



**Model: 8850**  
**Single Stage Fixed Height**  
**Hydro – Mechanical**  
**Aviation Tripod jack**  
S/N 1018 and Up

12/2018 – Rev. 01

REVISION  
01  
02

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TEXT AFFECTED  
Original release  
Modified Parts List

**TABLE OF CONTENTS**

	<b><u>PAGE</u></b>
<b>1.0 PRODUCT INFORMATION .....</b>	<b>4</b>
1.1 DESCRIPTION.....	4
1.2 MODEL & SERIAL NUMBER.....	4
1.3 MANUFACTURER .....	4
1.4 SPECIFICATIONS .....	4
<b>2.0 SAFETY INFORMATION .....</b>	<b>5</b>
2.1 USAGE AND SAFETY INFORMATION .....	5
<b>3.0 PREPARATION PRIOR TO FIRST USE .....</b>	<b>5</b>
<b>4.0 TRAINING .....</b>	<b>6</b>
4.1 TRAINING REQUIREMENTS .....	6
4.2 TRAINING PROGRAM .....	6
4.3 OPERATOR TRAINING .....	6
<b>5.0 OPERATION .....</b>	<b>6</b>
5.1 PRE OPERATION INSPECTION.....	6
5.2 OPERATING PROCEDURES.....	6
<b>6.0 TROUBLE SHOOTING .....</b>	<b>8</b>
<b>7.0 MAINTENANCE .....</b>	<b>9</b>
7.1 SERVICING .....	9
7.2 DISASSEMBLY INSPECTION.....	9
7.3 REPAIR AND REPLACEMENT .....	9
7.4 TESTING: .....	10
7.5 SPECIAL TOOLS:.....	10
<b>8.0 PROVISION OF SPARES .....</b>	<b>11</b>
8.1 SOURCE OF SPARE PARTS.....	11
8.2 RECOMMENDED SPARE PARTS LISTS .....	11
8.2.1 Standard Spare Parts.....	11
8.2.2 Air Pump Kit Spare Parts .....	11
8.2.3 Load Gauge Kit Spare Parts .....	11
8.2.4 Adjustable Foot Kit Spare Parts .....	12
8.2.5 Hydraulic Caster Kit Spare Parts.....	12
8.2.6 Ladder Assembly Kit Spare Part .....	12
8.2.7 Remote Control Kit Spare parts .....	12
<b>9.0 IN SERVICE SUPPORT .....</b>	<b>12</b>
<b>10.0 GUARANTEES/LIMITATION OF LIABILITY .....</b>	<b>13</b>
<b>11.0 APPENDICES .....</b>	<b>13</b>

This product can not be modified without the written approval of Tronair, Inc. Any modifications done without written approval voids all warranties and releases Tronair, Inc., its suppliers, distributors, employees, or financial institutions from any liability from consequences that may occur. Only Tronair OEM replacement parts shall be used.



**CAUTION!**

**Aircraft manufacturer's specifications and instructions must be followed. In the event of contradiction between aircraft manufacturer's specifications and Malabar's, aircraft manufacturer's will prevail.**

**1.0 PRODUCT INFORMATION**

**1.1 DESCRIPTION**

The Malabar Fixed Height Tripod Jack Model 8850 is a 41 ton capacity single stage hydraulic jack designed primarily for use in aircraft maintenance. It consists of a tripod structure, reservoir, valve block assembly, hand pump assembly, tow handle, swivel casters and the following optional equipment:

- Air pump
- Load gauge
- Adjustable swivel foot
- Adjustable swivel foot with hydraulic caster
- Ladder
- Remote control (platform operated)

The jack tow handle readily connects to tow vehicle for ease of transport. The jack should never be used as a personnel carrier while being towed or in motion. On jacks equipped with spring loaded swivel casters, the jack leg pads are raised off the ground. The casters will retract and the pads rest on the ground when a load is applied to the jack. On jacks equipped with adjustable swivel foot, the jack leg pads have adjustable leveling feet for slightly uneven or sloping floors. On jacks equipped with hydraulic casters, leveling of the jack is faster and easier by selectively extending or retracting the caster plungers utilizing the caster hand pump or release valve. Extending the casters also increases the towing ground clearance.

**1.2 MODEL & SERIAL NUMBER**

Reference nameplate on unit

**1.3 MANUFACTURER**

**Malabar International**  
1 Air Cargo Pkwy East  
Swanton, Ohio 43558 USA

Telephone: (419) 866-6301 or 800-426-6301  
E-mail: sales@malabar.com  
Website: www.malabar.com

**1.4 SPECIFICATIONS**

Rated Capacity	41 tons (37.2 m. tons)
Side Load	15% of vertical load
Roll Under Height	143.5 in (3645 mm)
Low Height	142 in (3607 mm)
Hydraulic Lift	76 in (1930 mm)
Extension Screw	16 in (406 mm)
Total Extended Height	234 in (5944 mm)
Oil Pressure at Rated Capacity	2646 psig (186 kg/sq cm)
Safety Pop-off Valves	
System Relief Valve set at	45 ton (40.9 m. tons)
Thermal Relief Valve set at	51 ton (46.5 m. tons)
Proof Load	62 ton (55.8 m. tons)
Reservoir Capacity	12.6 gal (47.7 l)
Hydraulic Fluid	MIL-PRF-5606 or equivalent
Maximum Towing Speed	5 mph (8 km/h)
Approximate Jack Net Weight	2450 lbs (1111 kg)

## 2.0 SAFETY INFORMATION

### 2.1 USAGE AND SAFETY INFORMATION

To insure safe operations please read the following statements and understand their meaning. Also refer to your equipment manufacturer's manual for other important safety information. This manual contains safety precautions which are explained below. Please read carefully.



#### **WARNING!**

Warning is used to indicate the presence of a hazard that can cause **severe personal injury, death, and/or substantial property damage** if the Warning Notice is ignored.



#### **CAUTION!**

Caution is used to indicate the presence of a hazard, which will or can cause **minor personal injury or property damage** if the Caution Notice is ignored.

## 3.0 PREPARATION PRIOR TO FIRST USE

Disregard the following erection procedure if the jack is shipped fully assembled. If the jack is shipped partially assembled, erection is accomplished by following the suggested sequence below (also see figures 1A & 1B):

1. Install sling under tripod head of cylinder assembly and support from a crane or forklift capable of lifting 3000 lbs (1361 kg) to a height of 14 ft (4.27 m).
2. Install legs, tripod head pins and retaining rings.
3. Install braces.
4. Tighten all bolts.

If jack is equipped with adjustable swivel feet, perform the following procedure to calibrate bubble level:

1. Hang 2 plumb bobs (at 90°) from the tripod head with the plumb bob strings approximately parallel to the cylinder assembly (dial indicator magnetic bases work well as supports for the plumb bobs).
2. Stand on jack footpads and screw the footpad locknuts up to the end of the legs, continue turning footpad locknuts until weight of jack is off casters (one end of the pump handle fits into the footpad locknuts to provide extra leverage if required). Adjust footpad locknuts so both plumb bob strings are parallel to the cylinder assembly (carefully measure top and bottom from cylinder assembly to strings). Alternately, if jack is equipped with hydraulic casters, operate hydraulic caster hand pumps and/or release valves to extend or retract casters until both plumb bob strings are parallel to the cylinder assembly.
3. Remove cover from bubble level and adjust screws to center bubble. Lock adjustment screws and replace cover. Tag with date of calibration.
4. Raise footpads fully to stow position and reinsert pump handle in handle holder. Remove plumb bobs.
5. Bubble level should be checked periodically as directed by cognizant quality control department.

Before placing jack in operation, perform the following procedure:

1. Remove filler cap from the filler spout located at the side of the reservoir.
2. Fill jack reservoir to mark on dipstick with MIL-H-5606 hydraulic fluid or approved equivalent (reservoir capacity is approximately 12.6 gallons/47.7 liters). Jack plunger must be fully retracted before filling reservoir. Replace filler cap.
3. Open release valve and operate hand pump a few strokes to bleed all air trapped under hand pump.
4. Close release valve and operate hand pump to raise plunger approximately 1 inch.
5. Open release valve to retract plunger fully to bleed all air trapped under jack plunger. Close release valve.
6. If jack is equipped with hydraulic casters, perform the following procedure:
  - a. Remove the elbow/breather located on top of the reservoir.
  - b. Open release valve and fully retract caster plunger.
  - c. Fill reservoir to the top with MIL-H-5606 hydraulic fluid or approved equivalent. Replace elbow/breather.
  - d. Open release valve and operate hydraulic caster hand pump a few strokes to bleed all air trapped under hand pump.
  - e. Close release valve and operate hand pump to extend caster approximately 1 inch.
  - f. Open release valve to retract caster fully to bleed all air trapped under plunger. Close release valve.
  - g. Repeat for other hydraulic casters.

## 4.0 TRAINING

### 4.1 TRAINING REQUIREMENTS

The employer of the operator is responsible for providing a training program sufficient for the safe operation of the unit.

### 4.2 TRAINING PROGRAM

The employer provided operator training program should cover safety procedures concerning use of the unit in and around the intended aircraft at the intended aircraft servicing location.

### 4.3 OPERATOR TRAINING

The operator training should provide the required training for safe operation of the unit.

**NOTE: Maintenance and Trouble Shooting are to be performed by a skilled and trained technician.**

## 5.0 OPERATION

### 5.1 PRE OPERATION INSPECTION

Each time the jack is to be used, inspect the following:

1. Check the tripod structure for rigidity. Make sure all bolts are tightened.
2. Check hydraulic line connections for leaks. Tighten as required.
3. Check for hydraulic fluid leaks around the base, reservoir, tripod head, air pump (if so equipped) and hand pump.
4. Check hand pumps for proper operation.
5. Check swivel casters for proper operation.
6. Check reservoir fluid level with jack plunger fully retracted.
7. Check hydraulic caster reservoir fluid levels with caster plungers fully retracted (if so equipped).

### 5.2 OPERATING PROCEDURES

#### CAUTION!



**Prior to towing, engage the two trailing swivel caster locks. On jacks equipped with adjustable swivel foot, always fully retract the footpads before moving or towing the jack. On jacks with hydraulic casters, fully extend casters before moving or towing jack.**

1. Position the jack under the jacking pad of the aircraft. For maximum maneuverability, verify all swivel caster locks are disengaged.
2. Raise the extension screw by turning counterclockwise until the ship adapter contacts the jacking pad or as far as the screw will travel, 16 in (40.64 cm) maximum.
3. Verify the jack is leveled (shim footpads if necessary). The jack plunger should be plumb during lifting. On jacks equipped with adjustable swivel foot, check level using the bubble level mounted on the jack. Adjust the footpads to contact the ground and plumb the jack. The footpads are adjusted by standing on the footpad and adjusting the footpad locknut as required to extend the footpad. One end of the pump handle fits the footpad locknut for final adjusting. On jacks equipped with hydraulic casters, operate hydraulic caster hand pumps to extend casters to plumb the jack and then adjust the footpads to contact the ground.



#### CAUTION!

**Open hydraulic caster release valves to ensure the weight is taken through the footpads.**

#### CAUTION!



**On jacks equipped with air pump, air relief valve must be installed at all times. If air relief valve is removed, it is possible to over pressurize the pneumatic system which could cause equipment failure and possible bodily injury.**

4. On jacks equipped with air pump, connect air supply (90-110 psig) to the 1/2 NPT air inlet at the air valve (a minimum of 28 scfm is required). Air relief valve must be properly installed. Do not attempt to remove air relief valve.

#### CAUTION



**Locknut must be installed and operable on jack at all times. Always maintain less than 2 in (5 cm) between the locknut and the tripod head in all phases of load raising and lowering.**

5.2 OPERATING PROCEDURES (*continued*)

5. To raise the load:
  - a. The jack is equipped with an adjustable hand pump. The hand pump handle length can be varied by inserting the quick release pin through the clamp and appropriate hole along the handle (see figure 4). A longer handle length provides greater pumping leverage for high pressure pump operation. A shorter handle will increase the plunger stroke and allow more oil pumped per stroke. This permits a more rapid raising of the jack plunger under a light or no load.
  - b. Close release valve located on the panel.
  - c. Operate the air valve or hand pump until the ship adapter contacts the jacking pad. Insure the ship adapter and the jacking pad are correctly mated. The load may now be raised by operating the air valve or hand pump.
  - d. Do not lift a load greater than the rated capacity of 41 tons.
  - e. Do not attempt to raise the plunger beyond the rated hydraulic lift (76 inches maximum).
  - f. Avoid lifting with excessive side load on the jack.
  - g. Spin the locknut down to the tripod head, as plunger is extending.
  - h. Keep the release valve closed at all times.
6. To lower the load:
  - a. Operate the air valve or hand pump to relieve pressure on the locknut.
  - b. Spin the locknut out of the way.
  - c. Slowly open the release valve located on the panel to lower the load. The speed of lowering is controlled by the amount the release valve is opened.
  - d. Close release valve after the plunger is fully retracted.
  - e. Lower the extension screw by turning clockwise.
  - f. Fully retract the adjustable footpads (if so equipped).
  - g. Fully extend hydraulic casters (if so equipped).
  - h. Cover the jack when not in use to prevent entrance of contaminants and water into the cylinder.

**6.0 TROUBLE SHOOTING**

TROUBLE	PROBABLE CAUSE	REMEDY
Jack will not raise	Release valve open (Oil passing back into reservoir)	Close valve firmly
	Intake valve open. (Oil passing back into reservoir)	Pump rapidly to flush dirt off
	Discharge valve open (Oil passing back into pump chamber)	Pump rapidly to flush dirt off
	Sticking intake valve	Remove pump from jack base. Unscrew valve block. Clean or replace valve
	Clogged screen	Remove and clean
	Lack of oil. Air under plunger	Refill. Check for leaks. Bleed air out by opening release valve. Pump rapidly a few times and close release valve
Jack will not raise to full height	Lack of oil	Refill, check for leaks
	Sticking intake valve	Remove pump from jack base. Unscrew valve block. Clean or replace ball valves. Re-tighten or repair
Jack will not raise capacity load	High pressure leaks (At pump or release valve)	Reseat valve
	Leaky release valve	Reseat valve and clean valve block
Jack raises and falls during each stroke	Leaky discharge valve	Tighten or replace ball valve or packing
Jack will not hold up load	Leaky release valve	Reseat valve
	Defective "O" ring and back up ring	Remove plunger and replace "O" ring and back up ring
Jack will not lower the load	Damaged release valve	Remove and replace parts as needed
	Bent plunger	Replace
Jack will not close completely	Air under plunger	Bleed air out. Open release valve and pump rapidly several times. Close valve
Handle stroke only partly effective	Air in pump chamber	Open release valve and pump rapidly several times. Close valve
	Sticking intake valve	Remove pump and clean valve block
	Clogged screen	Remove and clean
Handle raises without effort	Leaky intake valve	Remove pump and clean valve block
Handle snaps back	Sticking intake valve	Open release valve. Pump rapidly several times. Close valve
	Clogged screen	Remove and clean



## 7.0 MAINTENANCE

### 7.1 SERVICING

Servicing the jack consists primarily of the following:

1. When in use, the jack and hydraulic caster (if so equipped) reservoirs should be kept at the proper level with hydraulic fluid MIL-PRF-5606 or approved equivalent. Always check fluid level with jack and hydraulic caster plungers fully retracted.
2. Grease the swivel casters.
3. Lubricate hand pump pivot pins.
4. Fill pump lubricator with SAE #10 oil.
5. If the jack has been put into storage or has not been used, the plunger must be fully extended and retracted every 90 days to exercise the seals. A portion of the lift should be operated by the air pump (if so equipped) and a portion by the hand pump. Also, the hydraulic caster plungers must be fully extended and retracted by operating the hydraulic caster hand pumps and release valves.

### 7.2 DISASSEMBLY INSPECTION

#### CAUTION!



The jack thermal relief valve and system relief valve, located in the jack valve block assembly, should not be removed unless absolutely necessary. The jack thermal relief valve is set to by-pass hydraulic fluid back to the reservoir at 20-25% above the rated capacity of 41 tons. The jack system relief valve is set to by-pass hydraulic fluid back to the reservoir at 5-10% above the rated capacity of 41 tons. If Adjustment Is Required See 7.4 Testing

#### CAUTION!



The hydraulic caster relief valves (if so equipped), located in the hydraulic caster valve block assemblies, should not be removed unless absolutely necessary. The hydraulic caster relief valves are set to by-pass hydraulic fluid back to the reservoirs at  $450 \pm 10$  psig ( $31.6 \pm 0.7$  kg/sq cm). If adjustment is required see 7.4 testing

When necessary to disassemble the jack and/or hydraulic casters (if so equipped), open all release valves, drain all hydraulic fluid from reservoir and carefully inspect the following:

1. Inspect interior walls of jack cylinder and hand pump cylinder for smoothness and freedom from rust, nicks, scratches and excessive wear.
2. Check plunger, extension screw, cylinder, tripod head, etc., for corrosion, wear and condition of threads.
3. Verify that the extension screw has a positive stop to prevent it from being extended beyond its safe thread engagement.
4. Inspect packings, seals, gaskets and wipers in the cylinder assembly and hand pumps and hydraulic caster assemblies for cuts, scratches, deterioration and distortion.
5. Inspect upper and lower bearings for excessive scoring and/or wear.
6. Check oil screen located in the valve block assembly for cleanliness.
7. Inspect valves and valve seats in the hand pump body and valve block for scratches, dents and proper seating of the balls.
8. Inspect all pivot pins for wear, cracks, pits or evidence of damage or pending damage.
9. Check tripod structure for damages.
10. Inspect all areas for excessive dirt, oil, dust and chips.

### 7.3 REPAIR AND REPLACEMENT

No definite time schedule can be established for the overhaul of the jack for replacement of the various moving parts. The number of times the jack is raised and lowered and the amount of load raised at each operation materially affect the life of the working parts. Do not overload the jack. Overloading is dangerous, will hasten the need for overhaul and may damage the jack. During overhaul, replace all parts that do not pass disassembly inspection requirements. Regardless of apparent condition, replace all parts marked with (◆) in the parts breakdown. A repair parts kit (P/N 8850PK) which contains all of the parts marked with (◆) is available and recommended to keep on hand at your facility. Coat all O-rings and backup rings with hydraulic fluid MIL-PRF-5606 prior to assembly. Clean all metal parts with clean solvent and dry with compressed air. Lubricate all threads. Use teflon tape carefully on all pipe threads. Remove excess tape because it can clog valves and passages. If ball valves, located in valve block, do not seat properly, they may need to be reseated by tapping the ball into the valve seat with a brass rod cupped at one end.

**7.4 TESTING:**

Place jack in a load indicating test fixture. Make sure the test adapter is 1-1/4 inch female spherical radius. Operate hand pump to extend plunger against the test adapter. Make sure ship adapter and test adapter are correctly mated. Load test the jack at rated capacity of 41 tons. If the jack fails to operate properly, check for trouble as indicated in 6.0 Trouble Shooting. With the plunger extended and supporting the capacity load, allow the jack to stand for 10 minutes. Any excess settling indicates leakage in the hand pump, check valves or jack packing seals. Check for hydraulic fluid leaks and replace all defective parts.

If adjustment is required for the jack thermal relief valve, perform the following procedure:

1. Remove plug (figure 3, item 8) to expose the thermal valve. Close release valve (figure 3, item 2).
2. Place jack in a load indicating test fixture. Make sure the test adapter is 1 1/4 inch female spherical radius. Operate hand pump to extend plunger against the test adapter. Make sure ship adapter and test adapter are correctly mated.
3. While operating the hand pump, adjust set screw (figure 3, item 9) until the thermal relief valve bypasses hydraulic fluid back to the reservoir at 49.2 to 51.3 tons.
4. Replace plug (figure 3, item 8). Once more operate hand pump to verify correct setting.
5. Open release valve to relieve pressure.

If adjustment is required for the jack system relief valve, perform the following procedure:

1. Remove plug (figure 3, item 8) to expose system relief valve. Close release valve (figure 3, item 2).
1. Place jack in a load indicating test fixture. Make sure the test adapter is 1 1/4 inch female spherical radius. Operate hand pump to extend plunger against the test adapter.
2. While operating the hand pump, adjust set screw (figure 3, item 9) until the system relief valve bypasses hydraulic fluid back to the reservoir at 43.1 to 45.1 tons.
3. Replace plug (figure 3, item 8). Once more operate hand pump to verify correct setting.
4. Open release valve to relieve pressure.

If adjustment is required for the hydraulic caster relief valves (if so equipped), perform the following procedure:

1. Remove plug (figure 10, item 12) to expose relief valve. Close release valve (figure 10, item 6).
2. Remove plug (figure 10, item 33) and install a 0-1000 psig test gauge.
3. Operate the hydraulic caster hand pump (figure 10, item 17) to fully extend caster. Continue to operate hand pump until the relief valve by-passes hydraulic fluid back to the reservoir at 450 ± 10 psig (31.6 ± 0.7 kg/sq cm).
4. Replace plug (figure 10, item 12). Once more operate hand pump to verify correct setting.
5. Open release valve to relieve pressure, remove test gauge and replace plug (figure 10, item 33).
6. Repeat for other hydraulic casters.

**7.5 SPECIAL TOOLS:**

The following special tools are necessary to disassemble/reassemble the cylinder assembly. These tools may be purchased upon request:

Part Number	Description	Qty
73388	Spanner wrench, retaining nut	1
490-028	Spanner wrench, hydraulic caster cap	1
74816	Lifting tool, extension screw	1
70389	Lifting tool, plunger	1
70391	Lifting tool, tripod head	1
70390	Lifting tool, cylinder	1

**8.0 PROVISION OF SPARES**

**8.1 SOURCE OF SPARE PARTS**

Spare parts may be obtained from the manufacturer:

**Malabar International**

1 Air Cargo Pkwy East  
 Swanton, Ohio 43558 USA

Telephone: (419) 866-6301 or 800-426-6301

E-mail: sales@malabar.com

Website: www.malabar.com

**8.2 RECOMMENDED SPARE PARTS LISTS**

The following spare parts are recommended and available upon request. Reference the following page(s) for Replacement Parts and Kits available.

**8.2.1 Standard Spare Parts**

Part Number	Description	Qty
8850PK	Repair parts kit	1
56012-2	Valve block assembly	1
79366	Release valve knob	1
79365	Release valve stem	1
65228	Release valve lockscrew	1
55155	Safety pop-off valve assembly	1
79571-2	Hand pump assembly	1
55762-8	Pump handle	1
76347	Reservoir gasket	1
79562	Filler cap with dipstick	1
424-005	Drain cock valve	1
79596	Placard, instruction	1
55991-30	Placard, tonnage, 41 ton	1
55994	Sticker, fluid	1
55998	Sticker, Malabar	2
75940	Sticker, towing	1
73334A	Spring loaded swivel caster with swivel lock	3
73309	Lower bearing	1
73314	Upper bearing	1
885010	Ship adapter	1
79595	Rain hat	1

**8.2.2 Air Pump Kit Spare Parts**

Part Number	Description	Qty
441-002	Air pump	1
441-038	Air pump seal kit	1
421-004	Air valve	1
471-001	Lubricator	1
499-002	Muffler	1
425-001	Air relief valve	1
481-002	Oil Screen	1

**8.2.3 Load Gauge Kit Spare Parts**

Part Number	Description	Qty
885006	Load gauge	1
424-001	Shutoff valve	1

8.2.4 Adjustable Foot Kit Spare Parts

Part Number	Description	Qty
75941	Sticker, footpad	1
79225	Level assembly	1

8.2.5 Hydraulic Caster Kit Spare Parts

Part Number	Description	Qty
8818PK	Hydraulic caster repair parts kit	3
881801-1	Swivel caster	1
881801-2	Swivel caster with swivel lock	2
483-006	Breather	3
79366	Release valve knob	1
79365	Release valve stem	3
65228	Release valve lockscrew	3
881816	Safety pop-off valve assembly	3

8.2.6 Ladder Assembly Kit Spare Part

Part Number	Description	Qty
76378	Safety chain assembly	1

8.2.7 Remote Control Kit Spare parts

Part Number	Description	Qty
421-004	Air valve	1
85416	Release valve	1
76158	Placard, caution	2

**9.0 IN SERVICE SUPPORT**

Contact Malabar, Inc. for technical services and information. See Section 1.3 – Manufacturer.

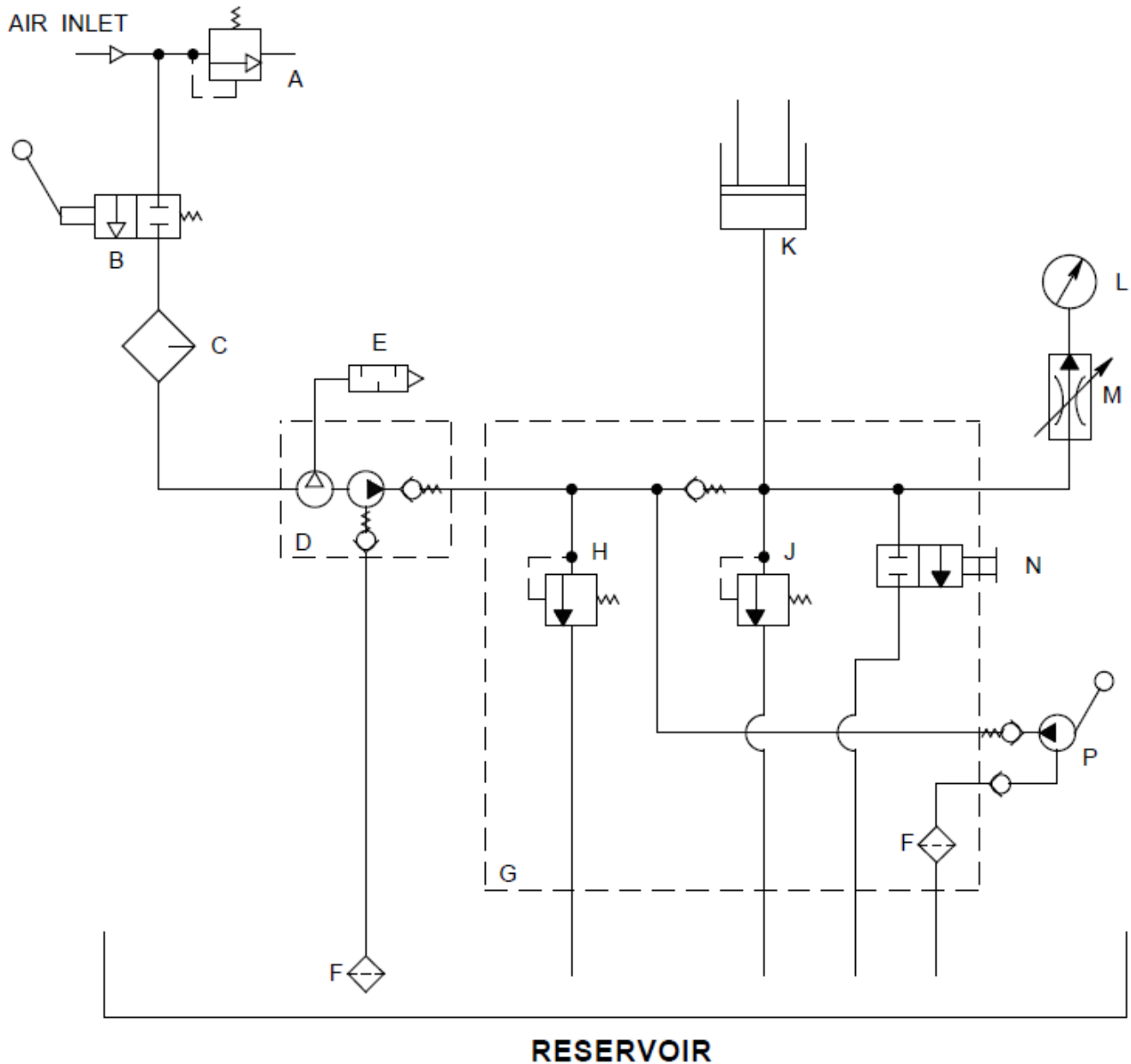
## 10.0 GUARANTEES/LIMITATION OF LIABILITY

- I. Seller warrants each new product of its manufacture to be free from defects in material or workmanship, under proper, reasonable, and normal use and service.
- II. The warranty period shall be as follows:
  - A. For Malabar equipment, with the exception of Tripod Jacks, the warranty period is one (1) year after date of shipment.
  - B. For Malabar Tripod Jacks, the warranty period is three (3) years after date of shipment.
- III. Where Buyer claims an alleged defect in material or workmanship and so advises Seller in writing within ten (10) days after discovery thereof, then and in such event, Buyer shall return said equipment, transportation prepaid, to the Seller, provided such return is timely and within the above-mentioned warranty period. This warranty and liability of the Seller is expressly limited solely to replacement or repair of defective parts or goods, and return at Buyer's expense to Buyer after finding by Seller the product was defective prior to original shipment or, at the option of Seller, to providing refund to Buyer of the purchase price for said product.
- IV. It is further expressly understood and agreed that:
  - A. THERE IS NO WARRANTY, REPRESENTATION OF CONDITION OF ANY KIND, EXPRESS OR IMPLIED, (INCLUDING NO WARRANTY OF MERCHANTABILITY OR OF FITNESS) EXCEPT THAT THE MATERIAL SHALL BE OF THE QUALITY SPECIFIED IN APPLICABLE SPECIFICATIONS, AND NONE SHALL BE IMPLIED BY LAW. Except as otherwise provided herein, quality shall be in accordance with Seller's specifications. Final determination of the material for the use contemplated by Buyer is the sole responsibility of Buyer and Seller shall have no responsibility in connection with such suitability, and
  - B. Buyer's sole and exclusive remedy shall be repair or replacement of defective parts or goods by the Seller. Should the goods, in the judgment of Seller, preclude the remedying of the warranted defects by repair or replacement, the Buyer's sole and exclusive remedy shall be the refund of the purchase price, and
  - C. Seller shall not be liable for prospective profits or special, indirect or consequential damages, nor shall any recovery of any kind against Seller be greater in amount than the purchase price of the specific material sold and causing the alleged loss, damage or injury. Buyer assumes all risk and liability for loss, damage or injury to persons or property of Buyer or others arising out of use or possession of any product or part sold hereunder, and
  - D. Seller shall in no way be deemed or held to be obligated, liable or accountable upon or for any guarantees or warranties, express or implied, or created by statute or by operation of law or otherwise, in any manner of form beyond its express agreement above set forth, and
  - E. No warranty herein shall apply to any product which shall have been repaired or altered, unless such alteration or repair has been made by Seller or if, after return to and inspection by Seller, the product is found by Seller to have been subject to misuse, negligence or accident, and
  - F. No warranty of any nature is made by Seller as to any component forming a part of the product sold and Buyer shall receive only such warranties offered by such other manufacturer of such component, and
  - G. Seller does not assume nor does Seller authorize any other person to assume for it any other liability or make any warranty in connection with the sale of its products.

## 11.0 APPENDICES

APPENDIX I Safety Data Sheet – MIL-PRF-5606 Hydraulic Fluid

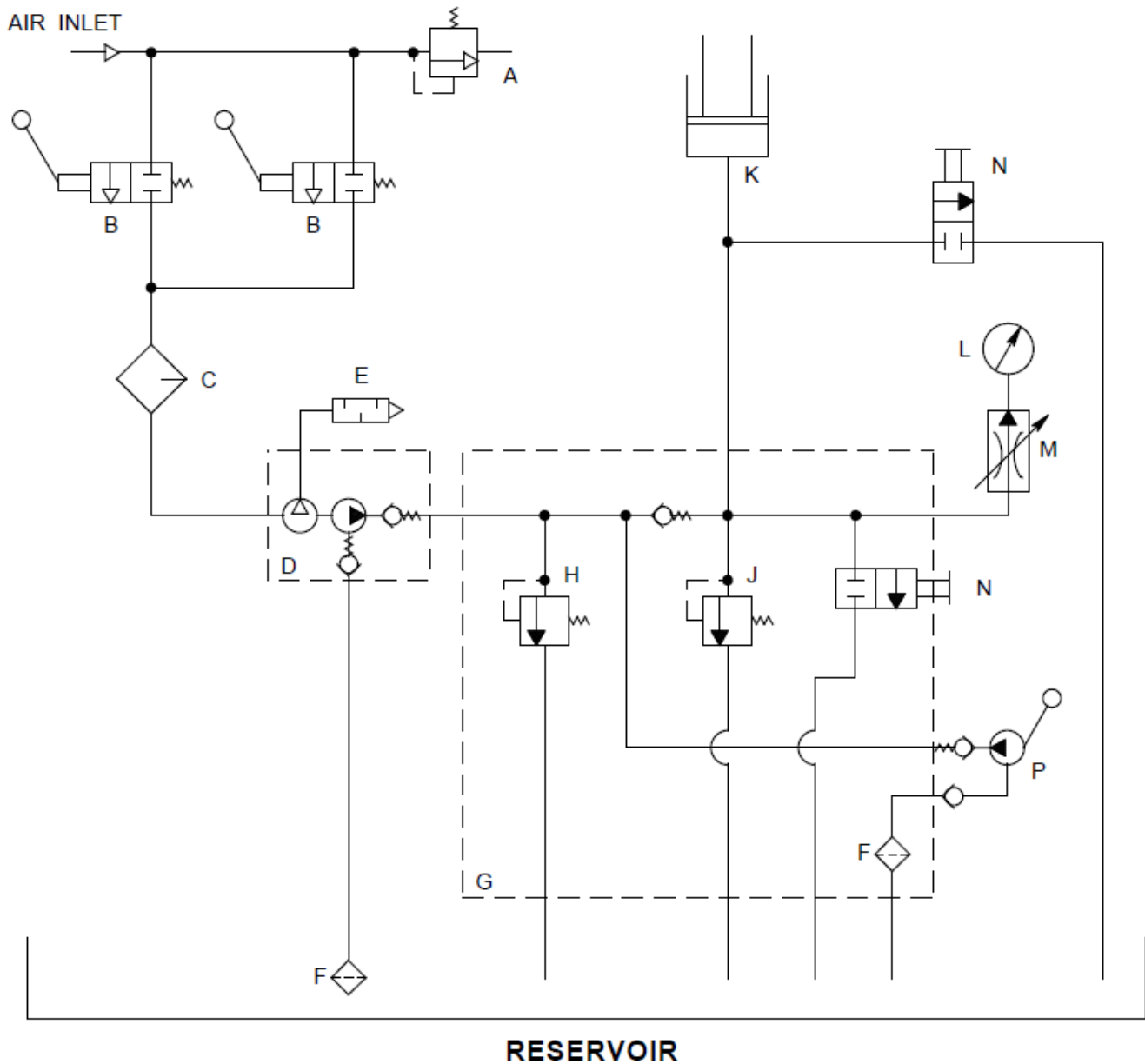
**Pneumatic / Hydraulic Diagram**



- A - AIR RELIEF VALVE
- B - AIR VALVE
- C - LUBRICATOR
- D - AIR PUMP
- E - MUFFLER
- F - OIL SCREEN
- G - VALVE BLOCK

- H - SYSTEM RELIEF VALVE
- J - THERMAL RELIEF VALVE
- K - CYLINDER ASSEMBLY
- L - LOAD GAUGE
- M - SHUTOFF VALVE
- N - RELEASE VALVE
- P - HAND PUMP

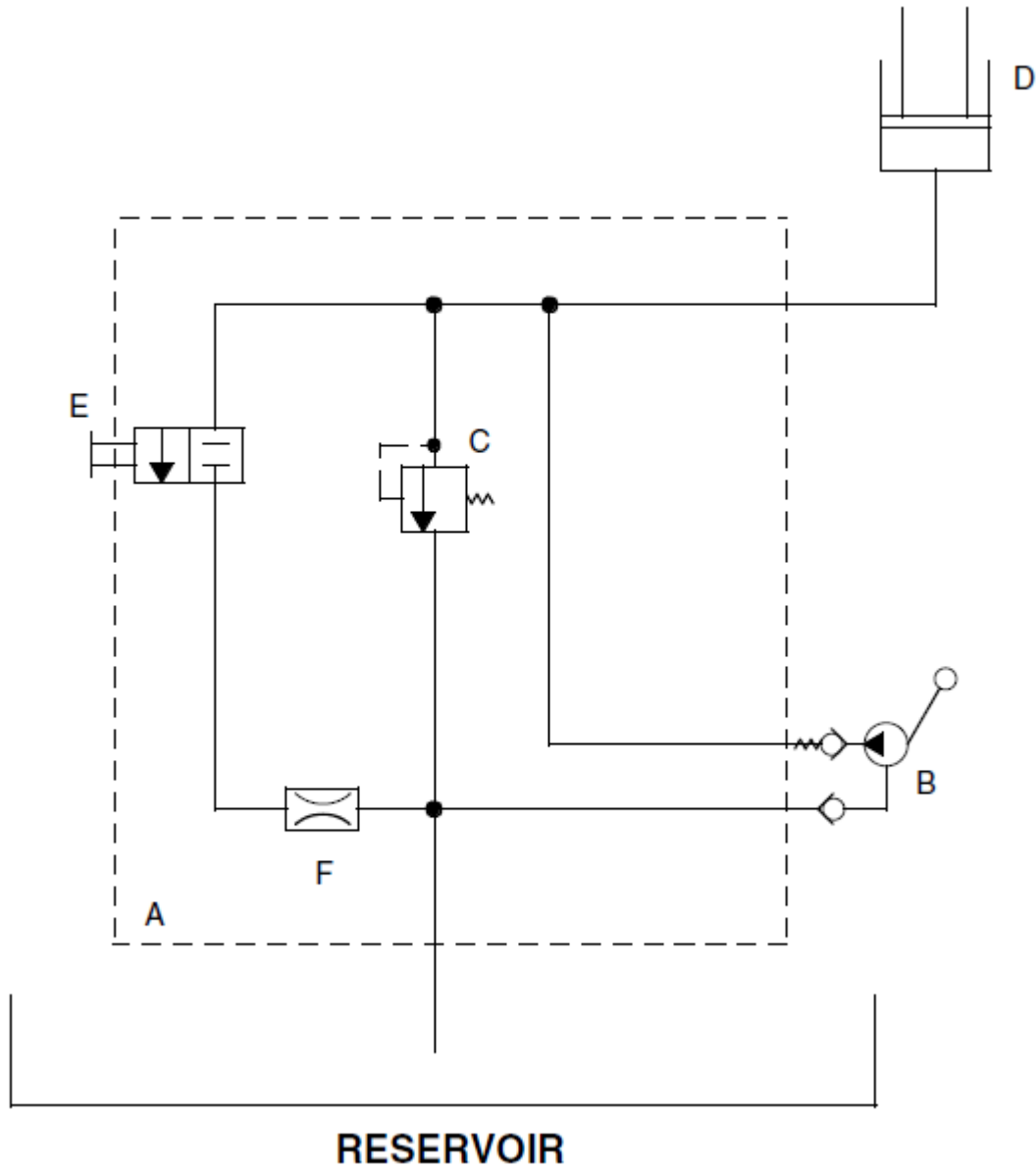
**Pneumatic / Hydraulic Diagram with Remote Control**



- A - AIR RELIEF VALVE
- B - AIR VALVE
- C - LUBRICATOR
- D - AIR PUMP
- E - MUFFLER
- F - OIL SCREEN
- G - VALVE BLOCK

- H - SYSTEM RELIEF VALVE
- J - THERMAL RELIEF VALVE
- K - CYLINDER ASSEMBLY
- L - LOAD GAUGE
- M - SHUTOFF VALVE
- N - RELEASE VALVE
- P - HAND PUMP

**Hydraulic Caster Hydraulic Diagram**



- A - VALVE BLOCK
- B - HAND PUMP
- C - RELIEF VALVE

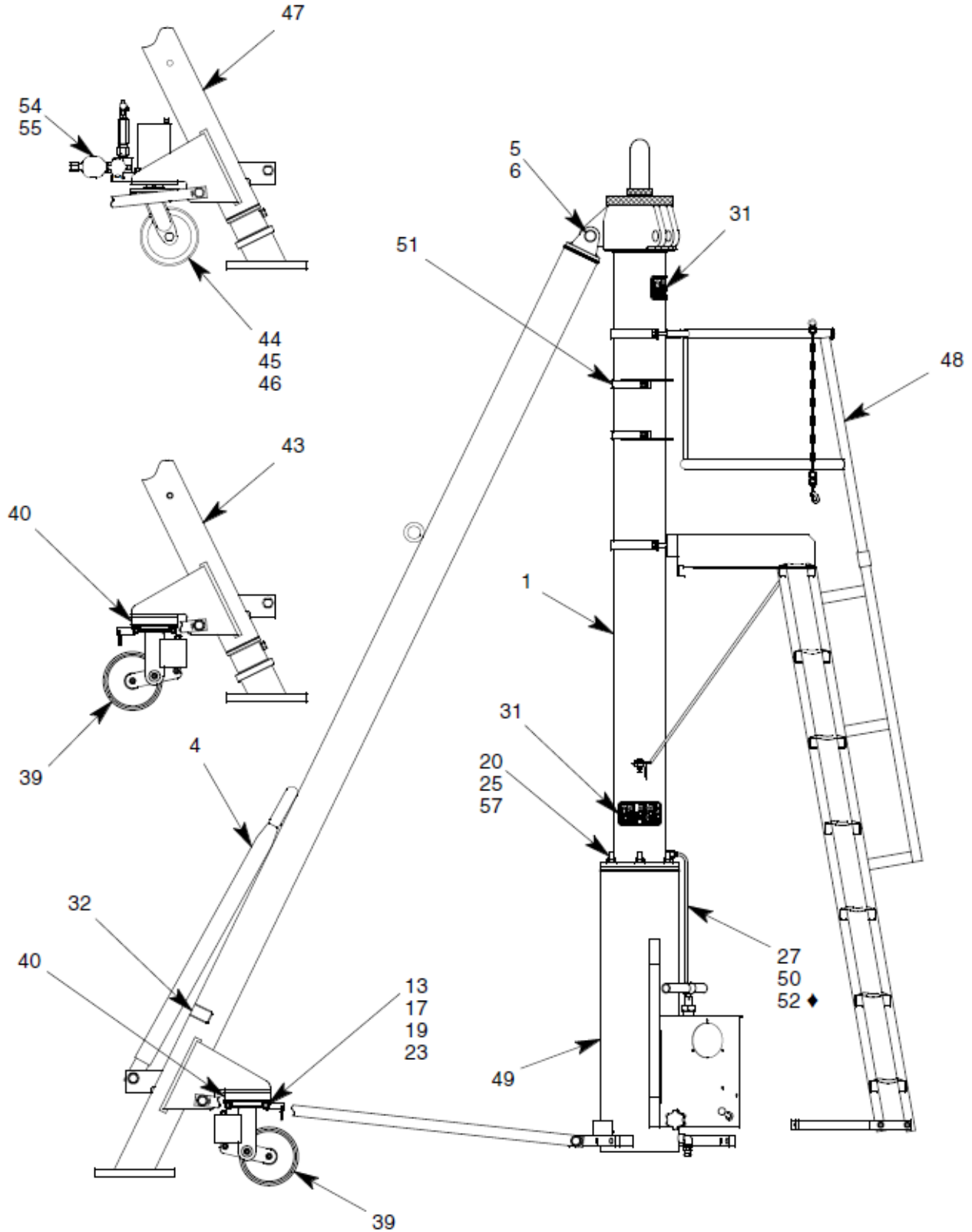
- D - CYLINDER ASSEMBLY
- E - RELEASE VALVE
- F - METERING ORIFICE



**Parts List – Figure 1A**

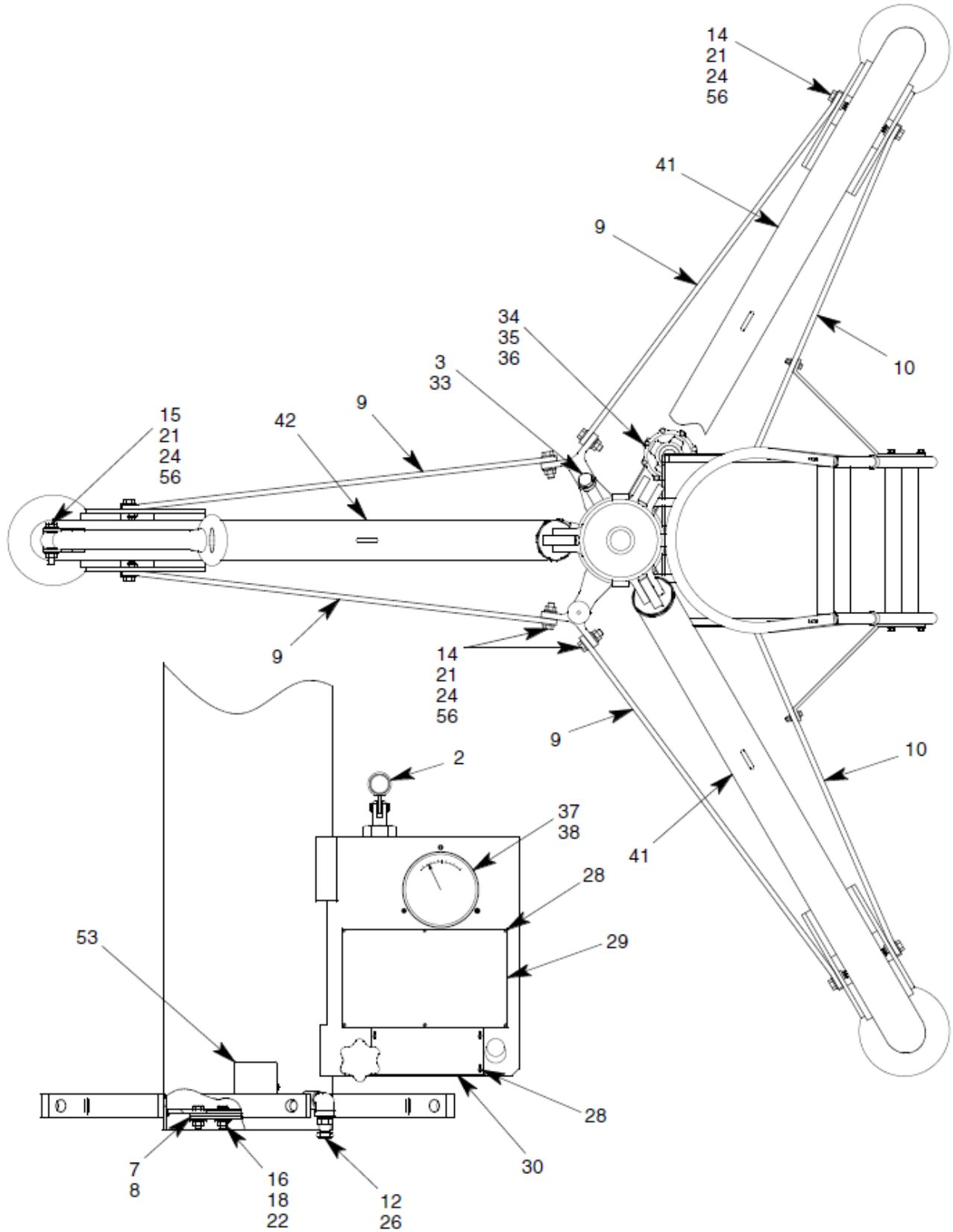
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

◆ PART OF REPAIR PARTS KIT



**Parts List – Figure 1B**

When ordering replacement parts/kits, please specify model, serial number and color of your unit.



### Parts List – Figure 1A & 1B

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
1	885099	CYLINDER ASSEMBLY	1
2	56012-2	VALVE BLOCK ASSEMBLY	1
3	79562	BREATHER CAP & DIPSTICK	1
4	79535	TOW HANDLE	1
5	74814	TRIPOD HEAD PIN	3
6	55923-150	RETAINING RING	6
7	76347	RESERVOIR GASKET	1
8	76346	RESERVOIR COVER	1
9	885033	BRACE	4
10	885033-1	BRACE WITH HOLE	2
11	79595	RAIN HAT (NOT SHOWN)	1
12	424-005	DRAIN COCK VALVE	1
13	321-009	HHCS, 1/2-13 x 2 3/4 LG	12
14	321-139	HHCS,, 3/4-10 x 2 3/4 LG	12
15	321-306	HHCS, 3/4-10 x 4 1/2 LG	1
16	361-001	FLAT WASHER, 3/8	6
17	362-005	FLAT WASHER, 1/2 SAE	24
18	363-003	SPLIT LOCKWASHER, 3/8	6
19	363-004	SPLIT LOCKWASHER, 1/2	12
20	363-005	SPLIT LOCKWASHER, 5/8	6
21	363-006	SPLIT LOCKWASHER, 3/4	13
22	G-1100-10700	HEX HEAD BOLT, GR 5, 3/8-16 X 3/4 LG	6
23	351-003	HEX NUT, 1/2-13	12
24	351-004	HEX NUT, 3/4-10	13
25	351-006	HEX NUT, 5/8-11	6
26	712-011	ELBOW, 90°, 1/2 NPT	1
27	732-010	TUBING, 3/8 OD x .065 WALL	AR
28	397-005	SELF TAPPING SCREW, #4	10
29	79596	PLACARD, INSTRUCTION	1
30	55991-30	PLACARD, TONNAGE, 41 TON	1
31	55998	STICKER, MALABAR	2
32	75940	STICKER, TOWING	1
33	55994	STICKER, FLUID	1
34	717-003	PLUG (NO AIR PUMP KIT)	1
35	717-008	PLUG (NO AIR PUMP KIT)	1
36	74975	AIR PUMP KIT	1
37	717-001	PLUG (NO GAUGE KIT)	1
38	885007	LOAD GAUGE KIT	1
39	73334A	SWIVEL CASTER	3
40	888241	SPACER	6
41	885079	LEG (NO ADJ. FOOT KIT)	2
42	885080	LEG W/ BRACKET (NO AFK)	1

Parts lists continued on following page.

### Parts List – Figure 1A & 1B

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

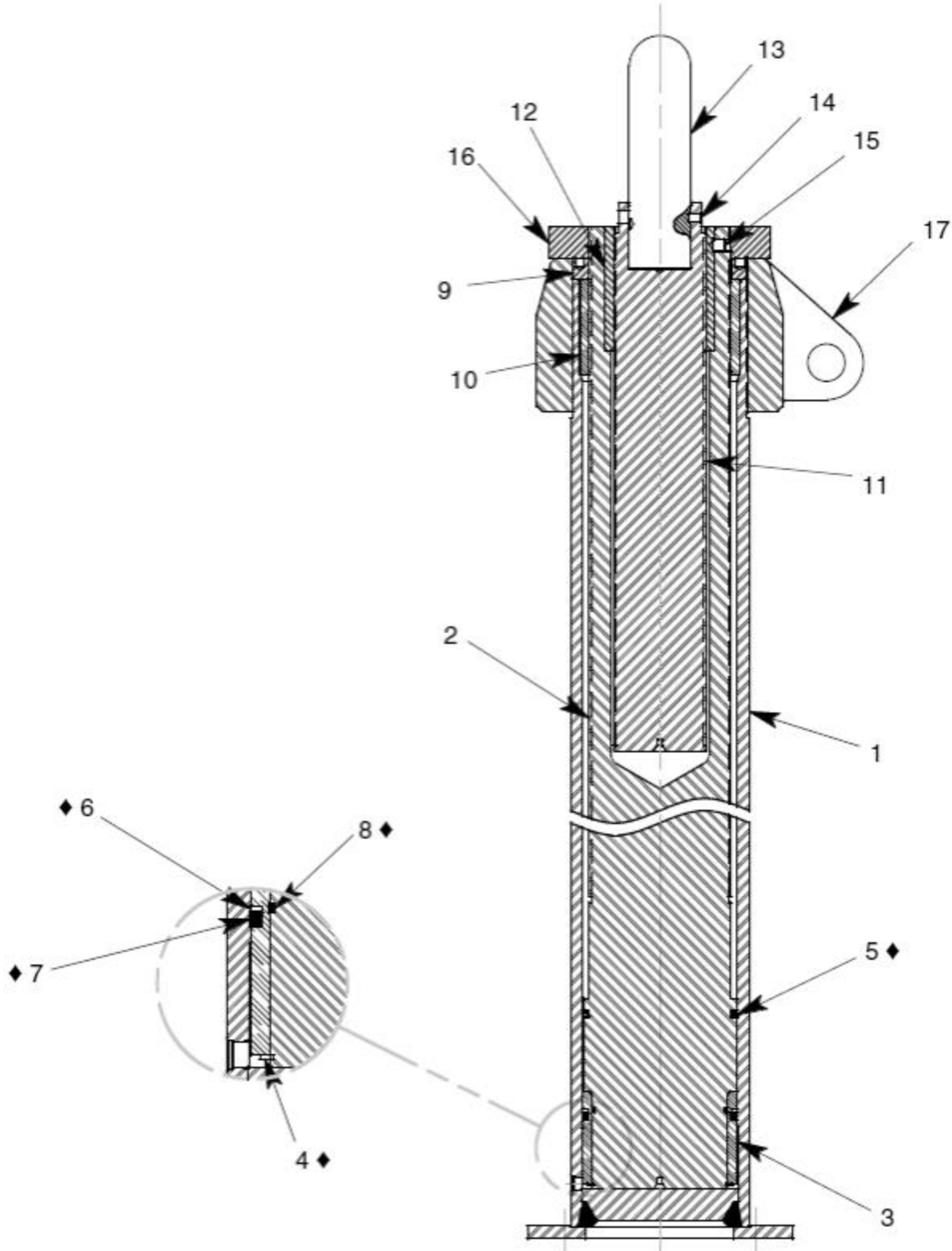
Item	Part Number	Description	Qty
43	885074	ADJUSTABLE FOOT KIT	1
44	325-001	FSHCS, 1/2-13 x 1 1/2 LG	12
45	881801-1	SWIVEL CASTER	1
46	881801-2	SWIVEL CASTER w/ LOCK	2
47	885075	ADJ. FOOT KIT w/ HYD. CAST.	1
48	885088	LADDER ASSEMBLY KIT	1
49	885035	RESERVOIR (NO R/C KIT)	1
50	721-005	CONNECTOR (NO R/C KIT)	1
51	885095	REMOTE CONTROL KIT	1
52	MS28778-6	O-RING (PART OF ITEM 50)	1
53	79225	LEVEL ASSEMBLY	1
54	717-003	PLUG (NO SA KIT)	3
55	881818	SHOCK ABSORBER KIT	1
56	361-007	FLAT WASHER, 3/4 SAE	16
57	361-002	FLAT WASHER, 5/8 SAE	6

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### Parts List – Figure 2

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

◆ PART OF REPAIR PARTS KIT



### Parts List – Figure 2

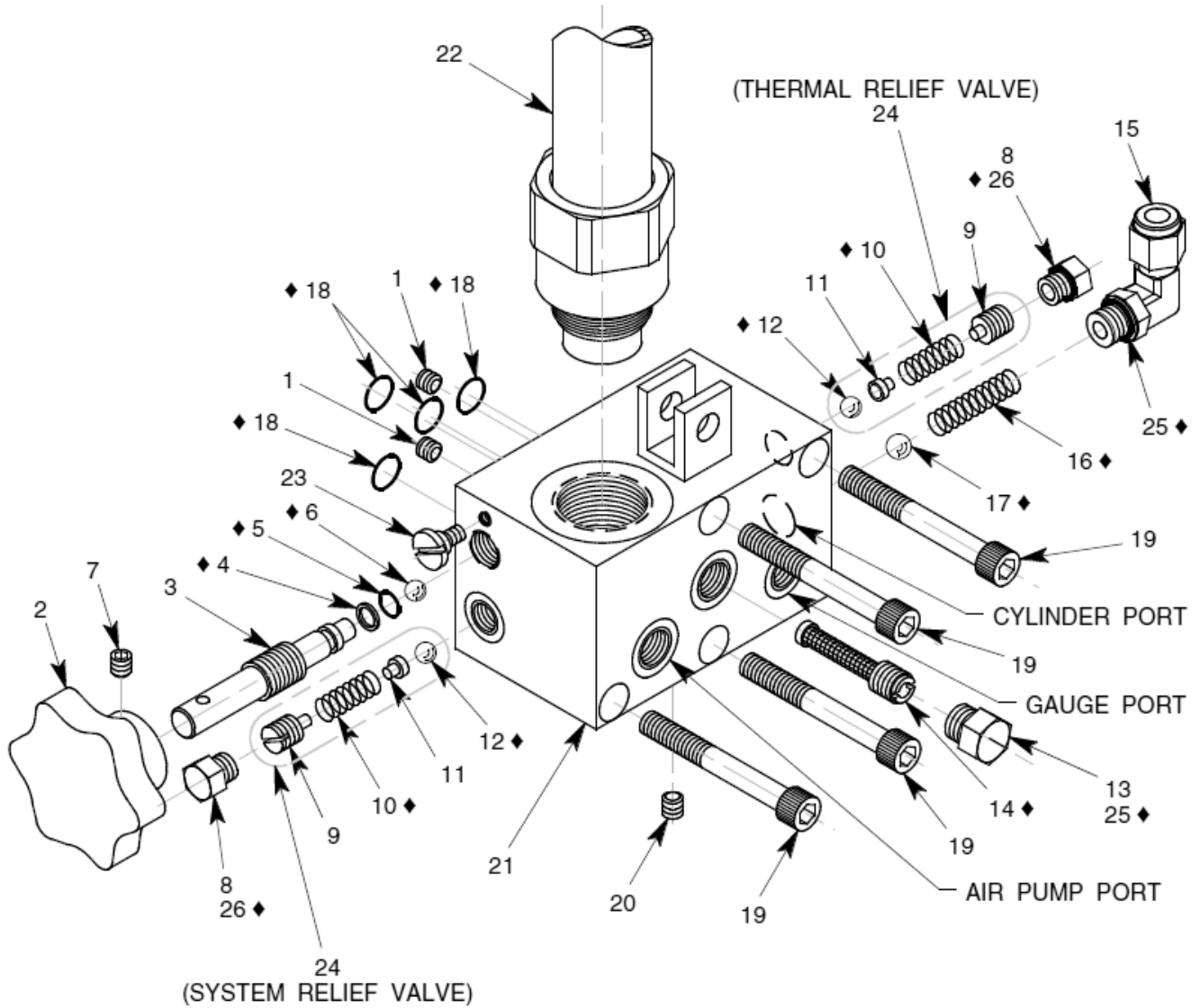
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
	<b>885099</b>	<b>Cylinder Assembly; consists of:</b>	
1	885003	CYLINDER	1
2	885030	PLUNGER	1
3	73309	LOWER BEARING	
4	55924-550	RETAINING RING	1
5	55931-435	TEFLON O-RING W / GROOVE	1
6	55929-435	BACK-UP RING	1
7	55925-435	O-RING	1
8	55932-252	O-RING	1
9	73320	RETAINING NUT	1
10	73314	UPPER BEARING	1
11	75904	EXTENSION SCREW	1
12	73316	EXTENSION SCREW NUT	1
13	885010	SHIP ADAPTER	1
14	331-002	SHSS, 3/8-16 x 1/2 LG	1
15	331-001	SHSS, 1/2-20 x 1/2 LG	1
16	73317	LOCKNUT	1
17	74813	TRIPOD HEAD	1

**Parts List – Figure 3**

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

◆ PART OF REPAIR PARTS KIT





### Parts List – Figure 3

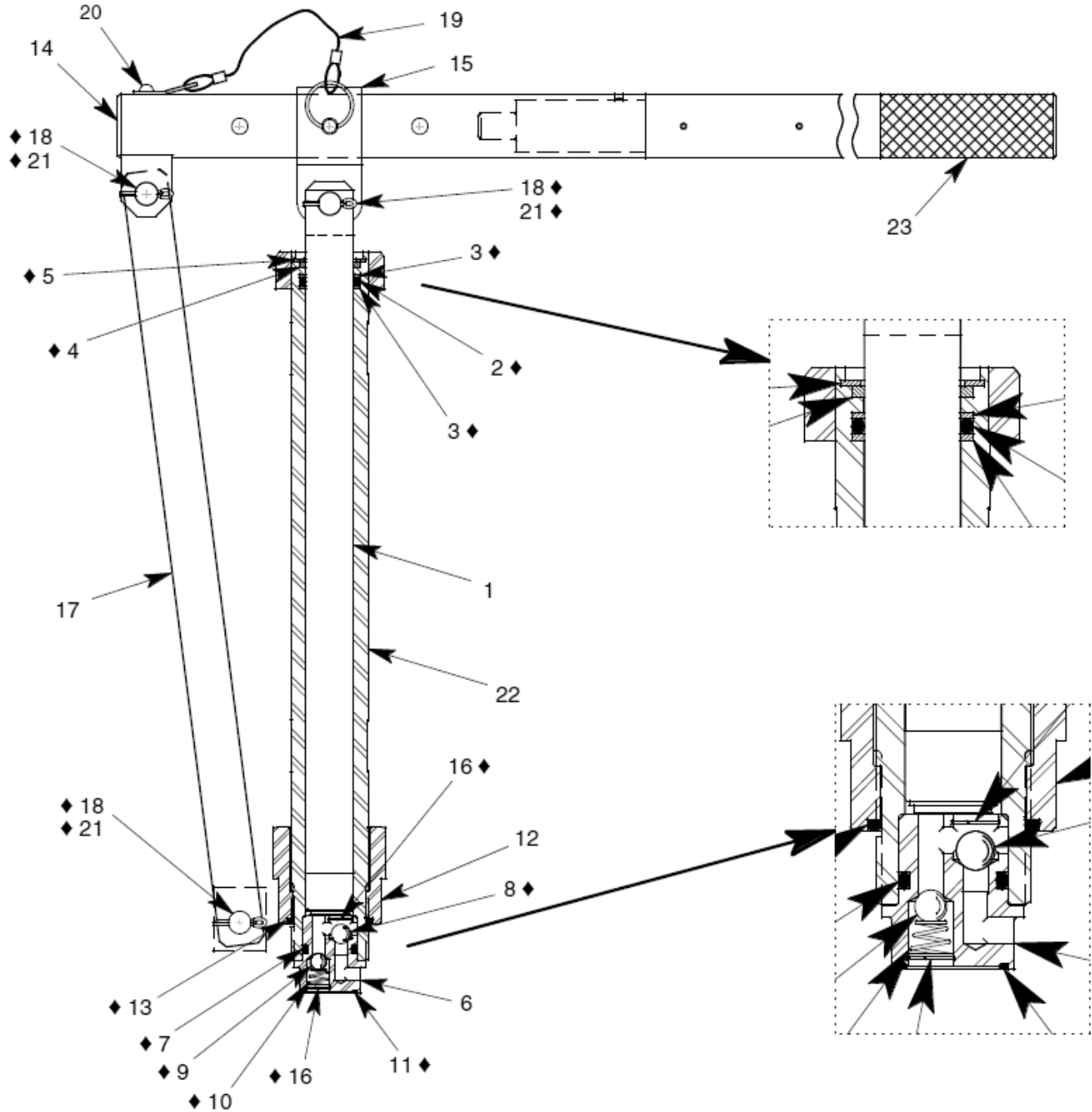
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
	<b>56010-2</b>	<b>Valve Block Assembly; consists of:</b>	
1	717-048	PLUG, FLUSH, 1/16 NPT	2
2	79366	RELEASE VALVE KNOB	1
3	79365	RELEASE VALVE STEM	1
4	55929-011	BACK-UP RING	1
5	55925-011	O-RING	1
6	412-002	STEEL BALL, 5/16 DIA	1
7	331-004	SETSCREW, 5/16-24 x 5/16 LG	1
8	717-001	PLUG, 1/4 SAE	2
9	55148	SAFETY BYPASS SCREW	2
10	55154H	SPRING	2
11	55153	SPRING GUIDE	2
12	412-004	STEEL BALL, 1/4 DIA	2
13	717-003	PLUG, 3/8 SAE	1
14	55568	OIL SCREEN	1
15	722-018	ELBOW, 3/8 T x 3/8 SAE	1
16	79367	SPRING	1
17	412-001	STEEL BALL, 3/8 DIA	1
18	55925-014	O-RING	4
19	323-009	SHCS, 3/8-24 x 3" LG	4
20	717-010	PLUG, SOC HD, 1/16 NPT	1
21	76345	VALVE BLOCK	1
22	79571-2	HAND PUMP ASSY	1
23	65228	RELEASE VALVE LOCKSCREW	1
24	55155	SAFETY POP-OFF VALVE ASSY	2
25	MS28778-6	O-RING (PART OF ITEM 13 & 15)	2
26	MS28778-4	O-RING (PART OF ITEM 8)	2

**Parts List – Figure 4**

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

◆ PART OF REPAIR PARTS KIT



### Parts List – Figure 4

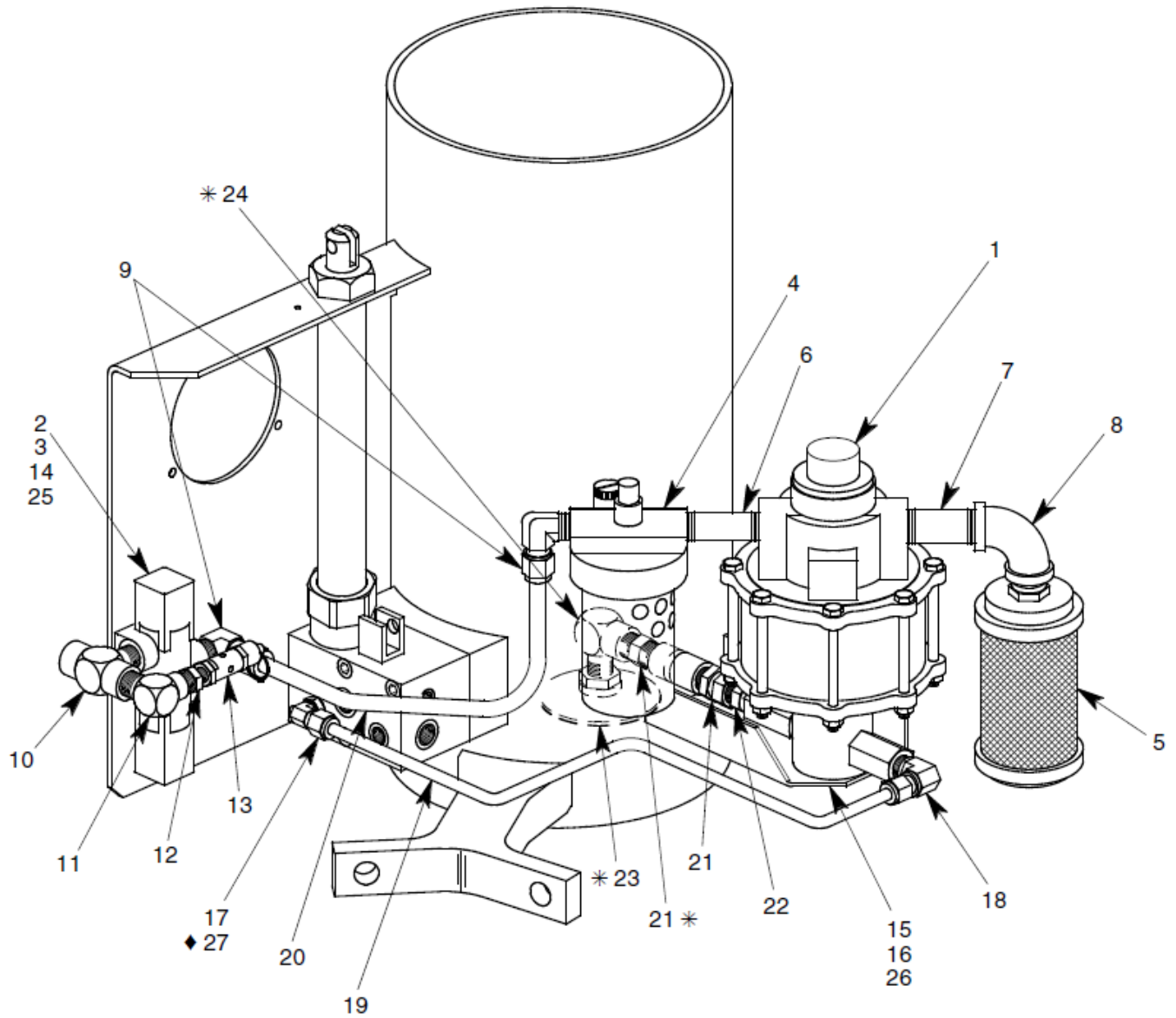
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
	<b>79571-2</b>	<b>Hand Pump Assembly; consists of:</b>	
1	55738	PISTON	1
2	55925-213	O-RING	1
3	55922-18	BACK-UP RING	1
4	55728	SCRAPER RING	2
5	55729	RETAINING RING	1
6	55753	PUMP BODY	1
7	55925-211	O-RING	1
8	412-001	STEEL BALL, 3/8 DIA	1
9	412-002	STEEL BALL, 5/16 DIA	1
10	55754	SPRING	1
11	55925-021	O-RING	2
12	79564	PUMP CYLINDER NUT	1
13	55925-220	O-RING	1
14	55761	FULCRUM	1
15	55745	PUMP HANDLE CLAMP	1
16	55927-43	RETAINING RING	1
17	55739	LINK	1
18	372-001	COTTER PIN, 3/32 x 3/4 LG	2
19	370-001	QUICK RELEASE PIN, 1/4 DIA	1
20	MS51861-44C	SELF TAPPING SCREW, #10	3
21	373-001	FLAT HEAD PIN, 7/16 DIA	
22	79563	CYLINDER	
23	55762-8	PUMP HANDLE	

**Parts List – Figure 5**

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

- ◆ PART OF REPAIR PARTS KIT
- \* PART IS LOCATED INSIDE RESERVOIR TANK



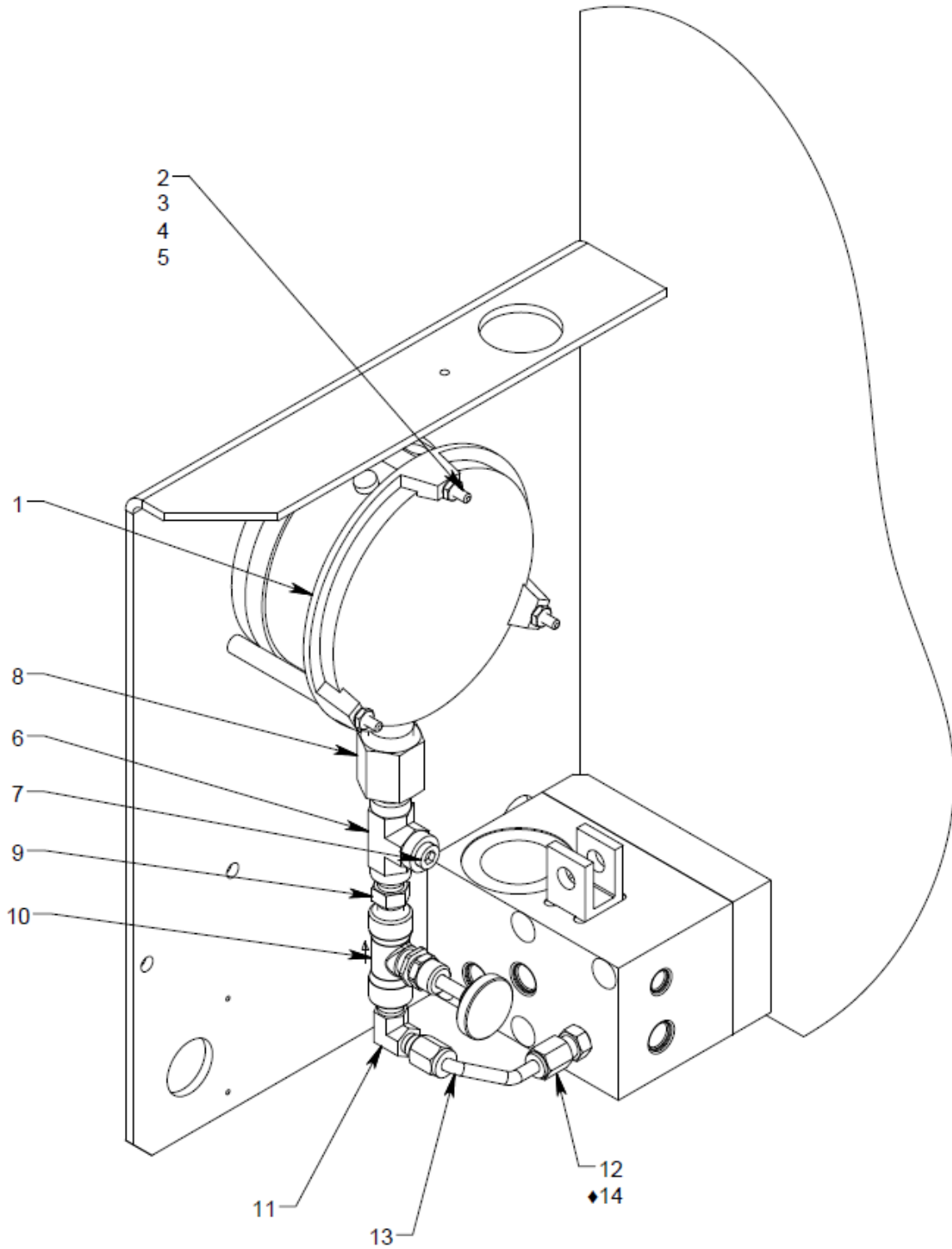
### Parts List – Figure 5

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
	<b>872227</b>	<b>Air Pump Kit; consists of:</b>	
1	441-002	AIR PUMP	1
2	392-001	STUD	2
3	421-004	AIR VALVE	1
4	471-001	LUBRICATOR	1
5	499-002	MUFFLER	1
6	711-006	NIPPLE, BRASS, 1/2 x 3" LG	1
7	711-010	NIPPLE, BRASS, 3/4 x 3" LG	1
8	712-063	ELBOW, BRASS, 3/4 FPT	1
9	722-013	ELBOW, 1/2 T x 1/2 MPT	2
10	713-021	TEE, BRANCH, 1/2 NPT	1
11	712-032	ELBOW, 1/2 MPT x 3/8 FPT	1
12	714-009	REDUCER, 3/8 MPT x 1/4 FPT	1
13	425-001	AIR RELIEF VALVE	1
14	359-001	ALLEN NUT, 5/16-18	2
15	321-013	HHCS, 3/8-24 x 1" LG	2
16	363-003	SPLIT LOCKWASHER, 3/8	2
17	722-018	ELBOW, 3/8 T x 3/8 SAE	1
18	722-015	ELBOW, 3/8 T x 1/2 MPT	1
19	732-010	TUBE, 3/8 O.D. x .065 WALL	AR
20	732-001	TUBE, 1/2 O.D. x .049 WALL	AR
21	711-004	NIPPLE, 1/2 MPT	2
22	719-001	SWIVEL ADAPTER	1
23	481-002	OIL SCREEN	1
24	712-011	ELBOW, STREET, 1/2 NPT	1
25	363-002	SPLIT LOCKWASHER, 5/16	2
26	361-001	FLAT WASHER, 3/8	2
27	MS28778-6	O-RING (PART OF ITEM 17)	1

### Parts List – Figure 6

When ordering replacement parts/kits, please specify model, serial number and color of your unit.



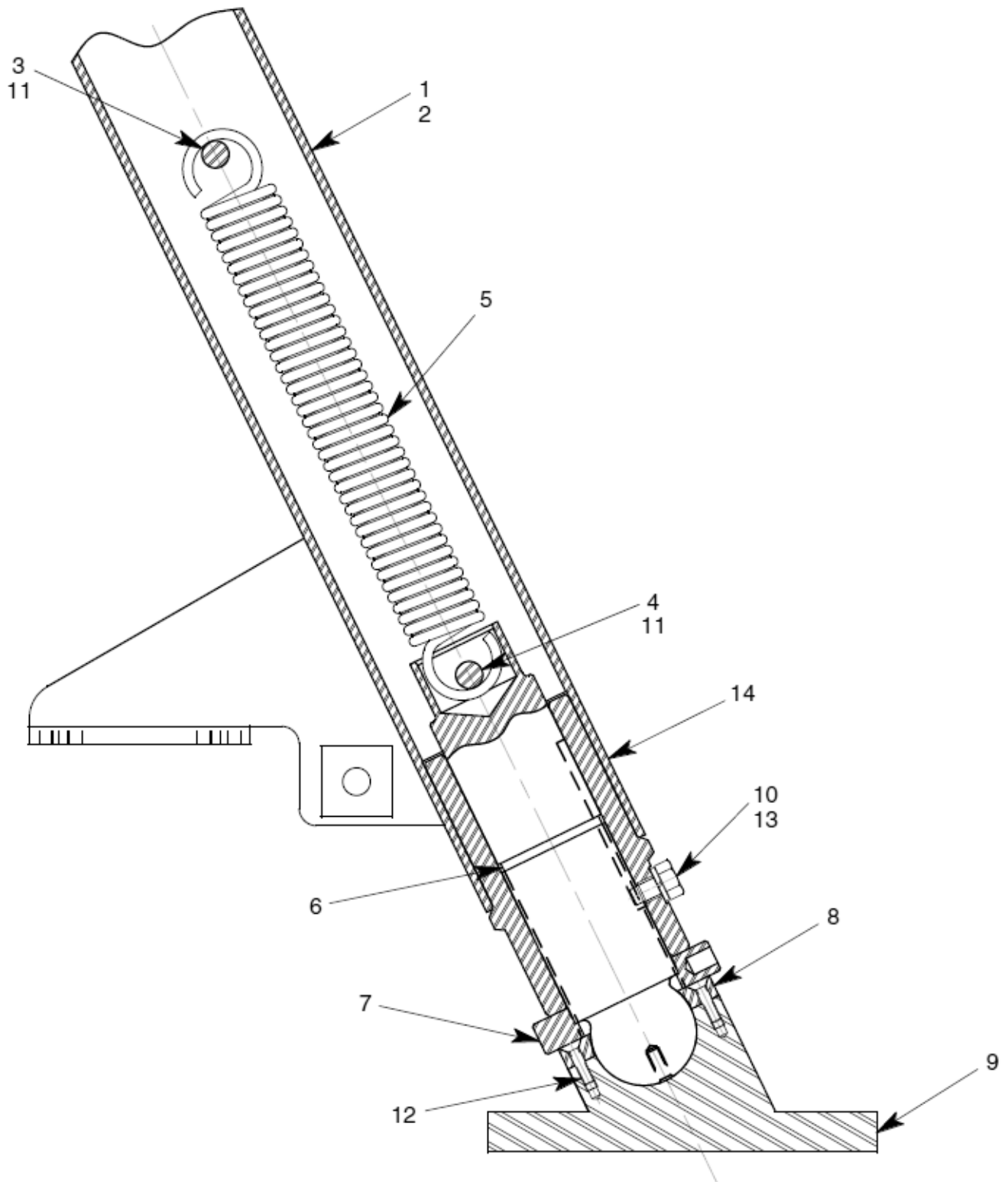
### Parts List – Figure 6

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
	<b>885007</b>	<b>Load Gauge Kit; consists of:</b>	
1	885006	LOAD GAUGE	1
2	323-091	SHCS, 10-32 x 4" LG	3
3	363-009	SPLIT LOCKWASHER, #10	3
4	351-008	HEX NUT, 10-32	3
5	876026	GAUGE SPACER	3
6	713-002	TEE, 1/4 FPT	1
7	717-006	HOLLOW HEX PLUG, 1/4 MPT	1
8	714-001	REDUCER, 1/2 FPT x 1/4 MPT	1
9	711-003	NIPPLE, 1/4 MPT	1
10	424-001	SHUTOFF VALVE	1
11	722-021	ELBOW, 1/4 TUBE x 1/4 MPT	1
12	721-011	CONNECTOR, 1/4 TUBE x 1/4 SAE O-RING	1
13	732-003	TUBE, 1/4 OD x .035 WALL x 12" LG	AR
14	MS28778-4	O-RING (PART OF ITEM 11)	1

### Parts List – Figure 7

When ordering replacement parts/kits, please specify model, serial number and color of your unit.





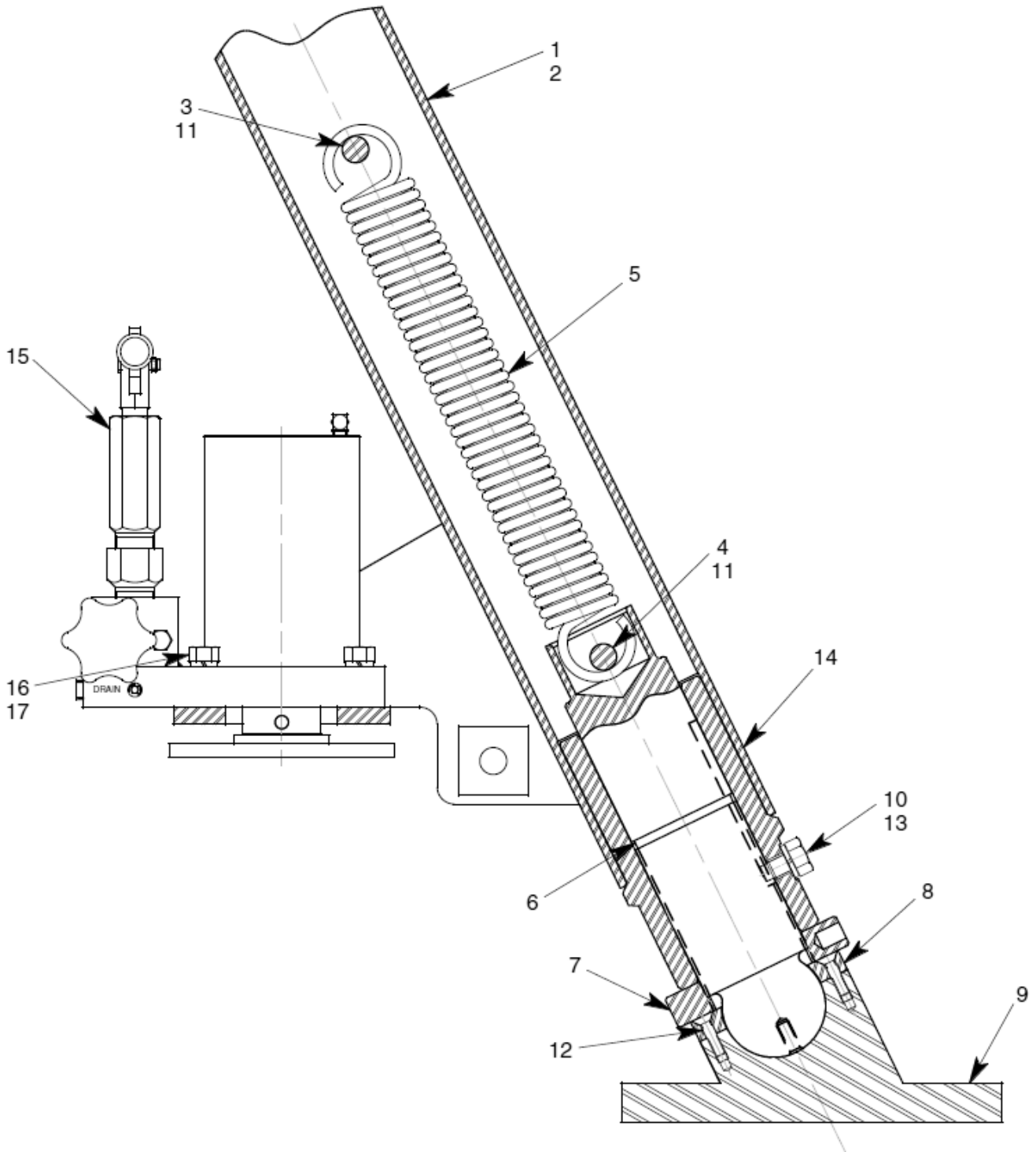
### Parts List – Figure 7

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
	<b>885074</b>	<b>Adjustable Foot Kit; consists of:</b>	
1	885072	TRIPOD LEG	2
2	885073	TRIPOD LEG w/ TOW BRKT	1
3	74880	LONG PIN	3
4	73348	SHORT PIN	3
5	73345	SPRING	3
6	73342	FOOT SCREW	3
7	73343	LOCKNUT	3
8	73344	RETAINING RING	3
9	885020	FOOT PAD	3
10	79347	GUIDE SCREW	3
11	55923-75	RETAINING RING	12
12	325-003	FHCS, 5/16-18 x 1 1/4 LG	18
13	363-005	SPLIT LOCKWASHER, 5/8	3
14	75941	STICKER, FOOTPADS	3

**Parts List – Figure 8**

When ordering replacement parts/kits, please specify model, serial number and color of your unit.



### Parts List – Figure 8

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

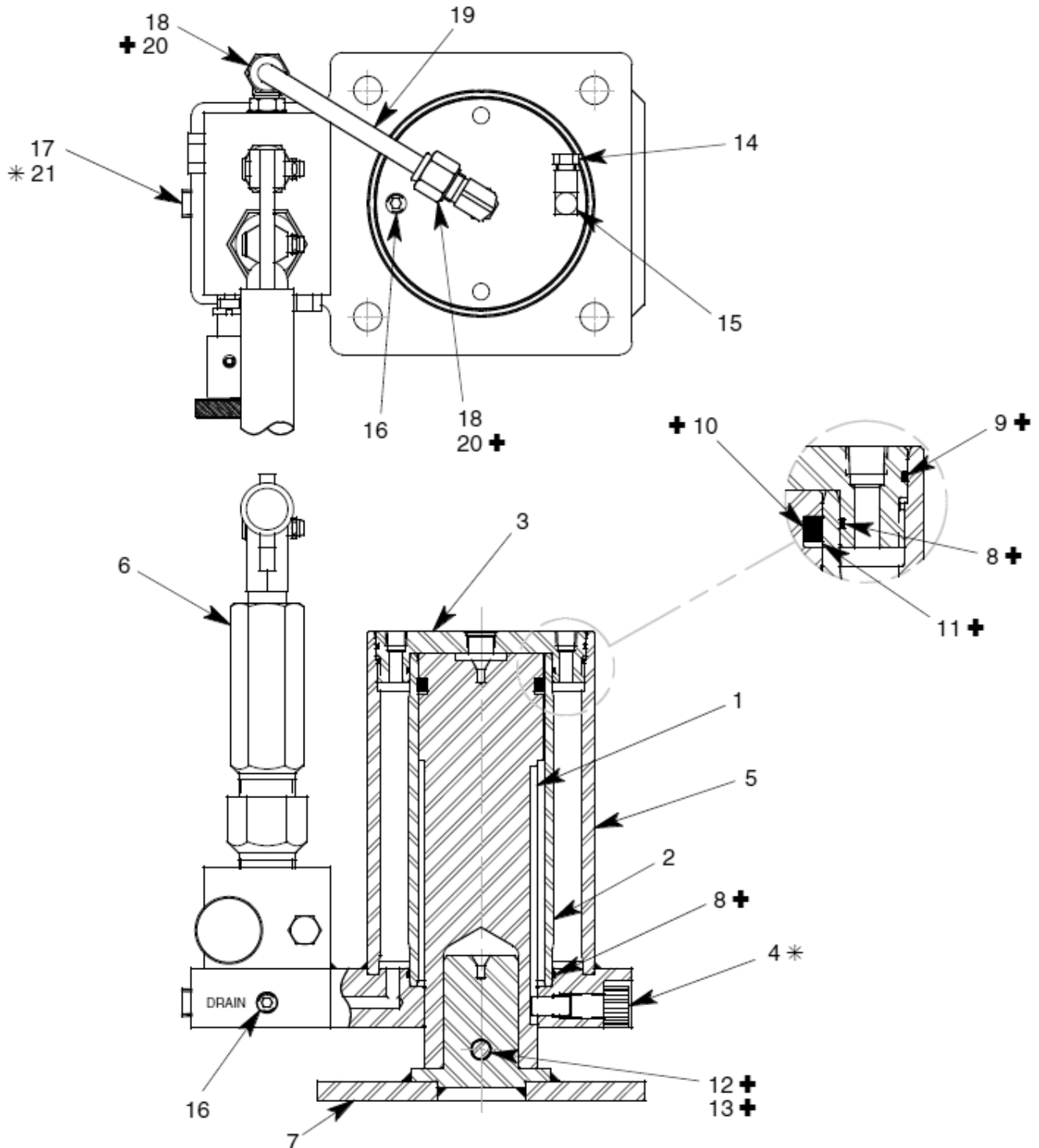
Item	Part Number	Description	Qty
	<b>885074</b>	<b>Adjustable Foot Kit with Hydraulic Caster; consists of:</b>	
1	885072	TRIPOD LEG	2
2	885073	TRIPOD LEG w/ TOW BRKT	1
3	74880	LONG PIN	3
4	73348	SHORT PIN	3
5	73345	SPRING	3
6	73342	FOOT SCREW	3
7	73343	LOCKNUT	3
8	73344	RETAINING RING	3
9	885020	FOOT PAD	3
10	79347	GUIDE SCREW	3
11	55923-75	RETAINING RING	12
12	325-003	FHCS, 5/16-18 x 1 1/4 LG	18
13	363-005	SPLIT LOCKWASHER, 5/8	3
14	75941	STICKER, FOOTPADS	3
15	881800	HYDRAULIC CASTER ASSY	3
16	321-005	HHCS, 1/2-13 x 2" LG	12
17	363-004	SPLIT LOCKWASHER, 1/2	12

### Parts List – Figure 9

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

+ PART OF HYDRAULIC CASTER REPAIR PARTS KIT

\* APPLY LOCTITE NO. 242 ON THREADS



### Parts List – Figure 9

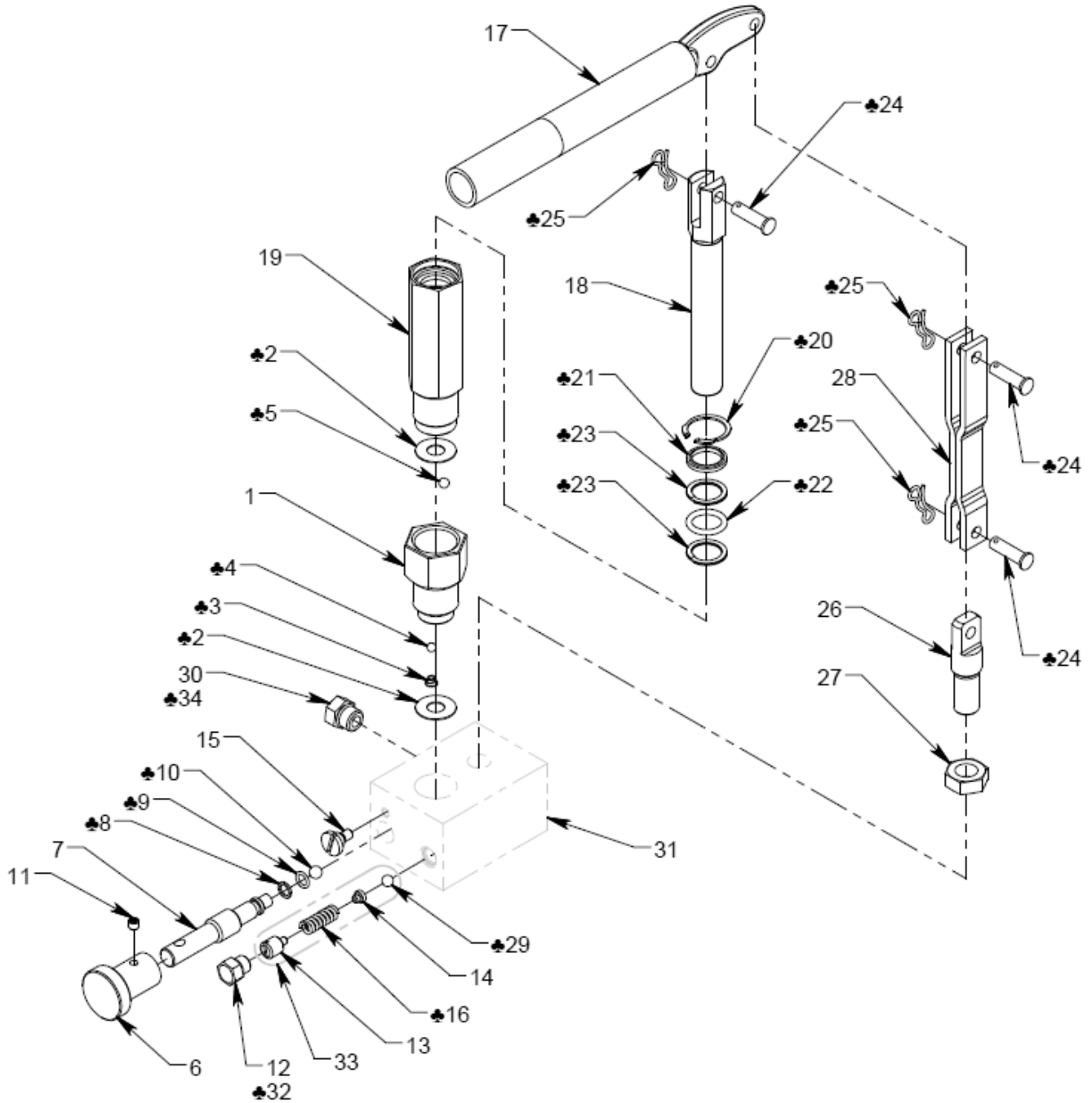
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
	<b>881800</b>	<b>Hydraulic Caster Assembly; consists of:</b>	
1	881803	PLUNGER	1
2	881804	CYLINDER	1
3	881805	CAP	1
4	881806	RETAINING SCREW	1
5	881807	RESERVOIR & BASE	1
6	881808	VALVE BLOCK & HAND PUMP	1
7	881809	CASTER MOUNTING PLATE	1
8	55925-040	O-RING	2
9	55925-045	O-RING	1
10	55925-330	O-RING	1
11	55929-330	BACK-UP RING	1
12	372-009	COTTER PIN, 3/32 x 1/2 LG	1
13	373-005	FLAT HEAD PIN, 3/8 DIA	1
14	483-006	BREATHER, 1/8 MPT	1
15	712-060	ELBOW, 1/8 MPT x 1/8 FPT	1
16	717-005	PLUG, 1/8 MPT	2
17	717-006	PLUG, 1/4 MPT	1
18	722-018	ELBOW, 3/8 TUBE x 3/8 SAE	2
19	732-024	TUBE, 3/8 OD x .035 WALL	AR
20	MS28778-6	O-RING (PART OF ITEM 18)	2
21	881817	SETSCREW ORIFICE	1

**Parts List – Figure 10**

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

♣ PART OF HYDRAULIC CASTER REPAIR PARTS KIT



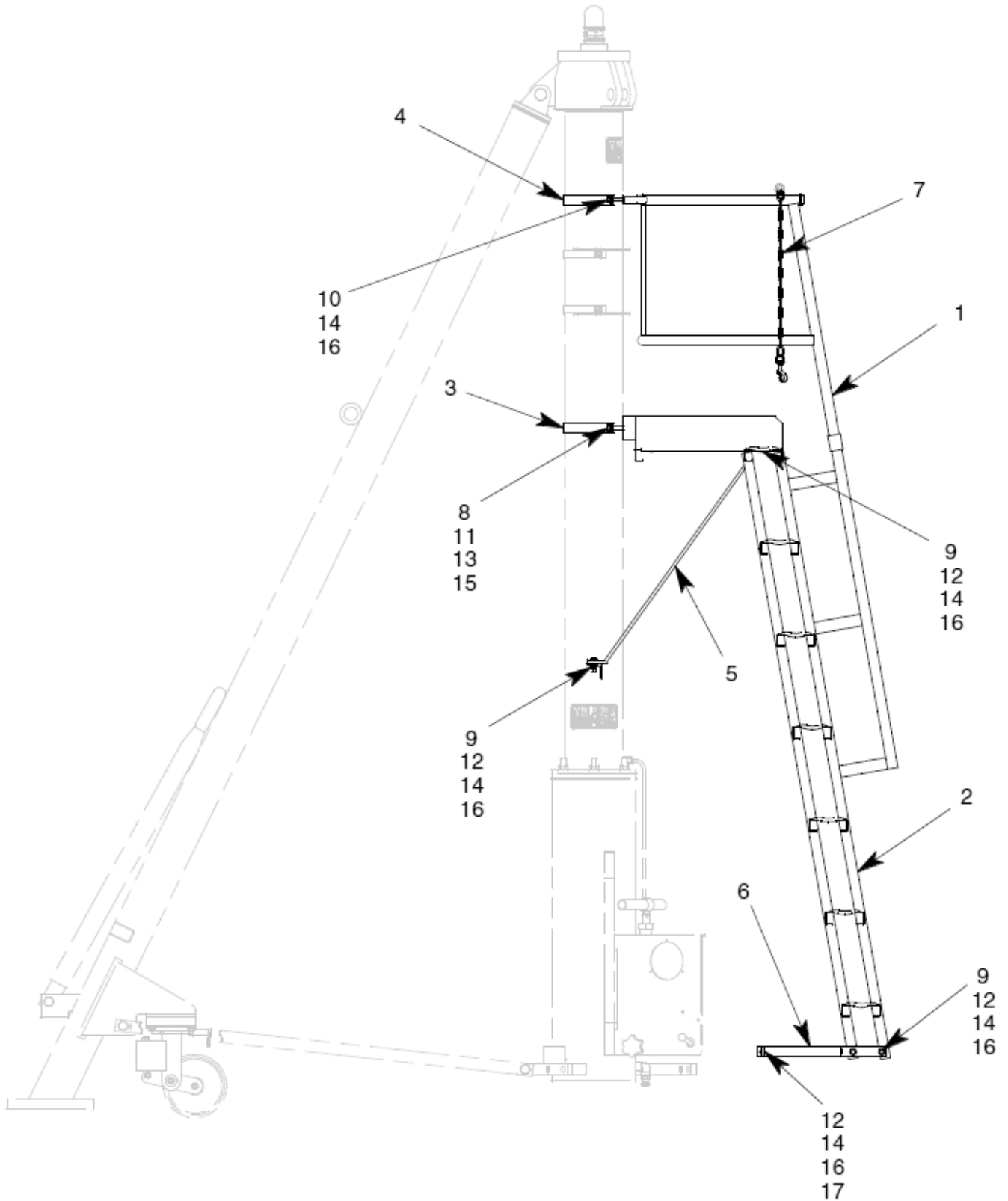
### Parts List – Figure 10

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
	<b>881808</b>	<b>Valve Block and Hand Pump Assembly; consists of:</b>	
1	55010	BLOCK VALVE	1
2	55024	GASKET	2
3	55295	SPRING, PUMP	1
4	412-003	STEEL BALL, 7/32 DIA	1
5	412-004	STEEL BALL, 1/4 DIA	1
6	723548	RELEASE VALVE KNOB	1
7	79365	RELEASE VALVE STEM	1
8	55929-011	BACK-UP RING	1
9	55925-011	O-RING	1
10	412-002	STEEL BALL, 5/16 DIA	1
11	331-011	SHSS, 1/4-20 x 1/4 LG	1
12	717-001	PLUG, 1/4 SAE O-RING	1
13	55148	SET SCREW	1
14	55153	GUIDE, SPRING	1
15	65228	RELEASE VALVE LOCK SCREW	1
16	495-048	SPRING	1
17	881815	FULCRUM WELDMENT	1
18	881847	PLUNGER, 3/4 DIA	1
19	881846	BODY, 3/4 DIA	1
20	55926-112	RETAINING RING	1
21	55911-15	SCRAPER RING	1
22	55925-210	O-RING	1
23	55922-15	BACK-UP RING	2
24	55002	PUMP PIN	3
25	372-028	BOW TIE COTTER	3
26	55011	ANCHOR	1
27	352-004	HEX JAM NUT, 5/8-18	1
28	55012	PUMP LINK	1
29	412-007	STEEL BALL, 9/32 DIA	1
30	717-003	PLUG, 3/8 SAE O-RING	1
31	881807	RESERVOIR / BASE WELDMENT	REF
32	MS28778-4	O-RING (PART OF ITEM 12)	1
33	881816	SAFETY POP-OFF VALVE ASSY	1
34	MS28778-6	O-RING (PART OF ITEM 30)	1

**Parts List – Figure 11**

When ordering replacement parts/kits, please specify model, serial number and color of your unit.





**Parts List – Figure 11**

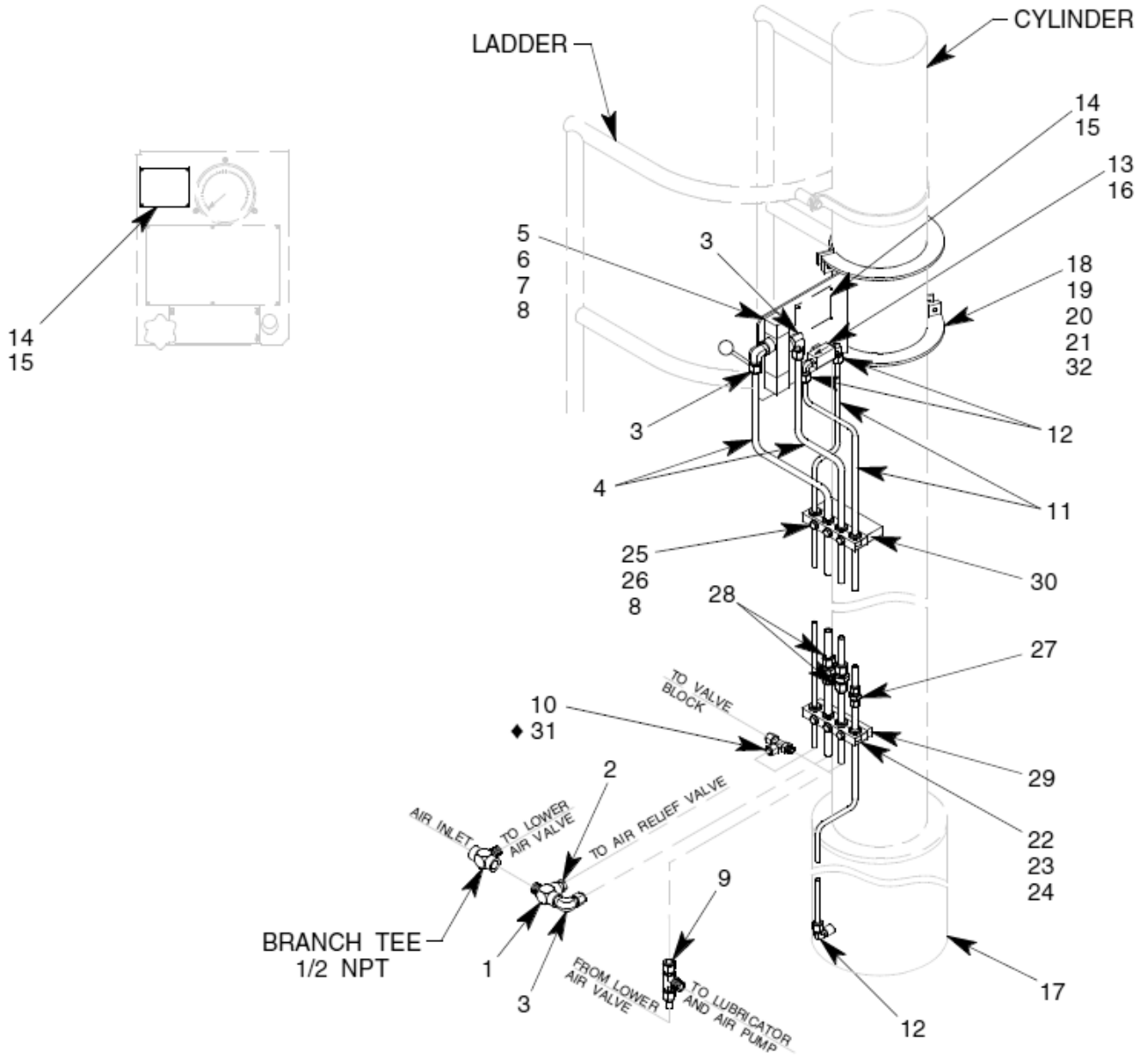
When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
	<b>885088</b>	<b>Ladder Assembly; consists of:</b>	
1	74958	RAIL	1
2	885089	LADDER AND PLATFORM	1
3	73355	PLATFORM STRAP	1
4	73355-1	RAIL STRAP	1
5	74891-1	LADDER SUPPORT BRACE	2
6	885093	LOWER LADDER BRACE	2
7	76378	SAFETY CHAIN ASSEMBLY	1
8	321-032	HHCS, 1/2-13 x 2 1/2 LG	2
9	321-028	HHCS, 3/8-16 x 1 1/2 LG	8
10	321-062	HHCS, 3/8-16 x 2 1/2 LG	2
11	351-003	HEX NUT, 1/2-13	2
12	351-002	HEX NUT, 3/8-16	10
13	363-004	SPLIT LOCKWASHER, 1/2	2
14	363-003	SPLIT LOCKWASHER, 3/8	12
15	362-005	FLAT WASHER, 1/2 SAE	4
16	361-001	FLAT WASHER, 3/8 SAE	22
17	321-024	HHCS, 3/4-16 x 1 3/4 LG	2

**Parts List – Figure 12**

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

◆ PART OF REPAIR PARTS KIT



### Parts List – Figure 12

When ordering replacement parts/kits, please specify model, serial number and color of your unit.

Item	Part Number	Description	Qty
	<b>885095</b>	<b>Remote Control Kit; consists of:</b>	
1	713-029	TEE, RUN, 1/2 NPT	1
2	714-003	REDUCER, 1/2 MPT x 1/4 FPT	1
3	722-013	ELBOW, 1/2 TUBE x 1/2 MPT	3
4	732-001	TUBE, 1/2 O.D. x .049 WALL	AR
5	421-004	AIR VALVE	1
6	392-001	STUD, 5/16-18 x 3/4 LG	2
7	359-001	ALLEN NUT, 5/16-18	2
8	363-002	SPLIT LOCKWASHER, 5/16	8
9	723-033	TEE, BRANCH, 1/2 T x 1/2 MPT	1
10	723-014	TEE, RUN, 3/8 TUBE x 3/8 SAE	1
11	732-010	TUBE, 3/8 O.D. x .065 WALL	AR
12	722-014	ELBOW, 3/8 TUBE x 1/4 MPT	3
13	85416	RELEASE VALVE	1
14	76158	CAUTION PLACARD	2
15	397-010	SELF TAPPING SCREW, #6	8
16	491-044	SAFETY LOCK WIRE, .025 DIA	AR
17	885096	RESERVOIR	1
18	74977	STRAP	2
19	73126	PANEL	1
20	321-028	HHCS, 3/8-16 x 1 1/2 LG	4
21	363-003	SPLIT LOCKWASHER, 3/8	4
22	394-033	SPLIT BUSHING, 1/2 TUBE	4
23	394-034	SPLIT BUSHING, 3/8 TUBE	4
24	394-031	CLAMPING UNIT	2
25	321-080	HHCS, 5/16-18 x 2" LG	6
26	362-002	FLAT WASHER, 5/16	6
27	723-027	UNION, 3/8 TUBE	1
28	721-133	UNION, 1/2 TUBE	2
29	76160	TUBE MOUNTING BRACKET	1
30	885008	TUBE MOUNTING BRACKET	1
31	MS28778-6	O-RING (PART OF ITEM 10)	1
32	361-001	FLAT WASHER, 3/8 SAE	8





## **APPENDIX I**

### **Safety Data Sheet MIL-PRF-5606 Hydraulic Fluid**



Product Name: MOBIL AERO HFA  
Revision Date: 01 Oct 2015  
Page 1 of 12

## SAFETY DATA SHEET

### SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

#### PRODUCT

**Product Name:** MOBIL AERO HFA  
**Product Description:** Base Oil and Additives  
**Product Code:** 201550401020, 490110-00, 970584  
**Intended Use:** Aviation hydraulic oil

#### COMPANY IDENTIFICATION

**Supplier:** EXXON MOBIL CORPORATION  
22777 Springwoods Village Parkway  
Spring, TX. 77253 USA

**24 Hour Health Emergency** 609-737-4411  
**Transportation Emergency Phone** 800-424-9300 or 703-527-3887 CHEMTREC  
**Product Technical Information** 800-662-4525  
**MSDS Internet Address** <http://www.exxon.com>, <http://www.mobil.com>

### SECTION 2 HAZARDS IDENTIFICATION

This material is hazardous according to regulatory guidelines (see (M)SDS Section 15).

#### CLASSIFICATION:

Flammable liquid: Category 4.  
Aspiration toxicant: Category 1.

#### LABEL:

Pictogram:



**Signal Word:** Danger

#### Hazard Statements:

H227: Combustible liquid. H304: May be fatal if swallowed and enters airways.

#### Precautionary Statements:

P210: Keep away from flames and hot surfaces. -- No smoking. P273: Avoid release to the environment. P280: Wear protective gloves and eye / face protection. P301 + P310: IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. P331: Do NOT induce vomiting. P370 + P378: In case of fire: Use water fog, foam, dry chemical or carbon dioxide (CO2) to extinguish. P403 + P235: Store in a well-ventilated place. Keep cool. P405: Store locked up. P501: Dispose of contents and container in accordance with local regulations.

Product Name: MOBIL AERO HFA  
 Revision Date: 01 Oct 2015  
 Page 2 of 12

**Other hazard information:**

**HAZARD NOT OTHERWISE CLASSIFIED (HNOC):** None as defined under 29 CFR 1910.1200.

**PHYSICAL / CHEMICAL HAZARDS**

Material can accumulate static charges which may cause an ignition. Material can release vapors that readily form flammable mixtures. Vapor accumulation could flash and/or explode if ignited. Combustible.

**HEALTH HAZARDS**

High-pressure injection under skin may cause serious damage. Excessive exposure may result in eye, skin, or respiratory irritation.

**ENVIRONMENTAL HAZARDS**

No significant hazards.

<b>NFPA Hazard ID:</b>	Health: 1	Flammability: 2	Reactivity: 0
<b>HMIS Hazard ID:</b>	Health: 1*	Flammability: 2	Reactivity: 0

**NOTE:** This material should not be used for any other purpose than the intended use in Section 1 without expert advice. Health studies have shown that chemical exposure may cause potential human health risks which may vary from person to person.

<b>SECTION 3</b>	<b>COMPOSITION / INFORMATION ON INGREDIENTS</b>
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This material is defined as a mixture.

**Hazardous Substance(s) or Complex Substance(s) required for disclosure**

Name	CAS#	Concentration*	GHS Hazard Codes
2,6-DI-TERT-BUTYL-P-CRESOL	128-37-0	0.1 - < 1%	H400(M factor 1), H410(M factor 1)
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	64742-47-8	5 - < 10%	H304
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	64742-53-6	50 - < 70%	H227, H304
HYDROTREATED MIDDLE DISTILLATE (PETROLEUM)	64742-46-7	20 - < 30%	H304
TRIPHENYL PHOSPHATE	115-86-6	0.1 - < 0.25%	H400(M factor 1), H410(M factor 1)

\* All concentrations are percent by weight unless material is a gas. Gas concentrations are in percent by volume.

As per paragraph (i) of 29 CFR 1910.1200, formulation is considered a trade secret and specific chemical identity and exact percentage (concentration) of composition may have been withheld. Specific chemical identity and exact percentage composition will be provided to health professionals, employees, or designated representatives in accordance with applicable provisions of paragraph (i).

<b>SECTION 4</b>	<b>FIRST AID MEASURES</b>
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**INHALATION**



Remove from further exposure. For those providing assistance, avoid exposure to yourself or others. Use adequate respiratory protection. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation.

#### SKIN CONTACT

Wash contact areas with soap and water. Remove contaminated clothing. Launder contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

#### EYE CONTACT

Flush thoroughly with water. If irritation occurs, get medical assistance.

#### INGESTION

Seek immediate medical attention. Do not induce vomiting.

#### NOTE TO PHYSICIAN

If ingested, material may be aspirated into the lungs and cause chemical pneumonitis. Treat appropriately.

### SECTION 5 FIRE FIGHTING MEASURES

#### EXTINGUISHING MEDIA

**Appropriate Extinguishing Media:** Use water fog, foam, dry chemical or carbon dioxide (CO<sub>2</sub>) to extinguish flames.

**Inappropriate Extinguishing Media:** Straight Streams of Water

#### FIRE FIGHTING

**Fire Fighting Instructions:** Evacuate area. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Firefighters should use standard protective equipment and in enclosed spaces, self-contained breathing apparatus (SCBA). Use water spray to cool fire exposed surfaces and to protect personnel.

**Unusual Fire Hazards:** Combustible. Pressurized mists may form a flammable mixture.

**Hazardous Combustion Products:** Aldehydes, Incomplete combustion products, Oxides of carbon, Phosphorus oxides, Smoke, Fume, Sulfur oxides

#### FLAMMABILITY PROPERTIES

**Flash Point [Method]:** >82°C (180°F) [ASTM D-93]

**Flammable Limits (Approximate volume % in air):** LEL: 0.7 UEL: 7.0 [Estimated]

**Autoignition Temperature:** >225°C (437°F)

### SECTION 6 ACCIDENTAL RELEASE MEASURES

#### NOTIFICATION PROCEDURES

In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable

regulations. US regulations require reporting releases of this material to the environment which exceed the applicable reportable quantity or oil spills which could reach any waterway including intermittent dry creeks. The National Response Center can be reached at (800)424-8802.

## PROTECTIVE MEASURES

Avoid contact with spilled material. Warn or evacuate occupants in surrounding and downwind areas if required due to toxicity or flammability of the material. See Section 5 for fire fighting information. See the Hazard Identification Section for Significant Hazards. See Section 4 for First Aid Advice. See Section 8 for advice on the minimum requirements for personal protective equipment. Additional protective measures may be necessary, depending on the specific circumstances and/or the expert judgment of the emergency responders.

For emergency responders: Respiratory protection: respiratory protection will be necessary only in special cases, e.g., formation of mists. Half-face or full-face respirator with filter(s) for dust/organic vapor or Self Contained Breathing Apparatus (SCBA) can be used depending on the size of spill and potential level of exposure. If the exposure cannot be completely characterized or an oxygen deficient atmosphere is possible or anticipated, SCBA is recommended. Work gloves that are resistant to hydrocarbons are recommended. Gloves made of polyvinyl acetate (PVA) are not water-resistant and are not suitable for emergency use. Chemical goggles are recommended if splashes or contact with eyes is possible. Small spills: normal antistatic work clothes are usually adequate. Large spills: full body suit of chemical resistant, antistatic material is recommended.

## SPILL MANAGEMENT

**Land Spill:** Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop leak if you can do it without risk. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Prevent entry into waterways, sewer, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Large Spills: Water spray may reduce vapor; but may not prevent ignition in closed spaces. Recover by pumping or with suitable absorbent.

**Water Spill:** Stop leak if you can do it without risk. Confine the spill immediately with booms. Warn other shipping. Remove from the surface by skimming or with suitable absorbents. Seek the advice of a specialist before using dispersants.

Water spill and land spill recommendations are based on the most likely spill scenario for this material; however, geographic conditions, wind, temperature, (and in the case of a water spill) wave and current direction and speed may greatly influence the appropriate action to be taken. For this reason, local experts should be consulted. Note: Local regulations may prescribe or limit action to be taken.

## ENVIRONMENTAL PRECAUTIONS

Large Spills: Dike far ahead of liquid spill for later recovery and disposal. Prevent entry into waterways, sewers, basements or confined areas.

## SECTION 7

## HANDLING AND STORAGE

### HANDLING

Avoid contact with skin. Avoid prolonged breathing of mists and heated vapor. Prevent small spills and leakage to avoid slip hazard. Material can accumulate static charges which may cause an electrical spark (ignition source). When the material is handled in bulk, an electrical spark could ignite any flammable vapors from liquids or residues that may be present (e.g., during switch-loading operations). Use proper bonding and/or ground procedures. However, bonding and grounds may not eliminate the hazard from static

accumulation. Consult local applicable standards for guidance. Additional references include American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practice on Static Electricity) or CENELEC CLC/TR 50404 (Electrostatics - Code of practice for the avoidance of hazards due to static electricity).

**Static Accumulator:** This material is a static accumulator.

**STORAGE**

The container choice, for example storage vessel, may effect static accumulation and dissipation. Keep container closed. Handle containers with care. Open slowly in order to control possible pressure release. Store in a cool, well-ventilated area. Storage containers should be grounded and bonded. Fixed storage containers, transfer containers and associated equipment should be grounded and bonded to prevent accumulation of static charge.

**SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION**

**EXPOSURE LIMIT VALUES**

Exposure limits/standards (Note: Exposure limits are not additive)

Substance Name	Form	Limit / Standard		NOTE	Source
2,6-DI-TERT-BUTYL-P-CRESOL	Inhalable fraction and vapor	TWA	2 mg/m3	N/A	ACGIH
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT [total hydrocarbon vapor]	Non-Aerosol	TWA	200 mg/m3	Skin	ACGIH
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	Mist.	TWA	5 mg/m3	N/A	OSHA Z1
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	Inhalable fraction.	TWA	5 mg/m3	N/A	ACGIH
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	Mist.	TWA	5 mg/m3	N/A	ACGIH
HYDROTREATED MIDDLE DISTILLATE (PETROLEUM)	Mist.	TWA	5 mg/m3	N/A	OSHA Z1
HYDROTREATED MIDDLE DISTILLATE (PETROLEUM)	Inhalable fraction.	TWA	5 mg/m3	N/A	ACGIH
TRIPHENYL PHOSPHATE		TWA	3 mg/m3	N/A	OSHA Z1
TRIPHENYL PHOSPHATE		TWA	3 mg/m3	N/A	ACGIH

**Exposure limits/standards for materials that can be formed when handling this product:** When mists/aerosols can occur the following are recommended: 5 mg/m<sup>3</sup> - ACGIH TLV (inhalable fraction), 5 mg/m<sup>3</sup> - OSHA PEL.

NOTE: Limits/standards shown for guidance only. Follow applicable regulations.

No biological limits allocated.

**ENGINEERING CONTROLS**

The level of protection and types of controls necessary will vary depending upon potential exposure conditions.

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Control measures to consider:

Use explosion-proof ventilation equipment to stay below exposure limits.

## PERSONAL PROTECTION

Personal protective equipment selections vary based on potential exposure conditions such as applications, handling practices, concentration and ventilation. Information on the selection of protective equipment for use with this material, as provided below, is based upon intended, normal usage.

**Respiratory Protection:** If engineering controls do not maintain airborne contaminant concentrations at a level which is adequate to protect worker health, an approved respirator may be appropriate. Respirator selection, use, and maintenance must be in accordance with regulatory requirements, if applicable. Types of respirators to be considered for this material include:

No special requirements under ordinary conditions of use and with adequate ventilation.

For high airborne concentrations, use an approved supplied-air respirator, operated in positive pressure mode. Supplied air respirators with an escape bottle may be appropriate when oxygen levels are inadequate, gas/vapor warning properties are poor, or if air purifying filter capacity/rating may be exceeded.

**Hand Protection:** Any specific glove information provided is based on published literature and glove manufacturer data. Glove suitability and breakthrough time will differ depending on the specific use conditions. Contact the glove manufacturer for specific advice on glove selection and breakthrough times for your use conditions. Inspect and replace worn or damaged gloves. The types of gloves to be considered for this material include:

If prolonged or repeated contact is likely, chemical resistant gloves are recommended. If contact with forearms is likely, wear gauntlet style gloves.

**Eye Protection:** If contact is likely, safety glasses with side shields are recommended.

**Skin and Body Protection:** Any specific clothing information provided is based on published literature or manufacturer data. The types of clothing to be considered for this material include:

If prolonged or repeated contact is likely, chemical, and oil resistant clothing is recommended.

**Specific Hygiene Measures:** Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Discard contaminated clothing and footwear that cannot be cleaned. Practice good housekeeping.

## ENVIRONMENTAL CONTROLS

Comply with applicable environmental regulations limiting discharge to air, water and soil. Protect the environment by applying appropriate control measures to prevent or limit emissions.

## SECTION 9

## PHYSICAL AND CHEMICAL PROPERTIES

**Note:** Physical and chemical properties are provided for safety, health and environmental considerations only and may not fully represent product specifications. Contact the Supplier for additional information.

## GENERAL INFORMATION

**Physical State:** Liquid

**Color:** Red

Product Name: MOBIL AERO HFA  
 Revision Date: 01 Oct 2015  
 Page 7 of 12

**Odor:** Characteristic  
**Odor Threshold:** N/D

**IMPORTANT HEALTH, SAFETY, AND ENVIRONMENTAL INFORMATION**

**Relative Density (at 15 °C):** 0.88  
**Flammability (Solid, Gas):** N/A  
**Flash Point [Method]:** >82°C (180°F) [ASTM D-93]  
**Flammable Limits (Approximate volume % in air):** LEL: 0.7 UEL: 7.0 [Estimated]  
**Autoignition Temperature:** >225°C (437°F)  
**Boiling Point / Range:** N/D  
**Decomposition Temperature:** N/D  
**Vapor Density (Air = 1):** N/D  
**Vapor Pressure:** [N/D at 20 °C]  
**Evaporation Rate (n-butyl acetate = 1):** N/D  
**pH:** N/A  
**Log Pow (n-Octanol/Water Partition Coefficient):** N/D  
**Solubility in Water:** Negligible  
**Viscosity:** 13.8 cSt (13.8 mm2/sec) at 40 °C | 5.1 cSt (5.1 mm2/sec) at 100°C [ASTM D 445]  
**Oxidizing Properties:** See Hazards Identification Section.

**OTHER INFORMATION**

**Freezing Point:** N/D  
**Melting Point:** N/A  
**Pour Point:** -60°C (-76°F) [ASTM D97]  
**DMSO Extract (mineral oil only), IP-346:** < 3 %wt

**SECTION 10 STABILITY AND REACTIVITY**

**REACTIVITY:** See sub-sections below.

**STABILITY:** Material is stable under normal conditions.

**CONDITIONS TO AVOID:** Open flames and high energy ignition sources.

**MATERIALS TO AVOID:** Strong oxidizers

**HAZARDOUS DECOMPOSITION PRODUCTS:** Material does not decompose at ambient temperatures.

**POSSIBILITY OF HAZARDOUS REACTIONS:** Hazardous polymerization will not occur.

**SECTION 11 TOXICOLOGICAL INFORMATION**

**INFORMATION ON TOXICOLOGICAL EFFECTS**

Hazard Class	Conclusion / Remarks
<b>Inhalation</b>	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Irritation: No end point data for material.	Elevated temperatures or mechanical action may form vapors, mist, or fumes which may be irritating to the eyes, nose, throat, or lungs.

Product Name: MOBIL AERO HFA  
 Revision Date: 01 Oct 2015  
 Page 8 of 12

<b>Ingestion</b>	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
<b>Skin</b>	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin Corrosion/Irritation: No end point data for material.	May dry the skin leading to discomfort and dermatitis. Based on assessment of the components.
<b>Eye</b>	
Serious Eye Damage/Irritation: No end point data for material.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.
<b>Sensitization</b>	
Respiratory Sensitization: No end point data for material.	Not expected to be a respiratory sensitizer.
Skin Sensitization: No end point data for material.	Not expected to be a skin sensitizer. Based on assessment of the components.
<b>Aspiration:</b> Data available.	May be fatal if swallowed and enters airways. Based on physico-chemical properties of the material.
<b>Germ Cell Mutagenicity:</b> No end point data for material.	Not expected to be a germ cell mutagen. Based on assessment of the components.
<b>Carcinogenicity:</b> No end point data for material.	Not expected to cause cancer. Based on assessment of the components.
<b>Reproductive Toxicity:</b> No end point data for material.	Not expected to be a reproductive toxicant. Based on assessment of the components.
<b>Lactation:</b> No end point data for material.	Not expected to cause harm to breast-fed children.
<b>Specific Target Organ Toxicity (STOT)</b>	
Single Exposure: No end point data for material.	Not expected to cause organ damage from a single exposure.
Repeated Exposure: No end point data for material.	Not expected to cause organ damage from prolonged or repeated exposure. Based on assessment of the components.

## TOXICITY FOR SUBSTANCES

NAME	ACUTE TOXICITY
2,6-DI-TERT-BUTYL-P-CRESOL	Oral Lethality: LD50 0.89 g/kg (Rat)

## OTHER INFORMATION

### For the product itself:

Repeated and/or prolonged exposure may cause irritation to the skin, eyes, or respiratory tract. Small amounts of liquid aspirated into the lungs during ingestion or from vomiting may cause chemical pneumonitis or pulmonary edema.

### Contains:

Base oil severely refined: Not carcinogenic in animal studies. Representative material passes IP-346, Modified Ames test, and/or other screening tests. Dermal and inhalation studies showed minimal effects; lung non-specific infiltration of immune cells, oil deposition and minimal granuloma formation. Not sensitizing in test animals.

The following ingredients are cited on the lists below: None.

--REGULATORY LISTS SEARCHED--

Product Name: MOBIL AERO HFA  
Revision Date: 01 Oct 2015  
Page 9 of 12

1 = NTP CARC  
2 = NTP SUS

3 = IARC 1  
4 = IARC 2A

5 = IARC 2B  
6 = OSHA CARC

## SECTION 12 ECOLOGICAL INFORMATION

The information given is based on data available for the material, the components of the material, and similar materials.

### ECOTOXICITY

Material -- Not expected to be harmful to aquatic organisms.

### MOBILITY

More volatile component -- Highly volatile, will partition rapidly to air. Not expected to partition to sediment and wastewater solids.

Less volatile component -- Low solubility and floats and is expected to migrate from water to the land. Expected to partition to sediment and wastewater solids.

### PERSISTENCE AND DEGRADABILITY

#### Biodegradation:

Components -- Expected to be inherently biodegradable

### BIOACCUMULATION POTENTIAL

Majority of components -- Has the potential to bioaccumulate, however metabolism or physical properties may reduce the bioconcentration or limit bioavailability.

## SECTION 13 DISPOSAL CONSIDERATIONS

Disposal recommendations based on material as supplied. Disposal must be in accordance with current applicable laws and regulations, and material characteristics at time of disposal.

### DISPOSAL RECOMMENDATIONS

Product is suitable for burning in an enclosed controlled burner for fuel value or disposal by supervised incineration at very high temperatures to prevent formation of undesirable combustion products. Protect the environment. Dispose of used oil at designated sites. Minimize skin contact. Do not mix used oils with solvents, brake fluids or coolants.

### REGULATORY DISPOSAL INFORMATION

RCRA Information: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed as hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity or reactivity and is not formulated with contaminants as determined by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

**Empty Container Warning** Empty Container Warning (where applicable): Empty containers may contain residue and can be dangerous. Do not attempt to refill or clean containers without proper instructions. Empty drums should be

Product Name: MOBIL AERO HFA  
Revision Date: 01 Oct 2015  
Page 10 of 12

completely drained and safely stored until appropriately reconditioned or disposed. Empty containers should be taken for recycling, recovery, or disposal through suitably qualified or licensed contractor and in accordance with governmental regulations. DO NOT PRESSURISE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION. THEY MAY EXPLODE AND CAUSE INJURY OR DEATH.

## SECTION 14 TRANSPORT INFORMATION

### LAND (DOT)

**Proper Shipping Name:** COMBUSTIBLE LIQUID, N.O.S. (Distillates (Petroleum), Hydrotreated Light)  
**Hazard Class & Division:** COMBUSTIBLE LIQUID  
**ID Number:** NA1993  
**Packing Group:** III  
**ERG Number:** 128  
**Label(s):** NONE  
**Transport Document Name:** NA1993, COMBUSTIBLE LIQUID, N.O.S. (Distillates (Petroleum), Hydrotreated Light), COMBUSTIBLE LIQUID, PG III

Footnote: This material is not regulated under 49 CFR in a container of 119 gallon capacity or less when transported solely by land, as long as the material is not a hazardous waste, a marine pollutant, or specifically listed as a hazardous substance.

**LAND (TDG):** Not Regulated for Land Transport

**SEA (IMDG):** Not Regulated for Sea Transport according to IMDG-Code

**Marine Pollutant:** No

**AIR (IATA):** Not Regulated for Air Transport

## SECTION 15 REGULATORY INFORMATION

**OSHA HAZARD COMMUNICATION STANDARD:** This material is considered hazardous in accordance with OSHA HazCom 2012, 29 CFR 1910.1200.

**Listed or exempt from listing/notification on the following chemical inventories:** AICS, DSL, ENCS, IECSC, KECI, PICCS, TCSI, TSCA

**EPCRA SECTION 302:** This material contains no extremely hazardous substances.

**SARA (311/312) REPORTABLE HAZARD CATEGORIES:** Fire. Immediate Health. Delayed Health.

**SARA (313) TOXIC RELEASE INVENTORY:** This material contains no chemicals subject to the supplier notification requirements of the SARA 313 Toxic Release Program.



Product Name: MOBIL AERO HFA  
 Revision Date: 01 Oct 2015  
 Page 11 of 12

The following ingredients are cited on the lists below:

Chemical Name	CAS Number	List Citations
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT	64742-47-8	1, 17, 18
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	64742-53-6	1, 4, 13, 17, 18
HYDROTREATED MIDDLE DISTILLATE (PETROLEUM)	64742-46-7	1, 4, 17, 18

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

<b>SECTION 16</b>	<b>OTHER INFORMATION</b>
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N/D = Not determined, N/A = Not applicable

**KEY TO THE H-CODES CONTAINED IN SECTION 3 OF THIS DOCUMENT (for information only):**

H227: Combustible liquid; Flammable Liquid, Cat 4  
 H304: May be fatal if swallowed and enters airways; Aspiration, Cat 1  
 H400: Very toxic to aquatic life; Acute Env Tox, Cat 1  
 H410: Very toxic to aquatic life with long lasting effects; Chronic Env Tox, Cat 1

**THIS SAFETY DATA SHEET CONTAINS THE FOLLOWING REVISIONS:**

Revision Changes:

Section 01: Company Mailing Address information was modified.  
 Section 05: Hazardous Combustion Products information was modified.  
 Section 15: List Citations Table information was modified.  
 Section 15: National Chemical Inventory Listing information was modified.  
 Section 14: Marine Pollutant information was modified.  
 Composition: Component Table information was modified.  
 Section 08: Exposure Limits Table information was modified.  
 Section 16: Revision Information - Implementation of GHS requirements phrase. information was deleted.

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Product Name: MOBIL AERO HFA  
Revision Date: 01 Oct 2015  
Page 12 of 12

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Internal Use Only

MHC: 2A, 0, 0, 0, 1, 1

PPEC: C

DGN: 2005454XUS (552975)

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