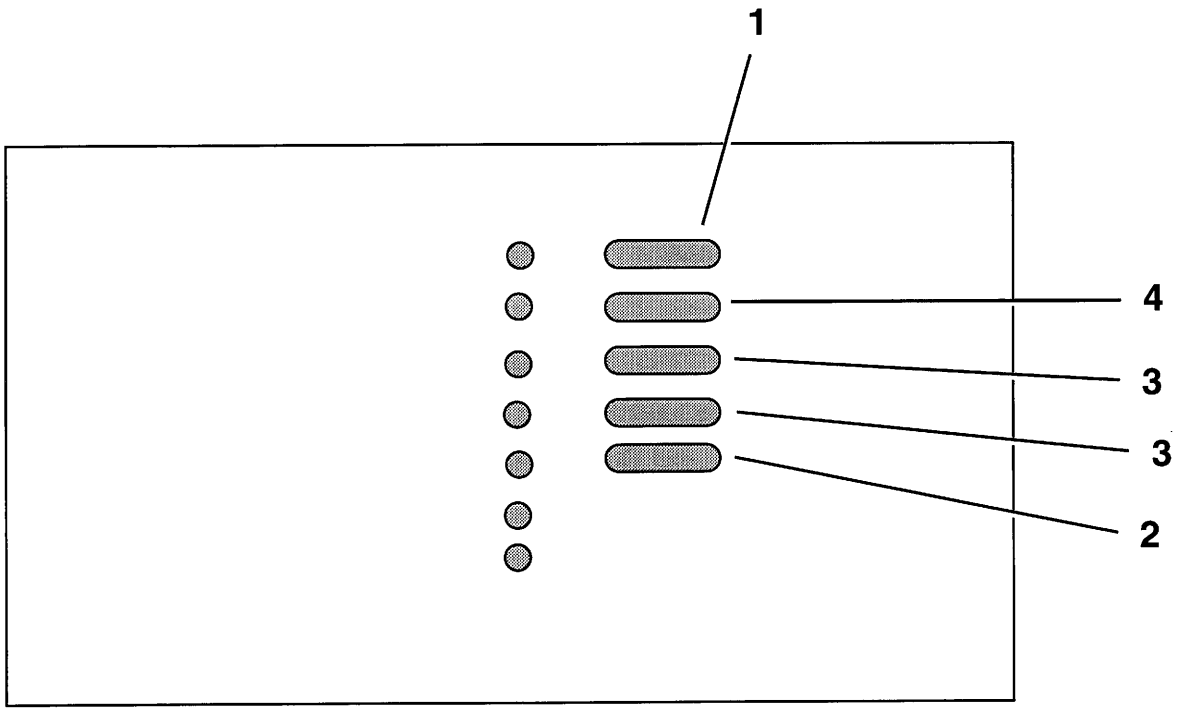


TITLE	HYDRAULIC TANK, 32/21E		
SIMON AERIALS INC. NEW JAN, 1996		PART NO.	PLATE NO. 07.26

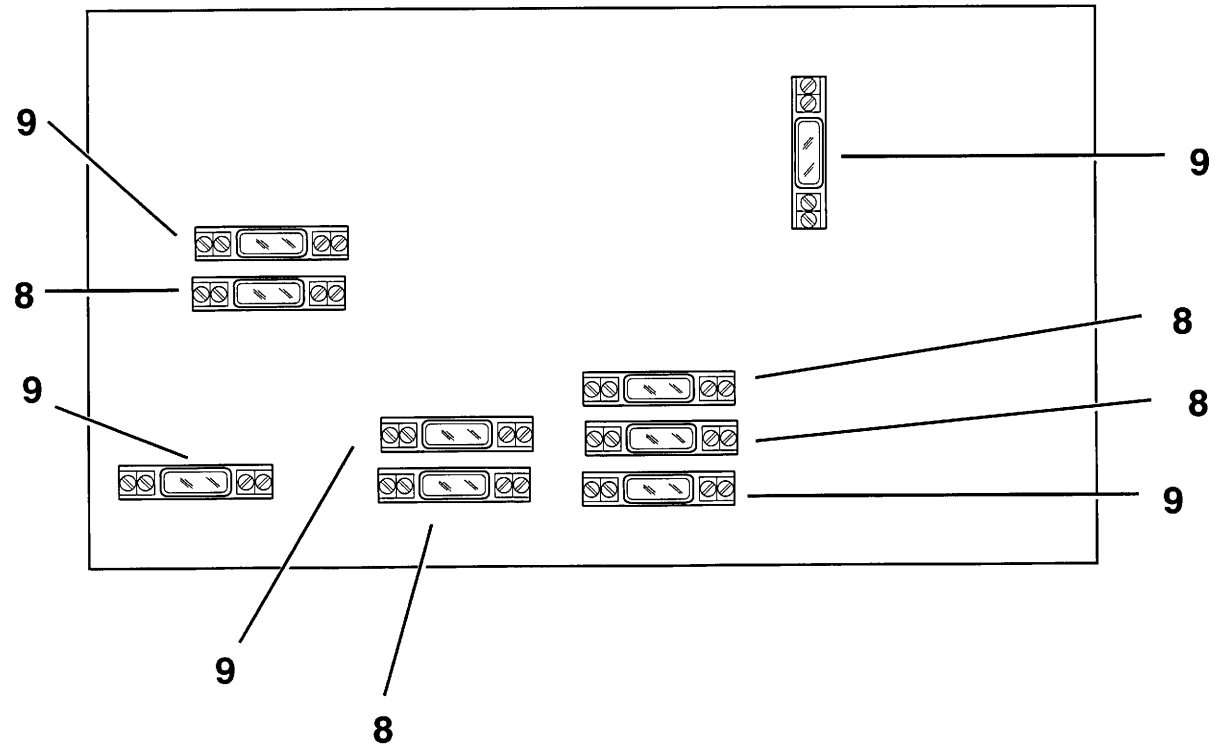
PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1	42015-0101		FUSE, SPADE (2 Amp)	1
2	10026		FUSE, SPADE (10 Amp)	1
3	11563		FUSE, SPADE (5 Amp)	2
4	14615		FUSE, SPADE (3 Amp)	1
5	44002-0013		NUT, NYLOC (M6)	4
6	44002-0014		SCREW, HEX HEAD (M6 x 20 mm)	4
7	44013-0007		WASHER, FLAT	8
8	42015-0015		RELAY (24 Volt DC)	4
9	42015-0100		RELAY (48 Volt DC)	5
10	44007-0013		NUT, NYLOC (M6)	2
11	44002-0015		SCREW, HEX HEAD (M6 x 20 mm)	2
12	44013-0006		WASHER, FLAT (M6)	4

TITLE	PCB BOX, 32/21E		
PLATE NO. 07.27	SIMON AERIALS INC. NEW JAN, 1996	PART NO. 42020-0016	



Outside View



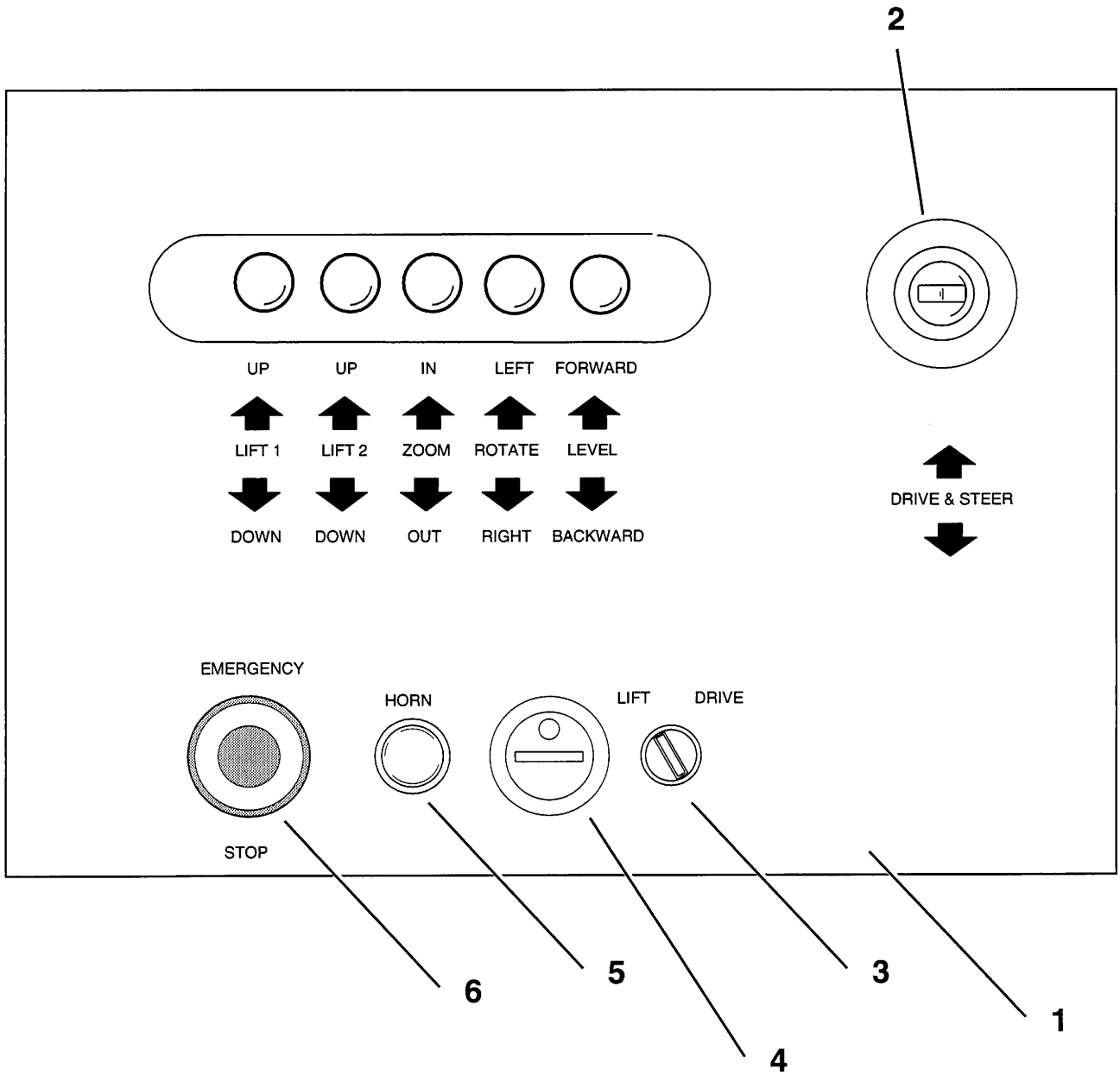
Inside View

TITLE	PCB BOX, 32/21E	
SIMON AERIALS INC. NEW JAN, 1996	PART NO. 42020-0016	PLATE NO. 07.27

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1	44029-0152		PLATE, CONSOLE	1
2	11745		CONTROLLER, DRIVE/ STEER (Joystick)	1
3	42002-0112		SWITCH	1
4	42014-0076		METER, HOUR/ BATTERY CHARGE	1
5	17716		PUSHBUTTON	1
6	42002-0079		BUTTON, EMERGENCY STOP	1

TITLE	PLATFORM CONTROL CONSOLE, 32/21E		
PLATE NO. 09.26	**SIMON AERIALS INC.** NEW MARCH, 1996		PART NO.

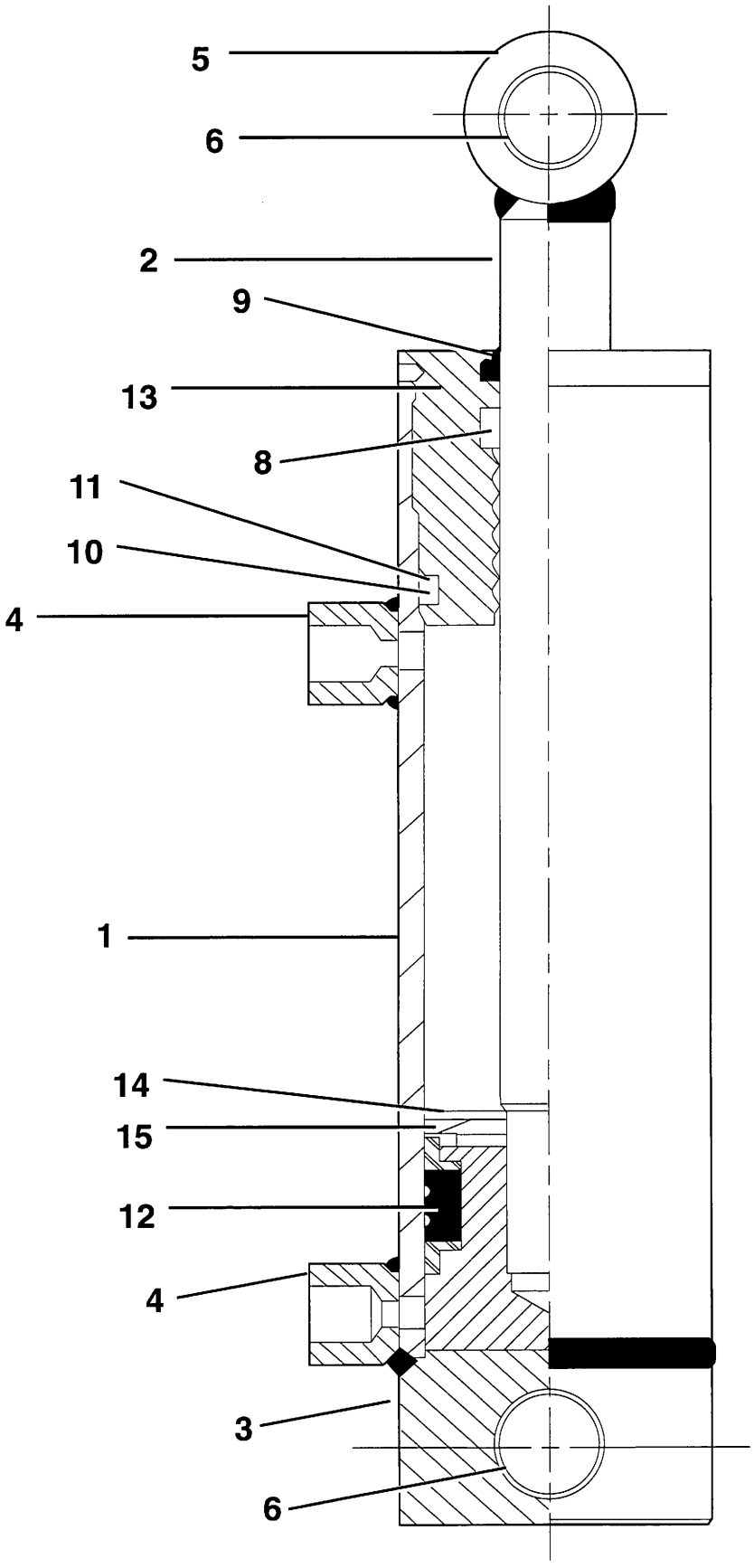


TITLE	PLATFORM CONTROL CONSOLE, 32/21E		
SIMON AERIALS INC. NEW MARCH, 1996		PART NO.	PLATE NO. 09.26

PARTS LIST

ITEM	PART NO	SEE PLATE	DESCRIPTION	QTY.
1			TUBE, CYLINDER (60mm)	1
2			ROD, CYLINDER (25mm)	1
3			CYLINDER END	1
4			FITTING (1/4" DSP FEM STD)	2
5			ROD END	1
6	44031-0020		BUSHING (20mm x 20mm)	2
7	X06025		SEAL KIT	1
8			SEAL, GLAND	1
9			SEAL, WIPER	1
10			"O"-RING	1
11			RING, BACKUP	1
12			SEAL	1
13			END GLAND	1
14			HEAD, PISTON	1
15			SCREW, HEX HEAD SOCKET (M8 x 10mm long)	1

TITLE	STEER CYLINDER, 32/21E		
PLATE NO. 11.90	**SIMON AERIALS INC.** NEW FEB., 1996	PART NO. 21002-0074	



TITLE	STEER CYLINDER, 32/21E		
SIMON AERIALS INC. NEW FEB., 1996	PART NO. 21002-0074	PLATE NO. 11.90	

PARTS LIST

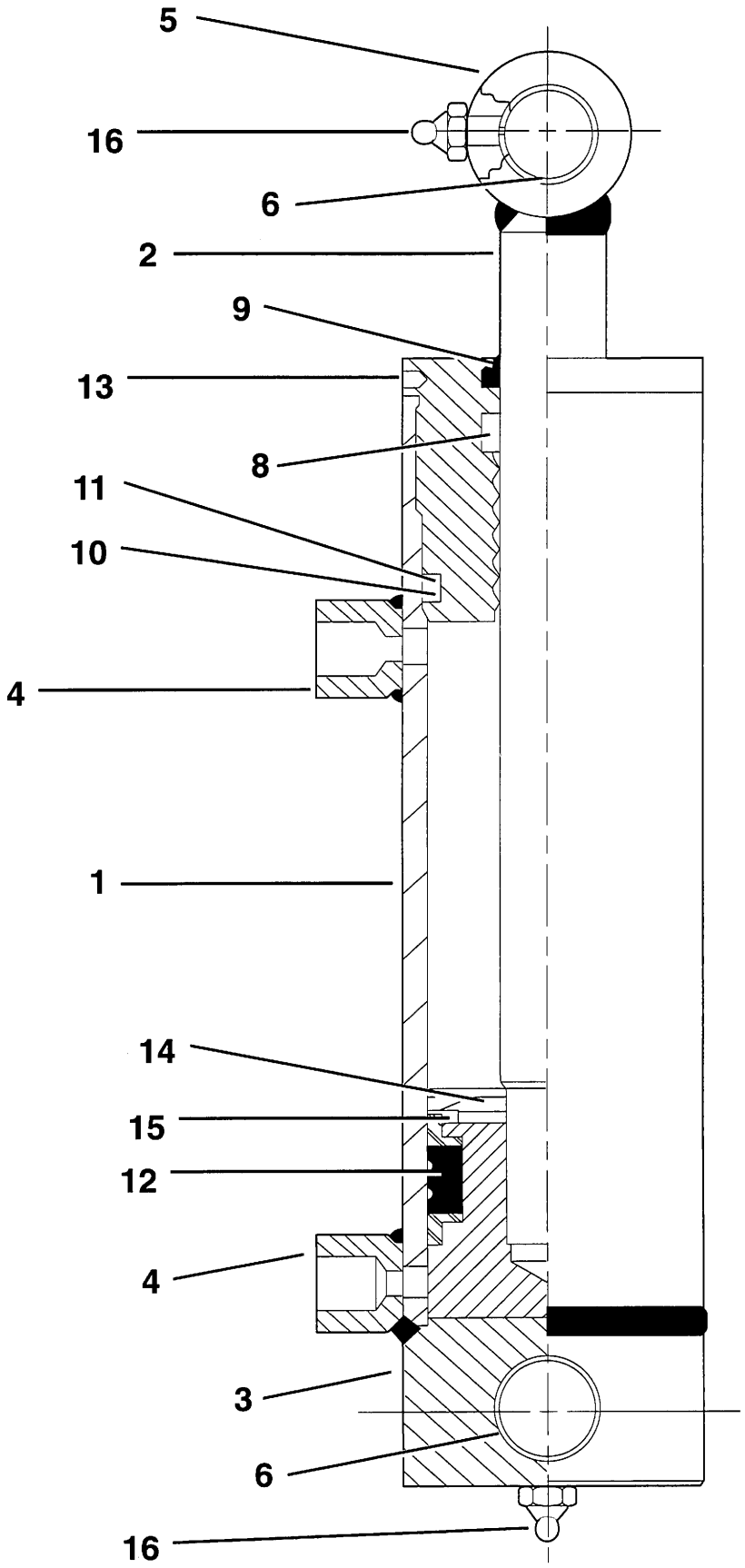
ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1			TUBE, CYLINDER (60mm)	1
2			ROD, CYLINDER (25mm)	1
3			CYLINDER END	1
4			FITTING (1/4" DSP FEM STD)	2
5			ROD END	1
6	44031-0020		BUSHING (20mm x 20mm)	2
7	41034-0090		SEAL KIT	1
8			SEAL, GLAND	1
9			SEAL, WIPER	1
10			"O"-RING	1
11			RING, BACKUP	1
12			SEAL	1
13			END GLAND	1
14			HEAD, PISTON	1
15			SCREW, HEX HEAD SOCKET (M8 x 10mm long)	1
16	EO18		FITTING, GREASE (1/8")	2

TITLE: MASTER CYLINDER, 32/21E

PLATE NO. 11.91

SIMON AERIALS INC. NEW FEB., 1996

PART NO. 21002-0086

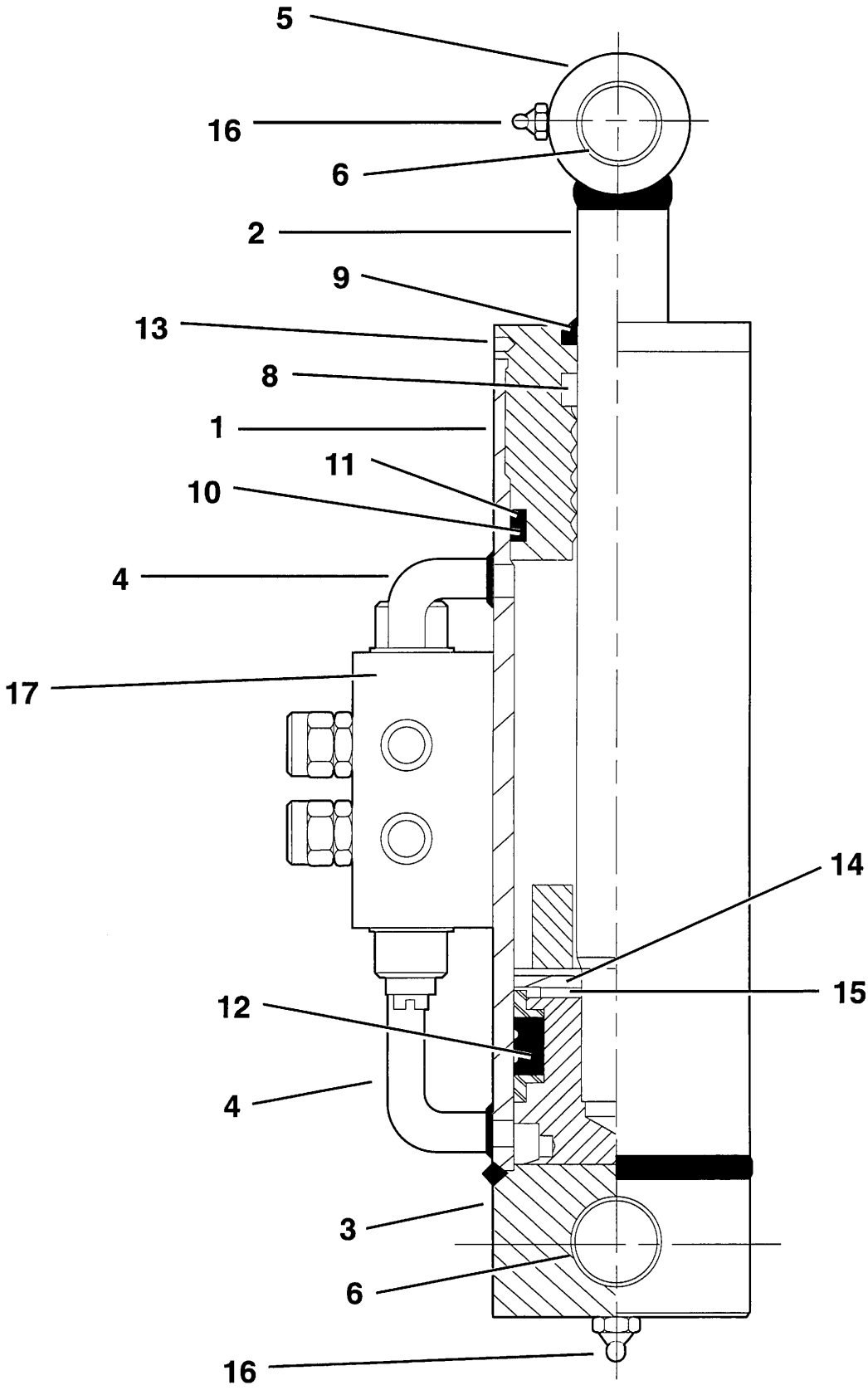


TITLE	MASTER CYLINDER, 32/21E		
SIMON AERIALS INC. NEW FEB., 1996	PART NO. 21002-0086	PLATE NO. 11.91	

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1			TUBE, CYLINDER (60mm)	1
2			ROD, CYLINDER (25mm)	1
3			CYLINDER END	1
4			TUBE, CONNECTING	2
5			ROD END	1
6	44031-0020		BUSHING (20mm x 20mm)	2
7	41034-0090		SEAL KIT	1
8			SEAL, GLAND	1
9			SEAL, WIPER	1
10			"O"-RING	1
11			RING, BACKUP	1
12			SEAL	1
13			END GLAND	1
14			HEAD, PISTON	1
15			SCREW, HEX HEAD SOCKET (M8 x 10mm long)	1
16	EO18		FITTING, GREASE (1/8")	2
17	EP02500J		VALVE, DOUBLE COUNTERBALANCE (Holding or overcenter valve)	1

TITLE	SLAVE CYLINDER, 32/21E			
PLATE NO.	11.92	**SIMON AERIALS INC.**	NEW FEB., 1996	PART NO. 21002-0089

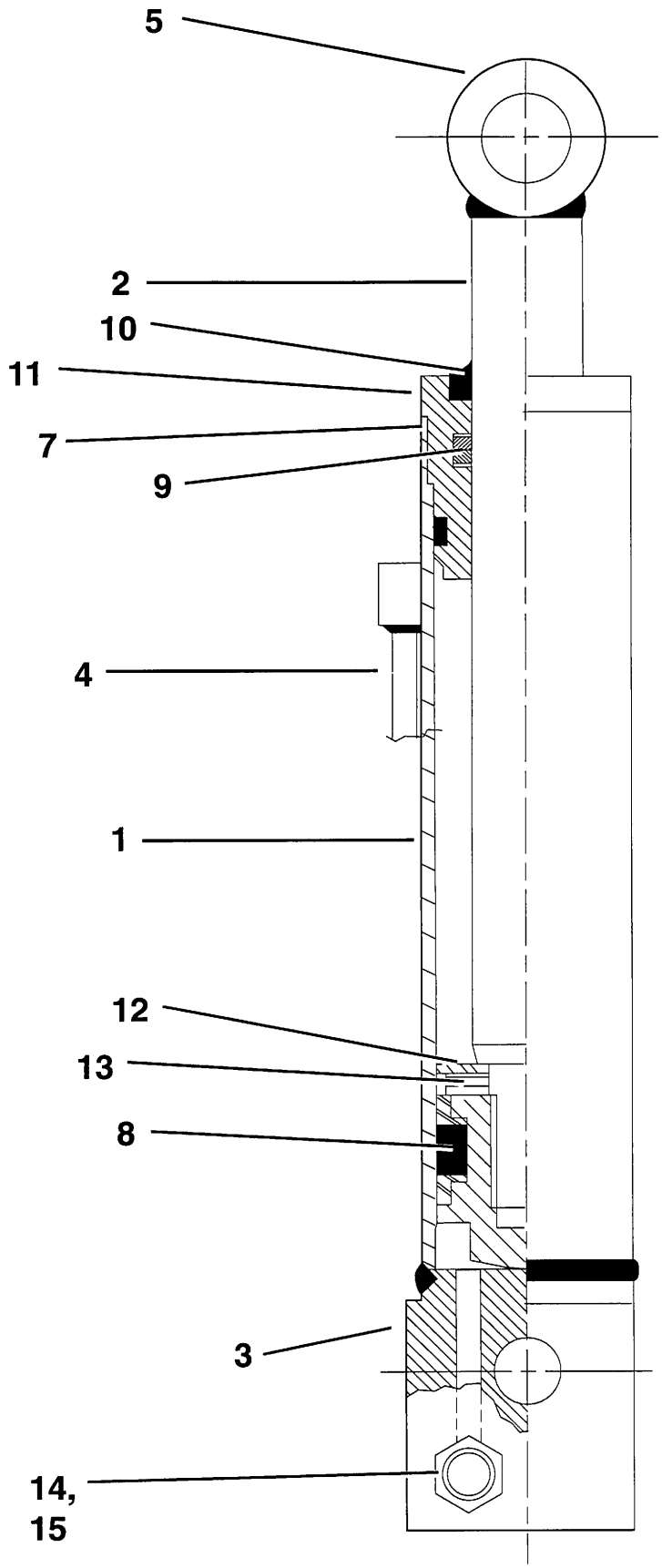


TITLE	SLAVE CYLINDER, 32/21E		
SIMON AERIALS INC. NEW FEB., 1996		PART NO. 21002-0089	PLATE NO. 11.92

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1			TUBE, CYLINDER (60mm)	1
2			ROD, CYLINDER (25mm)	1
3			VALVE BLOCK / CYLINDER END	1
4			TUBE, CONNECTING	2
5			ROD END	1
6	41034-0089		SEAL KIT	1
7			SEAL, GLAND	1
8			SEAL, WIPER	1
9			SEAL	1
10			"O"-RING	1
11			END GLAND	1
12			HEAD, PISTON	1
13			SCREW, HEX HEAD SOCKET (M8 x 10mm long)	1
14	CH06A		VALVE, CHECK	2
15	EN061G		VALVE, SHUTTLE (For check valve)	1

TITLE	EXTEND CYLINDER, 32/21E		
PLATE NO. 11.93	**SIMON AERIALS INC.**	NEW FEB., 1996	PART NO. 21002-0080

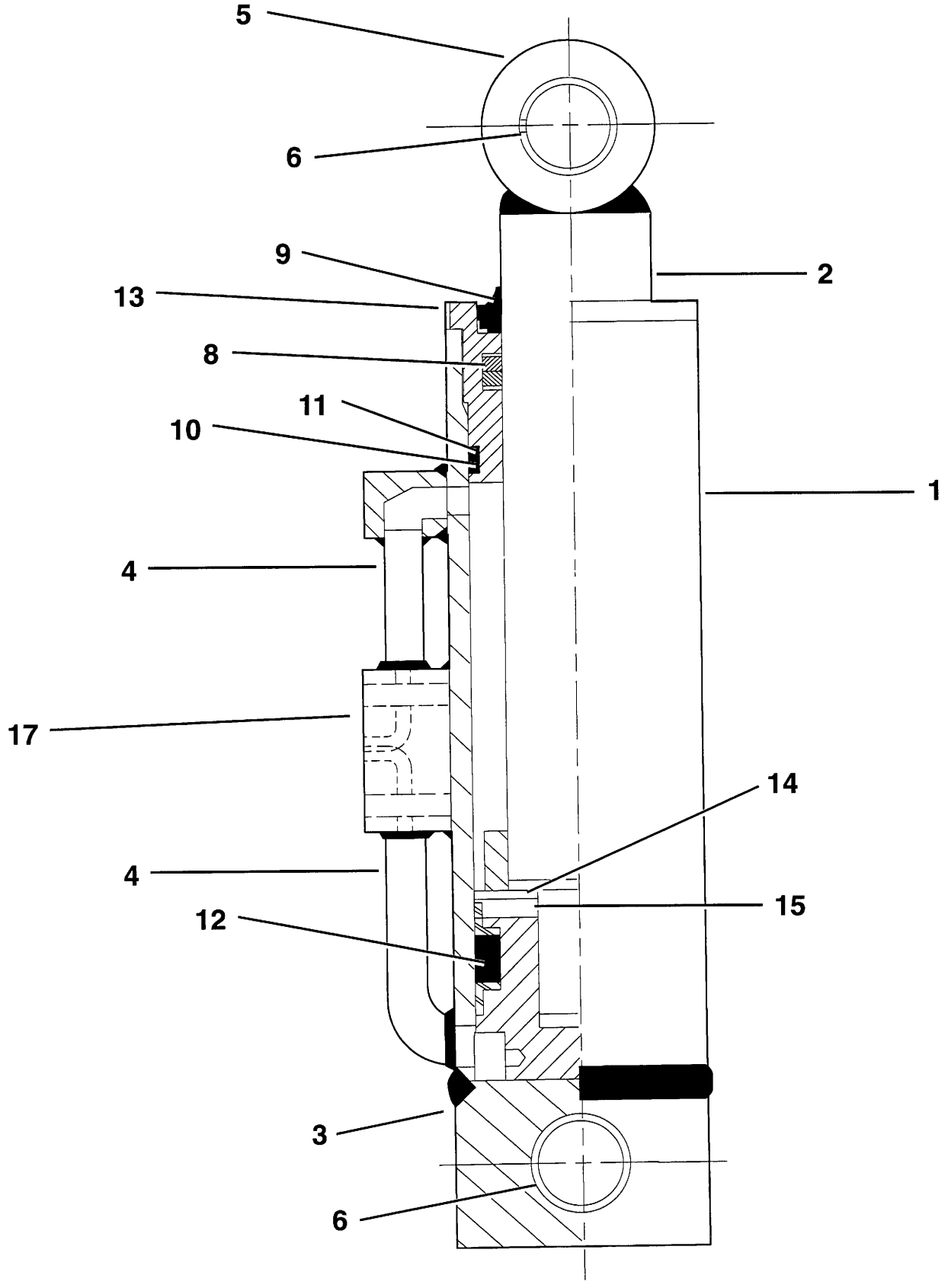


TITLE	EXTEND CYLINDER, 32/21E		
SIMON AERIALS INC. NEW FEB., 1996	PART NO. 21002-0080	PLATE NO. 11.93	

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1			TUBE, CYLINDER (60mm)	1
2			ROD, CYLINDER (25mm)	1
3			CYLINDER END	1
4			TUBE, CONNECTING	2
5			ROD END	1
6	44031-0028		BUSHING (25mm x 25mm)	2
7	41034-0088		SEAL KIT	1
8			SEAL, GLAND	1
9			SEAL, WIPER	1
10			"O"-RING	1
11			RING, BACKUP	1
12			SEAL	1
13			END GLAND	1
14			HEAD, PISTON	1
15			SCREW, HEX HEAD SOCKET (M8 x 10mm long)	1
16	EO18		FITTING, GREASE (1/8")	2
17	41031-0004		VALVE, COUNTERBALANCE (Holding or overcenter valve)	1

TITLE	BOOM LIFT CYLINDER, 32/21E		
PLATE NO. 11.94	**SIMON AERIALS INC.**	NEW FEB., 1996	PART NO. 21002-0075

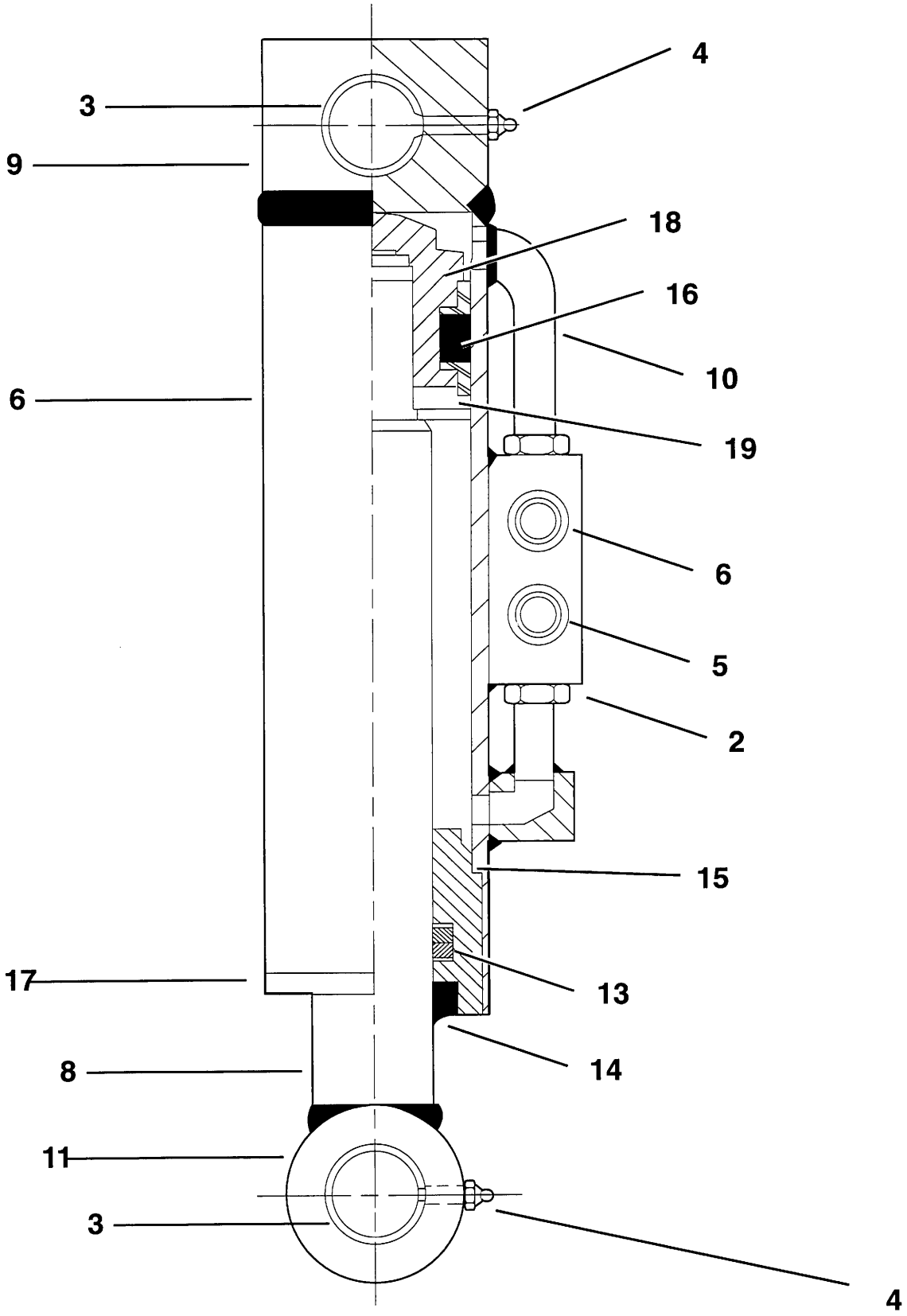


TITLE	BOOM LIFT CYLINDER, 32/21E		
SIMON AERIALS INC. NEW FEB., 1996	PART NO. 21002-0089	PLATE NO. 11.94	

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
1	21002-0085		CYLINDER, ROTATION	1
2	41031-0009		VALVE, COUNTERBALANCE	2
3	CA01015		BUSHING (Base end) (10 x 12 x 15 mm)	4
4	16940		FITTING, GREASE	2
5	31013-0180		FITTING, ORIFICE	1
6	31013-0181		FITTING, ORIFICE	1
7			TUBE, CYLINDER (40mm)	1
8			ROD, CYLINDER (18mm)	1
9			CYLINDER END	1
10			TUBE, CONNECTING	2
11			ROD END	1
12	41034-0099		SEAL KIT	1
13			SEAL, GLAND	1
14			SEAL, WIPER	1
15			"O"-RING	1
16			SEAL	1
17			END GLAND	1
18			HEAD, PISTON	1
19			SCREW, HEX HEAD SOCKET (M8 x 8mm long)	1

TITLE	ROTATION CYLINDER, 32/21E	
PLATE NO. 11.95	**SIMON AERIALS INC.** NEW MARCH, 1996	PART NO. 21002-0085

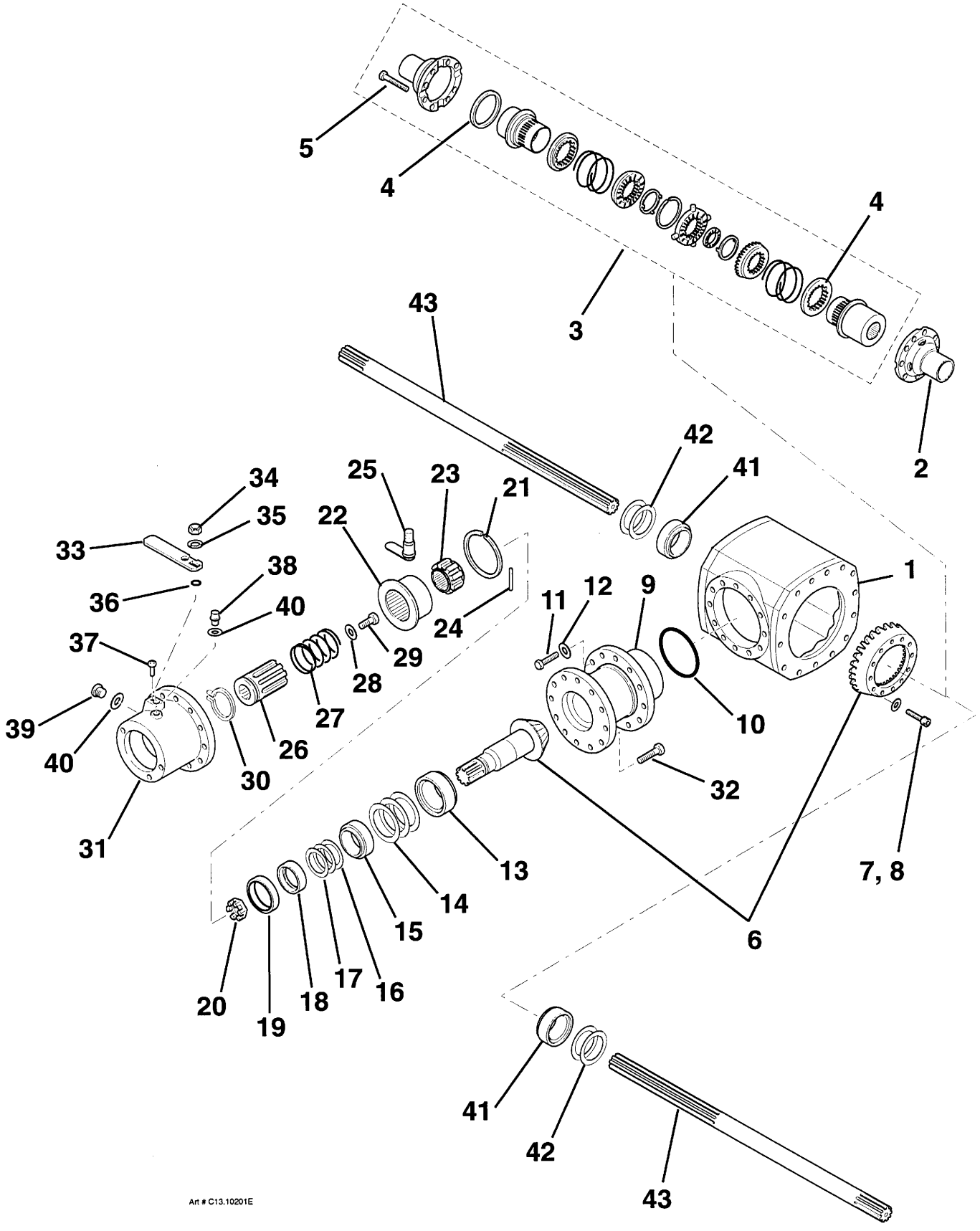


TITLE	ROTATION CYLINDER, 32/21E		
SIMON AERIALS INC. NEW MARCH, 1996		PART NO. 21002-0085	PLATE NO. 11.95

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
	02-045600		AXLE ASSEMBLY, REAR (418R-65)	1
1	02-039664		HOUSING, AXLE DIFFERENTIAL	1
2	02-039742		CASE HALF, DIFFERENTIAL	1
3	02-039771		DIFFERENTIAL, "NO-SPIN" (includes washers)	1
4	02-039633		WASHER (Differential side gear)	2
5	02-039729		BOLT (Differential side gear)	8
6	02-045610		GEAR SET, AXLE RING AND PINION	1
7	02-039732		SHOULDER BOLT, RING GEAR (M 10 x 25 mm)	12
8	02-039603		WASHER, DIFFERENTIAL HOUSING	12
9	02-039743		HOUSING, PINION	1
10	02-039613		"O"-RING (Pinion housing)	1
11	02-039615		BOLT (Pinion flange)	10
12	02-039678		WASHER (Pinion flange)	24
13	02-039628		BEARING, TAPERED ROLLER (Pinion rear)	1
14	02-039666		SHIM, PINION BEARING (Rear)	3
	02-039667		SHIM, PINION BEARING (Rear)	3
15	02-039629		BEARING, TAPERED ROLLER (Pinion front)	1
16	02-039674		"O"-RING (Pinion front)	1
17	02-039747		SHIM, PINION BEARING (Front)	2
	02-039756		SHIM, PINION BEARING (Front)	2
	02-039757		SHIM, PINION BEARING (Front)	2
18	02-039748		SPACER, PINION SEAL	1
19	02-039661		SEAL, PINION OIL	1
20	02-039620		NUT, PINION LOCK RETAINING	1
21	02-039725		RING, RETAINING (Snap ring)	2
22	02-039761		SLEEVE, OUTER (Hydraulic motor disconnect)	1
23	02-039759		SLEEVE, ENGAGING (Hydraulic motor disconnect)	1
24	02-039683		PIN, SPLINED	1
25	02-039741		PIN, MOTOR DISCONNECT	1
26	02-039760		SLEEVE, INNER (Electrical motor disconnect)	1
27	02-039764		SPRING	1
28	02-039749		SPACER	1
29			BOLT	1
30	02-039724		RING, RETAINING (Snap ring)	1
31	02-039739		HOUSING, ELECTRICAL MOTOR DISCONNECT	1
32	02-039615		BOLT, PINION FLANGE	18
33	02-039740		LEVER (Electrical motor disconnect)	1

TITLE	REAR AXLE ASSEMBLY, 32/21E (PLATE 1 OF 4)		
PLATE NO. 19.11	**SIMON AERIALS INC.** NEW FEB., 1996	PART NO.	02-045600

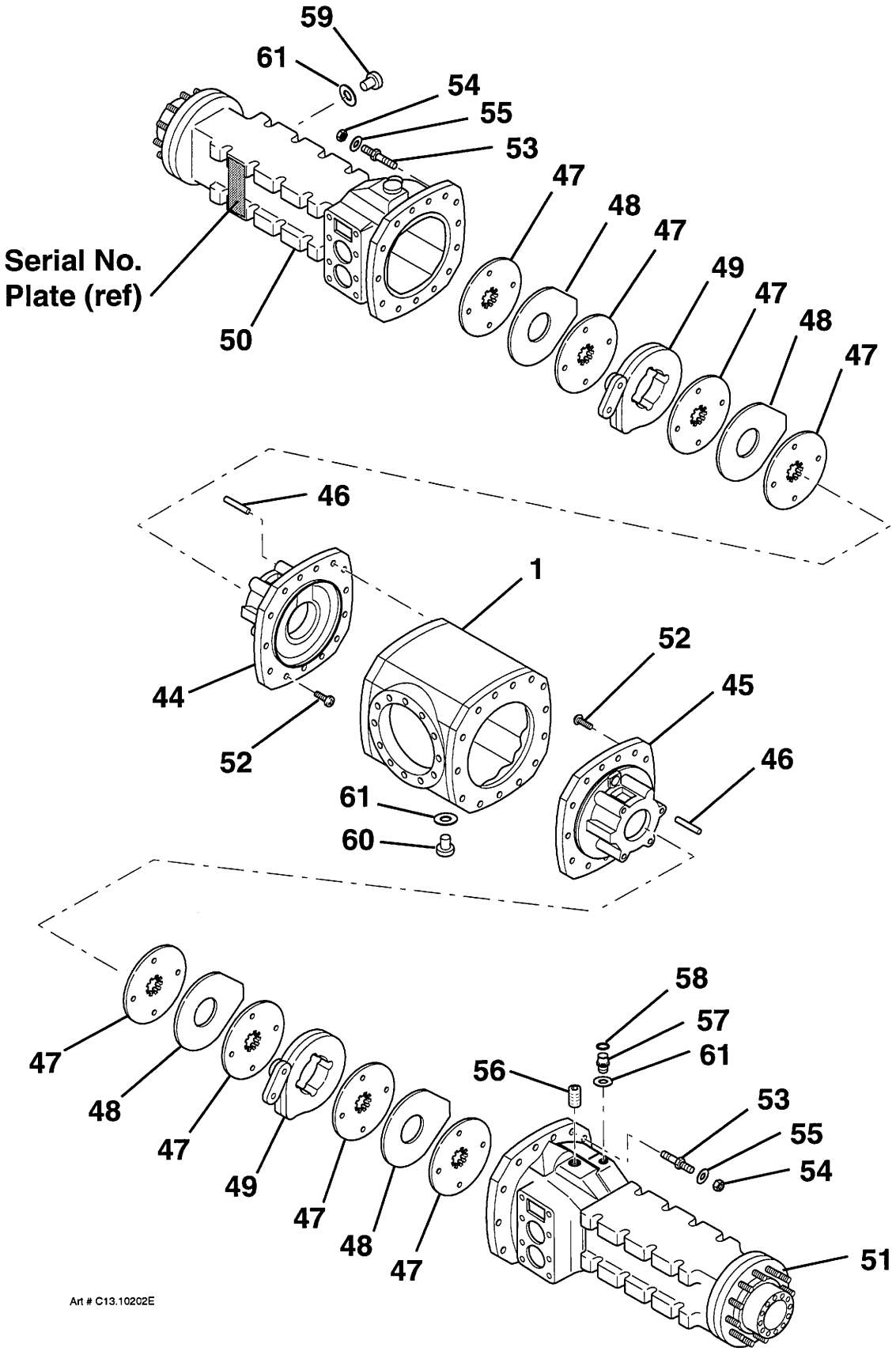


TITLE	REAR AXLE ASSEMBLY, 32/21E (PLATE 1 OF 4)		
SIMON AERIALS INC.	NEW FEB., 1996	PART NO. 02-045600	PLATE NO. 19.11

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
34	02-039734		NUT	1
35	02-039728		WASHER, HELICAL LOCK	1
36	02-039723		"O"-RING	1
37	02-039731		BOLT (M 6 x 10 mm)	1
38	02-039737		BREATHER	1
39	02-039686		BOLT, OIL FILL	1
40	02-039668		WASHER	2
41	02-045609		BEARING, TAPERED ROLLER (Differential)	2
42	02-039624		SHIM, DIFFERENTIAL BEARING	4
	02-039625		SHIM, DIFFERENTIAL BEARING	4
43	02-039707		AXLE SHAFT (Left,when facing axle input)	1
	02-045608		AXLE SHAFT (Right,when facing axle input)	1
44	02-039606		FLANGE, INTERMEDIATE (Left, when facing axle input)	1
45	02-039607		FLANGE, INTERMEDIATE (Right, when facing axle input)	1
46	02-039690		PIN, DOWEL	6
47	02-045604		DISC, BRAKE	8
48	02-039609		DISC, INTERMEDIATE	4
49	02-039608		ACTUATOR, BRAKE	2
50	02-045620		HOUSING, AXLE TUBE (Left, when facing axle input)	1
51	02-045621		TUBE, AXLE (Right, when facing axle input)	1
52	02-039662		BOLT, BRAKE (M 8 x 14 mm)	4
53	02-039605		SHOULDER BOLT (Double threaded)	24
54	02-039602		NUT (Axle tube)	24
55	02-039603		WASHER, DIFFERENTIAL HOUSING	24
56	02-039733		PIN, LOCATING	1
57	02-039736		PLUG, BREATHER	1
58	02-039722		"O"-RING	1
59	02-039685		PLUG (Axle tube oil filler)	1
60	02-039684		PLUG (Oil drain)	3
61	02-039669		WASHER	5
62	02-045602		SUPPORT ASSEMBLY, WHEEL HUB	2
63			SUPPORT, WHEEL HUB	1
64	02-045613		RING, OIL SEAL	1
65	02-045603		COVER, DUST	1
66	02-039706		BOLT (Wheel flange) (M 14 x 40 mm)	24
67	02-039678		WASHER (Wheel flange)	24

TITLE	REAR AXLE ASSEMBLY, 32/21E (PLATE 2 OF 4)		
PLATE NO. 19.11	**SIMON AERIALS INC.** NEW FEB., 1996	PART NO.	02-045600

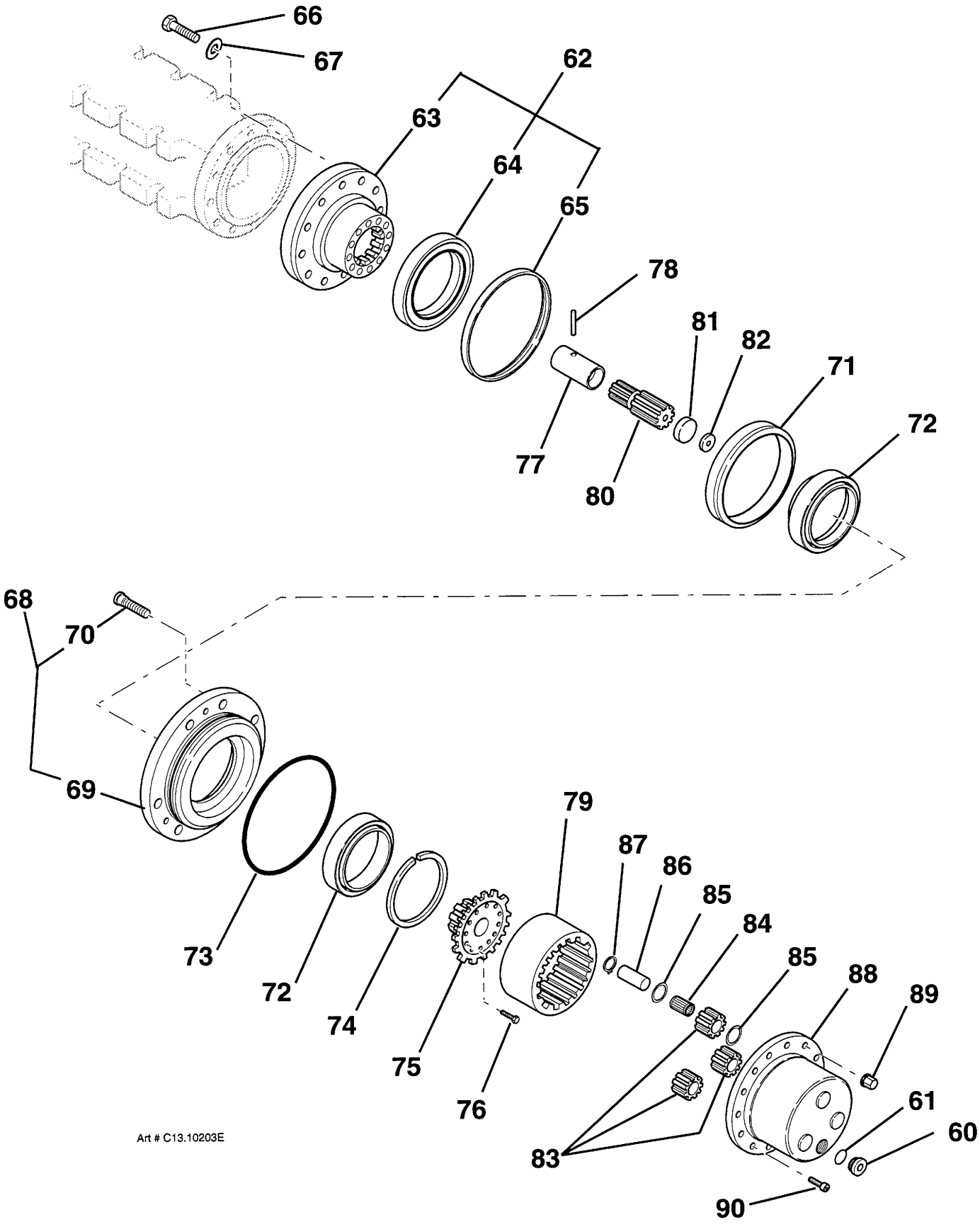


TITLE	REAR AXLE ASSEMBLY, 32/21E (PLATE 2 OF 4)		
SIMON AERIALS INC.	NEW FEB., 1996	PART NO. 02-045600	PLATE NO. 19.11

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
68	02-045611		HUB ASSEMBLY, REAR WHEEL	2
69			HUB, REAR WHEEL	1
70	02-039705		STUD, WHEEL	8
71			SEAL, OIL	2
72	02-039640		BEARING, TAPERED ROLLER	4
73	02-039701		"O"-RING (Wheel hub)	2
74	02-039726		RING, STOP	2
75	02-045614		FLANGE, ANNULUS	2
76	02-039704		BOLT (M 10 x 35 mm)	24
77	02-039758		SLEEVE, HALF SHAFT	2
78	02-039738		ROLL PIN	2
79	02-039718		GEAR, INTERNAL	2
80	02-039720		GEAR, SUN	2
81	02-039716		BUTTON, SHAFT STOP	2
82	02-039715		SHIM, SHAFT STOP	2
83	02-045615		GEAR SET, PLANET (set of three matched gears)	2
84	02-039721		BEARING, ROLLER	6
85	02-045619		WASHER	12
86	02-039717		PIN, PLANET GEAR	6
87	02-045605		RING, RETAINING (Snap ring)	6
88	02-039714		CARRIER, PLANETARY	2
89	02-039735		NUT	16
90	02-039730		BOLT (M 10 x 20 mm)	4
91	02-039655		LEVER, BRAKE FORK	2
92	02-039654		PIN, BRAKE PULL	2
93	02-039676		RING, RETAINING (Snap ring)	2
94	02-039653		BOOT, BRAKE (Bellows)	2
95	02-039769		CLAMP, BRAKE (Brake actuator)	2
96	02-039677		RING, RETAINING (Bellows snap ring)	2

TITLE	REAR AXLE ASSEMBLY, 32/21E (PLATE 3 OF 4)		
PLATE NO. 19.11	**SIMON AERIALS INC.** NEW FEB., 1996	PART NO.	02-045600

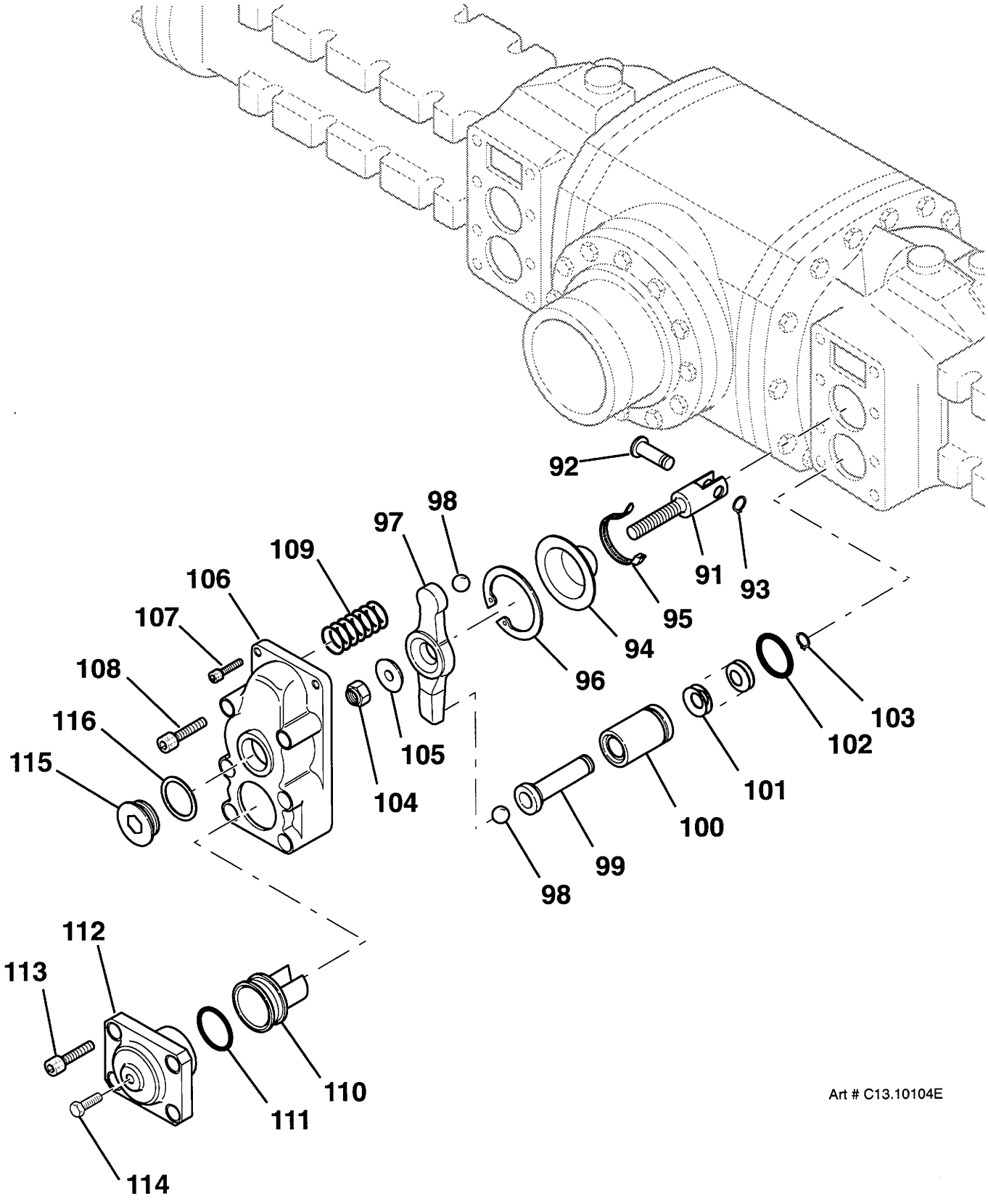


TITLE	REAR AXLE ASSEMBLY, 32/21E (PLATE 3 OF 4)		
SIMON AERIALS INC. NEW FEB., 1996		PART NO. 02-045600	PLATE NO. 19.11

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
97	02-039688		LEVER, FAIL SAFE BRAKE ACTUATING	2
98	02-039652		BALL, FAIL SAFE BRAKE ACTUATOR	4
99	02-039691		PIN, ACTUATING (Fail safe brake)	2
100	02-039693		RETAINER, SPRING (Fail safe brake)	2
101	02-045618		WASHER, SPRING (Belleville washer)	36
102	02-039659		"O"-RING (Fail safe brake)	2
103	02-039672		RING, RETAINING (Snap ring)	2
104	02-039649		NUT, BRAKE ADJUSTMENT	2
105	02-039665		WASHER, SPHERICAL	2
106	02-039656		COVER, BRAKE	2
107	02-039647		BOLT, HEX SOCKET HEAD (M 10 x 30 mm)	4
108	02-039642		BOLT, HEX SOCKET HEAD (M 10 x 60 mm)	4
109	02-039762		SPRING, SERVICE BRAKE	2
110	02-039658		PISTON, FAIL SAFE BRAKE	2
111	02-039657		"O"-RING (Fail safe brake piston)	2
112	02-045616		FLANGE, FAIL SAFE BRAKE	2
113	02-039663		BOLT (M 10 x 85 mm) (Fail safe brake flange)	8
114	02-039681		BOLT, RELEASE (Fail safe brake)	2
115	02-039687		PLUG (Service brake)	2
116	02-039670		GASKET, (Service brake plug)	2
			The following items **are not** part of Axle Assembly 02-045600:	
117	DS906		AXLE MOUNTING KIT	2
118	DS907		GEARBOX SUPPORT ASSEMBLY	1

TITLE	REAR AXLE ASSEMBLY, 32/21E (PLATE 4 OF 4)		
PLATE NO. 19.11	**SIMON AERIALS INC.** NEW FEB., 1996	PART NO.	02-045600

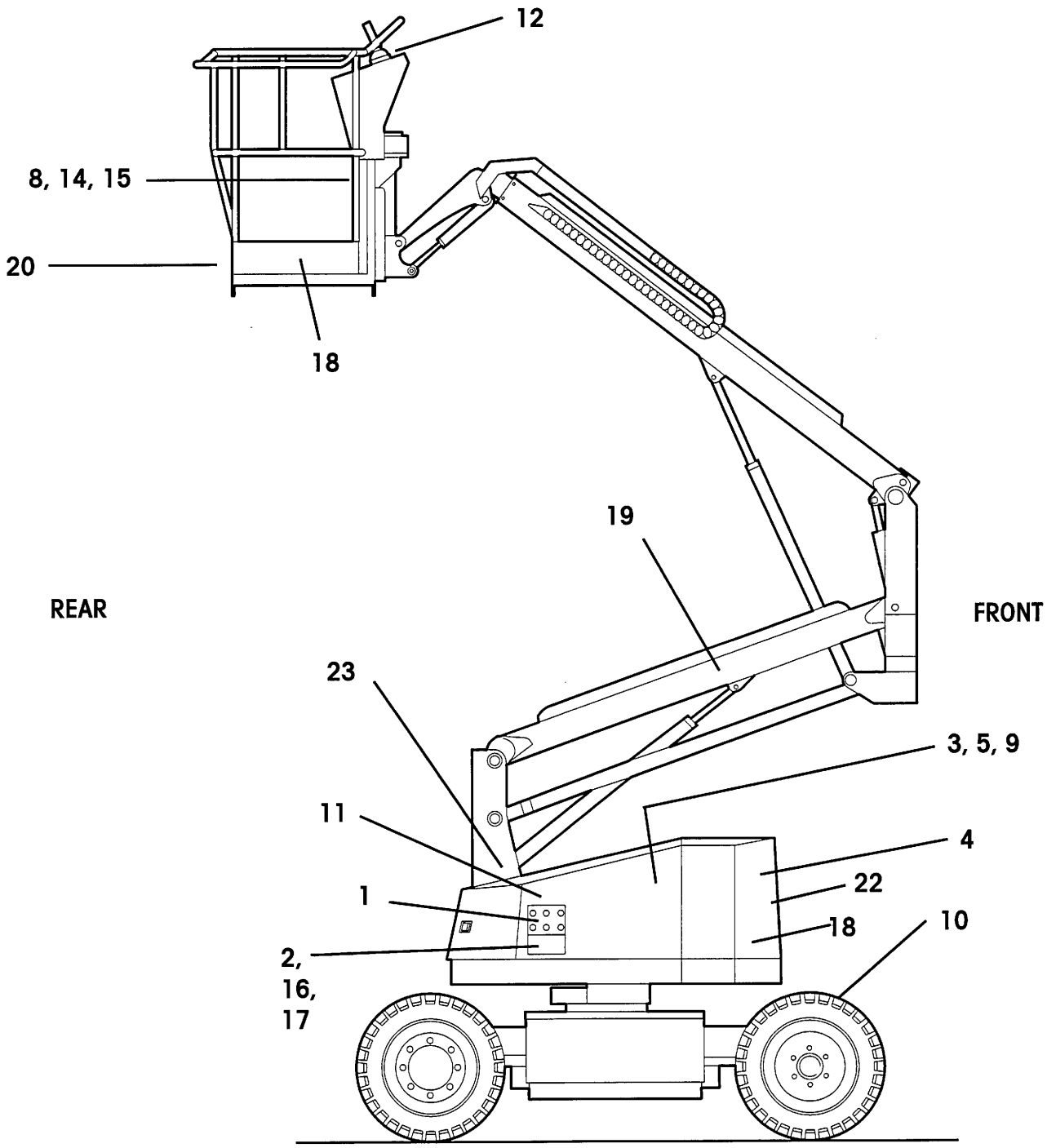


TITLE	REAR AXLE ASSEMBLY, 32/21E (PLATE 4 OF 4)		
SIMON AERIALS INC.	NEW FEB., 1996	PART NO. 02-045600	PLATE NO. 19.11

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
			DECAL KIT, 32/21E (Not available. Purchase decals individually)	1
1	AS103		Decal, Ground Control (on ground control box)	1
2	AS104		Decal, Ground Control (Levers)	1
3	10-130600		Decal, "DANGER", (Hazard listing, Ground controls)	1
4	10-150500		Decal, "DANGER", (Electrocution)	2
5	A580		Decal, "Hydraulic Oil Only "	1
6	A1129		Decal, Platform Control	1
7	A581/B		Decal, "WARNING", (Hazard listing, Platform controls)	1
8	10-139800		Decal, "Operators Manual Enclosed"	1
9	A1240A		Decal, Towing Instructions	1
10	A578		Decal, Towing Instructions (See inside control cabinet)	1
11	A577		Decal, "Emergency Lowering"	1
12	A1373A		Decal, Warning "After towing . . . "	1
13	47011-0153		Decal, Direction Arrow	1
14	AS100		Decal, "CAGE ROTATION"	1
15	AS101		Decal, "ROTATION LOCK"	1
16	10-148300		Decal, "Platform capacity 500 Lbs (225 Kg)" (4-1/2" [114 mm] wide)	1
17	AS106		Decal, Ground Control Valves	1
18	10-126800		Decal, STRIPE ([4] Orange stripes, 3-3/4" [95 mm] wide) (Bulk item, order as needed) (12 Ft [3.6 M] used here)	A.R.
19	10-017100		Decal, "SIMON" NAME (Black, 7" [178 mm] high)	1
20	10-105900		DECAL, "SIMON" NAME (White, 5" [127 mm] high)	2
21	10-131700		DECAL, "32/21" IDENTIFICATION	1
22	10-131000		DECAL, SIMON "S" LOGO (Orange/ Gray, 5" [127 mm] wide x 7-1/2" [191 mm])	2
23	47011-0154		DECAL, PINCH POINT (Round, with hand crossed through)	1

TITLE	DECALS, 32/21E	
PLATE NO. 99.17	**SIMON AERIALS INC.** NEW MAY, 1996	PART NO.



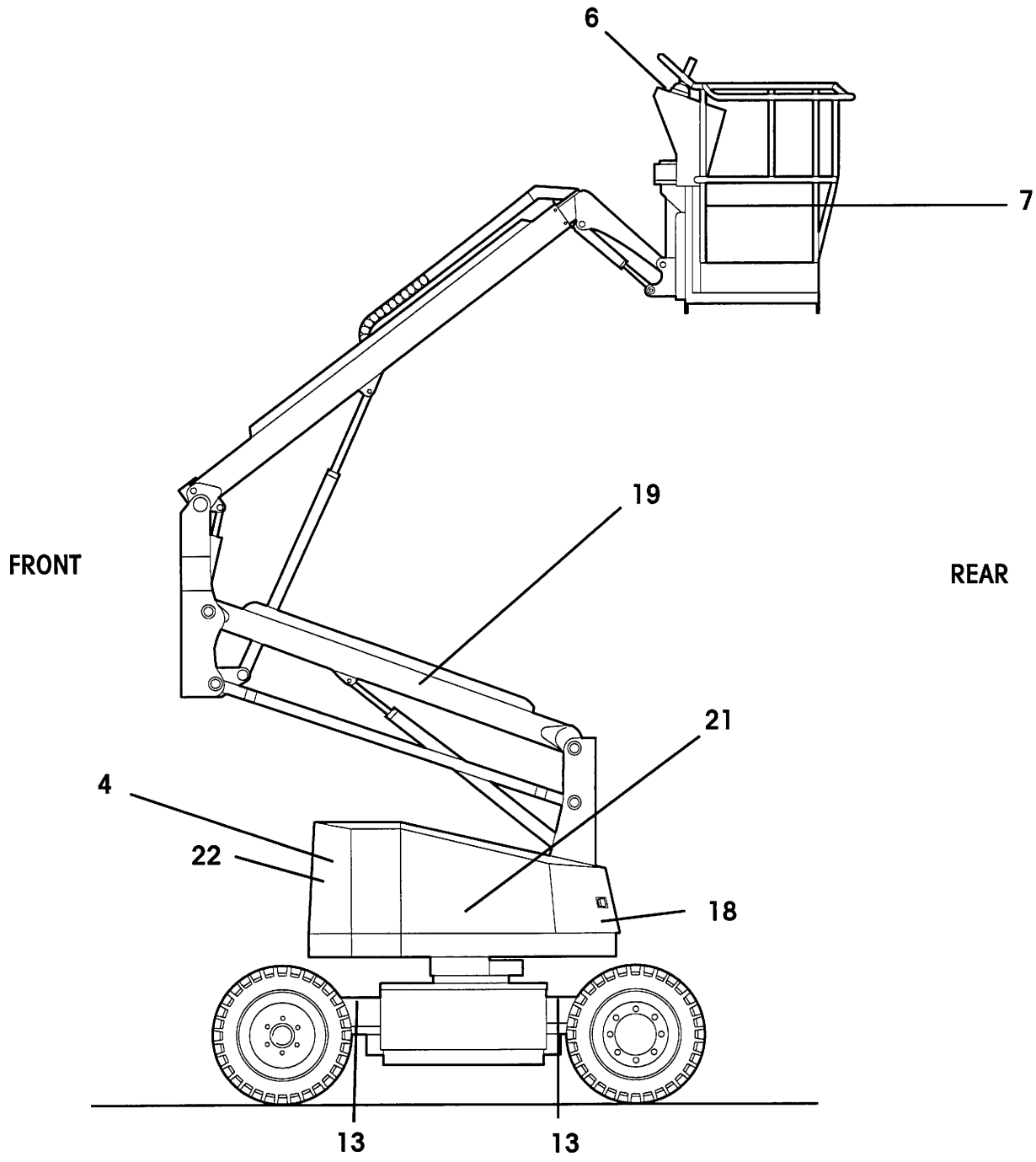
Right Hand Side.

TITLE	DECALS, 32/21E		
SIMON AERIALS INC. NEW MAY, 1996		PART NO.	PLATE NO. 99.17

PARTS LIST

ITEM	PART NO	SEE SECTION	DESCRIPTION	QTY.
			DECAL KIT, 32/21E (Not available. Purchase decals individually)	1
1	AS103		Decal, Ground Control (on ground control box)	1
2	AS104		Decal, Ground Control (Levers)	1
3	10-130600		Decal, "DANGER", (Hazard listing, Ground controls)	1
4	10-150500		Decal, "DANGER", (Electrocution)	2
5	A580		Decal, "Hydraulic Oil Only "	1
6	A1129		Decal, Platform Control	1
7	A581/B		Decal, "WARNING", (Hazard listing, Platform controls)	1
8	10-139800		Decal, "Operators Manual Enclosed"	1
9	A1240A		Decal, Towing Instructions	1
10	A578		Decal, Towing Instructions (See inside control cabinet)	1
11	A577		Decal, "Emergency Lowering"	1
12	A1373A		Decal, Warning "After towing . . . "	1
13	47011-0153		Decal, Direction Arrow	1
14	AS100		Decal, "CAGE ROTATION"	1
15	AS101		Decal, "ROTATION LOCK"	1
16	10-148300		Decal, "Platform capacity 500 Lbs (225 Kg)" (4-1/2" [114 mm] wide)	1
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23	47011-0154		DECAL, PINCH POINT (Round, with hand crossed through)	1

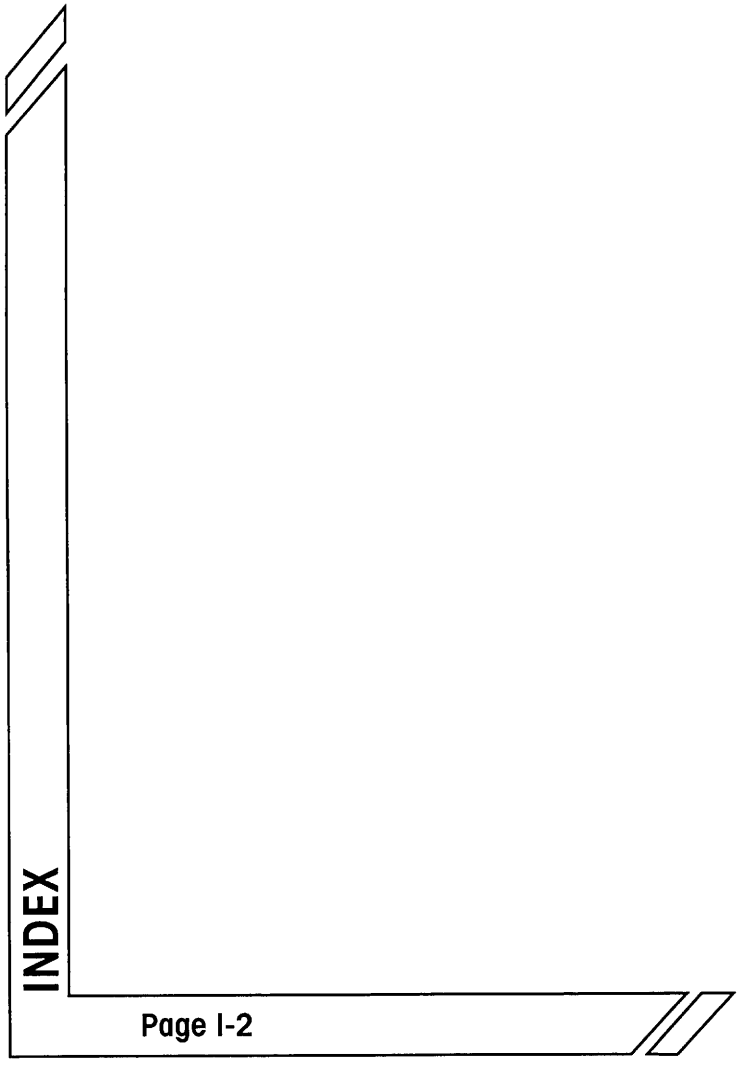
TITLE	DECALS, 32/21E		
PLATE NO. 99.17	**SIMON AERIALS INC.**	NEW MAY, 1996	PART NO.



Left Hand Side.

TITLE	DECALS, 32/21E		
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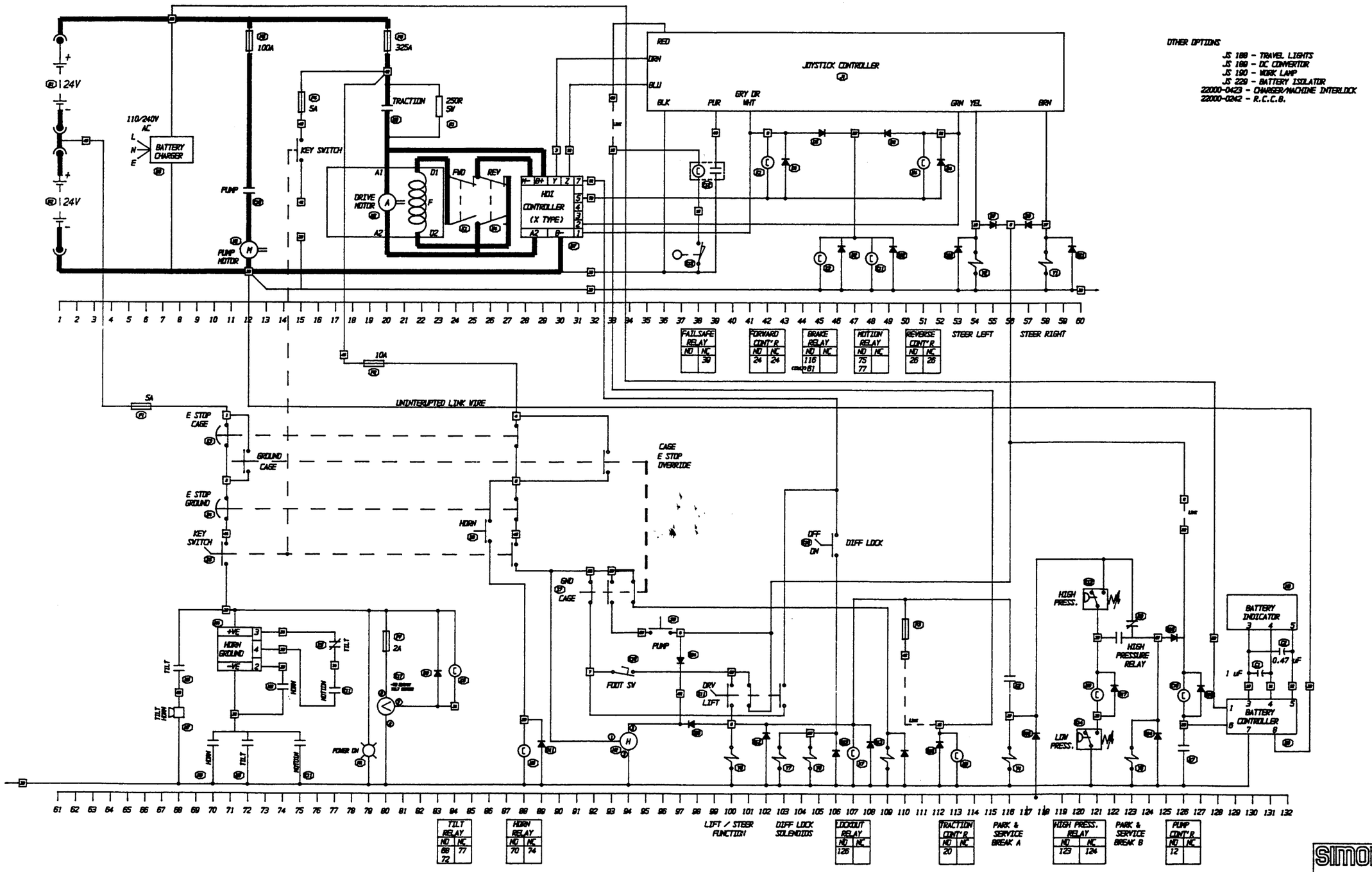
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JS 189 - DC CONVERTOR
JS 190 - WORK LAMP
JS 220 - BATTERY ISOLATOR
22000-0423 - CHARGER/MACHINE INTERLOCK
22000-0242 - R.C.C.B.

SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE: ELECTRICAL SCHEMATIC
BOXER 140, 150 & 170

REVISION: A /9-2-94

DRWG. NO. D-2339630

CAGE CONTROLS

LIFT 1 | LIFT 2 | LIFT 3 | ZOOM | ROTATE | CAGE SELF-LEVEL

190 bar

14379

10865 1/32" | 10865 1/32"

SLAVE 21002-0077

MASTER 21002-0076

CAGE LEVEL

18246

ROTATE

41007-0004

10854

41007-0004

170E:21002-0081
140/150E:21002-0080
ZOOM

21002-0075
LIFT 3

18243

170E:21002-0082
140/150E:21002-0075
LIFT 2

18243

21002-0075
LIFT 1

18243

DIVERTER VALVE
SLEW STOP

16474

TANK RETURN LINE
USE 1/2" HOSE.

MCH

LIFT 1 | LIFT 2 | LIFT 3 | ZOOM | ROTATE

190 bar

14378 GROUND CONTROLS

STEER RIGHT Y1

STEER LEFT Y2

LIFT/DRIVE Y6

BRAKES ON/OFF Y4

Y5

120 bar

120 bar

180 bar

40 bar

P1

T

P2

21002-0074
STEER

17244

17541

PSL 25 bar

PSH 35 bar

17542

FAILSAFE BRAKE

UCC 1700
10935

B

P

T

Y8

Y7

17245

DIFF. LOCK

11357
11389

11235

M

10319

41009-0007

40 bar

17713

3/4" BALL VALVE
11141

16160

LIFT/BRAKES OFF

11510

12424

SIMON-AERIALS INC. MILWAUKEE, WI. 53224	
TITLE	HYDRAULIC SCHEMATIC BOXER 140, 150 & 170
REVISION A / 9-2-94	DRWG. NO. C-2339620