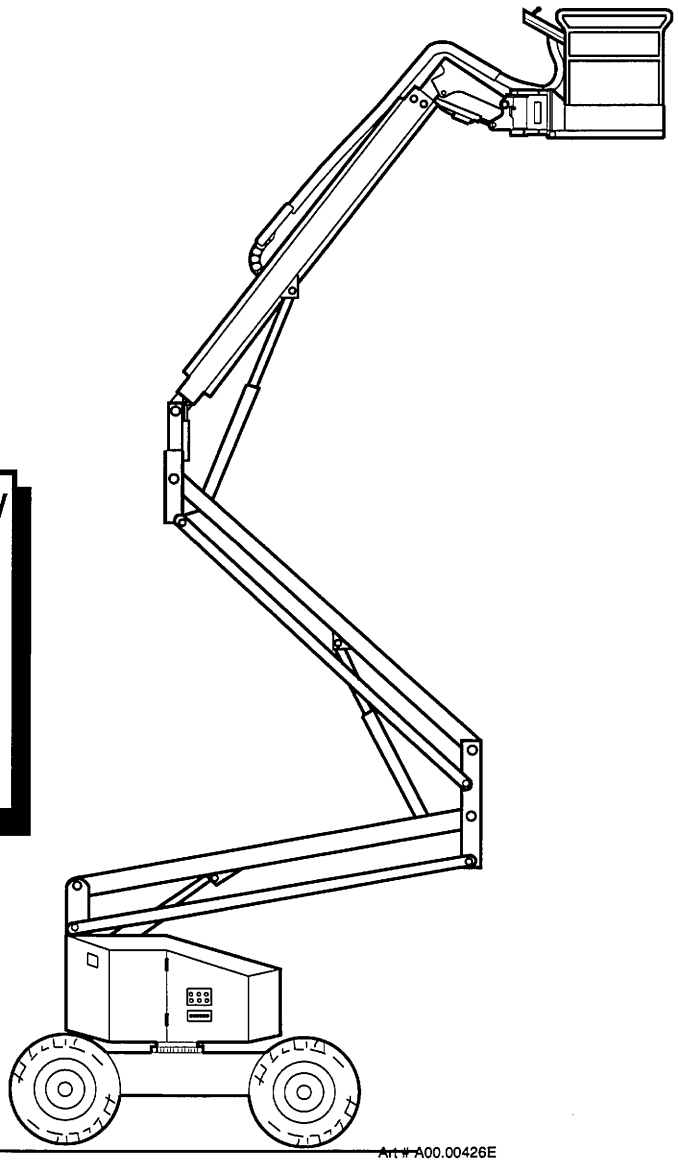
CONSTRUCTOR
MODEL AT45

SERVICE MANUAL



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

Phone (414) 355-3181

Part No. 89-445007 • Revision "0.2" dated May 1996 •

Table of Contents

Introduction vi
Machine Specifications viii
Primary Machine Component ix
Undercarriage Component Locator x
Superstructure Component Locator xi
Lower Boom Component Locator xiii
Middle Boom Component Locator xiv
Upper Boom Component Locator xv
Platform Component Locator xvi
Lubrication Chart xviii
Lubrication Diagram xix

Section 1: Transportation and Emergency Procedures

Transporting the Unit 1-4
Unloading Procedures 1-6
Emergency System and Procedures
- Emergency Pump 1-8
- Unpowered Emergency Movement 1-8
- Emergency Lowering 1-9

Section 2: Hydraulic System

Hydraulic Fluid 2-5
- Handling Precautions 2-5
- Fluid Recommendations 2-5
- Hydraulic Fluid Analysis 2-5
- System Flushing Procedure 2-6

Hydraulic System Components 2-9
- Hydraulic Pump 2-9
  - Main Hydraulic Pump 2-9
  - Main Hydraulic Pump Adjustment 2-10
- Main Hydraulic Pump De-stroke Valve 2-10
  - Emergency Pump 2-11
  - Emergency Pump Relief Valve Adjustment 2-11
- Drive/ Steer Manifold Assembly 2-11
  - Control Valve Manifold 2-11
  - Directional Control Valves 2-12
- Motion Control Valve Assembly 2-12
  - Motion Control Valve 2-12
  - Brake Needle Valve 2-12
  - Shuttle Valve 2-13
  - Pressure Reducing Valve 2-13
  - Cross Port Relief Manifold 2-13
  - Stop Cushion Solenoid Valve 2-13
- High Pressure Filter 2-13
  - High Pressure Filter Element 2-13
- Hydraulic Fluid Reservoir 2-13
- Hydraulic Reservoir Maintenance 2-14

Table of Contents (Continued)

Section 2: Hydraulic System (Continued)
Boom Lift System 2-14
Directional Control Valves 2-14
Platform 2-14
Ground 2-14
Lift Cylinders 2-15
Boom Telescope System 2-16
Directional Control Valves 2-16
Platform 2-16
Ground 2-16
Pressure Reducing Valve 2-16
Telescope Cylinder 2-17
Superstructure Swing System 2-18
Directional Control Valves 2-18
Platform 2-18
Ground 2-18
Double Counterbalance Valve (Swing) 2-18
Swing Drive Motor/ Reducer Assembly 2-18
Platform Rotate System 2-19
Rotate Control Valve 2-19
Rotary Actuator 2-19
Rotary Actuator Maintenance 2-19
Platform Rotator Pressure Relief Valve 2-19
Platform Leveling System 2-20
Level Control Valve 2-20
Double Pilot Operated Check Valve 2-20
Master Level Cylinder 2-20
Relief Valves 2-20
Slave Level Cylinder 2-20
Steer System 2-22
Drive/ Steer Manifold Assembly 2-22
Steer Cylinder 2-22
Steer System Maintenance 2-22
Hydraulic Swivel (Optional) 2-23
Solenoid Valve Checks 2-23

Section 3: Drive System
Drive System Components 3-3
Drive Motors 3-3
Front Wheel Motor 3-3
Hydraulic Drive Motor 3-3
Rear Axle Assembly 3-3
Rear Axle Drive Motor 3-4
Rear Axle Drive Motor Replacement 3-4
Rear Axle Assembly Replacement 3-5
Rear Axle Brake Adjustment 3-5
Hydraulic Manifold Valve Assembly 3-7

Table of Contents (Continued)

Section 3: Drive System (Continued)

Motion Control Valve Assembly 3-7
- Motion Control Valve 3-7
- Flow Control Valve 3-7
- Shuttle Valve 3-8
- Pressure Reducing Valve 3-8
- Cross Port Relief Manifold 3-8
- Solenoid Valve 3-8

Drive Enable Valve 3-8
Platform Drive Control Handle 3-8

Section 4: Electrical System

Electrical System 4-3
- Battery 4-3
  - Battery Maintenance (In Storage) 4-3
  - Battery Maintenance (In Use) 4-3
  - Battery Troubleshooting 4-4
  - Battery Replacement 4-4
- Electrical Theory of Operation 4-5
  - Ground Ignition Circuit 4-5
  - Platform Ignition Circuit 4-5
  - Pump Circuit 4-5
  - Drive Control Handle Circuit 4-5
- Platform Control Box 4-6
  - Emergency Stop Button 4-6
  - Ignition Switch 4-6
  - Toggle Switch 4-6
  - Push Button 4-6
  - Light Emitting Diode 4-7
- Foot Pedal Switch 4-7
- Ground Control Box 4-8
  - Circuit Breaker 4-8
  - Toggle Switch 4-8
  - Push Button 4-8
  - Key Switch 4-8
  - Volt Meter 4-8
  - Hour Meter 4-8
  - Engine Oil Pressure Gauge 4-9
- Pendant Control 4-9
  - Toggle Switch 4-9
- Movement Alarm 4-9
- Tilt Alarm 4-9
  - Tilt Alarm Test 4-10
  - Tilt Alarm Sensor Adjustment 4-10
- Warning Horn 4-10
- Relays 4-10
- Limit Switch 4-10
- Electrical and Continuity Checks 4-11

Table of Contents (Continued)

Section 5: Mechanical Components

Mechanical Components 5-3
Tires 5-3
Changing Tires 5-3
Wheels and Lug Nuts 5-3
Wheel Motor Assembly 5-4
Steer Cylinder 5-5
Steer Cylinder Pins 5-5
Base End Cylinder Pin Replacement 5-5
Steer Cylinder Seal Replacement 5-5
Tie Rod Assembly 5-6
Tie Rod Assembly Replacement 5-6
Superstructure 5-7
Platform 5-9
Hoses and Cables 5-9
Miscellaneous Equipment 5-9
Boom 5-10
Lower Boom 5-10
Lower Boom Lift Cylinder 5-10
Lower Boom Lift Cylinder Removal 5-10
Lower Boom Lift Cylinder Replacement 5-10
Lower Boom Lift Cylinder Seal Replacement 5-11
Lower Boom Lift Cylinder Holding Valve Replacement .. 5-11
Lower Boom and Lift Cylinder Pivot Pin Replacement ... 5-12
Middle Boom 5-13
Middle Boom Lift Cylinder 5-13
Middle Boom Lift Cylinder Removal 5-13
Middle Boom Lift Cylinder Replacement 5-13
Middle Boom Lift Cylinder Seal Replacement 5-14
Middle Boom Lift Cylinder Holding Valve Replacement . 5-14
Middle Boom and Lift Cylinder Pivot Pin Replacement .. 5-14
Upper Boom 5-15
Upper Boom Lift Cylinder 5-15
Upper Boom Lift Cylinder Removal 5-15
Upper Boom Lift Cylinder Replacement 5-15
Upper Boom Lift Cylinder Seal Replacement 5-16
Upper Boom Lift Cylinder Holding Valve Replacement .. 5-16
Upper Boom and Lift Cylinder Pivot Pin Replacement ... 5-16
Wear Pads 5-17
Rear (Upper End) Wear Pad Replacement 5-13
Front (Lower End) Wear Pad Replacement 5-14
Boom Telescope Cylinder 5-18
Telescope Boom Cylinder Pin Replacement 5-18
Telescope Cylinder Removal 5-19
Telescope Cylinder Seal Replacement 5-19
Telescope Cylinder Installation 5-19
Holding Valve Inspection 5-20
Platform Level Cylinders 5-21
Platform Level Cylinder Pin Replacement 5-21
Level Cylinder Seal Replacement 5-22
Bleeding the Platform Leveling Circuit 5-22

Table of Contents (Continued)

Section 6: Maintenance Schedule

Maintenance Schedule 6-3
General Maintenance Tips 6-3
First Three Months of Operation 6-3
Routine Servicing 6-3
Shift Operational Checklist 6-6
Monthly Operational Checklist 6-9
Semi-Annual Operational Checklist 6-11

Section 7: Troubleshooting

General Troubleshooting Tips 7-3
Troubleshooting Chart 7-4

Index

Appendix

INTRODUCTION

This Service Manual is designed to provide you with the instructions needed to properly maintain the SIMON AERIALS INC. AT45 Aerial Platform with full hydraulic controls. When used in conjunction with the Operators and Parts manuals (provided separately) this Service Manual will assist you in making necessary adjustments or repairs.

Simon Aerials Mobile Platforms are designed and built to provide many years of safe, dependable service. To obtain full benefits from your AT45, always follow the proper operating and maintenance procedures. Only trained, authorized personnel should be allowed to operate or service this machine. Service personnel should read and study the Operators, Service and Parts Manuals in order to gain a thorough understanding of the unit prior to making any repairs. Exercise all necessary safety precautions when performing maintenance not covered in this manual.

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

⚠ DANGER

"DANGER" INDICATES AN IMMINENTLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, WILL RESULT IN DEATH OR SERIOUS INJURY. THIS SIGNAL WORD IS LIMITED TO THE MOST EXTREME SITUATIONS.

⚠WARNING

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

⚠ CAUTION

"Caution" indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It is also used to alert against unsafe practices which could lead to property-damage-only accidents.

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

⚠ DANGER

MODIFICATIONS OF THIS MACHINE FROM THE ORIGINAL DESIGN 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.

Any procedures not found within this manual must be evaluated by the individual to assure that they are "proper and safe", because all possible procedures cannot be covered.

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 (Max.)	**51 Ft/** 15.54 M
Platform Height (Max.)	**45 Ft/** 13.72 M
Horizontal Reach (Max.)	**26 Ft 5 in./** 8.05 M
Platform Capacity (Unrestricted)	**500 Lbs./** 225 Kg
Platform Size	**30 In. x 60 In. x 43.5 In./** .76 M x 1.52 M x 1.10 M
Stowed Length	**19 Ft 10 In./** 6.05 M
Stowed Height	**7 Ft 10 In./** 2.39 M
Machine Width (Overall)	**7 Ft 10 In./** 2.39 M
Outside Turning Radius	**14 Ft 4 In. /** 4.37 M
Inside Turning Radius	**5 Ft 1.5 in./** 1.56 M
Tires	15" x 38.5" - 16.5" 6 Ply Mudder
Tire Pressure (Not required for foam filled tires)	**55 PSI/** 3.79 Bar/ 3.86 Kg-cm^2
Maximum Travel Speed:	
Boom Stowed (Note 1)	**3.0 MPH/** 4.83 KPH
Boom Extended	**0.5 MPH/** 0.8 KPH
Ground Clearance	**12.5 In./** 0.317 M
Gross Weight (Approx.) (Note 1)	**14,500 Lbs./** 6,577 Kg
Gradeability (On Hard Surface) (Note 1)	**15°/** 27%
Platform Rotation	**180°**
Superstructure Rotation	**360° Non-continuous**
Pump Compensator Setting (Maximum Hydraulic Pressure)	**3000 PSI/** 207 Bar/ 211 Kg-cm^2
Hydraulic Tank Capacity	**40 Gal./** 151 Liters
Fuel Tank Capacity	**35 Gal./** 132.5 Liters
Electrical System	**12 Volt DC Battery**

Engine Availability:

Standard . . . Wisconsin W4-1770, 35 HP (26.1 Kw), Air Cooled, Gasoline

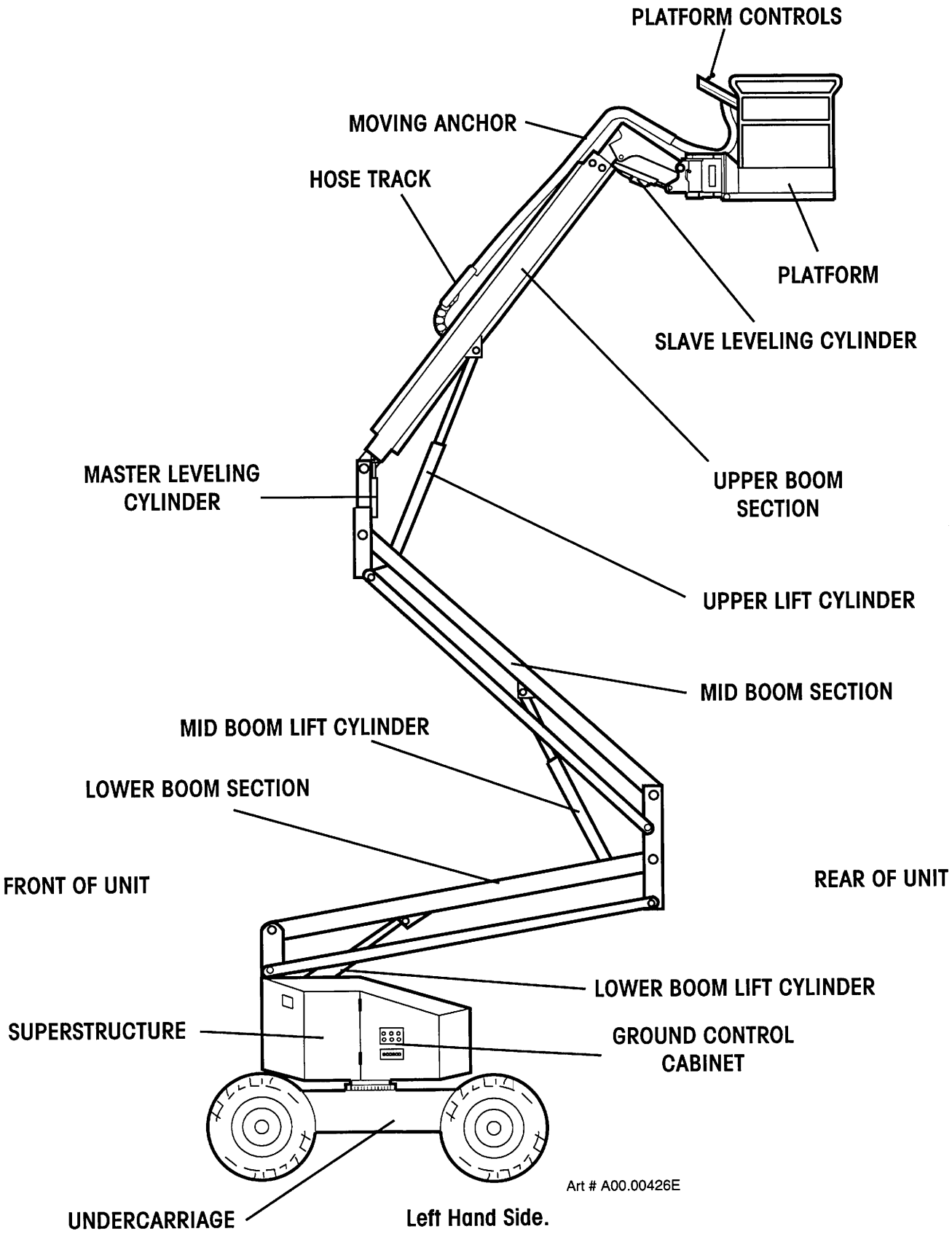
Optional . . . Wisconsin W4-1770, 35 HP (26.1 Kw), Air Cooled, Dual Fuel
Deutz F3L 1011, 42 HP (31.3 Kw), Air Cooled, Diesel
Ford VSG 413, 42 HP (31.3 Kw), Liquid Cooled, Gasoline and Dual Fuel (Note 2)

Drive Motor Bolt Torque Front Wheels (Lubricated)	**65 Ft Lbs./** 88.4 Nm/ 9.0 Kg-m
Rear Axle Drive Motor Bolt Torque	**65 Ft Lbs./** 88.4 Nm/ 9.0 Kg-m
Wheel Lug Nuts Torque	**65 Ft Lbs./** 88.4 Nm/ 9.0 Kg-m
Swing Bearing Bolt Torque (Lubricated)	**170 Ft Lbs./** 231 Nm/ 23.5 Kg-m

Note 1: Weight and performance shown represent typical standard units, and should be used as a general guideline only. Many variables between machines can lead to significant differences in these factors. Accurate figures, when necessary for a specific unit, can be best determined by testing.

Note 2: Contact factory for further selections.

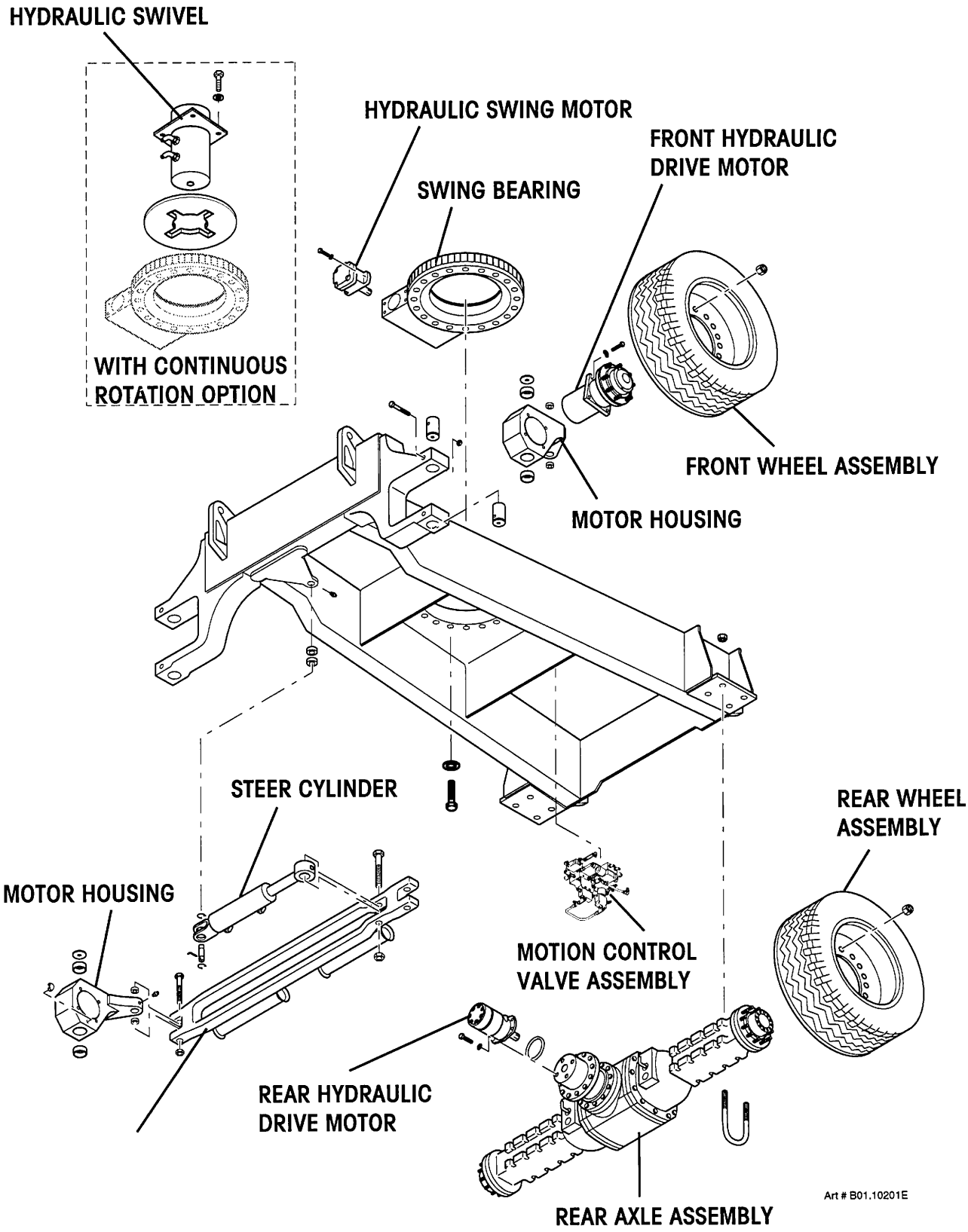
PRIMARY MACHINE COMPONENTS



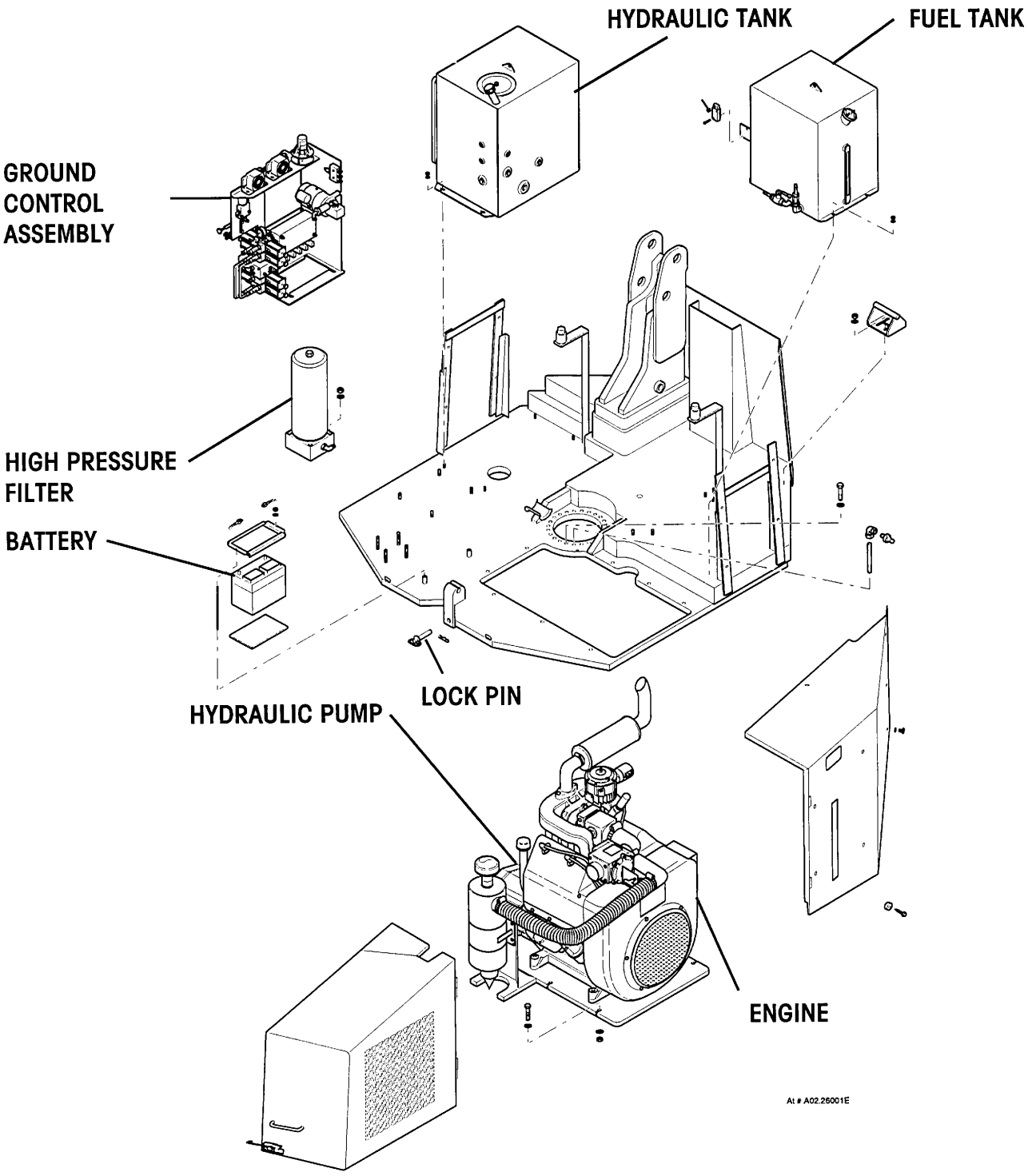
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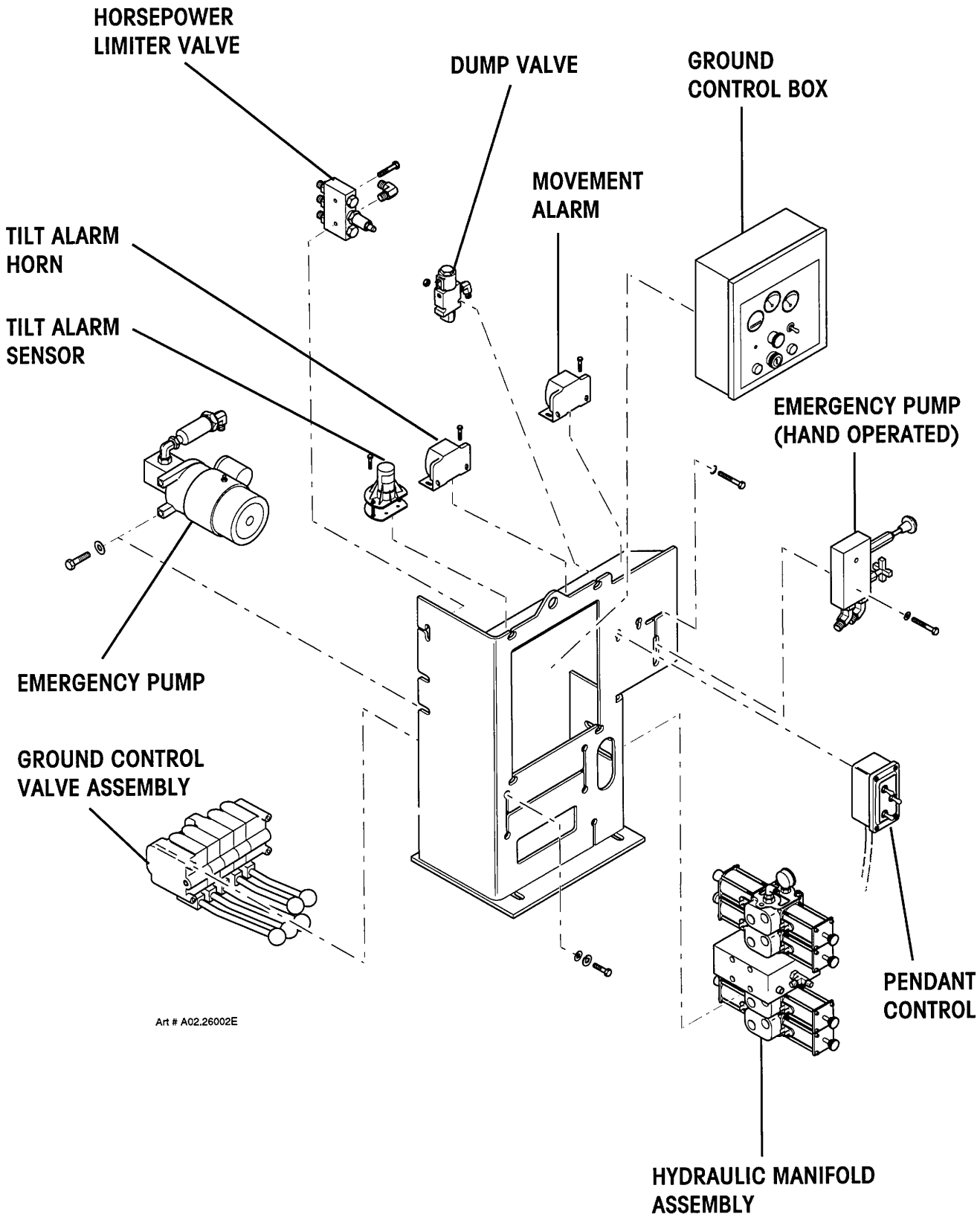
UNDERCARRIAGE COMPONENT LOCATOR



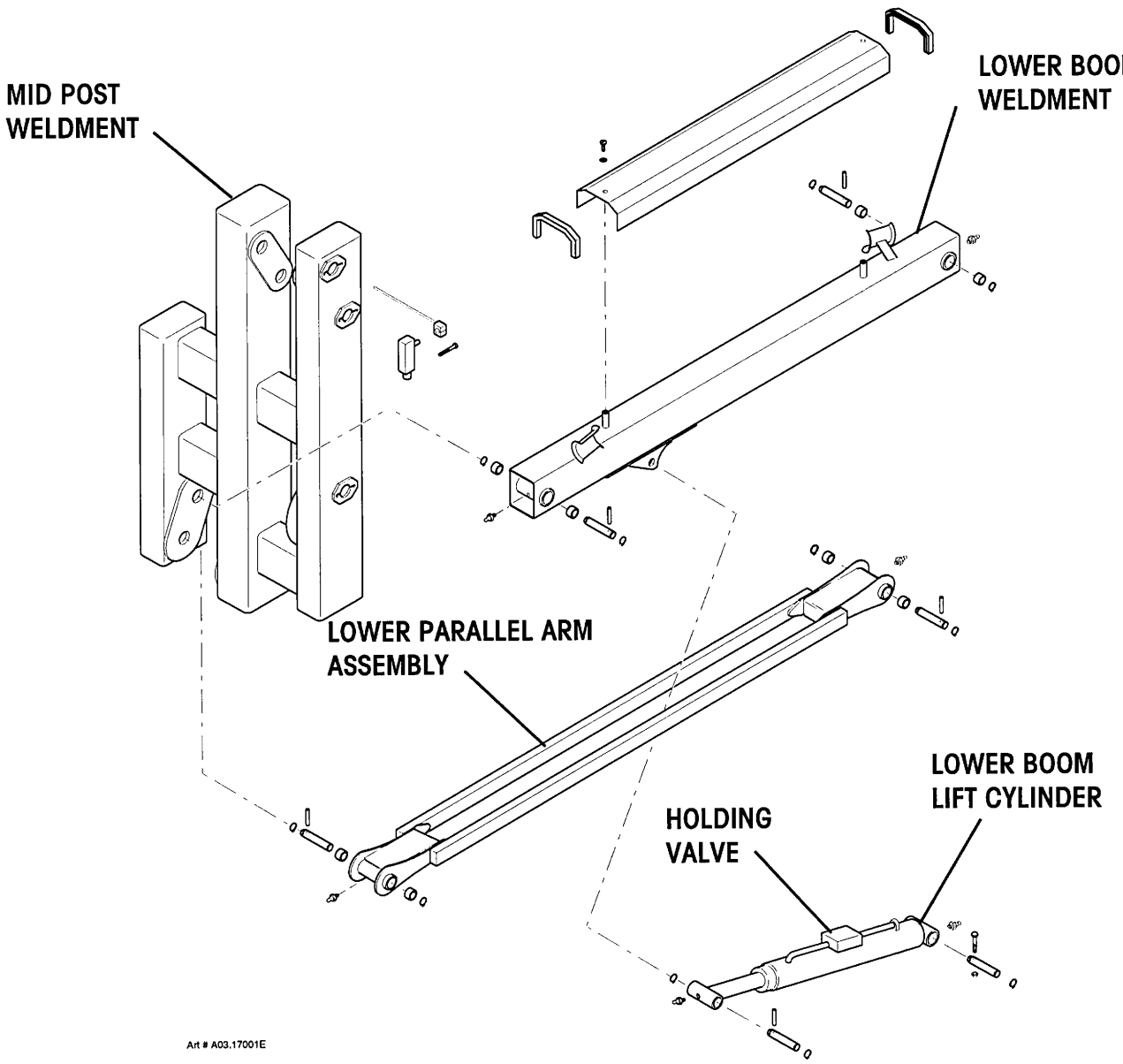
SUPERSTRUCTURE COMPONENT LOCATOR



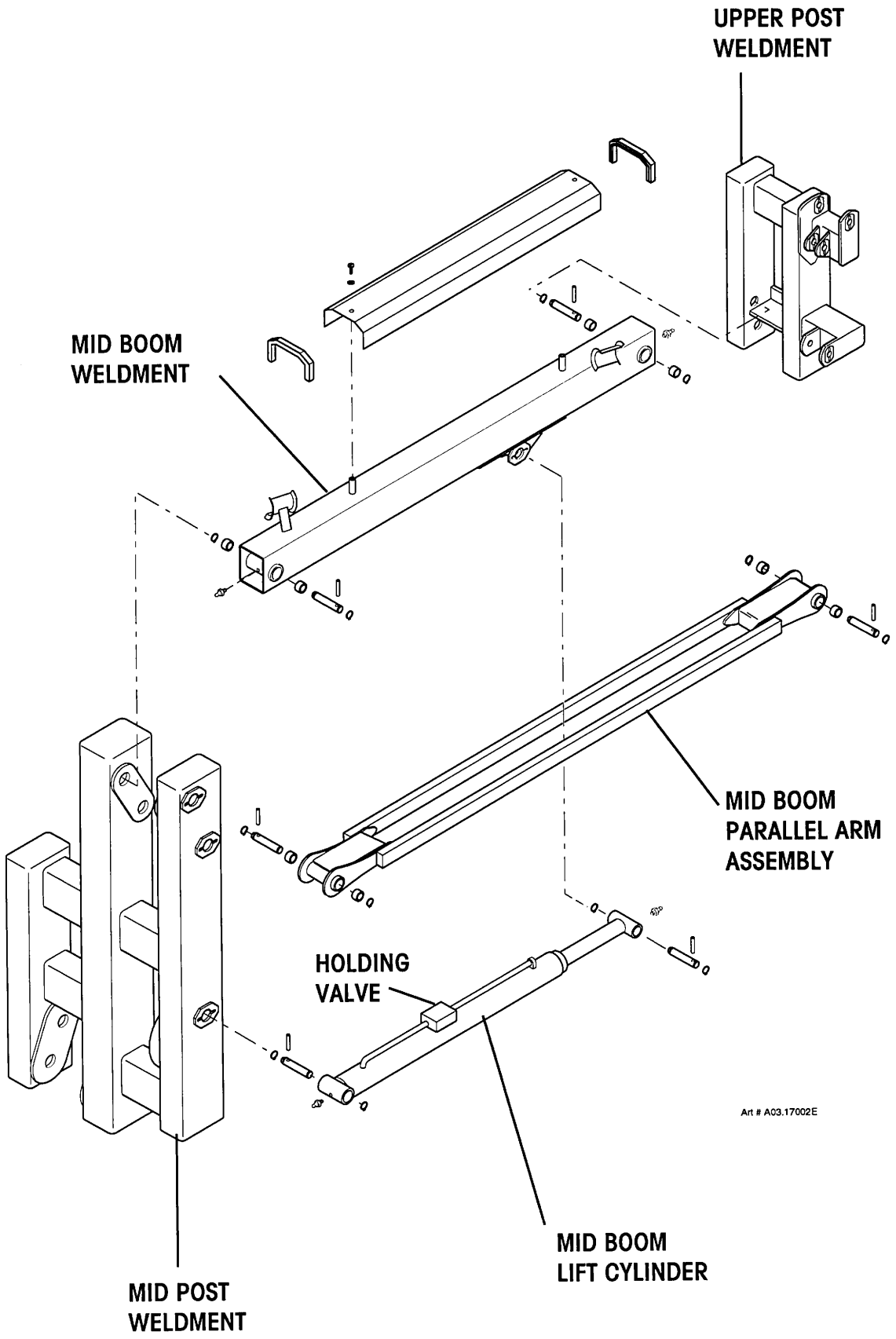
SUPERSTRUCTURE COMPONENT LOCATOR



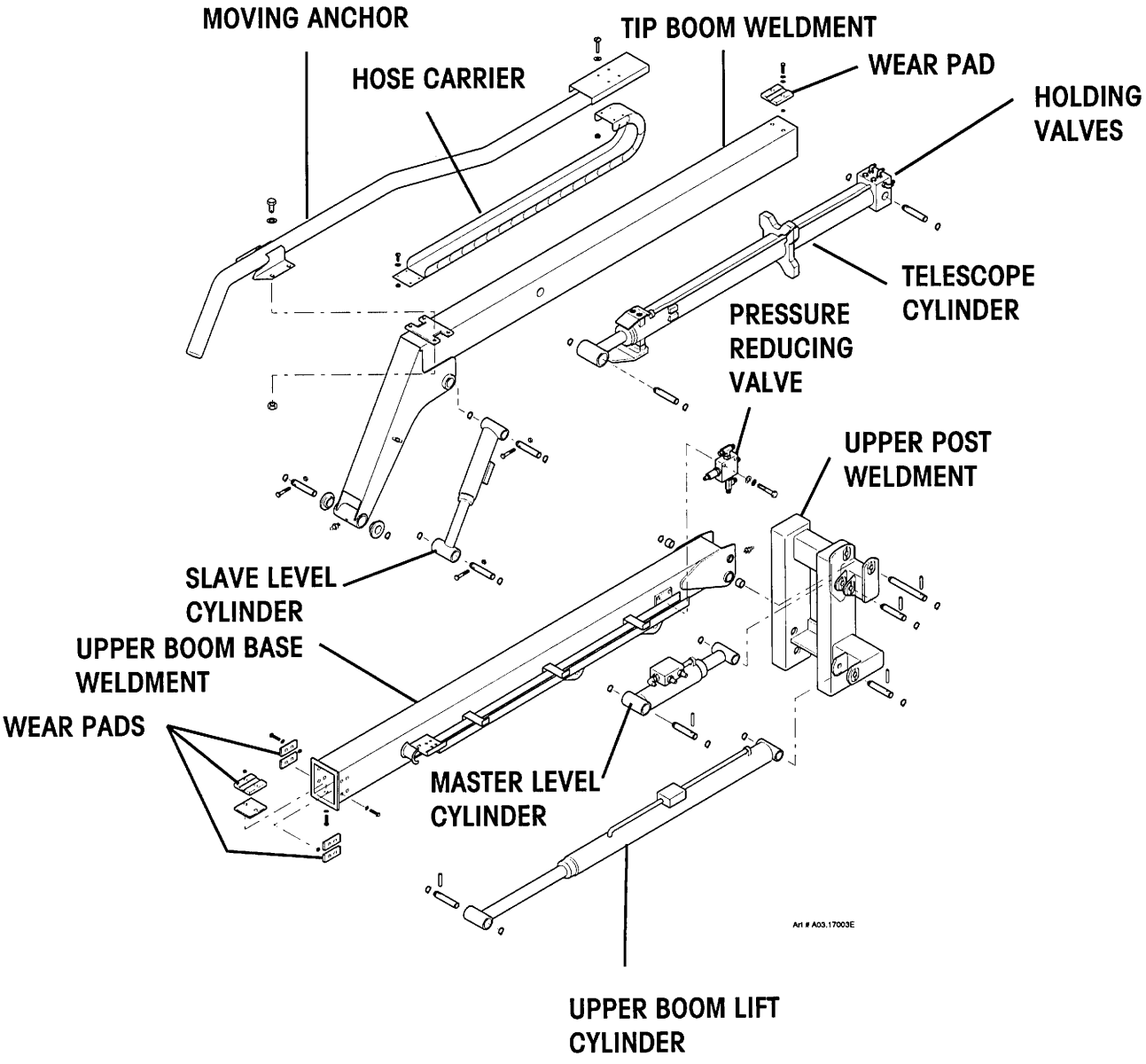
LOWER BOOM COMPONENT LOCATOR



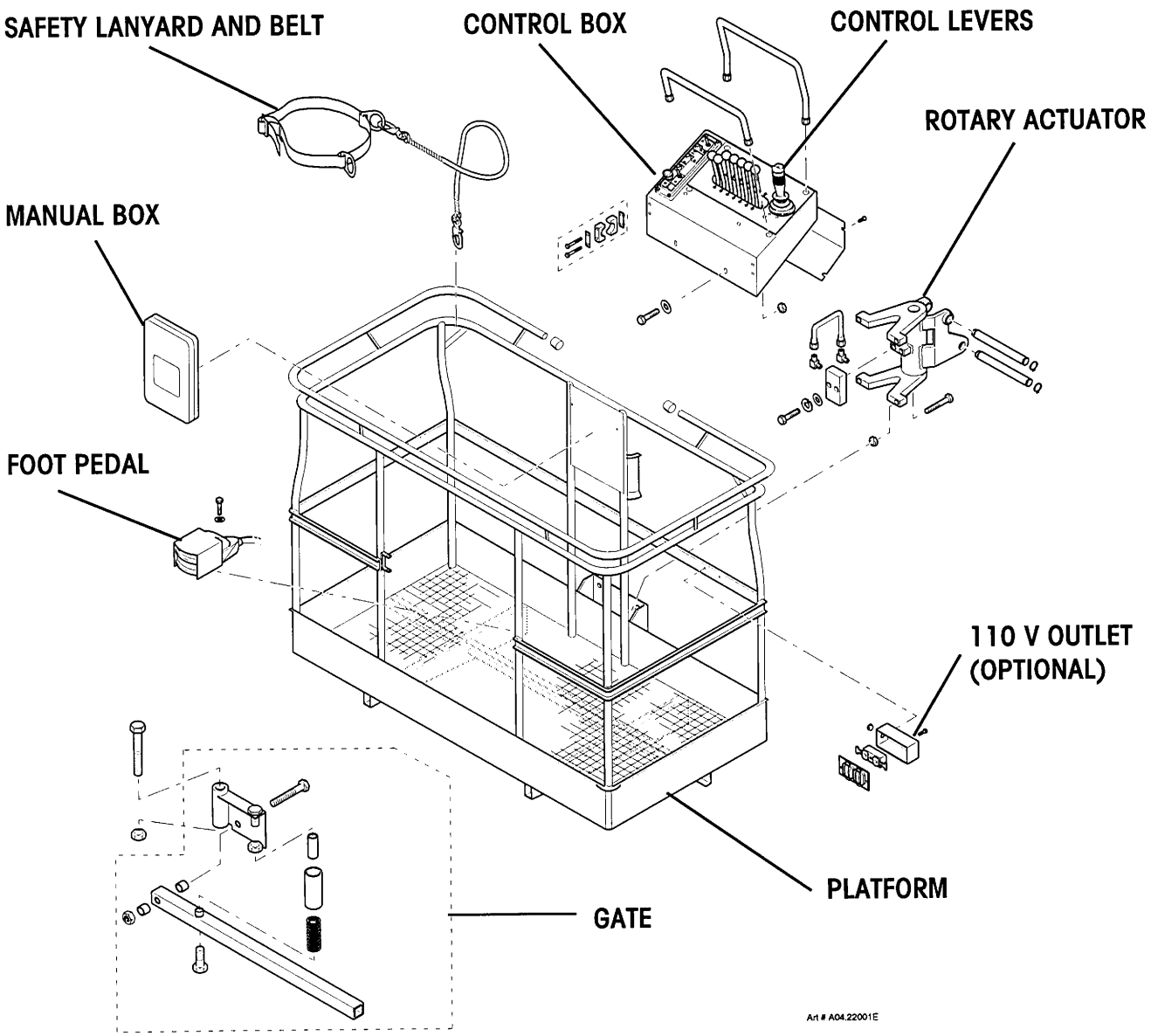
MIDDLE BOOM COMPONENT LOCATOR



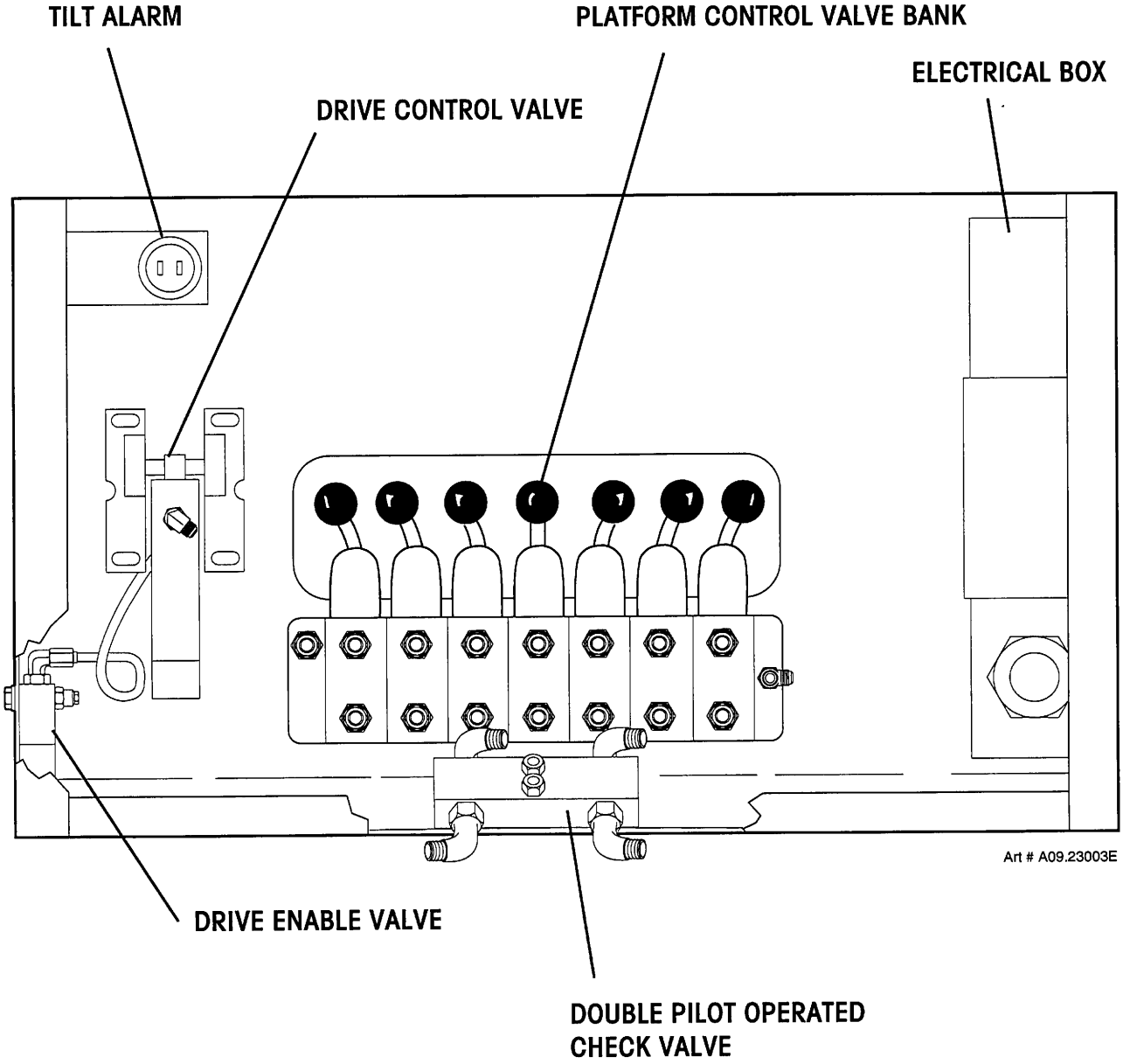
UPPER BOOM COMPONENT LOCATOR



PLATFORM COMPONENT LOCATOR



PLATFORM COMPONENT LOCATOR



Shown from Underside

LUBRICATION CHART

NO.	ITEM	SPECIFICATION AND QUANTITY	FREQUENCY OF LUBRICATION
1.	Hydraulic reservoir	Mobil DTE-13M 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 filter	Filter element (10 micron).	Change every six (6) months or 500 hours.*†
3.	Swing bearing (grease fitting in center of superstructure)	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 and planetary ends	SAE 80/ 90 APIGL5	Check monthly or every 100 hours.*† Change yearly or 1,000 hours.*
6.	Boom pivot pins and cylinder pins	Lithium N.L.G.I. #2 EP. Purge old grease.	Monthly or every 100 hours.*†
7.	Boom wear pads	Silicone spray.	Monthly or every 100 hours.*†
8.	Hydraulic control handle pivot pins	WD 40 Spray or equivalent penetrating oil.	Monthly or every 100 hours.*
9.	Steering spindles (king pin bearings)	Lithium N.L.G.I. #2 EP. Purge old grease.	Monthly or every 100 hours.*†
10.	Steering cylinder bearings	Lithium N.L.G.I. #2 EP. Purge old grease.	Monthly or every 100 hours.*†
11.	Tie rod bearings	Lithium N.L.G.I. #2 EP. Purge old grease.	Monthly or every 100 hours.*†
12.	Lever arm fuel shutoff rack (not shown)	WD 40 Spray or equivalent penetrating oil.	Monthly or every 100 hours.*

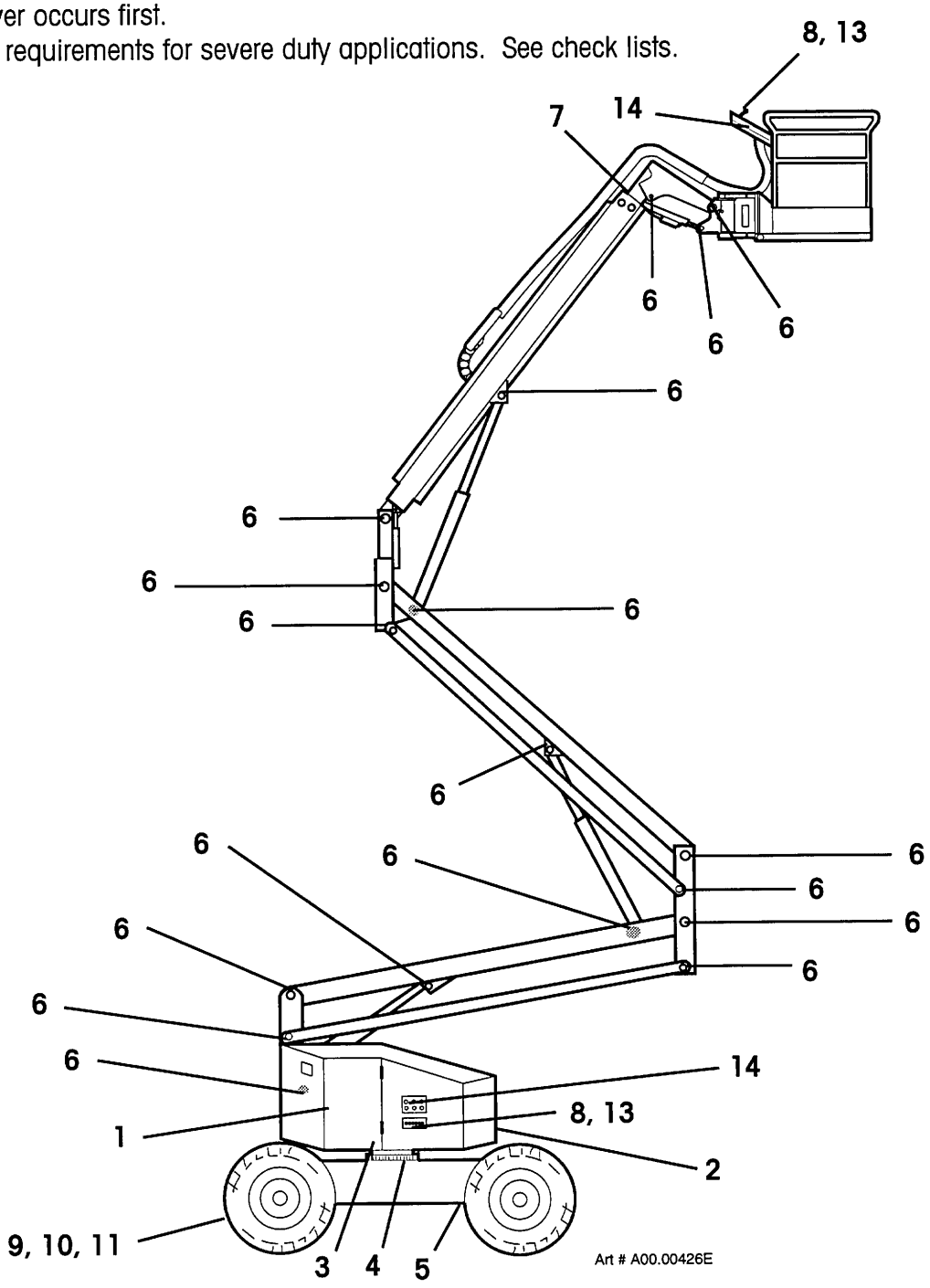
* Whichever occurs first.

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

NO.	ITEM	SPECIFICATION AND QUANTITY	FREQUENCY OF LUBRICATION
13.	Valve spool linkage	WD 40 Spray or equivalent penetrating oil.	Monthly or every 100 hours.*
14.	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.



SECTION 1: TRANSPORTATION AND EMERGENCY PROCEDURES

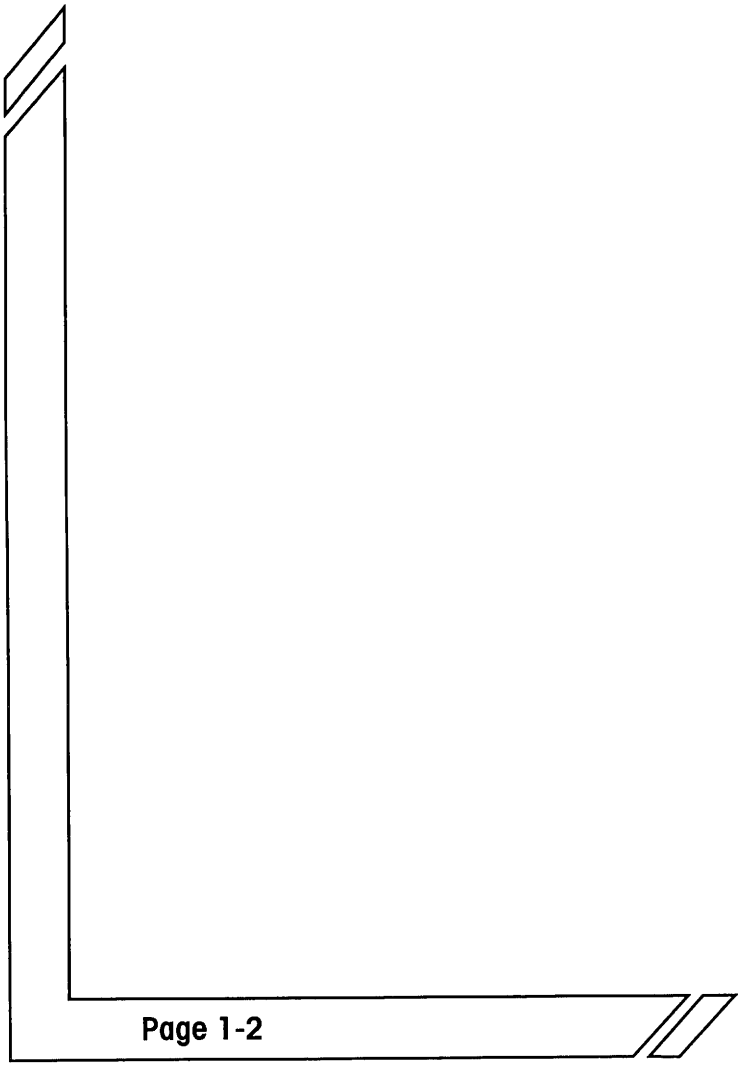


Table of Contents, Section 1

Transporting the Unit 1-4
Unloading Procedures 1-6
Emergency System and Procedures
Emergency Pump 1-8
Unpowered Emergency Movement 1-8
Emergency Lowering 1-9

TRANSPORTING THE UNIT

⚠WARNING

ALWAYS USE A WINCH TO ASSIST LOADING OR UNLOADING THE UNIT FROM A TRUCK OR TRAILER.

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 THE OPERATOR'S MANUAL BEFORE OPERATING THE UNIT.

THE WINCH OPERATOR AND UNIT OPERATOR MUST COORDINATE MOVEMENT WHILE LOADING THE UNIT.

1. Enter the platform, and start the engine using the platform controls. Select the "LOW" drive speed.

2. Raise the upper boom to allow greater ground clearance so that the platform will clear any obstacles as the machine goes up the loading ramp.

3. Connect winch cable through the tie down/ lifting lugs on the undercarriage.

4. Using a winch, carefully maneuver the unit onto the truck or trailer. (Moving drive levers off of center "neutral" position will release brakes.)

5. Lock the superstructure to the undercarriage by installing the lock pin provided.

⚠ CAUTION

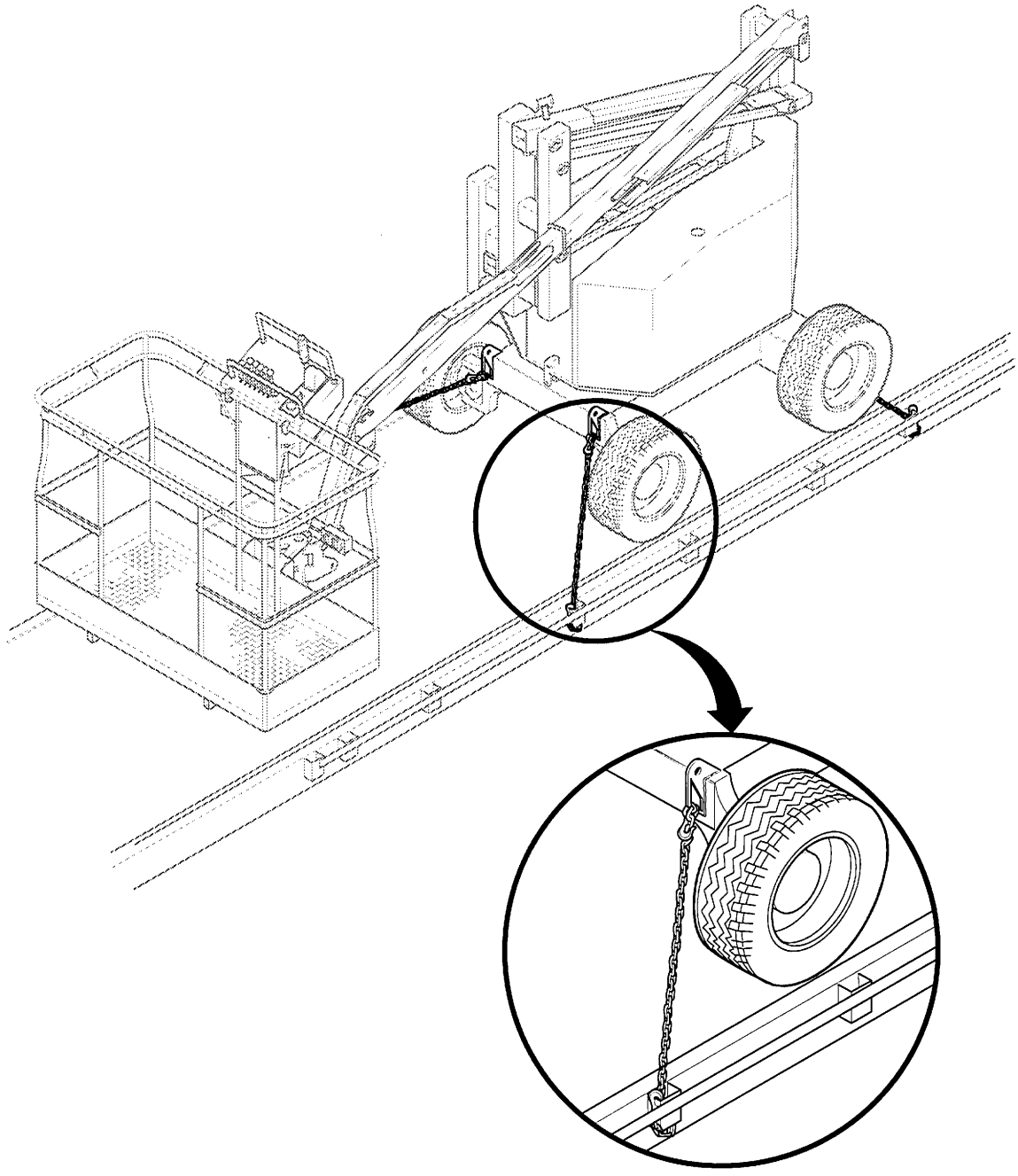
To avoid damaging the unit, the boom or platform MUST NOT be tied to the trailer bed in any way.

6. Ensure that the boom is fully retracted, and that the platform will **not** contact any other item, including the bed of the truck or trailer.

7. Use four (4) 1/2 inch, "Grade 7" chains attached to the tie down cut outs.

NOTE: 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.

8. The negative battery cables should be disconnected for transport. It is recommended that the fuel and hydraulic tank valves be closed as well.



Tie Down of AT45 (Recommended).

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.

1. Inspect the outside of the unit for damage (including the underside). Inspect all hoses, boom sections and cables for chafing or shipping damage. Confirm that all wheel lug nuts and swing bearing bolts are tight (refer to specifications).

2. Remove the pin that locks the superstructure to the undercarriage near the swing bearing. Stow the lock pin in the location provided nearby.

3. Unlock and open both side compartments. Inspect all fuel, electrical and hydraulic connections for damage and security.

4. Connect battery cables to battery if required. Check electrolyte level.

5. Perform Shift Checks and Machine Startup as described in the AT45 Operator's Manual. Then, turn the engine off.

6. Close side compartment covers.

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

⚠WARNING

ALWAYS USE A WINCH TO ASSIST LOADING OR UNLOADING THE UNIT FROM A TRUCK OR TRAILER. 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.

8. Turn key to "GROUND".

9. Remove all machine tie downs. Remove wheel chocks, if used. Turn the Ground/Platform key switch to "PLATFORM CONTROLS".

10. Enter the platform, and restart the engine using the platform controls. Test all platform functions.

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

12. Connect winch cable through the tie down/lifting lugs on the undercarriage.

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

⚠ CAUTION

Winch line and unit travel must be coordinated during this procedure.

The brakes are automatically released for driving, and will automatically apply when the drive control lever is brought back to the "NEUTRAL" position.

14. Before placing the unit into service, all operators must read and understand the contents of the AT45 Operator's Manual.

EMERGENCY SYSTEM AND PROCEDURES

⚠ DANGER

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

EMERGENCY ELECTRICAL PUMP

The AT45 Mobile Platform has a battery powered emergency pump. This pump can be activated from the operator's platform or ground control station to briefly operate the machine when the unit has lost engine power.

- Turn and hold the pump switch on the ground control console or optional remote pendant to "EMERGENCY; or

  press and hold the emergency pump button on the platform control console.

- Select the proper function as desired to fit the situation.

To prevent the battery from completely discharging and the emergency pump from overheating, release the emergency pump switch to allow a 30 second rest period after every 30 seconds of operation. Once the unit has been safely positioned, correct the cause of the failure before returning the unit to service.

UNPOWERED EMERGENCY MOVEMENT

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

⚠ DANGER

THIS PROCEDURE REQUIRES RELEASING THE VEHICLE 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 1 M.P.H. (1.6 K.P.H.).

- Secure the unit to towing device with chains or ropes.

  The AT45 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 BLOCK THE WHEELS BEFORE YOU RELEASE THE BRAKES TO PREVENT UNEXPECTED UNIT MOVEMENT ON SLOPES.

- Block wheels.

- Release brakes and disconnect rear drive motor.

  There is a hand pump located to the right of the ground control mounting bracket. Close the valve under the pump plunger by turning it to the right (clockwise) and operate hand pump. Continue to pump until high resis-

tance is felt in the pump plunger. At this point, wheel brakes and rear drive motor will be released.

After unblocking the wheels, the unit 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 open the needle valve under the hand pump plunger to engage wheel brakes and rear drive motor.

- The machine is now ready for normal operation.

EMERGENCY LOWERING

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 this type of emergency, it is important to remember:

- Stay calm.

- Think through the situation before operating the machine.

- Get help if necessary.

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

POSSIBLE CONDITION:

- One or more functions are not operating correctly.

- Unit movement from unselected control lever.

- Unit function(s) will not stop unless power is switched off.

CORRECTIVE ACTION

1. Remove foot from foot pedal.

2. Push the red "Emergency Stop" Button.

3. Evaluate the nature of the failure. Return to the ground, using the emergency pump and lowering procedure (see "Emergency Electrical Pump").

4. If unable to return to the ground using the platform controls and the emergency pump, contact an experienced operator to lower the machine with the emergency pump using the ground controls (see "Emergency Electrical Pump).

⚠ 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 immedi-**

ately.

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

⚠ DANGER

DO NOT TOUCH UNIT !!!

DETERMINE THE CAUSE OF THE PROBLEM BEFORE YOU TOUCH THE MACHINE.

CORRECTIVE ACTION

1. Check for contact with power lines.
2. Have someone summon first aid or rescue squad.
3. Attempt to talk to operator before taking any rescue measures.
4. **Check to see if the operator is in a pinned position, or would be endangered if platform is moved, before attempting emergency lowering procedure.**
5. After establishing that the machine is not in contact with live power lines, lower the platform or move the unit as necessary using the emergency procedures (see "Emergency Electrical Pump", earlier in this section).
6. Render first aid to the operator.
7. **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 !!!!

ELECTROCUTION HAZARD!!!

CORRECTIVE ACTION

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

Table of Contents, Section 2:

Hydraulic Fluid 2-5
Handling Precautions 2-5
Fluid Recommendations 2-5
Hydraulic Fluid Analysis 2-5
System Flushing Procedure 2-6
Hydraulic System Components 2-9
Hydraulic Pump 2-9
Main Hydraulic Pump 2-9
Main Hydraulic Pump Adjustment 2-10
Main Hydraulic Pump De-stroke Valve 2-10
Emergency Pump 2-11
Emergency Pump Relief Valve Adjustment 2-11
Drive/ Steer Manifold Assembly 2-11
Control Valve Manifold 2-11
Directional Control Valves 2-12
Motion Control Valve Assembly 2-12
Motion Control Valve 2-12
Brake Needle Valve 2-12
Shuttle Valve 2-13
Pressure Reducing Valve 2-13
Cross Port Relief Manifold 2-13
Stop Cushion Solenoid Valve 2-13
High Pressure Filter 2-13
High Pressure Filter Element 2-13
Hydraulic Fluid Reservoir 2-13
Hydraulic Reservoir Maintenance 2-14
Boom Lift System 2-14
Directional Control Valves 2-14
Platform 2-14
Ground 2-14
Lift Cylinders 2-15
Boom Telescope System 2-16
Directional Control Valves 2-16
Platform 2-16
Ground 2-16
Pressure Reducing Valve 2-16
Telescope Cylinder 2-17
Superstructure Swing System 2-18
Directional Control Valves 2-18
Platform 2-18
Ground 2-18
Double Counterbalance Valve (Swing) 2-18
Swing Drive Motor/ Reducer Assembly 2-18

Table of Contents, Section 2:

Platform Rotate System 2-19
Rotate Control Valve 2-19
Rotary Actuator 2-19
Rotary Actuator Maintenance 2-19
Platform Rotator Pressure Relief Valve 2-19
Platform Leveling System 2-20
Level Control Valve 2-20
Double Pilot Operated Check Valve 2-20
Master Level Cylinder 2-20
Relief Valves 2-20
Slave Level Cylinder 2-20
Steer System 2-22
Drive/ Steer Manifold Assembly 2-22
Steer Cylinder 2-22
Steer System Maintenance 2-22
Hydraulic Swivel (Optional) 2-23
Solenoid Valve Checks 2-23

HYDRAULIC FLUID

HANDLING PRECAUTIONS

⚠WARNING

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

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

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

⚠WARNING

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

FLUID LEAKS UNDER PRESSURE MAY NOT ALWAYS BE VISIBLE.

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

FLUID RECOMMENDATIONS

We strongly recommend the use of MOBIL DTE-13M HYDRAULIC FLUID. An EQUIVALENT substitute can be used if absolutely necessary. Mineral-based hydraulic fluids produced by different companies will USUALLY mix with each other satisfactorily, but this IS NOT RECOMMENDED. When in doubt, consult your supplier.

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

HYDRAULIC FLUID ANALYSIS

Use the following as a guide to determine when change or 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, or ny time the hydraulic reservoir has been contaminated.
- If, after the first 50 hours of operation, the hydraulic filter elements are plugged.
- Any time the hydraulic filter elements show signs of metal contamination.
- If valve spools at either operator's station have continuous sticking problems which are not corrected by lubrication.
- Once every six months, under normal operating conditions.
- Every 3 months, in extremely dusty or dirty operating conditions.

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

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

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

Following the above 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 OF THE MACHINE TO PREVENT UNEXPECTED MOVEMENT OF THE MACHINE.

1. With BOOM 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 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 the "Ground" position.
12. Press "Engine Start" button to start engine.
13. Activate pump selector toggle switch on remote control pendant and hold at "Main" to active engine powered pump.

⚠ CAUTION

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

14. Cycle all cylinder functions to the end of their stroke 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's 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.

15. 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.

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

17. Activate pump selector toggle switch on remote control pendant and hold at "Main" to active engine powered pump.

18. Activate the drive switch on remote control pendant to flush the drive circuit hydraulic components of the hydraulic fluid.

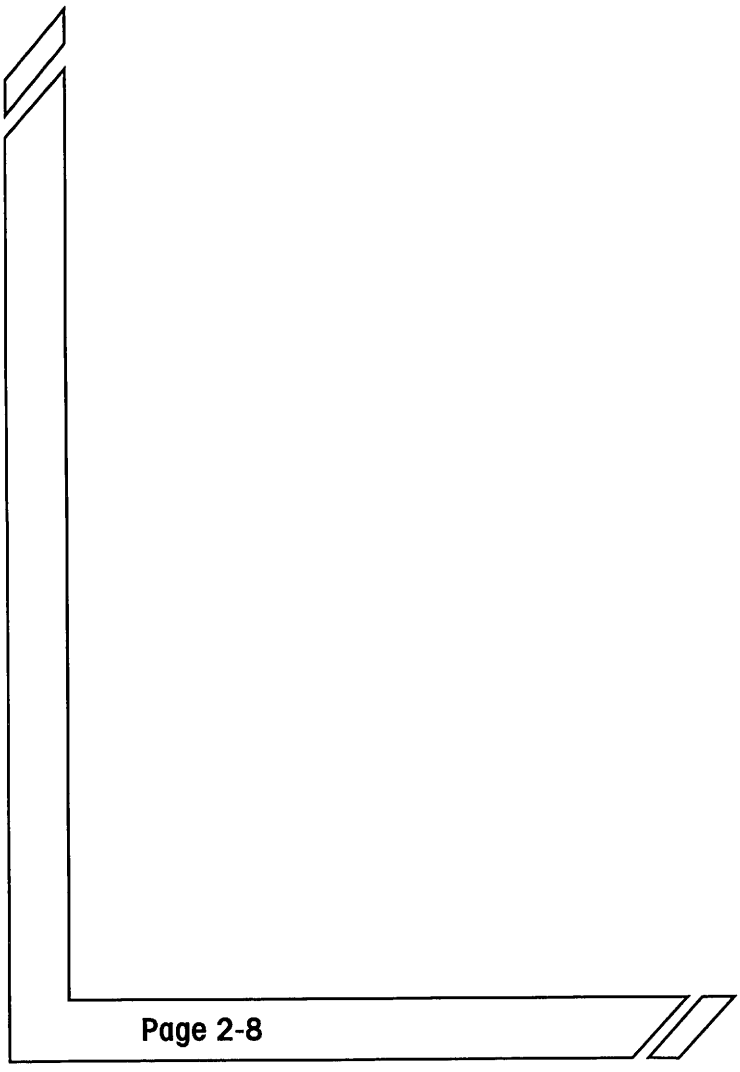
19. Activate the steer toggle switch on remote control pendant to flush the steer cylinder of the hydraulic fluid.

20. When the above procedures have been completed, re-connect all return hoses to tank and the return hoses for the drive motors.

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

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

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



HYDRAULIC SYSTEM COMPONENTS

Following is a description of the major components of the AT45 hydraulic system.

HYDRAULIC PUMP

There are two pumps on the machine; the main hydraulic pump and the emergency pump. The main hydraulic pump is located on the flywheel housing of the engine, and the emergency pump is located behind the ground control box.

MAIN HYDRAULIC PUMP

The main hydraulic pump is a variable displacement pressure compensated radial piston pump.

Hydraulic fluid enters through the inlet ports. A common inlet gallery provides fluid to all eight inlet valves in the housing. Pistons radially surround an eccentric cam. The cam moves a bearing race upon which the pistons ride. Behind each piston is a spring which holds the piston against the bearing race.

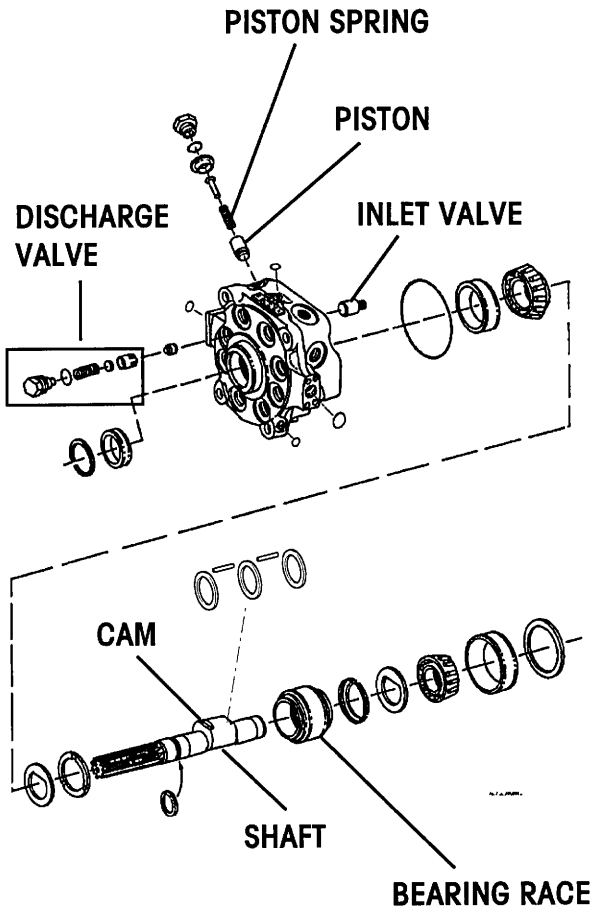
As the pump shaft rotates low hydraulic pressure develops in the piston spring area during downward stroke of the piston. This low pressure allows the inlet valve to open filling the piston cavity with hydraulic fluid. The inlet valve closes at the end of the intake stroke of the piston.

High pressure is developed as the race pushes the piston outward. As pressure increases a discharge valve opens allowing the fluid to pass into the outlet gallery.

At the end of the stroke, the discharge valve closes. All discharge valves share a common outlet gallery in the pump housing.

An orifice is located between the crankcase and the inlet gallery. Any fluid flow past the pistons is routed through the orifice to the inlet gallery. This flow allows for cooling and lubrication.

Pressure compensated pumps are designed to provide "on demand" high pressure fluid regardless of flow requirements up to the maximum pump output. The pressure compensator regulates fluid pressure into the pump crankcase. Increased pressure in the crankcase overcomes the piston spring pressure and hold the pistons away from the race, thereby destroking the pump.



Main Hydraulic Pump.

MAIN HYDRAULIC PUMP ADJUSTMENT

⚠WARNING

ESCAPING FLUID UNDER PRESSURE CAN PENETRATE THE SKIN CAUSING SERIOUS INJURY. RELIEVE PRESSURE BEFORE DISCONNECTING HYDRAULIC LINES. KEEP HANDS AND BODY AWAY FROM PINHOLES AND NOZZLES WHICH EJECT FLUIDS UNDER HIGH PRESSURE. USE A PIECE OF CARDBOARD OR PAPER TO SEARCH FOR LEAKS. DO NOT USE YOUR HAND.

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

NOTE: Refer to "Machine Specifications" to determine maximum system pressure for your unit.

To adjust the system pressure:

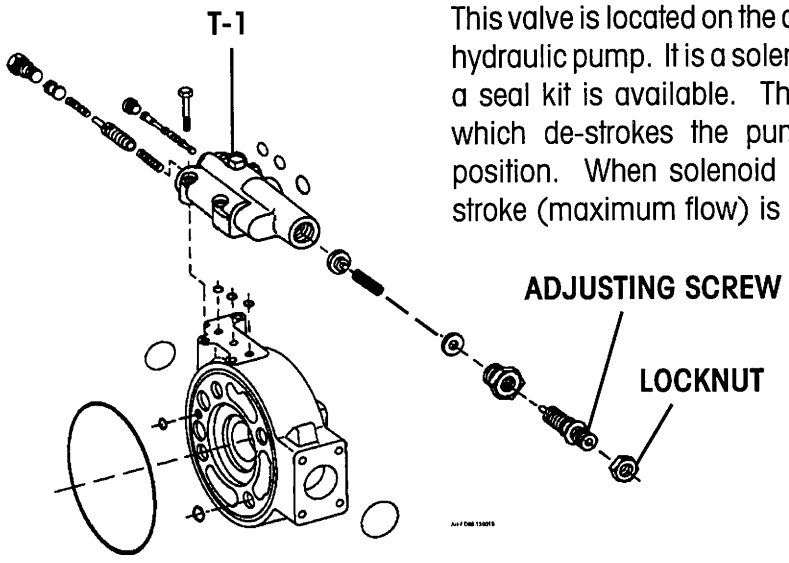
- Install a 14 mm adapter to the high pressure test port (T-1) and connect a 5000 psi (345 Bar/ 352 Kg/cm^2) gauge.
- Locate the adjusting screw on the side of the main pump adapter plate.
- Loosen the locknut and while viewing the pressure gauge, set system pressure to value specified in the "Machine Specifications".
    - Turn the adjusting screw out to decrease pressure, in to increase pressure.
- After system pressure has been set, tighten the lock nut.

⚠ CAUTION

When first starting a unit where the pump setting is unknown, the adjusting screw should be set to a minimum depth (nearly all the way out) to prevent excessive pressure at start up.

MAIN HYDRAULIC PUMP DE-STROKING VALVE

This valve is located on the compensator of the main hydraulic pump. It is a solenoid operated valve, and a seal kit is available. This normally open valve which de-strokes the pump (zero flow) in this position. When solenoid is energized, full pump stroke (maximum flow) is available.

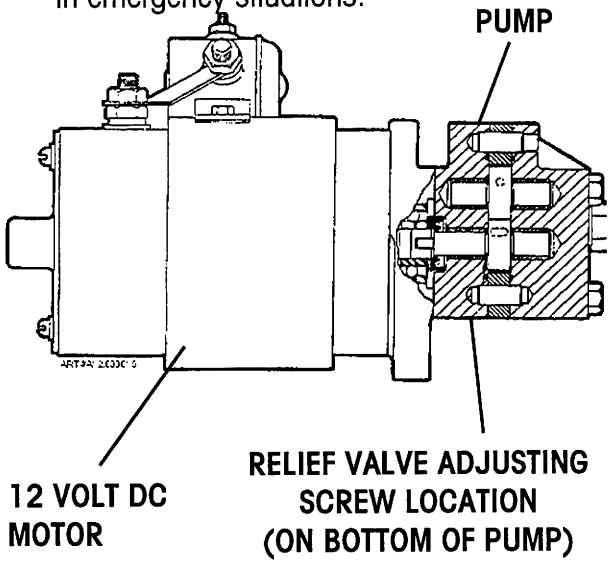


Main Hydraulic Pump Control Adjustment.

EMERGENCY PUMP

The emergency pump is driven by an electric 12 volt DC motor. This pump delivers hydraulic fluid, under pressure, to the manifold assembly. The electric motor is rated for non-continuous duty and will fail prematurely if activated continuously for extended time periods.

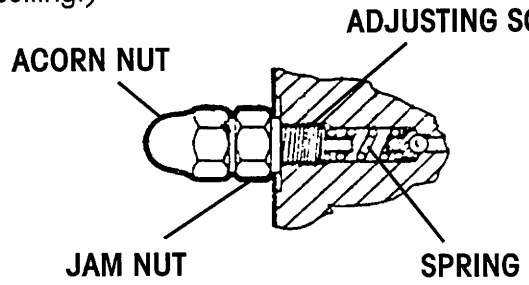
NOTE: This pump should only be used in emergency situations.



Emergency Pump.

EMERGENCY PUMP RELIEF VALVE ADJUSTMENT

The emergency pump relief valve pressure adjusting screw is located on the side of the adapter plate. To adjust the relief valve pressure on the pump, remove the acorn nut, loosen the jam nut and turn the adjusting screw in (C.W.) to increase pressure. To decrease pressure, turn the adjusting screw out (C.C.W.). (See "Machine Specification" for correct setting.)

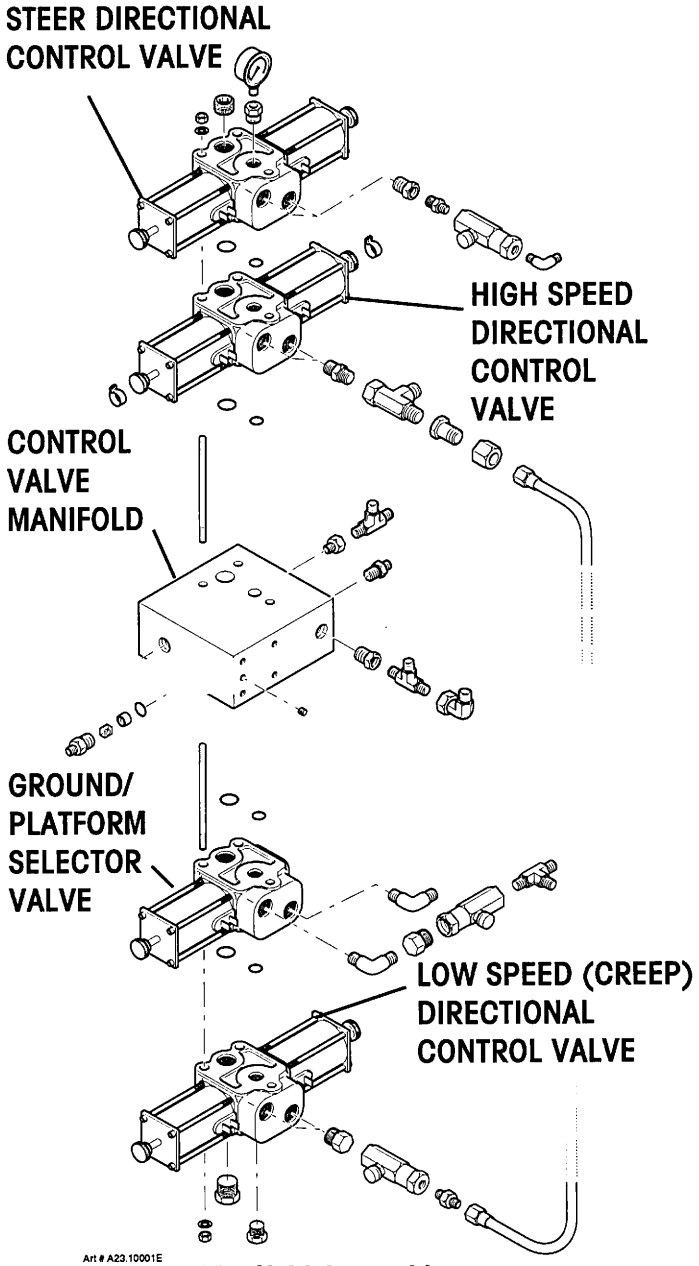


Emergency Pump Relief Valve.

DRIVE/ STEER MANIFOLD ASSEMBLY

CONTROL VALVE MANIFOLD

The control valve manifold is located in the center of the drive/ steer manifold assembly (main valve stack). This control valve manifold allows hydraulic fluid, from either the main hydraulic pump or the emergency pump, to enter the directional control valves. There is a check valve in this manifold which prevents oil going back to the main pump when the emergency pump is energized.



Manifold Assembly.

DIRECTIONAL CONTROL VALVES

The directional control valves direct fluid pressure to the steer and drive functions; thereby, allowing steering, driving at high or low speed, or hydraulic power for either the ground or platform station. Three of these valves are 4-way, three position valves. The ground/platform selector valve is a 4-way, two position directional control valve. All directional control valves are solenoid operated with manual overrides. The manual override is purposely disabled on the high speed drive valve to prevent inadvertent operation

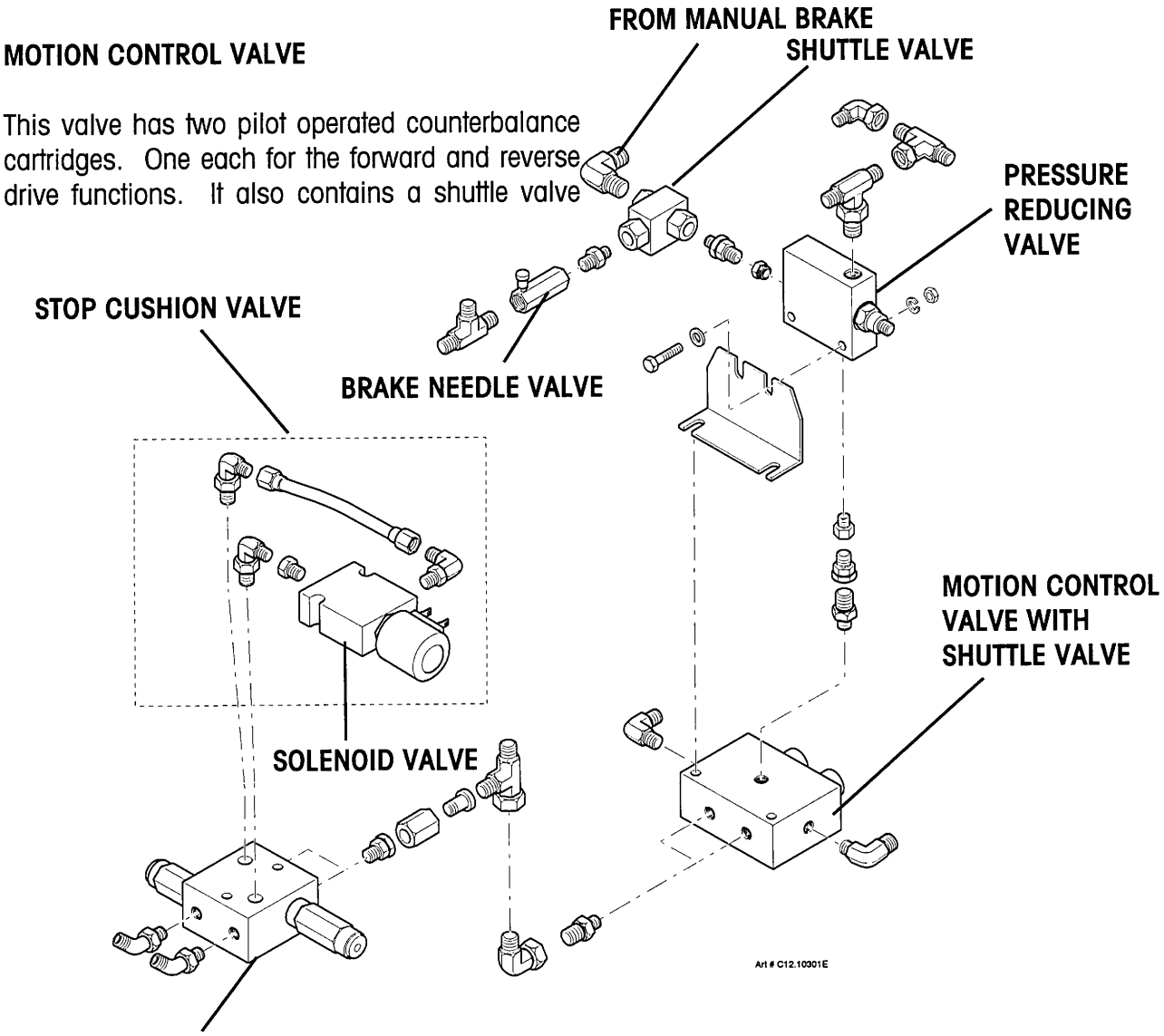
DRIVE/ BRAKE CONTROL VALVE ASM.

MOTION CONTROL VALVE

This valve has two pilot operated counterbalance cartridges. One each for the forward and reverse drive functions. It also contains a shuttle valve which directs high pressure hydraulic fluid to the axle brakes. The counter balance valves produce a back pressure in the drive system so that no uncontrolled or "runaway" movement happens when the machine is driven on steep inclines. They also provide dynamic braking and holding.

BRAKE NEEDLE VALVE

This valve regulates the hydraulic fluid flow from the brakes. Adjustment regulates the speed that the brakes are applied. When drive is selected oil free flows through the needle valve from the motion control valve to the brakes releasing the brakes in the axle.



Motion Control Valve Assembly.

SHUTTLE VALVE

The shuttle valve directs only high pressure hydraulic fluid flow to the axle brakes from either the drive pressure reducing valve or the manual brake release pump.

PRESSURE REDUCING VALVE

Reduces drive pressure to a maximum of 435 psi (30 Bar/ 30.6 Kg/cm^2) to release axle brakes.

CROSS PORT RELIEF MANIFOLD

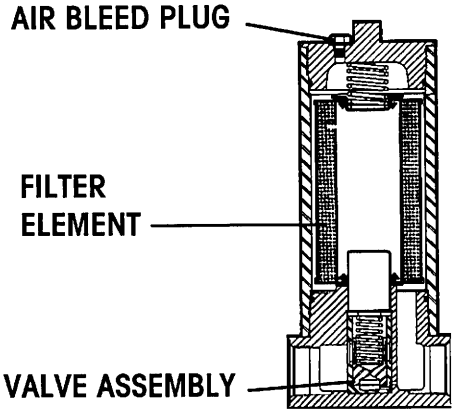
The cross port relief manifold limits pressure to all wheel drive motors. Valves are set at 3000 psi (207 Bar/ 211 Kg/cm^2).

STOP CUSHION SOLENOID VALVE

This solenoid valve opens or closes a drive motor bypass circuit. A small orifice (0.082) provides a gradual stop when the drive handle is centered to neutral. The valve and bypass circuit is closed when in creep speed or on slopes over 5°. Machine will stop instantly without cushioning when bypass circuit is closed.

HIGH PRESSURE FILTER

The high pressure hydraulic filter is a non-bypassing filter. This filter allows maximum fluid flow as long as the filter element is free of contaminants. When the filter is clogged, it restricts the hydraulic flow to avoid crushing the filter element due to differential pressure across the element. The build-up of pressure across the filter will reduce high speed drive performance and act as an indication of a clogged filter.



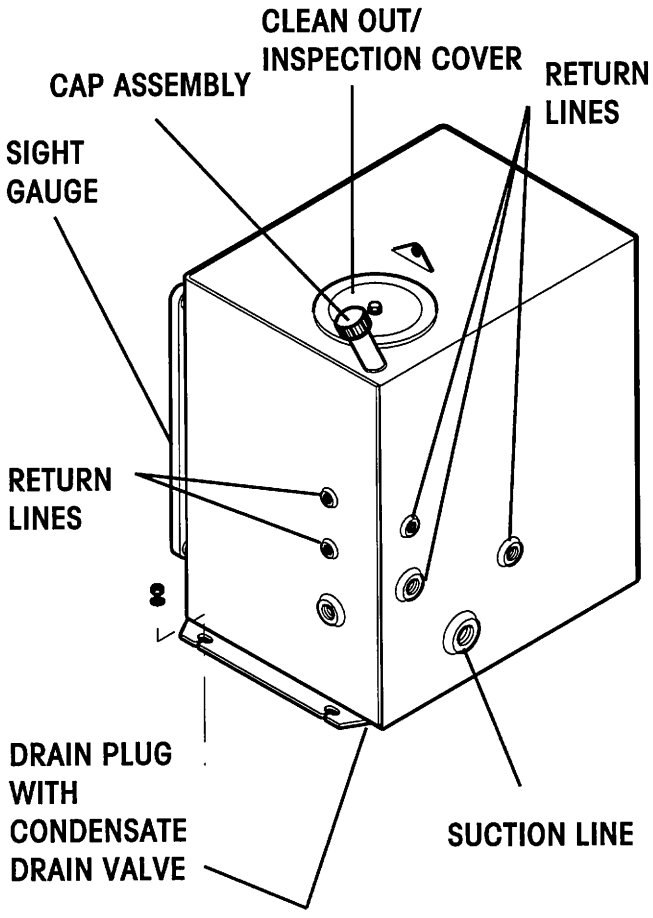
High Pressure Filter.

HIGH PRESSURE FILTER ELEMENT

A 10 micron element is the standard element for this filter. However, an optional 3 micron element is available. See Lubrication Chart for frequency of changing the filter element.

HYDRAULIC FLUID RESERVOIR

The hydraulic fluid reservoir is mounted in the superstucture and consists of the tank, a cap and strainer, a drain cock, one valve for the suction line, five valves for return lines and a sight gauge.



Hydraulic Fluid Reservoir.

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".

BOOM LIFT SYSTEM

The boom lift system consists of three hydraulic directional control valves in the platform valve bank assembly with pressure compensated flow controls, three other directional control valves in the ground valve bank assembly with pressure compensated flow controls, and a lift cylinder with a counterbalance (holding) valve for each of the three booms.

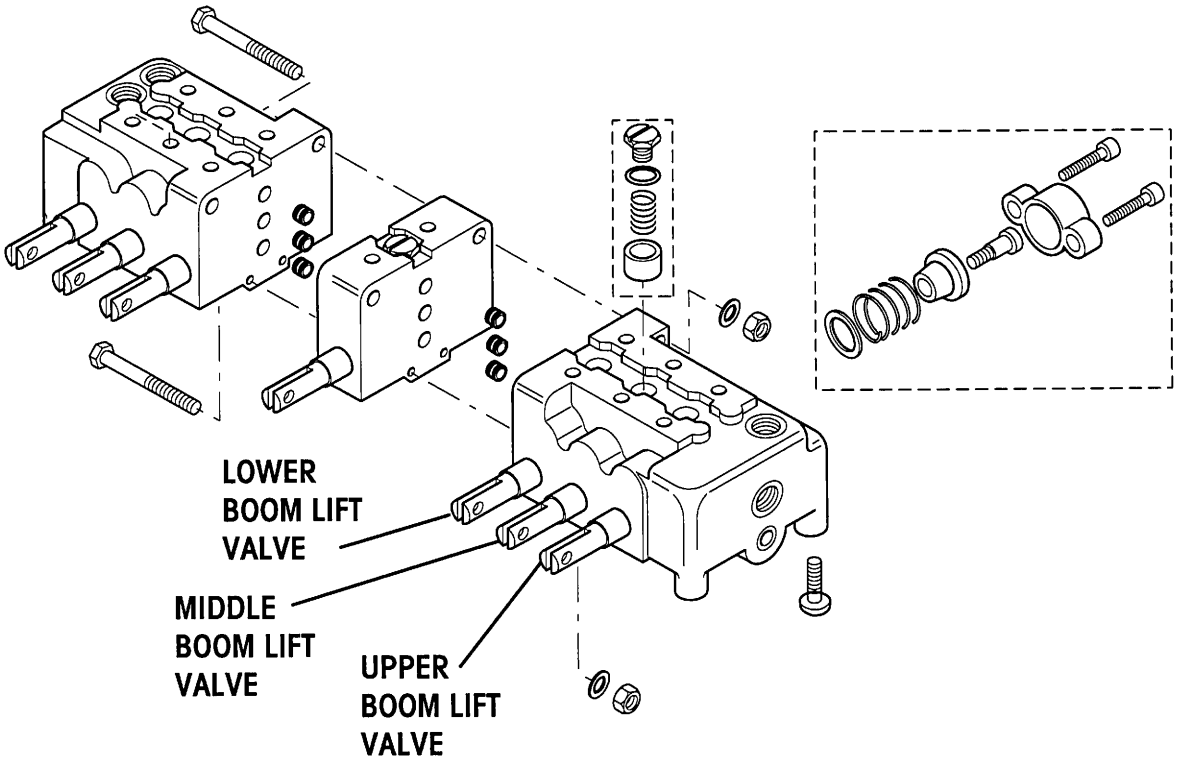
DIRECTIONAL CONTROL VALVES

Platform

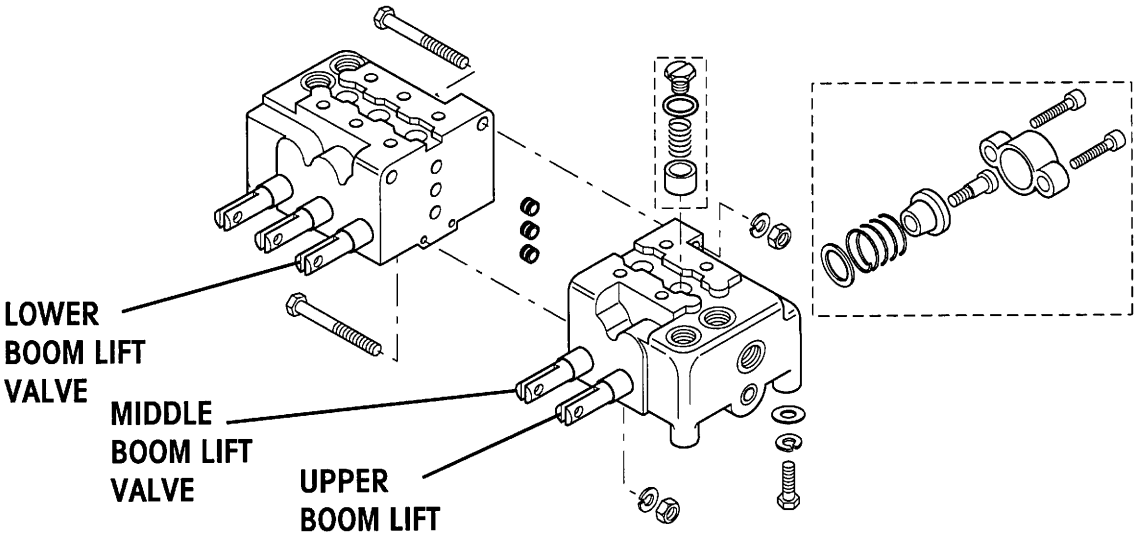
The platform directional control valves direct fluid flow to the boom lift cylinders to provide hydraulic power for raising or lowering the booms. This valve is a 3 position, 4 way manually operated valve. The pressure compensated flow control valves set the boom lift and lower speeds. They can be cleaned with a solvent and blow dried with air. There are no seal kits available and they cannot be adjusted.

Ground

The ground directional control valve is located in the valve bank assembly with the telescope and swing functions. This valve directs fluid flow to the boom lift cylinder to provide hydraulic power for raising or lowering the boom. This valve is a 3 position, 4 way manually operated valve. The pressure compensated flow control valves set the boom lift and lower speeds. They can be cleaned with a solvent and blow dried with air. There are no seal kits available for these valves and they cannot be adjusted.



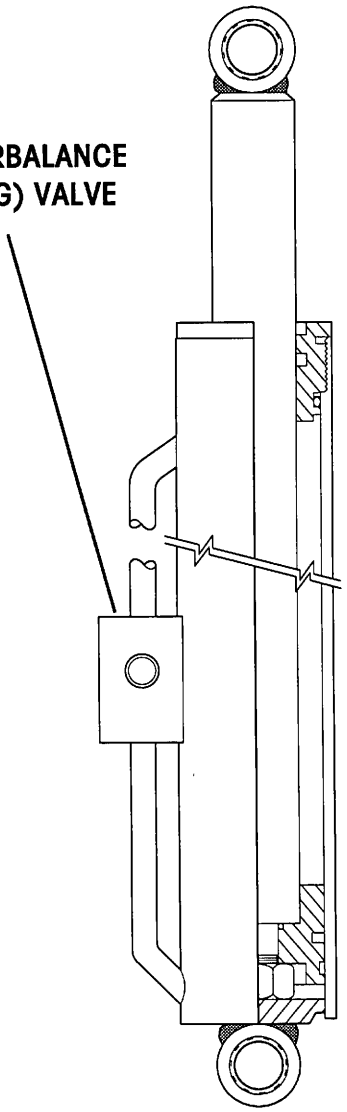
Platform Valve Bank Assembly.



Ground Valve Bank Assembly.

LIFT CYLINDERS

The boom lift functions are powered by double acting cylinders. These cylinders contain a counterbalance (holding) valve, which prevents unintended downward movement of the cylinder should a hose or fitting develop a leak. The counterbalance valve also prevents overspeeding of the boom down function. Make certain that all power is off and that lift cylinder bears no load before repairing. When a boom is lowered, fluid flows to the rod end cylinder port and to the counterbalance valve, opening this valve and allowing fluid from the base end of the



Lift Cylinder.

cylinder to flow back to the reservoir.

BOOM TELESCOPE SYSTEM

The boom telescope system consists of a hydraulic directional control valve in the platform valve bank assembly, another directional control valve in the ground valve bank assembly, a pressure reducing valve, and a telescope cylinder with a double counterbalance valve.

DIRECTIONAL CONTROL VALVES

Platform

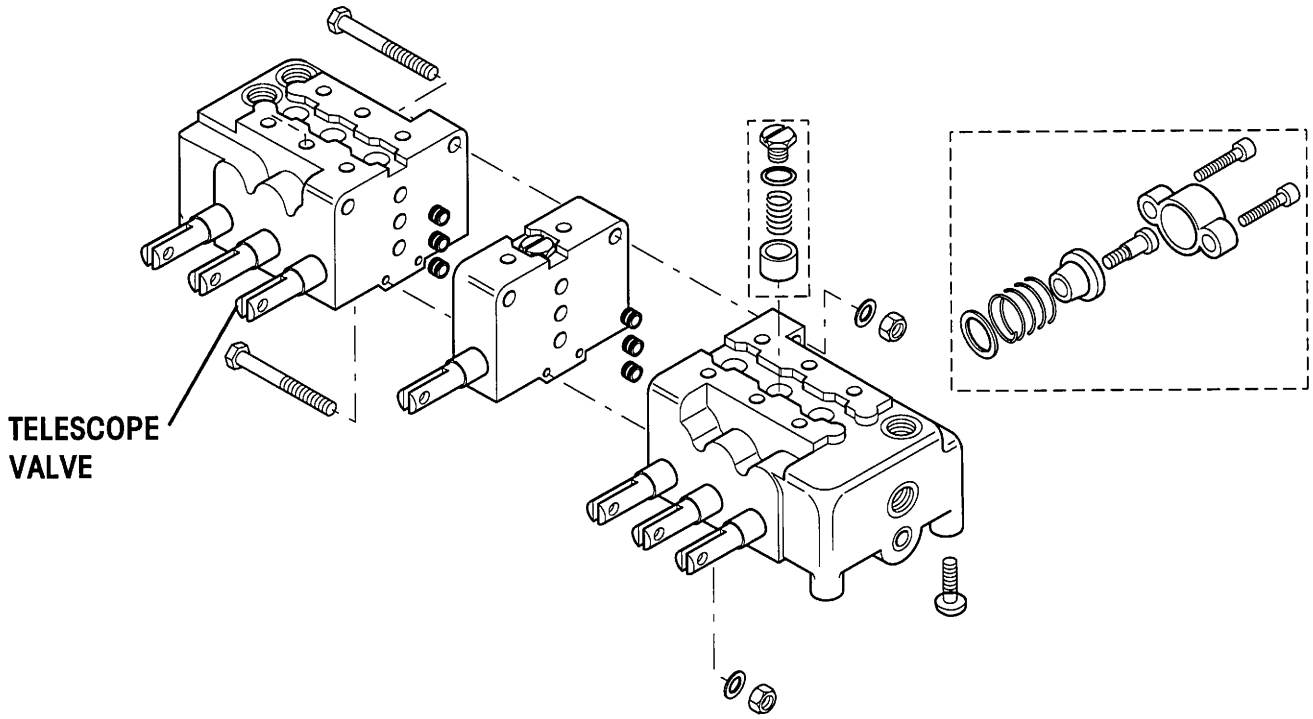
The platform directional control valve directs fluid flow to the telescope cylinder to power the extending or retracting the boom. This valve is a 3 position, 4 way manually operated valve.

Ground

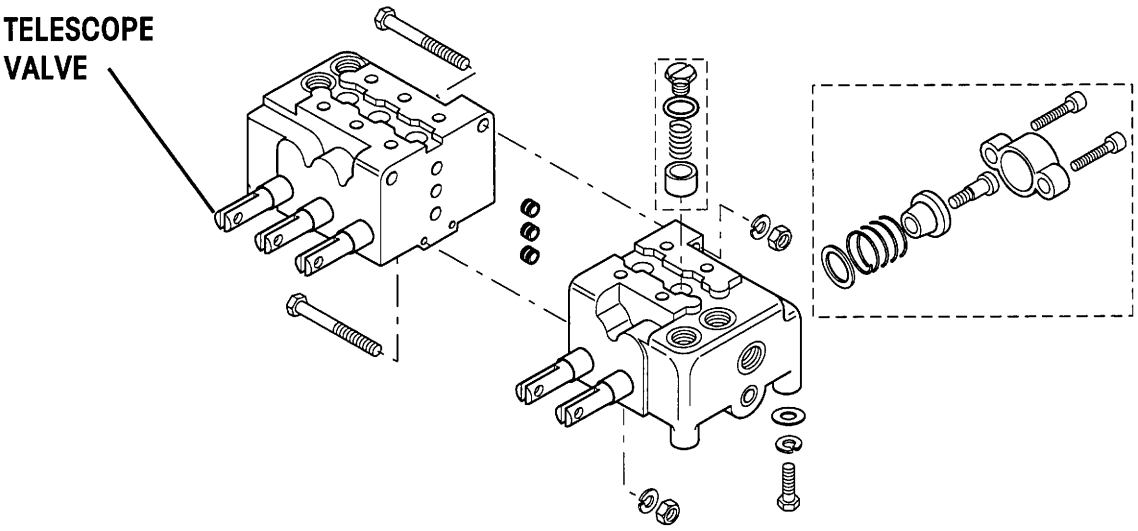
The ground directional control valve is located in the ground valve bank assembly with the lift and swing functions. This valve directs fluid flow to the telescope cylinder thereby extending or retracting the boom. This valve is a 3 position, 4 way manually operated valve.

PRESSURE REDUCING VALVE

The pressure reducing valve, located toward the base of the upper boom, is set at 2300 PSI (1-1/2 turns open from fully closed). Its function is to prevent overloading the telescope cylinder during extend.



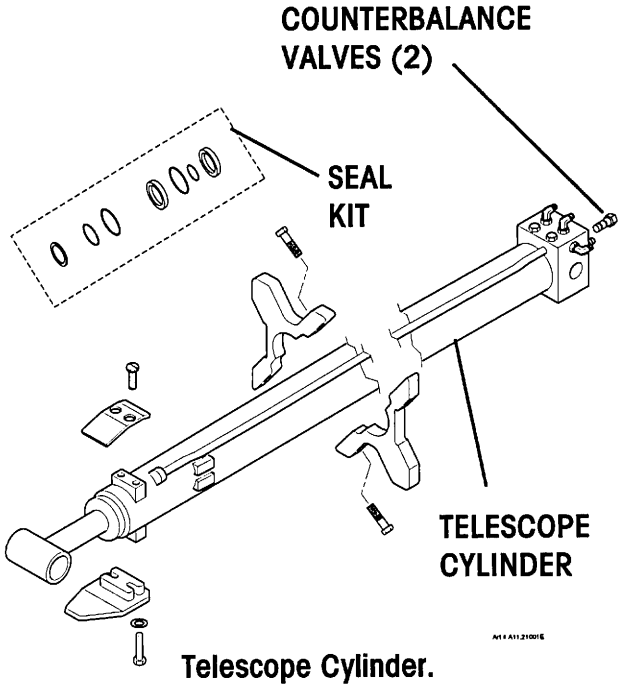
Platform Valve Bank Assembly.



Ground Valve Bank Assembly.

TELESCOPE CYLINDER

A double acting telescope cylinder performs the extension and retraction of the boom. This cylinder contains two counterbalance (holding) valves, which prevent unintended movement in either directionof the cylinder should a hose or fitting develop a leak. Also the counterbalance valves prevent overspeeding of the telescope function. When the boom is extended, fluid flows to the base end cylinder port and to the counterbalance valve, opening this valve and allowing fluid from the rod end of the cylinder to flow back to the reservoir.



Telescope Cylinder.

SUPERSTRUCTURE SWING SYSTEM

The superstructure swing system consists of a hydraulic directional control valve in the platform valve bank assembly, another directional control valve in the ground valve bank assembly, a double counterbalance valve and a motor driven worm gear swing reducer and bearing.

DIRECTIONAL CONTROL VALVE

Platform

The platform swing control valve directs fluid flow to the swing motor to power clockwise or counter-clockwise superstructure rotation. This valve is a 3 position, 4 way manually operated valve in a five (5) spool assembly.

Ground

The ground swing control valve is located in the valve bank assembly with the telescope and lift functions. This valve directs fluid flow to the swing motor to power clockwise or counter-clockwise superstructure rotation. This valve is a 3 position, 4 way manually operated valve.

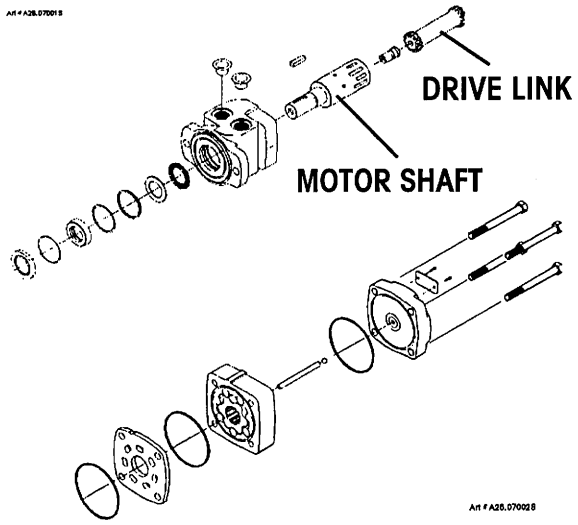
DOUBLE COUNTERBALANCE VALVE (SWING)

The double counterbalance valve acts as a hydraulic brake for the swing motor. It also prevents overrunning of the swing function. The valve maintains resistance to flow in one direction but permits free flow in the other.

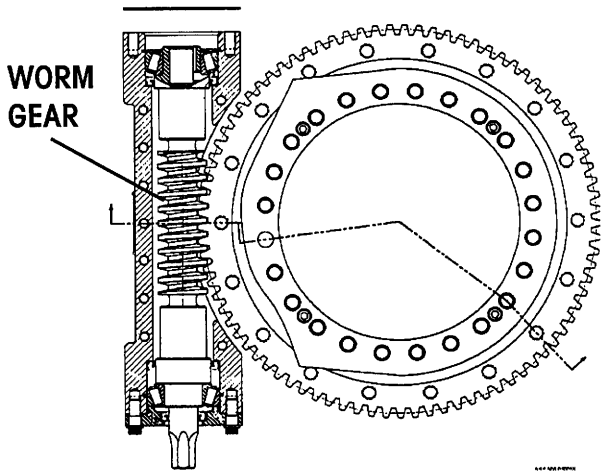
SWING DRIVE MOTOR/ REDUCER ASSEMBLY

The worm gear swing reducer reduces the hydraulic motor output speed while greatly increasing swing drive torque. This causes the superstructure to rotate at a slow controlled speed when ever fluid power is applied to the swing drive motor.

The worm gear drive in the swing reducer is self-locking and prevents unpowered movement of the swing function.



Swing Motor.



Worm Gear Swing Reducer.

PLATFORM ROTATE SYSTEM

The platform rotate system consists of a platform rotate control valve, a rotary actuator and a double relief/ check manifold. The platform rotate system can only be operated from the platform control console.

ROTATE CONTROL VALVE

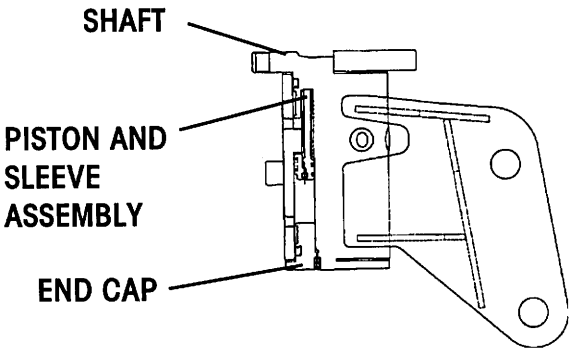
The platform rotate control valve is mounted on the platform control valve bank. This valve is a three position, four way valve which is manually operated. This control valve directs fluid flow to the rotate actuator via the manifold.

ROTARY ACTUATOR

The rotary actuator is a helical type. Hydraulic fluid enters the actuator from one of two ports depending on direction of rotation. Fluid under pressure will bear on the piston and force the piston sleeve up or down depending on rotation direction. The helical gear teeth engage with the shaft and causes rotation of the platform.

Rotary Actuator Maintenance

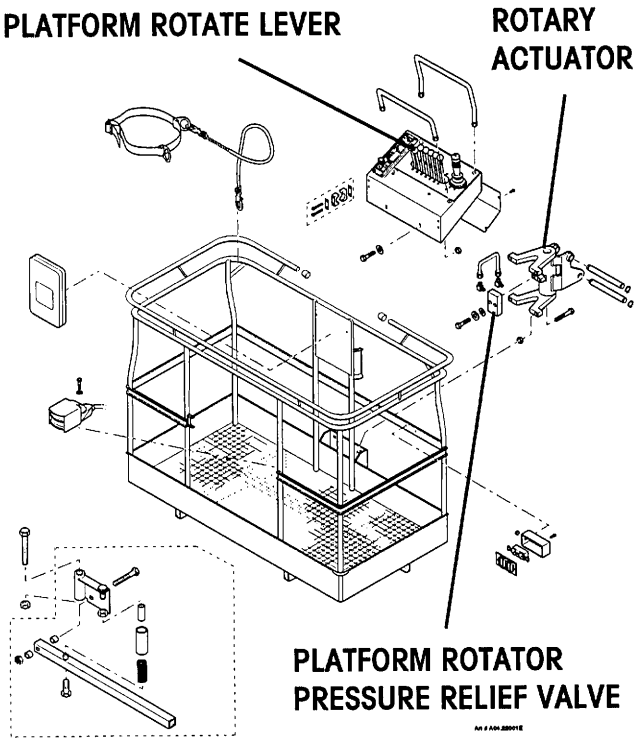
Check end cap torque every 800 hours or once a year.



Rotary Actuator.

PLATFORM ROTATOR PRESSURE RELIEF VALVE

The platform rotator pressure relief valve manifold contains a double pilot operated check valve which prevents involuntary movement of the rotary actuator. It is mounted to the rotary actuator. It also contains a cross port relief valve to prevent damage to the rotary actuator due to over-pressurization caused by the platform being swung, extended or driven into a stationary object. Each valve side should be set at 1200 psi. Call Simon Service for adjustment.



Components of Platform Rotate System.

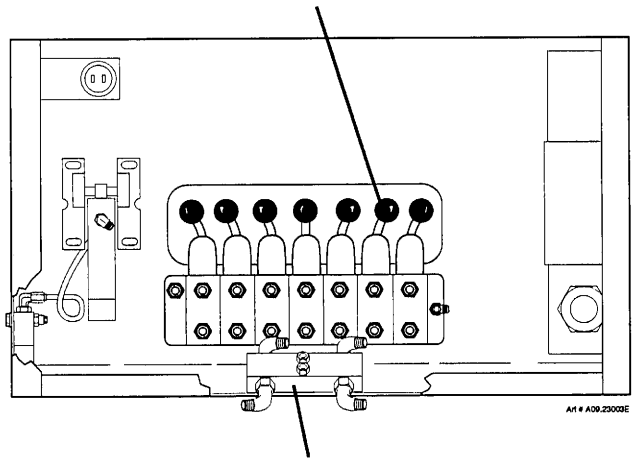
PLATFORM LEVELING SYSTEM

The platform level system consists of a level control valve, master leveling cylinder, slave leveling cylinder, double counterbalance (holding) valves, double pilot operated check valve and two relief valves.

The platform leveling system automatically keeps the platform level, using a master/ slave cylinder arrangement. As the boom is raised or lowered, fluid is transferred from the master cylinder to the slave cylinder in a closed loop, which keeps the platform level in any boom position. Platform level may be changed manually by adjusting the platform level control.

LEVEL CONTROL VALVE

The platform level control valve is mounted on the platform control (7 spool) valve bank.This valve is a manually operated three position, four way valve. This control valve directs fluid flow to the slave level cylinder to manually adjust the platform angle.



Platform Level Components.

DOUBLE PILOT OPERATED CHECK VALVES

The double pilot operated check valves provide a positive means of locking oil in the closed loop circuit

MASTER LEVEL CYLINDER

The master leveling cylinder is a double acting cylinder located between the upper post and the base boom. Whenever the upper boom is raised or lowered, the master cylinder rod is forced to extend or retract. The fluid displaced from the master level cylinder is in turn pumped up the boom to the slave level cylinder. This forces the slave level cylinder to move the same distance as the master level cylinder, automatically changing platform angle to match the upper boom angle.

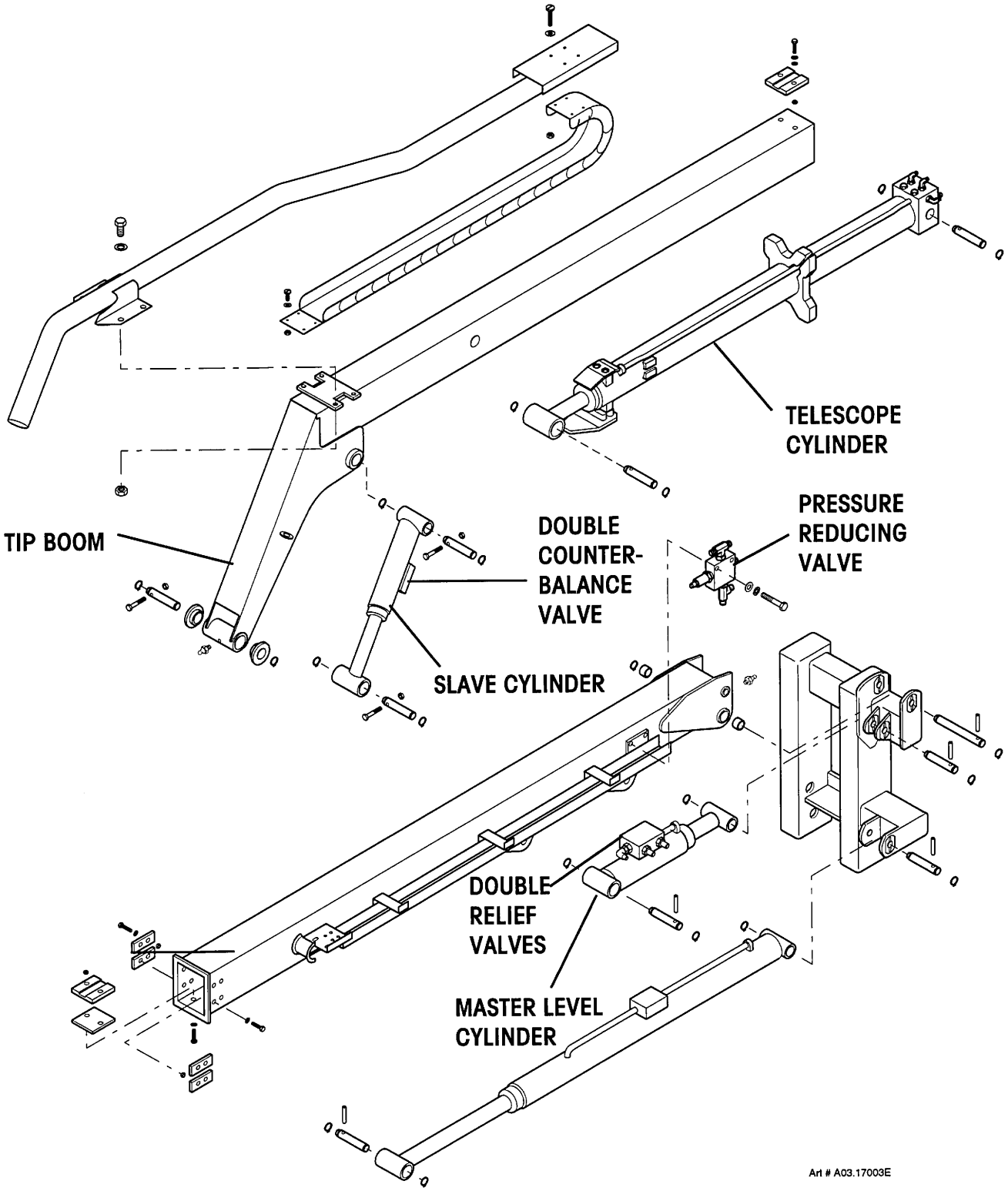
RELIEF VALVES

The relief valves are factory set at 3000 PSI (207 Bar/ 211 Kg/cm^2). High pressure can occur whenever the platform has been manually levelled, and the slave level cylinder "bottoms out" before the master level cylinder reaches the end of its stroke (either extending or retracting).

SLAVE LEVEL CYLINDER

The slave leveling cylinder is a double acting cylinder connected between the tip boom and the platform. This cylinder controls the angle of the platform relative to the tip boom.

The slave leveling cylinder contains two counterbalance valves. The counterbalance valves prevent unintended unpowered platform movement and overspeeding of the leveling function.



Platform Level Components.

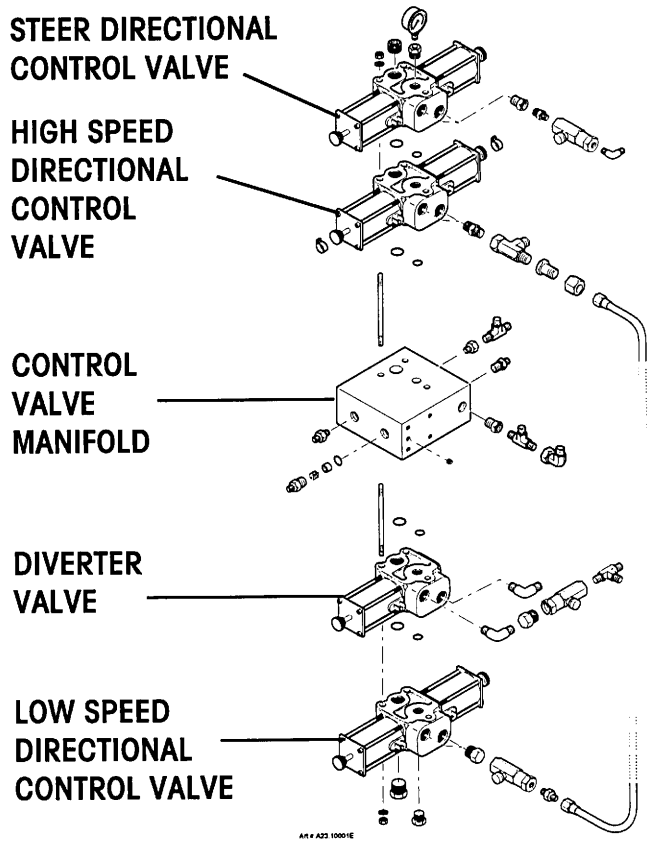
STEER SYSTEM

The steer system consists of the steer cylinder, a valve section in the drive/ steer manifold assembly, and control switches located at the platform and ground (option) stations.

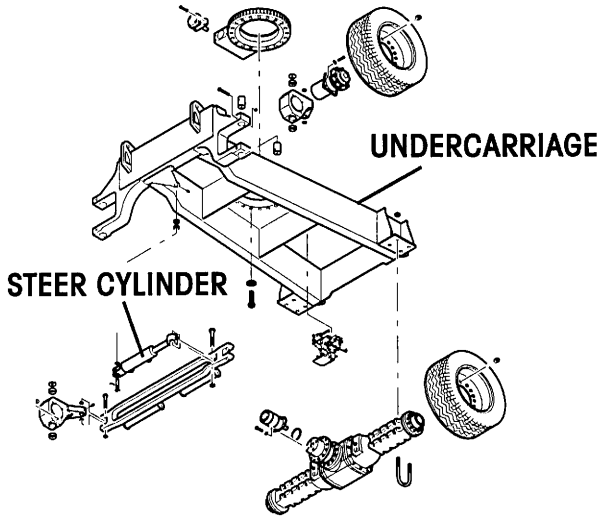
DRIVE/ STEER MANIFOLD ASSEMBLY

The steer system is controlled by the top valve on the drive/ steer manifold assembly. This valve is activated from the platform by a rocker switch on top of the drive control lever. When the switch is pressed to steer "LEFT" or "RIGHT", the steer valve solenoid energizes and the spool shifts to allow fluid flow to power the steer cylinder rod in either direction

The steer directional control valve is activated from the ground by a toggle switch located on the optional pendant control on the superstructure. When the toggle switch is moved to steer "LEFT" or "RIGHT", solenoid energizes and the valve spool shifts to power the steer cylinder rod in either direction.



Drive/ Steer Manifold Assembly.



Steer System Components.

STEER CYLINDER

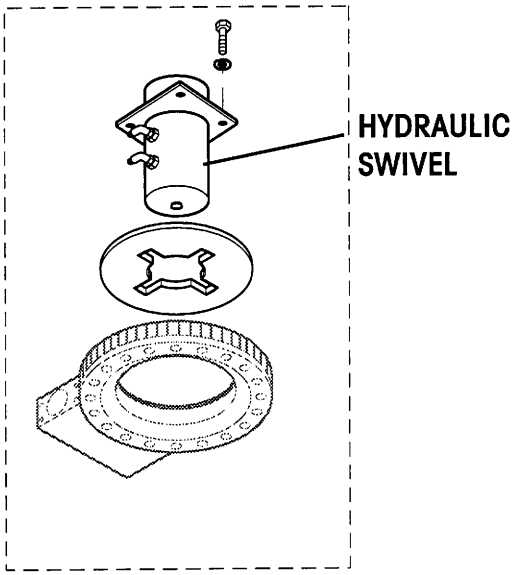
The steering system is poweredby a double acting hydraulic steer cylinder. The base end of the steer cylinder is attached to the chassis frame, while the rod end is connected to the tie rod.

STEER SYSTEM MAINTENANCE

Check all pins in steering system for excessive play, due to wear. All pins must be securely locked in place with the retainers provided. Lubricate pin joints as necessary. Check cylinder and hoses for hydraulic fluid leakage and security.

HYDRAULIC SWIVEL (OPTIONAL)

The optional hydraulic swivel joint allows hydraulic fluid for drive and steer to pass between the superstruture and the chassis. The swivel allows for 360° of continuous superstructure rotation in either direction.



Hydraulic Swivel Option.

SOLENOID VALVE CHECKS

To check solenoid operation:

1. Disconnect wires to solenoid.
2. Test resistance of coil. If resistance of coil is greater than 10 ohms, replace coil.

To check valve spool operation:

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

To clean valve:

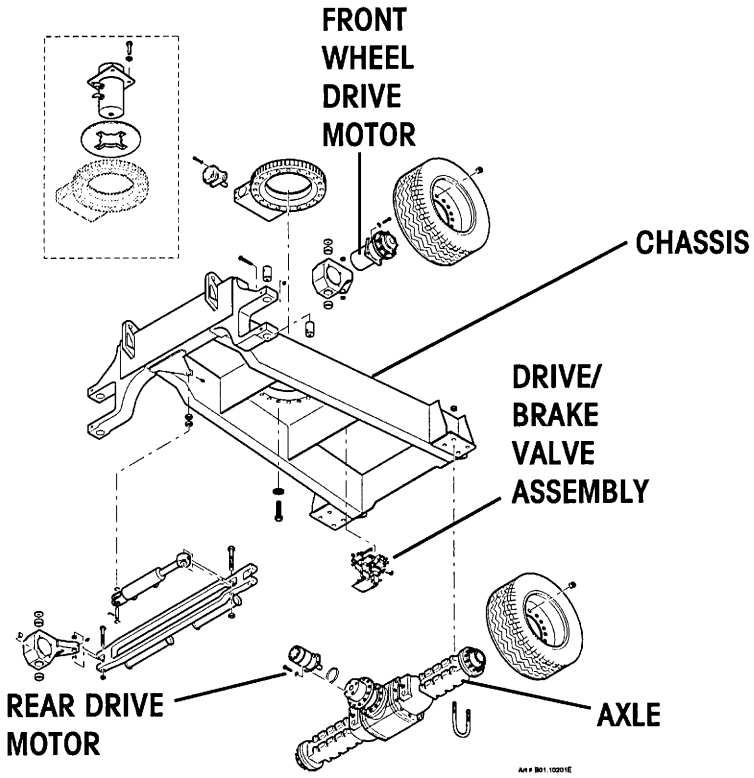
- Rinse in clean solvent and blow dry with air.

SECTION 3:
DRIVE SYSTEM

Table of Contents, Section 3

Drive System Components 3-3
Drive Motors 3-3
Front Wheel Motor 3-3
Hydraulic Drive Motor 3-3
Rear Axle Assembly 3-3
Rear Axle Drive Motor 3-4
Rear Axle Drive Motor Replacement 3-4
Rear Axle Assembly Replacement 3-5
Rear Axle Brake Adjustment 3-5
Hydraulic Manifold Valve Assembly 3-7
Motion Control Valve Assembly 3-7
Motion Control Valve 3-7
Flow Control Valve 3-7
Shuttle Valve 3-8
Pressure Reducing Valve 3-8
Cross Port Relief Manifold 3-8
Solenoid Valve 3-8
Drive Enable Valve 3-8
Platform Drive Control Handle 3-8

DRIVE SYSTEM COMPONENTS



Drive System Components.

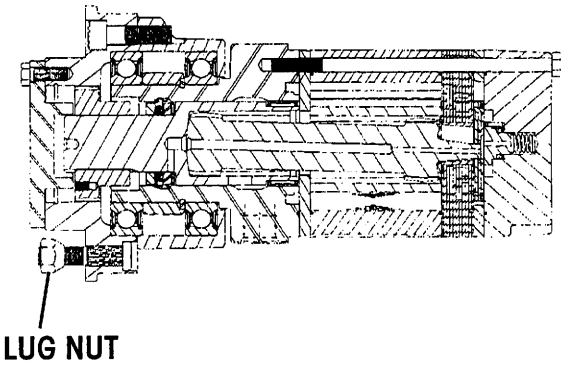
The AT45 drive circuit consists of a wheel drive motor at each front wheel and a hydraulic drive motor on the rear axle, a motion control valve assembly, a hydraulic manifold valve assembly, an optional pendant control, a drive enable valve and a platform drive control valve.

DRIVE MOTORS

There are two types of drive motors; one roller stator drive motor with integrated hub is mounted to each front wheel and a roller stator motor is mounted to the rear axle.

FRONT WHEEL MOTOR

Two hydraulic motors drive the front wheels. See "Mechanical Components" section in this manual for motor replacement.



Front Wheel Motor.

HYDRAULIC DRIVE MOTOR

A third hydraulic motor is mounted on the rear axle assembly and drives the rear wheels. A seel kit is available (see Illustrated Parts Catalog). See "Mechanical Components" section in this manual for motor replacement.

REAR AXLE DRIVE MOTOR

Check for any leaks. Check for brakes that are dragging by looking for over heating of the axle or slow down of drive speed. Refer tobrake adjustment in this section.

REAR AXLE DRIVE MOTOR REPLACEMENT

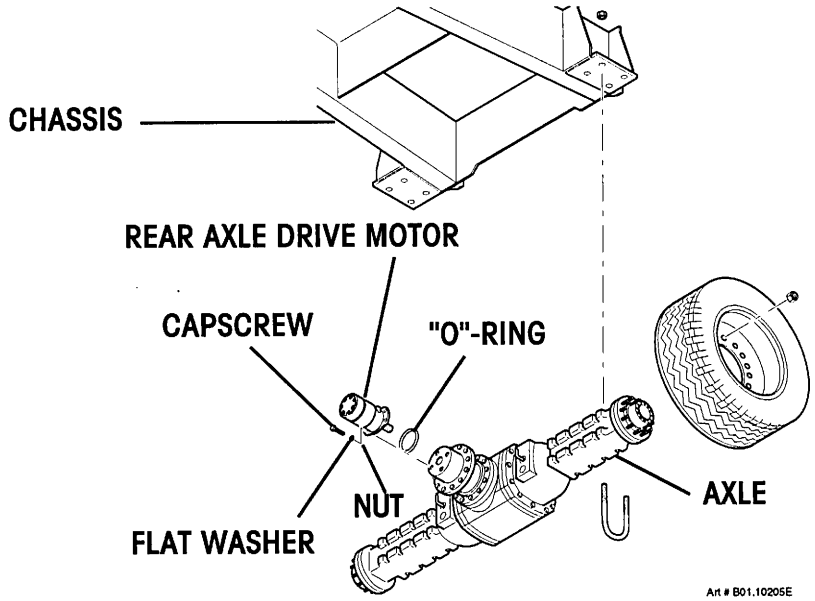
1. Block the front wheels and raise the rear of the machine.
2. Disconnect the hoses to the motor and mark hoses so they may be replaced in the proper ports.
3. Remove the capscrews, flat washers and nuts holding the motor to the axle.
4. Remove the rear axle drive motor.
5. Remove the "O"-ring.
6. Install a new "O"-ring.
7. Install the rear axle drive motor.

REAR AXLE ASSEMBLY REPLACEMENT

To remove the rear axle assembly:

⚠ CAUTION

ALWAYS BLOCK THE WHEELS before you raise the machine.



Rear Axle Drive Motor.

1. Block the front wheels.

2. Raise the rear of the machine and support the undercarriage structure.

3. Remove the motor from rear drive axle and disconnect the line connected to the axle disengage mechanism.

4. Remove both rear wheel and tire assemblies.

5. Support both axle hub ends with a crane and chains or floor jacks.

6. Remove the "U"- bolts and nuts from the undercarriage. This releases the axle assembly. Carefully lower the axle to the ground.

⚠ CAUTION

DO NOT let the axle drop. You may damage the axle.

To install the rear axle assembly:

1. Support both axle hub ends with a crane and chains.

2. Position the rear axle assembly to align with the undercarriage mounting holes.

3. Install "U" - bolts and nuts.

4. Remove the support chains.

5. Install rear wheel and tire assemblies. Fasten lug nuts and tighten to proper torque (see Machine Specifications).

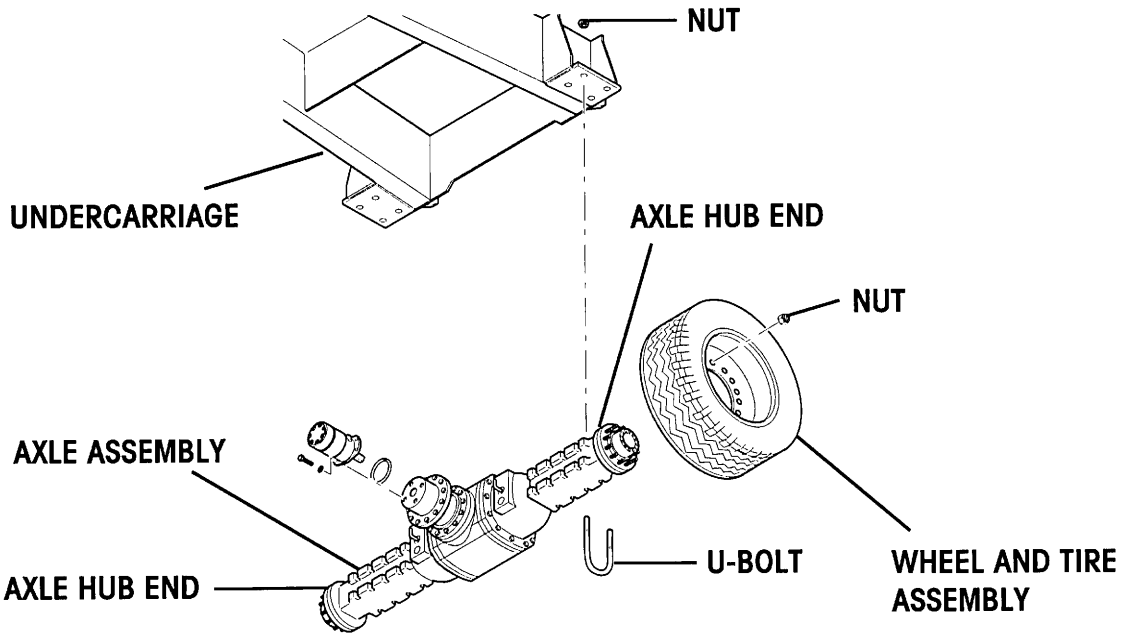
6. Install the motor to rear drive axle and connect the line connected to the axle disengage mechanism.

7. Lower the machine and remove the blocks.

REAR AXLE BRAKE ADJUSTMENT

1. Remove the socket head center plug on the brake cover.

2. Remove the hydraulic line and fitting just below the actuator shaft. Install bolt where the hydraulic line fitting was removed and screw to maximum depth to disengage the failsafe brake.



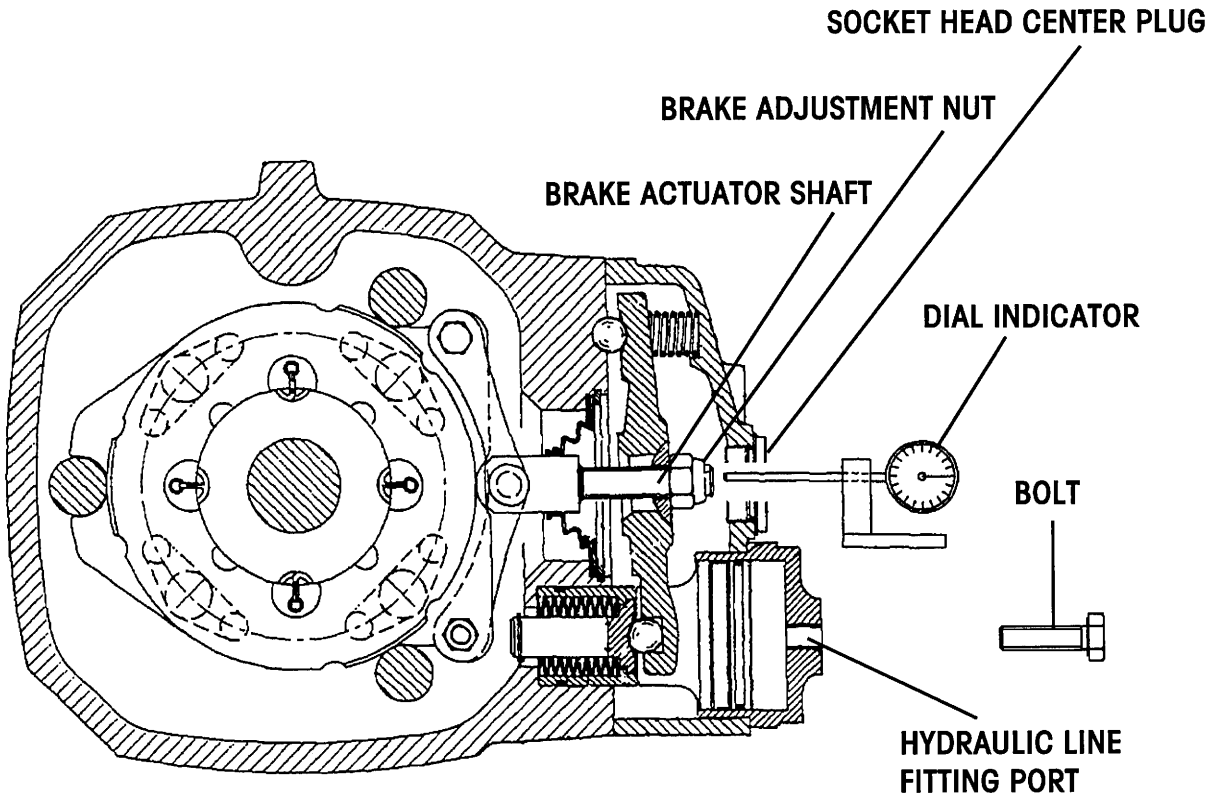
Rear Axle Assembly.

3. Install a dial indicator to the end of the actuator shaft. Indicator shaft must be in the same plane as the brake actuator shaft. Adjust the dial setting to "0".

4. Back out the bolt (M12 x 1) until the brake engages (bolt will turn free).

5. Read gauge setting. Proper setting range is 0.059 - 0.079 inch (1.5 - 2.0 mm).

   If the indicator setting is out of this range, the indicator should be removed so the brake adjustment nut can be adjusted for proper shaft travel.



Spring Applied Hydraulic Release Brake.

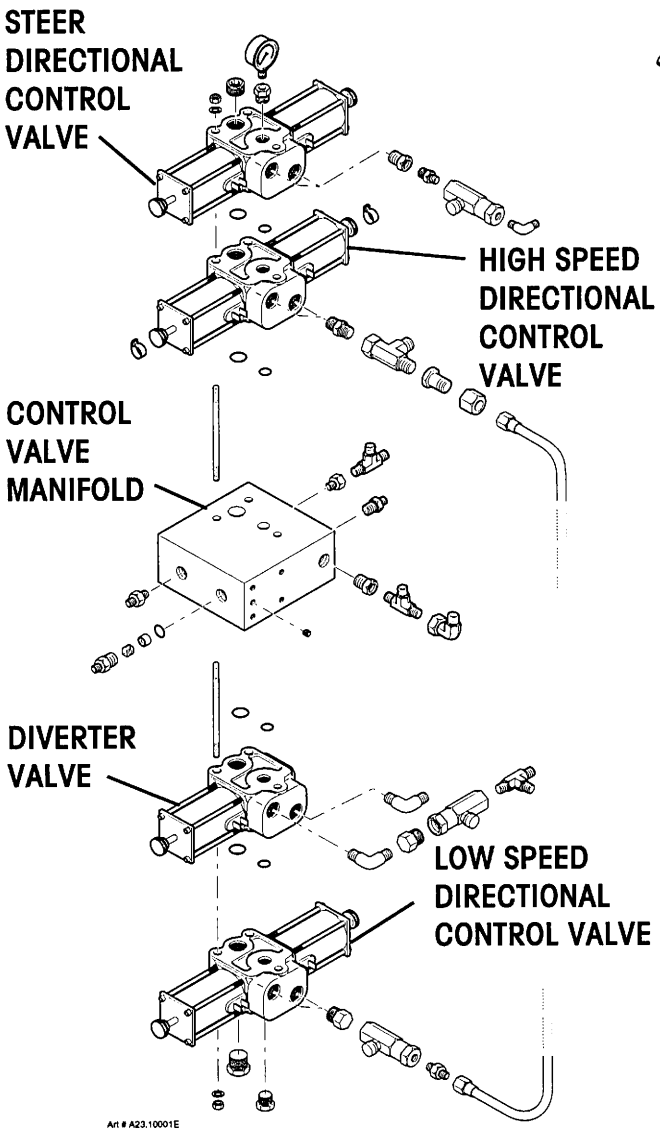
REAR AXLE ASSEMBLY

In the axle, check the gear lube monthly and change the gear lube yearly.

Check for any leaks. Check for proper operation. Call Simon Service before checking for any bearing or gear damage. Replace rear axle assembly if components can't be replaced.

HYDRAULIC MANIFOLD VALVE ASSEMBLY

The drive system is controlled by valves on the hydraulic manifold valve assembly mounted on superstructure, to right of controls. These valves are activated by the drive control lever on the platform control console or a toggle switch on the optional pendant control at the ground station. When the drive control lever or the toggle switch is pushed to "FORWARD" or "REVERSE", the valve spools shift to allow hydraulic fluid flow to the drive motors.



Manifold Assembly, Directional Control Valve.

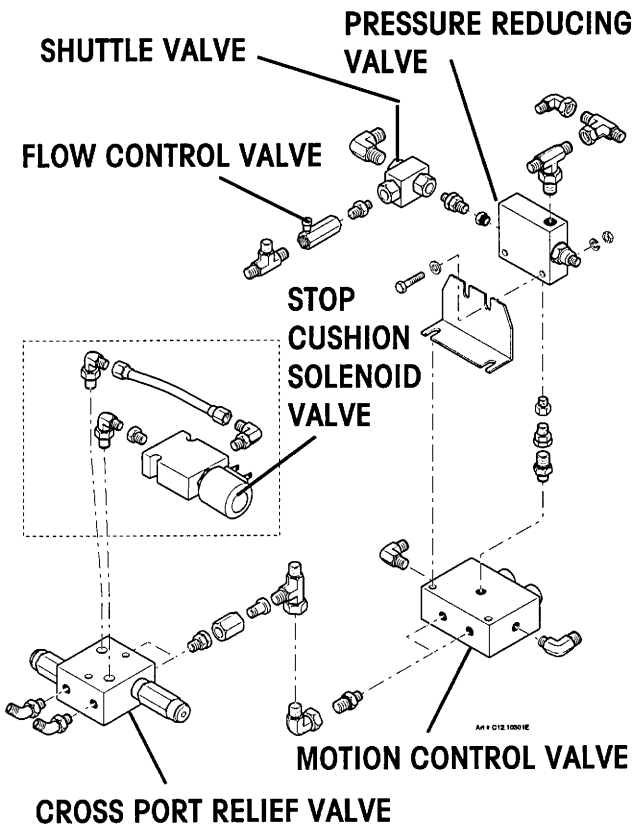
The low speed valve and the high speed valve are both 4-way, three position solenoid operated valves.

DRIVE/ BRAKE VALVE ASSEMBLY

Thedrive/ brake valve assembly is mounted on the underside of the undercarriage, near the rear axle. It consists of the motion control valve, flow control valve, shuttle valve, pressure reducing valve, a cross port relief manifold and stop cushion solenoid valve.

MOTION CONTROL VALVE

This valve has a forward and a reverse cartridge that produces a back pressure in the drive system so that no uncontrolled movement occurs. This valve is



Drive/ Brake Valve Assembly.

factory preset and cannot be adjusted. It also has a small shuttle valve to direct fluid to the brake circuitry.

FLOW CONTROL VALVE

The flow control valve meters the hydraulic fluid flow released from the spring applied brake assemblies for a smooth braking action. The correct valve setting is one (1) turn from the closed position.

SHUTTLE VALVE

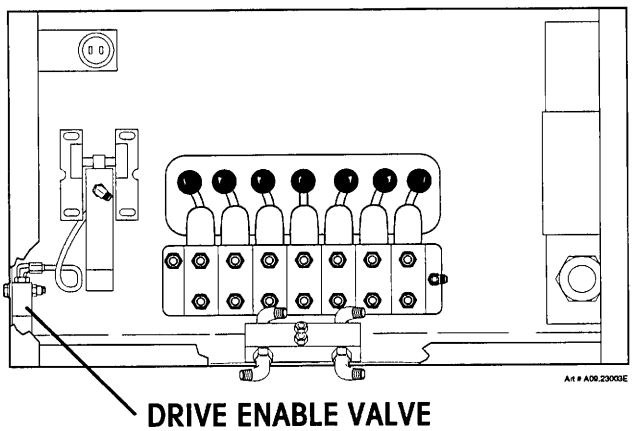
The shuttle valve directs hydraulic fluid flow from either the drive circuit or the manual brake release to the brake pressure ports.

PRESSURE REDUCING VALVE

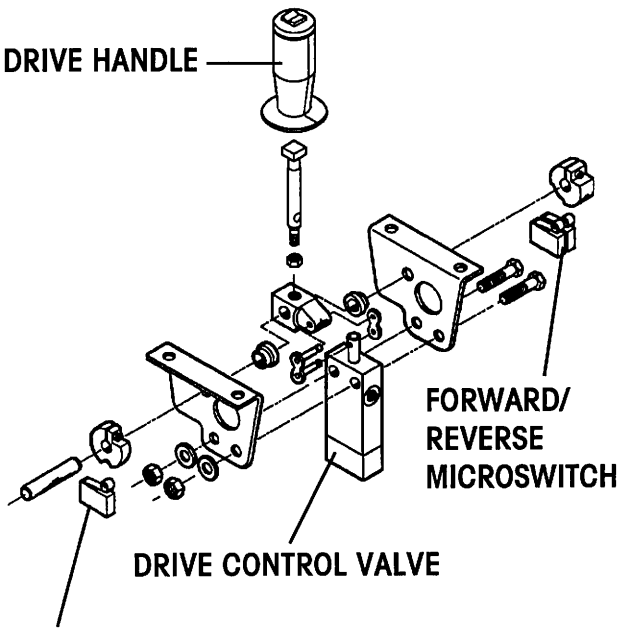
Reduces pressure from a maximum drive pressure of 3000 psi (207 Bar/ 211 Kg/cm^2) to 435 psi (30 Bar/ 30.6 Kg/cm^2) for the brake assemblies.

CROSS PORT RELIEF MANIFOLD

The cross port relief manifold relieves pressure to the wheel drive motors. Valves are set at 3000 psi (207 Bar/ 211 Kg/cm^2).



Drive Enable Valve.



Platform Drive Control Valve and Handle.

STOP CUSHION SOLENOID VALVE

This solenoid valve controls an orifice to allow for a gradual stop before the brakes are applied.

DRIVE ENABLE VALVE

The drive enable valve is a two-way valve which when open allows fluid to go to the drive handle to control the pump flow output. This valve is normally closed when operating boom functions.

PLATFORM DRIVE CONTROL HANDLE

The platform drive control handle is a proportional control valve which controls the displacement of the main hydraulic pump, and therefore, proportionally controls drive speed.

SECTION 4:
ELECTRICAL SYSTEM

Table of Contents, Section 4

Electrical System 4-3
- Battery 4-3
  - Battery Maintenance (In Storage) 4-3
  - Battery Maintenance (In Use) 4-3
  - Battery Troubleshooting 4-4
  - Battery Replacement 4-4
- Electrical Theory of Operation 4-5
  - Ground Ignition Circuit 4-5
  - Platform Ignition Circuit 4-5
  - Pump Circuit 4-5
  - Drive Control Handle Circuit 4-5
- Platform Control Box 4-6
  - Emergency Stop Button 4-6
  - Ignition Switch 4-6
  - Toggle Switch 4-6
  - Push Button 4-6
  - Light Emitting Diode 4-7
- Foot Pedal Switch 4-7
- Ground Control Box 4-8
  - Circuit Breaker 4-8
  - Toggle Switch 4-8
  - Push Button 4-8
  - Key Switch 4-8
  - Volt Meter 4-8
  - Hour Meter 4-8
  - Engine Oil Pressure Gauge 4-9
- Pendant Control 4-9
  - Toggle Switch 4-9
- Movement Alarm 4-9
- Tilt Alarm 4-9
  - Tilt Alarm Test 4-10
  - Tilt Alarm Sensor Adjustment 4-10
- Warning Horn 4-10
- Relays 4-10
- Limit Switch 4-10
- Electrical and Continuity Checks 4-11

ELECTRICAL SYSTEM

Following is a description of the major components of the AT45 electrical system.

BATTERY

One 12 volt battery supplies the electrical current required to start the engine and supply emergency power. The battery is located in the engine side compartment of the superstructure.

BATTERY MAINTENANCE (IN STORAGE)

Follow these procedures for maintenance of stored batteries:

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

"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 mounting frame for signs of damage or corrosion.

Check battery terminals for:

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

Check battery electrolyte level. Replenish the electrolyte, if necessary.

⚠WARNING

NEVER ADD ADDITIONAL ACID TO THE BATTERY.

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). Do not use a hose to add water to battery.

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, 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 the 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 TROUBLESHOOTING

Once a month:

- Check all cells with a hydrometer for variation in specific gravity. A fully charged battery should indicate between 1.25 and 1.28 specific gravity. A variation of 0.03 points or more between cells is an indication that the battery should be replaced. Mark the low cells.

BATTERY REPLACEMENT

To remove the battery, follow these procedures:

⚠WARNING

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

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

⚠ CAUTION

Always disconnect the negative battery cable first.

Remove the nut, washer, rod and hold down bracket holding the battery to the superstructure.

Carefully lift the battery from the superstructure. Set aside and dispose of properly.

To install the battery, place the battery in its proper location. Position the battery hold down bracket and install rod, washer and nut. Connect the battery cables.

⚠ CAUTION

Always connect the positive battery cable first.

ELECTRICAL THEORY OF OPERATION

GROUND IGNITION CIRCUIT

With the 20 amp circuit breaker, the ground emergency stop button and platform relay CR3B closed, and the keyswitch to GROUND, power goes to CR3A, the ground ignition relay coil and closes normally open CR3A, and opens normally closed CR3B.

When the ground start pushbutton is pressed, power goes to the engine start coil and closes the normally open CR1, as well as to the fuel solenoid, and energizes the starter motor relay coil and closes the normally open SR1. The starter motor engages and turns over the engine.

If the oil pressure switch is open, the engine start relay CR1 remains open preventing the engine starter motor relay SR1from closing; consequently the engine will not start.

PLATFORM IGNITION CIRCUIT

With the 20 amp circuit breaker and the ground emergency stop button closed, and the keyswitch to PLATFORM, power goes to the normally closed foot pedal switch.

With the platform ignition switch closed, power is applied to solenoid CR30, enaging platform power and with the switch pressed to start, power energizes relay CR1 coil and closes normally open CR1, so that power passes through coil SR1 closing the normally open SR1 relay to power the starter motor.

If the oil pressure switch is open, the engine start relay CR1 remains open preventing the engine starter motor relay SR1from closing; consequently the engine will not start.

Also, if the platform foot switch is closed, the engine will not start.

PUMP CIRCUIT

For ground operation, with the ground pump switch to MAIN, power goes to the pump stroke valve and dump valve, thus engaging the hydraulic pump.

With the ground pump switch to EMERGENCY, the dump valve is closed, and power energizes SR2, closing the normally open emergency pump relay, and energizing the emergency pump motor.

For platform operation, with the platform emergency stop button closed, power goes to the pump stroke valve and the dump valve, thus engaging the hydraulic pump, if platform foot switch is closed.

With the platform emergency pump button pressed, power goes to the emergency pump relay coil SR2 and closes the normally open relay to provide power for the emergency pump.

DRIVE CONTROL HANDLE CIRCUIT

With the ground selector switch positioned for platform operation, forward drive is controled by normally open relay CRF and reverse drive is controlled by normally open relay CRR.

The boom limit switch, when open, inhibits high speed.

Steer right is controlled by relay CRSR which energizes the right steer coil and shifts steer right valve, and steer left is controlled by relay CRSL which energizes the left steer coil and shifts the steer left valve.

PLATFORM CONTROL BOX

EMERGENCY STOP BUTTON

The emergency stop button acts as a power "ON/ OFF" switch. Both switches (one on the ground control box and one at the platform control panel) must be "ON" to operate the machine. When either of the emergency stop buttons is depressed, all functions stop immediately, including the engine, and the wheel brakes are automatically applied.

When troubleshooting the electrical circuit, check first if either emergency stop button is depressed. If there is a problem with the emergency stop button, check the wiring to the button. If the wiring is correct, replace the emergency stop button.

IGNITION SWITCH

The ignition switch ("START/ ON/ OFF") on the platform control panel acts as a power "ON/ OFF" switch. The switch must be "ON" to operate the machine from the platform. When the ignition switch is flipped to "OFF", all functions stop immediately and the wheel brakes are automatically applied.

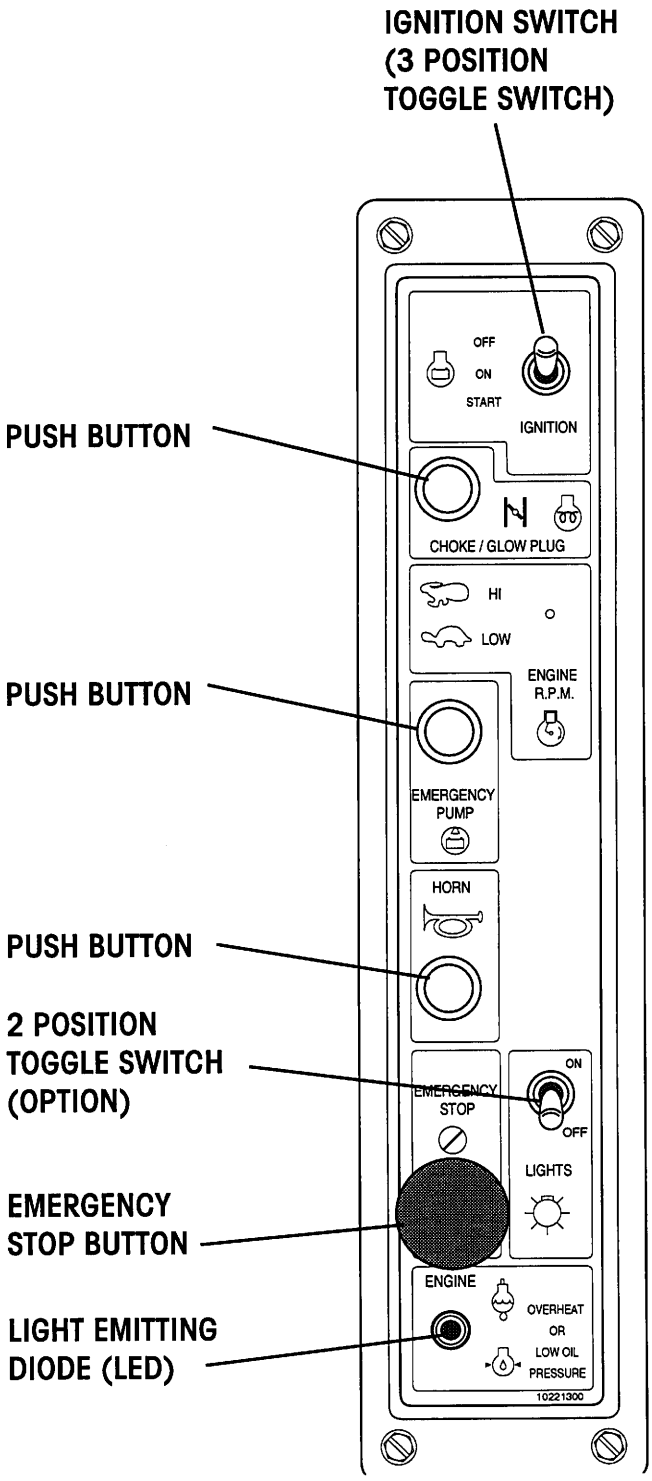
If there is a problem with the ignition switch, check the wiring to the switch. If the wiring is correct, replace the switch.

TOGGLE SWITCH

There can be one or more two-position toggle switches on the platform control box. If there is a problem with a toggle switch, check the wiring. If the wiring is correct, replace the toggle switch.

PUSH BUTTON

There are push buttons on the platform control box. If there is a problem with a push button, check the wiring. If the wiring is correct, replace the push button.



Platform Control Box.

LIGHT EMITTING DIODE

There is one light emitting diode (LED) on the platform control box. If there is a problem with the diode, check the wiring. If the wiring is correct, replace the diode.

FOOT PEDAL SWITCH

The foot pedal is located on the platform floor. The foot pedal is a double pole, double throw electrical switch which must be fully depressed before any machine function can be operated from the platform. When the foot pedal switch is released, power to the dump valve solenoid and drive valve solenoids is terminated, and all machine functions stop. The engine continues to run.

When troubleshooting the electrical and hydraulic circuits to the platform, ensure that the foot pedal switch is depressed. Check the wiring to the foot pedal switch. If the wiring is correct, but there is a problem with the foot pedal circuit, replace the switch.

GROUND CONTROL BOX

CIRCUIT BREAKER

There is one 20 amp circuit breaker mounted on the cover of the ground control box.

Check for a tripped breaker and re-set by pushing in the button. If the breaker trips again, the cause of the high current draw must be corrected prior to further operation.

TOGGLE SWITCH

There are two three-position toggle switches (one optional) on the ground control box. If there is a problem with a toggle switch, check the wiring. If the wiring is correct, replace the toggle switch.

PUSH BUTTON

There are two push buttons on the ground control box. If there is a problem with a push button, check the wiring. If the wiring is correct, replace the push button.

KEY SWITCH

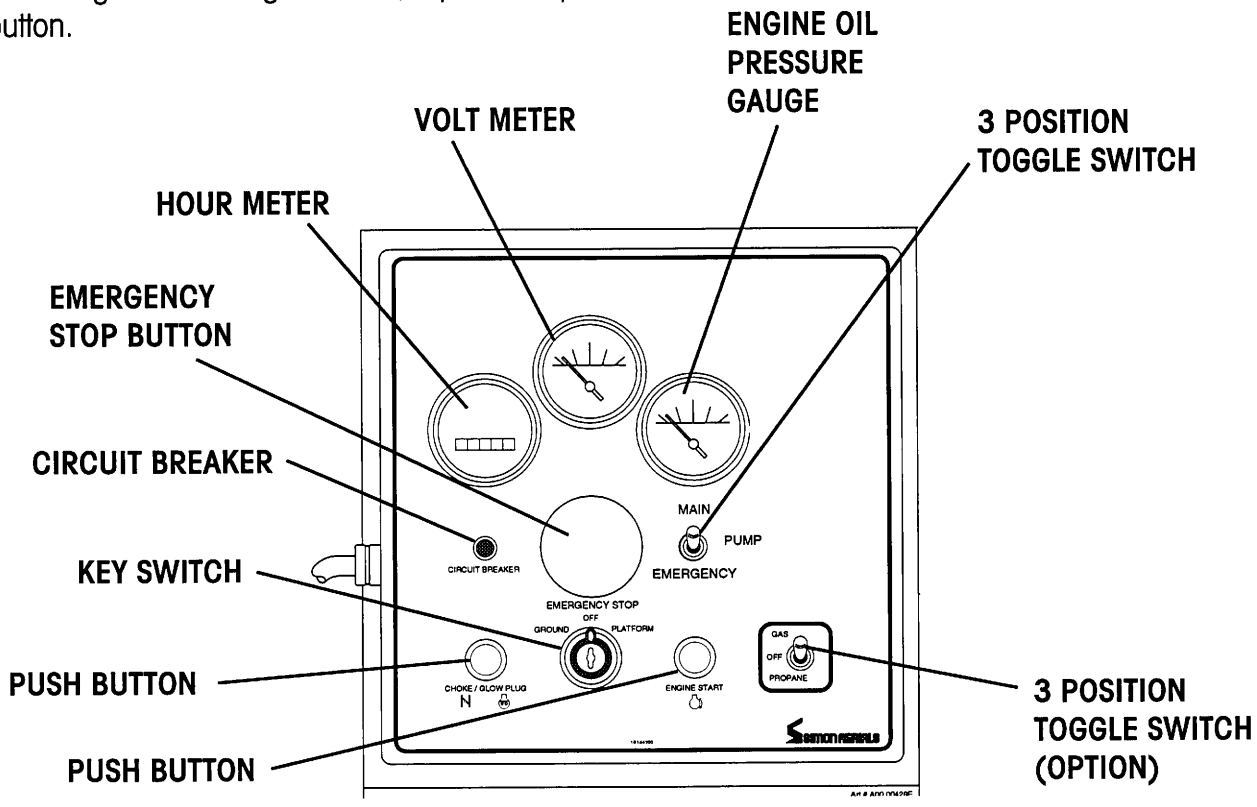
There is a three-position key switch (GROUND/ OFF/ PLATFORM) on the ground control box that acts as a power "ON-OFF" switch. The switch must be in the "GROUND" or "PLATFORM" position to operate the machine. When troubleshooting the electrical circuit, make sure the key switch is in the correct position. If there is a problem with the key switch, check the wiring. If the wiring is correct, replace the key switch.

VOLT METER

The volt meter indicates the current battery charge. If there is a problem with the volt meter, check the wiring. If the wiring is correct, replace the meter.

HOUR METER

The hour meter indicates total elapsed time the machine has been operated in hours and tenths. If there is a problem with the hour meter, check the wiring. If the wiring is correct, replace the meter.



Ground Control Box.

ENGINE OIL PRESSURE GAUGE

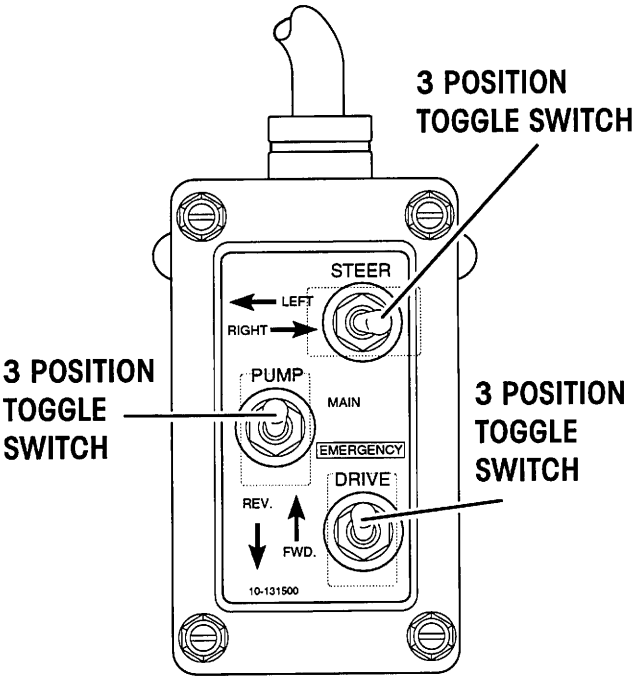
The engine oil pressure gauge indicates the engine oil pressure. If there is a problem with the engine oil pressure gauge, check the wiring. If the wiring is correct, replace the gauge.

PENDANT CONTROL (OPTION)

The optional pendant control is located on the superstructure, behind the control side door.

TOGGLE SWITCH

There are three three-position toggle switches. If there is a problem with a toggle switch, check the wiring. If the wiring is correct, replace the toggle switch.



Pendant Control.

MOVEMENT ALARM

The movement alarm is located on top of the ground control bracket. It is activated as soon as the drive controller on the platform control console or the forward/ reverse toggle switch on the pendant control is moved off the center "Neutral" position.

⚠WARNING

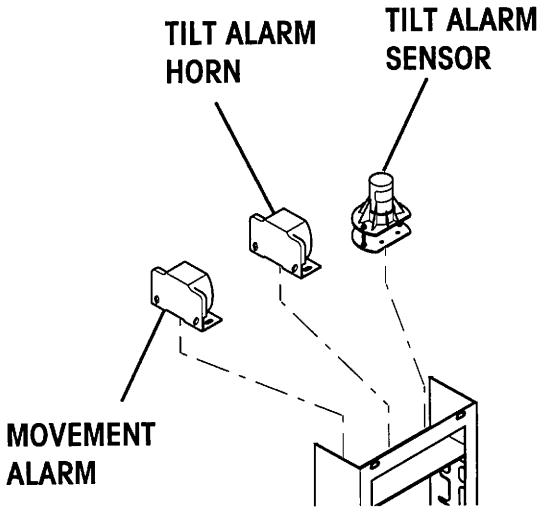
THE MOVEMENT ALARM IS PROVIDED FOR YOUR PROTECTION, AND THE PROTECTION OF PERSONS WORKING IN THE IMMEDIATE AREA.

DISABLING THIS IMPORTANT SAFETY DEVICE MAY RESULT IN DEATH OR SERIOUS INJURY.

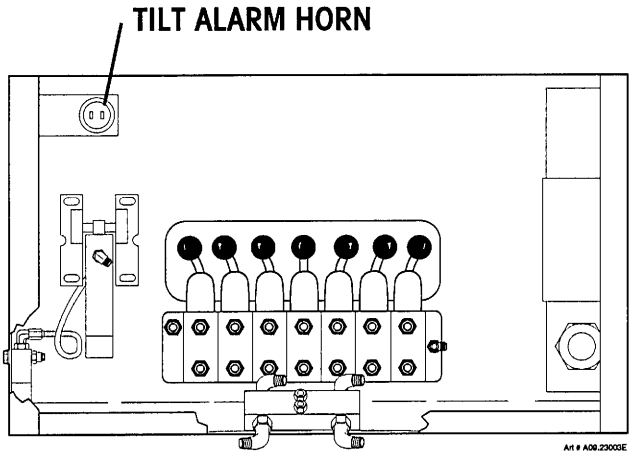
If the movement alarm does not function, check the wiring. If wiring is correct, replace the alarm.

TILT ALARM

The tilt alarm gives an audible warning at the ground and at the platform when the machine is five degrees or more out of level. The alarm can be tested by manually tipping the alarm sensor (see "Tilt Alarm Test" procedure). If the tilt alarm does not function, check the horn, then check the output relay in the ground control box. Check the wiring. If wiring is correct, replace the alarm sensor.



Ground Station Alarm Components.



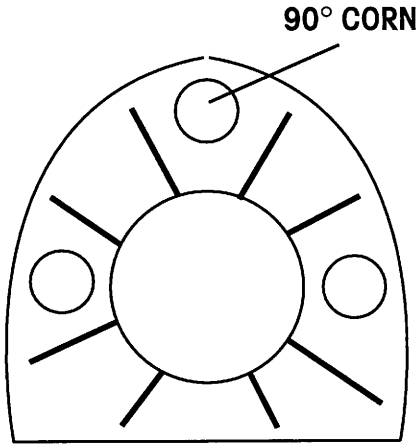
Platform Tilt Alarm Horn.

TILT ALARM TEST

Check the tilt alarm daily with the boom extended. Individually push down and hold for 10 seconds each of the three fastened corners of the tilt alarm sensor. There should be enough travel to cause the alarm to sound as each corner is pressed. If not, the flange nuts have been tightened too far. Loosen the nut on the 90° corner and perform the adjustment procedure. This "Push-to-Test" feature enables the tilt alarm to be tested without losing its adjustment.

TILT ALARM SENSOR ADJUSTMENT

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



Tilt Alarm 90° Corner.

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

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

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

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

WARNING HORN (OPTIONAL)

The horn gives an audible warning. If the horn does not function, check the wiring. If wiring is correct, replace the horn.

RELAYS

There are a number of relays associated with machine functions that are located in the ground control box (refer to Electrical Schematic at the back of this manual). If faulty, replace.

LIMIT SWITCH

There is one limit switch located on the unit as a safety device for the boom hoist function.

Unless the boom hoist limit switch is closed as shown on the unit electrical schematic at the end of this manual, the unit will only be able to travel at creep speed. If faulty, replace.

ELECTRICAL AND CONTINUITY CHECKS

To check continuity of a toggle switch:

1. Connect one probe of ohm meter to connection on toggle switch and other probe on other connection.

2. When toggle is open, there should be no reading, and when closed there should be a low reading.

To check continuity of key switch:

1. Connect one probe to common of key switch and the other probe to normally open terminal.

2. When switch is flipped, there should be a low resistance.

To check continuity of emergency stop button:

1. Connect one probe of ohm meter to connection on button and other probe on other connection.

2. There should be no reading with the button pressed and a low resistance with it reset.

To check relay operation:

1. With one connection grounded, apply voltage to other relay connection.

2. Confirm normally closed contacts are opening, or normally open contacts are closing.

To check limit switch operation.

1. With one probe of ohm meter to common and other probe to open contact, move limit switch arm. Low resistance should be seen.

2. With one probe of ohm meter to common and other probe to closed contact. Low resistance should be seen. Move limit switch arm and no resistance should be seen.

SECTION 5:
MECHANICAL COMPONENTS

Table of Contents, Section 5

Mechanical Components 5-3
Tires 5-3
Changing Tires 5-3
Wheels and Lug Nuts 5-3
Wheel Motor Assembly 5-4
Steer Cylinder 5-5
Steer Cylinder Pins 5-5
Base End Cylinder Pin Replacement 5-5
Steer Cylinder Seal Replacement 5-5
Tie Rod Assembly 5-6
Tie Rod Assembly Replacement 5-6
Superstructure 5-7
Platform 5-9
Hoses and Cables 5-9
Miscellaneous Equipment 5-9
Boom 5-10
Lower Boom 5-10
Lower Boom Lift Cylinder 5-10
Lower Boom Lift Cylinder Removal 5-10
Lower Boom Lift Cylinder Replacement 5-10
Lower Boom Lift Cylinder Seal Replacement 5-11
Lower Boom Lift Cylinder Holding Valve 5-11
Lower Boom and Lift Cylinder Pivot Pin 5-12
Middle Boom 5-13
Middle Boom Lift Cylinder 5-13
Middle Boom Lift Cylinder Removal 5-13
Middle Boom Lift Cylinder Replacement 5-13
Middle Boom Lift Cylinder Seal Replacement 5-14
Middle Boom Lift Cylinder Holding Valve 5-14
Middle Boom and Lift Cylinder Pivot Pin 5-14
Upper Boom 5-15
Upper Boom Lift Cylinder 5-15
Upper Boom Lift Cylinder Removal 5-15
Upper Boom Lift Cylinder Replacement 5-15
Upper Boom Lift Cylinder Seal Replacement 5-16
Upper Boom Lift Cylinder Holding Valve 5-16
Upper Boom and Lift Cylinder Pivot Pin 5-16
Wear Pads 5-17
Rear (Upper End) Wear Pad Replacement 5-13
Front (Lower End) Wear Pad Replacement 5-14
Boom Telescope Cylinder 5-18
Telescope Boom Cylinder Pin Replacement 5-18
Telescope Cylinder Removal 5-19
Telescope Cylinder Seal Replacement 5-19
Telescope Cylinder Installation 5-19
Holding Valve Inspection 5-20
Platform Level Cylinders 5-21
Platform Level Cylinder Pin Replacement 5-21
Level Cylinder Seal Replacement 5-22
Bleeding the Platform Leveling Circuit 5-22

MECHANICAL COMPONENTS

Following is a description of the major mechanical components of the AT45.

TIRES

Tires used are calcium or optional foam filled. Inspect tires for cuts, sidewall damage or abnormal wear. Any tire faults MUST BE CORRECTED before further machine operation.

CHANGING TIRES

⚠WARNING

CALCIUM OR FOAM FILLED TIRES ARE EXTREMELY HEAVY. CARE MUST BE TAKEN TO AVOID PERSONAL INJURY.

When a tire change is necessary, follow these steps:

⚠ CAUTION

ALWAYS BLOCK THE WHEELS before you raise the machine.

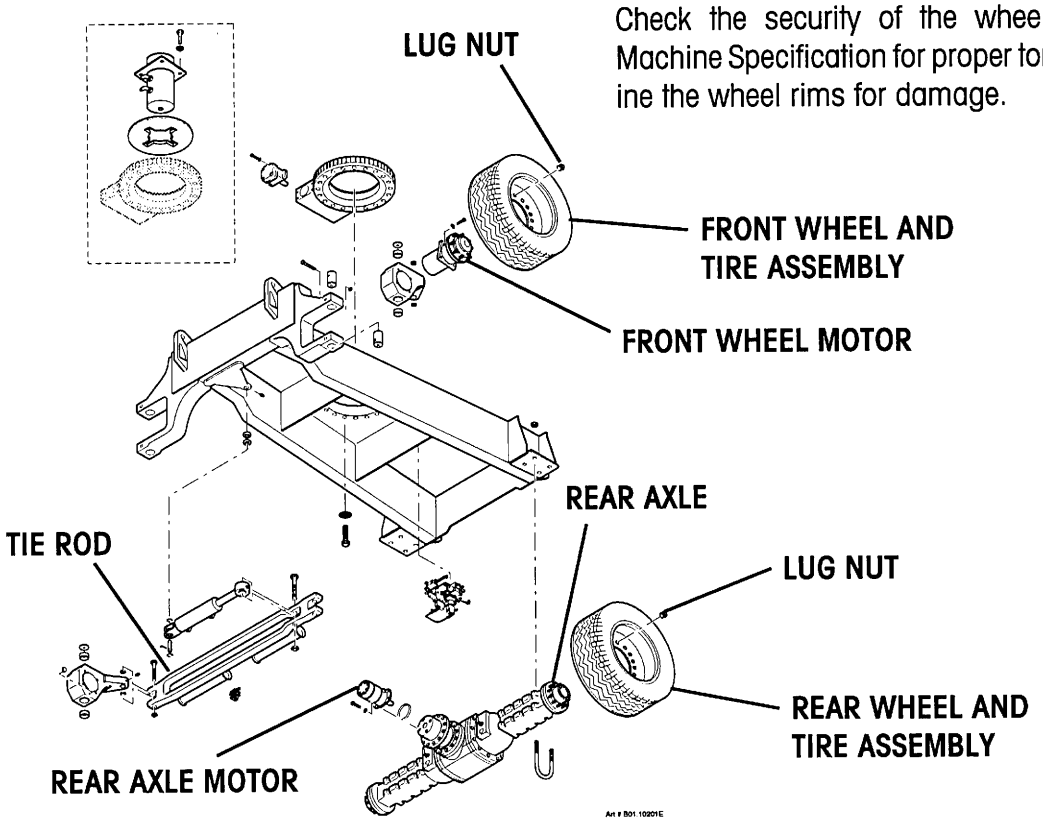
- Loosen and remove lug nuts, and pull off the wheel and tire assembly.
- Replace the tire and reinstall.

  NOTE: Tire should have the correct amount of calcium.

- Fasten lug nuts and tighten to proper torque (see Machine Specifications).
- Lower the machine and remove the blocks.

WHEELS AND LUG NUTS

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



Undercarriage Mechanical Components.

WHEEL MOTOR ASSEMBLY

- Check for any leaks. Check for proper operation. Replace hydraulic wheel motor if damaged.

- To remove front wheel motor:

1. Block the rear wheels and raise the machine at the front end.

⚠WARNING

CALCIUM OR FOAM FILLED TIRES ARE EXTREMELY HEAVY. CARE MUST BE TAKEN TO AVOID PERSONAL INJURY.

2. Loosen and remove the lug nuts and remove tire and wheel assembly.

⚠ CAUTION

Plug all open hydraulic fittings to prevent contamination by dirt or other foreign objects.

3. Disconnect hoses to the wheel motor.

4. Loosen and remove four capscrews and helical lockwashers holding the wheel motor.

5. Remove all fittings.

6. Slide out wheel motor from motor housing.

- Install front wheel motor:

1. Align the wheel motor in the motor housing.

2. Install and torque the four capscrews with helical lockwashers. See "Machine Specifications".

3. Install all fittings.

4. Connect hydraulic hoses to the wheel motor assembly.

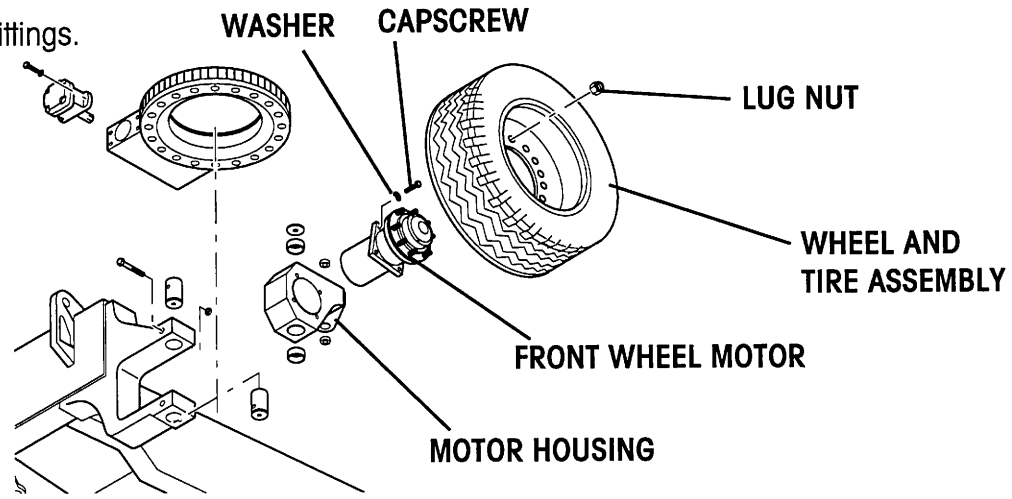
⚠WARNING

CALCIUM OR FOAM FILLED TIRES ARE EXTREMELY HEAVY. CARE MUST BE TAKEN TO AVOID PERSONAL INJURY.

5. Position tire and wheel assembly and install and torque lug nuts. See "Machine Specification".

6. Lower the machine and remove the rear wheel blocks.

STEER CYLINDER



Front Tire and Wheel Assembly, and Wheel Motor.

The steer cylinder is of the double acting type. Check the cylinder for hydraulic fluid leaks.

STEER CYLINDER PINS

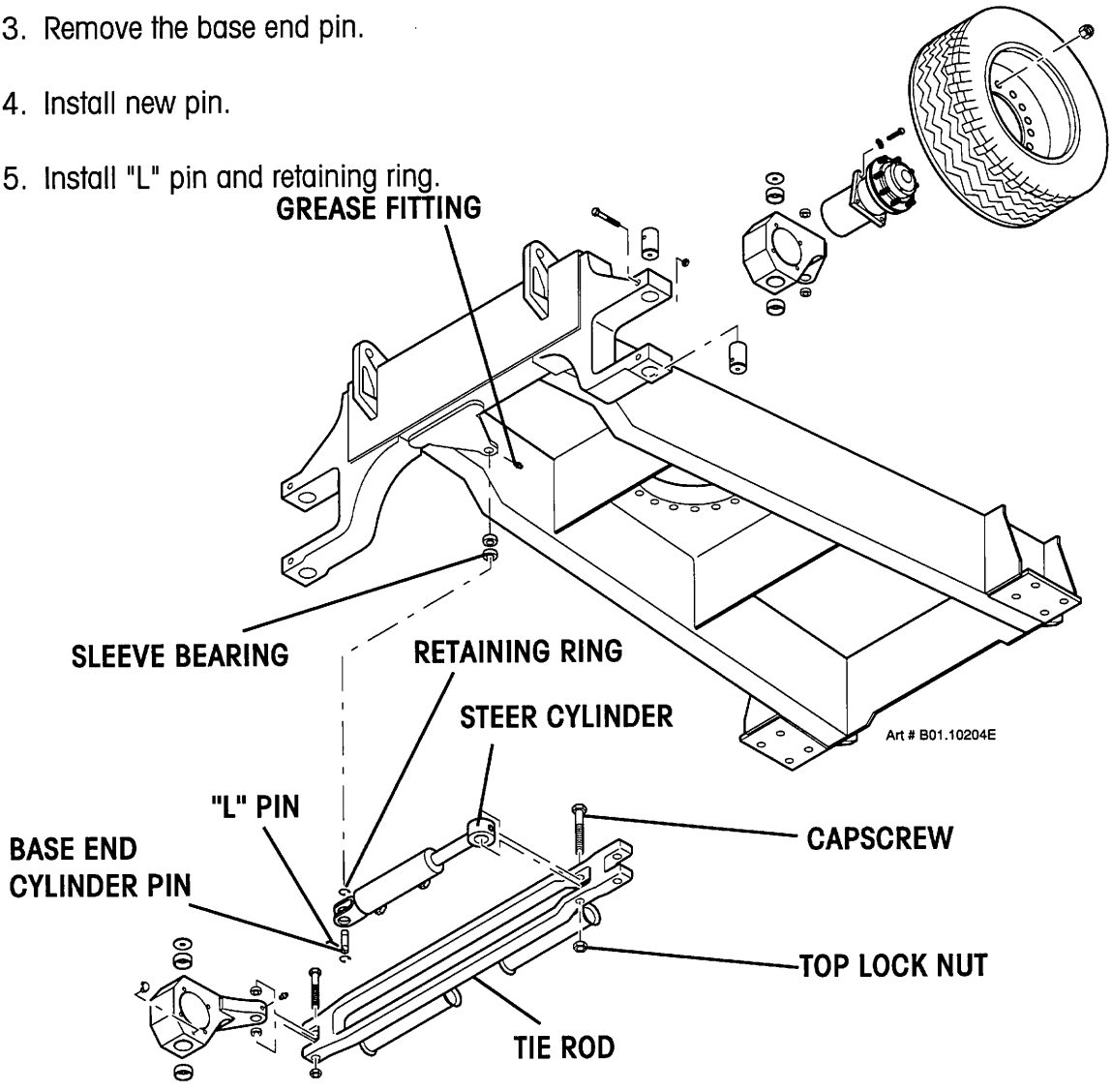
Check all pins for wear. If base end pin rotates, check for a missing retaining ring or "L" pin. If wear is detected, the pin must be replaced.

Base End Cylinder Pin Replacement

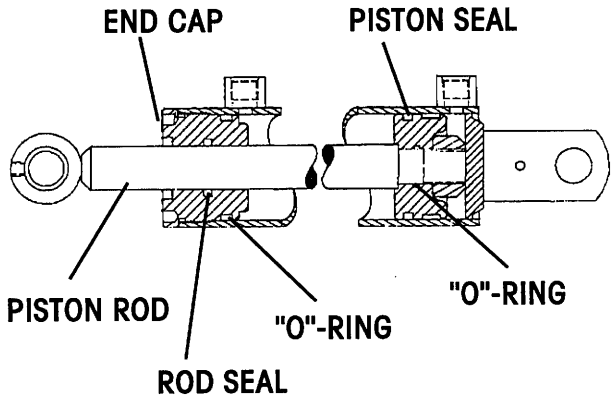
1. Remove retaining ring.
2. Remove the "L" pin.
3. Remove the base end pin.
4. Install new pin.
5. Install "L" pin and retaining ring.
6. Apply grease to sleeve bearing.

STEER CYLINDER SEAL REPLACEMENT

1. Disconnect the hydraulic hoses.
2. Remove the base end steer cylinder pin.
3. Remove capscrew and top lock nut holding the steer cylinder rod end.
4. Remove the cylinder.
5. Clean the cylinder.



Steer Cylinder and Tie Rod Assembly.



Steer Cylinder.

6. Loosen the end cap and withdraw it over the piston rod.

⚠ CAUTION

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

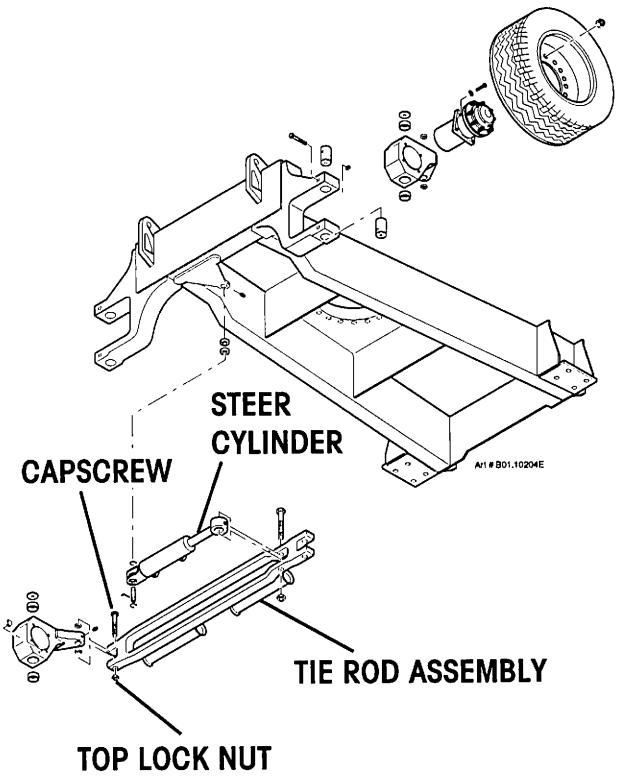
7. Remove the rod and piston assembly.
8. Replace the seals and "O"-rings.
9. Install the rod and piston assembly.
10. Install and tighten the end cap.
11. Install cylinder.
    - Position steer cylinder base end.
    - Install base end steer cylinder pin.
    - Install capscrew and top lock nut holding the steer cylinder rod end.
12. Connect the hydraulic hoses.

TIE ROD ASSEMBLY

Check for a bent or broken tie rod assembly. Replace if bent or broken.

TIE ROD ASSEMBLY REPLACEMENT

1. Remove capscrews and top locknuts at both ends and steer cylinder rod end.
2. Remove tie rod assembly.
3. Install new tie rod assembly and attach it with the capscrews and top locknuts.
4. Install rod end of steer cylinder.

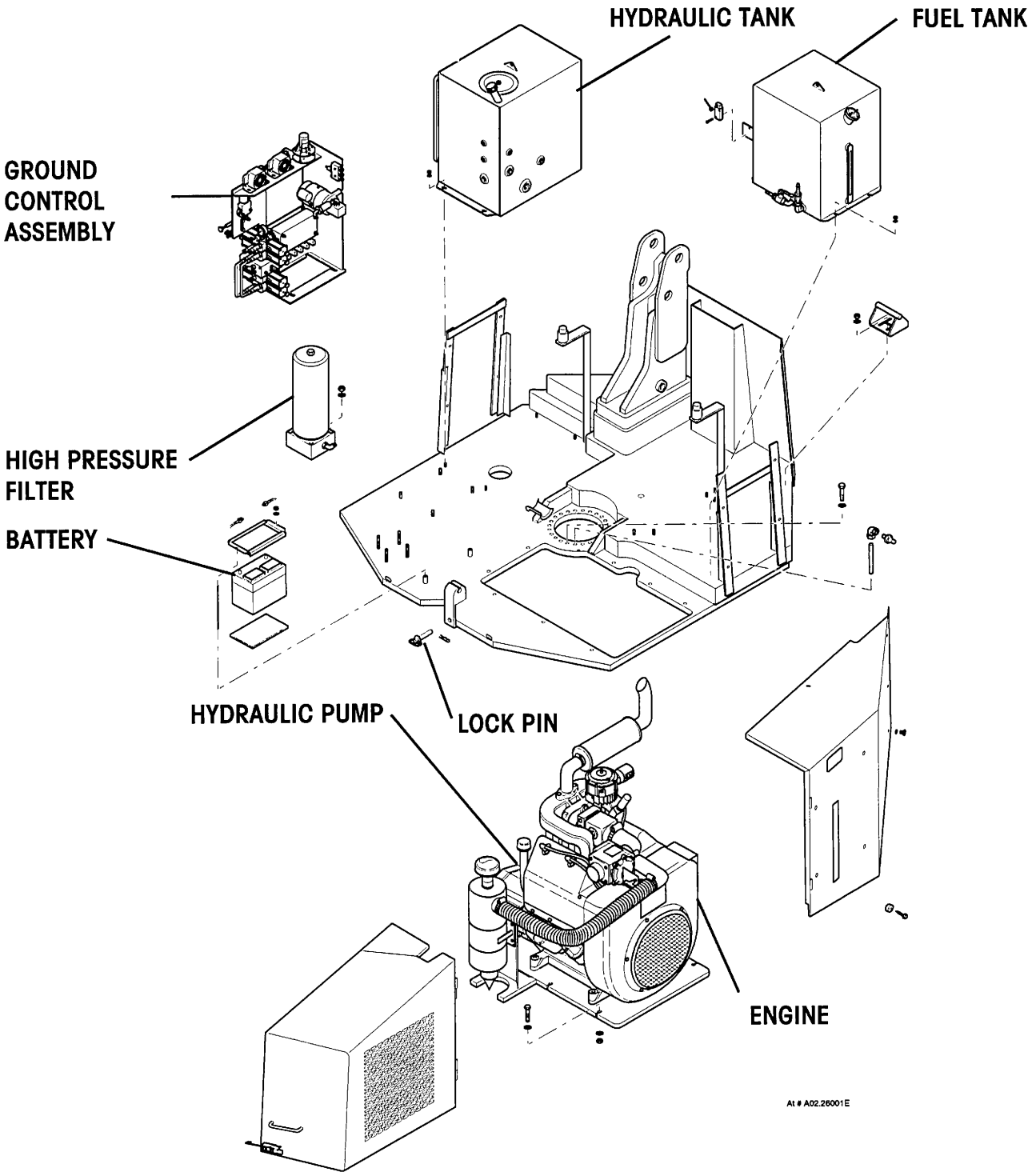


Steer Cylinder and Tie Rod Assembly.

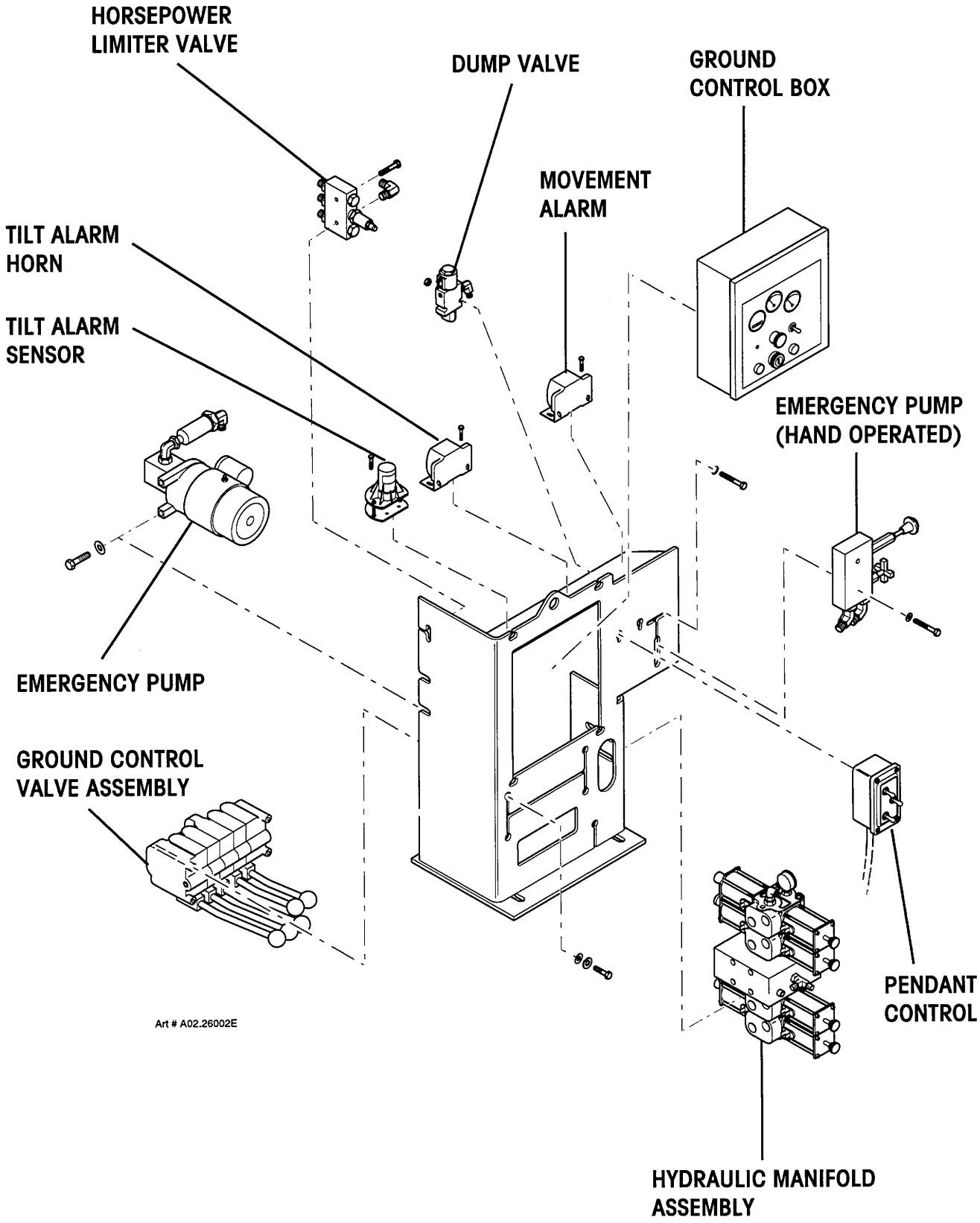
SUPERSTRUCTURE

The superstucture consists of two compartments; one is the engine compartment and the other is the hydraulic compartment.

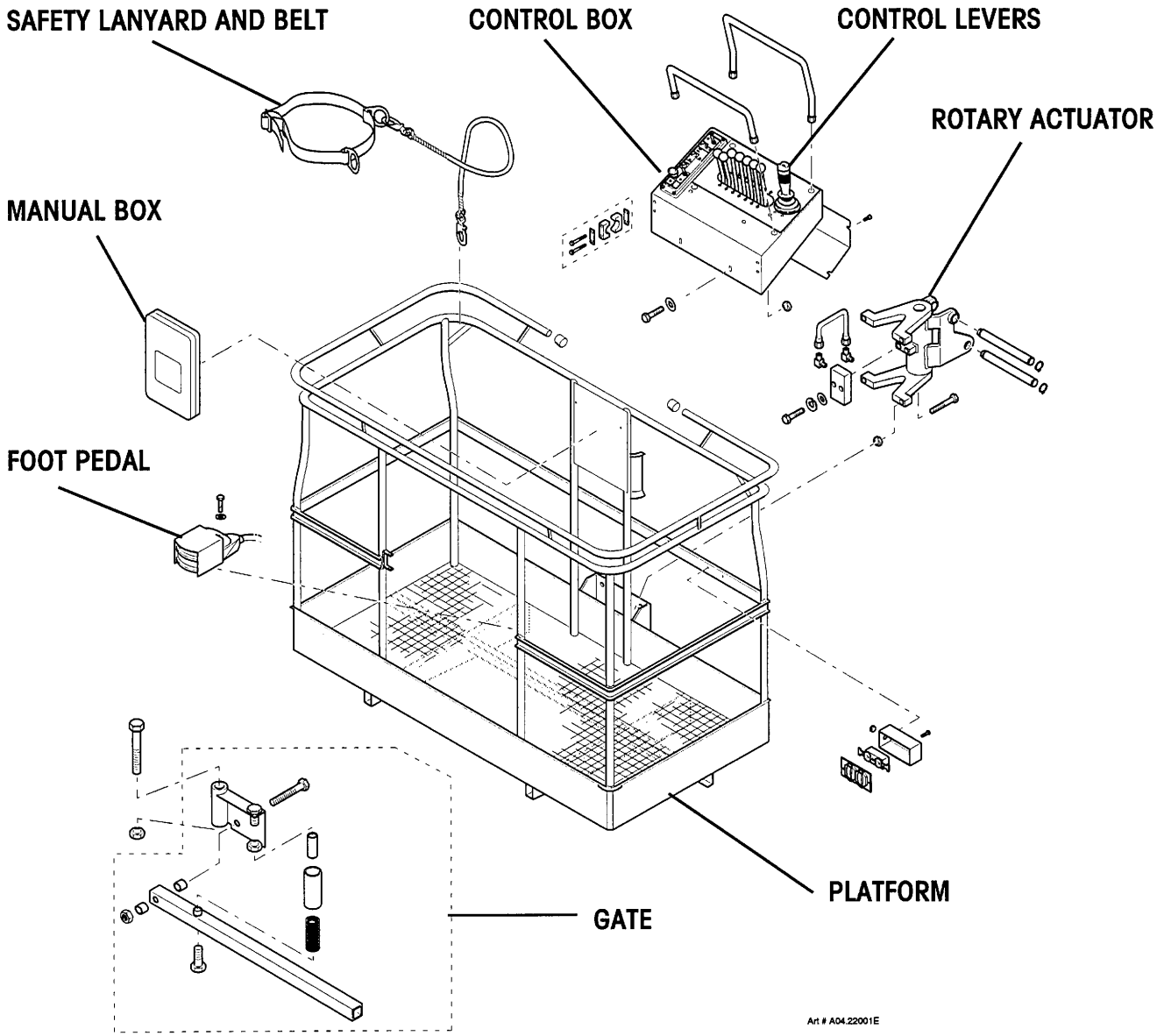
Steam clean the superstructure once a year, and inspect all welds and brackets. Check for cylinder pins that turn in their mountings, which will indicate sheared pin lock bolts.



Components Found on the Superstructure.



Components Found on the Ground Control Assembly.



Platform Components.

PLATFORM

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

HOSES AND CABLES

Inspect all hoses and electrical cables for security and damage. Check for leaks at fittings. ANY DAMAGED HOSES OR CABLES SHOULD BE REPLACED.

Cables and hoses should be examined for rubbing and chafing, especially in the swing bearing area and the hose track area.

MISCELLANEOUS EQUIPMENT

Check all miscellaneous equipment mounted on the machine for secure attachment. Check for evidence of oil or hydraulic fluid leakage.

BOOM

LOWER BOOM

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

⚠WARNING

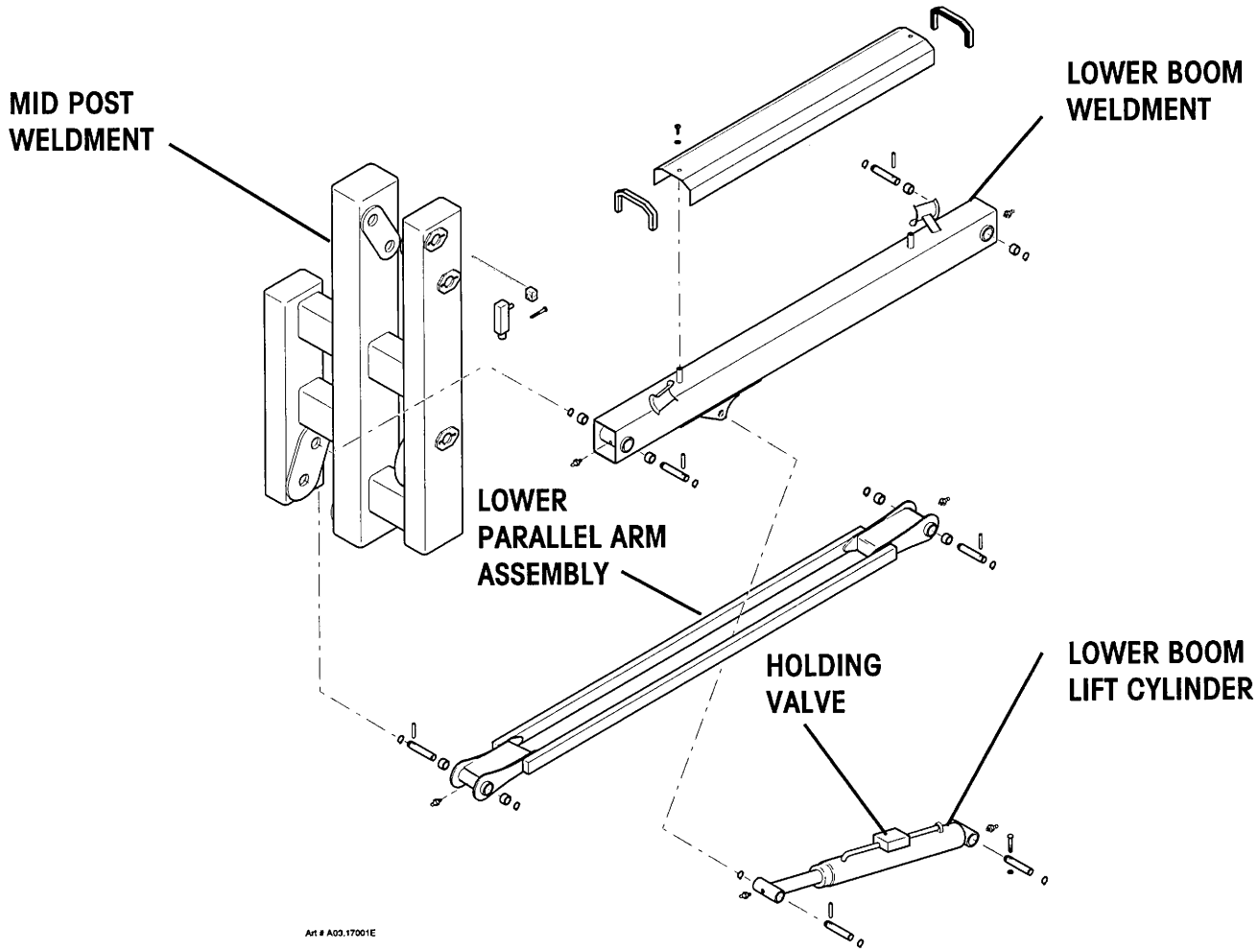
TO PREVENT PERSONAL INJURY WHILE SERVICING ANY PART OF THE LOWER BOOM, ENSURE THAT IT IS SUPPORTED BY A CRANE AT FRONT AND REAR, AND THAT THE BOOM CARRIES NO LOAD.

LOWER BOOM LIFT CYLINDER

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

LOWER BOOM LIFT CYLINDER REMOVAL

1. Support the upper boom.
2. Disconnect lower lift cylinder from lower boom weldment by removing the pivot pin after taking off retaining ring and keeper pin.



Lower Boom Components.

3. Disconnect and plug the hydraulic hoses.

⚠ CAUTION

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

4. Support the cylinder and remove the cylinder base end pin.

5. Remove the cylinder.

LOWER BOOM LIFT CYLINDER REPLACEMENT

1. Carefully position the new cylinder in the machine with the holding valve and hose connections facing upward.

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

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

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

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

6. Grease both ends of the cylinder pivot pins at the two (2) grease fittings.

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

8. Raise and lower the platform several times to confirm correct operation and purge all air from the cylinder. Initially, there may be a hesitation due to the presence of air in the cylinder.

LOWER BOOM LIFT CYLINDER SEAL REPLACEMENT

1. Remove lift cylinder.

⚠ CAUTION

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

2. Remove end gland from lift cylinder.

3. Remove cylinder rod and piston.

4. Remove seals.

5. Replace boom lift cylinder seals.

6. Replace cylinder rod and piston.

7. Secure end gland to lift cylinder.

8. Replace boom lift cylinder in the unit.

LOWER LIFT CYLINDER HOLDING VALVE REPLACEMENT

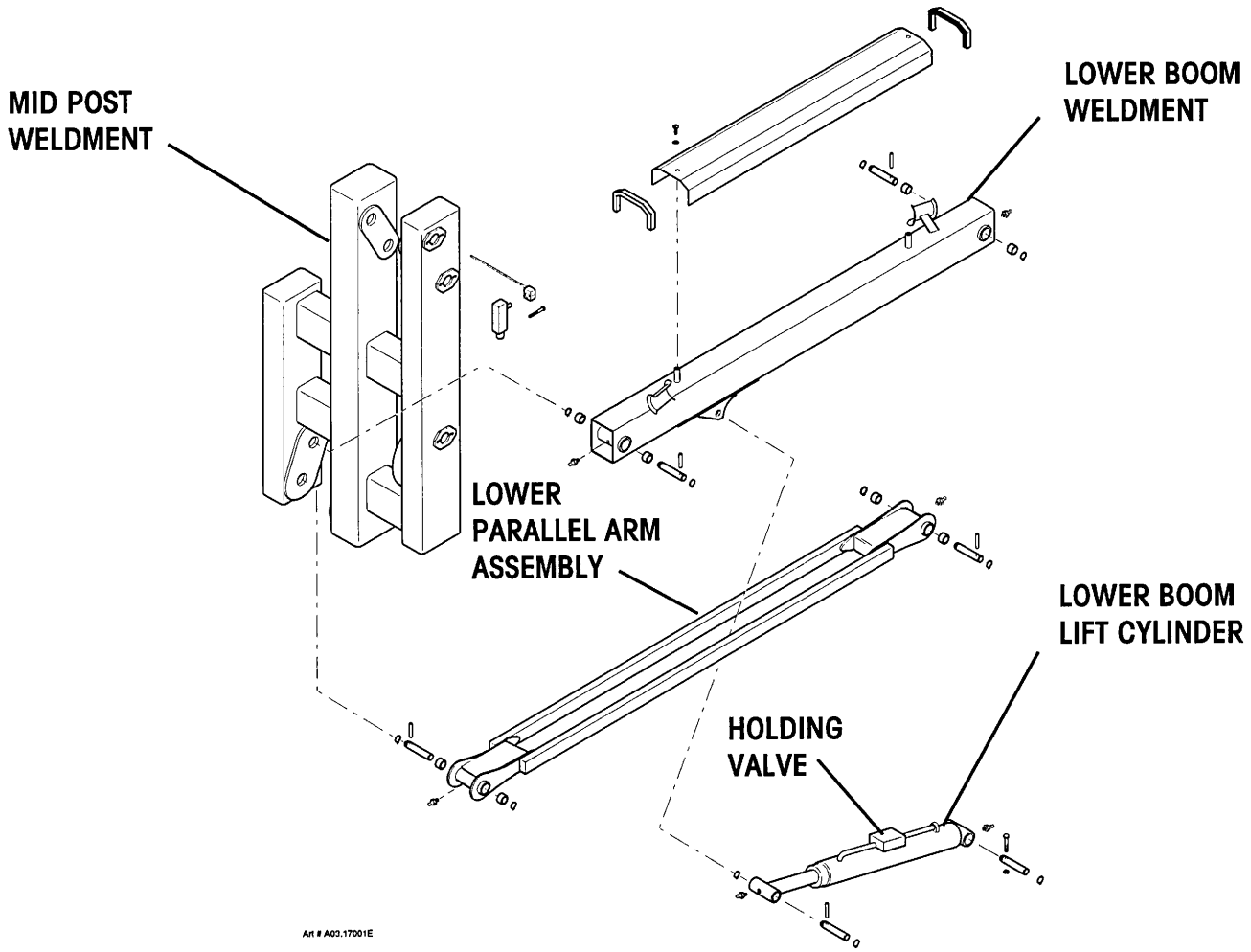
The holding valve is integrated into the upper side of the lift cylinder. Make certain that all power is off and that the lift cylinder bears no load before proceeding with repairs.

1. Loosen holding valve and wiggle to bleed off any possible hydraulic pressure.

2. Remove valve.

3. When installing new valve, lubricate seals with clean oil and install valve.

4. Torque to 30 to 35 Ft Lbs.



Lower Boom Components.

LOWER BOOM, CYLINDER PIVOT PIN AND BUSHING REPLACEMENT

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

1. Support the upper boom.

2. For boom pivot pin and bushing replacement, remove retaining ring and lock pin from the boom weldment and parallel arm one at a time and replace before proceeding to next pivot pin and bushing.

   For cylinder pivot pin and bushing replacement, remove retaining ring and lock pin from one end of the cylinder at a time before proceeding to the other pivot pin and bushing.

   a. Remove the pivot pin.

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

   c. Seat replacement bushings, using an arbor press.

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

   e. Replace retaining rings and lock pin.

3. Grease all the bearing surfaces through the grease fittings with the appropriate lubricant (see Lubrication Chart).

MIDDLE BOOM

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

⚠WARNING

TO PREVENT PERSONAL INJURY WHILE SERVICING ANY PART OF THE MIDDLE BOOM, ENSURE THAT IT IS SUPPORTED BY A CRANE AT FRONT AND REAR, AND THAT THE BOOM CARRIES NO LOAD.

MIDDLE BOOM LIFT CYLINDER

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

MIDDLE BOOM LIFT CYLINDER REMOVAL

1. Support the upper boom.
2. Disconnect middle lift cylinder from middle boom weldment by removing the pivot pin after taking off retaining ring and keeper pin.
3. Disconnect and plug the hydraulic hoses.

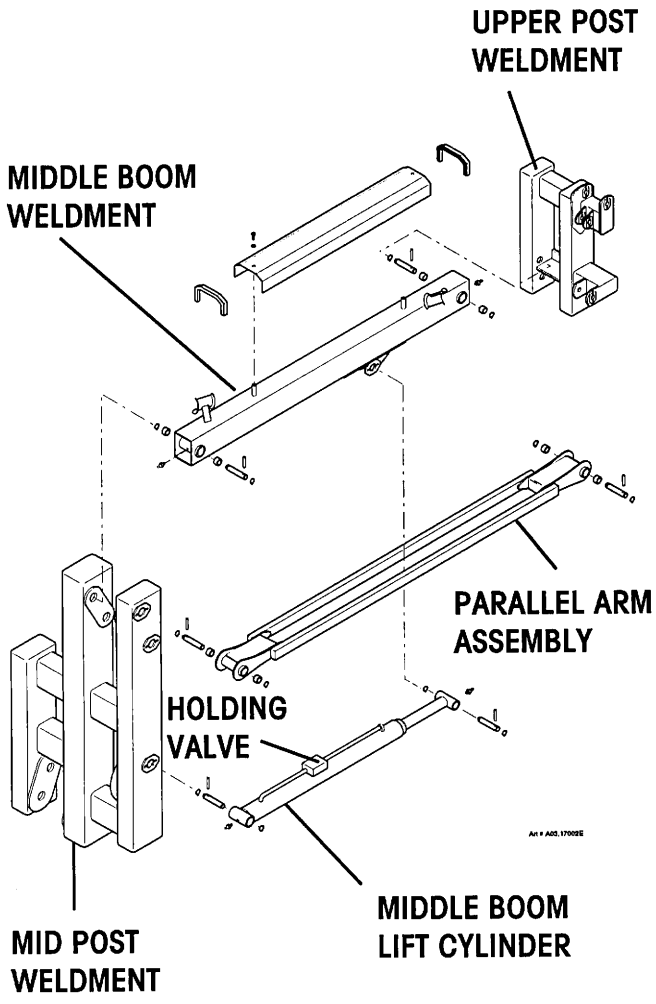
⚠ CAUTION

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

4. Support the cylinder and remove the cylinder base end pin.
5. Remove the cylinder.

MIDDLE BOOM LIFT CYLINDER REPLACEMENT

1. Carefully position the new cylinder in the machine with the holding valve and hose connections facing upward.
2. Connect the base end of cylinder to the machine by reinstalling the pin and all retainers.
3. Support the rod end of the cylinder and reconnect the hoses to the cylinder.
4. Use the controls to extend or retract the cylinder to align the cylinder so the rod end pin can be installed. Install the pin and retainers.



Middle Boom Components.

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

6. Grease both ends of the cylinder pivot pins at the two (2) grease fittings.

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

8. Raise and lower the platform several times to confirm correct operation and purge all air from the cylinder. Initially, there may be a hesitation due to the presence of air in the cylinder.

MIDDLE BOOM LIFT CYLINDER SEAL REPLACEMENT

1. Remove lift cylinder.

⚠ CAUTION

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

2. Remove end gland from lift cylinder.

3. Remove cylinder rod and piston.

4. Remove seals.

5. Replace boom lift cylinder seals.

6. Replace cylinder rod and piston.

7. Secure end gland to lift cylinder.

8. Replace boom lift cylinder in the unit.

MIDDLE LIFT CYLINDER HOLDING VALVE REPLACEMENT

The holding valve is integrated into the upper side of the lift cylinder. Make certain that all power is off and that the lift cylinder bears no load before proceeding with repairs.

1. Loosen holding valve and wiggle to bleed off any possible hydraulic pressure.

2. Remove valve.

3. When installing new valve, lubricate seals with clean oil and install valve.

4. Torque to 30 to 35 Ft Lbs.

MIDDLE BOOM AND CYLINDER PIVOT PIN AND BUSHING REPLACEMENT

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

1. Support the top boom.

2. For boom pivot pin and bushing replacement, remove retaining ring and lock pin from the boom weldment and parallel arm one at a time and replace before proceeding to next pivot pin and bushing.

   For cylinder pivot pin and bushing replacement, remove retaining ring and lock pin from one end of the cylinder at a time before proceeding to the other pivot pin and bushing.

   a. Remove the pivot pin.

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

   c. Seat replacement bushings, using an arbor press.

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

   e. Replace retaining rings and lock pin.

3. Grease all the bearing surfaces through the grease fittings with the appropriate lubricant.

UPPER BOOM

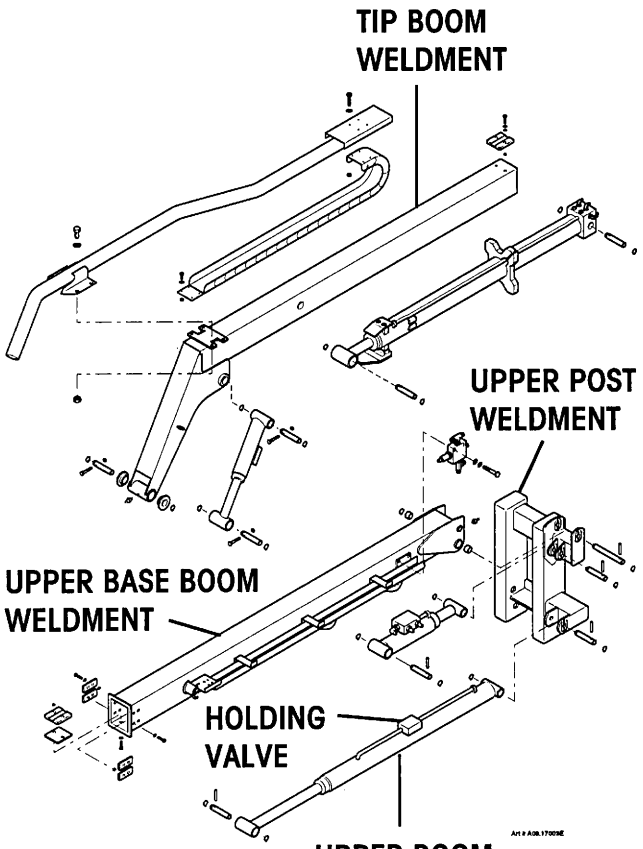
Clean the boom once a year and inspect along the boom structure, especially all welds and brackets.

⚠WARNING

TO PREVENT PERSONAL INJURY WHILE SERVICING ANY PART OF THE UPPER BOOM, ENSURE THAT IT IS SUPPORTED BY A CRANE AT FRONT AND REAR, AND THAT THE BOOM CARRIES NO LOAD.

UPPER BOOM LIFT CYLINDER

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



Upper Boom Components.

UPPER BOOM LIFT CYLINDER REMOVAL

1. Support the top boom.
2. Disconnect upper lift cylinder from upper boom weldment by removing the pivot pin after taking off retaining rings and keeper pin.
3. Disconnect and plug the hydraulic hoses.

⚠ CAUTION

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

4. Support the cylinder and remove the cylinder base end pin.
5. Remove the cylinder.

UPPER BOOM LIFT CYLINDER REPLACEMENT

1. Carefully position the new cylinder in the machine with the holding valve and hose connections facing upward.
2. Connect the base end of cylinder to the upper post by reinstalling the pin and all retainers.
3. Support the rod end of the cylinder and reconnect the hoses to the cylinder.
4. Use the controls to extend or retract the cylinder to align the cylinder so the rod end pin can be installed. Install the pin and retainers.
5. Use plastic wire ties to fasten the hose to the cylinder as it was prior to this installation.
6. Grease both ends of the cylinder pivot pins at the two (2) grease fittings.

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

8. Raise and lower the platform several times to confirm correct operation and purge all air from the cylinder. Initially, there may be a hesitation due to the presence of air in the cylinder.

UPPER BOOM LIFT CYLINDER SEAL REPLACEMENT

1. Remove lift cylinder.

⚠ CAUTION

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

2. Remove end gland from lift cylinder.

3. Remove cylinder rod and piston.

4. Remove seals.

5. Replace boom lift cylinder seals.

6. Replace cylinder rod and piston.

7. Secure end gland to lift cylinder.

8. Replace boom lift cylinder in the unit.

UPPER LIFT CYLINDER HOLDING VALVE REPLACEMENT

The holding valve is integrated into the upper side of the lift cylinder. Make certain that all power is off and that the lift cylinder bears no load before proceeding with repairs.

1. Loosen holding valve and wiggle to bleed off any possible hydraulic pressure.

2. Remove valve.

3. When installing new valve, lubricate seals with clean oil and install valve.

4. Torque to 30 to 35 Ft Lbs.

UPPER BOOM AND CYLINDER PIVOT PIN AND BUSHING REPLACEMENT

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

1. Support the top boom.

2. For boom pivot pin and bushing replacement, remove retaining ring and lock pin from the boom weldment and parallel arm one at a time and replace before proceeding to next pivot pin and bushing.

   For cylinder pivot pin and bushing replacement, remove retaining ring and lock pin from one end of the cylinder at a time before proceeding to the other pivot pin and bushing.

   a. Remove the pivot pin.

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

   c. Seat replacement bushings, using an arbor press.

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

   e. Replace retaining rings and lock pin.

3. Grease all the bearing surfaces through the grease fittings with the appropriate lubricant (see Lubrication Chart).

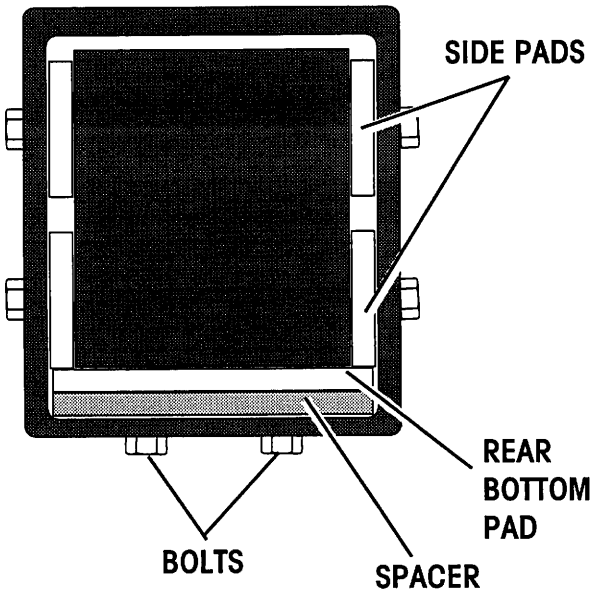
WEAR PADS

The nylon wear pads should be checked for wear approximately every six months. Fully retract the upper telescope boom section, and check the gap between the top wear pad and the outer boom section, at the front (lower) end of the boom. Inspect the side and bottom pads as well.

Then, extend the boom out, and check the gap between the bottom wear pad and the inner boom section, at the rear (upper) end of the outer boom section. Inspect the side and top pads as well.

⚠ CAUTION

If a pad wears to approximately 3/8" (9.5 mm) thick, it should be replaced. Generally, only the bottom pad at the upper end and the top pad at the lower end of the boom will show wear.



Rear (Upper) End Wear Pads.

REAR (UPPER END) WEAR PAD REPLACEMENT

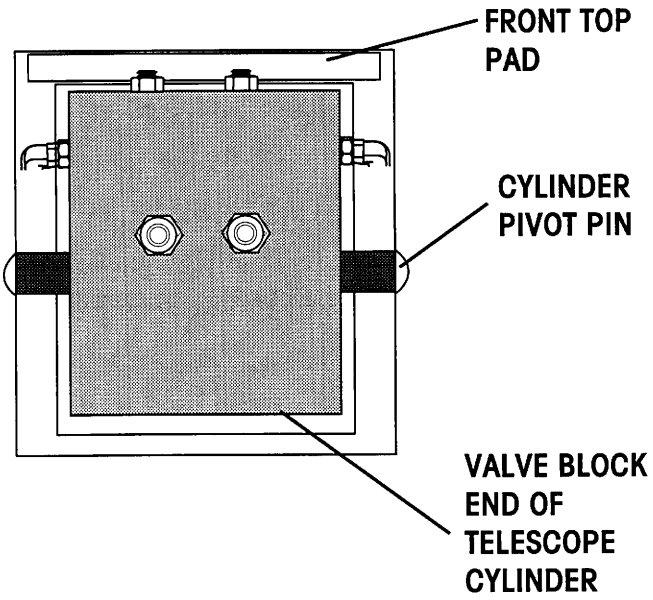
1. Remove the bolts holding the bottom spacer and pad.
2. Remove the pad (the boom may need to be extended out a short distance).
3. Install replacement pad by tapping into place, then securing pad and spacer with mounting bolts.

   Repeat this procedure for the side and top pads if required.

FRONT (LOWER END) WEAR PAD REPLACEMENT

1. Fully retract the telescope boom section.
2. Remove the pivot pin at the lower (valve block) end of the telescope cylinder, then extend the cylinder from the boom.

   Access can now be gained to the front top pad retaining bolts.
3. Remove and replace pad.
4. Retract cylinder and install the pivot pin.



Front (Lower) End Wear Pad.

BOOM TELESCOPE CYLINDER

The function of the telescope cylinder is to extend and retract the upper boom segment to allow positioning of the work platform. The double acting cylinder must be removed from the machine before a thorough inspection can be accomplished.

TELESCOPE BOOM CYLINDER PIN REPLACEMENT

1. Operate boom lift to horizontal position.

⚠ CAUTION

Support the boom any time maintenance is required on the boom or boom cylinders.

2. SUPPORT THE BOOM (on a boom stand or similar rigid platform) at the horizontal position.

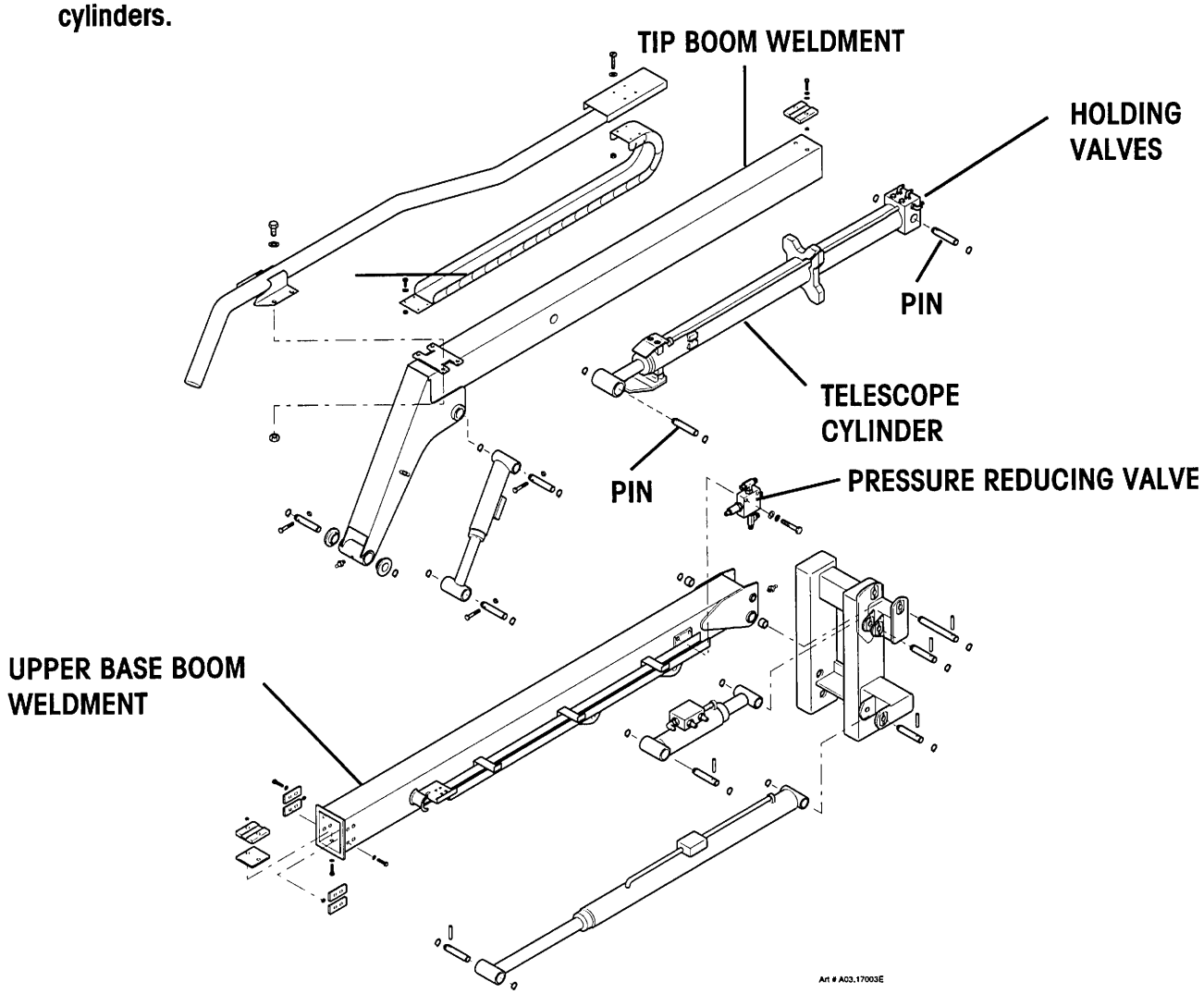
3. Remove the retaining ring.

⚠ CAUTION

The cylinder will fall if not supported when the rod end pin is removed.

4. SUPPORT THE CYLINDER and remove the base end pin.

5. Install new pin, and retaining rings. Cylinder must be lined up for ease of installation.



Telescope Cylinder Replacement.

TELESCOPE CYLINDER REMOVAL

1. Elevate the boom to the horizontal position.

⚠ CAUTION

Support the boom any time maintenance is required on the boom or boom cylinders.

2. Extend the boom until the telescope cylinder rod end mounting pin is exposed.
3. SUPPORT THE EXTENDED TIP BOOM (on a boom stand or similar rigid platform).
4. Remove the pin and snap rings holding the rod end of the telescope cylinder to the tip boom.
5. Disconnect the hydraulic hoses from the telescope cylinder.
6. Remove the retaining rings, and pin from the base end of the cylinder.
7. Using a crane, withdraw the cylinder from the boom.

TELESCOPE CYLINDER SEAL REPLACEMENT

1. Remove the end cap from the cylinder.

⚠ CAUTION

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

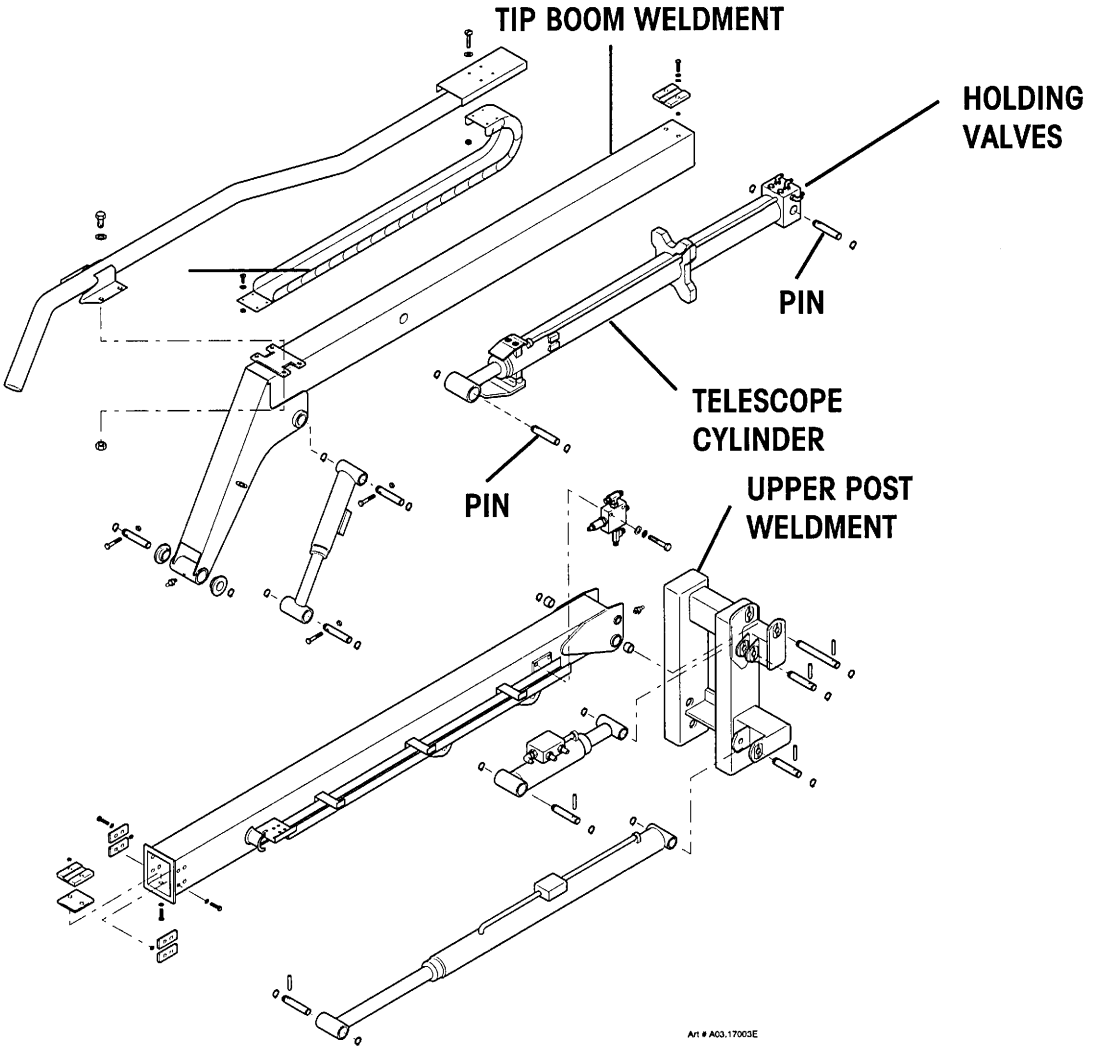
2. Pull the cap and rod straight out of the cylinder barrel.
3. Remove the nut from the end of the rod.
4. Slip off the piston.
5. Examine the rod and seals for signs of damage or wear.
6. Remove the old seals and backup rings.
7. Install new seals and backup rings.

TELESCOPE CYLINDER INSTALLATION

⚠ CAUTION

Support the boom any time maintenance is required on the boom or boom cylinders.

1. SUPPORT THE EXTENDED TIP BOOM (on a boom stand or similar rigid platform) IN THE HORIZONTAL POSITION.
2. Using a crane, slide the telescope cylinder into the boom until the rod end mounting holes align with the holes in the tip boom.
3. Install the pin and snap rings holding the rod end of the telescope cylinder to the tip boom.
4. Install the pin, and retaining rings in the base end of the cylinder.
5. Connect the hydraulic hoses to the telescope cylinder.
6. Cycle the telescope cylinder several times to BLEED THE SYSTEM.



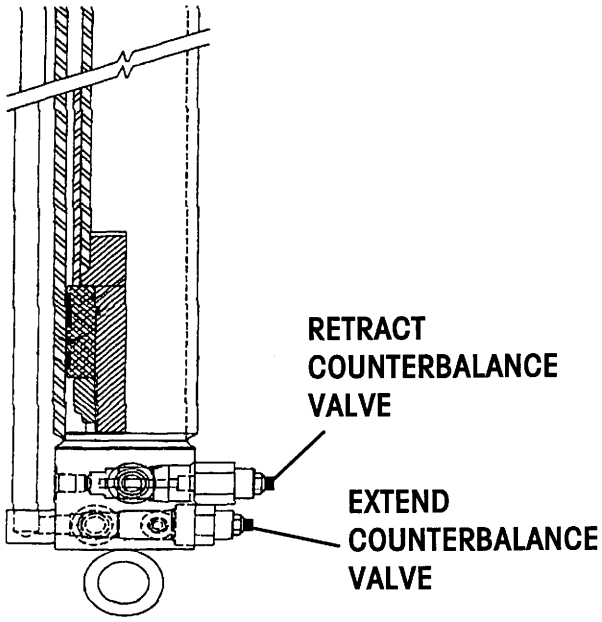
Telescope Cylinder Replacement.

HOLDING VALVE INSPECTION

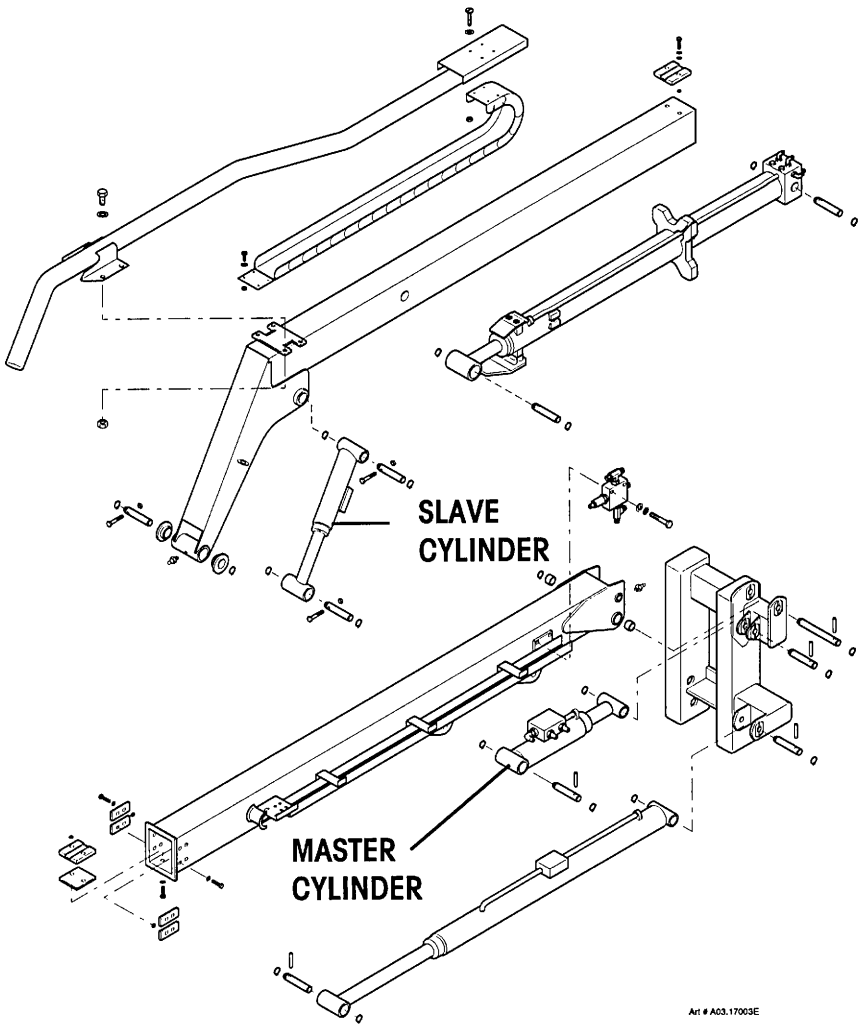
1. Place rated load in the platform, hoist the boom to full elevation and extend the telescope cylinder, then stop the engine.

2. If the telescope cylinder subsequently begins to move, the counterbalance valve is faulty and the cartridge should be replaced.

   NOTE: The counterbalance valve is pre-set at the factory and is not adjustable.



Telescope Cylinder.



Master and Slave Cylinder Pin Replacement.

PLATFORM LEVEL CYLINDERS

The platform level 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. The platform level cylinders (master and slave) are of the double acting type.

1. Check pivot pins for wear.
2. Check the pivot pin locking bolts for tightness.
3. Inspect the cylinders for fluid leakage, damage and security.
4. Replace the seals when the cylinder is serviced.

PLATFORM LEVEL CYLINDER PIN REPLACEMENT

⚠ CAUTION

Support the platform any time maintenance is required on the level cylinders.

1. SUPPORT THE PLATFORM to remove the load on both master and slave leveling cylinders.
3. Remove the retaining rings, the pin locking capscrew and nut, and remove the pin.
4. Install new pin, locking capscrew, nut and retaining rings.
5. Apply grease to pin through the grease fitting.

LEVEL CYLINDER SEAL REPLACEMENT

1. Lower the boom all the way.
2. SUPPORT THE PLATFORM to remove the load on the slave leveling cylinder.
3. Remove the lock collar and pin. Slave cylinder seals can be replaced on the machine. Master cylinder must be removed for seal replacement.
4. Clean the cylinder.
5. Unscrew the end cap and pull the cap and rod straight out of the cylinder barrel.

⚠ CAUTION

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

6. Remove the split pin and nut from the end of the rod.
7. Slip off the piston.
8. Examine the rod and seals for signs of damage or wear.
9. Remove the old seals and install a new seal kit.

BLEEDING THE PLATFORM LEVELING CIRCUIT

After a platform level cylinder has been repaired or replaced, or if the platform does not remain level with the raising and lowering of the boom, the platform leveling circuit may need to be bled.

NOTE: Assistance is required in order to perform the bleeding procedure. One person is needed to operate the platform level control, while the second person bleeds the system.

1. With boom retracted, check the hydraulic fluid level in the tank.

⚠WARNING

HYDRAULIC FLUID WILL BE FORCIBLY EJECTED FROM "B" AND "C" FITTINGS. LOOSEN NIPPLE SLOWLY.

NOTE: The "B" and "C" are marked on the hoses and the fittings are for the hoses marked "B" and "C". If not marked, identify them for your reference.

2. Slightly loosen the "B" and "C" hose fittings at the base of the master leveling cylinder.
3. With the platform near ground, operate the platform level control to move the platform fully backward and forward. Perform procedure five (5) times in order to expel any air from the system.

⚠WARNING

CARE MUST BE TAKEN WHEN OPERATING LEVEL CONTROL. AIR IN CYLINDERS CAN CAUSE ERRATIC OR JERKY PLATFORM MOTION.

4. Tighten the "B" and "C" hose fittings and replenish the hydraulic tank.
5. Repeat the procedure as required until all air is expelled.
6. After bleeding the leveling circuit, raise boom to full elevation and then fully lower boom to ensure that platform remains level.
7. Check platform level control lever for proper operation.

SECTION 6:
MAINTENANCE SCHEDULE

Table of Contents, Section 6

Maintenance Schedule 6-3
General Maintenance Tips 6-3
First Three Months of Operation 6-3
Routine Servicing 6-3
ShiftOperational Checklist 6-6
Monthly Operational Checklist 6-9
Semi-Annual Operational Checklist 6-11

MAINTENANCE SCHEDULE

The Simon AT45 is designed to require a minimum amount of maintenance. However, it is essential that the specified services be performed at the indicated intervals, and that the instructions contained in this manual are followed to ensure safety and reliability.

⚠ DANGER

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

GENERAL MAINTENANCE TIPS

- ALWAYS clean the surrounding area before opening hydraulic components.
- Never open a hydraulic system when there are contaminants in the air.
- Never leave components or hoses open. They must be protected from contamination (including rain) at all times.
- Use only recommended lubricants (see Lubrication Chart in this manual). Improper lubricants or incompatible lubricants may be as harmful as no lubrication.
- Watch for makeshift "fixes", which can jeapordize safety as well as lead to more costly repairs.
- Any work platform found not to be in safe operating condition should be removed from service until repaired. All repairs should be made by authorized personnel in conformance with the manufacturer's operating, maintenance, and repair manuals.

FIRST THREE MONTHS OF OPERATION

As with any new machine, minor fluid leaks may occur until the various hydraulic components and pipe fittings are fully seated.

It is particularly important that, for the first three months of operation, all hydraulic components, hoses and pipe fittings be checked regularly for leaks and tightness, and corrective action taken as required.

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

ROUTINE SERVICING

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

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

SHIFT SERVICE

Hydraulic System

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

Ensure that the filler cap is secure to prevent entry of water or other impurities into the tank.

Tire Condition

Check that the tires are in good condition.

Platform Rails and Safety Gate

Check security of platform and safety gate.

Control Valves

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

Steering

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

Batteries

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

Pivot Pins

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

Test All Machine Systems

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

Test the operation of all machine boom functions.

Checklist

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

MONTHLY SERVICE

Hydraulic System

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

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

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

Chassis Bolts

Check all bolts for signs of looseness. Refer to individual items in the monthly checklist.

Cylinders

Check all cylinders for hydraulic fluid leakage.

Pivot Pins and Grease Fittings

Lubricate all pivot pins and grease fittings.

Platform Mounting

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

Checklist

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

SEMI-ANNUAL SERVICE

Boom Cylinders

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

Fully retract, then extend the boom telescope cylinder. At each extreme position, check that there is no movement of the cylinder pin.

High Pressure Filter

Change the high pressure filter element.

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

Checklist

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

ANNUAL SERVICE

> **NOTE:** Machine Annual Inspection Report Forms are available from Simon.

Flexible Hoses

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

Hydraulic Fluid

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

Hydraulic Fluid Tank

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

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

Open the drain tap, and completely drain the fluid from the tank.

Clean or replace the suction hose, and close the drain tap. Refill the tank to the correct level.

Structural Examination

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

FOUR YEAR INTERVAL SERVICE

Pivot Pins and Bearings

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

SHIFT OPERATIONAL CHECKLIST

All checks must be completed before operation of the 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 AT45 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, flat or damaged tires, etc. Open both compartment doors to inspect components inside.
_____	2. Check battery electrolyte level and connections. Check fuel, engine oil and coolant levels.
_____	3. Check tire pressure (not required for foam filled).
_____	4. Check that the lug nuts are tight.
_____	5. Check hydraulic fluid level. The level should be at the line marked on the sight gauge with the unit in stowed position.

SHIFT OPERATIONAL CHECKLIST (CONTINUED)

INITIAL	DESCRIPTION
_____	6. Check that all shutoff valves on hydraulic tank are open (parallel to flow).
_____	7. Check all drive motor nuts for tightness.
_____	8. Check hoses for worn areas.
_____	9. Check hose carrier to verify that it is not bent or sagging.
_____	10. Inspect safety belt connections, and check for worn areas on the belts.
_____	11. Check platform rails and gate latch step for damage.
_____	12. Check pivot pins for security.
_____	13. Check that all warning and instructional labels are legible and secure.
_____	14. Start engine. Check that hydraulic pressure is as stated in the machine specifications.
_____	15. Check that the tilt alarm is working properly.
_____	16. Check that no attempt had been made to override the drive interlock system by a previous operator.
_____	17. When all pre-inspection checks have been completed, the operator is ready to test the ground controls for proper operation.
_____	18. Check platform controls for proper operation.
_____	19. With the platform raised, check for the smooth operation of low speed drive.
_____	20. Follow engine daily service requirements. Refer to the Engine Maintenance Manual supplied with your AT45.

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
_____	21. Inspect cylinder boots, valve spool boots, etc., for cuts or other damage after every eight (8) hours of service. Repair or replace if necessary.
_____	22. Check hydraulic system for leakage after every eight (8) hours of operation.
_____	23. Follow engine severe usage service requirements. Refer to the Engine Maintenance Manual supplied with your AT45.

WEEKLY

INITIAL	DESCRIPTION
_____	24. Inspect condition of hydraulic fluid in the reservoir. Fluid should have a clear amber color.
_____	25. Lubricate all boom pivot pins and cylinder pins (see Lubrication Chart).
_____	26. Check oil level in axle differential and planetary ends (see Lubrication Chart).
_____	27. Apply lubricant to swing bearing gear teeth and drive pinion gear teeth (see Lubrication Chart).

MONTHLY OPERATIONAL CHECKLIST

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 AT45 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. Lubricate all boom pivot pins and cylinder pins (see Lubrication Chart).
_____	3. Apply lubricant to swing bearing gear teeth and drive pinion gear teeth (see Lubrication Chart).
_____	4. Inspect condition of hydraulic fluid in the reservoir. Fluid should have a clear amber color.
_____	5. Check hydraulic system for leaks, examine hoses for signs of excessive wear, chafing or twisting. Adjust the hoses and/ or replace them if necessary (refer to AT45 Service Manual).
_____	6. Inspect the work platform and boom structure for signs of damage and broken welds. Check all bolts (including platform rotator bolts) for tightness.
_____	7. Check for structural damage, broken welds, loose bolts, improper or makeshift repairs.

INITIAL	DESCRIPTION
_____	8. Check protective rubber cover around hoses at moving anchor, tip boom, boom hose passages, and at swing bearing.
_____	9. Check torque of wheel lug nuts (see specifications).
_____	10. Check torque of swing bearing bolts (see specifications).
_____	11. 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.
_____	12. Check oil level in axle differential and planetary ends (see Lubrication Chart).
_____	13. Check front wheel motors mounting bolt torque (see specifications).
_____	14. Check that the boom does not drift with a full load, no hydraulic pressure (engine off) and the control valve in the "BOOM DOWN" position.
_____	15. Check to make sure boom sections are not dented or bent.
_____	16. Check that all adjustable flow valves are locked.
_____	17. Check fuel shutoff engine linkage (optional for some Diesels) for proper operation. Loosen lever arm and lubricate with WD-40 or equivalent.
_____	18. Lubricate boom wear pads (see Lubrication Chart).
_____	19. Lubricate hydraulic control handle pivot pins (see Lubrication Chart).
_____	20. Lubricate steering spindles (see Lubrication Chart).
_____	21. Lubricate steering cylinder bearings (see Lubrication Chart).
_____	22. Lubricate tie rod bearings (see Lubrication Chart).
_____	23. Follow engine monthly service requirements. Refer to the Engine Maintenance Manual supplied with your AT45.

ADDITIONAL MAINTENANCE REQUIREMENTS FOR SEVERE USAGE APPLICATIONS

EVERY 90 DAYS

INITIAL	DESCRIPTION
_____	24. Replace hydraulic filter element (earlier replacement if reduced speed of drive function is indicated).

SEMI-ANNUAL OPERATIONAL CHECKLIST

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 AT45 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 (earlier replacement if reduced speed of drive function is indicated).

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. Follow engine semi-annual service requirements. Refer to the Engine Maintenance Manual supplied with your AT45.

SECTION 7:
TROUBLESHOOTING

Table of Contents, Section 7

General Troubleshooting Tips 7-3
Troubleshooting Chart 7-4
Index to Troubleshooting Chart
All hydraulic functions inoperable. 7-10
Boom drifts down without lever activation 7-11
Boom drifts down without lever actuated with power .. 7-10
Boom track cross braces breaking 7-5
Boom track sagging 7-6
Cavitation, a gaseous condition within the fluid 7-5
Drive function does not operate from ground 7-11
Engine won't crank 7-6
Excessive hydraulic pump pressure 7-8
Execssive heat 7-4
Function chatter 7-9
Hydraulic functions slow 7-8
Hydraulic pump and fluid line vibration 7-9
Hydraulic pump noise or squeal 7-10
Hydraulic pump shaft seal failure 7-9
Lift cylinder drifts 7-7
Low hydraulic pump output 7-8
Low speed drive 7-18
Movement alarm will not sound 7-7
No drive function from platform 7-12
No extend or retract function from platform 7-14
No hydraulic pump output 7-7
No lift function from platform 7-13
No steer function from ground 7-12
No swing function from platform 7-14
Platform does not level properly (platform drifting) 7-16
Platform level selector valve body cracked or blown .. 7-16
Platform rotate selector valve body cracked or blown . 7-15
Platform will not react to platform rotate control 7-15
Poor lubrication, parts break through lubricant 7-4
Slow hydraulic pump response 7-8
Steer selector valve body cracked or blown 7-17
Swing gear pinion shaft, tooth and/ or ring bearing 7-15
Swing motor will not run in either direction 7-14
Telescope, swing, or hoist functions 7-10
Throttle actuator 7-6
Unit will not go into high speed drive 7-18
Unit will not steer; all other functions operate 7-16
Varnish 7-4
Water in hydraulic fluid 7-4
Wheel drive motor failure 7-17

GENERAL TROUBLESHOOTING TIPS

Before investigating a malfunction, check the following items:

- The Main Power Key Switch should be in the "GROUND" or "PLATFORM" position.
- The Foot Pedal Switch is pressed and held for platform console operation.
- Pump Selector Switch is pressed and held for ground control operation.
- Check that battery connections are secure and battery is fully charged.
- Check that the Emergency Stop Buttons are released.
- Check that the hydraulic reservoir ball valves are open.
- Check that hydraulic fluid is at the correct level.

Common Causes of Hydraulic System Malfunctions:

- Mixing incompatible hydraulic fluids, destroying the additives and causing varnish build up resulting in sticking valves.
- Water in the hydraulic fluid due to a damp climate and loss of reservoir pressurization.
- Improper viscosity hydraulic fluid; too high in a cold climate, too low in a warm climate.

  NOTE: Mobil DTE-13M is recommended as a general purpose fluid suitable for all but the most extreme environmental conditions.

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

TROUBLESHOOTING CHART

Problem	Probable Cause	Solution
• Excessive heat causing excessive wear on seals and metal parts due to lowered hydraulic fluid viscosity. Symptoms to watch for are: pump case turns brown, hydraulic fluid darkens and premature pump failure.	• Excessive water in the hydraulic fluid.	• Drain and flush hydraulic system. See Section 2, System Flushing Procedure.
	• Improper oil viscosity.	• Replace hydraulic fluid with the correct fluid. See Section 2, Fluid Recommendations.
	• Pump cam bearing failure.	• Rebuild pump as required. Refer to Illustrated Parts Catalog.
	• Foot pedal blocked to the "ON" position.	• Unblock foot pedal.
• Water in hydraulic fluid. Symptoms to watch for are: pitting and etching of pump pistons and pump piston cam wear causing heat build up and premature pump failure.	• Damp climate, or hydraulic fitting or port open to contaminants.	• Drain and flush hydraulic system. See Section 2, System Flushing Procedure.
	• Reservoir not pressurized.	• Check pressure. Check reservoir for leaks.
• Varnish, the dark brownish residue left from oxidation of hydraulic fluids. Symptoms to watch for are: pistons, spools and moving parts with close tolerances tend to stick and hang up.	• Mixing of incompatible fluids or poor quality fluids.	• Drain and flush hydraulic system. See Section 2, System Flushing Procedure.
	• Excessive heating of the fluids.	• Replace hydraulic fluid with the correct fluid. See Section 2, Fluid Recommendations.
• Poor lubrication, parts break through lubricant causing metal to metal contact. Symptoms to watch for are: heads of pump pistons worn and excessive heat build up.	• Hydraulic fluid viscosity low.	• Drain and flush hydraulic system, then fill with recommended hydraulic fluid.
	• Improper or poor grade hydraulic fluid or lubricant without anti-wear additives.	• Drain and flush hydraulic system, then fill with recommended hydraulic fluid.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Cavitation, a gaseous condition within the fluid stream where the pressure is reduced to the vapor pressure of the fluid. The higher the system pressure the more violent the reaction will be. Symptoms to watch for are: pitting and etching of pump pistons.	• Low reservoir fluid level.	• See Section 2, Fluid Recommendations.
	• Air leaks in suction line.	• Tighten suction hose clamps.
	• Improper hydraulic fluid.	• Replace hydraulic fluid with the correct fluid. See Section 2, Fluid Recommendations.
	• Vaporization of water.	• Drain and flush hydraulic system. See Section 2, System Flushing Procedure.
	• Hydraulic fluid system has not been warmed before using full system pressure.	• Warm up system before using full system pressure.
	• Pump speed too high.	• Ensure reservoir pressurization is operating properly and adjust engine speed.
• Hose wear.	• Hoses skiving in the boom track.	• Check hydraulic pressure and adjust if necessary.
	• Hoses too tight in the track.	• Adjust hose tension.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Boom track sagging.	• Track pin holes stretched usually caused by a damaged "I" beam support.	• Check "I" beam support and replace if necessary. Refer to Illustrated Parts Catalog.
	• Overhead guard is damaged. If the guard is damaged, the track could get caught and could also tear off the moving anchor.	• Replace overhead guard and any other items damaged due to a damaged guard. Refer to Illustrated Parts Catalog.
	• Improper lubrication and cleaning.	• See Lubrication Chart.
• Engine won't crank.	• Foot pedal depressed.	• Release foot pedal.
	• Ground/ platform switch, ground/ platform ignition switch, or starter motor relay, starter motor interlock relay, power relay or shut down relay.	• A breakdown in any one of these components will cause the engine not to crank. Trace the available voltage to starter motor relay. See Electrical and Continuity Checks, Section 3, and electrical schematic in Appendix.
	• Low oil pressure/ high water temperature sensors, or engine failure.	• Refer to engine Service Manual. Replace the faulty component(s).
• Throttle actuator doesn't work.	• Throttle high speed relay, or circuit breaker is bad.	• See Electrical and Continuity Checks, Section 3, and electrical schematic in Appendix.
	• An actuator failure.	• Refer to Illustrated Parts Catalog.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Movement alarm will not sound.	• Broken wire or connection in the horn circuit. Horn or diodes are faulty.	• Trace the voltage to horn. See electrical schematic in Appendix. See Electrical and Continuity Checks, Section 3.
• Lift cylinder(s) drifts down.	• Counterbalance valve cartridge dirty or faulty.	• See Lift Cylinders, and Solenoid Valve Checks, Section 2.
	• Cylinder packing is damaged.	• Replace cylinder packing. Refer to Illustrated Parts Catalog.
• No hydraulic pump output	• Water in hydraulic fluid, or improper oil viscosity.	• See Section 2, System Flushing Procedure. Use correct fluid. See Lubrication Chart.
	• Foot pedal blocked.	• Unblock foot pedal.
	• Hydraulic fittings loose or ports open.	• Close ports and tighten fittings. Drain and flush hydraulic system. See Section 2, System Flushing Procedure.
	• Pump cam bearing failure, or broken pump drive shaft.	• Replace pump. Refer to Illustrated Parts Catalog.
	• Compensator malfunction.	• See Main Hydraulic Pump Adjustment, Section 2.
	• Fluid leaks.	• Tighten clamps on suction line. Check lines for other leaks.
	• Pump stroking valve faulty.	• See Main Hydraulic Pump Stroking Valve, and Solenoid Valve Checks in Section 2.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Low hydraulic pump output.	• Low pressure.	• See Main Hydraulic Pump Adjustment, Section 2.
	• Compensator failure.	• Check for compensator, seat, spring or packing failure and replace if damaged. See Main Hydraulic Pump Adjustment, Section 2. Also, refer to Illustrated Parts Catalog.
	• Pump failure.	• Check for worn or scored pistons and bores; replace if damaged. Refer to Illustrated Parts Catalog.
	• Discharge valves failure.	• Check for broken discharge valves or springs; replace if damaged. See Main Hydraulic Pump, Section 2. Also, refer to Illustrated Parts Catalog.
	• Restricted pump inlet.	• Check for restricted inlet or insufficient inlet fluid. See Main Hydraulic Pump, Section 2. Also, refer to Illustrated Parts Catalog.
	• Pump stroking valve faulty.	• See Main Hydraulic Pump Stroking Valve, and Solenoid Valve Checks in Section 2.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Hydraulic functions slow.	• Low hydraulic pump pressure.	• See Main Hydraulic Pump Adjustment, Section 2.
	• Hydraulic high pressure filter.	• Check for plugged hydraulic high pressure filter; replace filter element. See High Pressure Filter Element, Section 2.
	• Compensator failure.	• Check for compensator, seat, spring or packing failure and replace if damaged. See Main Hydraulic Pump Adjustment, Section 2. Also, refer to Illustrated Parts Catalog.
• Slow hydraulic pump response.	• High pressure filter.	• Check for plugged high pressure filter. See High Pressure Filter Element, Section 2.
• Excessive hydraulic pump pressure.	• Improper compensator adjustment.	• See Main Hydraulic Pump Adjustment, Section 2.
• Function chatter.	• Hydraulic fluid low.	• See Lubrication Chart.
	• Hydraulic tank not pressurized.	• Check hydraulic tank cap.
	• Broken pump components.	• Check for sticking pump pistons, broken discharge valve or spring, broken inlet valve; replace if necessary. Refer to Illustrated Parts Catalog.
		• Check for system leakage.
		• Tighten pump suction line clamps.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Hydraulic pump and fluid line vibration.	• Component failure.	• Check for broken discharge valve, spring, or leaking inlet valve; replace if damaged. Refer to Illustrated Parts Catalog.
• Hydraulic pump shaft seal failure.	• High pressure.	• Check seal drain line for blockage and replace seal, if necessary.
• Hydraulic pump noise or squeal.	• Low pressure.	• Check for low deadhead pressure and see Main Hydraulic Pump Adjustment, Section 2. Add hydraulic fluid, if required. See Lubrication Chart.
	• Component failure.	• Check for compensator valve, seat, spring or packing failure, or leaking inlet valve; replace if damaged. Refer to Illustrated Parts Catalog. • Tighten inlet connections. • Check that inlet valve is open and line is intact.
• All hydraulic functions inoperable.	• Low fluid in reservoir. • Hydraulic pump compensator out of adjustment. • Pump stroking valve.	• Fill to proper level. • See Main Hydraulic Pump Adjustment, Section 2. • See Main Hydraulic Pump Stroking Valve, and Solenoid Valve Checks in Section 2.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Telescope, swing, or lift functions don't operate using ground control.	• Hydraulic pump defective.	• Repair or replace. Refer to Illustrated Parts Catalog.
	• Pendant toggle switches have no voltage.	• See Electrical and Continuity Checks, Section 3. Also, refer to electrical schematic in Appendix.
	• Valve is stuck.	• Repair as required. Refer to Illustrated Parts Catalog.
	• Pump stroke valve.	• See Main Hydraulic Pump Stroking Valve, and Solenoid Valve Checks in Section 2.
	• Defective counterbalance valve.	• See Telescope Cylinder, Lift Cylinders or Swing Double Counterbalance Valve, and Solenoid Valve Checks in Section 2.
• Boom drifts down without lever actuated with power on or off.	• Defective counterbalance valve.	• See Lift Cylinders, and Solenoid Valve Checks in Section 2.
	• Cylinder packing.	• Refer to Illustrated Parts Catalog.
• Boom drifts down without lever activation but with power on; does not drift down with power off.	• Mechanical failure.	• Check that ground and platform boom control levers return to neutral position. Refer to Illustrated Parts Catalog.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Drive function does not operate from ground.	• No voltage at toggle switch.	• See electrical schematic in Appendix. Also, see Electrical and Continuity Checks, Section 3.
	• Drive control relay in ground control box is bad.	• See Electrical and Continuity Checks, Section 3. Also, refer to Illustrated Parts Catalog.
	• Drive motors are damaged.	• Inspect, repair or replace. Refer to Illustrated Parts Catalog.
	• Drive valve spool is stuck.	• Manually engage and check for proper operation. Repair or replace if faulty. Refer to Illustrated Parts Catalog.
	• Low speed flow control valves are closed.	• Call Simon Service for procedure to set valves.
• No steer function from ground.	• Steer toggle switch is bad.	• See electrical schematic in Appendix. Also, see Electrical and Continuity Checks, Section 3.
	• Steer valve.	• Manually engage and check for proper operation. Replace if faulty. Refer to Illustrated Parts Catalog.
	• Faulty steer cylinder.	• Inspect, repair or replace steer cylinder. Refer to Illustrated Parts Catalog.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No drive function from platform.	• Platform low speed drive control relay is bad.	• See Electrical and Continuity Checks, Section 3. Also, refer to Illustrated Parts Catalog.
	• No hydraulic fluid flow available to the drive motors.	• Test for available fluid flow at the drive motors.
	• Diverter valve not fully shifted.	• Manually engage and check for proper operation. Repair or replace if faulty. Refer to Illustrated Parts Catalog.
	• Drive motors are damaged.	• Inspect, repair or replace. Refer to Illustrated Parts Catalog.
	• Drive valve spool is stuck.	• Manually engage and check for proper operation. Replace if faulty. Refer to Illustrated Parts Catalog.
	• Low speed flow control valves are closed.	• Call Simon Service for procedure to set valves.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No lift function from platform.	• Mechanical failure.	• Check that ground and platform boom control levers return to neutral position. Refer to Illustrated Parts Catalog.
	• Lift spool valve stuck.	• Manually engage and check for proper operation. Replace if faulty. Refer to Illustrated Parts Catalog.
	• Defective counterbalance valve.	• See Lift Cylinders, and Solenoid Valve Checks in Section 2.
	• Faulty cylinder.	• Inspect, repair or replace lift cylinder. Refer to Illustrated Parts Catalog.
	• Pump not coming on stroke.	• See Main Hydraulic Pump Stroking Valve, and Solenoid Valve Checks in Section 2.
	• Drive enable valve energized.	• See Platform Component Locator, and Electrical and Continuity Checks in Section 3.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• No extend or retract function from platform.	• Spool valve stuck.	• Manually engage and check for proper operation. Replace if faulty. Refer to Illustrated Parts Catalog.
	• Mechanical failure.	• Check that ground and platform boom control levers return to neutral position. Refer to Illustrated Parts Catalog.
	• Pressure reducing valve possibly leaking to tank.	• Inspect, clean and retest. Replace if faulty.
	• Defective counterbalance valve.	• Check counterbalance valve for foreign material or internal damage; replace if damaged.
	• High pressure filter dirty.	• Check for a dirty high pressure filter; replace filter element if dirty.
• No swing function from platform.	• Drive enable valve energized.	• Check drive enable valve for voltage/ open cartridge. See Drive Enable Valve, Section 3.
	• Spool valve stuck.	• Manually engage and check for proper operation. Replace if faulty. Refer to Illustrated Parts Catalog.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Swing motor will not run in either direction.	• Drive enable valve energized.	• Check drive enable valve for voltage/ open cartridge. See Drive Enable Valve, Section 3.
	• Mechanical malfunction.	• Check for an obstruction between the pinion gear and swing bearing; remove the obstruction.
		• Swing gearbox pinion shaft is broken; replace pinion shaft. Refer to Illustrated Parts Catalog.
		• Swing motor shaft is broken or seized; replace the swing motor. Refer to Illustrated Parts Catalog.
• Swing gear pinion shaft, tooth and/ or ring bearing failure.	• Excessive side loading of boom.	• Check for excessive side loading of boom; correct the situation and replace rotation bearing if teeth damaged.
	• Unit throttling not being used, causing instant on and off of the swing motor.	• Check that the foot pedal is depressed before the lever is activated.
	• Swing pinion gear torqued too tight.	• Check for correct torque; adjust the torque. See Machine Specifications.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Platform will not react to platform rotate control movement.	• Double pilot operated check valve (relief valve).	• Check the valve cartridge and replace if necessary.
	• Relief valve set too low.	• Increase pressure setting. See Platform Rotator Pressure Relief Valve, Section 2.
	• Valve spool leakage.	• Check for internal leakage of the valve spool; replace as required. Refer to Illustrated Parts Catalog.
	• Mechanical malfunction.	• If platform rotates only in one direction, check for physical constraints or foreign material restricting platform rotation; remove foreign material.
• Platform rotate selector valve body cracked or blown body seal.	• Excessive system pressure.	• Check that there is no back pressure on the return port. Check that inlet and return hoses are connected.
	• Blocked hoses.	• Check for blocked or partially blocked return hoses.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Platform does not level properly (platform drifting).	• Damaged parts.	• Check for damaged parts such as bent pins or elongated pin holes; replace damaged parts. May need to replace slave cylinder.
	• Defective counterbalance valve.	• Check counterbalance valve for foreign material or internal damage; replace if damaged. Refer to Illustrated Parts Catalog.
	• Defective double pilot operated check valve.	• Repair or replace as necessary.
• Platform level selector valve body cracked or blown body seal.	• Excessive system pressure.	• Check that there is no back pressure on the return port. Check that inlet and return hoses are connected.
	• Blocked hoses.	• Check for blocked or partially blocked return hoses.
• Unit will not steer; all other functions operate.	• Steer cylinder may not be mechanically connected to steering linkage.	• Check for disconnected, binding or damaged steering linkage; connect or replace steering linkage as necessary. Refer to Illustrated Parts Catalog.
	• Steering directional control valve.	• The steering directional control valve may not be shifting. The valve spools may be stuck. The directional control valve maybe defective or a valve spool obstructed. Remove valve and inspect, clean, repair or replace as needed. Refer to Illustrated Parts Catalog.

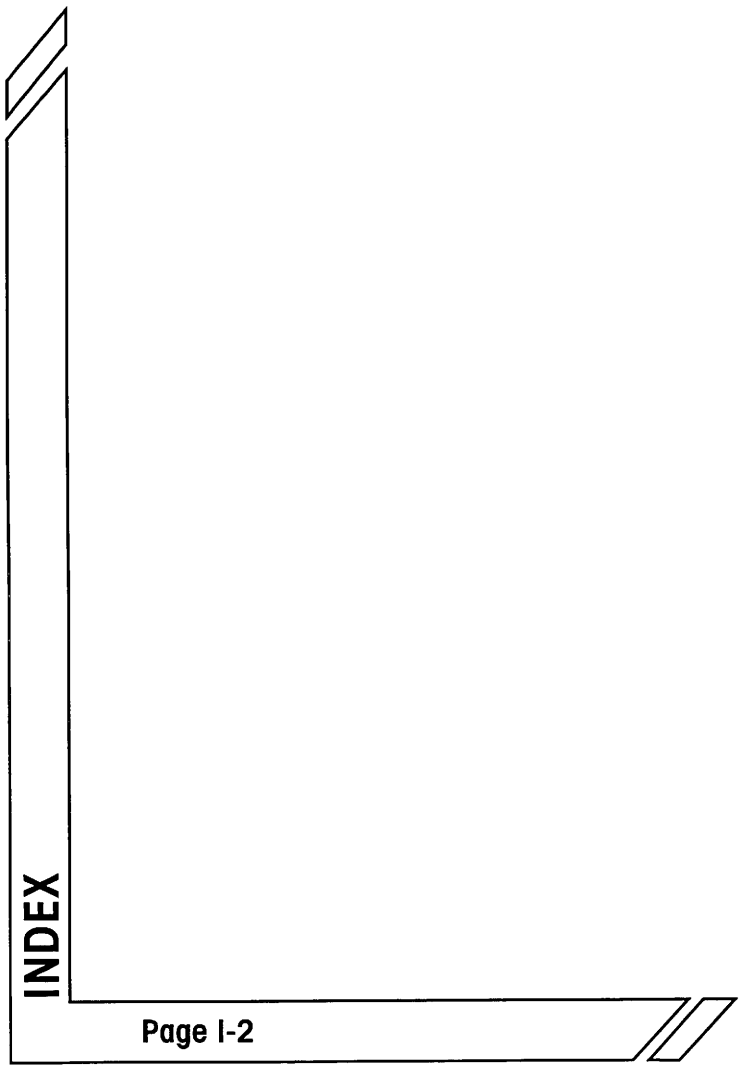
TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Steer selector valve body cracked or blown body seal.	• Excessive system pressure.	• Check that there is no back pressure on the return port. Check that inlet and return hoses are connected.
	• Blocked hoses.	• Check for blocked or partially blocked return hoses.
• Wheel drive motor failure.	• Contaminated hydraulic fluid.	• Check for contamination of hydraulic fluid; drain, flush system and replace with the correct grade of hydraulic fluid. See System Flushing, Section 2.
	• Wheel drive motor component failure.	• Replace the motor. If one motor failed, internal loose or broken pieces will eventually flow into the opposite motor causing that motor to fail; unless lines are properly cleaned. Drain, flush system and replace hydraulic fluid after replacing broken component. See System Flushing, Section 2.
	• Wheel bearing failure.	• Check for proper installation of wheel bearing. Refer to Illustrated Parts Catalog.
	• Machine has been towed with drive motor engaged.	• Do not tow the machine if not equipped with the tow package.

TROUBLESHOOTING CHART (CONTINUED)

Problem	Probable Cause	Solution
• Low speed drive valve inoperative in low speed drive mode only.	• Valve spool stuck.	• Check for a sticking spool; replace if necessary.
	• High speed drive valve coil.	• Check resistance in the high speed drive valve coil. Each coil should have 4 ohms resistance, if valve has less than 4 ohms resistance, excessive voltage will feed across the coil to the opposite coil of the low speed valve trying to be operated. Thus both coils are trying to actuate. Replace high speed drive coil if necessary.
	• Flow controls closed or plugged.	• Clean or replace flow control valve.
• Unit will not go into high speed drive with boom retracted and lowered.	• High pressure filter dirty.	• Replace filter element.
	• Hi speed drive valve faulty.	• Repair or replace if necessary.
	• Boom limit switches faulty.	• Check wiring or replace switches.
	• High speed drive valve coil.	• Check resistance in the high speed drive valve coil. Each coil should have 4 ohms resistance, if valve has less than 4 ohms resistance, excessive voltage will feed across the coil to the opposite coil of the low speed valve trying to be operated. Thus both coils are trying to actuate. Replace high speed drive coil if necessary.

INDEX


INDEX

Index

A

Annual Service 6-5

B

Base End Cylinder Pin Replacement 5-5
Batteries 6-4
Battery 4-3
Battery Maintenance (In Storage) 4-3
Battery Maintenance (In Use) 4-3
Battery Replacement 4-4
Battery Troubleshooting 4-4
Bleeding the Platform Leveling Circuit 5-22
Boom 5-10
Boom Component Locator ..... xiii, xiv, xv
Boom Cylinders 6-5
Boom Lift System 2-14
Boom Telescope Cylinder 5-18
Boom Telescope System 2-16
Brake Needle Valve 2-12
Brakes 1-8

C

Changing Tires 5-3
Chassis Bolts 6-4
Checklist 6-4, 6-5
Circuit Breaker 4-8
Control Valve Manifold 2-11
Control Valves 6-4
Cross Port Relief Manifold 2-13, 3-8
Cylinders 6-4

D

Daily Service 6-4
Directional
Control Valves 2-12, 2-14, 2-16, 2-18
Double Pilot Operated Check Valve 2-20
Drive Enable Valve 3-8
Drive Motors 3-3
Drive System Components 3-3
Drive/ Steer Manifold Assembly 2-11, 2-22

E

Electrical System 4-3
Electrical Theory of Operation 4-5
Emergency Lowering 1-8, 1-9
Emergency Pump 2-11
Emergency Pump Adjustment 2-11
Emergency Stop Button 4-6
Emergency System and Procedures 1-8
Engine Oil Pressure Gauge 4-9

F

First Three Months of Operation 6-3
Flexible Hoses 6-5
Fluid Recommendations 2-5
Foot Pedal Switch 4-7
Four Year Interval Service 6-5
Front Wheel Motor 3-3

G

General Maintenance Tips 6-3
Ground Control Box 4-8

H

Handling Precautions (Hydraulic Fluid) 2-5
High Pressure Filter 2-13, 6-5
High Pressure Filter Element 2-13
Horn 4-10
Hoses and Cables 5-9
Hour Meter 4-8
Hydraulic Drive Motor 3-3
Hydraulic Fluid 2-5, 6-5
Hydraulic Fluid Analysis 2-5
Hydraulic Fluid Reservoir 2-13
Hydraulic Fluid Reservoir Maintenance 2-14
Hydraulic Fluid Tank 6-5
Hydraulic Pump 2-9
Hydraulic Swivel 2-22
Hydraulic System 6-4
Hydraulic System Components 2-9

I

Ignition Switch 4-6
Introduction vi

K

Key Switch 4-8

L

Level Control Valve 2-20
Level Cylinder Seal Replacement 5-22
Lift Cylinders 2-15
Light Emitting Diode 4-7
Limit Switch 4-10
Lower Boom 5-10

Index (Continued)

M

Machine Components ix
Main Hydraulic Pump 2-9
Main Hydraulic Pump Adjustment 2-10
Maintenance Schedule 6-3
Master Level Cylinder 2-20
Mechanical Components 5-3
Miscellaneous Equipment 5-9
Monthly Operational Checklist 6-10
Monthly Service 6-4
Motion Control Valve 2-12, 3-7
Motion Control Valve Assembly 3-7
Movement Alarm 4-9

P

Pendant Control 4-9
Pivot Pins 6-4
Pivot Pins and Bearings 6-5
Pivot Pins and Grease Fittings 6-4
Platform 5-9
Platform Component Locator ..... xvi, xvii
Platform Control Box 4-6
Platform Drive Control Handle 3-8
Platform Level Cylinder Pin Replacement ... 5-21
Platform Level Cylinders 5-21
Platform Leveling System 2-20
Platform Mounting 6-5
Platform Rails and Safety Gate 6-4
Platform Rotate System 2-19
Platform Rotator Manifold 2-19
Pressure Reducing Valve 2-13, 3-8
Push Button 4-6, 4-8

R

Rear Axle Assembly 3-3
Rear Axle Assembly Replacement 3-5
Rear Axle Brake Adjustment 3-5
Rear Axle Drive Motor 3-4
Rear Axle Drive Motor Replacement 3-4
Relays 4-10
Relief Valves 2-20
Rotary Actuator 2-19
Rotary Actuator Maintenance 2-19
Rotate Control Valve 2-19
Routine Servicing 6-3

S

Semi-Annual Operational Checklist 6-12
Semi-Annual Service 6-5
Shift Operational Checklist 6-6
Shuttle Valve 2-13, 3-8
Shuttle Valve Assembly 2-13
Slave Level Cylinder 2-20
Solenoid Valve 3-8
Steer Cylinder 2-22, 5-5
Steer Cylinder Pins 5-5
Steer Cylinder Seal Replacement 5-5
Steer System 2-22
Steer System Maintenance 2-22
Steering 6-4
Stop Cushion Solenoid Valve 2-13
Structural Examination 6-5
Superstructure 5-7
Superstructure Component Locator ..... xi, xii
Superstructure swing system 2-18
Swing Drive Motor/ Reducer Assembly 2-18
System Flushing Procedure 2-6

Index (Continued)

T

Telescope Boom Cylinder Pin Replacement 5-18
Telescope Cylinder 2-17
Telescope Cylinder Installation 5-19
Telescope Cylinder Removal 5-19
Telescope Cylinder Seal Replacement 5-19
Test All Machine Systems 6-4
Tie Rod Assembly 5-6
Tie Rod Assembly Replacement 5-6
Tilt Alarm 4-9
Tilt Alarm Sensor Adjustment 4-10
Tilt Alarm Test 4-10
Tire Condition 6-4
Tires 5-3
Toggle Switch 4-6, 4-8, 4-9
Transporting the Unit 1-4

U

Undercarriage Component Locator x
Unloading Procedures 1-6

V

Volt Meter 4-8

W

Wear Pads 5-17
Wheel Motor Assembly 5-4
Wheels and Lug Nuts 5-3

APPENDIX

Table of Contents, Appendix

Hydraulic Schematics:
- Deutz F3L1011 S/N CDA00273 and up E-2366160
- Deutz F3L1011 S/N CDA00272 and below E-2353620
- Wisconsin 35 HP, Isuzu 3KR1, 1.3L Ford E-2325100
- Martin-Marietta E-2344610

Electrical Schematics:
- Deutz F3L1011 ..... D-2326160
- Ford 1.3 L (Dual Fuel) D-2326670
- Wisconsin 35 HP (Dual Fuel) D-2326150
- Wisconsin 35 HP (Dual Fuel) (S/N CDA00147and up) D-2337960
- Isuzu 3KR1 ..... D-2326680
- Ford 2.3 L (Dual Fuel) B-2364720
- Deutz F3L1011 and F41101 ..... B-2367810
- Wisconsin 35 HP (Gas and Dual Fuel) B-2370510
- Hatz 3L40C A-2369750

APPENDIX

PARKER RETURN LINE FILTER (10 MICRON)

PUMP SUCTION

MAIN PUMP (PARKER) 37 GPM @ 3000 RPM 3 in³/REV

COMPENSATOR SET @ 3000 PSI

PUMP STROKE (DEADMAN)

HYDRAULIC RESERVOIR 40 GAL CAPACITY

3000 PSI

EMERGENCY PUMP / MOTOR (1.2 GPM NOM.)

PRESSURE FILTER (10 MICRON)

PLATFORM MASTER LEVEL CYLINDER

DOUBLE RELIEF VALVES SET @ 3000 PSI

(15) HOSES THRU HOSE TRACK
(4) 6 HOSES
(11) 4 HOSES

PARKER PRESSURE FILTER (10 MICRON)

PILOT OPERATED CHECK VALVE

DUMP VALVE

7.9 GPM MAX.

7.9 GPM MAX.

6.4 GPM MAX.

BOOM TELESCOPE | SWING | LOWER BOOM LIFT | MID BOOM LIFT | UPPER BOOM LIFT

GROUND CONTROLS

PRESSURE REDUCING VALVE SET @ 2300 PSI (1 1/2 TURNS OPEN)

POWER BEYOND PLUG (REF.) P/N 01098704

SET @ 3000 PSI

SET @ 3000 PSI

DOUBLE COUNTERBALANCE VALVE

BOOM TELESCOPE CYLINDER

Ø.120 ORIFICE (5)

Ø.045 ORIFICE (45)

SWING DRIVE MOTOR 10in³/REV

DOUBLE COUNTERBALANCE VALVES SET @ 2500 PSI

(4) 10 HOSES BETWEEN SUPERSTRUCTURE & CHASSIS OR USE (2) 16 HOSES W/OPTIONAL HYD. SWIVEL (360° CONTINUOUS ROTATION)

LOWER BOOM LIFT CYLINDER

COUNTERBALANCE VALVE SET @ 3900 PSI

Ø.070 ORIFICE (47)

Ø.085 (48)

MID BOOM LIFT CYLINDER

COUNTERBALANCE VALVE SET @ 3900 PSI

UPPER BOOM LIFT CYLINDER

COUNTERBALANCE VALVE SET @ 3900 PSI

Ø.052 (52)

HAND PUMP / NEEDLE VALVE (DRIVE MOTOR DISCONNECT & BRAKE RELEASE)

DOUBLE COUNTERBALANCE VALVE W/ BRAKE SHUTTLE VALVE SET @ 3000 PSI

29.4 GPM (HI SPEED)

5.3 GPM (CREEP)

INTERNAL DISC BRAKE (SPRING APPLIED / HYD RELEASE)

ADAPTER FITTING P/N REF 06000018

AXLE DISENGAGED

AXLE ENGAGED

ADAPTER FITTING P/N REF 06000018

INTERNAL DISC BRAKE (SPRING APPLIED / HYD RELEASE)

WHEEL DRIVE MOTORS WITH PLANETARY HUBS (FRONT) 13.30:1 REDUCTION

STEERING CYLINDER

.082

WHEEL DRIVE MOTOR (REAR)

7.6 GPM (HI SPEED) 1.3 GPM (CREEP)

DOUBLE RELIEF VALVES SET @ 3,000 PSI

PRESSURE REDUCING VALVE SET @ 600 PSI

AXLE DISCONNECT CYLINDER

REAR DRIVE AXLE (SIGE) 14.058: TOTAL REDUCTION

DRIVE CUSHION VALVE

PLATFORM SLAVE LEVEL CYLINDER
DOUBLE COUNTERBALANCE VALVES
REF: P/N 01227200
SET @ 3000 PSI

WHEEL DRIVE

UPPER BOOM LIFT

MID BOOM LIFT

LOWER BOOM LIFT

SWING

BOOM TELESCOPE

PLATFORM LEVEL

PLATFORM ROTATE

Ø .021 ORIFICE

Ø .021 ORIFICE

DOUBLE PILOT CHECK VALVE

SET @ 1200 PSI

SET @ 1200 PSI

POWER BEYOND PLUG P/N 01098704, REF

PLATFORM CONTROLS

PLATFORM ROTARY ACTUATOR

DOUBLE RELIEF / DOUBLE PILOT CHECK VALVES MANIFOLD

NOTE: THIS DRAWING REPLACES DWG E-2353620 STARTING W/MACHINE S/N CDA-00273

KEY - LINE SIZES	
4	1/4" ID HOSE
6	3/8" ID HOSE
8	1/2" ID HOSE
12	3/4" ID HOSE
16	1" ID HOSE
24	1 1/2" ID HOSE

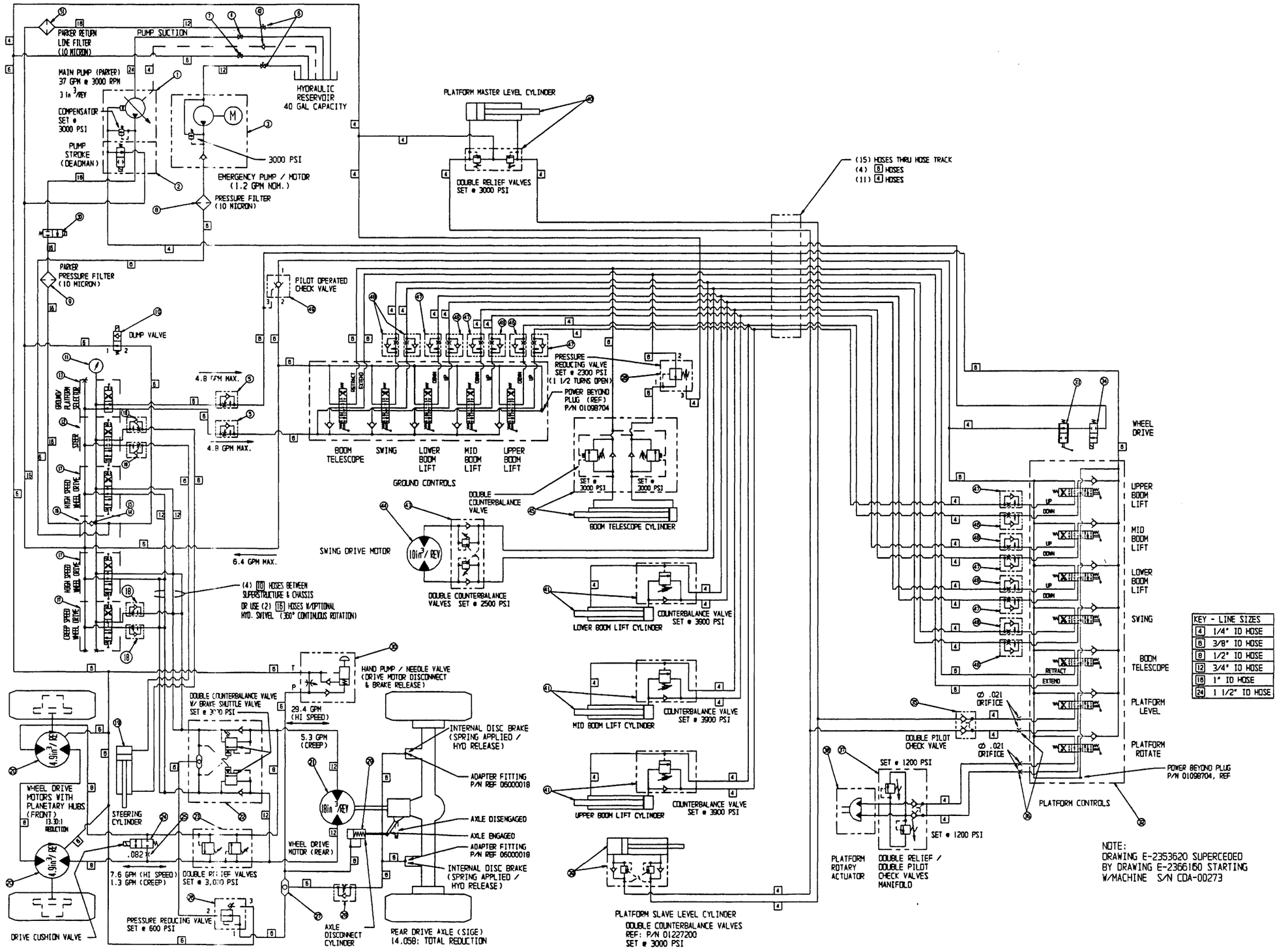
REF: DEUTZ F3L1011

SIMON AERIALS INC.
MILWAUKEE, WI. 53224

TITLE
HYDRAULIC SCHEMATIC / AT45

REVISION A / 12-30-93

DRWG. NO. E-2366160



NOTE:
DRAWING E-2353620 SUPERCEDED BY DRAWING E-2366160 STARTING W/MACHINE S/N CDA-00273

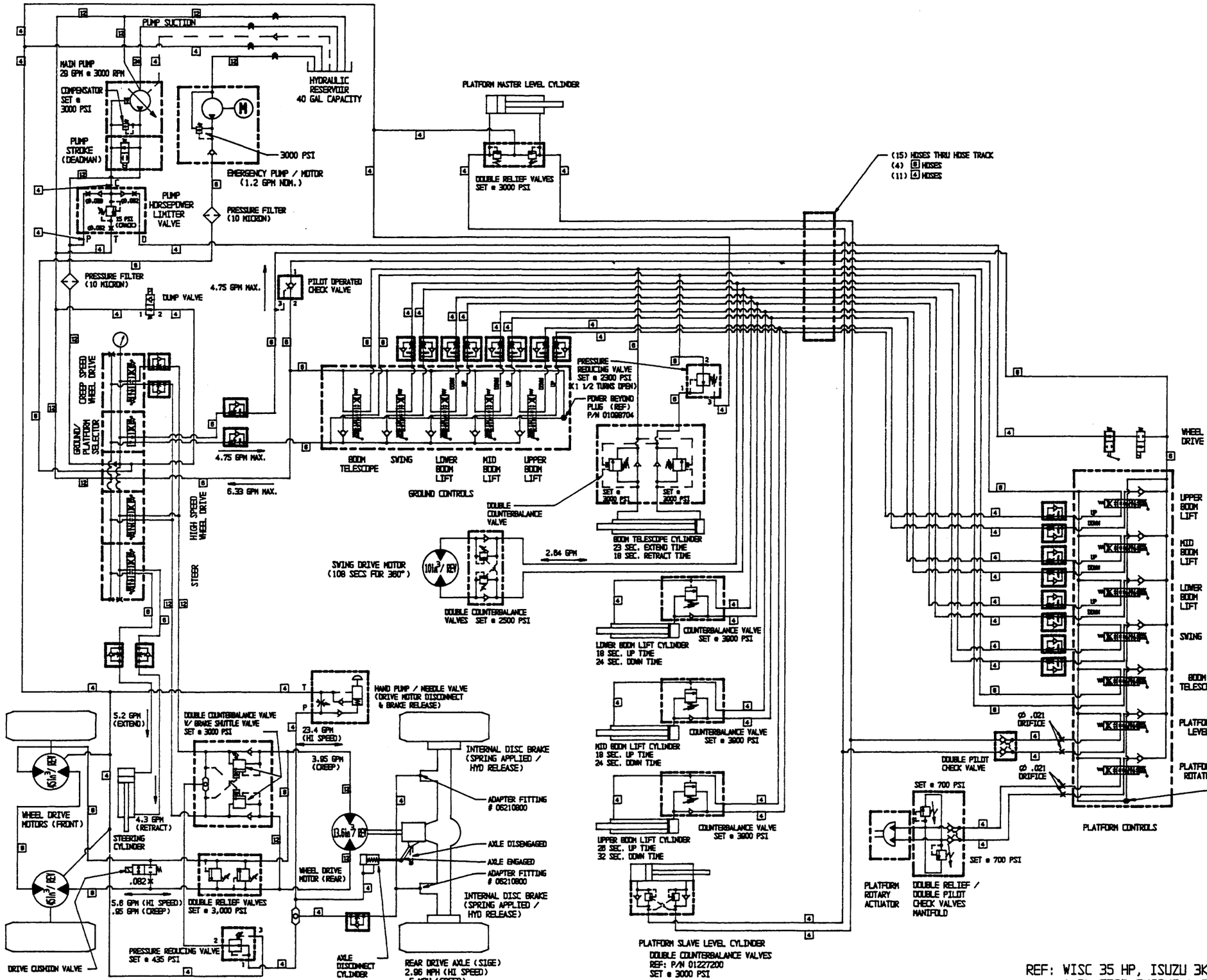
REF: DEUTZ F3L1011

SIMON AERIALS INC.
MILWAUKEE, WI. 53224

TITLE
HYDRAULIC SCHEMATIC / AT45

REVISION A / 12-30-93

DRWG. NO. E-2353620



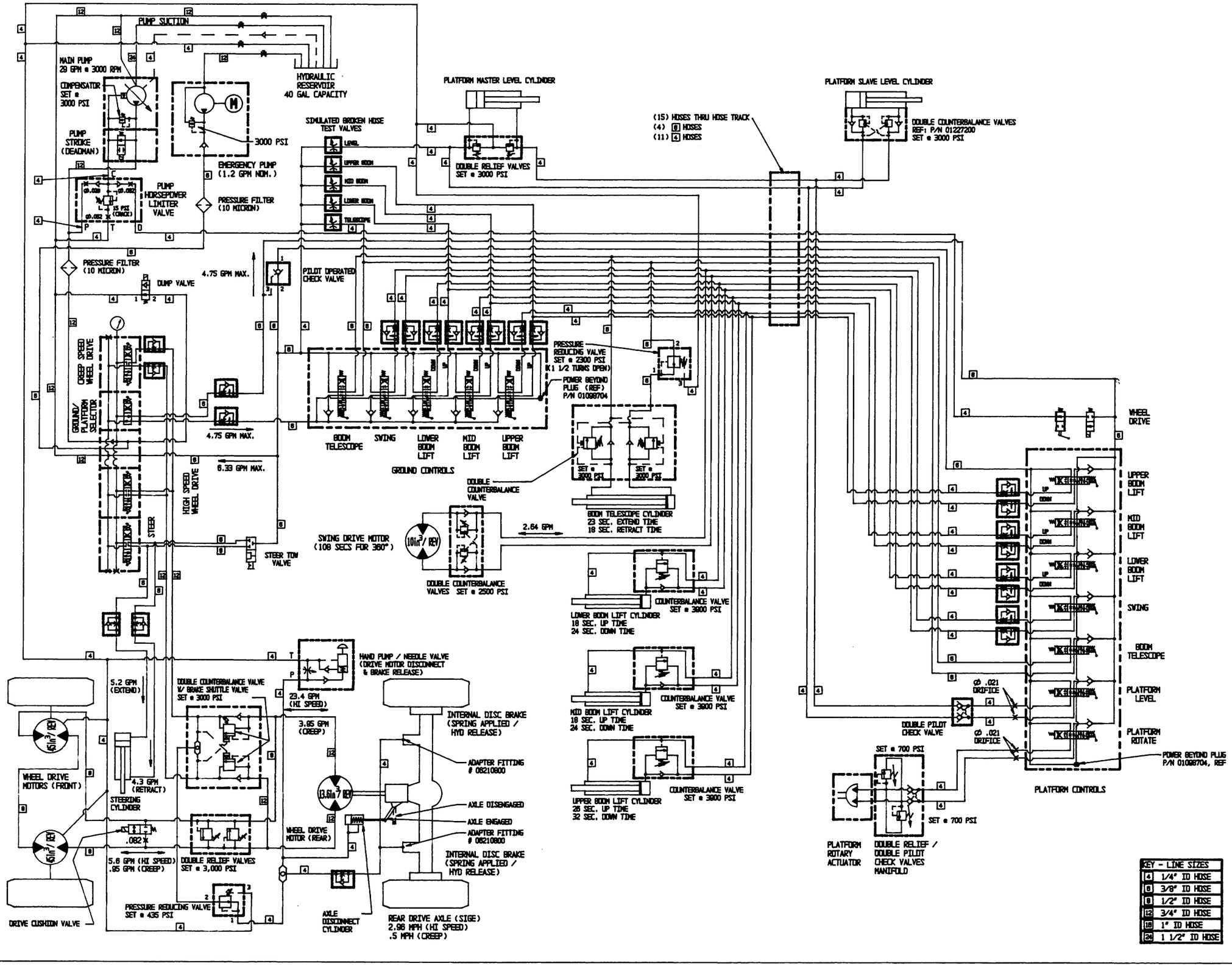
REF: WISC 35 HP, ISUZU 3KR1,
1.3L FORD ENGINE & F.P.H. CONTROLS

SIMON AERIALS INC.
MILWAUKEE, WI. 53224

TITLE: HYDRAULIC SCHEMATIC / AT45

REVISION: B / 12-30-93

DRWG. NO. E-2325100



KEY - LINE SIZES	
4	1/4" ID HOSE
6	3/8" ID HOSE
8	1/2" ID HOSE
12	3/4" ID HOSE
16	1" ID HOSE
24	1 1/2" ID HOSE

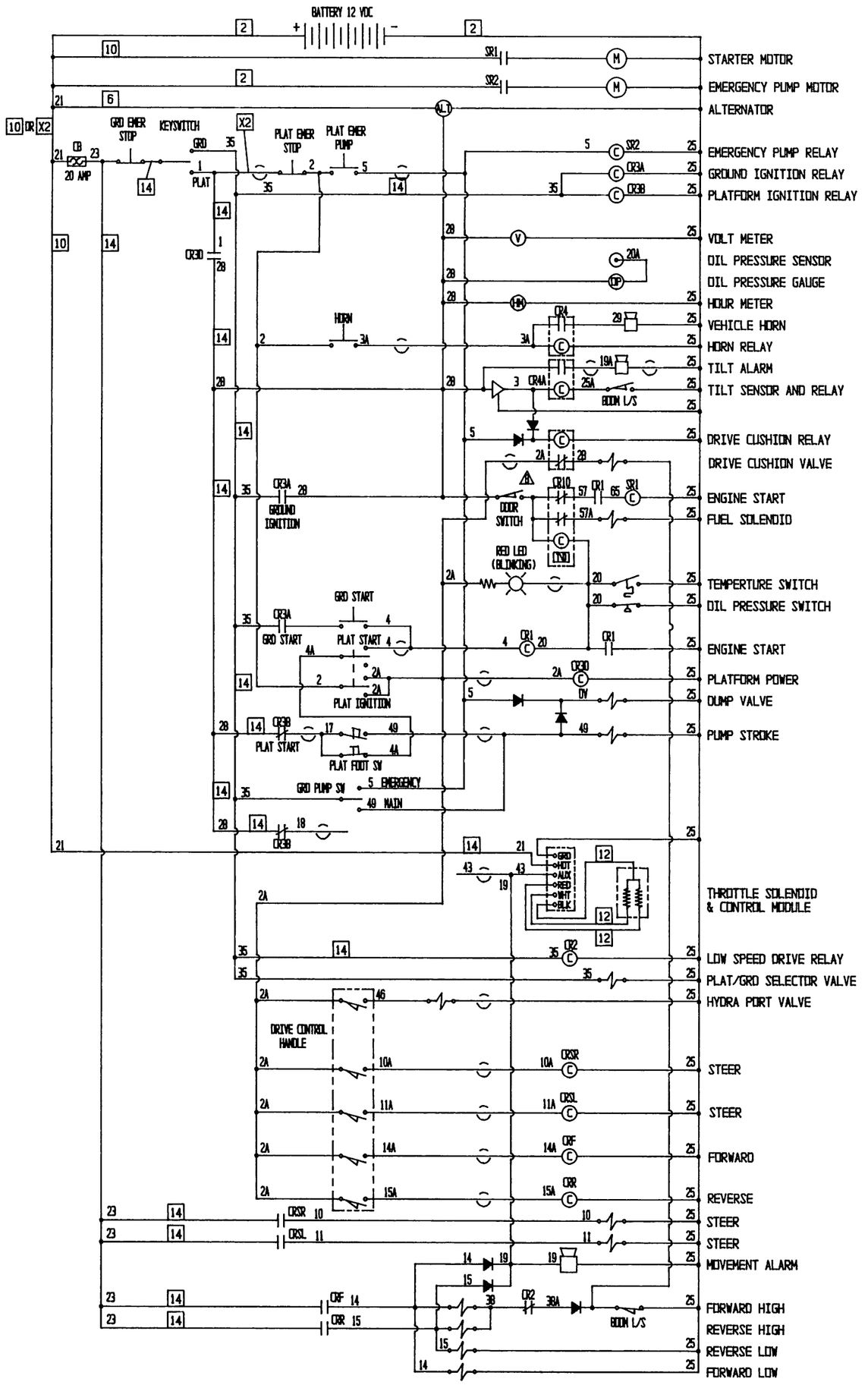
AT-45 MARTIN-MARIETTA

SIMON AERIALS INC.
MILWAUKEE, WI. 53224

TITLE
HYDRAULIC SCHEMATIC

REVISION
RELEASE, 12-28-94

DRWG. NO.
E-2344610



X2	DOUBLE WIRES
14	#14 AWG
12	#12 AWG
10	#10 AWG
6	#6 AWG
4	#4 AWG
2	#2 AWG
20	#20 AWG

NOTE: ALL WIRE SIZE TO BE 16 GA. EXCEPT AS NOTED.

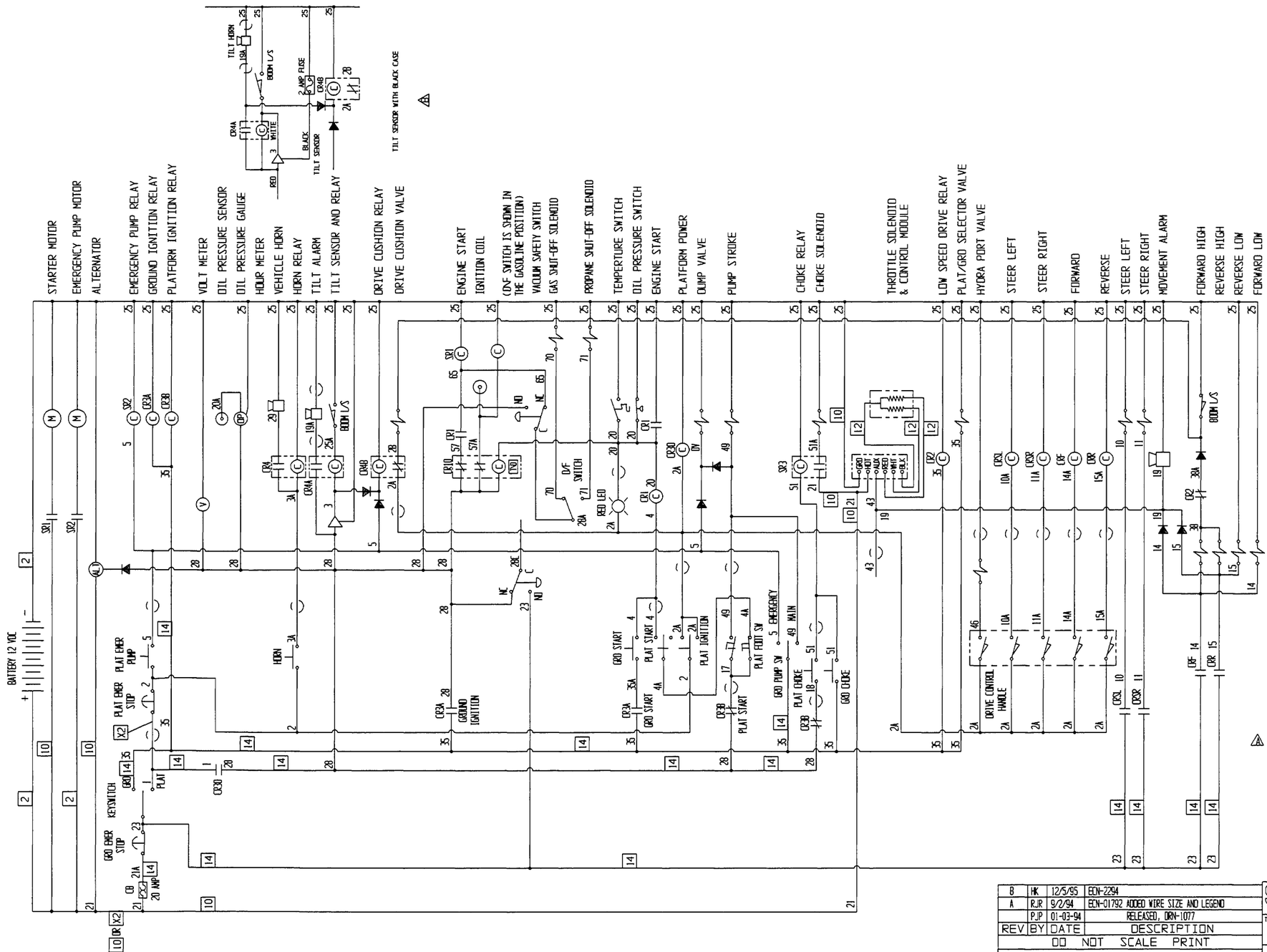
AT-45, DEUTZ F3L1011 ENGINE

SIMON-AERIALS INC.
MILWAUKEE, WI. 53209

TITLE: ELECTRICAL SCHEMATIC

REVISION: B

DWG. NO.: D-2326160



REV	BY	DATE	DESCRIPTION
B	HK	12/5/95	ECN-2294
A	RJR	9/2/94	ECN-01792 ADDED WIRE SIZE AND LEGEND
	PJP	01-03-94	RELEASED, DRN-1077
C	RLN	10/10/96	ECN-2791

DO NOT SCALE PRINT

ALL WELDS MUST BE IN ACCORDANCE WITH THE LATEST A.W.S. STANDARDS D1.1, D14.1 OR D10.9

THIS DRAWING IS THE PROPERTY OF SIMON-AERIALS INC. AND ALL THE INFORMATION THEREIN IS CONFIDENTIAL AND MUST NOT BE PUBLIC, NOR COPIED, NOR USED TO THE DISADVANTAGE OF SIMON-AERIALS INC. AND IS SUBJECT TO RETURN ON DEMAND.

SIMON AERIALS INC.
HOLLAND, MI. 49424

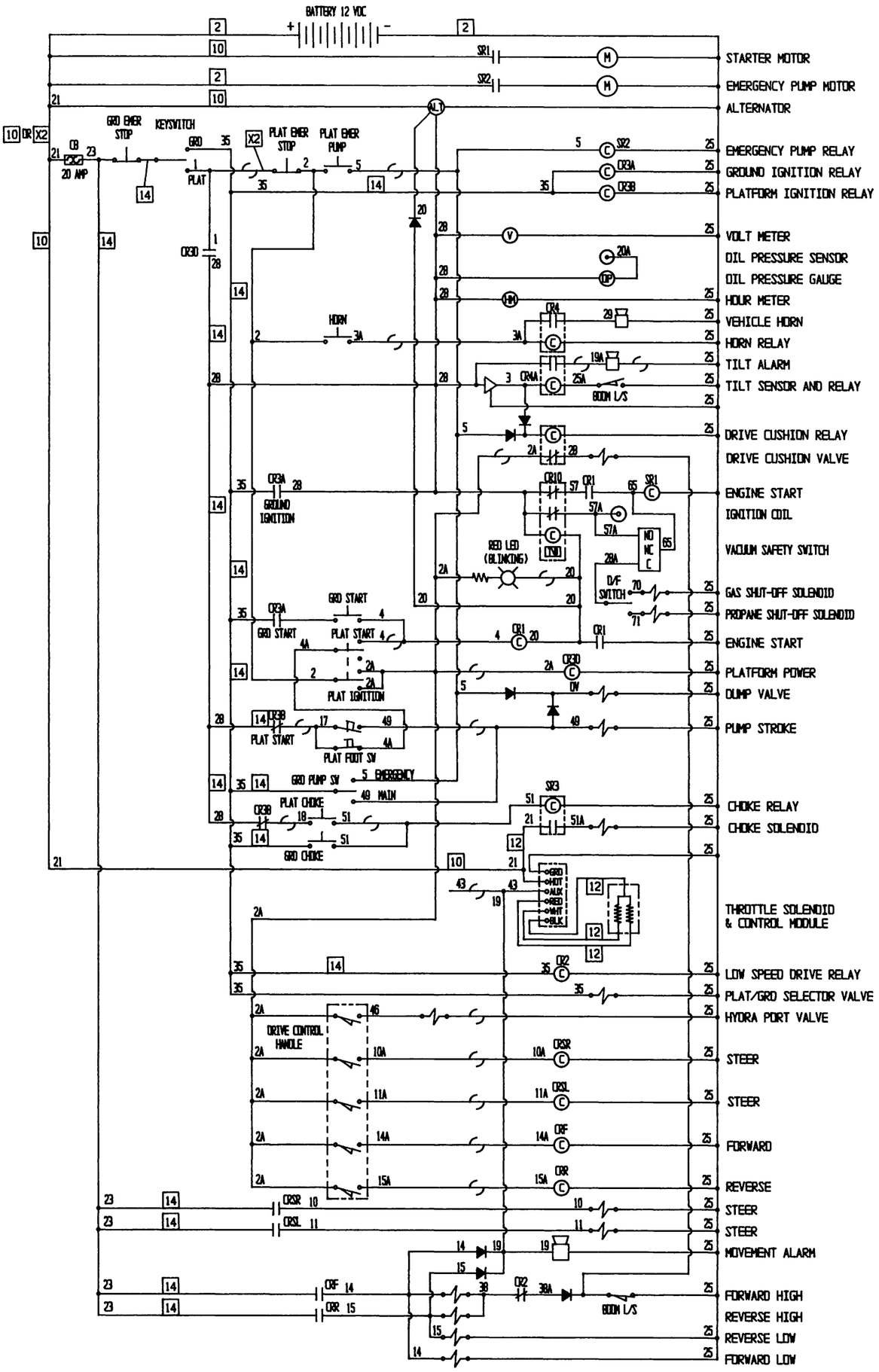
TITLE: ELECTRICAL SCHEMATIC

CADKEY DRAWING DO NOT REVISE MANUALLY

SCALE	DRAWN	DATE	CHECKED	APPROVED	DRAWING NO.
	PJP	01-03-94			D-2326670

UNLESS TOLERANCE

X.X	± .1
X.XX	± .05
X.XXX	± .015
FRACTIONAL	± 1/8
ANGULAR	± 0.5 deg.



20	#2/0 AWG
2	#2 AWG
4	#4 AWG
10	#10 AWG
12	#12 AWG
14	#14 AWG
X2	DOUBLE WIRES

NOTE: ALL WIRE SIZE TO BE 16 GA. EXCEPT AS NOTED.

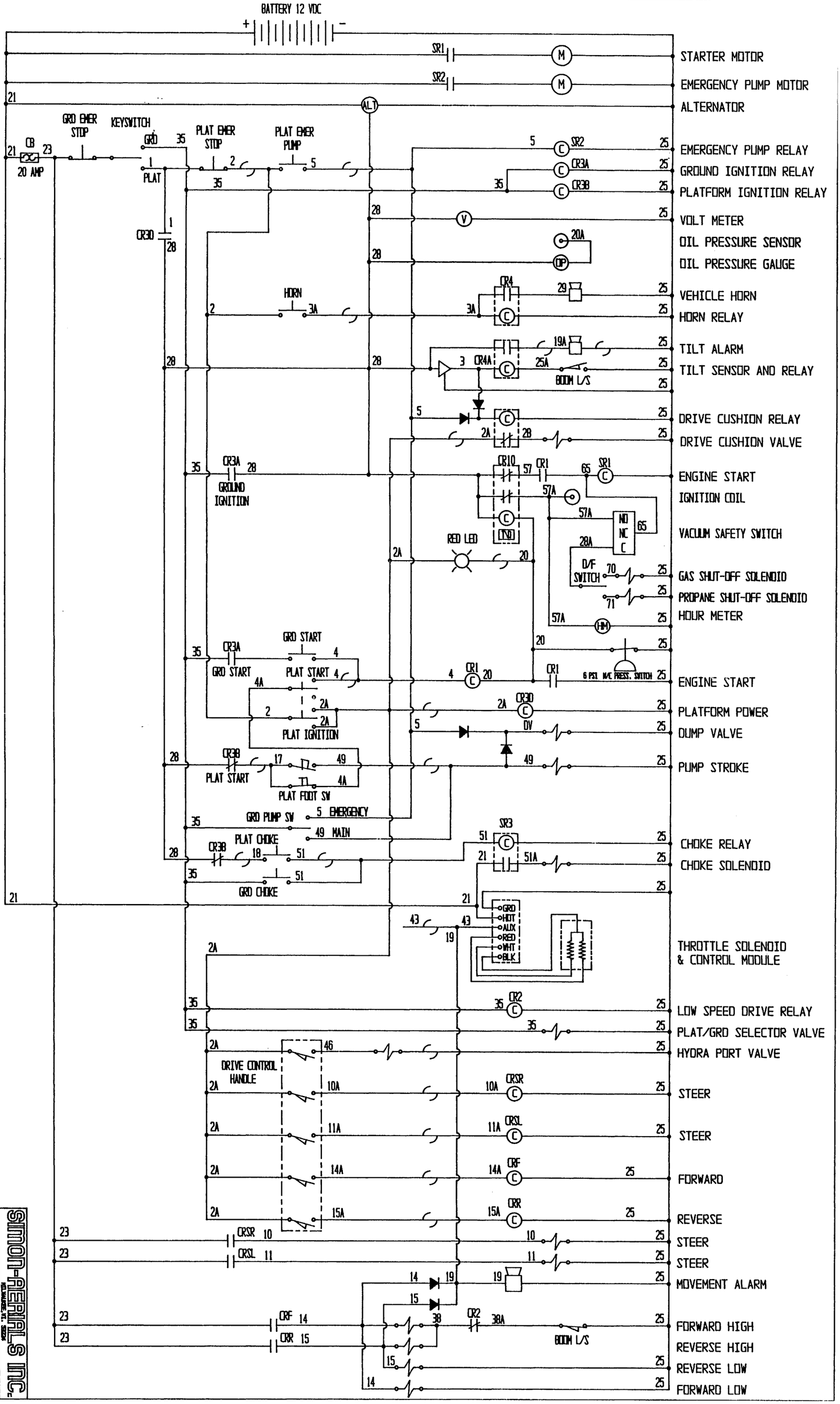
AT-45, WISCONSIN 35 HP ENGINE
DUAL FUEL

SIMON-AERIALS INC.
MILWAUKEE, WI. 53209

TITLE
ELECTRICAL SCHEMATIC

REVISION A

DRWG. NO. D-2326150



AT-45, WISCONSIN 35 HP ENGINE
DUAL FUEL SEALED ALTERNATOR
FIRST USED ON SER.#CDA00147

REVISION	TITLE: ELECTRICAL SCHEMATIC	SIMON-AERIALS INC.
DWNG. NO.	D 2337960	

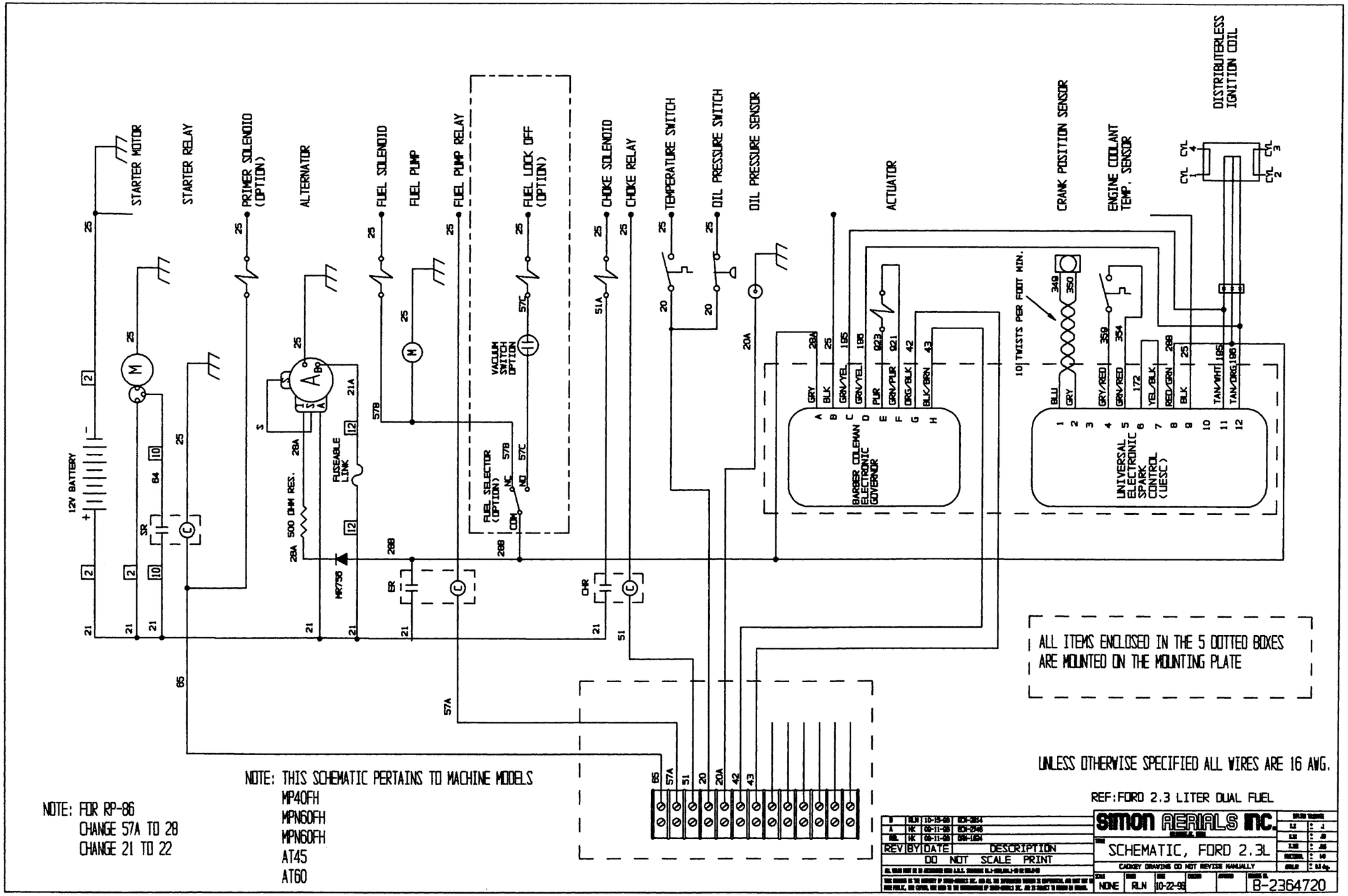
AT-45, ISUZU 3KR1 ENGINE

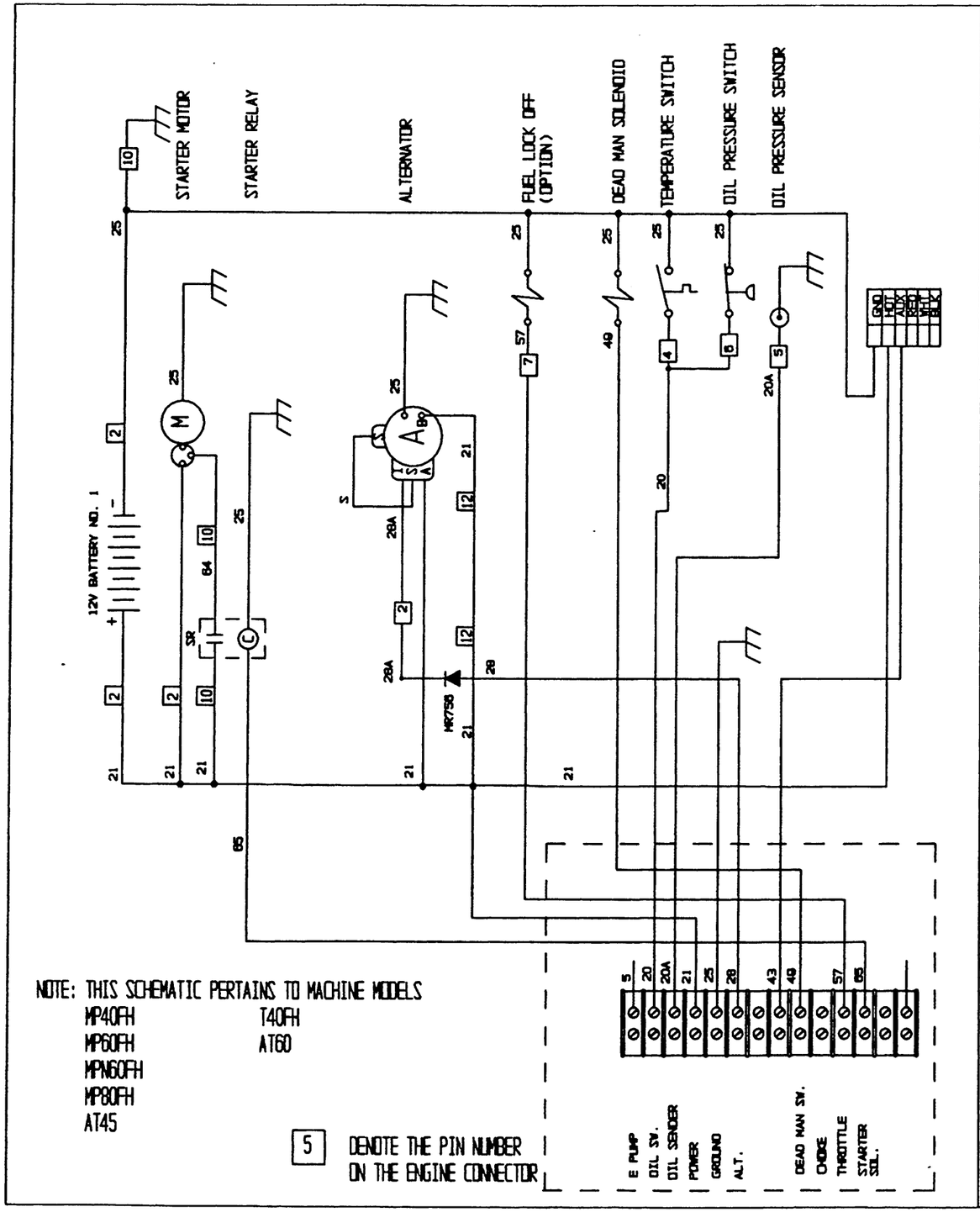
SIMON-AERIALS INC.
MILWAUKEE, WI. 53224

TITLE: ELECTRICAL SCHEMATIC

REVISION: A

DRWG. NO.: D-2326680

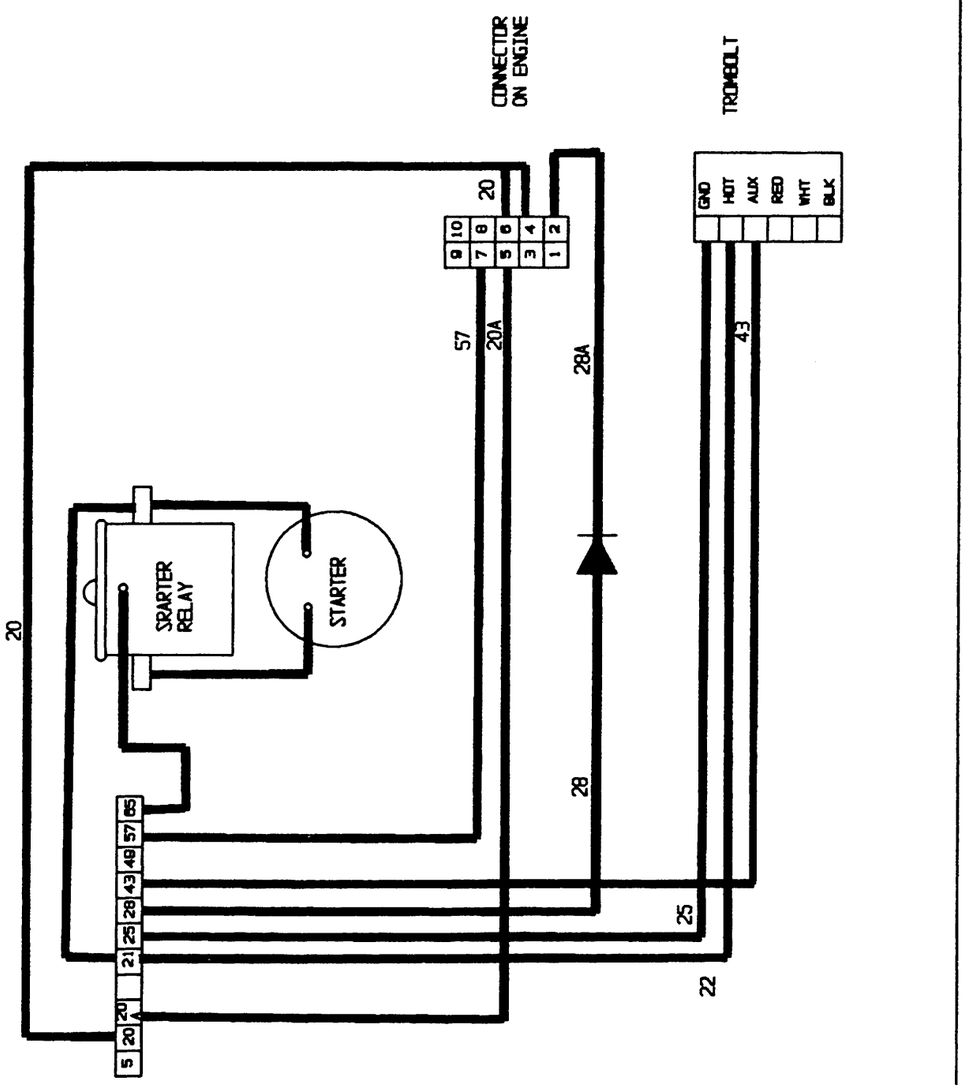

12V BATTERY
STARTER MOTOR
STARTER RELAY
PRIMER SOLENOID (OPTION)
ALTERNATOR
FUEL SOLENOID
FUEL PUMP
FUEL PUMP RELAY
FUEL LOCK OFF (OPTION)
CHOKE SOLENOID
CHOKE RELAY
TEMPERATURE SWITCH
OIL PRESSURE SWITCH
OIL PRESSURE SENSOR
ACTUATOR
CRANK POSITION SENSOR
ENGINE COOLANT TEMP. SENSOR
DISTRIBUTERLESS IGNITION COIL
10 TWISTS PER FOOT MIN.
500 OHM RES.
FUSEABLE LINK
FUEL SELECTOR (OPTION)
VACUUM SWITCH OPTION
SR
ER
CHR
MR756
BARBER COLEMAN ELECTRONIC GOVERNOR
UNIVERSAL ELECTRONIC SPARK CONTROL (UESC)
ALL ITEMS ENCLOSED IN THE 5 DOTTED BOXES ARE MOUNTED ON THE MOUNTING PLATE
UNLESS OTHERWISE SPECIFIED ALL WIRES ARE 16 AWG.
REF:FORD 2.3 LITER DUAL FUEL
NOTE: THIS SCHEMATIC PERTAINS TO MACHINE MODELS
MP40FH
MPN60FH
MPN60FH
AT45
AT60
NOTE: FOR RP-86
CHANGE 57A TO 28
CHANGE 21 TO 22
REV BY DATE DESCRIPTION
DO NOT SCALE PRINT
SIMON AERIALS INC.
SCHEMATIC, FORD 2.3L
CADKEY DRAWING DO NOT REVISE MANUALLY
NONE
RLN
10-22-96
B-2364720



NOTE: THIS SCHEMATIC PERTAINS TO MACHINE MODELS

MP40FH	T40FH
MP60FH	AT60
MPN60FH	
MP80FH	
AT45	

[5] DENOTE THE PIN NUMBER ON THE ENGINE CONNECTOR



REF: DEUTZ F3L1011 & F4L1011
ALL FH MODELS

UNLESS OTHERWISE SPECIFIED ALL WIRES ARE 16 AWG.

REV	BY	DATE	DESCRIPTION
	RLN	11-1-96	

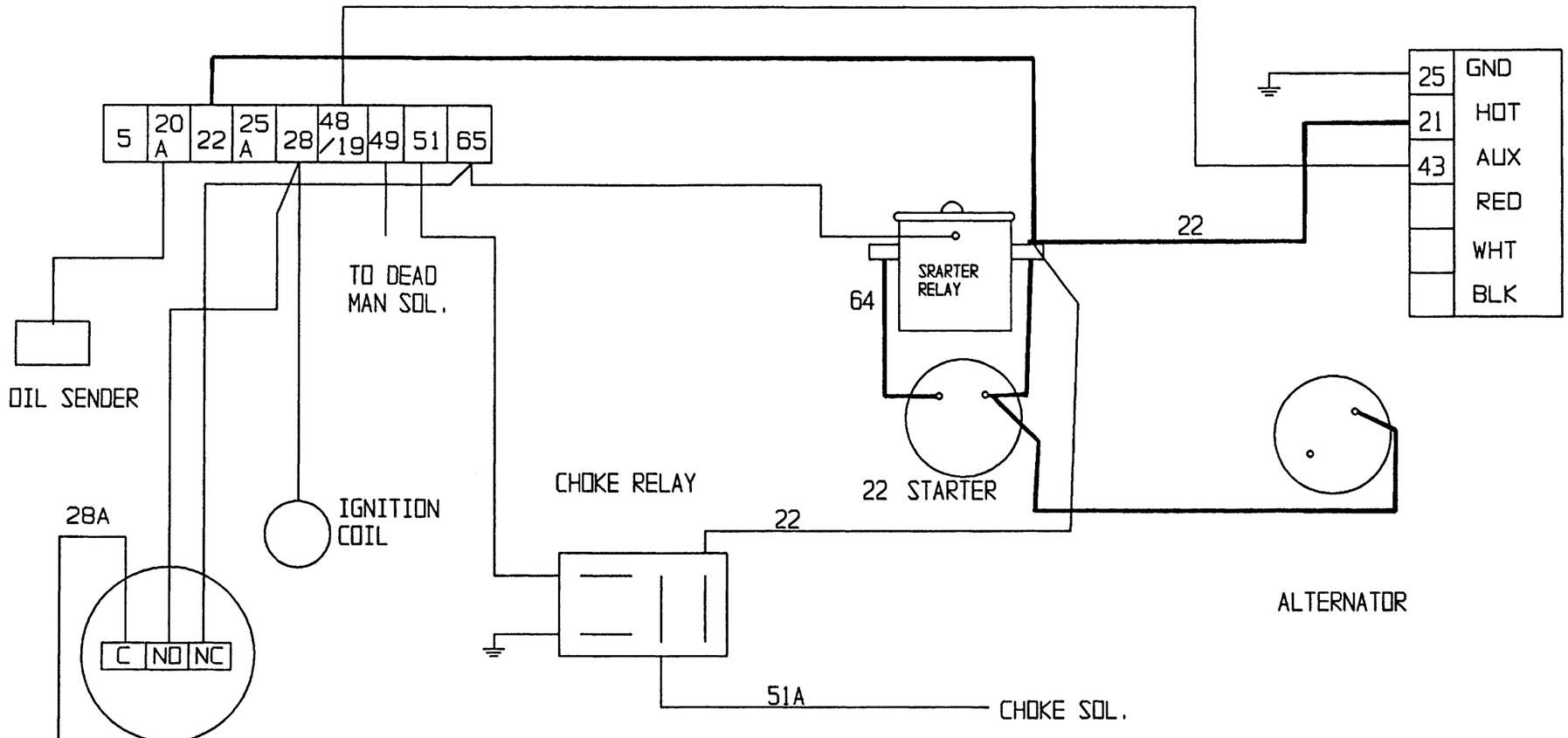
DO NOT SCALE PRINT

SIMON AERIALS INC.

ELECTRICAL SCHEMATIC

CADKEY DRAWING DO NOT REVISE MANUALLY

SIZE	SCALE	DATE			DRAWING NO.
D	NONE	RLN	11-1-96		B-2367810



REF:WI 65HP GAS/DF
MP60FH
AT60

REF:WI 35HP GAS/DF
MP40FH
AT45
T40FH

#22, 64, ARE 10 GA RED
ALL OTHERS ARE 14 GA

REV	BY	DATE	DESCRIPTION
	RLN	1-2-97	ECH-2810

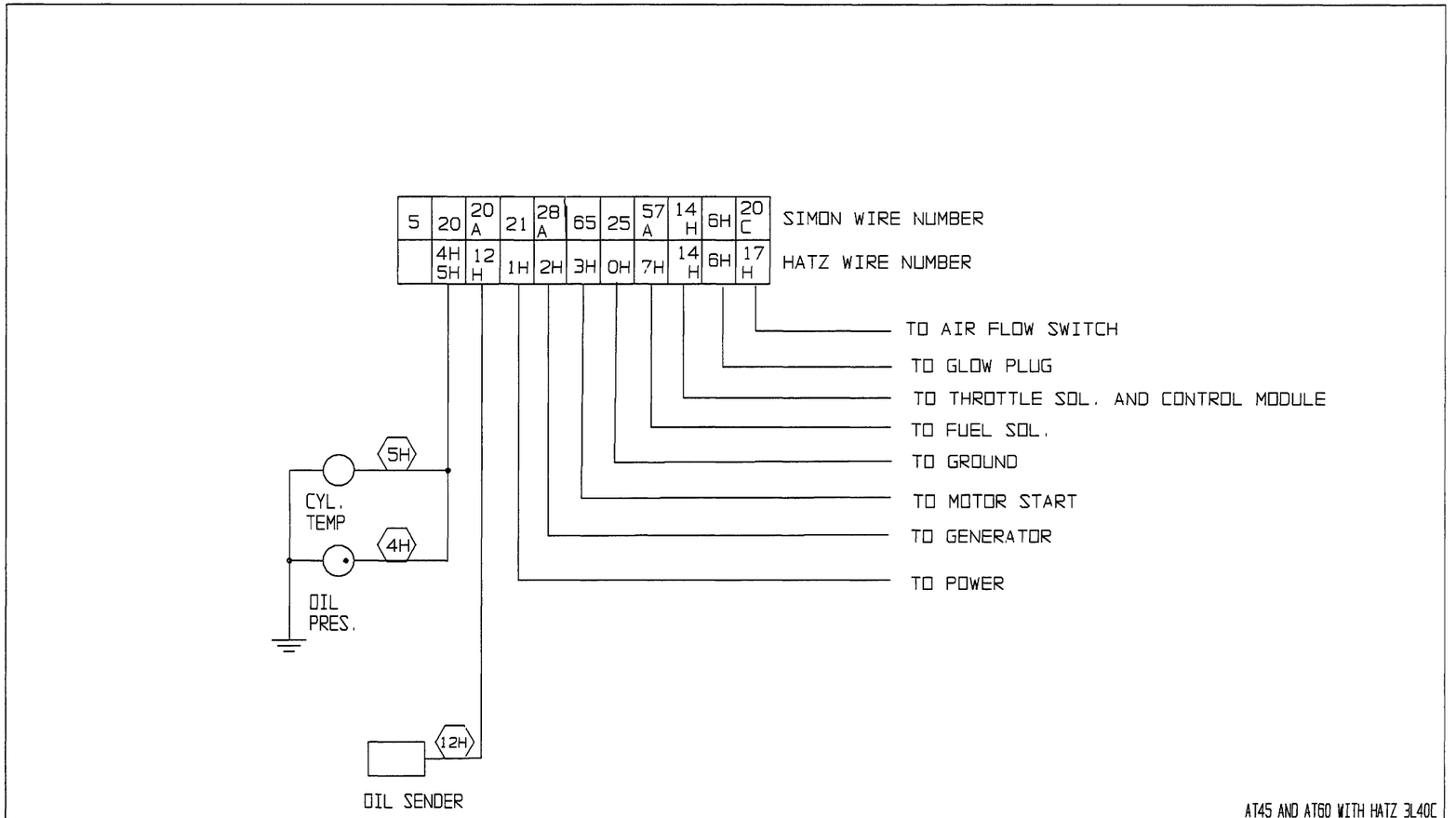
DO NOT SCALE PRINT

SIMON AERIALS INC.

ELECTRICAL SCHEMATIC

CADKEY DRAWING DO NOT REVISE MANUALLY

SIZE	DWG	DATE	CHKD	APVD	DRAWING NO.
NONE	RLN	1-2-97			B-2370510



AT45 AND AT60 WITH HATZ 3L40C

REV	BY	DATE	DESCRIPTION
	RLN	2-10-97	ECN 2002

DO NOT SCALE PRINT

SIMON AERIALS INC.

TITLE: ELECTRICAL SCHEMATIC

CADKEY DRAWING DO NOT REVISE MANUALLY

SCALE	DRWN	DATE	CHKD	APPROVED	DRAWING NO.
NONE	RLN	2-10-97			A-2369750