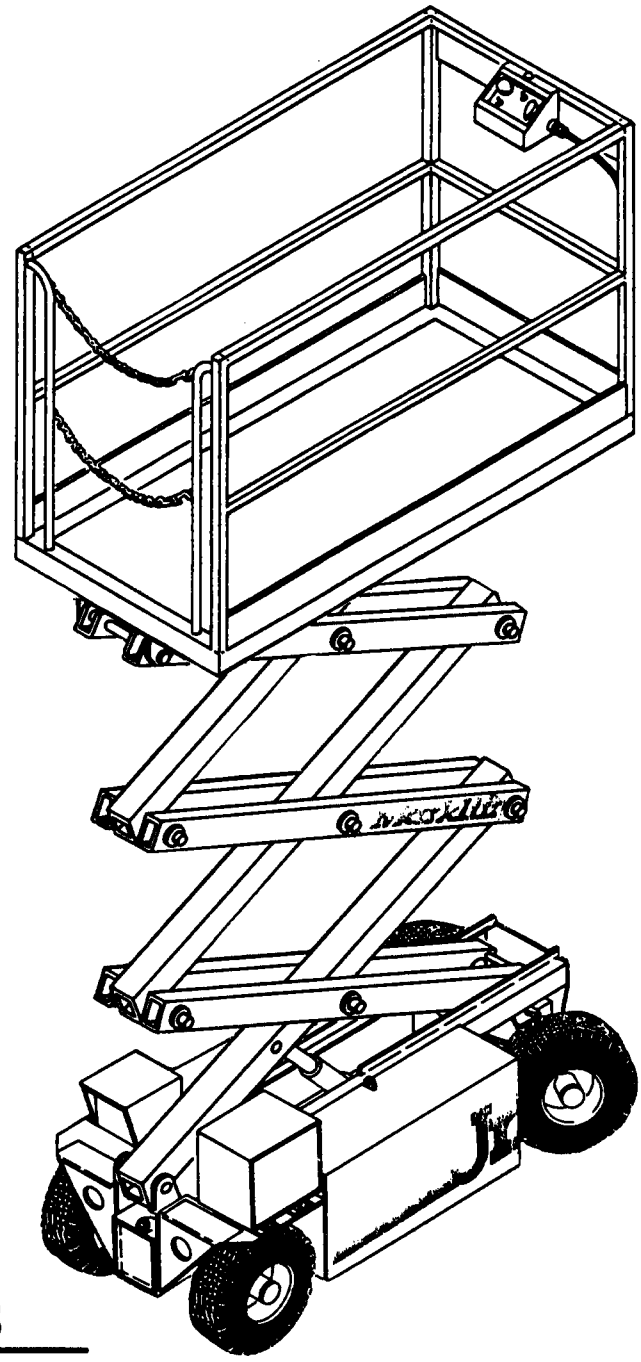
The Marklifts.®

A Product of Mark Industries

MARKLIFT JR. SELF PROPELLED SCISSOR

OPERATION MAINTENANCE AND PARTS MANUAL



JR.-7
JR.-14
JR.-19

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REVISION 1
FEB. 1986

Mark Industries

P.O. Box 2255
Brea, California 92622
205 South Puente Street, Brea, California 92621
(714) 879-6275, FAX (714) 879-8885

17206

HOW TO ORDER PARTS

MARKLIFT SELF-PROPELLED SCISSOR

JR. SERIES

1. To order by phone: 1 (800) 421-1826 or (213) 639-9700 ask for Parts or Service Department.

2. To order by mail: Mark Industries, P.O. Box 720, Long Beach, CA 90801
   Attention: Parts or Service Department

3. When ordering, use the parts list page from the parts list section of this manual. Order using these numbers.

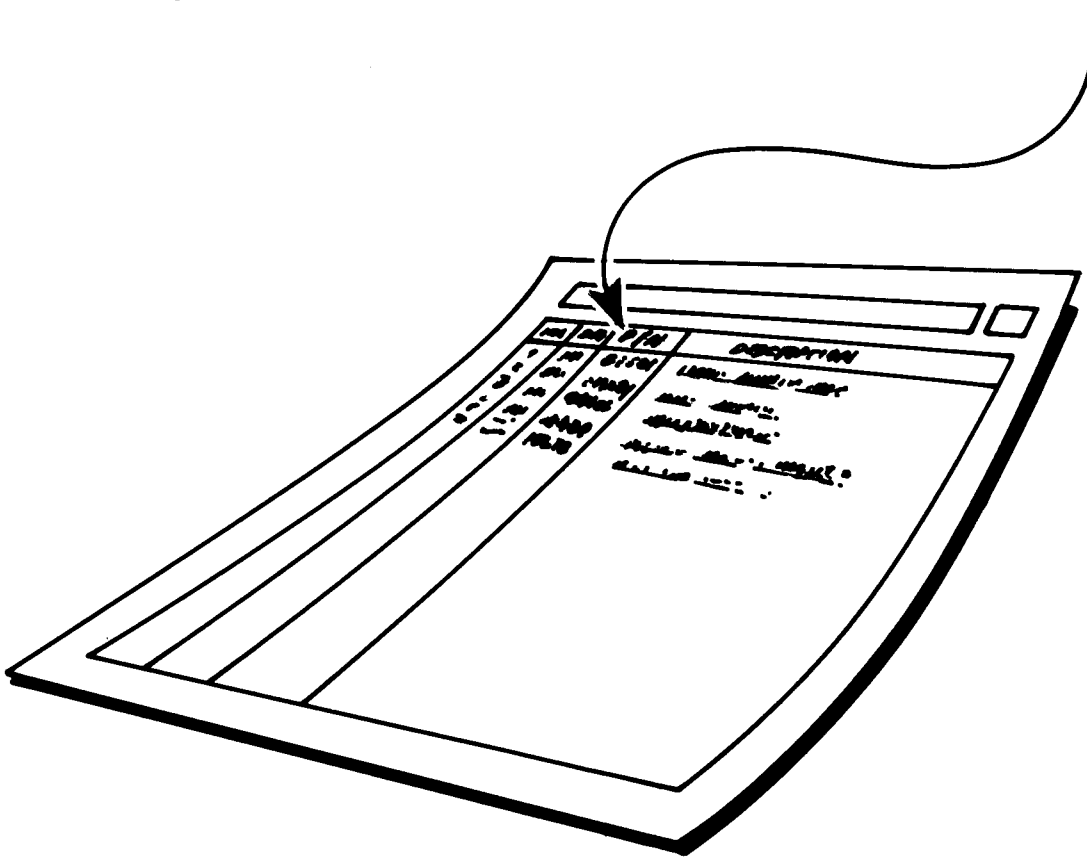


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MARKLIFT SELF-PROPELLED SCISSOR

OPERATION MAINTENANCE AND PARTS MANUAL

The purpose of this manual is to provide the customer with operation maintenance and parts information that will enhance the reliable performance of the Marklift. Schematic and vendor information is also furnished.

> WARNING: IMPROPER USAGE OF THIS MACHINE MAY RESULT IN SERIOUS PERSONNEL INJURY. TO PROTECT YOURSELF AND THE EQUIPMENT, STUDY THIS MANUAL BEFORE STARTING OPERATIONS.

The model capacity, pressure settings and serial number can be found on the ID Plate mounted on the rear of the main frame.

The serial number should be used when ordering parts. This will help our parts department in giving prompt and accurate service.

If additional information or service is needed, we urge the customer to contact his local dealer. If this is not possible, please get in touch with the Mark Industries Service Department.

All Marklifts are tested and operated to assure their proper operating condition before shipment. At this time, all necessary adjustments are made and an overall physical inspection is conducted. After the unit is delivered, some final minor adjustments and inspections must be made prior to putting the unit in service. These functions are outlined in the inspection and checkout instructions in the operation section of this manual.

MARKLIFT JR. 7
SELF PROPELLED SCISSOR

DESCRIPTION	ENGLISH	METRIC
HEIGHT-WORKING (ELEVATED)	12'9"	3.82 m
HEIGHT-PLATFORM (ELEVATED)	6'9"	2.03 m
(LOWERED)	29"	.73 m
LENGTH (OVERALL)	50"	1.25 m
WIDTH (OVERALL)	29.5"	.74 m
PLATFORM-SIZE (INSIDE)	27.5" x 48"	.69m x 1.20m
PLATFORM-SAFETY RAILS	40"	1.0 m
PLATFORM-TOE PLATE	4"	.10 m
LIFT CAPACITY	500 LBS.	225 kg.
WHEEL BASE	36"	.90 m
WHEEL TRACK	25"	.63 m
TURNING RADIUS (INSIDE)	3'2"	.95 m
DRIVE SPEED--LOW	1.0 MPH.	1.6 km-hr.
DRIVE SPEED--HIGH	2.4 MPH.	3.8 km-hr.
LIFT/LOWER SPEED	17-14 SEC.	
POWER SYSTEM	12 VDC	
BATTERY VOLTAGE	6 VDC	
CAPACITIES-BATTERY	250 AMP-HR (2)	
CAPACITIES-HYDRAULIC TANK	3.65 GAL.	12 LITER
BATTERY CHARGER	30 AMP	
TIRE SIZE	5.30x6 (MONOFILLED)	
SHIPPING WEIGHT	1080 LBS.	495 kg.
SHIPPING CUBE	59.9 CU.FT.	1.68 CU.M

MARKLIFT JR. 14
SELF PROPELLED SCISSOR

DESCRIPTION	ENGLISH	METRIC
HEIGHT-WORKING (ELEVATED)	20'2"	6.05 m
HEIGHT-PLATFORM (ELEVATED)	14'2	4.25 m
(LOWERED)	33.5"	.84 m
LENGTH (OVERALL)	62"	1.55 m
WIDTH (OVERALL)	29.5"	.74 m
PLATFORM-SIZE (INSIDE)	27.5" x 60"	.69m x 1.5m
PLATFORM-SAFETY RAILS	40"	1.0 m
PLATFORM-TOE PLATE	4"	.10 m
LIFT CAPACITY	500 LBS.	225 kg.
WHEEL BASE	48"	1.20 m
WHEEL TRACK	25"	.63 m
TURNING RADIUS (INSIDE)	4'8"	1.4 m
DRIVE SPEED--LOW	1.0 MPH.	1.6 km-hr.
DRIVE SPEED--HIGH	2.4 MPH.	3.8 km-hr.
LIFT/LOWER SPEED	14-14 SEC.	
POWER SYSTEM	12 VDC	
BATTERY VOLTAGE	6 VDC	
CAPACITIES-BATTERY	250 AMP-HR (4)	
CAPACITIES-HYDRAULIC TANK	4.5 GAL.	16.88 LITER
BATTERY CHARGER	40 AMP	
TIRE SIZE	5.30x6 (MONOFILLED)	
SHIPPING WEIGHT	1700 LBS.	765 kg.
SHIPPING CUBE	78.57 CU.FT.	2.20 CU.M

MARKLIFT JR. 19
SELF PROPELLED SCISSOR

DESCRIPTION	ENGLISH	METRIC
HEIGHT-WORKING (ELEVATED)	*	*
HEIGHT-PLATFORM (ELEVATED)		
(LOWERED)		
LENGTH (OVERALL)		
WIDTH (OVERALL)		
PLATFORM-SIZE (INSIDE)		
PLATFORM-SAFETY RAILS		
PLATFORM-TOE PLATE		
LIFT CAPACITY		
WHEEL BASE		
WHEEL TRACK		
TURNING RADIUS (INSIDE)		
DRIVE SPEED--LOW		
DRIVE SPEED--HIGH		
LIFT/LOWER SPEED		
POWER SYSTEM		
BATTERY VOLTAGE		
CAPACITIES-BATTERY		
CAPACITIES-HYDRAULIC TANK		
BATTERY CHARGER		
TIRE SIZE		
SHIPPING WEIGHT		
SHIPPING CUBE		

* SPECIFICATIONS TO BE SUPPLIED

MANUFACTURERS' LIMITED WARRANTY

MARK INDUSTRIES makes no warranty, express or implied, on any product manufactured or sold by MARK INDUSTRIES except for the following limited warranty against defects in materials and workmanship on products manufactured by MARK INDUSTRIES.

> MARK INDUSTRIES warrants the products manufactured by MARK INDUSTRIES to be free from defects in material and workmanship under normal use and service for a period of six (6) months from the date of shipment. This limited warranty does not extend to any product of another manufacturer or to any part, component, accessory or attachment not manufactured by MARK INDUSTRIES, The warranty, if any, with respect to any product of another manufacturer or to any part, component, accessory or attachment not manufactured by MARK INDUSTRIES is limited to the warranty, if any extended to MARK INDUSTRIES by the manufacturer of the other product, part, component, accessory or attachment.

This limited warranty does not extend to any product (or any part or parts of any product which has been subject to improper use or application, misuse, abuse, operation beyond its rated capacity, repair or maintenance except in accordance with the sales and service manuals and special instructions of MARK INDUSTRIES, or modification without the prior written authorization of MARK INDUSTRIES (whether by the substitution of nonapproved parts or otherwise).

The sole obligation and liability of MARK INDUSTRIES under this limited warranty (and the exclusive remedy for any purchaser, owner or user of MARK INDUSTRIES products) is limited to the repair or replacement, at the option of MARK INDUSTRIES, of any product (or any part or parts of any product) manufactured by MARK INDUSTRIES which, within six (6) months from the date of shipment, shall have been returned to the MARK INDUSTRIES facility in Brea, California (or any other location within the United States as shall be designated by MARK INDUSTRIES), at no expense to MARK INDUSTRIES, and demonstrated to the satisfaction of MARK INDUSTRIES as being defective in material or workmanship.

To make a claim under this limited warranty, contact MARK INDUSTRIES or the MARK INDUSTRIES distributor from whom the product was originally purchased. A statement giving the model and serial number of the allegedly defective product, the date and a description of the alleged defect, the date of the purchase and proof of the purchase and purchase date must accompany the returned product (or any part or parts of any product). Any product (or any part or parts of any product) determined by MARK INDUSTRIES to be defective will be repaired or replaced, at the option of MARK INDUSTRIES, free of charge, f.o.b. Brea, California. No credit will be given for any allegedly defective product (or any part or parts of any product) not returned to MARK INDUSTRIES.

There are no other warranties, express or implied, in addition to this limited warranty. **This limited warranty is exclusive and in lieu of all other warranties, express or implied (in fact or by operation of law or otherwise), including the implied warranties of merchantability and fitness for a particular purpose.**

MARK INDUSTRIES shall not be liable for any special, indirect or consequential damages. Further, no representation or warranty made by any person, including any representative of MARK INDUSTRIES, which is inconsistent or in conflict with, or in addition to the terms of the foregoing limited warranty (or the limitations of the liability of MARK INDUSTRIES as set forth above) shall be binding upon MARK INDUSTRIES unless reduced to writing and approved by an officer of MARK INDUSTRIES.

Tires, batteries, filter elements and electrical components are specifically excluded from this limited warranty.

Mark Industries
P.O. BOX 2255 Brea, CA 92622-2255
714-879-6275 800-448-MARK
TELEX 194402 FAX 1-714-879-8884

WARRANTY REGISTRATION

PURCHASER

_____

COMPANY NAME

_____

ADDRESS

_____

_____

TELEPHONE NUMBER

_____

DATE SHIPMENT RECEIVED

UNIT WILL BE USED _____

_____

DATE OF INVOICE

UNIT WILL BE SOLD _____

_____

DATE UNIT PUT INTO SERVICE

_____

INSPECTION	_____	GEN'L MAINTENANCE	_____	PAINTING/SANDBLAST	_____
MINING	_____	HEATING/AIR COND.	_____	STEEL FABRICATION	_____
WELDING	_____	CARPENTRY	_____	RIGGING	_____
CONSTRUCTION	_____	PLUMBING	_____	ROOFING	_____
SCAFFOLDING	_____	ELECTRICAL	_____	GLAZING	_____
MECHANICAL	_____	SPRINKLER	_____	OTHER	_____

_____

COMMENTS:

_____

_____

_____

_____

_____

_____

INSPECTION COMPLETED BY:

WARRANTY WILL BE VOID UNLESS THIS INSPECTION REPORT IS POSTMARKED TO MARK INDUSTRIES NOT MORE THAN 14 DAYS FROM DATE SHIPMENT RECEIVED.

(WARRANTY REGISTRATION)

		YES	NO
1	CAPACITY DECAL IS [ ]	☐	☐
2	ALL APPLICABLE WARNING DECALS ARE INSTALLED	☐	☐
3	EMERGENCY DESCENT VALVE FUNCTIONS PROPERLY	☐	☐
4	OPERATORS INSTRUCTIONS ARE PROPERLY INSTALLED	☐	☐
5	OPERATORS GUIDE RECEIVED	☐	☐
6	ELECTRICAL SCHEMATIC RECEIVED	☐	☐
7	ALL CONTROLS ARE IDENTIFIED AND OPERATE PROPERLY	☐	☐
8	PLATFORM GUARD RAILS IN GOOD CONDITION	☐	☐
9	PLATFORM ACCESS CHAIN WORKS PROPERLY	☐	☐
10	HORN/BEACON OPERATES PROPERLY (OPTIONAL)	☐	☐
11	BRAKES OPERATE PROPERLY	☐	☐
12	CIRCUIT BREAKER OPERATES PROPERLY	☐	☐
13	SCISSOR ARM SHAFT COLLARS ARE IN PLACE AND TIGHT	☐	☐
14	LIFT CYLINDER IS FREE OF LEAKS	☐	☐
15	SYSTEM PRESSURE IS SET AT [ ] PSIG	☐	☐
16	DRIVE MOTORS ARE FREE OF LEAKS	☐	☐
17	DRIVE GEAR BOX OIL LEVEL	☐	☐
18	ALL NUTS & BOLTS ARE TIGHT	☐	☐
19	(2) WHEEL NUTS ARE TORQUED AT [ ] FT. LBS.	☐	☐
20	LUG NUTS ON THE WHEELS ARE [ ] FT. LBS.	☐	☐
21	BATTERY FLUID LEVEL IS CORRECT	☐	☐
22	HYDRAULIC HOSES AND FITTINGS ARE FREE OF LEAKS	☐	☐
23	HYDRAULIC OIL LEVEL [ ]	☐	☐
24	HYDRAULIC OIL TANK & FITTINGS ARE FREE OF LEAKS	☐	☐
25	STEERING CYLINDER IS FREE OF LEAKS	☐	☐
26	MANUAL OVERRIDE ON VALVES OPERATE PROPERLY	☐	☐
27	ALL ELECTRICAL CONNECTIONS ARE TIGHT	☐	☐
28	CHARGER FUNCTIONS PROPERLY	☐	☐

MODEL NUMBER _____ SERIAL NUMBER _____

INSPECTOR _____ OPTIONS _____

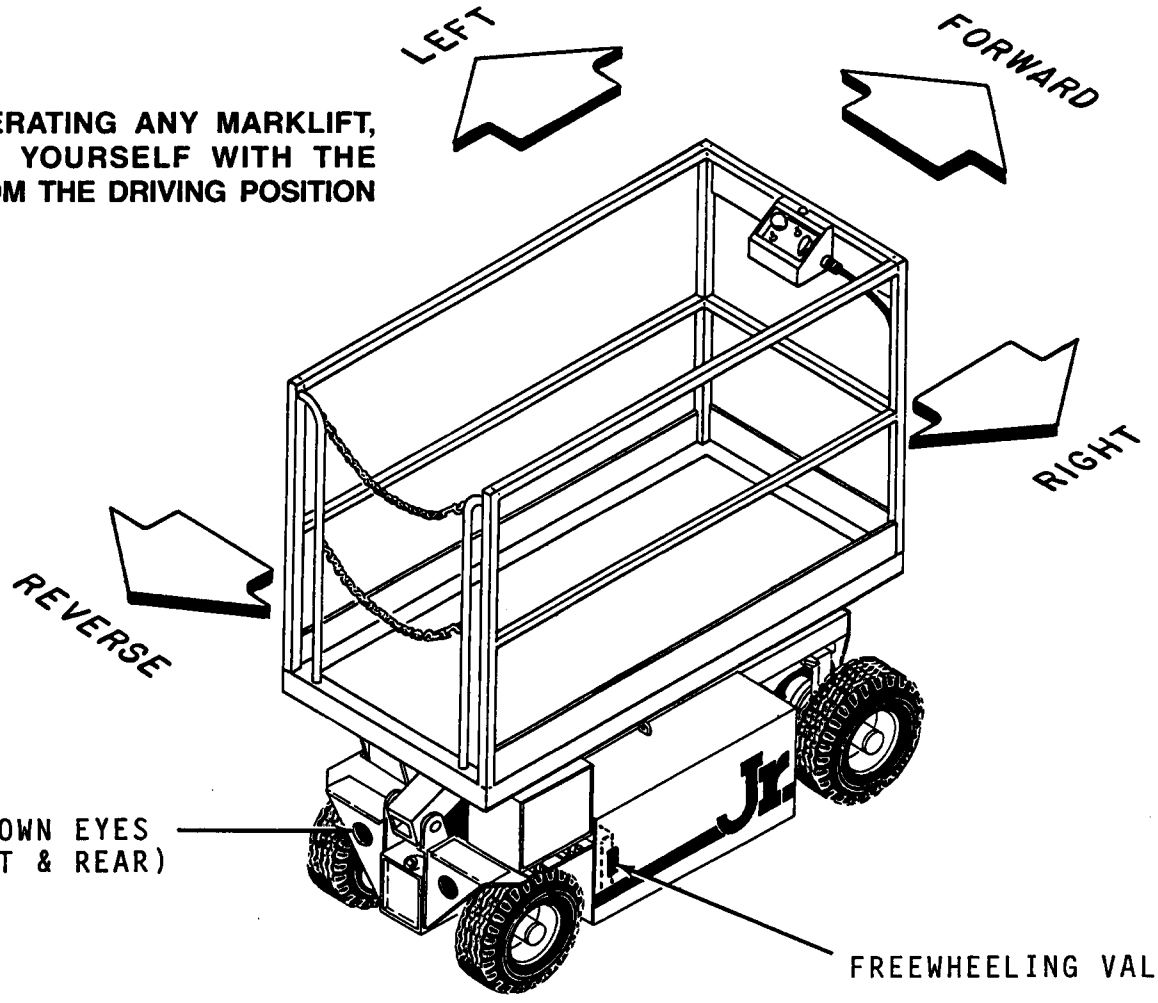
WHEN A LOADING DOCK IS UNAVAILABLE AND A FORKLIFT MUST BE USED, MAKE SURE TO LIFT THE UNIT FROM THE SIDE ONLY. DO NOT LIFT THE MARKLIFT JR. FROM THE FRONT OR REAR. WHEN LIFTING FROM THE SIDE, MAKE SURE THE FORKS ARE CENTERED BETWEEN THE FRONT AND REAR WHEELS AND UNDER THE BELLYPAN.

THE MARKLIFT JR. MAY BE FREEWHEELED FOR VERY SHORT DISTANCES AT NO GREATER THAN 5 MPH.
WHEN PREPARING FOR FREEWHEELING, MAKE SURE THE UNIT IS ON A LEVEL SURFACE.
BRAKE IS DISENGAGED BY CLOSING THE FREEWHEELING VALVE AND MOMENTARILY ACTIVATING ROTARY DRIVE SWITCH.
USE CAUTION WHEN BRAKE IS DISENGAGED!
ALWAYS REMEMBER TO OPEN FREEWHEELING VALVE TO RESTORE BRAKING!
(SEE DRAWING BELOW FOR VALVE LOCATION.)

IF A ROLLBACK IS USED TO LOAD OR UNLOAD THE MARKLIFT, USE A WINCH AND ATTACH THE CHAIN OR STRAP THROUGH THE TWIN TIE-DOWN EYES ON EITHER THE FRONT OR REAR OF THE UNIT.

WHEN SECURING THE MARKLIFT JR. FOR TRANSPORT MAKE SURE TO ATTACH THE CHAIN OR STRAP THROUGH ALL FOUR TIE-DOWN EYES. DO NOT CHAIN OR STRAP THE UNIT OVER THE PLATFORM OR GUARD RAILS.

BEFORE OPERATING ANY MARKLIFT, FAMILIARIZE YOURSELF WITH THE MACHINE FROM THE DRIVING POSITION AS SHOWN



MARKLIFT JR.
SELF PROPELLED SCISSOR

All Marklift units are tested and operated to assure proper operating condition before shipment.

At this time, all necessary adjustments are made and an overall physical inspection is conducted. After the unit is delivered, some minor adjustments and inspections must be made before putting the unit into service.

The following items should be reviewed:

1. Check electric power system.
   - A. Electric power
   - B. Battery water level only enough to cover cells.
   - C. Battery specific gravity readings (minimum and maximum)
   - D. Battery charger
   - E. Battery connections for tightness
2. Check electrical system:

   Turn power switch at ground control station to "on", position selector switch to aerial, then enter platform. Pull emergency on/off switch out (on) at aerial control.

Test Drive	Test Steer	Test Lift
A. Forward	C. Left	E. Up
B. Reverse	D. Right	F. Down

3. Inspect all electrical connections.

   A. See B. Feel C. Tighten

4. Check hydraulic system.
   - A. Hydraulic fluid level
   - B. Filter on top of tank
   - C. Hydraulic lines
   - D. Hydraulic pump
   - E. Hydraulic cylinders
5. Check tires and wheels.
   - A. For cuts
   - B. Wheel spindle nuts and cotter pins in place
6. Structural connections and fittings.
   - A. Check all nuts and bolts for tightness.
7. Brake
   - A. Check for holding on incline up to four (4) degrees.

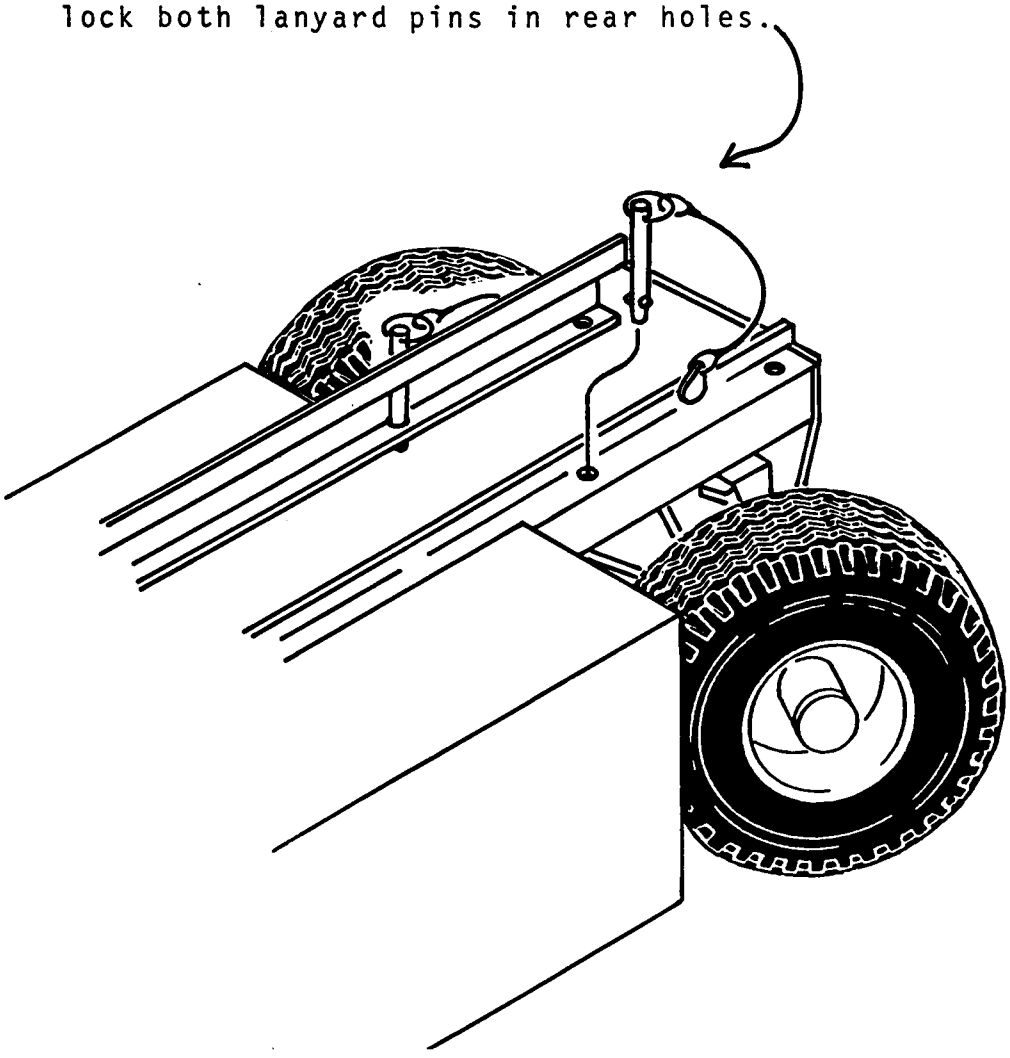
MARKLIFT JR.
SELF PROPELLED SCISSOR

Every operator of the Marklift must know, understand and follow the safety rules set forth herein.

1. The Marklift self-propelled aerial work platfrom is a personnel lifting device, and it is essential that it be properly maintained and operated to perform all functions with maximum safety.
2. The operation of any new and unfamiliar equipment can be hazardous in the hands of untrained operators. Only trained operators must be assigned to operate the Marklift.
3. It is the responsibility of the operator to be familiar with this manual and to follow all recommendations made. Never exceed manufacturer's recommended platform load capacity.
4. Although the Marklift conforms to specified ANSI & OSHA requirements, it is the responsibility of the owner to instruct the operators concerning safety requirements made not only by Mark Industries, but by the various safety boards in your area, as well as additional requirements set forth by ANSI & OSHA.
5. The Marklift is a <u>non-insulated</u> personnel carrier <u>and must not be operated within 10 feet of a 50,000 volt line</u>. (See page 14 & 15 articles)

6. Remember, the load capacity of the Marklift is total combined weight of personnel and tools, fixtures, accessories, etc.
7. Always distribute load evenly over platform floor area.
8. It is recommended that head gear (Hard Hats) be worn by all personnel in the work platform.
9. Under no conditions should horseplay be tolerated. Report any misuse of equipment to the proper personnel.
10. The Marklift structure must not be used as a welding ground. Disconnect both battery leads prior to performing any welding operations.
11. Do not lean over platform guard railings to perform work.
12. Do not use ladders or scaffolding on the platform to obtain greater height.
13. Battery sulphuric acid can cause a serious burn. Flush away acid with water.
14. Hydrogen and oxygen gases are produced during normal battery operation. This gas mixture can explode if flames or sparks are near battery vents.
15. Monitor batteries during charging. Do not allow batteries to overcharge and boil.
16. Do not override any hydraulic, mechanical, or electrical safety devices.

17. Do not drive on uneven, sloping or soft terrain, as this is hazardous and must be avoided.
18. Do not work on platform if your physical condition is such that you feel dizzy or unsteady in any way.
19. Do not jump start other vehicles using Marklift battery.
20. When machine is not in use, remove key from ground control box to prevent unauthorized use.
21. When working under elevated platform, mechanically lock both lanyard pins in rear holes.



TITLE 8 DIVISION OF INDUSTRIAL SAFETY 358.38.113
(Register 73, No. 30--7-28-73)

Article 86. Provisions for Preventing Accidents

Article 86. Provisions for Preventing Accidents Due to Proximity to Overhead Lines

2946. Provisions for Preventing Accidents Due to Proximity to Overhead lines. (a) General. No person, firm, or corporation, or agent of same, shall require or permit any employee to perform any function in proximity to energized high-voltage lines; to enter upon any land, building, or other premises and thereto engage in any excavation, demolition, construction, repair, or other operation; or to erect, install, operate, or store in or upon such premises any tools, machinery, equipment, materials, or structures (including scaffolding, house moving, well drilling, pile driving, or hoisting equipment) unless and until danger from accidental contact with said high-voltage lines has been effectively guarded against.

(b) Clearances or Safeguards Required. Except where electrical distribution and transmission lines have been de-energized and visibly grounded or effective barriers have been erected to prevent physical and arcing contacts with the high-voltage lines, the following provisions shall be met:

(1) Over Lines. The operation, erection, or handling of tools, machinery, apparatus, supplies, or materials, or any part thereof, over energized high-voltage lines shall be prohibited.

(2) Equipment and Materials in Use. The operation, erection, or handling of tools, machinery, equipment, apparatus, materials, or supplies, or any part thereof within the minimum clearances from energized lines set forth in Table X shall be prohibited.

Table X
Required Clearances from Overhead High-Voltage Lines

Nominal voltage (Phase to Phase)	Minimum Required Clearance (Feet)
750 - 50,000	10
over 50,000 - 75,000	11
over 75,000 - 125,000	13
over 125,000 - 175,000	15
over 175,000 - 250,000	17
over 250,000 - 370,000	21
over 370,000 - 550,000	27
over 550,000 - 1,000,000	42

(3) Transportation or Transit. The transportation or transit of any tool, machinery, equipment, or apparatus, or the moving of any house or other building in proximity to overhead high-voltage lines shall be expressly prohibited if at any time during such transportation or transit such tool, machinery, equipment, apparatus, or building, or any part thereof, can come closer to high-voltage lines than the minimum clearances set forth in Table Y.

Article 86. Provisions for Preventing Accidents

Except where the boom of boom-type equipment is lowered and no load is imposed thereon, the equipment in transit shall conform to the minimum required clearances set forth in Table X.

Table Y
Required Clearances from Energized High-Voltage Conductors
(While in Transit)

Nominal Voltage (Phase to Phase)	Minimum Required Clearance (Feet)
750 - 50,000	6
over 50,000 - 345,000	10
over 345,000 - 750,000	16
over 750,000 - 1,000,000	20

(4) Storage. The storage of tools, machinery, equipment, supplies, materials, or apparatus under, by, or near energized high-voltage lines is hereby expressly prohibited if at any time during such handling or other manipulation it is possible to bring such tools, machinery, equipment, supplies, materials, or apparatus, or any part thereof, within the minimum required clearances from high-voltage lines as set forth in Table X.

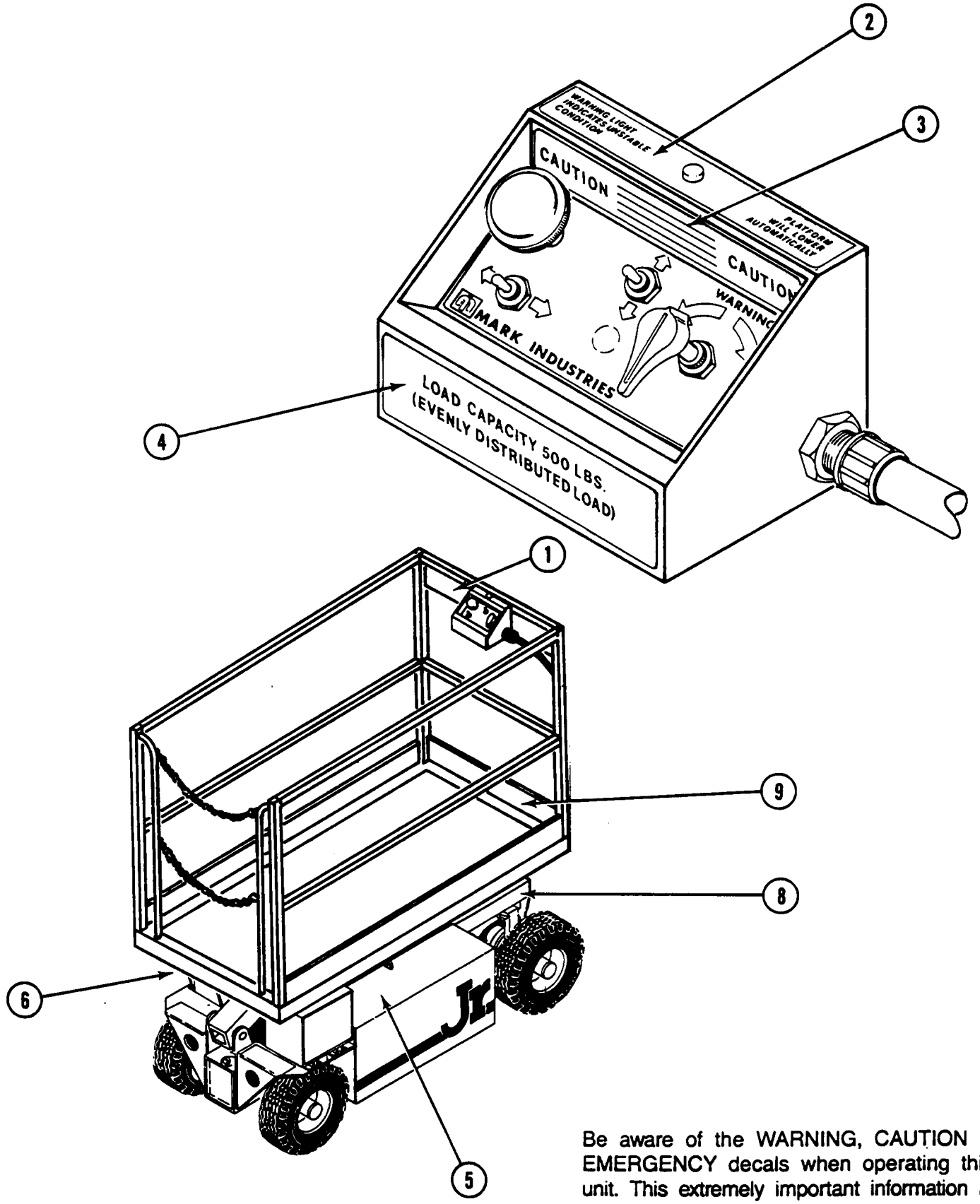
(c) The specified clearance shall not be reduced by movement due to any strains impressed (by attachments or otherwise) upon the structures supporting the high-voltage line or upon any equipment, fixtures, or attachments thereon.

(d) Insulated cage-type boom guards, boom stops, insulating links, or proximity warning devices may be used on cranes, but the use of such devices shall not alter the required clearances set forth in Table X.

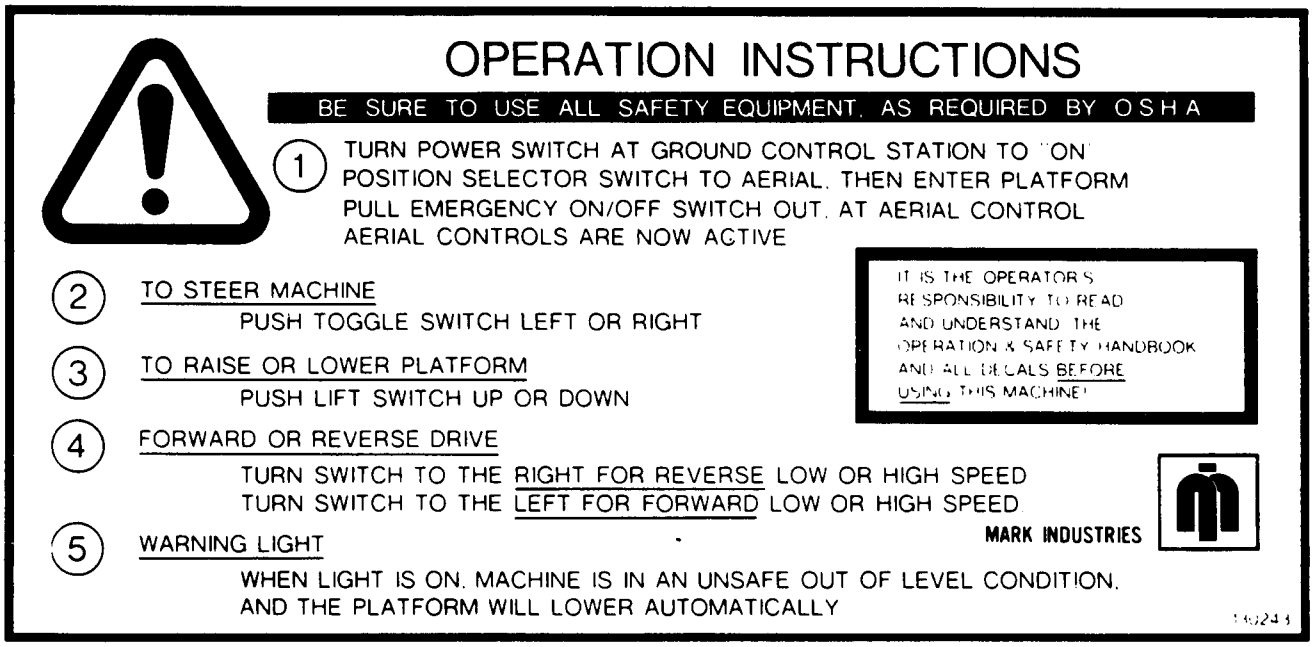
(e) Any overhead conductor shall be considered to be energized unless and until the person owning or operating such line verifies that the line is not energized, and the line is visibly grounded at the work site.

2947. Warning Signs Required. The owner, agent, or employer responsible for the operations of equipment shall post and maintain in plain view of the operator and driver on each crane, derrick, power shovel, drilling rig, hay loader, hay stacker, pile driver, or similar apparatus, a durable warning sign legible at 12 feet reading: "Unlawful To Operate This Equipment Within 10 Feet of High-Voltage Lines of 50,000 Volts Or Less."

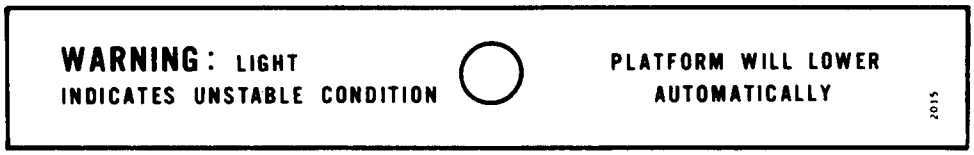
In addition to the above wording, the following statement in small lettering shall be provided on the warning sign: "For Minimum Clearances of High-Voltage Lines In Excess of 50,000 Volts, See Article 86, Title 8, High-Voltage Electrical Safety Orders."



Be aware of the WARNING, CAUTION & EMERGENCY decals when operating this unit. This extremely important information is placed at various locations on the unit to alert personnel of possible dangers and platform load limitations.



(1) * ON JR.7 AFTER JUNE 1985



(2) * WARNING LIGHT STANDARD EQUIPMENT
ON JR.7 AFTER JUNE 1985



(3)

LOAD CAPACITY 500 LBS.
(EVENLY DISTRIBUTED LOAD)

2022

4

IMPORTANT

CHECK BATTERY WATER LEVEL AT LEAST ONCE A WEEK.

2003

5

— WARNING —

DO NOT WORK UNDERNEATH THIS LIFT UNLESS IT IS MECHANICALLY LOCKED.

see service manual for location and use of mechanical locks

2016

6

THE HYDRAULIC SYSTEM OF THIS MACHINE IS DESIGNED TO USE G. M. TRANSMISSION FLUID TYPE "B" WITH DEXRON

2017

7

CAUTION

MONOFILLED TIRES ONLY

CAUTION

22175

8

ATTACH SAFETY CHAINS BEFORE RAISING PLATFORM

11064

9

MARKLIFT JR.
SELF PROPELLED SCISSOR

It shall be the responsibility of all Marklift operators to read and comply with the following operating instructions. They are designed to promote safety and a better understanding of the operation of the self-propelled aerial platform.

1. STARTING

A. GROUND CONTROL

The only functions that can be operated from the ground control station are ON/OFF and the lift circuit.

B. AERIAL CONTROL

Turn power switch at ground control station to "on".
Position selector switch to "aerial", then enter platform.
Attach safety chains after entering platform.
Pull out the red emergency ON/OFF button located in the upper left corner of the aerial control box. Electric models are now operational.

2. STEERING

Steering the machine is done from the aerial control box only. By pushing the toggle switch for steering to the left, the front wheels will go left. Pushing the switch to the right, the front wheels will go to the right. Because a momentary type switch is used, when the operator releases the switch it will automatically return to the off position. The wheels will remain at an angle until returned, by pushing the toggle switch in the opposite direction.

3. LIFT

Raising and lowering the platform can be done from either the aerial control box or the ground control station. To raise the platform the operator must push the lift switch to the up position, and to lower the platform the operator must push the switch to the down position. When the switch is released, it will automatically return to the off position, and the platform will remain stationary.

4. TRAVEL

Forward and reverse travel of the machine is done from the aerial control box only. The machine is capable of two speeds for both forward and reverse travel. Low and high speed travel is activated with a rotary switch. Turning the switch to forward travel; first position is low speed; second position is high speed. Turning the switch to reverse travel; the first position is low speed; second position is high speed.

5. WARNING LIGHT *

As a safety feature the JR. 14 and JR. 19 have been equipped with a series of mercury switches that will cut-out the lift circuit whenever the unit is in an unstable condition. An unstable condition consists of a tilt of three (3) degrees side and six (6) degrees forward and aft. If the platform is in the down position, it cannot be raised. If platform is already raised, it will lower automatically. This unstable condition is indicated by a light located in the top center of the control box.

*WARNING LIGHT STANDARD EQUIPMENT ON JR. 7 AFTER JUNE 1985

MARKLIFT SELF-PROPELLED SCISSOR

HYDRAULIC FLUID TABLE

Oil Company	Chevron	Gulf	Shell	Union
Brand Name	ATF Dexron 11	ATF Dexron 11	Donaz-T6	ATF Dexron
Viscosity -				
Sus @ 100°F	187.4	195	200	200
Sus @ 210°F	49.2	50.4	50	52.3
Viscosity -				
Index typical	153°	155°	160°	172°
Flash Point°F	400°	405°	390°	395°
Pour Point°F	-40°	-50°	-50°	-45°

SERVICE TOOLS

To properly and efficiently service your Marklift, several basic tools are required. The following list of tools should be available.

1. Volt/Ohm Meter
2. Hydraulic Pressure Guage (0-3000 PSI)
3. Female Quick Disconnect Coupler (P/N 842)
4. Battery Hydrometer
5. Battery Load Tester
6. Standard Mechanics Hand Tools
7. Scissor Arm Supports
8. Electrical Test Light
9. Hydraulic Pressure Gauge (0-1000 PSI)

MARKLIFT SELF-PROPELLED SCISSOR

INTRODUCTION

Whenever trouble shooting any problem the initial consideration MUST be to "Check the basics".

Check the basics, means to insure that the batteries are in good shape, and have at least a three quarter charge, determined by use of a hydrometer, and battery maintenance instructions (page 26)

A large percentage of electrical problems can be attributed to insufficiently charged or defective batteries.

(Some Helpful Hints)

ELECTRICAL

1. If problem seems to be electrical, utilize your applicable schematic, and test light to trace power flow (electrical current) starting at battery and continuing through system until the problem is located.
2. Keep in mind, if you DO NOT have a good ground to a valve coil, relay etc., then even if you have proper electrical current to the coil or relay, the item will not function properly.
3. Diodes can be thought of as "One way electrical check valves" they permit current flow in one direction and stop it in the opposite direction.

4. The basic purpose of a relay is to maintain full electrical current. When sending an electrical signal to the relay coil, the electrical current flows through relay contacts and to the desired valve coil.

HYDRAULIC

1. For the various functions the system pressure is utilized. If a slower drive speed is needed, a portion of the hydraulic fluid is dumped to tank by low speed valve.
2. Directional valves (Steering and Drive) have two opposite electrical coils with a moveable spool between the coils.
3. One way valves (Lift, Descent, Relief) can be either N/C (Normally Closed) or N/O (Normally Open)

(Trouble Shooting Check List)

LIFT

1. Will not lift. All other functions work.
   - A. Loose electrical connections.
   - B. Descent valve stuck open.
   - C. Tilt switches out of adjustment.
2. Will not lift rated load.
   - A. Low system pressure.
   - B. Internal seal leaking in cylinder.

STEERING

1. Steers in one direction only.
   A. Loose electrical connection.
   B. Loss of ground to coil on affected direction.
   C. Spool sticking in one direction.
   D. Faulty steering switch in aerial control box.

DRIVE

1. Will drive forward. No reverse.
   A. Loose electrical connection in reverse circuit.
   B. Faulty drive switch.
   C. Valve spool sticking in one direction.
2. No forward or reverse drive.
   A. Faulty drive switch.
   B. Both forward and reverse diodes inoperative on rotary drive swtich preventing pump/motor from running.
3. No high speed.
   A. Loose electrical connections.
   B. High speed solenoid valve inoperative.

4. No functions working.
   - A. Faulty circuit breaker.
   - B. Loose power connections.
   - C. Power relay inoperative.
   - D. Relief valve inoperative.
   - E. Battery not charged.

5. No system pressure.
   - A. No hydraulic oil.
   - B. Pressure relief valve inoperative.
   - C. Hydraulic pump inoperative.
   - D. Batteries require charging

6. Low System pressure.
   - A. Pressure relief valve out of adjustment.
   - B. Relief valve faulty.
   - C. Hydraulic pump faulty.
   - D. Hydraulic tank sump filter obstructed.
   - F. Low battery charge.

If this trouble shooting check list does not help to solve your problem, contact you local MARKLIFT representative or the MARK INDUSTRIES Service Department.

MARKLIFT SELF-PROPELLED SCISSOR

A new fully charged battery will have a specific gravity of 1.260 or 1.280 at 80°F.

The tables (on page 27) show the specific gravity as a function of percentage battery charge.

1.260 Sp. Gr.	1.280	100% charged
1.230	1.250	75% charged
1.200	1.220	50% charged
1.170	1.190	25% charged
1.40	1.160	Very little useful capacity
1.110	1.130	Discharged

The percentage charge of a battery should be checked with a good hydrometer that has a thermometer and temperature correction scale built into it. This allows a temperature correction to be made readily. A correction of .04 points in gravity shall be made for each ten degrees either above or below 80°F. For every 10°F below 80°F, subtract .04 points; and for every 10° above 80°F, add .04 points.

Within every thirty day period, the cell of each battery should be checked to determine the percentage charge. If any cell has a hydrometer reading of more than .020 less than the other cells in the battery, that cell is bad and the battery should be removed from service.

Periodic checks by hydrometer after charging, but prior to any discharge, is recommended to determine if batteries are receiving a full charge.

Either excessive overcharge or moderate undercharge can shorten battery life.

With proper attention to water level and charging time, compared to hydrometer reading, the batteries should give a long useful life.

TEMPERATURE/SPECIFIC GRAVITY CORRECTION TABLE FOR BATTERIES

Actual Hydrometer Reading at Actual Temperature*

80°F (27°C)	0°F (-18°C)	-10°F (-23°C)	-20°F (-29°C)	-30°F (-34°C)	-45°F (-43°C)	-65°F (-54°C)	Approx. State of Charge In %
1.280	1.312	1.316	1.320	1.324	1.330	1.338	100
1.250	1.282	1.286	1.290	1.294	1.300	1.308	75
1.220	1.252	1.256	1.260	1.264	1.270	1.278	50
1.190	1.222	1.226	1.230	1.234	1.240	1.248	25
1.160	1.192	1.196	1.200	1.204	1.210	1.218	0

Specific Gravity Corrected to 80°F (17°C)	Freezing Temperature	
1.280	-90°F	-68°C
1.250	-62°F	-52°C
1.200	-16°F	-27°C
1.150	+ 5°F	-15°C
1.000	+19°F	- 7°C

MARKLIFT SCISSOR MAINTENANCE CHECKLIST

Model: _____ Serial No. _____

Date: _____ Equip. No. _____

Location: _____ Mechanic: _____

1	Batteries		19	Front End Assy.	
2	Battery Terminals		20	Tire Condition	
3	Motor Brushes		21	Wheel Nuts	
4	Hydraulic Fluid		22	Wheel Bearing	
5	Hyd. Oil Filter		23	Nuts & Bolts	
6	Hydraulic System		24	Lubrication	
7	Hydraulic Pressure		25	Warning Decals	
8	Hydraulic Hoses		26	Operation Sheet	
9	Cylinders		27	General Decals	
10	Drive Motors		28	Paint	
11	Brake		29	All Operations	
12	Aerial Control Box		30	Lift	
13	Ground Control Box		31	Steering	
14	Relays		32	Low Drive	
15	Wire Connections		33	High Drive	
16	Safety Cut-outs		34	Tilt Switches	
17	Bushings		35	Options	
18	Rollers		36	Other	

CODE

F - Filled
R - Repaired
C - Checked
A - Adjusted
X - Needs Repair

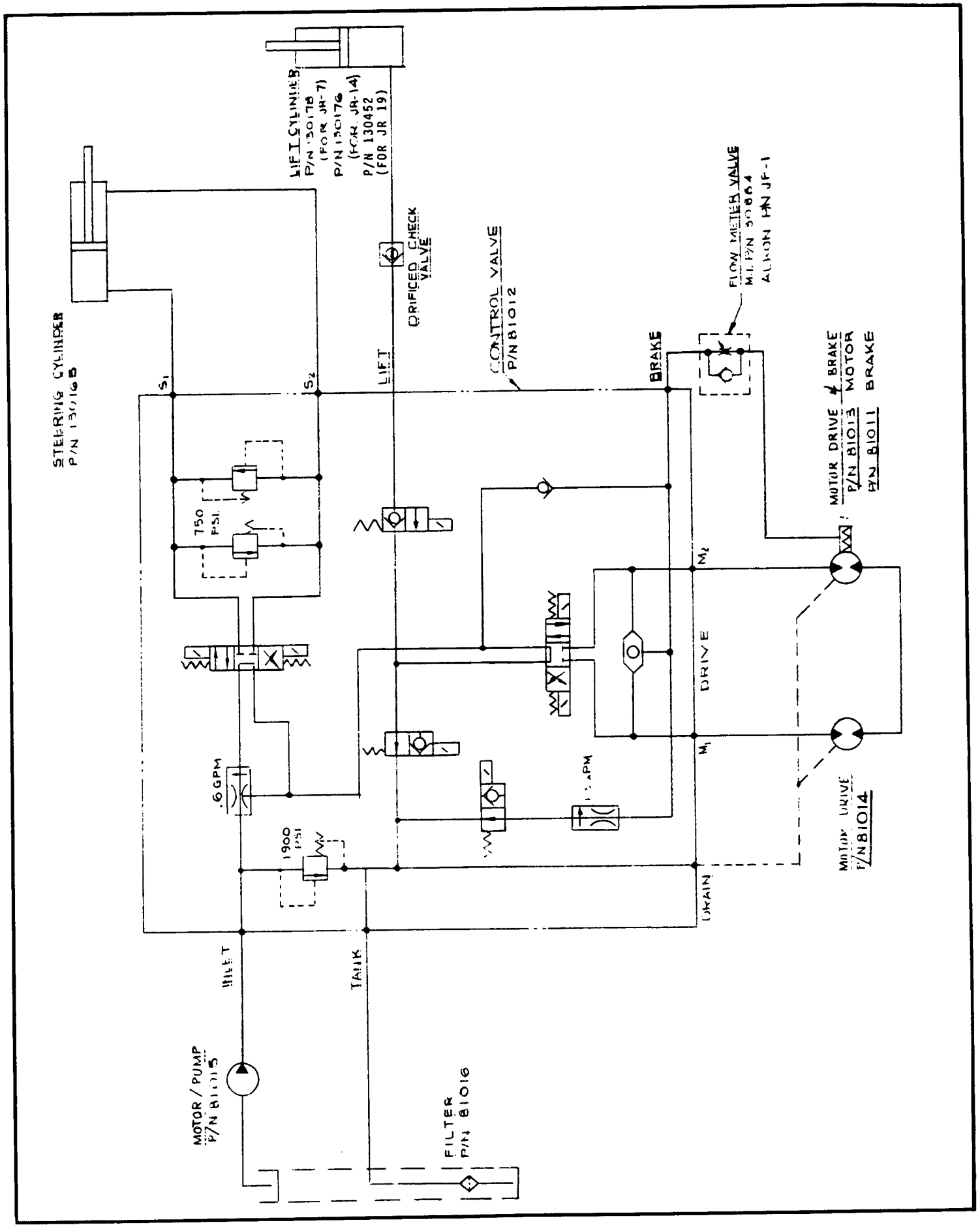
Other Comments:

MARKLIFT SERVICE MAINTENANCE RECORD

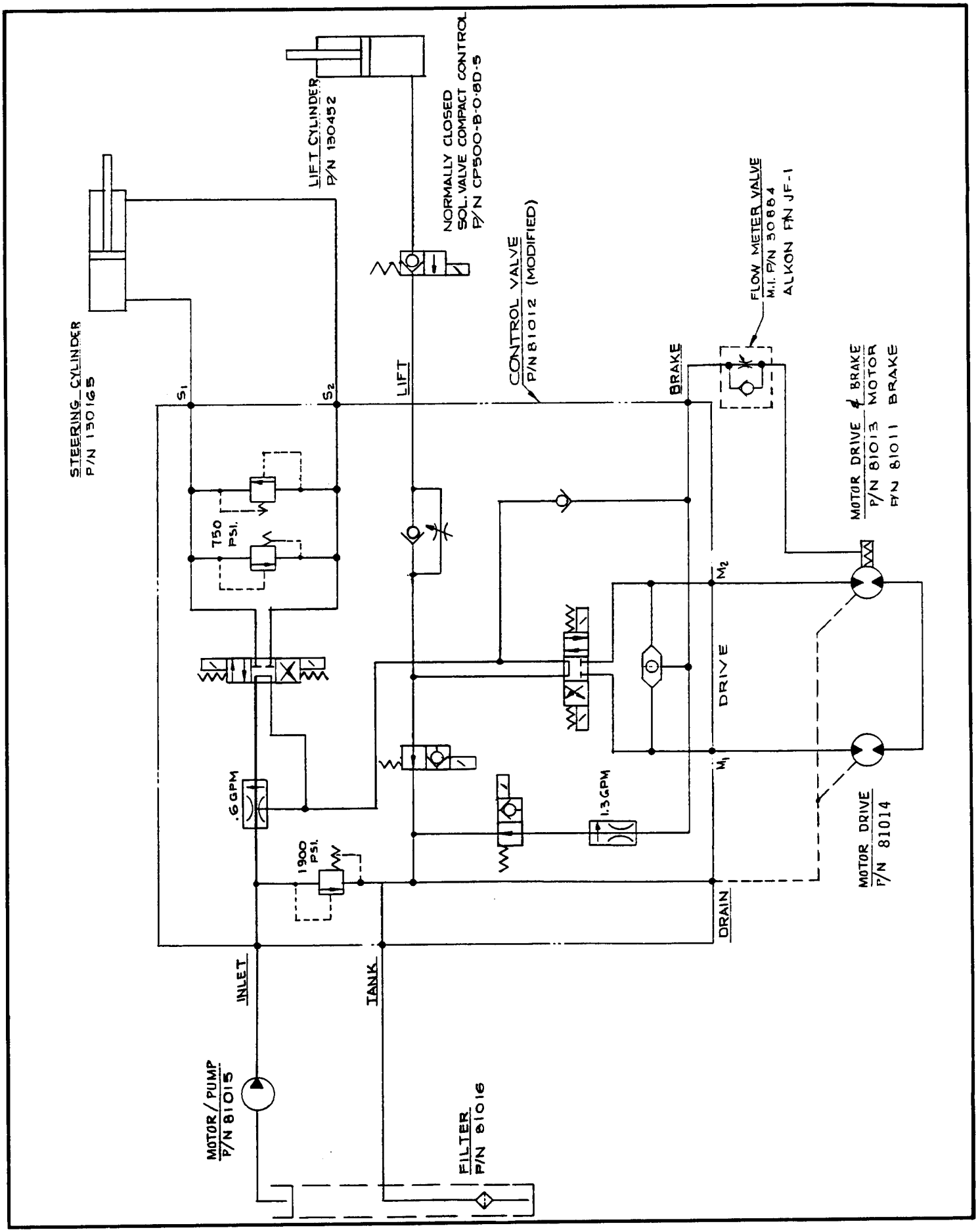
MODEL:
SER. NO.:
DATE SOLD:
DATE IN SERVICE
OPTIONS
WARRANTY
CODE: C-CHECKED N-NEW PART A-ADJUSTED X-NEEDS R-REPAIRED REPAIR

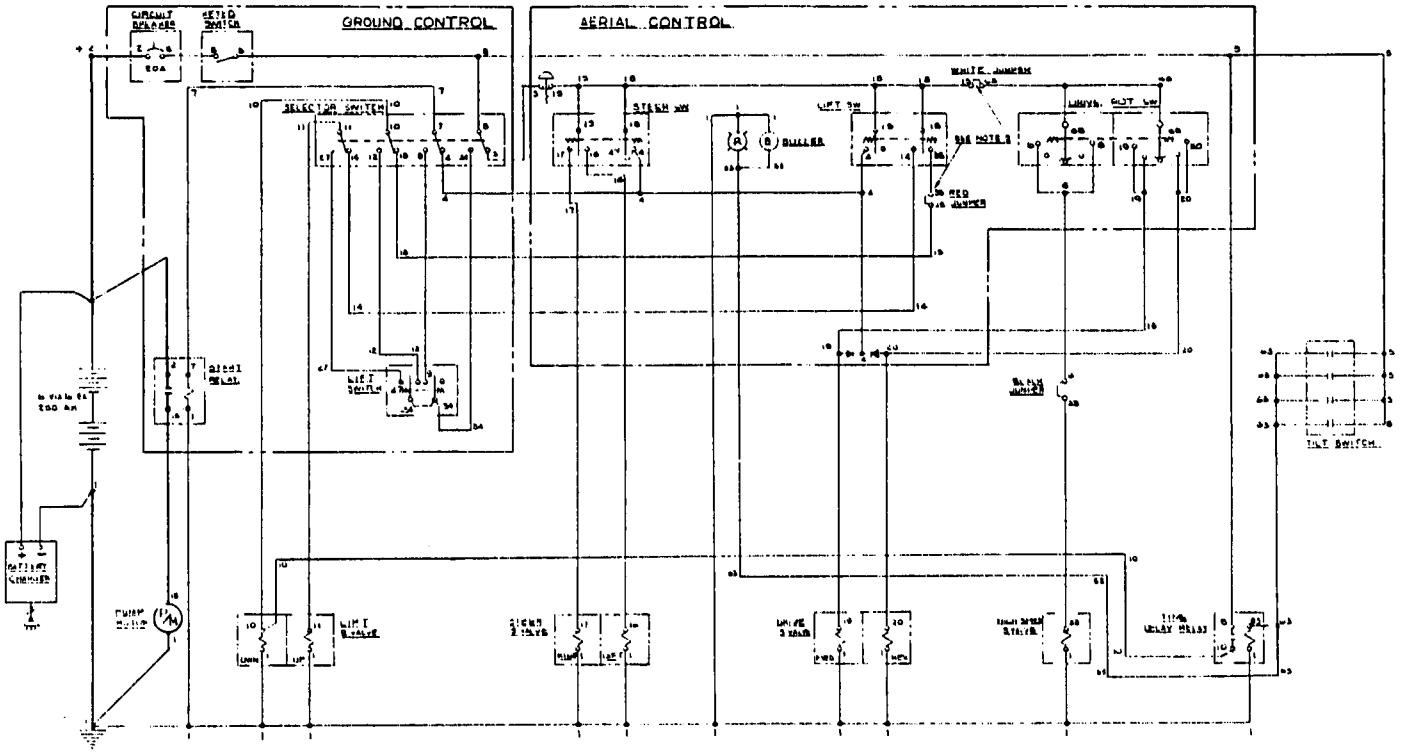
DATE	W.O.	MECH.	HYDRAULIC OIL CHANGE	HYDRAULIC OIL FILTER	WHEEL BEARING PACK	DRIVE MOTOR	PUMP MOTOR BRUSHES	ELECTRICAL CONTROLS	BATTERY	HYDRAULIC SYSTEM	LIFT CYLINDER SEALS	HYDRAULIC CONTROL VALVE	HYDRAULIC PUMP	LIFT ROLLERS	HYDRAULIC HOSES	BRAKES	STEERING	STEERING HOSES	STEERING CYLINDER	DRIVE TIRE

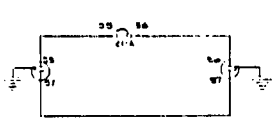
DATE	REMARKS	DATE	REMARKS	AGENCY


LIFT CYLINDER
P/N 130178 (FOR JR-7)
P/N 130176 (FOR JR-14)
P/N 130452 (FOR JR 19)
STEERING CYLINDER
P/N 130168
ORIFICED CHECK VALVE
CONTROL VALVE
P/N 81012
FLOW METER VALVE
MFG P/N 50864
ALSO IN JF-1
BRAKE
MOTOR DRIVE & BRAKE
P/N 81013 MOTOR
P/N 81011 BRAKE
S1
S2
LIFT
750 PSI
1900 PSI
.6 GPM
DRIVE
M2
M1
MOTOR DRIVE
P/N 81014
DRAIN
INLET
TANK
MOTOR / PUMP
P/N 81015
FILTER
P/N 81016

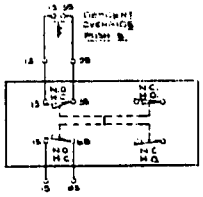
JR. 19 (SLIDE OUT) HYDRAULIC SCHEMATIC - 130674



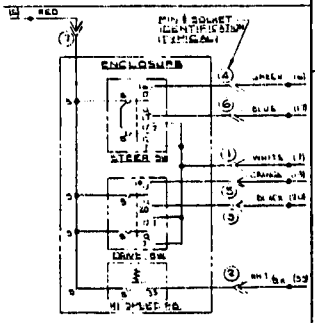




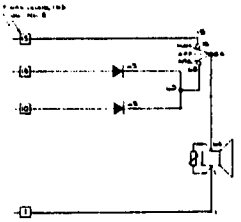
115 V.A.C. OPTION



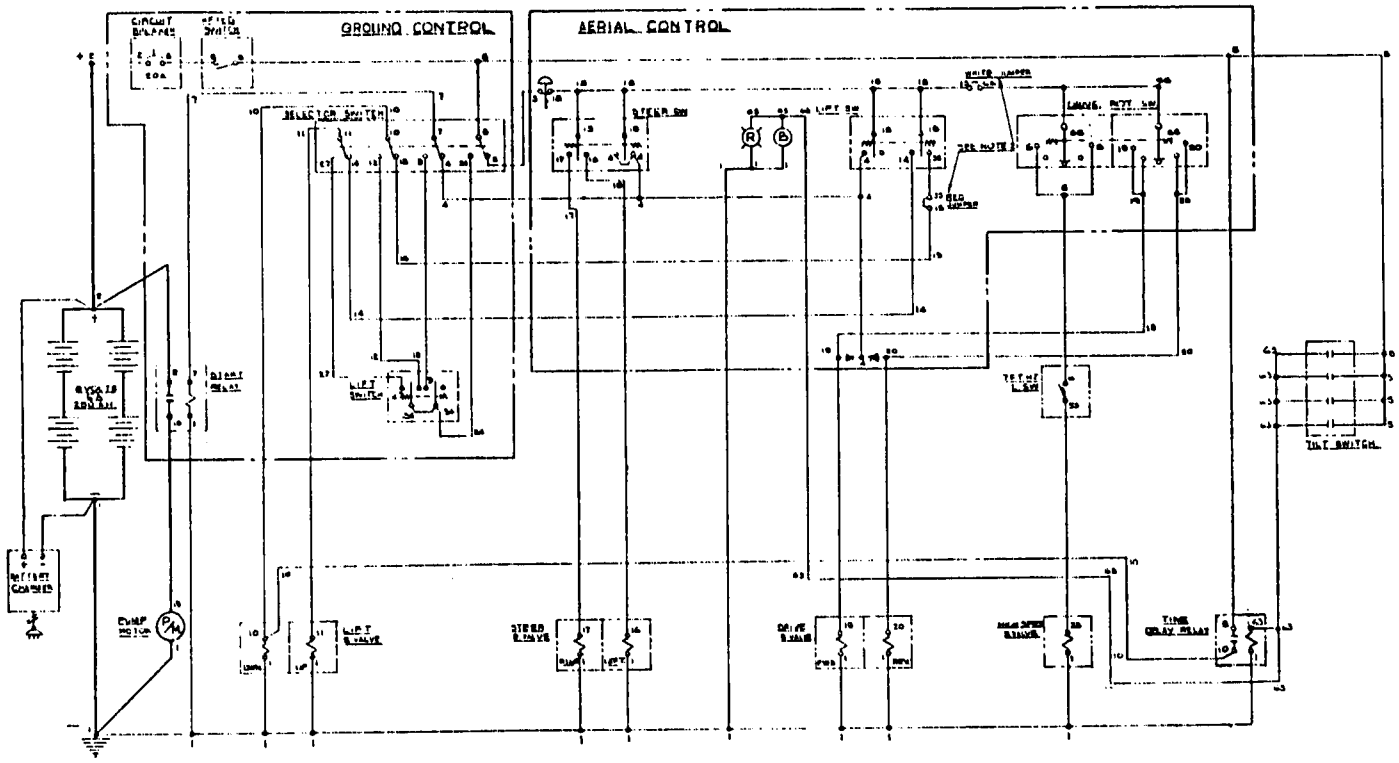
L.S.W. ELECTRICAL SCHEMATIC FOR SLIDE OUT OPTION

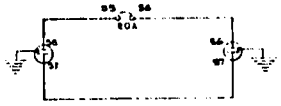


REMOTE CONTROL OPTION

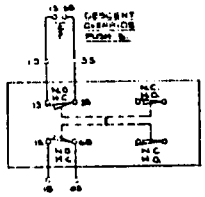


HORN OPTION

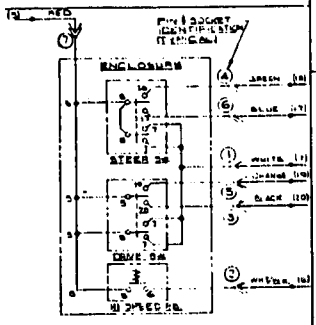




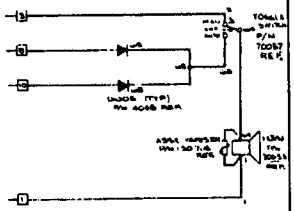
115 V A C OPTION



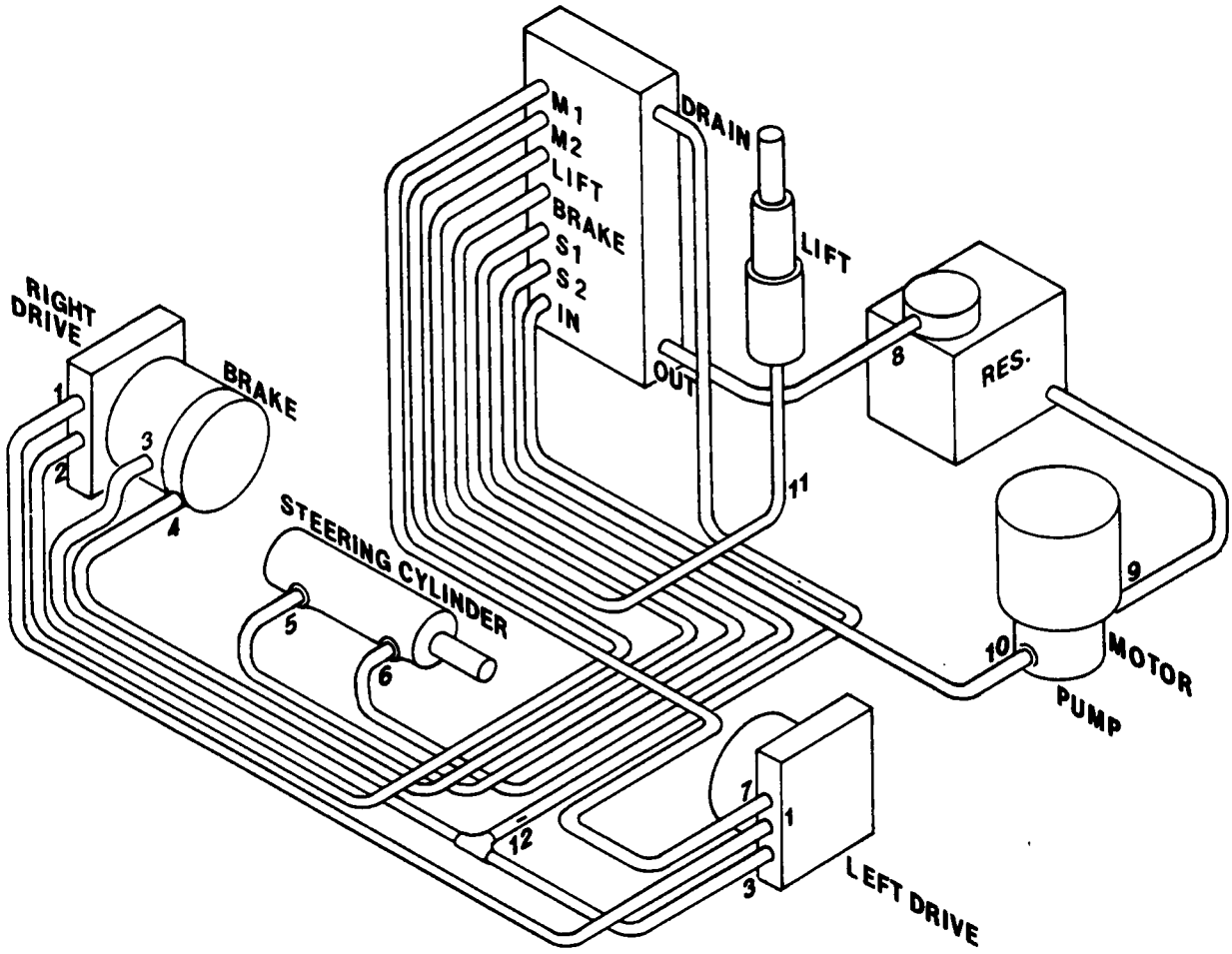
L SW ELECTRICAL SCHEMATIC — FOR EXTENDABLE PLATFORM OPTION



REMOTE CONTROL OPTION



HORN OPTION



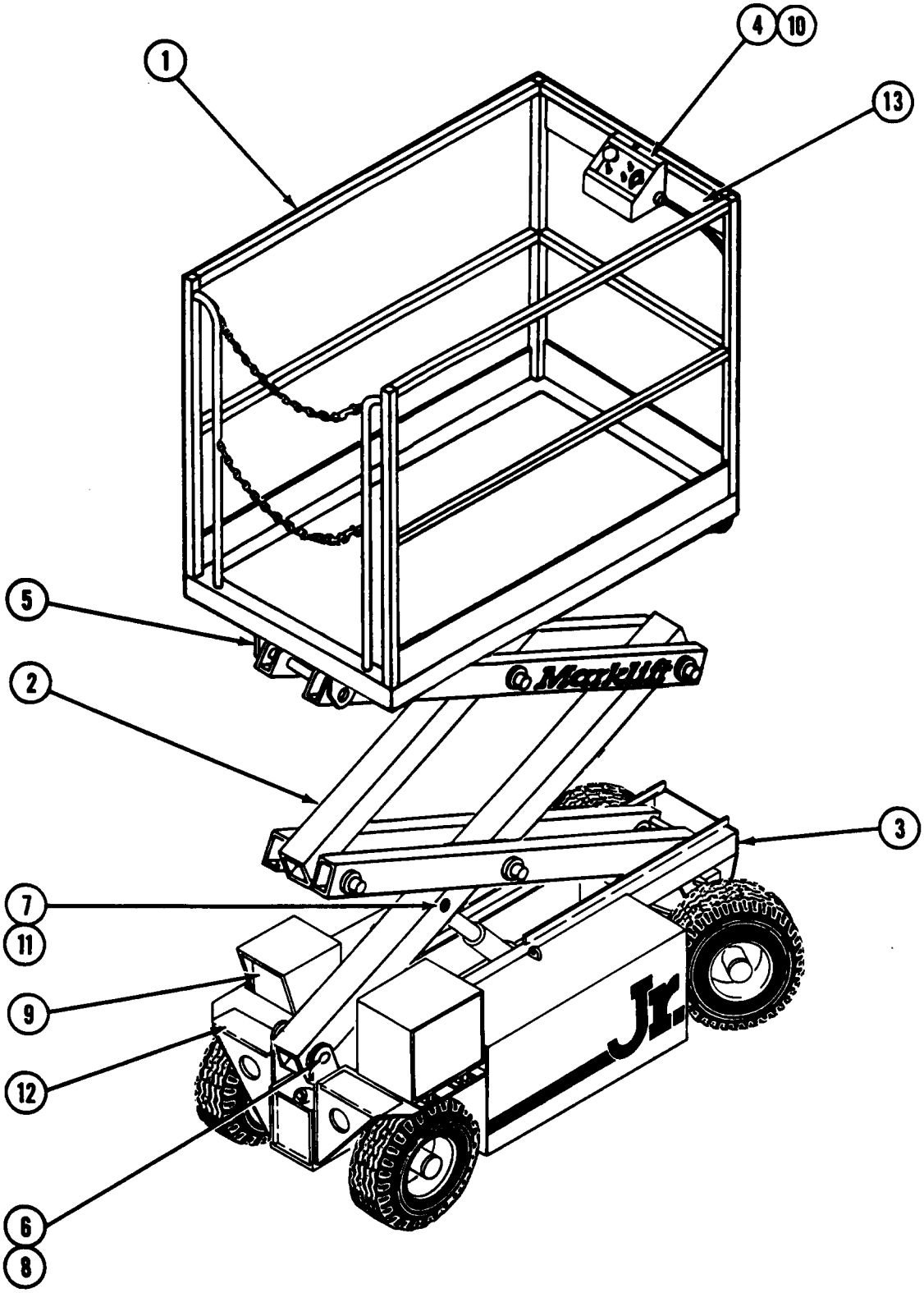
P/N	130240	130229	130588
HOSE NO.s	JR. 7	JR. 14	JR. 19
1	13213-04-0186	13217-04-0192	13203-08-0250
2	13214-04-0550	13217-04-0642	13213-06-0624
3	13213-04-0160	13210-04-0674	13213-06-0134
4	13211-04-0490	13216-04-0580	13211-04-0694
5	13214-04-0520	13216-04-0596	13216-04-0324
6	13214-04-0510	13211-04-0606	13211-04-0654
7	13213-04-0544	13217-04-0634	13216-04-0714
8	13213-06-0140	13213-06-0120	13211-04-0674
9	13213-08-0220	13213-08-0200	13213-04-0744
10	13213-06-0280	13213-06-0354	13214-04-0244
11	13214-04-0344	13214-04-0376	13213-04-0254
12	13213-06-0140	13214-04-0186	13213-04-0284

MARKLIFT JR.
SELF PROPELLED SCISSOR LIFT

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ITEM	QTY	PART NO.	DESCRIPTION
1	1	130106	ASSEMBLY, PLATFORM (REF. FIG. 3)
2	1	130140	ASSEMBLY, SCISSOR (REF. FIG. 4)
3	1	130102	ASSEMBLY, BASE (REF. FIG. 5)
4	1	130162	ASSEMBLY, AERIAL CONTROL BOX (REF. FIG. 29)
5	1	130169	PIN
6	1	130182	PIN
7	1	130170	PIN
8	2	64206	PIN, ROLL
9	1	130187	ASSEMBLY, GROUND CONTROL BOX (REF. FIG. 28)
10	7	61711	SCREW, SELF-TAPPING #12 x 1/2 LG TYPE A
11	1	62203	SCREW, SET SOCKET 3/8-16 UNC x 3/8 LG
12	2	130331	FOOT STEP, ANTI-SKID
13	1	65581	DOCUMENT PLASTIC BAG

FIGURE 2 JR. 7 DECAL LOCATIONS

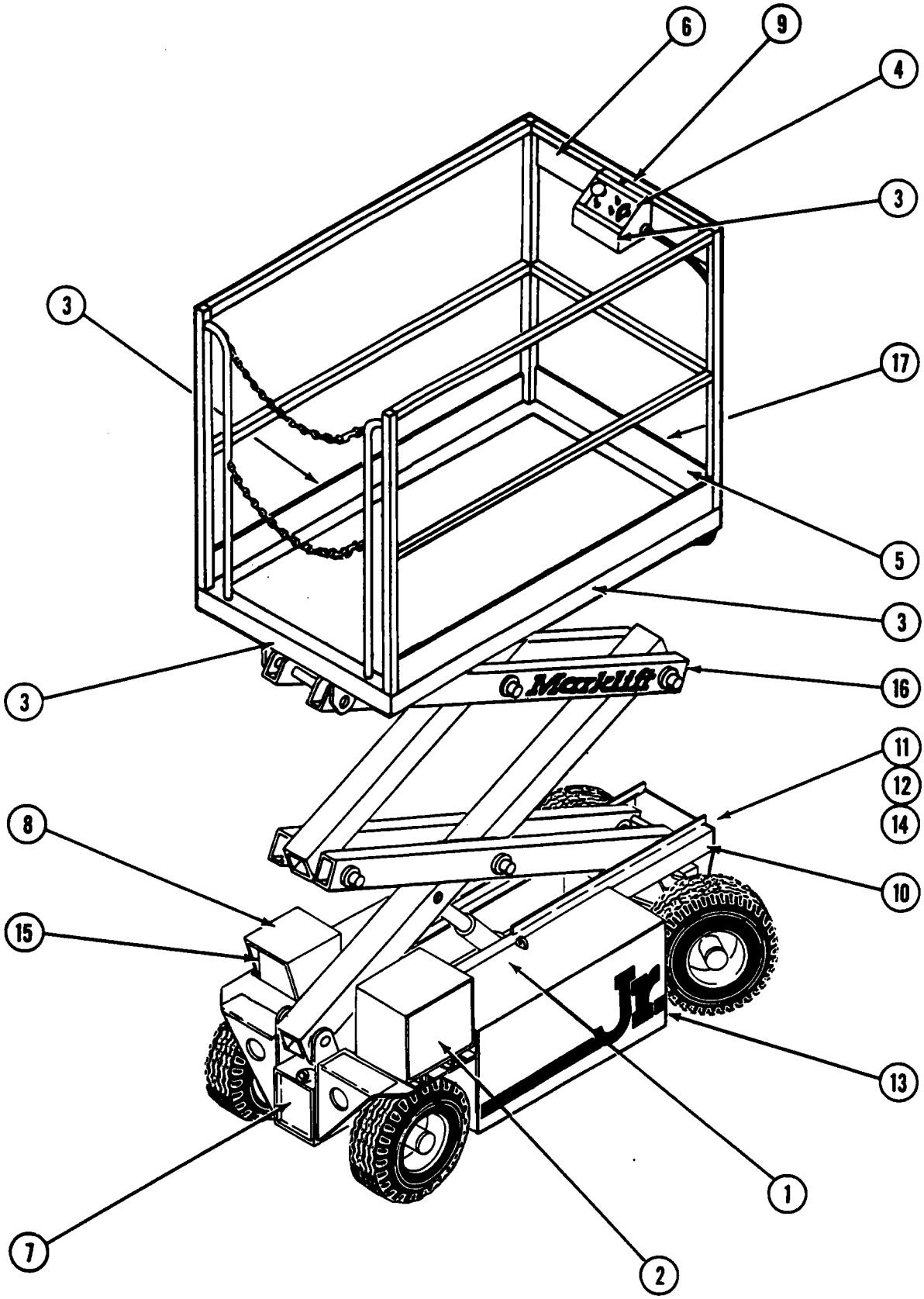
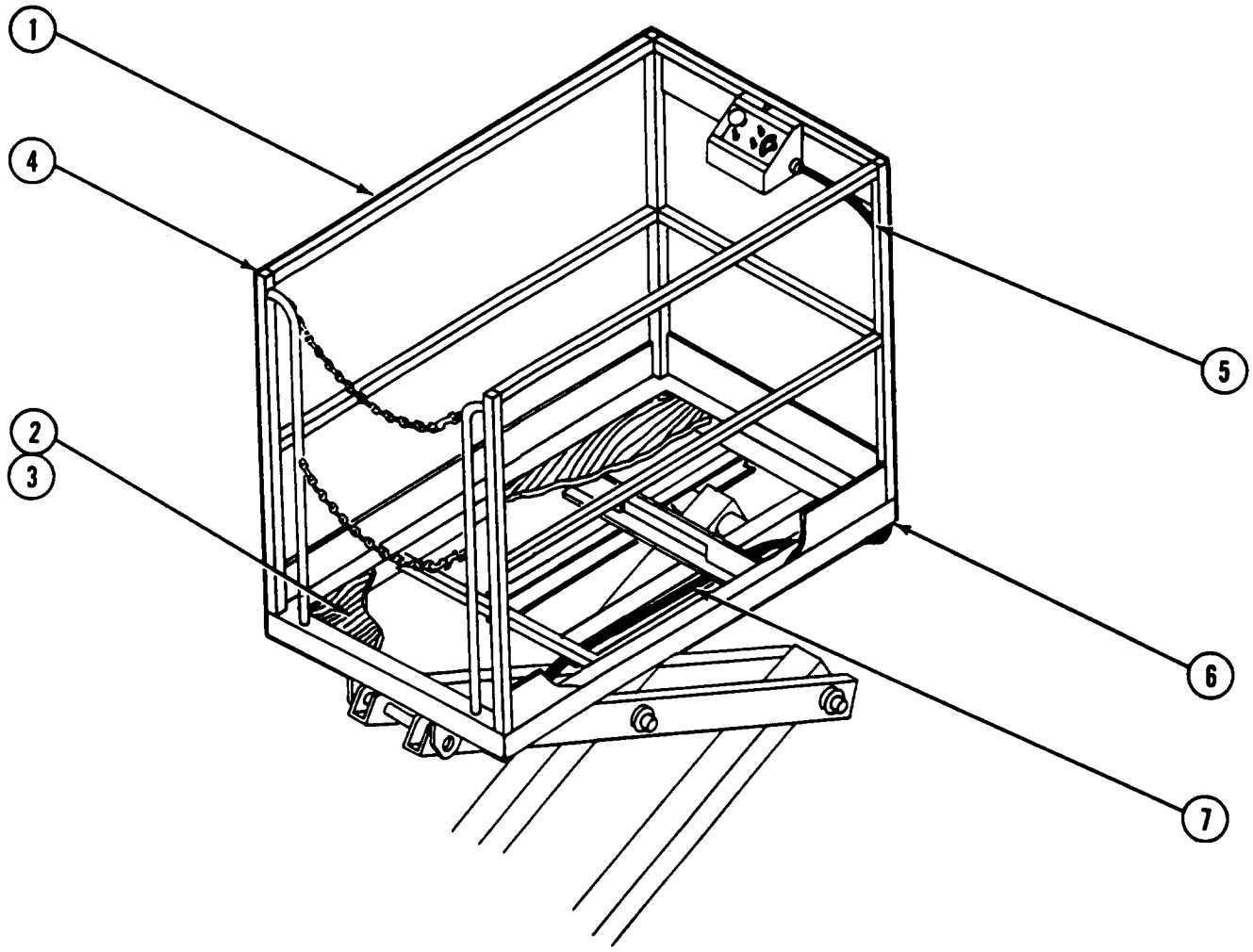


FIGURE 2 JR. 7 DECAL LOCATIONS

ITEM	QTY	PART NO.	DESCRIPTION
1	2	2003	DECAL, WATER LEVEL
2	1	2005	DECAL, BATTERY CHARGER PLUG
3	2	2022	DECAL, LOAD CAPACITY, 500 LBS.
4	1	2009	DECAL, AERIAL CONTROL BOX
5	1	11064	DECAL, ATTACH SAFETY CHAINS
6	1	130173	DECAL, OPERATING INSTRUCTIONS
7	1	2017	DECAL, HYDRAULIC FLUID
8	1	2016	DECAL, WARNING, DO NOT WORK UNDER
9	1	2014	DECAL, CAUTION, HIGH VOLTAGE
10	2	22175	DECAL, MONOFILLED TIRES
11	1	20661	PLATE, ANSI A-92
12	1	30520	PLATE, PATENTS
13	2	130242	DECAL, - "JR." - SIDE STRIPE
14	1	20660	IDENTIFICATION PLATE
15	1	130201	DECAL, GROUND CONTROL STATION
16	2	31259	DECAL, "MARKLIFT"
17	2	130596	DECAL, "A PRODUCT OF MARK INDUSTRIES"

FIGURE 3 JR. 7 PLATFORM ASSEMBLY - 130106



ITEM	QTY	PART NO.	DESCRIPTION
1	1	130108	PLATFORM, WELDMENT
2	1	130218	PLYWOOD
3	8	61713	SCREW, SELF-TAPPING 1/4-20x1 1/4LG #2 PHILLIPS FLAT HEAD
4	4	91541	CAP, PLUG #FP16S
5	1	70016	GROMMET 3/4 HEYMAN OCB-750
6	1	70248	GROMMET 5/8 ID/1 1/8 OD
7	7	764	CLAMP, RUBBER

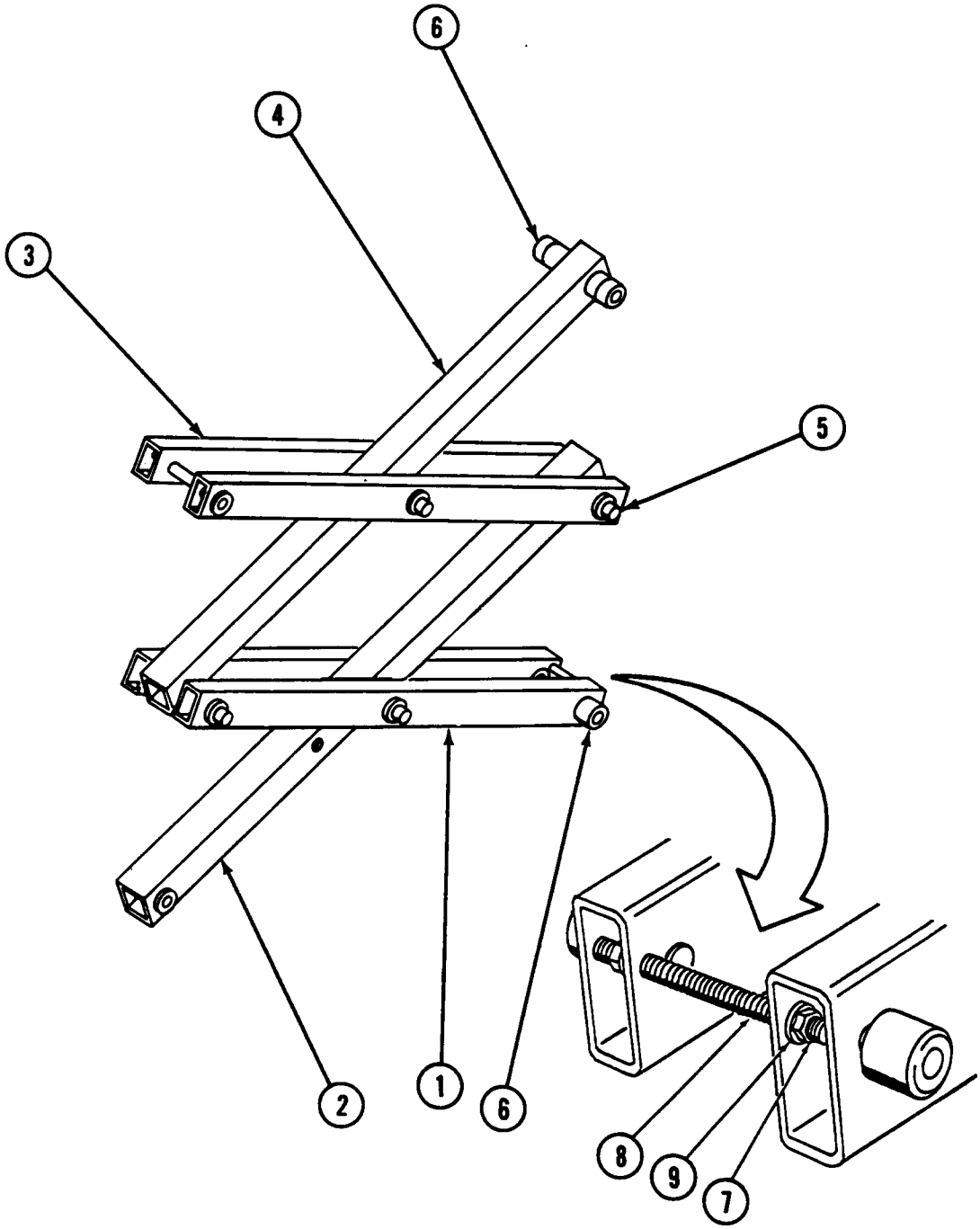

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FIGURE 4 JR. 7 SCISSOR ASSEMBLY - 130140

ITEM	QTY	PART NO.	DESCRIPTION
1	2	130144	WELDMENT, OUTER BOTTOM
2	1	130142	WELDMENT, INNER BOTTOM
3	2	130145	WELDMENT, OUTER TOP
4	1	130143	WELDMENT, INNER TOP
5	8	64206	PIN, EXPANSION
6	4	65555	CAM ROLLER CARTER SFH-64-A
7	4	60705	NUT, HEX 1/2-13 UNC
8	1	63665	ROD, THREADED 1/2-13 UNC x 6 1/2 LG
9	2	63305	WASHER, LOCK SPLIT 1/2.

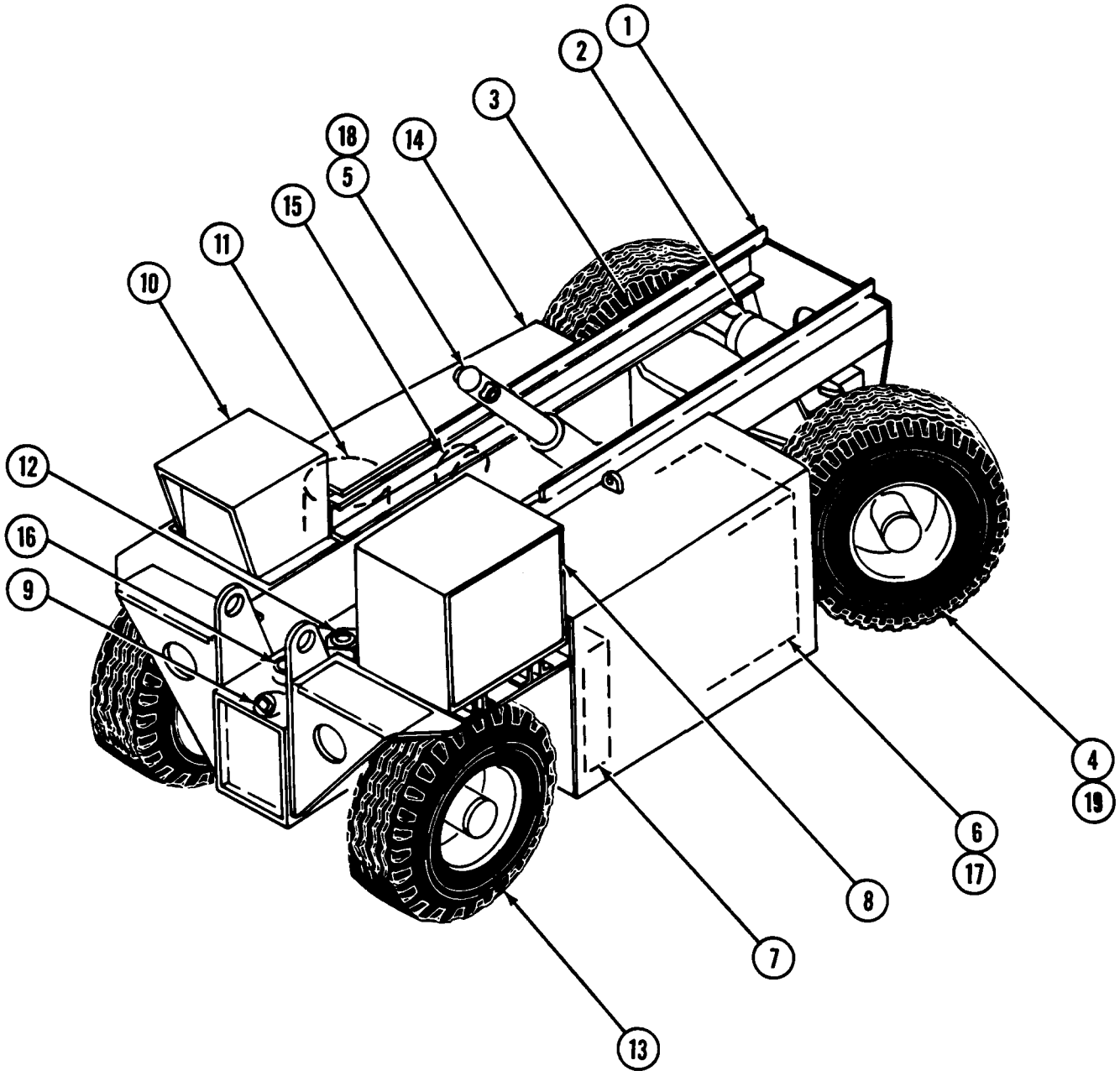
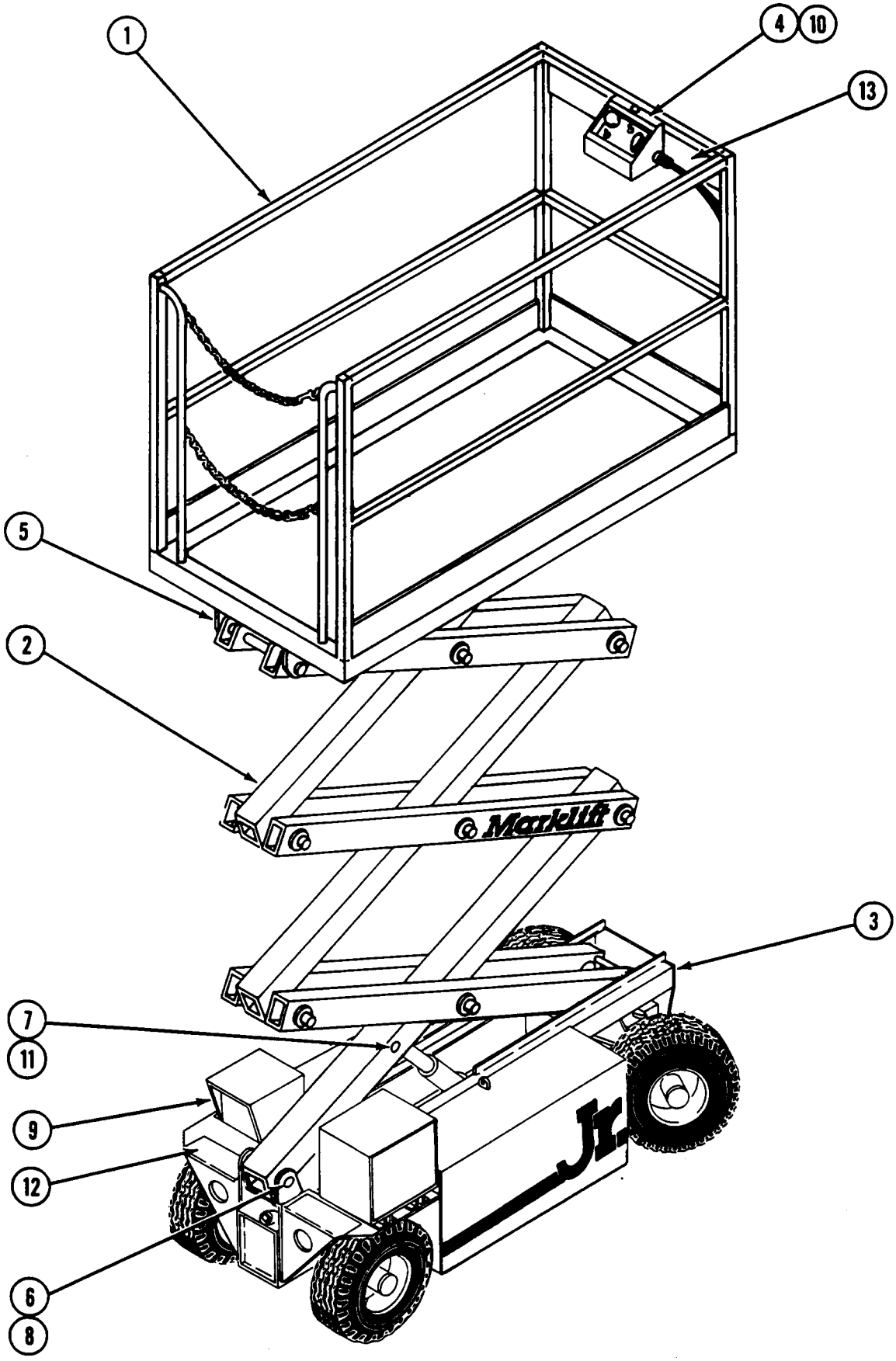

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FIGURE 5 JR. 7 BASE ASSEMBLY - 130102

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130104	WELDMENT, BASE
2	1	130237	ASSEMBLY, STEERING CYLINDER (REF. FIG. 22)
3	1	130239	ASSEMBLY, MOTOR DRIVE & BRAKE (REF. FIG. 17)
4	2	130202	ASSEMBLY, TIRE & WHEEL/DRIVE (REF. FIG. 23)
5	1	130235	ASSEMBLY, CYLINDER LIFT (REF. FIG. 19)
6	2	4007	BATTERY, TROJAN J-250 6V 250 AMP (REF. FIG.25)
7	1	130234	ASSEMBLY, VALVE CONTROL (REF. FIG. 18)
8	1	70224	BATTERY CHARGER (REF. VENDOR SECTION)
9	1	130230	WELDMENT, DIPSTICK
10	1	130200	ASSEMBLY, GROUND CONTROL BOX (REF. FIG. 28)
11	1	130241	** ASSEMBLY, MOTOR/PUMP (REF. FIG. 25) (SEE BELOW)
12	1	81016	FILTER - 66739 = FILTER ELEMENT FOR 81016
13	2	130203	ASSEMBLY, TIRE & WHEEL/IDLER (REF. FIG. 24)
14	2	130172	BATTERY BASE COVER
15	1	70209	SOLENOID (REF. FIG. 25)
16	1	65213	BREATHER
17	1	130232	KIT, BATTERY CABLE (REF. FIG. 25)
18	1	130171	PIN (BASE TO LIFT CYLINDER)
19	1	130238	ASSEMBLY, MOTOR DRIVE (REF. FIG. 17)

** P/N 130241 consists of the items below:

81015-1 PUMP
81015-2 MOTOR
80008-10 MALE ELBOW
80008-14 MALE ELBOW


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ITEM	QTY	PART NO.	DESCRIPTION
1	1	130105	ASSEMBLY, PLATFORM (REF. FIG. 8)
2	1	130141	ASSEMBLY, SCISSOR (REF. FIG. 9)
3	1	130101	ASSEMBLY, BASE (REF. FIG. 10)
4	1	130186	ASSEMBLY, AERIAL CONTROL BOX (REF. FIG. 29)
5	1	130169	PIN
6	1	130182	PIN
7	1	130233	PIN
8	2	64206	PIN, ROLL
9	1	130187	ASSEMBLY, GROUND CONTROL BOX (REF. FIG. 28)
10	4	61711	SCREW, SELF-TAPPING 12 x 1/2 LG
11	1	62203	SCREW, SET SOCKET 3/8-16 UNC x 3/8 LG
12	2	130331	FOOT STEP, ANTI-SKID
13	1	65581	DOCUMENT PLASTIC BAG

FIGURE 7 JR. 14 DECAL LOCATIONS

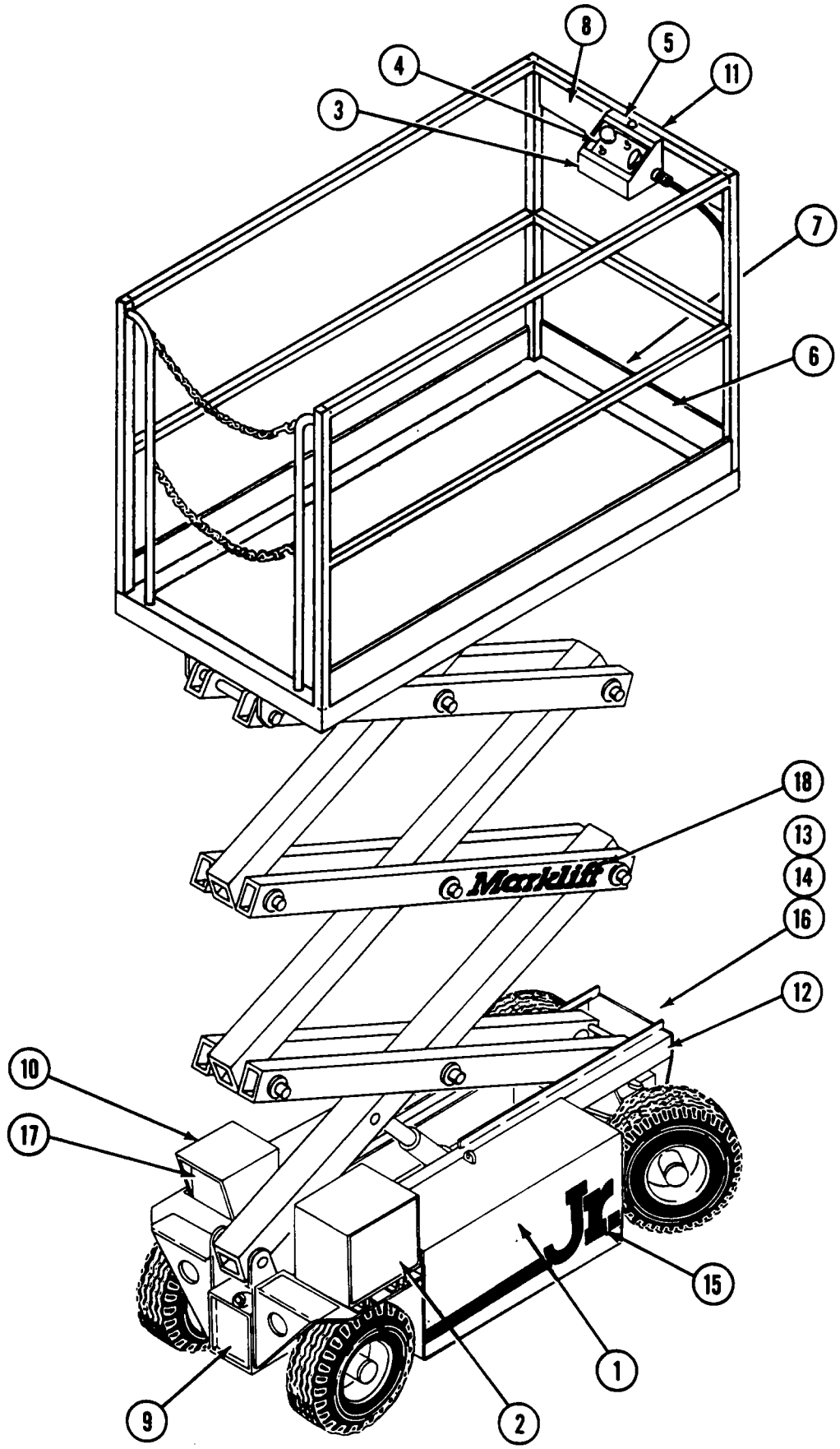
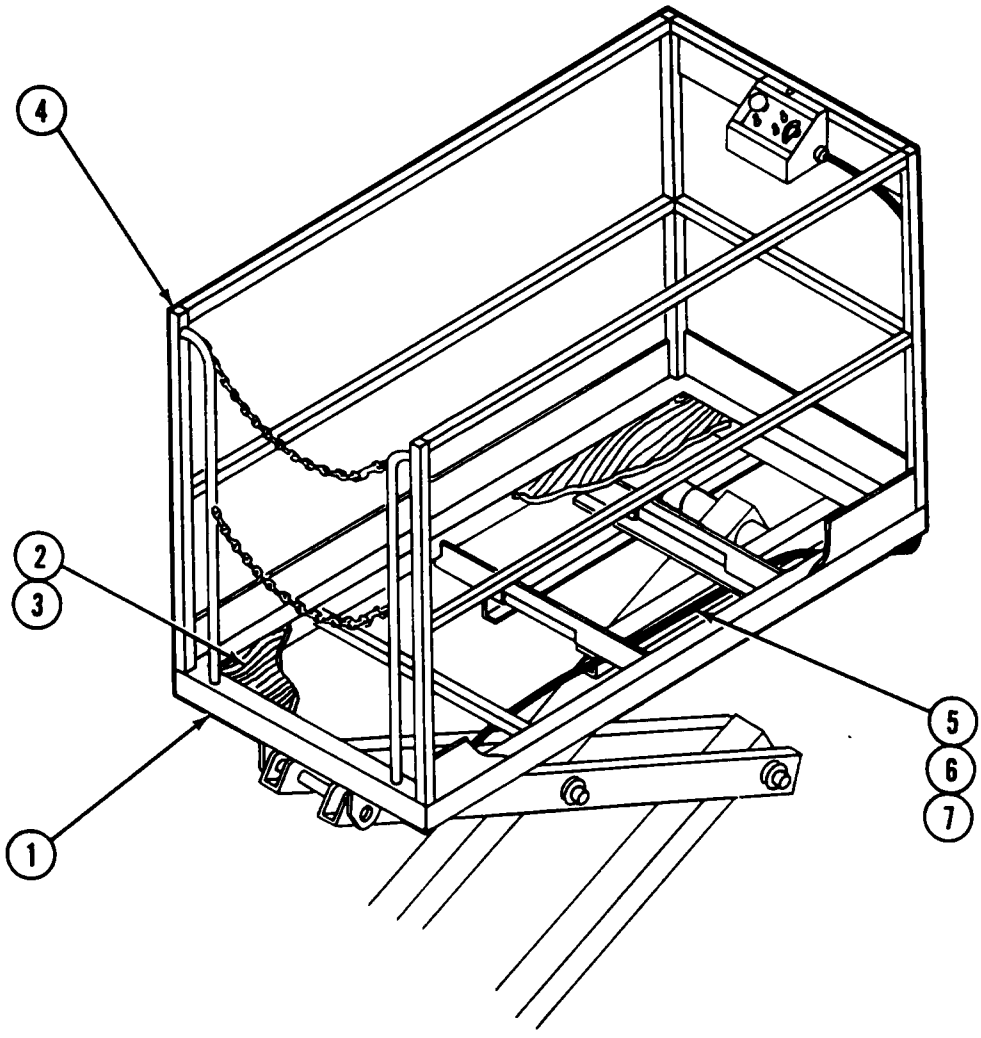


FIGURE 7 JR. 14 DECAL LOCATIONS

ITEM	QTY	PART NO.	DESCRIPTION
1	2	2003	DECAL, WATER LEVEL
2	1	2005	DECAL, BATTERY CHARGER PLUG
3	4	2022	DECAL, LOAD CAPACITY, 500 LBS.
4	1	2009	DECAL, AERIAL CONTROL BOX
5	1	2015	DECAL, WARNING, UNSTABLE CONDITION
6	1	11064	DECAL, ATTACH SAFETY CHAINS
7	2	130596	DECAL, "A PRODUCT OF MARK INDUSTRIES"
8	1	130243	DECAL, OPERATING INSTRUCTIONS
9	1	2017	DECAL, HYDRAULIC FLUID
10	1	2016	DECAL, WARNING, DO NOT WORK UNDER
11	1	2014	DECAL, CAUTION, HIGH VOLTAGE
12	2	22175	DECAL, MONOFILLED TIRES
13	1	20661	PLATE, ANSI A-92
14	1	30520	PLATE, PATENTS
15	2	130242	DECAL, - "JR." - SIDE STRIPE
16	1	20660	IDENTIFICATION PLATE
17	1	130201	DECAL, GROUND CONTROL BOX
18	2	31259	DECAL, "MARKLIFT"

FIGURE 8 JR. 14 PLATFORM ASSEMBLY



ITEM	QTY	PART NO.	DESCRIPTION
1	1	130107	PLATFORM, WELDMENT
2	1	130217	PLYWOOD
3	8	61713	SCREW, SELF TAPPING 1/4-20 x 1 1/4 LG #2 PHILLIPS FLAT HEAD
4	4	91541	CAP, PLUG FP16S
5	1	70016	GROMMET 3/4 OCB-750
6	1	70248	GROMMET 5/8 ID/1 1/8 OD
7	3	764	CLAMP, RUBBER

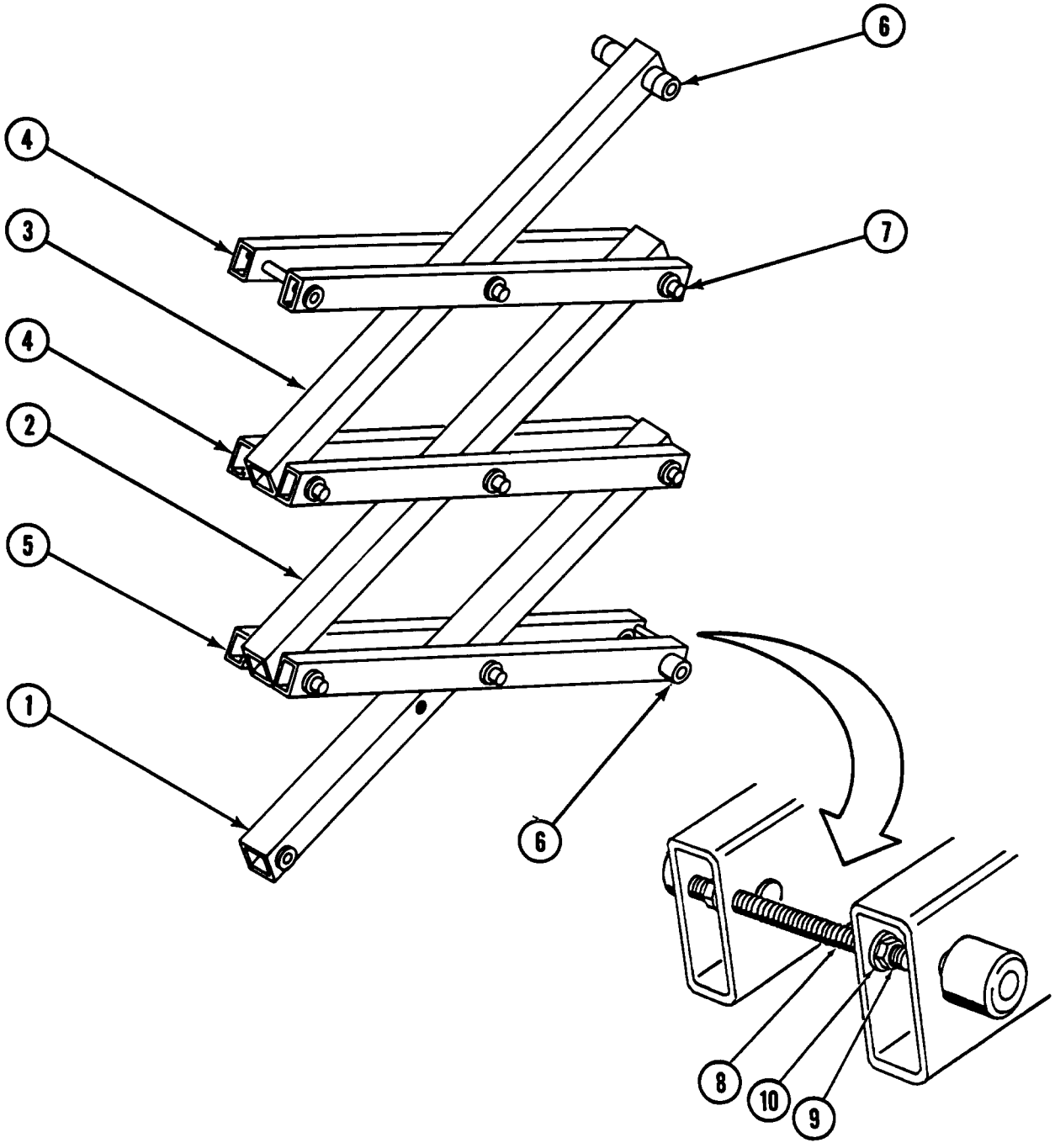
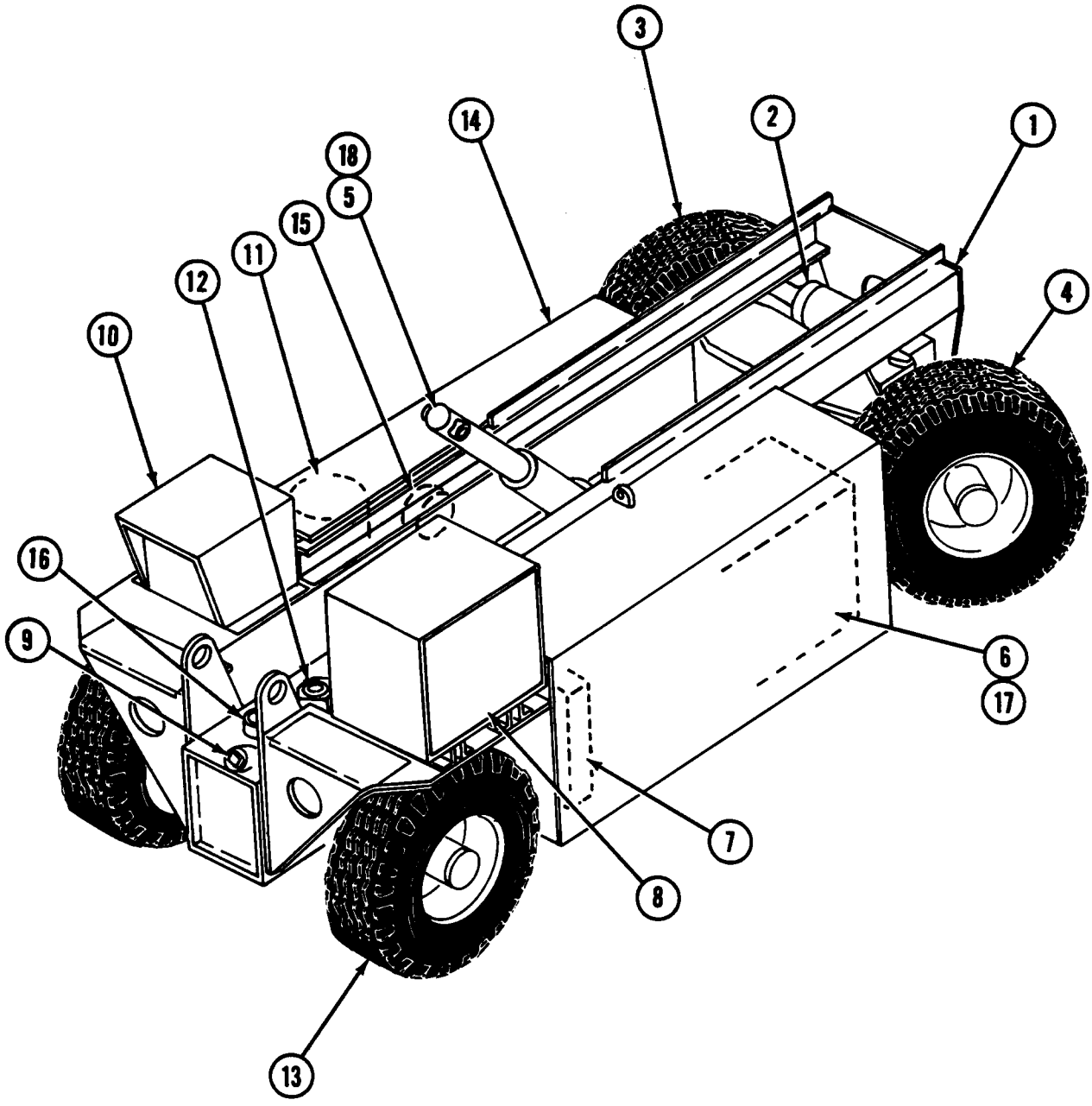

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FIGURE 9 JR. 14 SCISSOR ASSEMBLY - 130141

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130160	WELDMENT, ARM INNER BOTTOM
2	1	130159	WELDMENT, ARM INNER MIDDLE
3	1	130158	WELDMENT, ARM INNER TOP
4	4	130157	WELDMENT, ARM OUTER TOP/MIDDLE
5	2	130161	WELDMENT, ARM OUTER BOTTOM
6	4	65555	CAM ROLLER CARTER #SFH-64-A
7	14	64206	PIN, ROLL 1/4 DIA x 2 1/4 LG
8	1	63665	THREADED ROD 1/2-13 UNC x 6 1/2 LG
9	4	60705	NUT, HEX 1/2-13 UNC
10	2	63305	WASHER, LOCK SPLIT 1/2


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ITEM	QTY	PART NO.	DESCRIPTION
1	1	130103	WELDMENT, BASE
2	1	130237	ASSEMBLY, STEERING CYLINDER (REF. FIG. 22)
3	1	130239	ASSEMBLY, MOTOR DRIVE/ BRAKE (REF. FIG. 17)
4	2	130202	ASSEMBLY, TIRE & WHEEL/DRIVE (REF. FIG. 23)
5	1	130236	ASSEMBLY, LIFT CYLINDER (REF. FIG. 20)
6	4	4007	BATTERY J-250 6V. 250 AMP. (REF. FIG. 26)
7	1	130234	ASSEMBLY, VALVE CONTROL (REF. FIG. 18)
8	1	70223	BATTERY CHARGER (REF. VENDOR SECTION)
9	1	130230	WELDMENT, DIPSTICK
10	1	130187	ASSEMBLY, GROUND CONTROL BOX (REF. FIG. 28)
11	1	130241	** ASSEMBLY, MOTOR/PUMP (SEE BELOW) (REF. FIG. 26)
12	1	81016	FILTER 66739 = FILTER ELEMENT FOR 81016
13	2	130203	ASSEMBLY, TIRE & WHEEL/IDLER (REF. FIG. 24)
14	2	130214	WELDMENT, COVER
15	1	70209	SOLENOID (REF. FIG. 26)
16	1	65213	BREATHER
17	1	130231	KIT, BATTERY CABLE (REF. FIG. 26)
18	1	130171	PIN (BASE TO LIFT CYLINDER)
	1	130238	ASSEMBLY, MOTOR DRIVE 114-3Y1 (RIGHT SIDE) (REF. FIG17.1)

** P/N 130241 consists of the items below:

81015-1 PUMP
81015-2 MOTOR
80008-10 MALE ELBOW
80008-14 MALE ELBOW

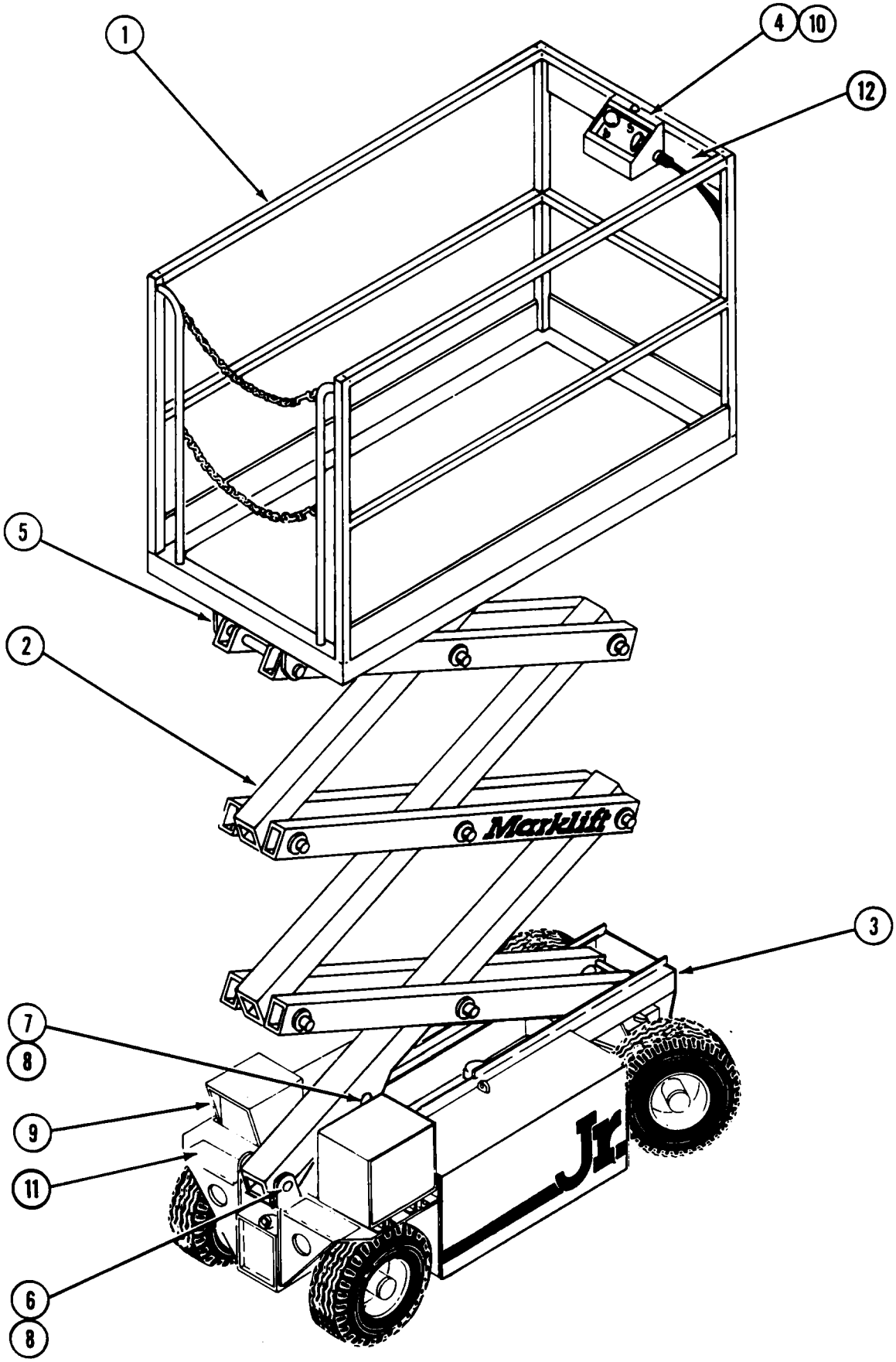

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FIGURE 11 JR. 19 FINAL ASSEMBLY - 130051

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130528	ASSEMBLY, PLATFORM (REF. FIG. 13)
2	1	130526	ASSEMBLY, SCISSOR (REF. FIG. 14)
3	1	130527	ASSEMBLY, BASE (REF. FIG. 15)
4	1	130613	ASSEMBLY, AERIAL CONTROL BOX (REF. FIG. 29)
5	1	130584	PIN
6	1	130586	PIN
7	1	130585	PIN
8	3	64206	PIN, ROLL
9	1	130187	ASSEMBLY, GROUND CONTROL BOX (REF. FIG. 28)
10	4	61711	SCREW, SELF-TAPPING 12 x 1/2 LG
11	2	130331	FOOT STEP, ANTI-SKID
12	1	65581	DOCUMENT PLASTIC BAG

FIGURE 12 JR. 19 DECAL LOCATIONS

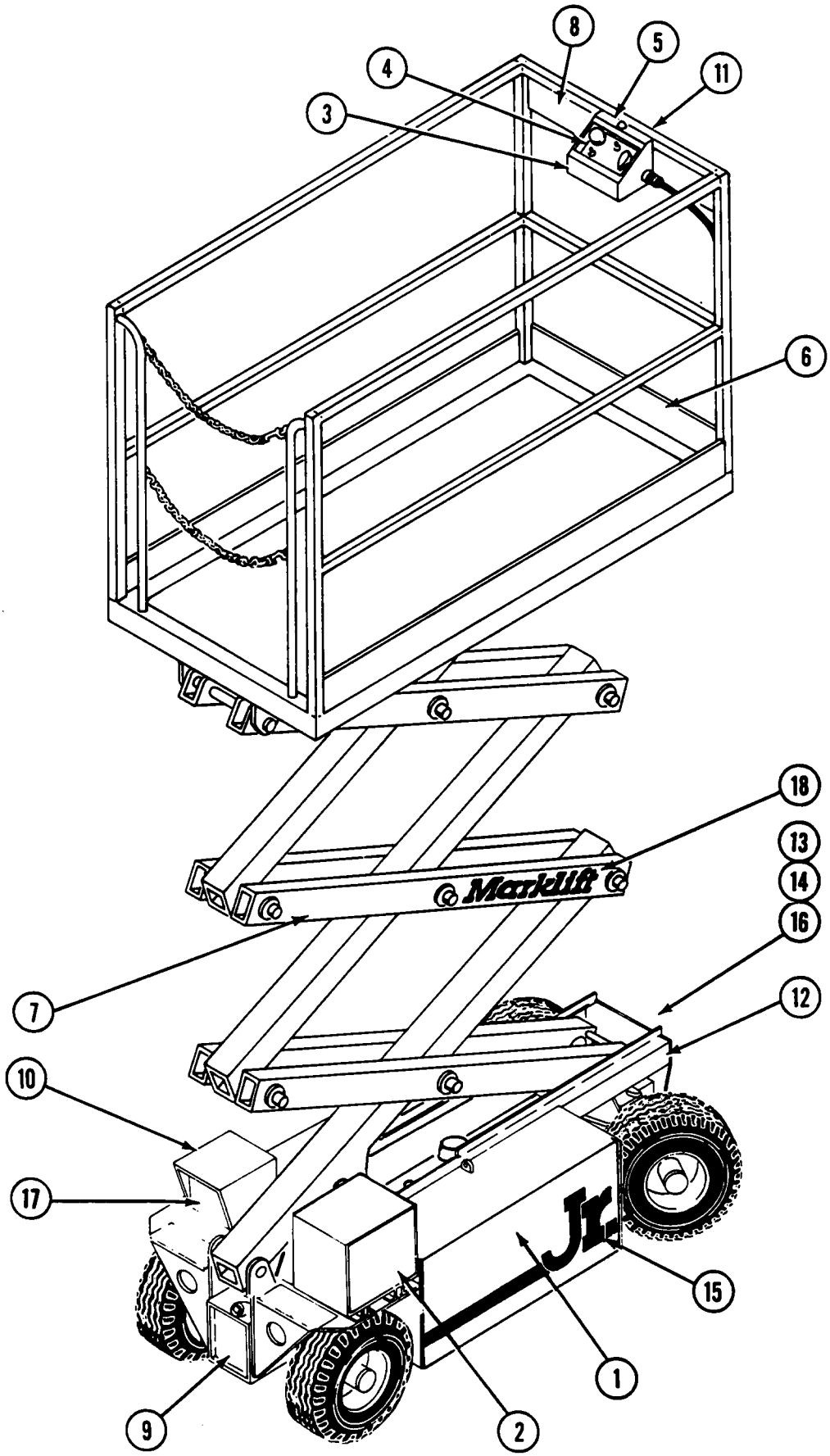


FIGURE 12 JR. 19 DECAL LOCATIONS

ITEM	QTY	PART NO.	DESCRIPTION
1	2	2003	DECAL, WATER LEVEL
2	1	2005	DECAL, BATTERY CHARGER PLUG
3	4	2022	DECAL, LOAD CAPACITY, 500 LBS.
4	1	2009	DECAL, AERIAL CONTROL BOX
5	1	2015	DECAL, WARNING, UNSTABLE CONDITION
6	1	11064	DECAL, ATTACH SAFETY CHAINS
7	2	130596	DECAL, "A PRODUCT OF MARK INDUSTRIES"
8	1	130243	DECAL, OPERATING INSTRUCTIONS
9	1	2017	DECAL, HYDRAULIC FLUID
10	1	2016	DECAL, WARNING, DO NOT WORK UNDER
11	1	2014	DECAL, CAUTION, HIGH VOLTAGE
12	2	22175	DECAL, MONOFILLED TIRES
13	1	20661	PLATE, ANSI A-92
14	1	30520	PLATE, PATENTS
15	2	130242	DECAL, -"JR."- SIDE STRIPE
16	1	20660	IDENTIFICATION PLATE
17	1	130201	DECAL, GROUND CONTROL BOX
18	2	31259	DECAL, "MARKLIFT"

FIGURE 13 JR. 19 PLATFORM ASSEMBLY

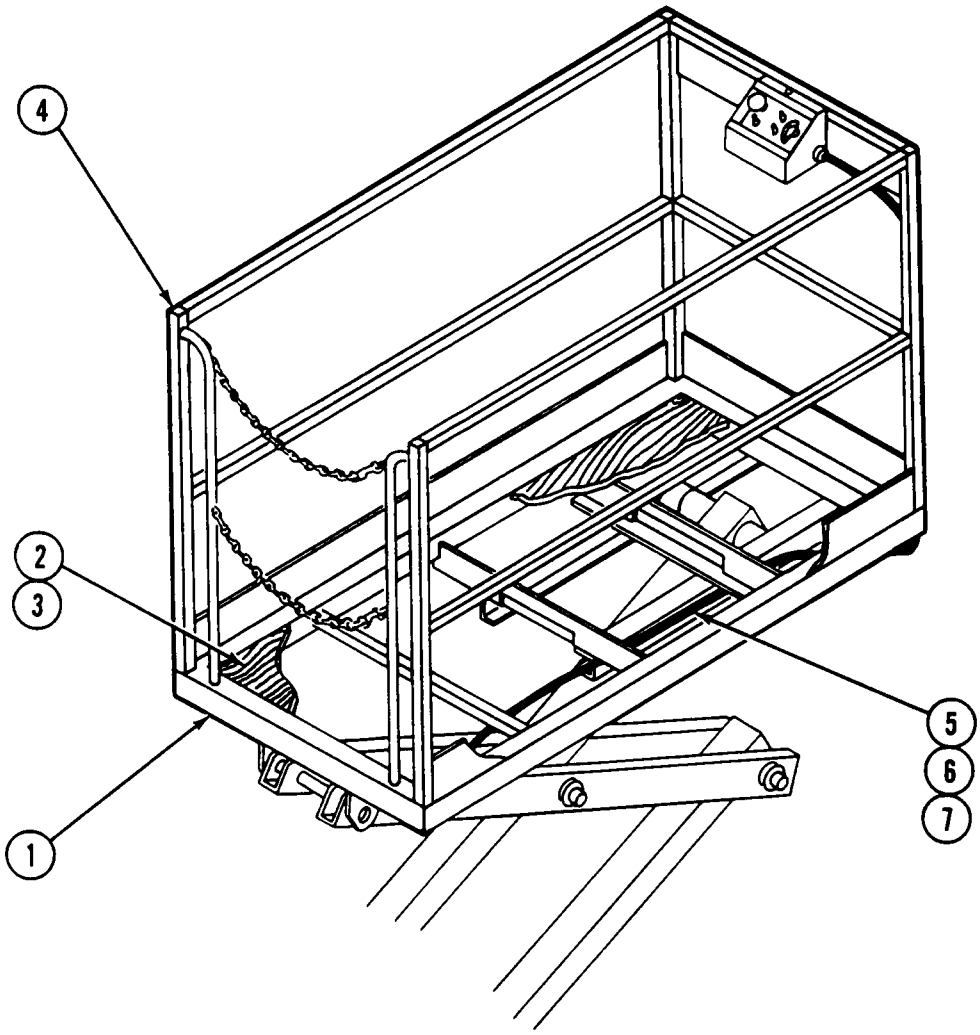


FIGURE 13 JR. 19 PLATFORM ASSEMBLY - 130528

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130570	PLATFORM, WELDMENT
2	1	130580	PLYWOOD
3	8	61713	SCREW, SELF TAPPING 1/4-20 x 1 1/4 LG
4	4	91541	CAP, PLUG FP16S
5	1	70016	GROMMET 3/4 OCB-750
6	1	70248	GROMMET 5/8 ID/1 1/8 OD
7	3	764	CLAMP, RUBBER

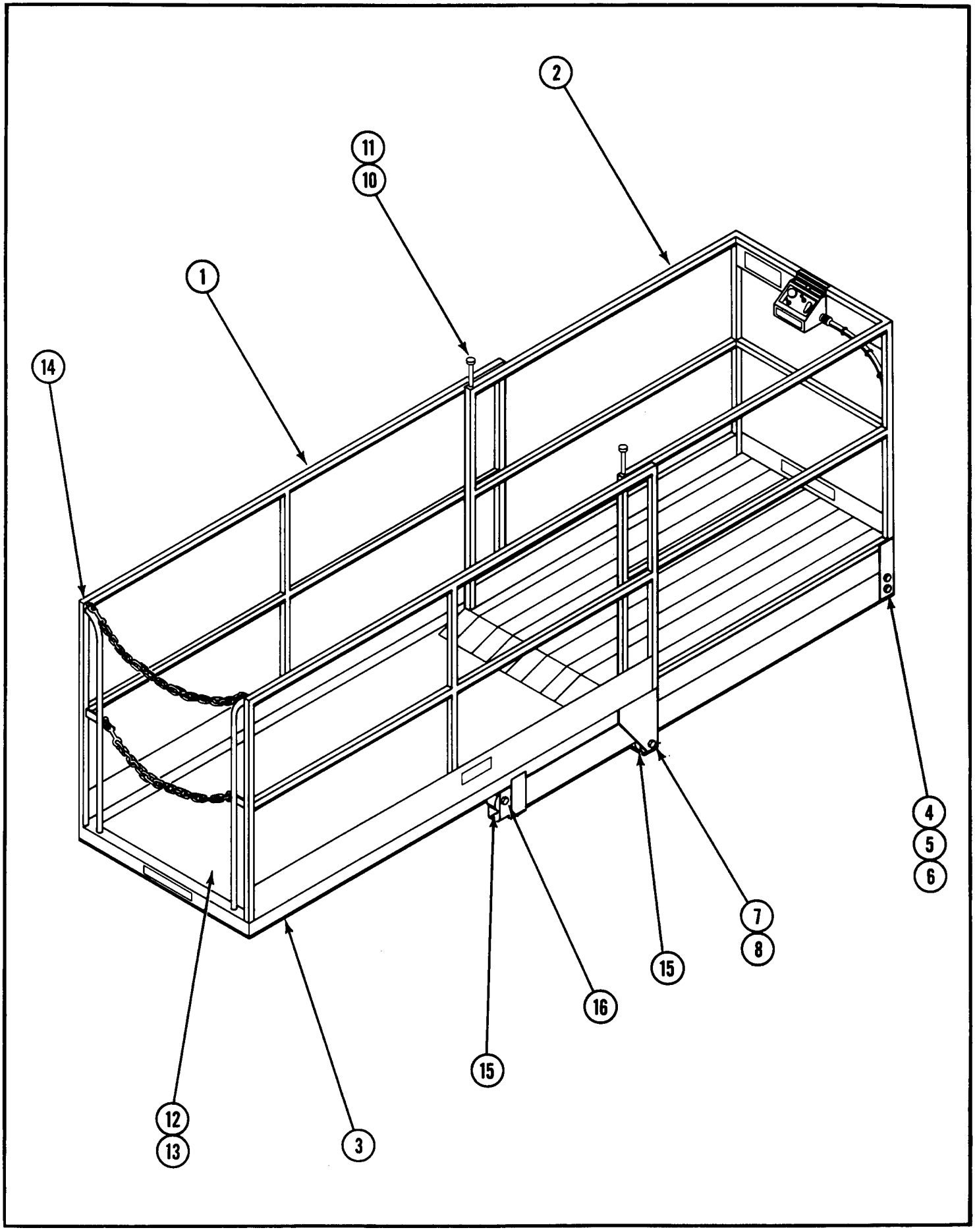

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FIGURE 13.1 JR.19 SLIDE OUT PLATFORM ASSEMBLY - 130647

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130625	WELDMENT PLATFORM
2	1	130626	WELDMENT DECK SLIDE OUT
3	2	130628	WELDMENT SUPPORT RAILS
4	6	63302	WASHER LOCK
5	6	60702	NUT, HEX
6	4	60339	SCREW, CAP
7	2	60397	SCREW, CAP
8	4	61305	NUT, HEX
9			
10	2	130632	WELDMENT LOCKPIN
11	2	65687	RING, SPLIT
12	1	130580	PLYWOOD FLOOR
13	8	61713	SCREW, CAP SELF - TAPPING
14	6	91541	CAP, PLUG
15	6	130652	ROLLER
16	2	60363	SCREW, CAP
17	2	16050	SCREW, SHOULDER SOCKET HEAD
18	2	31161	ROLLER BATTERY TRAY

NOTE: FOR JR.19 WITH SLIDE OUT PLATFORM OPTION: MODIFY CONTROL VALVE P/N 130234 PER DWG. (REF. FIG. 18 & 18.1) AND LIFT CYLINDER P/N 130583 PER DWG. (REF. FIG. 21) FOR JR.19 EXTENDABLE ONLY.

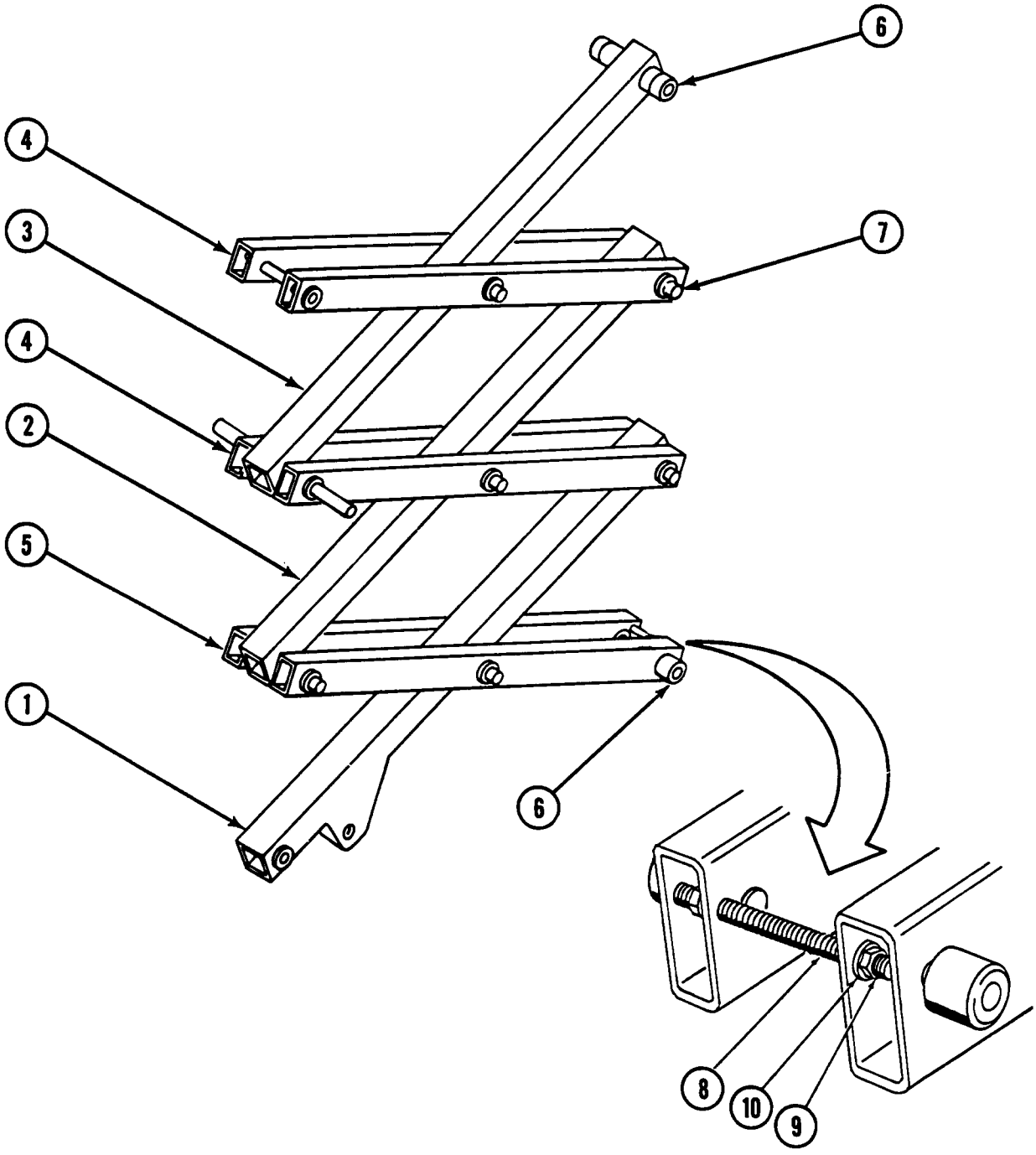

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FIGURE 14 - JR. 19 SCISSOR ASSEMBLY - 130526

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130529	WELDMENT, ARM INNER BOTTOM
2	1	130532	WELDMENT, ARM INNER MIDDLE
3	1	130534	WELDMENT, ARM INNER TOP
4	4	130538	WELDMENT, ARM OUTER TOP/MIDDLE
5	2	130536	WELDMENT, ARM OUTER BOTTOM
6	4	65555	CAM ROLLER CARTER #SFH-64-A
7	14	64206	PIN, ROLL 1/4 DIA x 2 1/4 LG
8	1	63665	THREADED ROD 1/2-13 UNC x 6 1/2 LG
9	4	60705	NUT, HEX 1/2-13 UNC
10	2	63305	WASHER, LOCK SPLIT 1/2
	2	36257	BAR, FLAT 5/16X2½X24LG

FIGURE 15 JR. 19 BASE ASSEMBLY

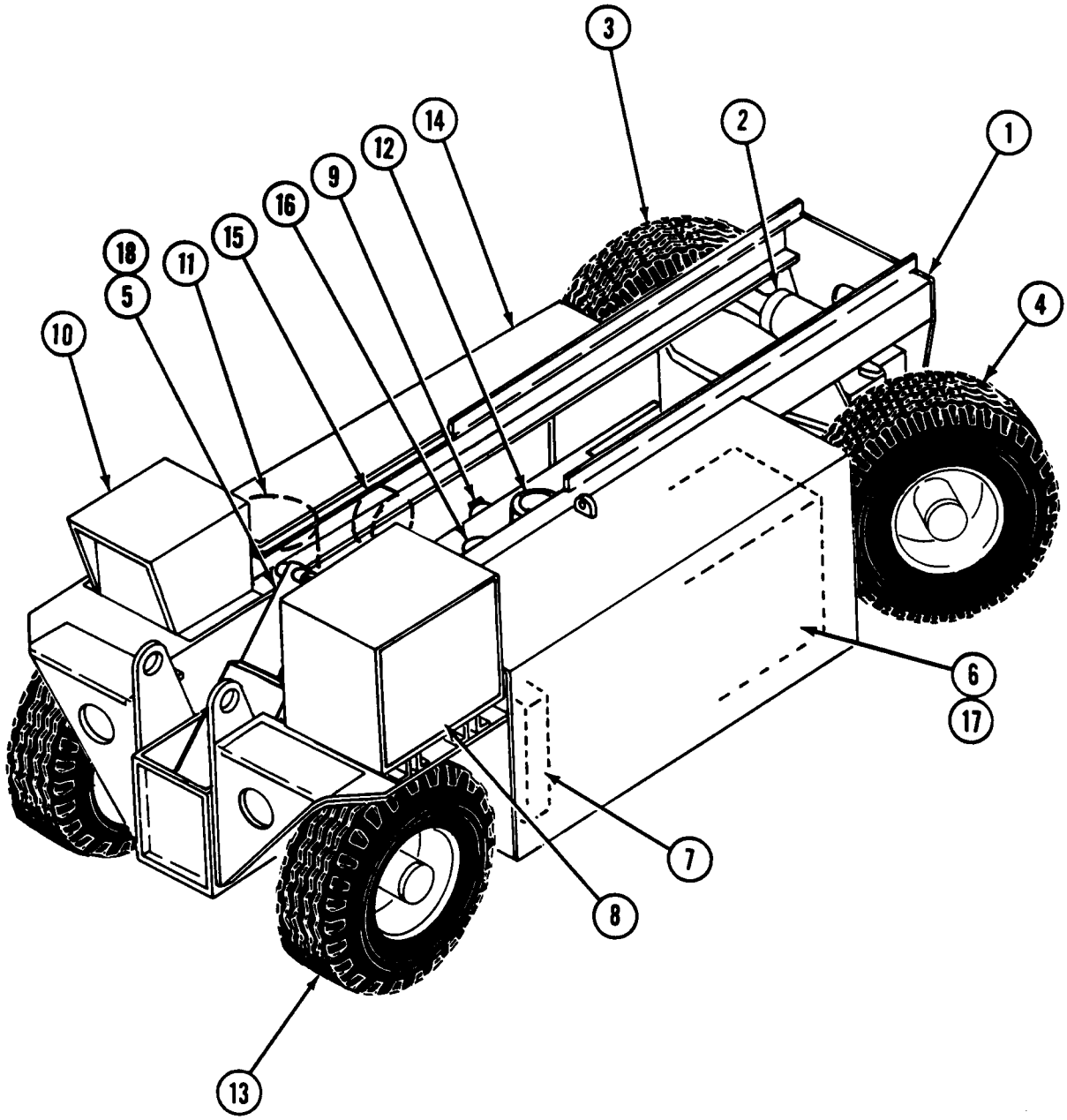


FIGURE 15 - JR. 19 BASE ASSEMBLY - 130527

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130553	WELDMENT, BASE
2	1	130675	ASSEMBLY, STEERING CYLINDER (REF. FIG. 22)
3	1	130239	ASSEMBLY, MOTOR DRIVE & BRAKE (REF. FIG. 17)
4	2	130202	ASSEMBLY, TIRE & WHEEL/DRIVE (REF. FIG. 23)
5	1	130583	ASSEMBLY, LIFT CYLINDER (REF. FIG. 21)
6	4	4007	BATTERY J-250 6V. 250 AMP. (REF. FIG. 27)
7	1	130234	ASSEMBLY, VALVE CONTROL (REF. FIG. 18)
8	1	70223	BATTERY CHARGER (REF. VENDOR SECTION)
9	1	130593	WELDMENT, DIPSTICK
10	1	130187	ASSEMBLY, GROUND CONTROL BOX (REF. FIG. 28)
11	1	130241	** ASSEMBLY, MOTOR/PUMP (REF. FIG. 27)(SEE BELOW)
12	1	81016	FILTER 66739 = FILTER ELEMENT FOR 81016
13	2	130203	ASSEMBLY, TIRE & WHEEL/IDLER (REF. FIG. 24)
14	2	130577	WELDMENT, COVER
15	1	70209	SOLENOID (REF. FIG. 27)
16	1	65213	BREATHER
17	1	130231	KIT, BATTERY CABLE (REF. FIG. 27)
18	1	130754	PIN (BASE TO LIFT CYLINDER)
19	1	130238	ASSEMBLY, MOTOR DRIVE (REF. FIG. 17)
		64206	ROLL PIN

** P/N 130241 consists of the items below:

81015-1 PUMP
81015-2 MOTOR
80008-10 MALE ELBOW
80008-14 MALE ELBOW

FIGURE 16 STEERING ASSEMBLY

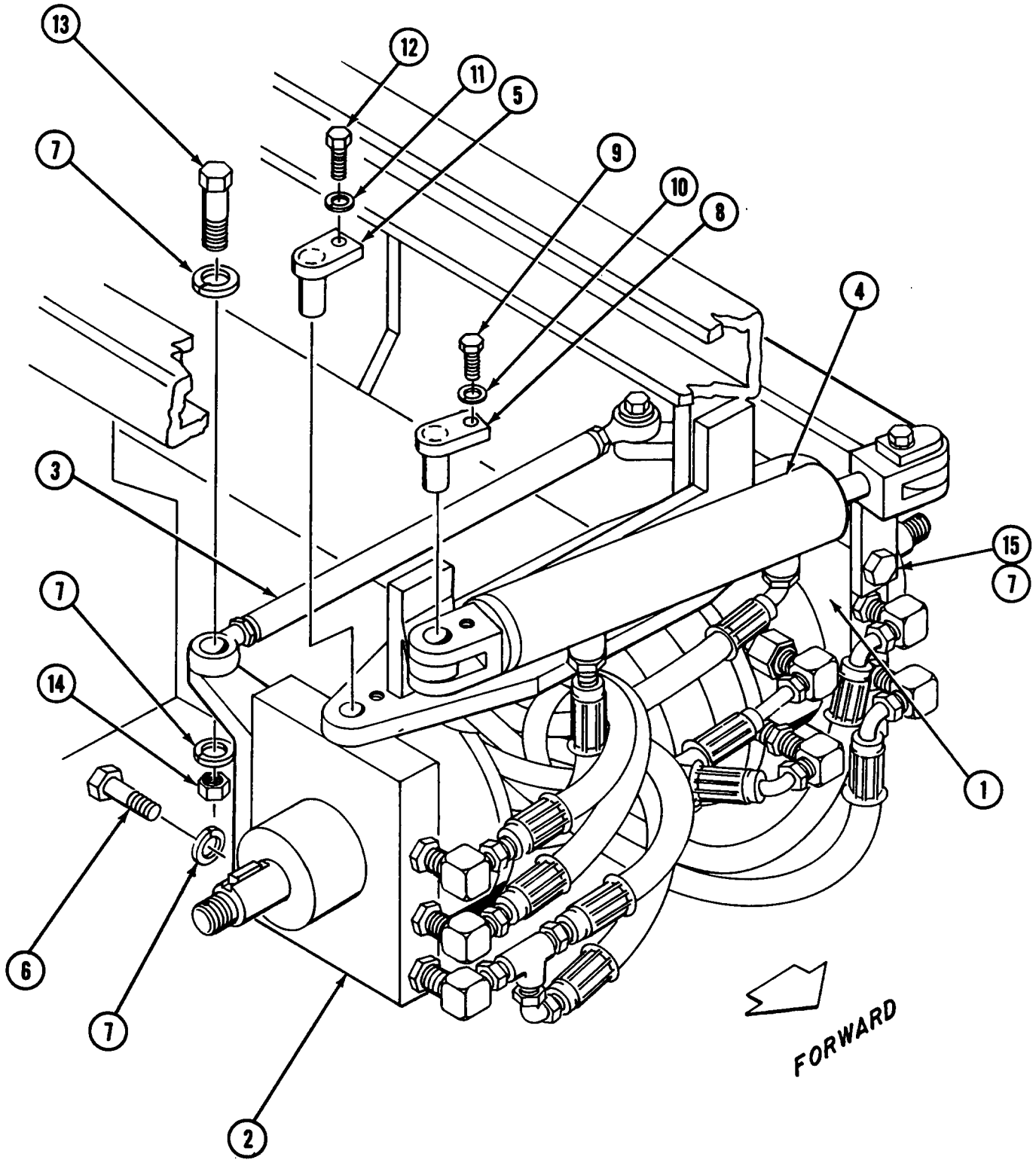


FIGURE 16 STEERING ASSEMBLY

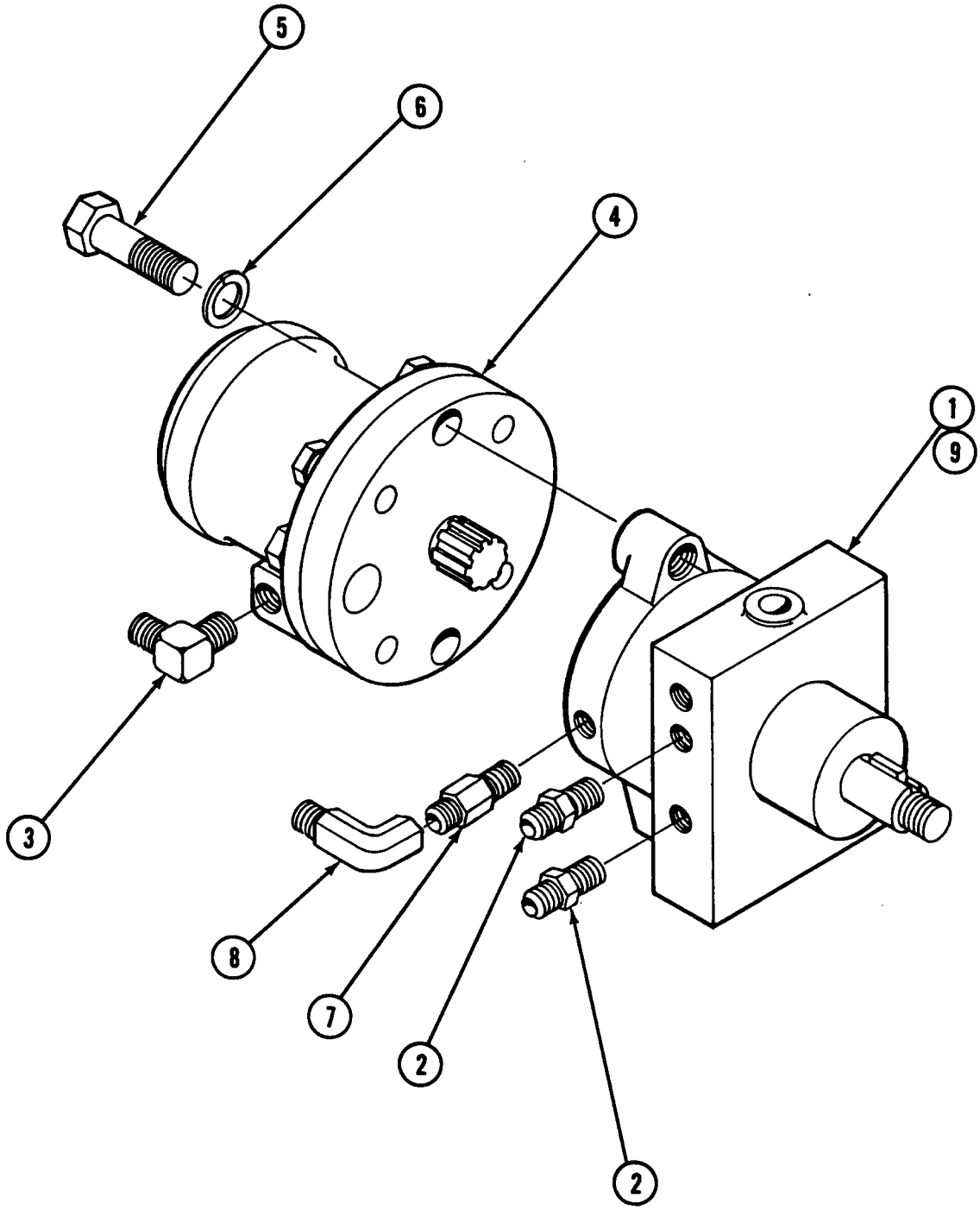
ITEM	QTY	PART NO.	DESCRIPTION
1	1	130239	ASSEMBLY, MOTOR DRIVE/BRAKE (REF.FIG. 17)
2	1	130238	ASSEMBLY, MOTOR DRIVE (REF.FIG. 17.1)
3	1	130163	** TIE ROD (JR. 7 & 14) (130581=JR. 19)
4	1	130237	CYLINDER, STEERING (REF.FIG. 22)
5	4	130192	PIN, TRUNNION
6	4	60602	SCREW, CAP 1/2-13 UNC x 1 1/2 LG BOWMALOK
7	7	63305	WASHER, LOCK SPLIT 1/2
8	2	20252	PIN, STEERING CYLINDER ANCHOR
9	2	60353	SCREW, CAP 1/4-20 UNC x 1/2 LG GR 5
10	2	63301	WASHER, LOCK SPLIT 1/4
11	4	63302	WASHER, LOCK SPLIT 5/16
12	4	60338	SCREW, CAP 5/16 - 18 UNC x 1 LG GR 5
13	2	60393	SCREW, CAP 1/2 - 13 UNC x 2 1/4 LG GR 5
14	2	61242	NUT, LOCK
15	1	60610	SCREW, CAP 1/2 - 13 UNC x 1" BOWMALOK

**P/N 130163 Consists of the items below:

2ea P/N 2274 TIE ROD END

2ea P/N 60901 JAM NUT 1/2-20

1ea P/N 130303 TIE ROD


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ITEM	QTY	PART NO.	DESCRIPTION
1	1	130239	ASSEMBLY, MOTOR DRIVE/BRAKE 114-3Y101 (BRAKE OR LEFT SIDE)
2	4	80004-05	CONNECTOR, STRAIGHT THREAD 4-6F50X-S
3	2	80012-03	ELBOW, STRAIGHT THREAD 4-C50X-S
4	1	81011	BRAKE, PARKING 93-002-1013 (LEFT SIDE ONLY)
5	2	61935	SCREW,CAP 1/2-13 UNC x 1 3/4 LG SOCKET HEAD
7	2	80004-03	CONNECTOR, STRAIGHT THREAD 4-F50X-S
8	2	80015-03	ELBOW, NUT SWIVEL 4-C6X-S
9	1	81013	DRIVE MOTOR
		66812	SEAL KIT

FIGURE 17.1 MOTOR DRIVE ASSEMBLY - 130238

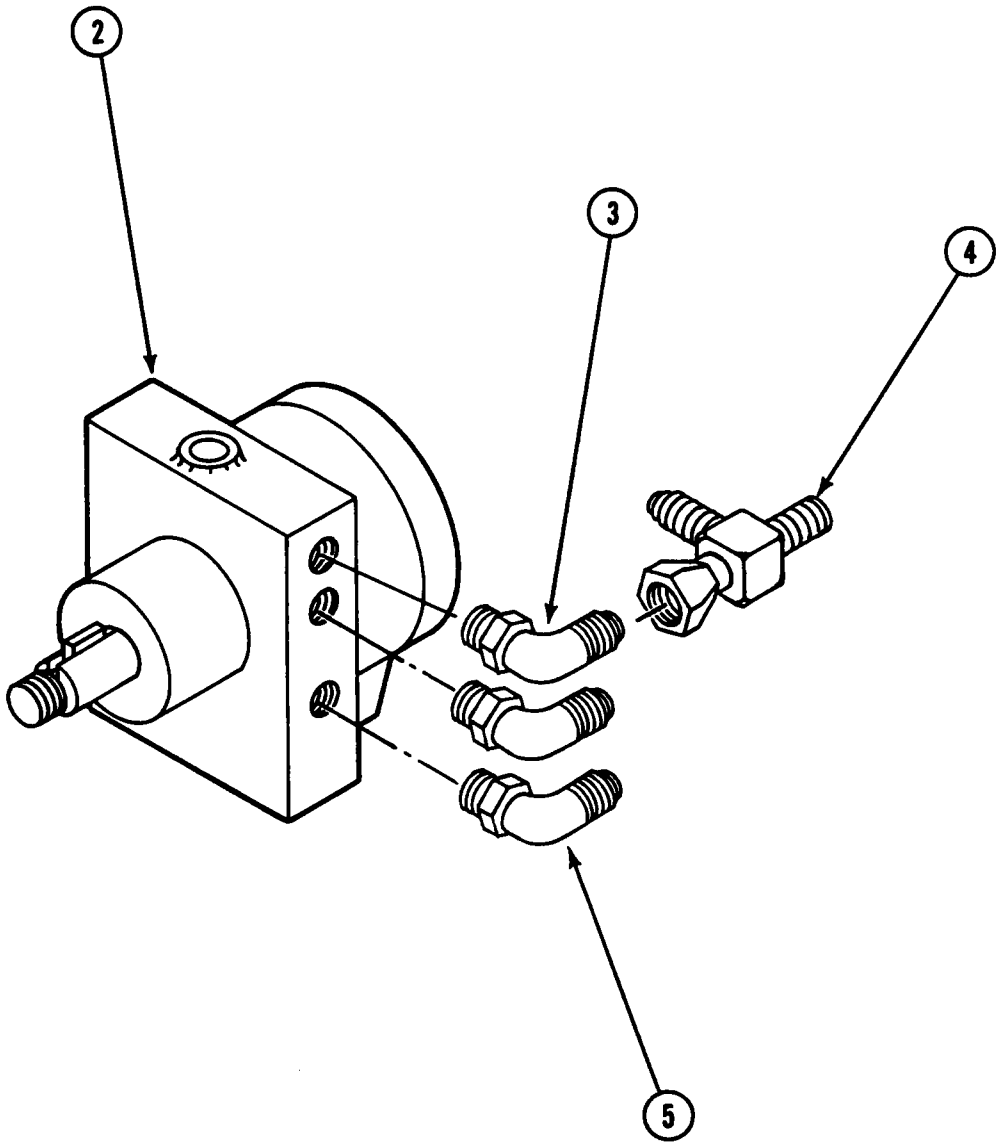


FIGURE 17.1 MOTOR DRIVE ASSEMBLY - 130238

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130238	ASSEMBLY, MOTOR DRIVE 114-3Y1 (RIGHT SIDE)
2	1	81014	DRIVE MOTOR
3	1	80012-03	ELBOW
4	1	80028-03	TEE RUN SWIVEL NUT
5	2	80012-05	ELBOW
		66813	SEAL KIT

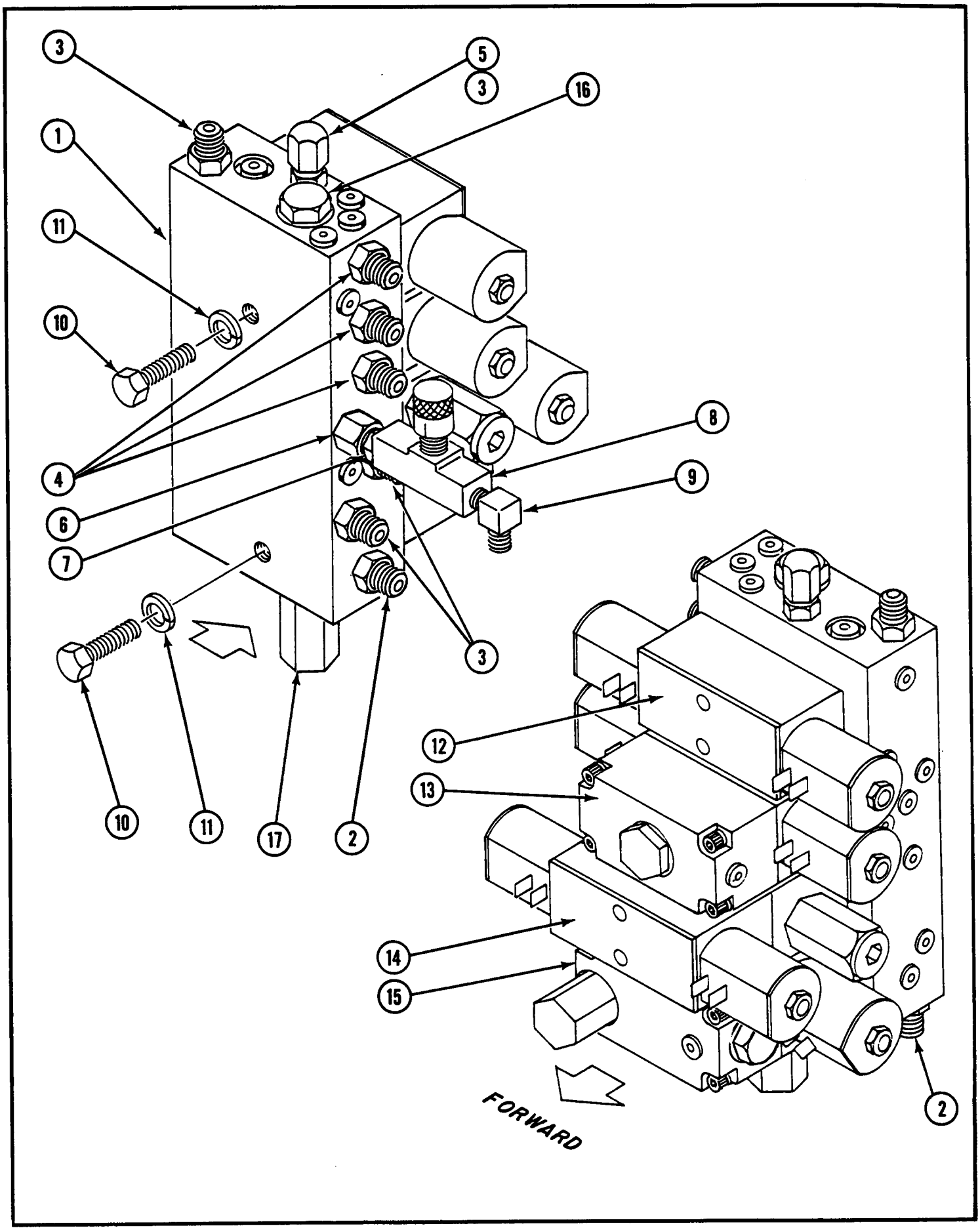

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FIGURE 18 CONTROL VALVE ASSEMBLY - 130234

ITEM	QTY	PART NO.	DESCRIPTION
1	1	81012	CONTROL VALVE
2	2	80004-08	CONNECTOR STRAIGHT THREAD 6 F50X-S
3	4	80004-03	CONNECTOR STRAIGHT THREAD 4 F50X-S
4	3	80004-05	CONNECTOR STRAIGHT THREAD 4-6 F50X-S
5	1	80059-03	CAP 4 FNTX
6	1	51903	ADAPTER, PIPE FEMALE 2216-2-4S
7	1	80052-02	NIPPLE, PIPE 1/8 FF-S
8	1	30884	VALVE, FLOW CONTROL 1/8 NPT
9	1	80012-03	ELBOW, STRAIGHT THREAD 4C50X-S
10	2	60372	SCREW, CAP 3/8-16 UNC x 7/8 LG. GR. 5
11	2	63303	WASHER, LOCK 3/8 SPLIT
12	1	66679/66660	FORWARD/REVERSE VALVE
13	1	66662	LIFT/LOWER VALVE
14	1	66679/66660	STEERING VALVE
15	1	66678/66659	TWO SPEED VALVE
16	1	66664	SHUTTLE VALVE
17	1	66658	RELIEF VALVE

REFER TO FIGURE 18.1 FOR SEAL KIT AND OTHER INFORMATION.

	FIGURE 18.1 CONTROL VALVE ASSEMBLY - 130234	69.1

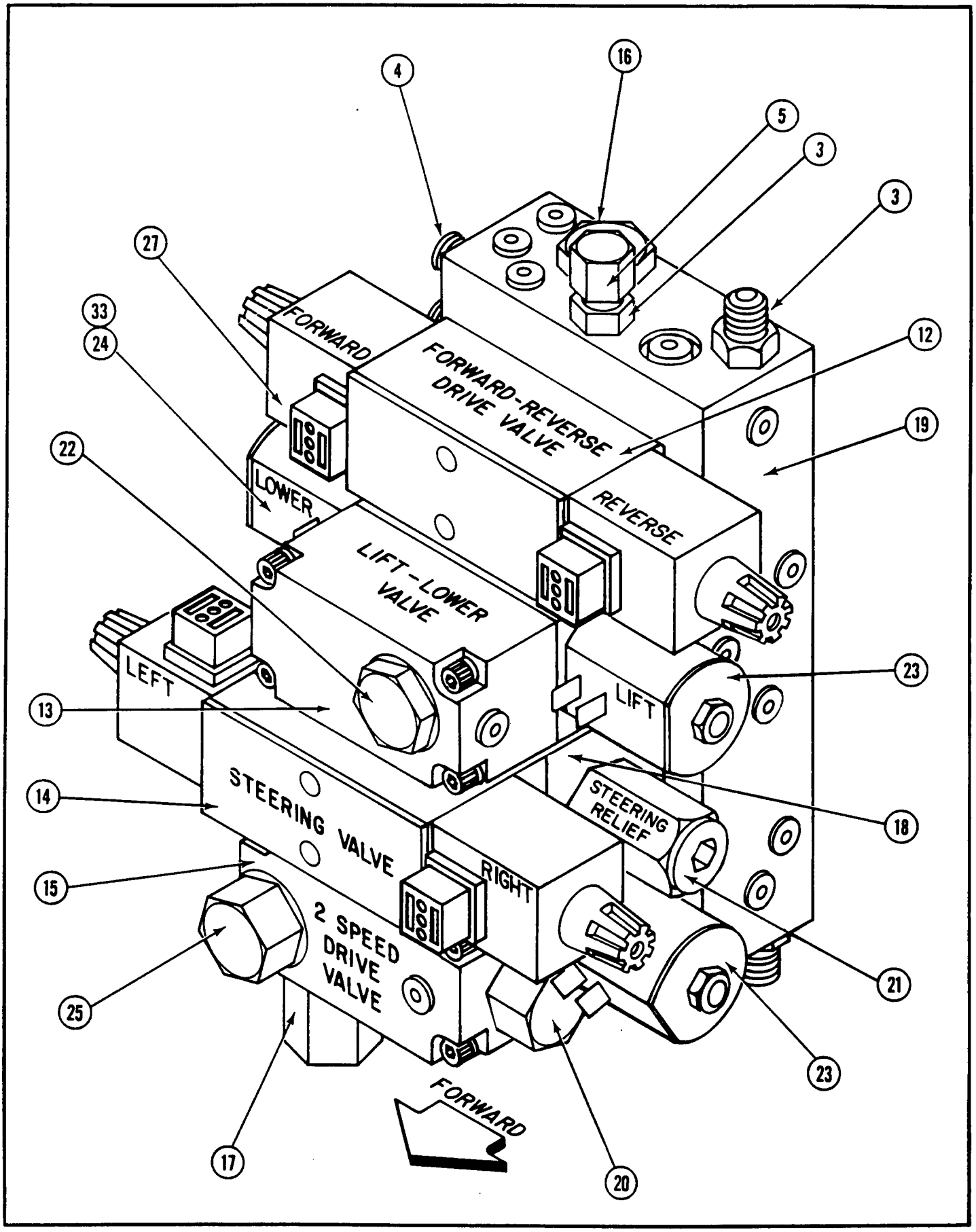


FIGURE 18.1 CONTROL VALVE ASSEMBLY - 130234

ITEM	QTY	PART NO.	DESCRIPTION
1	1	81012	CONTROL VALVE
2	2	80004-08	CONNECTOR STRAIGHT THREAD 6 F50X-S
3	4	80004-03	CONNECTOR STRAIGHT THREAD 4 F50X-S
4	3	80004-05	CONNECTOR STRAIGHT THREAD 4-6 F50X-S
5	1	80059-03	CAP 4 FNTX
6	1	51903	ADAPTER, PIPE FEMALE 2216-2-4S
7	1	80052-02	NIPPLE, PIPE 1/8 FF-S
8	1	30884	VALVE, FLOW CONTROL 1/8 NPT
9	1	80012-03	ELBOW, STRAIGHT THREAD 4C50X-S
10	2	60372	SCREW, CAP 3/8-16 UNC x 7/8 LG. GR. 5
11	2	63303	WASHER, LOCK 3/8 SPLIT
12	1	66660	FORWARD/REVERSE DRIVE VALVE (SOLENOID)
13	1	66662	LIFT/LOWER VALVE
14	1	66660	STEERING VALVE (SOLENOID)
15	1	66659	TWO SPEED DRIVE VALVE (INLET SECTION)
16	1	66664	SHUTTLE VALVE
17	1	66658	RELIEF VALVE (SYSTEM PRESSURE ADJUST)
18	1	66661	STEERING (CROSS RELIEF SECTION)
19	1	66663	SUB PLATE (MANIFOLD BASE)
20	1	66678	FLOW REDUCER (1.3 G.P.M.)
21	2	66680	STEERING RELIEF VALVE (750 PSI)
22	1	66674	CHECK VALVE (IN LIFT LOWER VALVE)
23	2	66676	SOLENOID 9V (LIFT & HIGH SPEED DRIVE)
24	1	66675	SOLENOID 9V (LOWER)
25	1	66677	FLOW REDUCER (6 G.P.M.)
26	1	66667	FLOW REDUCER
27	4	66686	COIL ONLY 9V
28		66685	SEAL KIT (STEERING VALVE)
29		66682	SEAL KIT (LIFT LOWER SECTION)
30		66683	SEAL KIT (SHUTTLE VALVE)
31		66641	SEAL KIT (CENTRAL VALVE)
32		66681	SEAL KIT (DRIVE INLET SECTION)
33	1	81059	FLOW CONTROL VALVE (REPLACES P/N 66675 ON JR.19 EXTENDABLE PLATFORM)

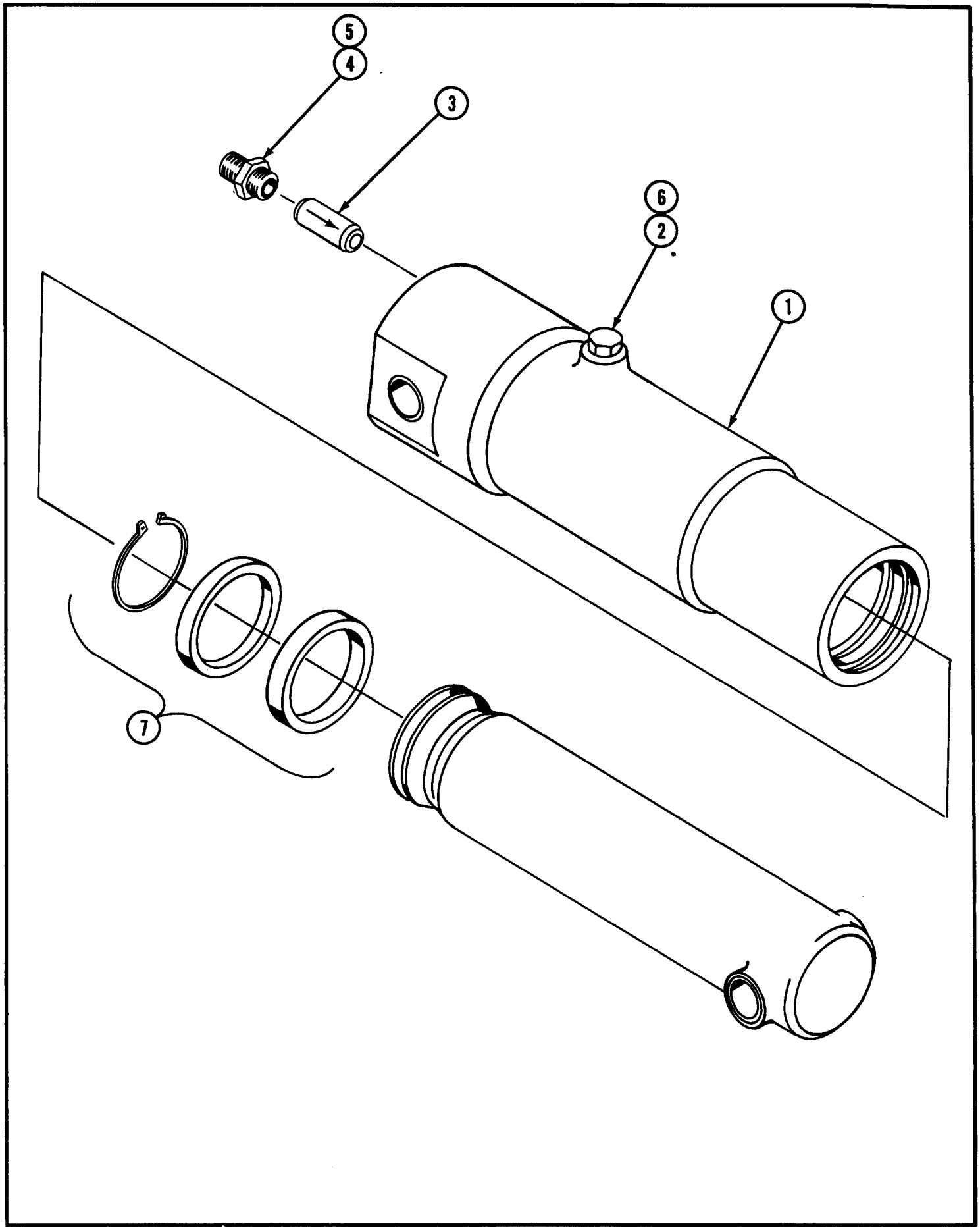

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FIGURE 19 JR. 7 LIFT CYLINDER ASSEMBLY - 130235

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130178	CYLINDER
2	1	880	O-RING
3	1	130471	VALVE, CHECK MODIFICATION
4	1	80004-14	CONNECTOR, STRAIGHT THREAD 8-12 F50X-S
5	1	80056-03	REDUCER, TUBE END 8-6 TRTX-S
6	1	80060-06	NUT 8 BTX-S
7	1	66638	SEAL KIT

FIGURE 20 JR. 14 LIFT CYLINDER ASSEMBLY - 130236

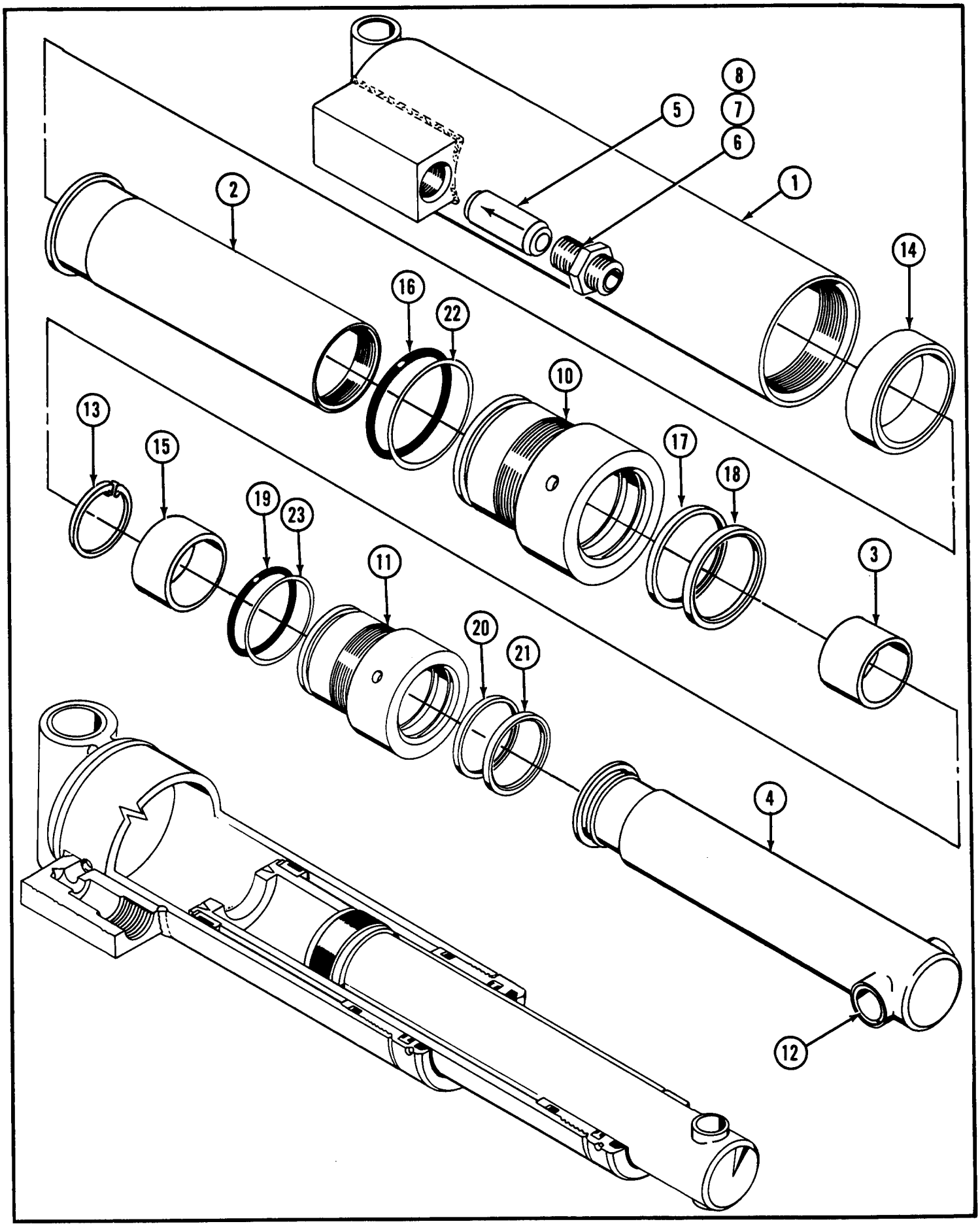


FIGURE 20 - JR. 14 LIFT CYLINDER ASSEMBLY - 130236

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130176	LIFT CYLINDER
2	1		WELDMENT, TUBULAR
3	1		PISTON, STEEL
4	1		ROD, MACHINED
5	1	130471	VALVE, CHECK MODIFICATION
6	1	80004-14	CONNECTOR, STRAIGHT THREAD 8-12 FSOX-S
7	1	80056-02	REDUCER, TUBE END 8-6 TRTX-S
8	1	80060-06	NUT, 8 BTX-S
9	1	66639	SEAL KIT (SEAL KIT INCLUDES ITEMS 13,14,15,16 17,18,19,20,21,22,23)
10	1		GLAND, LARGE HEAD
11	1		GLAND, SMALL HEAD
12	4		BUSHINGS, BRONZE
13	1		RING, SNAP
14	1		WEAR RING, LARGE
15	1		WEAR RING, SMALL
16	1		O-RING, LARGE
17	1		T SEAL, LARGE
18	1		WIPER SEAL, LARGE
19	1		O-RING, SMALL
20	1		T SEAL, SMALL
21	1		WIPER SEAL, SMALL
22	1		PARBACK SEAL, LARGE
23	1		PARBACK SEAL, SMALL

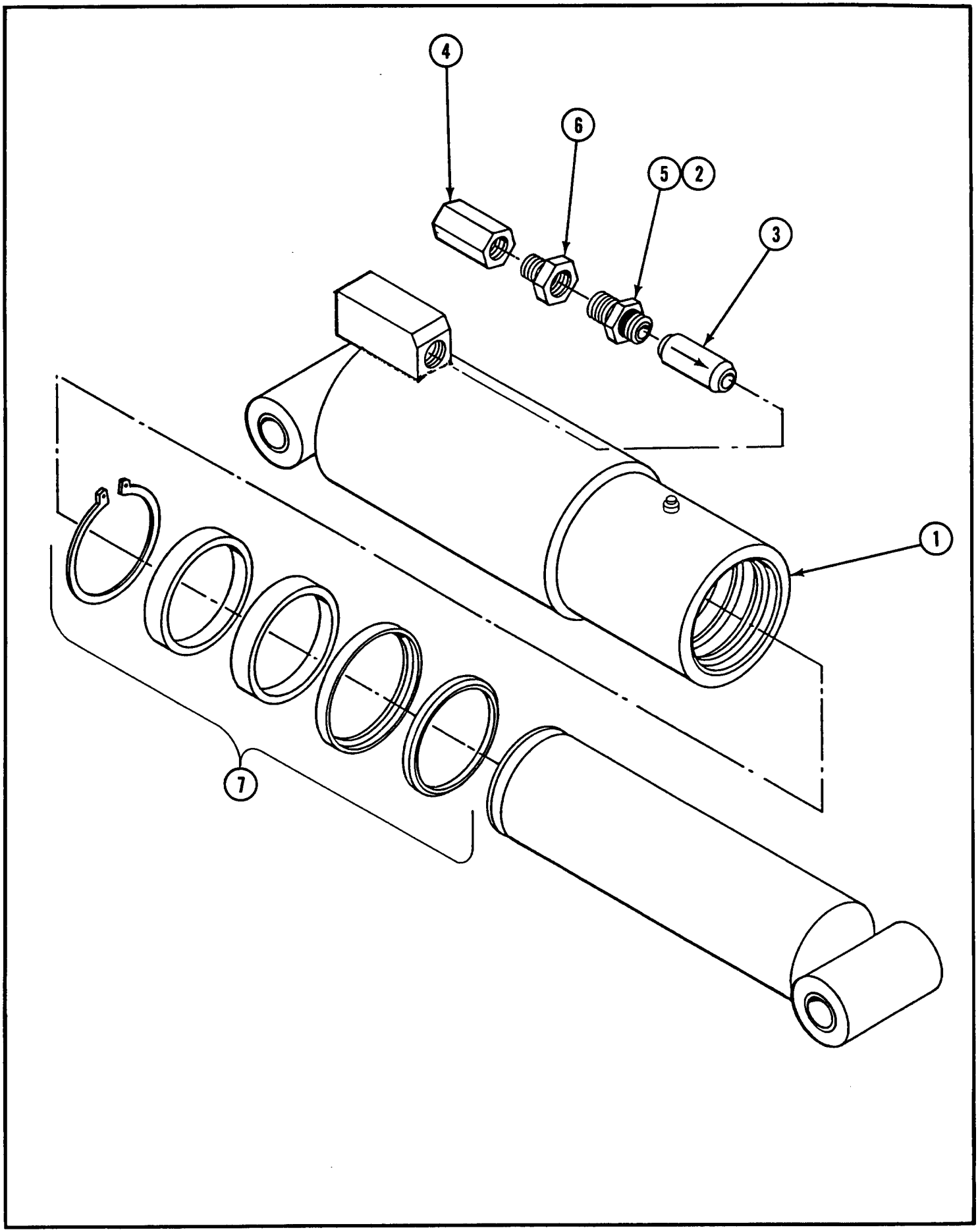

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FIGURE 21 JR. 19 LIFT CYLINDER ASSEMBLY - 130583

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130452	CYLINDER
2	1	880	O-RING
3	1	130471	VALVE, CHECK MODIFICATION
4	1	80004-14	CONNECTOR, STRAIGHT THREAD
5	1	80056-02	REDUCER, TUBE END
6	1	80060-06	NUT
7	1	66657	SEAL KIT
		81059	FLOW CONTROL VALVE - INCLUDES ITEMS 2,3,4,5 & 6 THIS ITEM IS ALL ONE PIECE ON NEWER MACHINES

NOTE: FOR JR.19 WITH SLIDE OUT PLATFORM OPTION: REPLACE P/N 81059 FLOW CONTROL VALVE WITH P/N 66675 NORMALLY CLOSED SOLENOID VALVE, FROM FLOW CONTROL VALVE P/N 81012 (REF. FIG 18 & 18.1) FOR JR.19 EXTENDABLE ONLY.

FIGURE 21.1 JR.19 EXTENDING PLATFORM LIFT CYLINDER - 130695

75.1

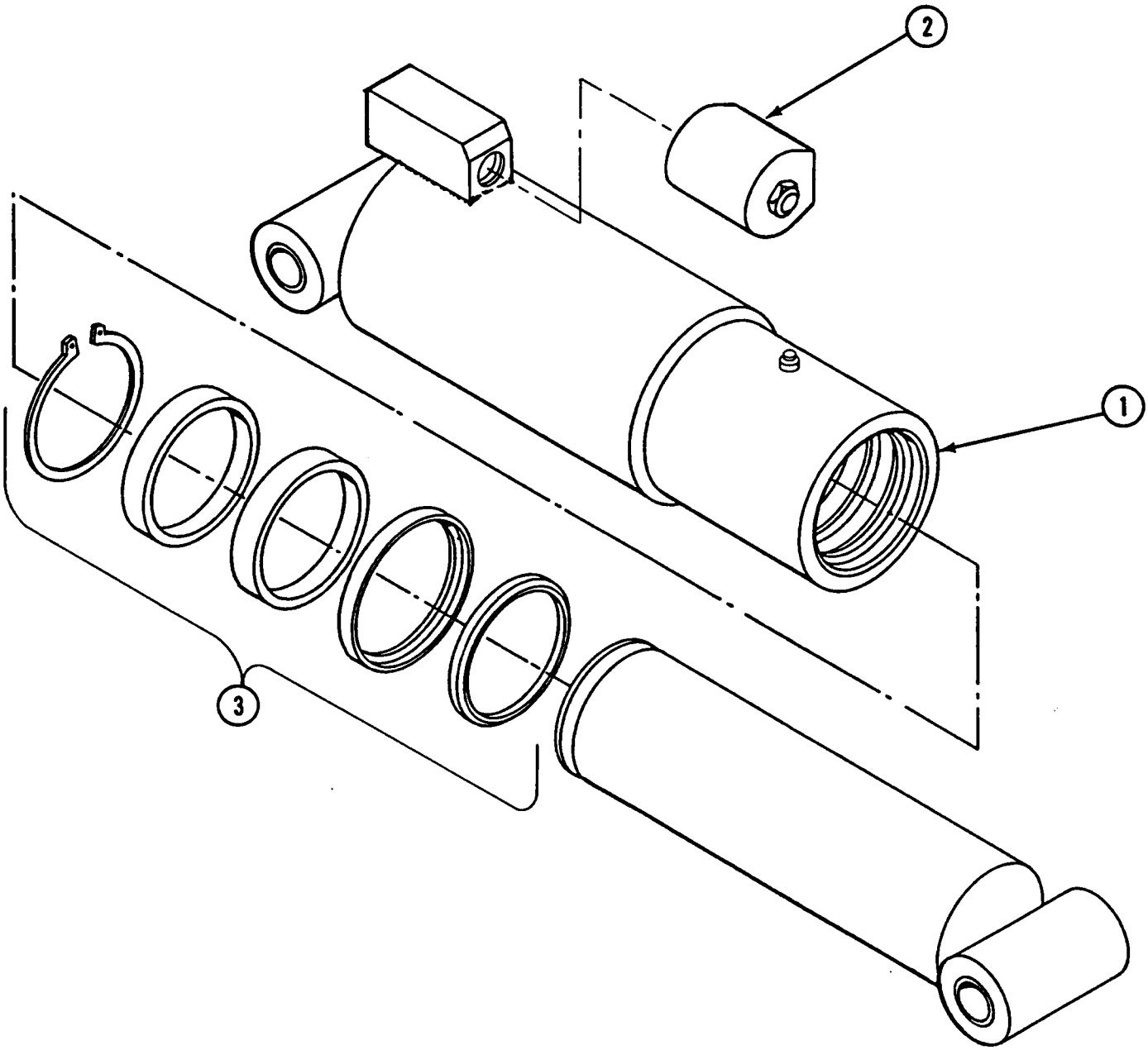


FIGURE 21.1 JR.19 EXTENDING PLATFORM LIFT CYLINDER - 130695

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130452	CYLINDER, LIFT
2	1	66675	SOLENOID VALVE (NORMALY CLOSED)
3	1	66657	SEAL KIT

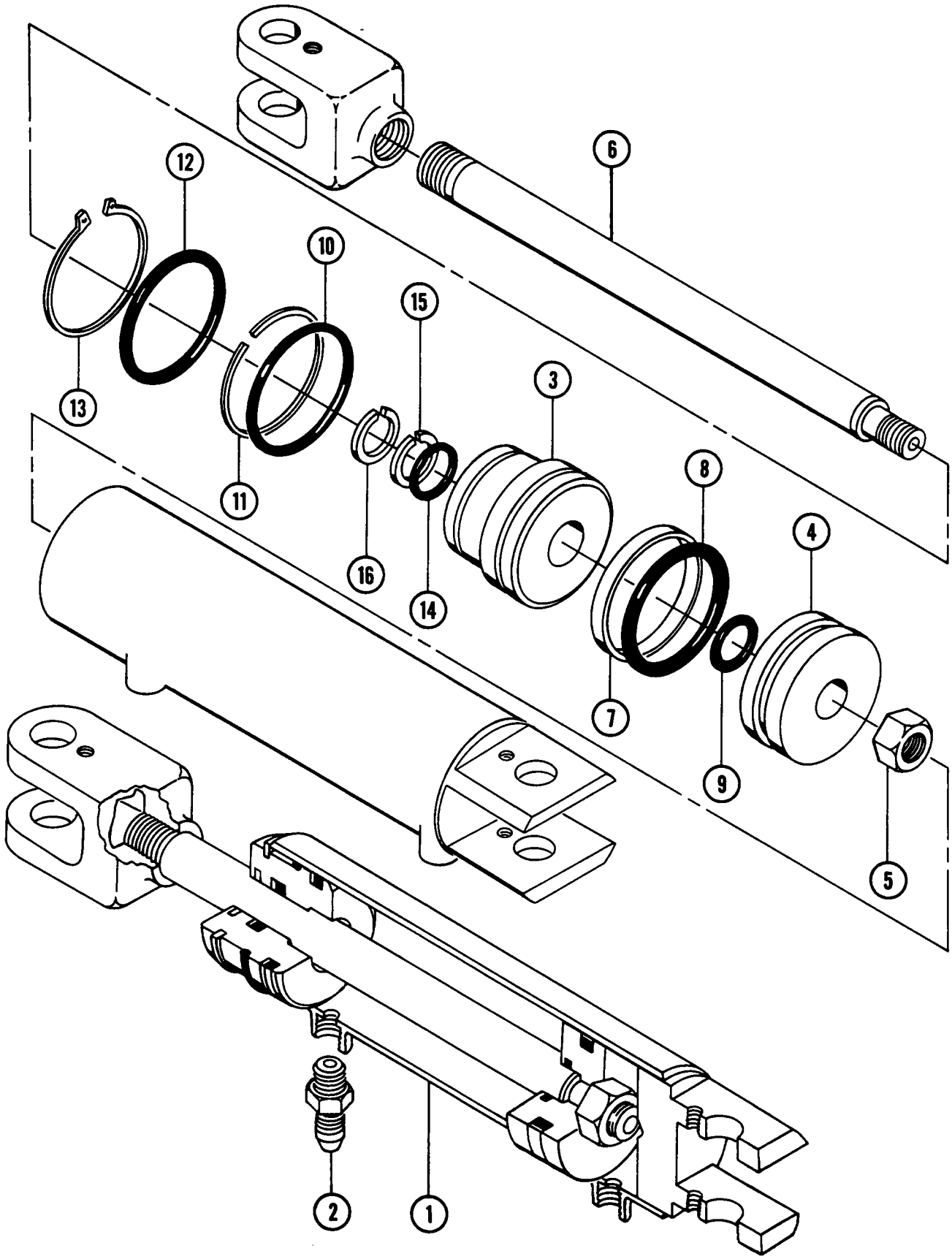

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FIGURE 22 STEERING CYLINDER ASSEMBLY - 130237

ITEM	QTY	PART NO.	DESCRIPTION
1	1	130165	CYLINDER, STEERING
2	2	80004-03	CONNECTOR, STRAIGHT THREAD
		66640	SEAL KIT (INCLUDES ITEMS 8,9,10,11,13,14,15,16)
3	1		BEARING
4	1		PISTON
5	1		NUT, LOCK
6	1		ROD, CHROME PLATED
7	1		RING, SLIPPER
8	1		O'RING
9	1		O'RING
10	1		O'RING
11	1		WASHER, BACK UP
12	1		RING, LOCK
13	1		RING, RETAINING
14	1		O'RING
15	1		WASHER, BACK UP
16	1		SEAL, WIPER

FIGURE 23 DRIVE WHEEL ASSEMBLY - 130202

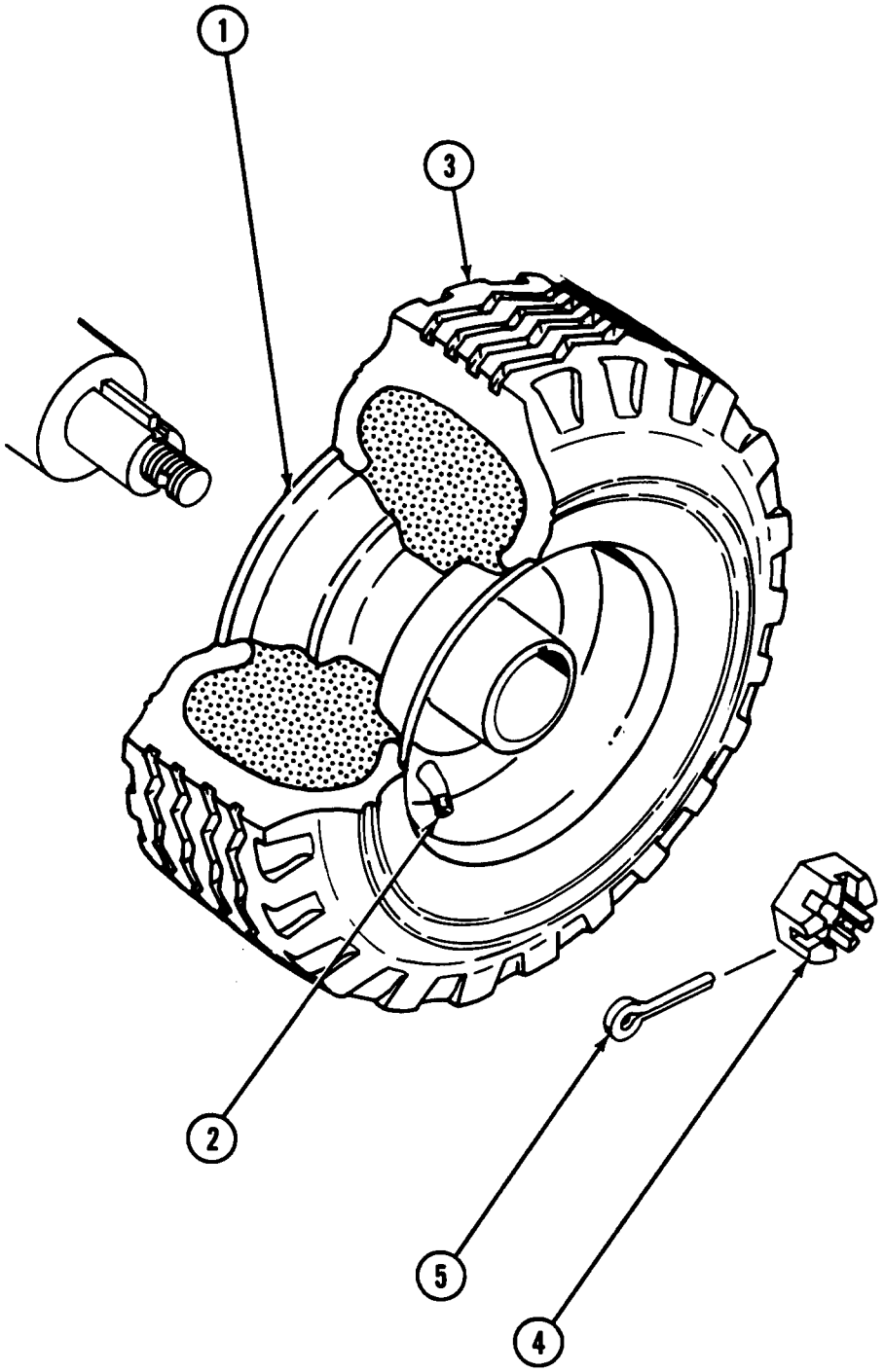


FIGURE 23 DRIVE WHEEL ASSEMBLY - 130202

ITEM	QTY	PART NO.	DESCRIPTION
		130202	DRIVE WHEEL ASSEMBLY (MONOFILLED)
1	2	130246	WHEEL
2	2		STEM, VALVE
3	2	130244	TIRE
4	2	61001	NUT, CASTLE
5	2	64308	PIN, COTTER 3/32 x 1 1/2 LG

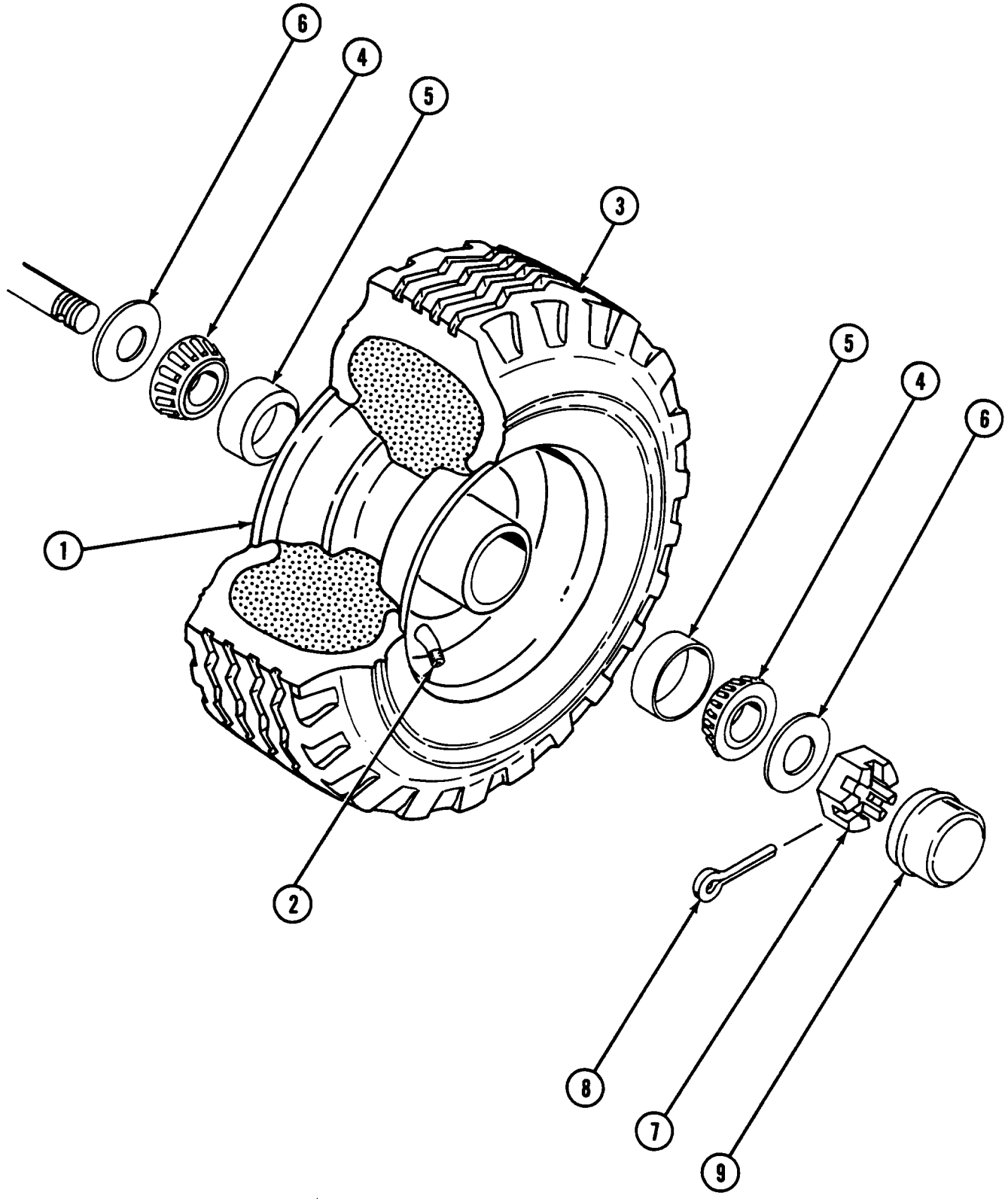

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9

FIGURE 24 IDLER WHEEL ASSEMBLY - 130203

ITEM	QTY	PART NO.	DESCRIPTION
		130203	IDLER WHEEL ASSEMBLY (MONOFILLED)
1	2	130245	WHEEL
2	2		STEM, VALVE
3	2	130244	TIRE
4	4	66803	BEARING, CONE
5	4	66802	CUP, BEARING
6	4	66801	SEAL
7	2	61001	NUT, CASTLE
8	2	64308	PIN, COTTER 3/32 x 1 1/2 LG.
9	2	66804	DUST CAP

FIGURE 25 JR. 7 BATTERY GROUP - 130232

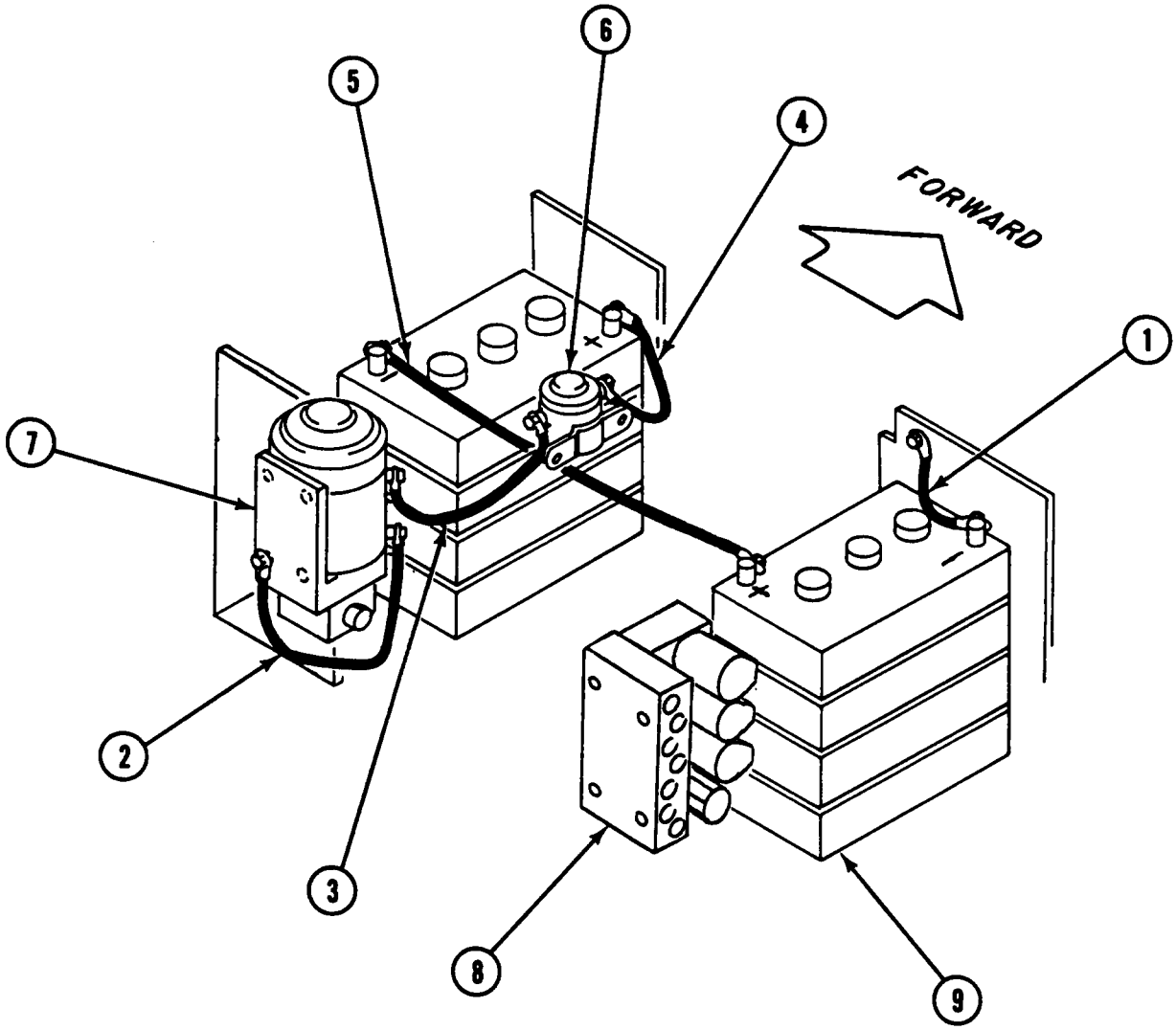


FIGURE 25 JR. 7 BATTERY GROUP - 130232

ITEM	QTY	PART NO.	DESCRIPTION
1	1	13226-0060	ASSEMBLY, ELECTRICAL CABLE
2	1	13226-0140	ASSEMBLY, ELECTRICAL CABLE
3	1	13226-0090	ASSEMBLY, ELECTRICAL CABLE
4	1	13226-0120	ASSEMBLY, ELECTRICAL CABLE
5	1	13226-0360	ASSEMBLY, ELECTRICAL CABLE
6	1	70209	SOLENOID
7	1	130241	** MOTOR PUMP
8	1	130234	CONTROL VALVE
9	2	4007	BATTERY
		130172	BATTERY BASE COVER
			BATTERY HOLD DOWN KIT:
	2	61302	NUTS
	1	63403	FLATWASHER
	1	63670	THREADED ROD
	1	35932	ANGLE
	1	130698	BRACKET

** P/N 130241 consists of the items below:

81015-1 PUMP
81015-2 MOTOR
80008-10 MALE ELBOW
80008-14 MALE ELBOW

FIGURE 26 JR. 14 BATTERY GROUP - 130231

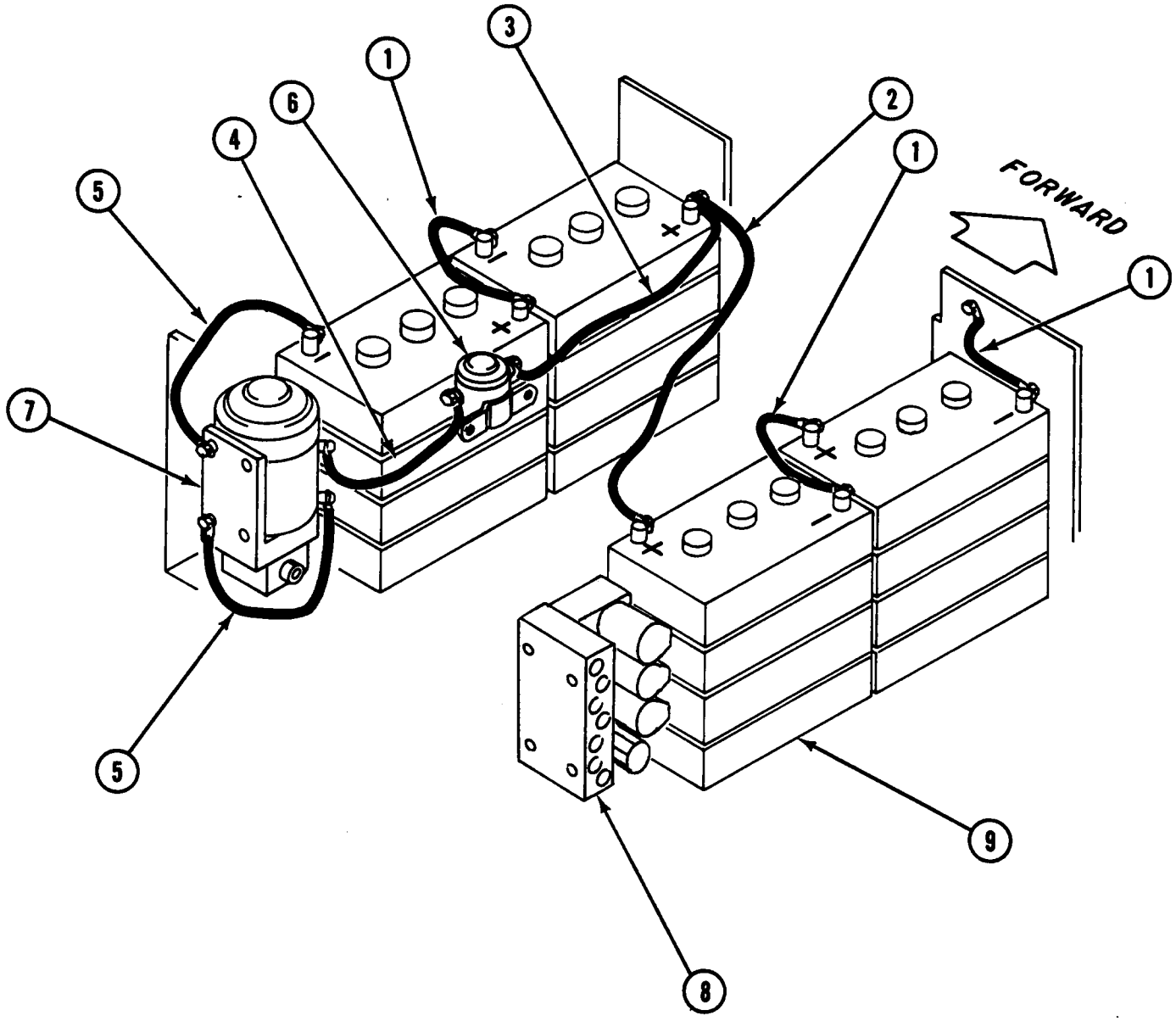


FIGURE 26 JR. 14 BATTERY GROUP - 130231

ITEM	QTY	PART NO.	DESCRIPTION
1	3	13226-0060	ASSEMBLY, ELECTRICAL CABLE
2	1	13226-0580	ASSEMBLY, ELECTRICAL CABLE
3	1	13226-0300	ASSEMBLY, ELECTRICAL CABLE
4	1	13226-0120	ASSEMBLY, ELECTRICAL CABLE
5	2	13226-0140	ASSEMBLY, ELECTRICAL CABLE
6	1	70209	SOLENOID
7	1	130241	** MOTOR PUMP
8	1	130234	CONTROL VALVE
9	4	4007	BATTERY
			BATTERY HOLD DOWN KIT:
	4	61302	NUTS
	2	63403	FLATWASHER
	2	63670	THREADED ROD
	2	35932	ANGLE
	2	130699	BRACKET

** P/N 130241 consists of the items below:

81015-1 PUMP
81015-2 MOTOR
80008-10 MALE ELBOW
80008-14 MALE ELBOW

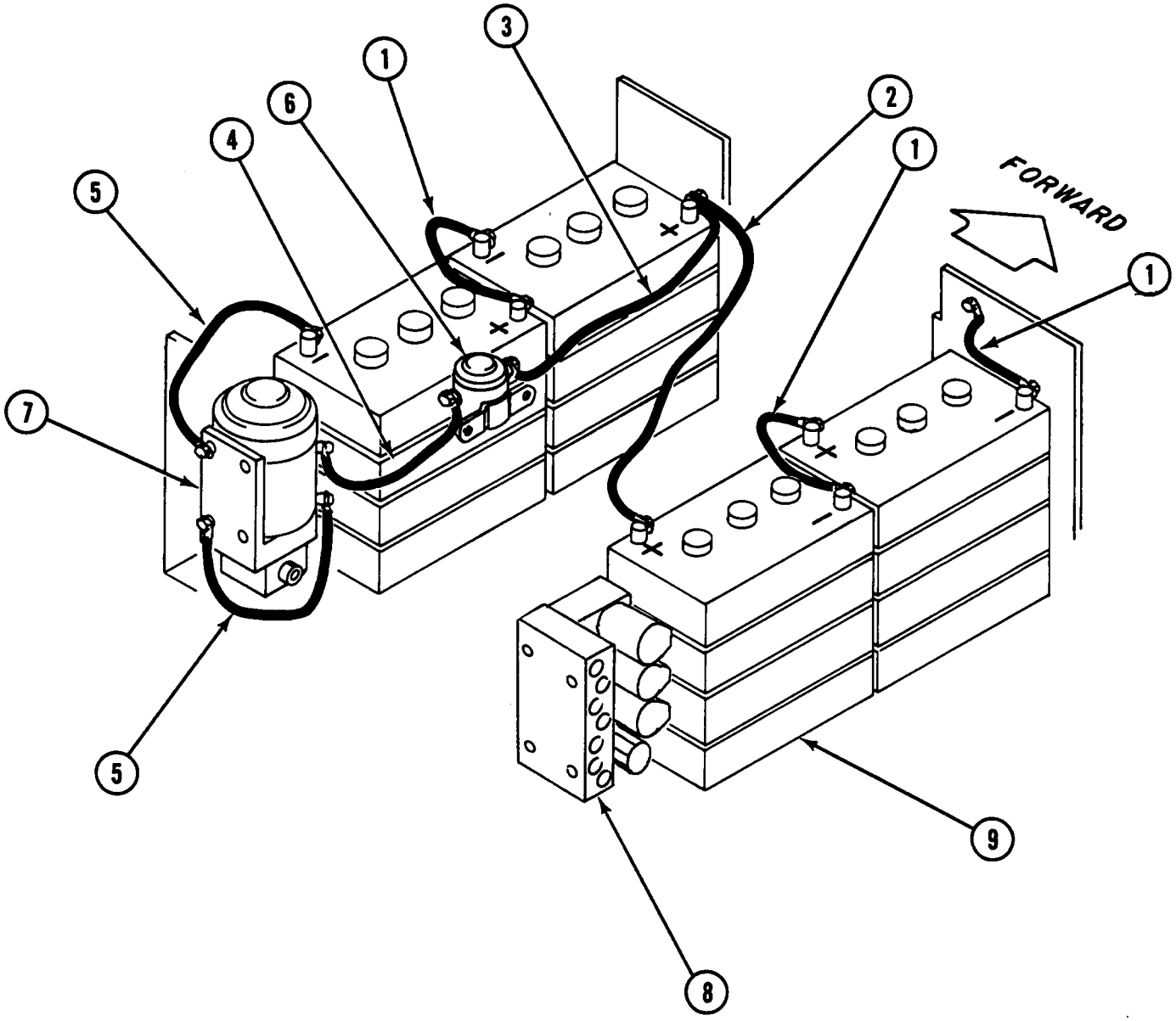

1
3
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4
2
1
5
FORWARD
1
7
5
9
8

FIGURE 27 JR. 19 BATTERY GROUP -130587

ITEM	QTY	PART NO.	DESCRIPTION
1	3	13226-0060	ASSEMBLY, ELECTRICAL CABLE
2	1	13226-0580	ASSEMBLY, ELECTRICAL CABLE
3	1	13226-0300	ASSEMBLY, ELECTRICAL CABLE
4	1	13226-0120	ASSEMBLY, ELECTRICAL CABLE
5	2	13226-0140	ASSEMBLY, ELECTRICAL CABLE
6	1	70209	SOLENOID
7	1	130241	** MOTOR PUMP
8	1	130234	CONTROL VALVE
9	4	4007	BATTERY
			BATTERY HOLD DOWN KIT:
	4	61302	NUTS
	2	63403	FLATWASHER
	2	63670	THREADED ROD
	2	35932	ANGLE
	2	130699	BRACKET

** P/N 130241 consists of the items below:

81015-1 PUMP
81015-2 MOTOR
80008-10 MALE ELBOW
80008-14 MALE ELBOW

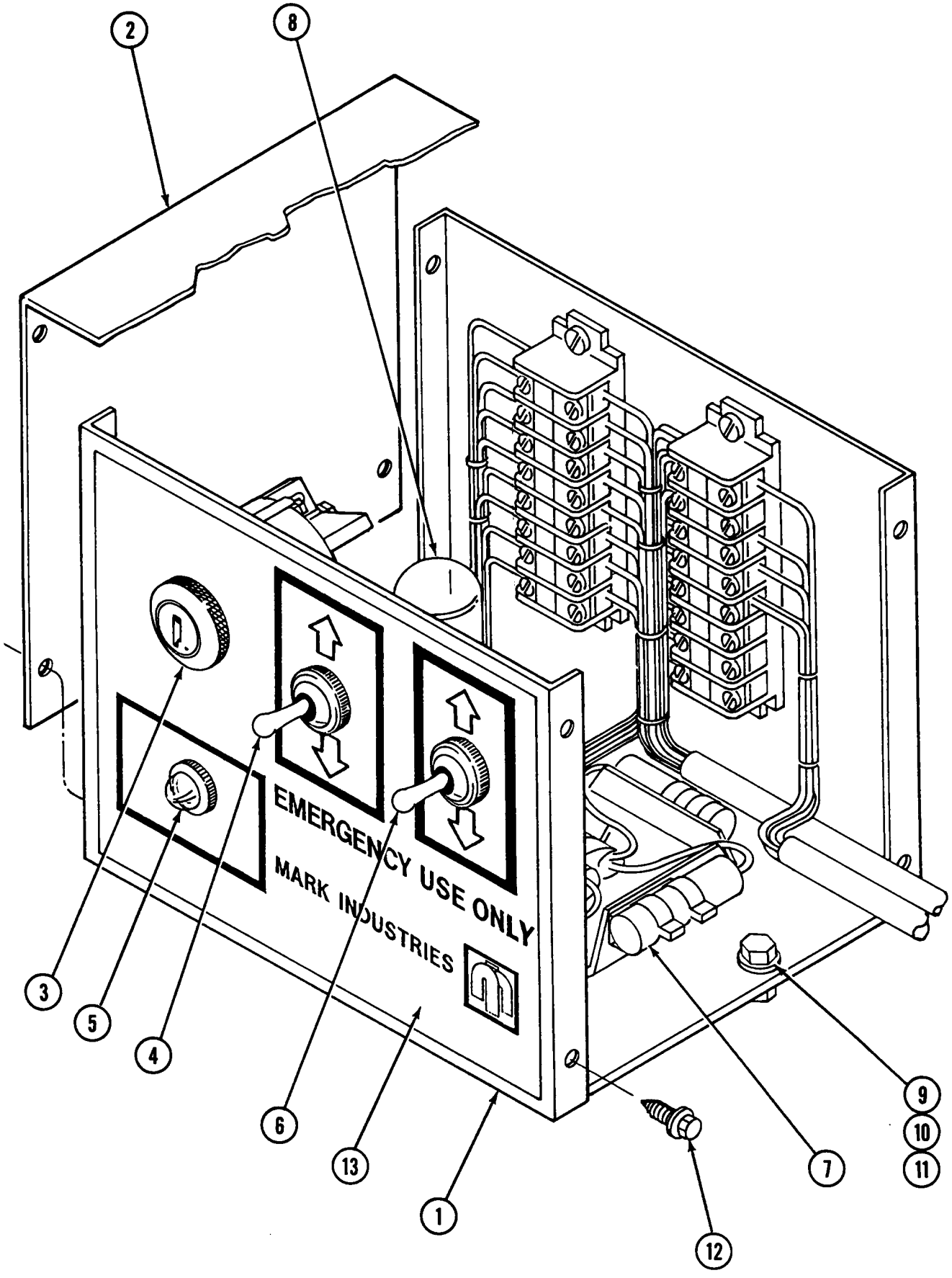
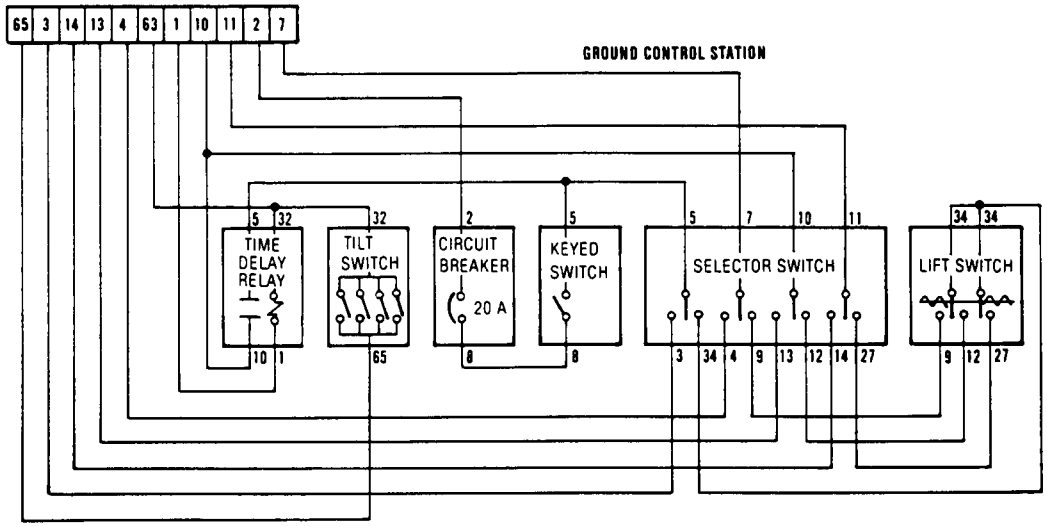

2
8
EMERGENCY USE ONLY
MARK INDUSTRIES
3
5
4
6
13
1
12
7
9
10
11

FIGURE 28 GROUND CONTROL STATION - 130187

ITEM	QTY	PART NO.	DESCRIPTION
		130187	ASSEMBLY, GROUND CONTROL BOX JR 7,JR 14 & JR 19
1	1	130129	MACHINING, GROUND CONTROL BOX
2	1	130128	COVER
3	1	2717	SWITCH, KEYED
4	1	16260	SWITCH, TOGGLE (SELECTOR)
5	1	20562	CIRCUIT BREAKER
6	1	20481	SWITCH, TOGGLE (LIFT)
7	1	130193	ASSEMBLY, TILT SWITCH (JR.14 & JR.19 ONLY; REF. FIG. 30)
8	1	20523	RELAY, TIME DELAY
9	6	60701	NUT 1/4-20
10	4	63301	WASHER, SPLIT 1/4
11	1	60309	SCREW, CAP
12	8	61711	SCREW
13	1	130201	DECAL, GROUND CONTROL BOX
14		4027	TERMINAL BLOCK
15		117-A	END BLOCK
		30392	CABLE, GROUND CONTROL - JR.7
		130228-A	CABLE, GROUND CONTROL - JR.14

SCHEMATIC


65 3 14 13 4 63 1 10 11 2 7
GROUND CONTROL STATION
5 32
TIME DELAY RELAY
10 1
32
TILT SWITCH
65
2
CIRCUIT BREAKER
20 A
8
5
KEYED SWITCH
8
5 7 10 11
SELECTOR SWITCH
3 34 4 9 13 12 14 27
34 34
LIFT SWITCH
9 12 27

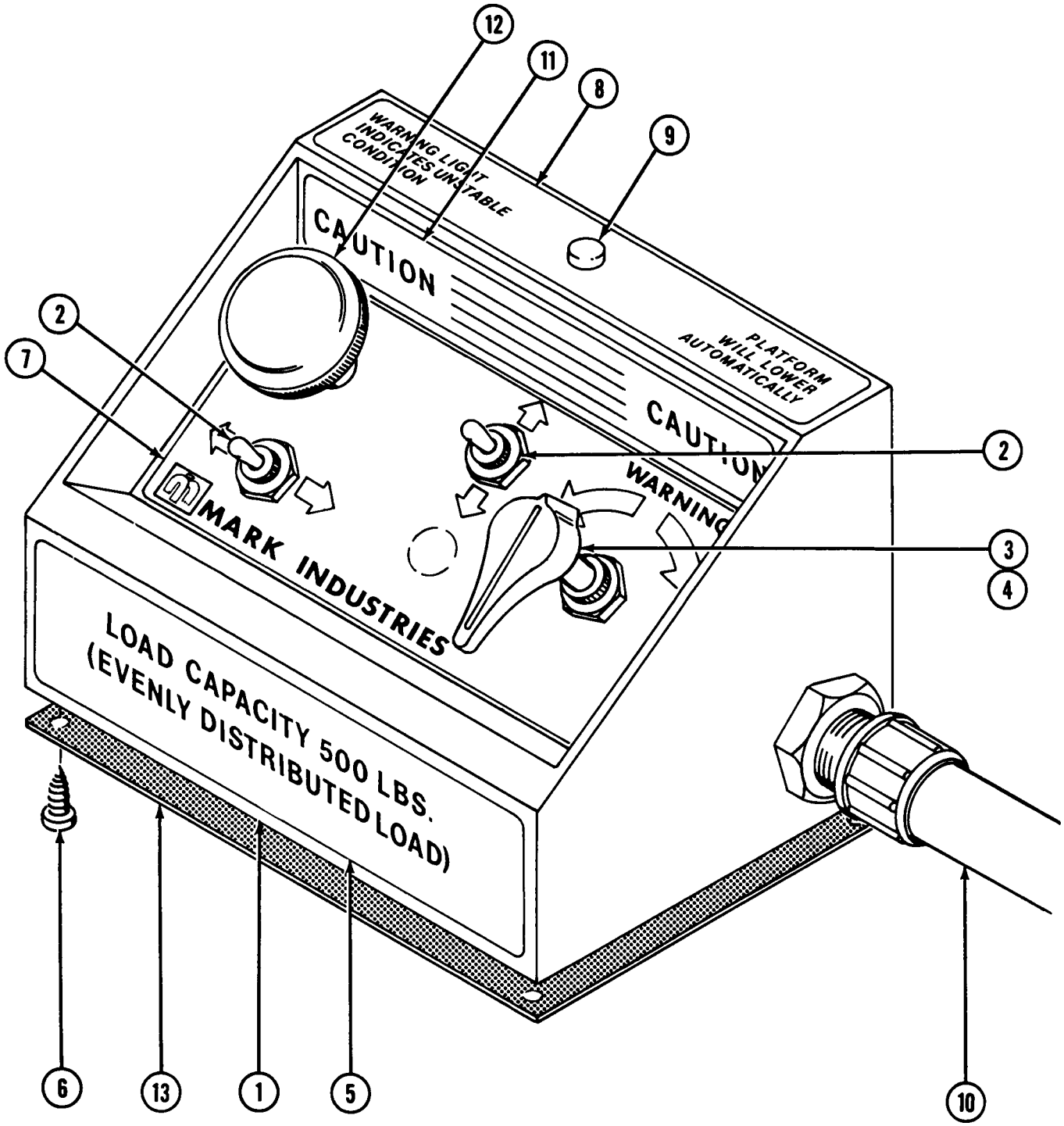
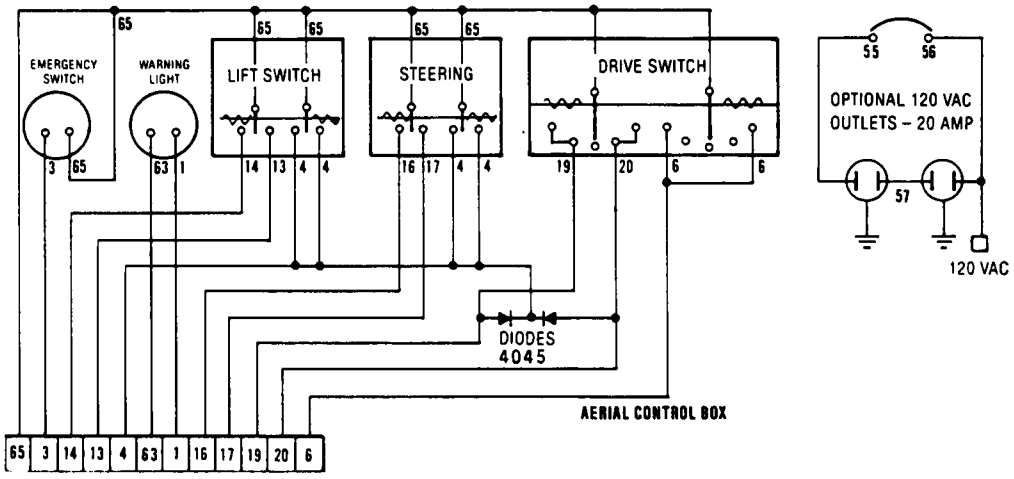

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WARNING LIGHT INDICATES UNSTABLE CONDITION
CAUTION
PLATFORM WILL LOWER AUTOMATICALLY
2
7
2
CAUTION
WARNING
3
4
MARK INDUSTRIES
LOAD CAPACITY 500 LBS.
(EVENLY DISTRIBUTED LOAD)
6
13
1
5
10

FIGURE 29 AERIAL CONTROL BOX - 130162-130186-130613

ITEM	QTY	PART NO.	DESCRIPTION
		130162	AERIAL CONTROL BOX, JR. 7
		130186	AERIAL CONTROL BOX, JR. 14
		130613	AERIAL CONTROL BOX, JR. 19
1,13	1	130188	CASE, CONTROL BOX; COVER, CONTROL BOX
2	2	20481	SWITCH, TOGGLE (STEER AND LIFT)
3	1	4106	SWITCH, FIVE POSITION (DRIVE)
4	1	65151	KNOB, DRIVE SWITCH
5	1	2022	DECAL - "LOAD CAPACITY"
6	4	61711	SCREW, SELF TAPPING #12 x 1/2
7	1	2009	DECAL, CONTROL UNIT FACE
8	1	2015	DECAL, "OUT OF LEVEL CONDITION"
9	1	4031	ASSEMBLY, RED WARNING LIGHT
10	1	130228-23	CONDUCTOR CABLE, JR. 7 (POWER TO PLATFORM)
		130228-30	CONDUCTOR CABLE, JR. 14
		130228-40	CONDUCTOR CABLE, JR. 19
11	1	2014	DECAL, "CAUTION HIGH VOLTAGE"
12	1	4018	SWITCH, EMERGENCY
	1	70259	BUZZER 4099-12V

SCHEMATIC


EMERGENCY SWITCH
WARNING LIGHT
LIFT SWITCH
STEERING
DRIVE SWITCH
OPTIONAL 120 VAC OUTLETS - 20 AMP
120 VAC
DIODES 4045
AERIAL CONTROL BOX
65 3 14 13 4 63 1 16 17 19 20 6

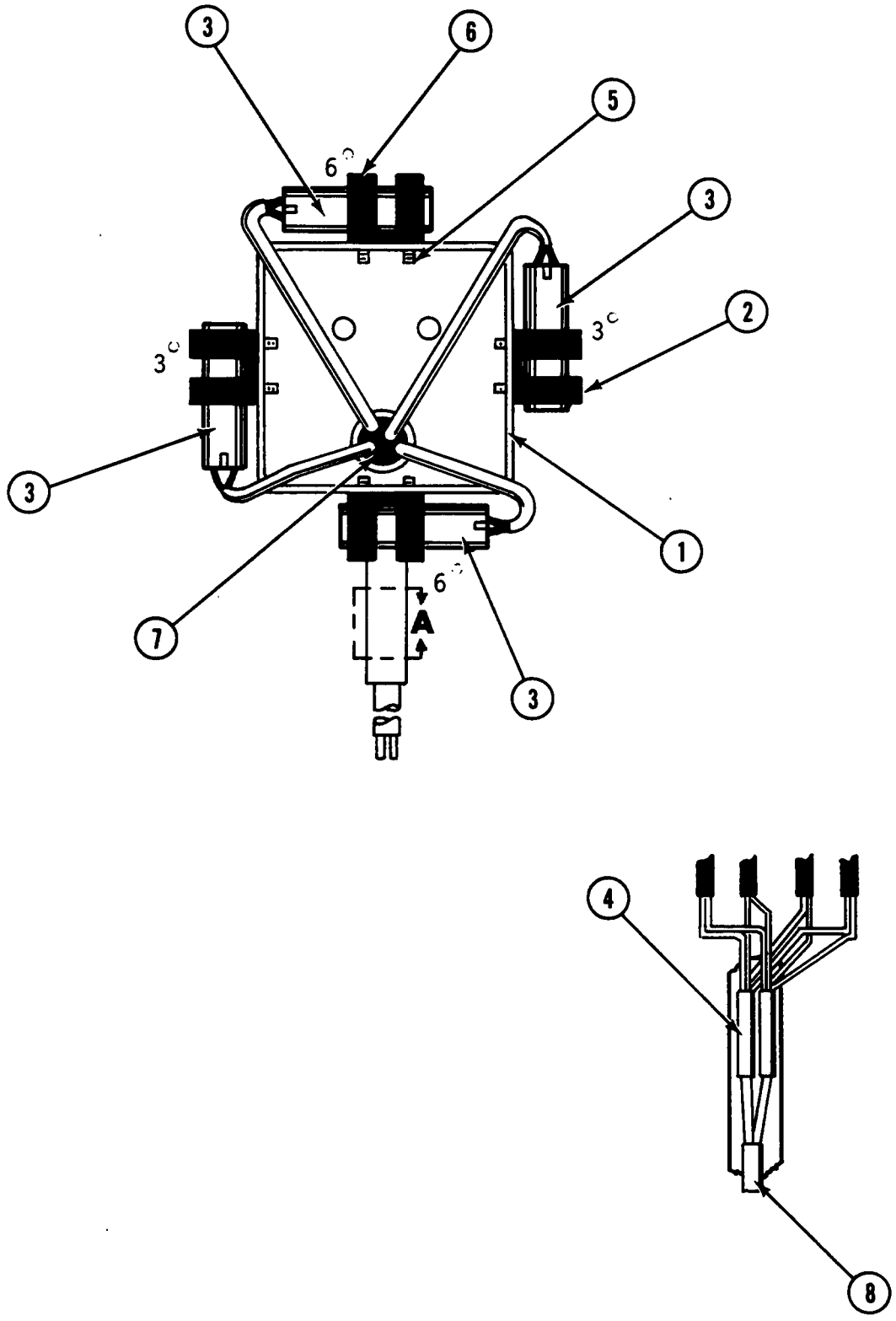

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FIGURE 30 TILT SWITCH ASSEMBLY - 130193

ITEM	QTY	PART NO.	DESCRIPTION
1	1	30385	BRACKET, TILT SWITCH
2	4	199-A	BRACKET, MICRO SWITCH
3	4	4014	SWITCH, MERCURY
4	2	70068	CONNECTOR, BUTT
5	8	62605	SCREW, MACH.
6	1'	2626	WIRE, SAFETY
7	1	70230	GROMMET, RUBBER
8	1'	70023	CABLE, ELEC. 2 CONDUCTOR
	1	16306	TUBE, HEAT SHRINK mms-80
	2	16307	TUBE, HEAT SHRINK mms-80

WARNING FLASHING LIGHTS	P/N 70278
MOVEMENT HORN	P/N 70053
360° ROTARY WARNING LIGHT (2 BULB):	P/N 70277
WARNING BEACON 12V (1 BULB) . . .	P/N 20586
REMOTE CONTROL ASSEMBLY	P/N 130683

OWNERS MANUAL

Lester-MATIC

BATTERY CHARGER

PROVEN *over the years...*
IN THE FIELD!

FEATURES

Pioneered by Lester in 1957 and proven in 200,000 chargers.

- Automatic taper of charge rate for superior battery life through good equalization of cells and low water use rate.

- Silicon diodes with inherent surge protection operated at a conservative percentage of their rating. 200,000 units have proven the highest reliability of motive power chargers.

- Convection cooled design for maximum reliability and minimum maintenance.

- Line voltage compensation achieved by flux oscillator circuit applied to battery chargers by Lester in 1962 for high reliability "Minute Man" missile standby applications. Compensates automatically for AC supply voltage variations of ± 10% from nominal with corresponding battery voltage variation of ± 1% maximum, decreasing to ± ½% at finish rate with constant electrolyte temperatures. No taps or rate controls to set.

Lester Electrical OF NEBRASKA 625 W. A St., Lincoln, Nebraska 68522
Pioneers in Motive Power Chargers

OPERATION OF
"LESTER-MATIC" BATTERY CHARGERS

INTRODUCTION

The Lester-Matic battery charger is a highly reliable, line compensating unit. When used according to instructions, the Lester-Matic will tend to lengthen battery life with less frequent additions of water.

INITIAL INSTALLATION

Provide adequate circuit breaker or fuse protection in the AC line to which the charger is to be plugged. Refer to electrical specifications on charger nameplate for input power requirements. When it is necessary to use an AC extension cord to the charger, use a three conductor No. 12 AWG cord with ground, and keep as short as possible. Instructions printed on the charger case are for daily reference.

NORMAL OPERATION

1. Provide adequate ventilation for both batteries and charger. The convection-cooled design requires an unobstructed flow of cooling air for proper operation.
2. Connect charger DC output cord to batteries.
3. Turn timer to "ON" for well discharged batteries or to "7" for lightly discharged batteries. Charger shuts off automatically at end of set period.

The state of discharge of the batteries will be slightly different each time they are put on charge, but the Lester-Matic varies automatically the initial charge rate, and taper of charge rate over the charge period. For well discharged batteries the charge rate at the start of the charge period should correspond to the "DC AMPS" rating on the charger nameplate. The rate should then taper gradually down to a lower finish rate. Normal charging at the low finish rate during the last 1-3 hours is necessary to achieve equalization of all battery cells. This equalization period allows the specific gravity of the battery electrolyte solution to rise to its full charge value. Since the taper of the charging rate (in amps, as indicated by the ammeter needle) is controlled by the rising voltage of the batteries being charged, proper performance of the charger and resulting good battery life is dependent upon the following factors:

a. An adequate AC line to handle the power required (See "Initial Installation"). Request your electrician or power company to survey your installation.

b. All cells of the batteries must be good, rising to approximately 2.5 DC volts per cell while still on charge or near the end of a charging period. When in doubt, check each cell with a single cell volt-meter while still on charge. If a low reading is obtained, check the low cells with a temperature corrected hydrometer. NOTE: Hydrometer float must be thoroughly clean to obtain accurate specific gravity readings.

c. Connections on the battery terminals and connector wiring must be clean and tight.

The necessity of adding water more frequently than two or three weeks, and/or hot battery cases at the end of the charging cycle, indicates the finish rate is too high, due to one or both of the following:

a. One or more bad cells in the batteries.

b. Batteries are starting to age to the point where hours of charge should be reduced gradually to obtain prolonged battery life.

4. To determine approximate full charge at start of day's use, turn timer knob to "1". Drop of ammeter needle to the low finish rate within 15 minutes indicates full charge.
5. Always turn timer to "OFF" before disconnecting charger from batteries.

STORAGE

Charger may be left connected to the batteries and should be turned on for a full charge period once a month. In extremely cold conditions it may be necessary to charge more frequently. Check with your battery manufacturer. After each charge cycle the charger should be checked to insure that it has turned off. Severe overcharging and possible damage to the batteries could result if the charger remains on for prolonged periods of time.

CAUTION

THIS CHARGER IS FOR USE ONLY ON BATTERY SYSTEMS AS SPECIFIED ON THE CHARGER NAMEPLATE. USE OTHERWISE WILL DAMAGE CHARGER AND/OR BATTERIES.

Due to the electrical characteristics of this charger, it is possible to improperly hook up batteries and not blow the fuses when charging. When installing batteries, be sure polarity is correct. With a DC voltmeter, check terminal voltage and polarity at the battery connector.

When working near capacitor terminals be sure charger is turned off. With charger "on" transformer capacitor terminals provide a very high voltage. Care is to be shown.

MALFUNCTION SYMPTOMS AND THEIR REMEDIES

The Lester-Matic charger is designed with as few parts as possible making it a very reliable unit. Since each component can be tested individually, trouble shooting is a simple task. The following is a list of symptoms with their associated test procedures and remedies.

NO TRANSFORMER HUM AND AMMETER DOES NOT REGISTER

In the event no hum is detected from the transformer, check the AC cord to be sure it is securely plugged into a live AC outlet. When three-prong or two-prong adapters are used, they tend to work loose giving a poor connection. If the cord connection is secure and still no hum is noticed, a continuity test of the AC circuit is necessary. Turn the timer to "ON" and with a suitable continuity tester, check circuit across the AC plug prongs (Figure 1). CIRCUIT SHOULD BE COMPLETE. If not complete, individually check the AC cord, timer, primary transformer coil, and all connections.

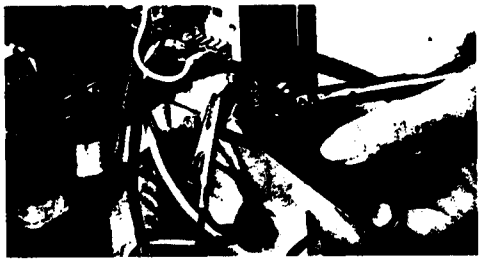


FIG. 1

TRANSFORMER HUMS BUT NO AMMETER INDICATION

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

(a) Connect tester clip to negative (−) blade and probe to positive (+) blade (Figure 2). CIRCUIT SHOULD BE COMPLETE. If not complete, first check the DC fuse link. If one or both fuses have blown, the link will be broken and usually the clear plastic fuse cover will be discolored. Refer to "Fuse Link Blowing" for test procedures. If fuses are good, individually check the fuse connections, DC cord, and diode connections (each may be checked with the continuity test light).

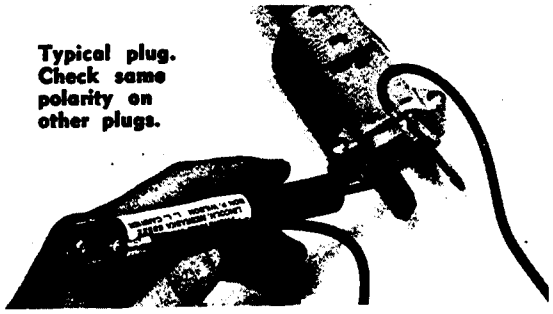


FIG. 2

(b) If the circuit in Figure 2 is complete, reverse test light leads as shown in Figure 3. CIRCUIT SHOULD NOT BE COMPLETE. If circuit is complete, check DC cord for a "short" between the two wires. More probably, one or both diodes have "shorted". Refer to "Fuse Link Blowing" part (b) for continuity test of diodes.

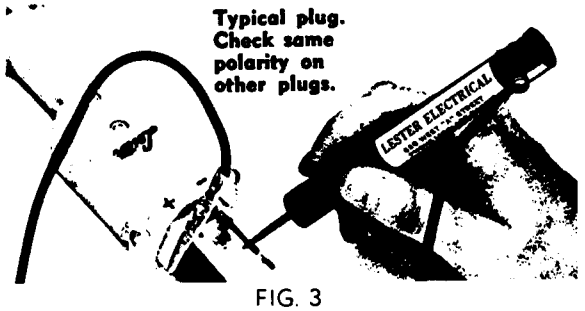


FIG. 3

(c) If (a) Figure 2 and (b) Figure 3 check good, assume the capacitor is shorted. Remove one wire from a capacitor terminal and place continuity tester clip to one terminal and probe to other. If circuit is complete, capacitor is "shorted" and must be replaced.

CHARGER DC FUSE LINK(S) BLOWS

This condition may be caused by:

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

(b) A short circuit failure of one or both diodes. First disconnect one diode. Using a low voltage continuity tester check each diode as shown in Figure 4. Then reverse the tester leads and check each diode again. If the diode conducts current in **both** directions the diode is shorted and must be replaced. Replace either the entire heat-sink assembly or the defective diode. When replacing a single diode be sure the new diode is pressed squarely into the hole and that it does not extend beyond the rear surface of the heat sink plate.



FIG. 4

(c) If (a) and (b) fail to reveal the malfunction, check wiring of both charger and battery connections against their respective wiring diagrams. The charger wiring diagram is shown on the enclosed sheet along with the parts list.

CHARGER OUTPUT IS LOW

The most probable cause is one diode shorting and blowing one fuse. Refer to "Fuse Link Blowing" part (b) to check the diodes. If a diode is shorted both the defective diode/heat sink and the defective fuse assembly must be replaced.

CHARGER DOES NOT TURN OFF

In models equipped with timers, this is due to an inoperative timer. In this case replace timer assembly.

AC LINE FUSE OR CIRCUIT BREAKER BLOWS

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

FORM 832-1
01-22-85

OWNERS MANUAL

LESTRONIC III BATTERY CHARGER

MODEL 11170 - TYPE 24LC30-8ET
INPUT: 115 VAC, 60 HZ.
OUTPUT: 24 VDC, 30 AMP.

****
* CAUTION: THIS CHARGER IS INTENDED FOR THE CHARGING OF A 12 *
* CELL (24V) LEAD ACID STORAGE BATTERY ONLY. USE OF THIS *
* CHARGER ON ANY OTHER BATTERY COULD CAUSE DAMAGE TO THE *
* BATTERY AND/OR TO THE CHARGER. *
****

THIS MANUAL CONTAINS VITAL INFORMATION FOR THE SAFE USE AND EFFICIENT OPERATION OF THE BATTERY CHARGER. CAREFULLY READ THIS MANUAL BEFORE USING CHARGER, AND RETAIN FOR FUTURE REFERENCE. FAILURE TO ADHERE TO INSTRUCTIONS COULD RESULT IN SERIOUS BODILY INJURY OR PROPERTY DAMAGE. ALL REPAIRS SHOULD BE MADE BY QUALIFIED PERSONNEL ONLY.

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LESTER ELECTRICAL OF NEBRASKA, INC.
625 WEST A ST., LINCOLN, NE 68522
PHONE 402-477-8988

CHARGER MODEL 11170 OPERATION

1. CHARGER INSTALLATION: MOUNT THE CHARGER IN THE VEHICLE AND CONNECT THE CHARGER POSITIVE (WHITE) DC CORD LEAD TO THE POSITIVE BATTERY TERMINAL AND CONNECT THE CHARGER NEGATIVE (BLACK) DC CORD LEAD TO THE NEGATIVE BATTERY TERMINAL.

2. ELECTRICAL SUPPLY: THIS CHARGER MUST BE OPERATED FROM A PROPERLY GROUNDED 115 VOLT, 60 HZ AC OUTLET ONLY.

3. CHARGER OPERATION:

   A. STARTING THE CHARGER, INSERT THE AC PLUG INTO THE APPROPRIATE CHARGER AC RECEPTACLE. THE CHARGER WILL START WHEN THE AC PLUG IS INSERTED.

   B. MONITER METERS : THE AMMETER SHOULD INDICATE AN INITIAL CHARGE RATE OF APPROXIMATELY 30 AMPS. THE CHARGE RATE WILL GRADUALLY TAPER TO A FINISH RATE OF FROM 2 TO 10 AMPS.

   C. MONITER LIGHTS (LIGHT EMITTING DIODES-L.E.D.): THE GREEN "AC POWER ON" LIGHT SHOULD GLOW AT ALL TIMES WHEN THE AC CORD IS PLUGGED INTO A "LIVE" 115 VAC 60 HZ OUTLET AND THE DC CORD IS CONNECTED TO THE BATTERY.

   NOTE: THE GREEN LIGHT, DUE TO THE CHARACTERISTICS OF THE L.E.D., MAY NOT BE HIGHLY VISIBLE WHEN THE CHARGER IS LOCATED IN A BRIGHTLY LIGHTED AREA.

   THE RED LIGHT "CHARGE ON/COMPLETE" SHOULD BLINK WHEN THE CHARGE STARTS AND REMAIN BLINKING UNTIL THE CHARGE IS COMPLETED. WHEN THE CHARGE IS COMPLETE THE LIGHT WILL STOP BLINKING AND GLOW CONTINUOUSLY. IF THE RED LIGHT IS "OFF", NOT GLOWING OR BLINKING, THEN A POSSIBLE PROBLEM EXISTS.

   THE YELLOW LIGHT "AC INTERRUPT" WHEN GLOWING INDICATES THAT THE 115 VAC POWER SOURCE HAS BEEN INTERRUPTED WHILE THE THE CHARGE WAS IN PROGRESS. ALL LIGHTS WILL BE OFF DURING THE ABSENCE OF THE AC POWER.

   ****
   * NOTE: IF THE CHARGE IS TERMINATED BY UNPLUGGING THE *
   * AC CORD OR IF THE "AC INTERRUPT" LIGHT IS GLOWING *
   * WHEN THE AC CORD IS UNPLUGGED, THE STOP/RESTART *
   * SWITCH MUST BE MOMENTARILY ENGAGED PRIOR TO THE NEXT *
   * CHARGE TO PREVENT THE "AC INTERRUPT" LIGHT FROM *
   * GLOWING WHEN THE NEXT CHARGE IS STARTED. *
   ****

   THE ORANGE LIGHT "CHECK BATTERY" INDICATES ONE OF THE FOLLOWING TWO CONDITIONS: THAT THE BATTERIES ARE NOT BEING CHARGED BEFORE THE PRESET MAXIMUM TIME HAS ELAPSED, OR THE BATTERY POTENTIAL OF 2.35 VOLTS/CELL HAS NOT BEEN REACHED IN THE COURSE OF THE CHARGE. THIS LIGHT SHOULD NOT GLOW UNDER NORMAL CIRCUMSTANCES. IF THE ORANGE LIGHT GLOWS AFTER THE CHARGE IS TERMINATED CHECK THE BATTERY FOR WEAK CELLS.

D. CHARGE TERMINATION: THE CHARGER AUTOMATICALLY TERMINATES THE CHARGE WHEN THE BATTERIES ARE FULLY CHARGED OR, WHEN THE PRESET MAXIMUM TIME HAS ELAPSED, OR IF THE BATTERY POTENTIAL AFTER REACHING 2.16 VOLT/CELL STOPS INCREASING FOR A TIME PERIOD OF 80 MINUTES BEFORE REACHING 2.35 VOLTS/CELL. THE CHARGE MAY ALSO BE TERMINATED MANUALLY BY MOMENTARILY ENGAGING THE STOP/RESTART SWITCH. IF SWITCH IS DEPRESSED BEFORE 2.35 VOLTS/CELL THE FAULT LED LIGHT WILL TURN ON. IF VOLTAGE IS HIGHER THEN 2.35 VOLT/CELL THE COMPLETE LED WILL TURN ON. THE PRESET MAXIMUM CHARGE TIME IS SIXTEEN (16) HOURS.

****
* CAUTION: DO NOT DISCONNECT THE CHARGER DC CORD FROM THE VEHICLE *
* BATTERY TERMINALS DURING THE CHARGE. IF THE BATTERY MUST BE DIS- *
* CONNECTED, STOP THE CHARGE WITH THE STOP/RESTART SWITCH AND UN- *
* PLUG THE AC CORD BEFORE DISCONNECTING THE BATTERY. *
****

E. CHARGE TIME: THE TIME REQUIRED TO FULLY CHARGE THE BATTERIES WILL NORMALLY BE 8 TO 12 HOURS.

F. FULL CHARGE TEST: TO TEST FOR A FULL CHARGE ON A 24V BATTERY, RESTART THE CHARGER WITH THE STOP/RESTART SWITCH. IF THE BATTERY IS FULLY CHARGED, THE CHARGE RATE RATE SHOULD DROP TO APPROXIMATELY 8 TO 15 AMPS WITHIN 10 TO 20 MINUTES. THE CHARGER WILL AUTOMATICALLY SHUTOFF WITHIN 45 TO 90 MINUTES OR IT MAY BE SHUT OFF WITH THE STOP/RESTART SWITCH.

G. AC POWER FAILURE: IF AN AC POWER FAILURE OCCURS DURING THE CHARGE, THE CHARGER WILL AUTOMATICALLY RESUME THE CHARGE WHEN THE AC POWER RETURNS. ALL CHARGER TIMING IS RESET TO ZERO TIME. THE "AC INTERRUPT" LIGHT WILL GLOW TO INDICATE THAT THE AC POWER HAS FAILED.

H. CHARGER RESTART: THE CHARGER MAY BE RESTARTED, AFTER IT HAS SHUT OFF BY UNPLUGGING THE AC POWER CORD FOR A FEW SECONDS (3 TO 5 SECONDS) AND THEN PLUGGING THE CORD BACK IN. ALSO THE CHARGER MAY BE RESTARTED BY MOMENTARILY ENGAGING THE STOP/RESTART SWITCH.

IF THE CHARGER AC CORD REMAINS CONNECTED TO THE 115 VAC 60 HZ AND THE DC CORD REMAINS CONNECTED TO THE BATTERIES AFTER THE CHARGER HAS FINISHED THE FIRST CHARGE, THE CHARGER WILL AUTOMATICALLY RESTART AFTER A PRESET NUMBER OF DAYS (24 HOUR PERIODS). THE CHARGE TIME (PROVIDED THE BATTERIES ARE UNLOADED) WILL NORMALLY BE 15 TO 90 MINUTES. THE CHARGER WILL AUTOMATICALLY SHUT OFF AND AGAIN TURN ON AFTER THE PRESET NUMBER OF DAYS. THIS CYCLE (CALLED A STORAGE MODE) WILL CONTINUE AS LONG AS THE CHARGER REMAINS CONNECTED TO THE AC POWER AND BATTERIES. THE PRESET NUMBER OF DAYS FOR TURN ON" IS FOUR (4).

NOTE: THE ALLOWABLE MAXIMUM CHARGE TIME BEFORE SHUTOFF IS AUTOMATICALLY REDUCED IN THE STORAGE MODE TO PREVENT POSSIBLE OVERCHARGING OF THE BATTERIES. THE MAXIMUM CHARGE TIME IN THE STORAGE MODE IS THREE (3) HOURS.

IF AN AC POWER FAILURE OCCURS WHEN THE CHARGER IS IN THE STORAGE MODE THE CHARGER WILL START WHEN THE AC POWER RETURNS AND CONTINUE OPERATING IN THE STORAGE MODE.

IF THE BATTERY VOLTAGE DROPS TO APPROXIMATELY 21 VOLTS WHEN THE CHARGER IS "OFF" IN THE STORAGE MODE, THE CHARGER WILL AUTOMATICALLY RESTART WITHOUT WAITING FOR THE PRESET NUMBER OF DAYS TO ELAPSE. THE STORAGE MODE WILL CONTINUE AFTER THE BATTERIES ARE FULLY CHARGED.

TROUBLE SHOOTING INSTRUCTIONS FOR CHARGER MODEL 11170

THE FOLLOWING IS A LIST OF POSSIBLE PROBLEMS AND REMEDIES FOR PROBLEMS WHICH MIGHT OCCUR TO THE CHARGER.

THE VOM USED FOR MEASUREMENTS SHOULD HAVE A RESISTANCE OF 20,000 OHMS/VOLT DC, 5000 OHMS/VOLT AC OR GREATER.

IF A PROBLEM OCCURS IN THE CHARGER, BEFORE MAKING THE FOLLOWING ELECTRICAL TESTS, DISCONNECT THE CHARGER FROM THE 115 VAC OUTLET AND BATTERIES AND EXAMINE THE AC AND DC CORDS FOR DAMAGE OR LOOSE CONNECTIONS. AFTER THE COVER HAS BEEN REMOVED EXAMINE THE INTERNAL PARTS AND CONNECTIONS FOR SIGNS OF DAMAGE OR LOOSE ELECTRICAL CONNECTIONS.

1. GREEN LIGHT (L.E.D.) DOES NOT GLOW AND CHARGER DOES NOT WORK WHEN CHARGER IS CONNECTED TO 115 AC 60 HZ AND BATTERIES:

   ****
   * CAUTION: USE EXTREME CARE WHEN WORKING INSIDE THE CHARGER *
   * WHEN IT IS CONNECTED TO THE 115 VAC LINE AND/OR THE *
   * BATTERIES IN ORDER TO PREVENT ELECTRICAL SHOCK OR TO *
   * PREVENT POSSIBLE DAMAGE TO THE PRINTED CIRCUIT BOARD *
   * COMPONENTS. *
   ****

   READ THE AC VOLTAGE BETWEEN PINS 1 AND 3 OF THE COMPU-TIME 4 PRINTED CIRCUIT BOARD EDGE CONNECTOR. THE VOLTAGE SHOULD BE THE SAME POTENTIAL AS THE 115 VAC POWER IS. IF THE VOLTAGE IS NOT PRESENT CHECK FOR LOOSE ELECTRICAL CONNECTIONS. IF THE VOLTAGE IS CORRECT, THE P.C BOARD IS FAULTY AND MUST BE REPLACED. READ PRECAUTIONS BELOW ON HANDLING THE P.C. BOARD BEFORE REMOVING THE BOARD FROM THE CHARGER.

2. GREEN "AC POWER ON" LIGHT GLOWS BUT CHARGER WILL NOT START OR STARTS BUT WILL NOT SHUT OFF WHEN CONNECTED TO THE 115 VAC AND THE BATTERY: THESE PROBLEMS COULD BE CAUSED BY THE COMPU-TIME 4 PRINTED CIRCUIT BOARD AND THE FOLLOWING VOLTAGE MEASUREMENTS SHOULD DETERMINE IF THAT IS THE CASE.

A. P1 VOLTAGE READINGS (P1 IS THE EDGE CONNECTOR OF THE P.C. BOARD), ALL VOLTAGE READINGS ARE REFERENCED TO PIN 9.

PIN	APPROXIMATE PIN VOLTAGE
7	SAME AS BATTERY VOLTAGE
5	CHARGER ON = LESS THAN 1 VDC CHARGER OFF = BATTERY VOLTAGE

IF ALL VOLTAGES ARE CORRECT, CHECK THE CONNECTOR TERMINALS TO BE SURE THEY ARE MAKING PROPER CONTACT WITH PINS. IF VOLTAGES ARE NOT CORRECT REPLACE THE COMPU-TIME 4 PRINTED CIRCUIT BOARD AND RETURN THE DEFECTIVE BOARD TO THE FACTORY FOR REPAIR.

****
* COMPU-TIME 4 PRINTED CIRCUIT BOARD REPLACEMENT: TO REMOVE *
* THE BOARD FIRST DISCONNECT THE CHARGER FROM THE 115 VAC AND *
* BATTERIES. THEN REMOVE THE TWO MOUNTING SCREWS FROM THE *
* FRONT PANEL AND REMOVE THE BOARD BY PULLING IT OUT THRU THE *
* FRONT OF THE CHARGER. UNPLUG THE EDGE CONNECTOR. *
* *
* DO NOT ATTEMPT TO REPLACE INDIVIDUAL COMPONENTS ON THE BOARD.*
* DO NOT HANDLE THE BOARD ANY MORE THAN NECESSARY. SOME *
* OF THE COMPONENTS ON THE BOARD COULD BE DAMAGED BY STATIC *
* ELECTRICITY. PLACE THE BOARD IN AN ANTI-STATIC BAG OR *
* WRAP THE BOARD IN ALUMINUM FOIL, THEN PACK CAREFULLY IN A *
* CARDBOARD BOX AND SHIP TO FACTORY. *
* *
* TO INSTALL A NEW PRINTED CIRCUIT BOARD, REVERSE THE REMOVAL *
* PROCEDURES DESCRIBED ABOVE. *
****

IF THE PRINTED CIRCUIT BOARD IS NOT THE PROBLEM, CHECK THE RELAY TO SEE IF THE CONTACTS ARE CLOSING OR STICKING.

3. CHARGER OPERATES AT A REDUCED RATE OF CHARGE CURRENT AND/OR BLOWS DC FUSES OR TRIPS AC POWER CIRCUIT BREAKER:

   THE PROBLEM COULD BE A FAULTY DIODE. DISCONNECT THE CHARGER FROM THE 115 VAC OUTLET AND BATTERIES AND CHECK CONTINUITY ACROSS THE DIODES WITH THE VOM. REMOVE THE TRANSFORMER LEADS FROM THE DIODES BEFORE READING CONTINUITY. IF A DIODE SHOWS APPROXIMATELY ZERO OHMS IN BOTH DIRECTIONS, THEN IT IS SHORTED AND SHOULD BE REPLACED. IF A DIODE SHOWS AN OPEN CIRCUIT IN BOTH DIRECTIONS THEN IT IS OPEN AND SHOULD BE REPLACED.

   IF THE DIODES ARE OK CONNECT THE TRANSFORMER LEADS BACK TO DIODES. REMOVE THE BROWN LEAD FROM THE RELAY AND PLACE A JUMPER (CLIP LEAD) BETWEEN THE RELAY TERMINAL AND THE AMMETER POST. WITH THE CHARGER STILL DISCONNECTED FROM THE BATTERIES PLUG IN THE AC CORD TO THE 115 VAC OUTLET AND MAKE THE FOLLOWING VOLTAGE MEASUREMENTS.

****
* DANGER: USE EXTREME CAUTION WHEN WORKING NEAR THE CAPACITOR *
****

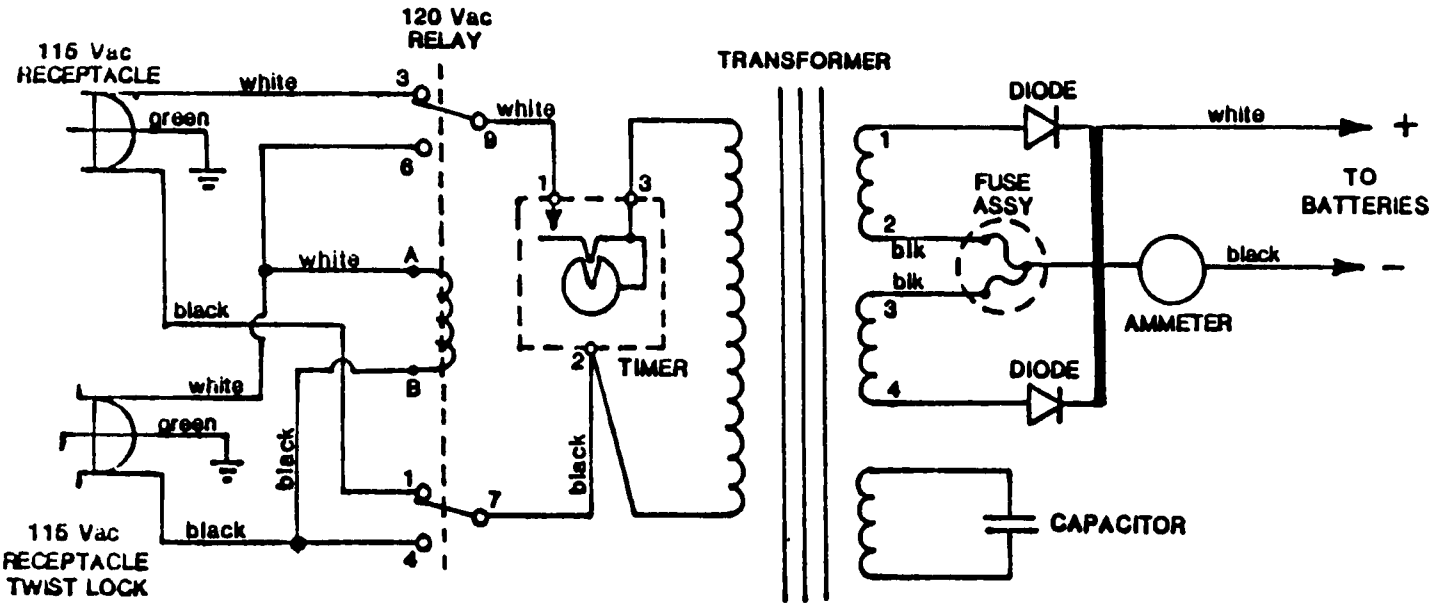
PLACE METER LEADS ACROSS	*APPROXIMATE VOLTAGE READINGS	
	WITH CAPACITOR CONNECTED	WITH CAPACITOR DISCONNECTED
(1) AMMETER POST TO EACH DIODE ANODE (TRANSFORMER LEAD)	30 VAC	21 VAC
(2) AMMETER POST TO DIODE CATHODES (HEAT SINK)	26 VDC	18 VDC
(3) TRANSFORMER LEADS CONNECTED TO THE CAPACITOR	700 VAC	470 VAC

NOTE: THESE READINGS APPLY ONLY IF THE TRANSFORMER IS NOT "MOTOR BOATING" (TRANSFORMER EMITTING AN AUDIBLE MOTOR BOAT SOUND). IT MAY BE NECESSARY TO ENGAGE AND DISENGAGE THE AC PLUG A FEW TIMES TO GET A NORMAL OPERATION.

IF THE READINGS ARE THE SAME WITH THE CAPACITOR CONNECTED AS THEY ARE WITH THE CAPACITOR DISCONNECTED, THEN THE CAPACITOR SHOULD BE REPLACED.

IF READING # (2) ONLY, IS ABOUT ONE HALF OF THE VALUES SHOWN, THEN A DIODE IS OPEN. RECHECK DIODE CONTINUITY AS WAS DONE ABOVE JUST PREVIOUS TO READING VOLTAGES.

IF THE VOLTAGES ARE STILL NOT CORRECT AND THE CAPACITOR AND DIODES ARE GOOD, THEN THE TRANSFORMER MAY BE FAULTY AND SHOULD BE REPLACED.



PARTS LIST FOR LESTER MATIC CHARGER
JR.7: MODEL 11160 TYPE 12LC30-4T12 P/N 70224
JR. 14 & 19 : MODEL 11165 TYPE 12LC40-8T12 P/N 70223
115 VAC. 60HZ

MODEL	VENDOR PART NO.	MARK PART NO.	DESCRIPTION
JR.7	11894S		CASE ASSEMBLY
JR.14,19	11896S		CASE ASSEMBLY
JR.7	11175S		TRANSFORMER ASSEMBLY
JR.14,19	11185S		TRANSFORMER ASSEMBLY
JR.7	08524S		HEATSINK ASSEMBLY, WITH DIODES
JR.14,19	09041S		HEATSINK ASSEMBLY, WITH DIODES
JR.7	08811S	66731	DIODE ASSEMBLY
JR.14,19	08849S	66730	DIODE ASSEMBLY
JR.7,14,19	02367S		AMMETER
JR.7,14,19	02002S	66732	TIMER, 12 HOUR
JR.7,14,19	02003S	66733	KNOB, TIMER
JR.7,14,19	02390S		CAPACITOR, 6.0 MFD, 660 VAC
JR.7,14,19	02028S		BUSHING, INSULATOR FOR DC CORD
JR.7,14,19	11813S	66734	RECEPTACLE, 125/15, STRAIGHT BLADE
JR.7,14,19	11814S	66735	RECEPTACLE, 125/20, TWIST LOCK
JR.7	11812S		CORDSET, DC. NO PLUG
JR.14,19	11807S		CORDSET, DC. NO PLUG
JR.7	08776S	66727	FUSE ASSEMBLY
JR.14,19	08774S	66726	FUSE ASSEMBLY
JR.7,14,19	04558S	66728	RELAY, 120 VAC, 15 AMP

"LIMITED WARRANTY"

Lester warrants each new Lester Charger for defects in material and workmanship for a period of two years from the date of manufacture of the complete unit.

Repairs can be made at the Lester factory. To do so send the defective unit with transportation charges prepaid to:

Lester Electrical of Nebraska, Inc.
625 West "A" Street
Lincoln, Nebraska 68522
Attention: Repair Department

For repairs made at other than the Lester factory, Lester will provide only the replacement parts. Defective parts should be sent with transportation charges prepaid to the Lester factory at the previously mentioned address.

If the unit or parts are found in the reasonable judgement of Lester to be defective in material or workmanship, repair or replacement will be made by Lester without charge for parts or labor. Repair or replacement will be at the discretion of Lester, with replacements being made using current models or parts performing the equivalent function. Labor charges other than those incurred at the Lester factory are not covered under this warranty. All expenses associated with delivering defective items to the Lester factory and the expense of returning repaired or replaced items from the Lester factory to the owner will be paid for by the owner. All warranty work accomplished at the Lester factory will be completed within a reasonable time after receipt of defective items.

This warranty does cover any semiconductor parts, such as diodes, which are vulnerable to electrical overloads beyond the control of Lester. Warranty on parts not manufactured by Lester, which include, but are not limited to, timers and ammeters is limited to the period specified in the original manufacturer's warranty.

This warranty does not cover any charger that has been subject to misuse, neglect, negligence, or accident, or operated in any way contrary to instructions specified on the charger case and in the owner's manual. No claim of breach of warranty shall be cause for cancellation of the contract of sale of any Lester charger. Lester assumes no responsibility for loss of time, inconvenience, or other damage, consequential or otherwise, resulting from a defective charger. All implied warranties (including merchantability) are limited in duration to the two years from date of manufacture warranty period.

Some states do not allow the exclusion or limitation of incidental or consequential damages; or limitations on how long an implied warranty lasts, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Lester's obligation under this warranty is strictly and exclusively limited to the repair or replacement of defective items. Lester issues this warranty in good faith and with full confidence in the workmanship and quality of Lester products.

PROPER CARE OF MOTIVE POWER BATTERIES

1. New batteries should be given a full charge before their first use because it is difficult to know how long the batteries have been in storage without a charge.
2. Limit use of new batteries between charges for the first 5 cycles. New batteries and older batteries which have been in storage are not capable of their rated output until they have been discharged and charged a number of times.
3. During the first month of use, particularly when temperatures are below 60°F, new batteries should be given an extra full charge once a week. The ampere-hours of energy that batteries can deliver and their charge acceptance varies directly with battery temperature.
4. As long as the charger tapers down to the specified finish charge rate near the end of the charge cycle, the batteries should be given a full charge. All cells in a set of batteries do not react identically to the same discharge and charge current. In a normal charge, the last 1 to 3 hours at the low finish charge rate equalize the cells for better battery life.
5. When batteries age to the point where the charge rate will no longer taper into the low finish rate area, reduce the hours of charge progressively. Reducing the charge period will prevent excessive battery heating and the resultant high water use rate.
6. Prior to each day's use, turn the charger on and check to see if charger ammeter needle jumps smartly upward and then tapers down to the finish rate area within 15 minutes. This will provide a very simple means of verifying that the batteries were charged.
7. Add water carefully to the proper level in cells as required after they have been fully charged. Do not fill them so high that they bubble over while charging. New batteries require very little addition of water, whereas very old batteries may need additional water two or three times a week. Water (electrolyte) level in the cells settles when batteries are discharged and rises during charge. The probability of overfilling can be reduced by adding water when batteries are fully charged.
8. When the temperature falls below 65°F, batteries should be placed on charge as soon after use as possible. In these low temperatures a 4 hour equalizing charge once a week will improve state of charge and battery life.
9. Keep tops of batteries and battery hold-downs clean and dry at all times. This will reduce the amount of current leakage between batteries and the frame.

THIS CHAPTER HAS BEEN PROVIDED TO KEEP **MARK INDUSTRIES** SERVICE BULLETINS THAT APPLY TO THE IMPROVEMENT OF YOUR **MARKLIFT.**

Mark Industries

Service Bulletin

Date: February 1986

To: Mark Industries Distibutors and Representatives

From: Service Department

Subject: Revision 1 - Marklift Jr. Self - Propelled Scissor Lift Operation Maintenance and Parts Manual

This revision has been prepared to incorporate recent changes and refinements to the Marklift Jr. series of equipment.

For ease of updating this manual, complete replacement sections are provided for the schematics, parts and vendor sections.

If any questions arise, please call our service department.

John Laurin
SERVICE MANAGER

MAILING ADDRESS: POST OFFICE 720 • LONG BEACH, CALIFORNIA 90801
2662 E. DEL AMO BLVD., CARSON, CA 90220 TELEX: 194-402
(800) 421-1826 (213) 639-9700