

**Model: 02A7850C0100
60 Ton (54.4 Metric)
Tripod Jack with Air Pump**



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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.

1.0 PRODUCT INFORMATION

Name of Equipment: 60 Ton TWO STAGE JACK

Model Number: 02A7850C0100 See Nameplate for Serial Number.

Manufactured by: TRONAIR, INC. South 1740 Eber Rd., Holland, OH 43528-9794 USA

1.1 USAGE

The device is intended to lift an aircraft by its fuselage and/or main wing with other hydraulic jacks arranged by position and quantity to provide proper balance, and in conjunction with the correct jack pad, whose maximum load on any one jack does not exceed the rated capacity of the jack.

The jacks are not intended for metal forming, metal working, or any purpose other than that stated above.

1.2 LIST OF DRAWINGS

Reference Parts List and Illustrations.

2.0 SAFETY INFORMATION

2.1 ALARM AND WARNING SYSTEMS

None.

2.2 WARNING AND DANGER SIGNS

See labels on unit.

WARNING!



The ram locknuts are user operated safety devices. Failure to utilize these locknuts may result in personal injury or death.

2.3 COMPONENT SAFETY FEATURES

- **Ram Locknut** prevents lowering of the ram. The Ram Locknut must be lowered as the aircraft is being lifted.
- **Hold to Run Air Valve** requires the operator to hold the air valve lever to raise the ram using the air pump. Releasing the air valve lever stops upward movement of the ram.
- **CE Hand Pump With Check Valve** prevents unintentional descent of aircraft if relief valve fails.

2.4 FUNCTIONAL SAFETY FEATURES

Pressure Relief Valve prevents overload during raising operations.

2.5 FEATURES FOR OPERATOR SAFETY

- Hold to Run Air Valve
- Air Shut Off Valve
- Cautions And Instruction Labels Located on Jack
- Ram Locknut

2.6 ENVIRONMENTAL SAFETY FEATURES

Jack is non-polluting. See Appendix V Material Safety Data Sheet for the recommended hydraulic fluid (MIL-PRF-5606).

2.7 NECESSARY PERSONAL PROTECTIVE EQUIPMENT



CAUTION!

Always wear safety glasses.

2.0 SAFETY INFORMATION *(continued)***2.8 SAFETY GUIDELINES****CAUTION!**

Do not place hands on top of jack near ram locknuts while lowering jack.

Pinch points exist between top of jack and threads on ram.

- Never put hands between the aircraft and the jack pad; as after aircraft has been lowered, struts may have hung up.
- Never align jack under aircraft by pounding on jack legs. Dented legs may lead to jack collapse.
- Always lower ram locking nut(s) after jack is under load. Be sure ram nut(s) is seated fully after jacking.
- Always raise and lower jacks simultaneously so that aircraft remains level.
- Always use a tail or nose stand, as applicable, for additional stability.

**WARNING!**

The ram locknuts are user operated safety devices.
Failure to utilize these locknuts may result in personal injury or death.

2.9 CONDITIONS FOR SAFE USE

- Use in a clean dry environment on a level surface.
- Operate between -20° C and 50°C/-4° F and 122° F.

2.10 OPERATOR QUALIFICATIONS

This jack is intended to be used by the skilled and trained aircraft technician. The operator must be familiar with the jacking procedures for the aircraft to be raised, and the operation of the jack.

Installation/Maintenance/Dismantling Qualifications: This jack is to be installed, maintained, and dismantled by qualified technicians familiar with hydraulic systems.

2.11 ADDITIONAL SAFETY MEASURES

This jack must be used in accordance with this technical manual, and in accordance with the aircraft manufacturer's jacking procedures.

2.12 IN CASE OF HYDRAULIC LINE FAILURE

Ram Locknut prevents unintentional decent in case of hydraulic failure. It is important to keep Ram Locknut within 1 inch of bottom of ram when lowering or raising aircraft.

3.0 PACKAGING AND STORAGE

3.1 PACKAGING REQUIREMENTS

Jacks are to be packaged as required to prevent damage to legs or hydraulic equipment during shipment.

3.2 HANDLING

Jacks can be rolled by hand on its casters.

3.3 STRAPPING

Jacks can be strapped down by suitable means to prevent unwanted movement during shipment.

3.4 PACKAGING PROTECTION

No special packaging material for cushioning or suspension is required.

3.5 LABELING OF PACKAGING

Packaging should be labeled DO NOT DROP.

3.6 STORAGE COMPATIBILITY

No special considerations.

3.7 STORAGE ENVIRONMENT

- Store jacks between -20°C and +50°C/-4° F and 122° F.
- Always store jack with ram all the way down.
- Suitable for outdoor storage by using a full coverage waterproof tarp or canvas.

3.8 STORAGE SPACE AND HANDLING FACILITIES

- Minimum closed height 60 in (152.4 cm)
- Mechanical extension..... 24 in (61 cm)
- Hydraulic extension..... 44 in (111.8 cm)
- Maximum height obtainable 128 in (325.1 cm)
- Weight: 1300 lbs (590 kg)

4.0 TRANSPORTATION

Lifting can be accomplished by crane and strap through top of tripod, or by fork truck under lower tripod support. Approximate weight = 1300 lbs (590 kg)

5.0 ASSEMBLY

This product is shipped completely assembled and tested and requires no further assembly before operation. The following sections apply when servicing the unit.

5.1 GENERAL INSTRUCTIONS

- This product should be assembled and/or repaired using good workmanship practices and proper tools. Bolts and elastic stopnuts should be tightened to a torque not to exceed industry standards for Grade '5' bolts.
- All replacement parts must be the same as or better than the original parts supplied.
- Dispose of waste per federal and local laws and regulations.
- No modifications are allowed that will adversely affect the jack's safety performance.
- The pressure relief valve is not serviceable. It must be replaced as a unit.

5.2 PRE-USE CHECKS

1. Refer to the Illustrated Parts List to identify and ensure that all parts are present.
2. Generally check over unit to assure the tightness of all nuts, bolts and fittings.
3. With rams completely collapsed, check hydraulic fluid level.
 - Replenish with MIL-PRF-5606 fluid as required.
 - Fluid level is full when fluid level is 5 in (12.7 cm) from top of reservoir.

NOTE: Refer to fluid manufacturer's (Appendix V) safety data sheet, and advisory for handling and disposal of fluid.

5.3 PERSONNEL REQUIREMENTS

This jack is to be assembled by qualified technicians familiar with hydraulic systems.

5.4 INSPECTION AND TEST PROCEDURES

1. Ensure fluid level is full.
2. Raise ram to full stroke, and check for leaks.

6.0 INSTALLATION

Installation and commissioning requires connection of the hold to run air valve to an adequate air supply.

6.1 AIR SUPPLY REQUIREMENTS

- 90 - 100 psi (6.21 - 6.89 bar) recommended

7.0 OPERATION

7.1 OPERATING PARAMETERS

- The user shall work in accordance with the Operator Manual
- It is not allowed to work under the raised load until it is secured by suitable means, i.e. Ram Locknut
- The employer of the operator shall provide for all necessary training and give information about pumping and translating forces
- Operate between -20° C and 50°C/-4° F and 122° F
- Hydraulic pump operates with 90 – 100 psi (6.21 – 6.89 bar) air pressure

7.2 NUMERICAL VALUES

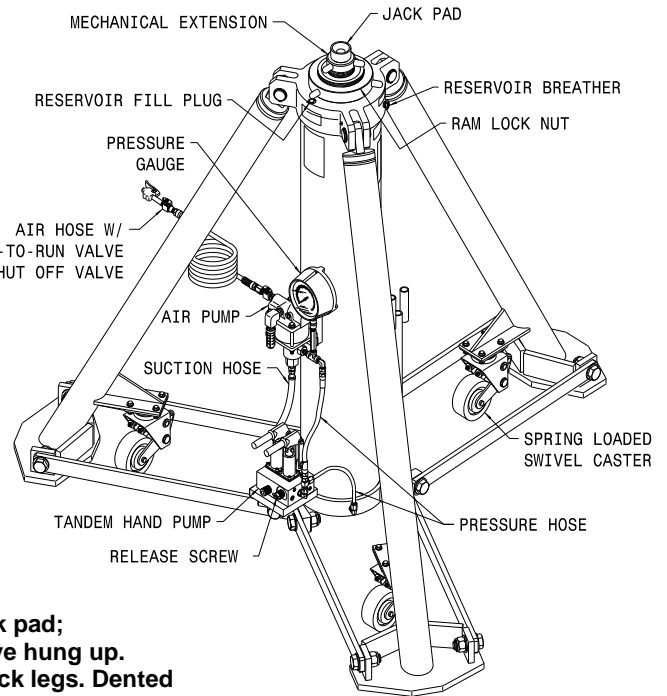
- Rated Capacity..... 120,000 lbs (54,431 kg)
- Minimum closed height 60 in (152.4 cm)
- Mechanical extension..... 24 in (61 cm)
- Hydraulic extension..... 44 in (111.8 cm)
- Maximum height obtainable 128 in (325.1 cm)
- Weight: 1300 lbs (590 kg)
- Noise level is 64 dB(A) at a distance of 120 in (3,048 mm) at an inlet pressure of 100 psi (6.9 bar)

7.3 OPERATOR CONTROLS

See illustration

7.4 OPERATING INSTRUCTIONS

The user should be familiar with the following statements prior to using the jack(s):



CAUTION!



1. **DO NOT** extend mechanical extension more than 20 in (61 cm).
2. **Never** put hands between the aircraft and the jack pad; as after aircraft has been lowered, struts may have hung up.
3. **Never** align jack under aircraft by pounding on jack legs. Dented legs may lead to jack collapse.
4. **Always** lower ram locking nut(s) after jack is under load. Be sure ram nut(s) is seated fully after jacking.
5. **Always** raise and lower jacks simultaneously so that aircraft remains level.
6. **Always** use a tail or nose stand, as applicable, for additional stability.

WARNING!



When collapsing rams by hand miss-staging may occur and cause pinch points. To collapse ram, add a minimum 50 lb load to the mechanical extension. Keep hands and fingers clear of locking nuts. Failure to adhere to this safety instruction can cause injury.

7.4.1 Rules For Operating

1. The user shall work in accordance with the Operator and/or Technical Manuals.
2. It is not allowed to work under the raised load until it is secured by suitable means, i.e. Ram Locknut.
3. The employer of the operator shall provide for all necessary training and give information about pumping and translating forces.
4. Operate between -20° C and 50°C/-4° F and 122° F.
5. Hydraulic pump operates with 90 – 100 psi (6.21 – 6.89 bar) air pressure

7.4 OPERATING INSTRUCTIONS *(continued)*

7.4.2 Jack Instructions

To Raise Aircraft:

1. Place jack on a hard, level surface.
2. Hydraulic ram must be completely retracted before operating the jack.
3. Raise mechanical extension as close to aircraft jack pad as possible.
4. Close pump release valve and operate pump.
5. Lower mechanical ram locknut while extending rams. Keep within 1 inch of bottom of extending ram
6. Do not continue to operate air pump after all rams have fully extended.

**WARNING!**

The ram locknuts are user operated safety devices. Failure to utilize these locknuts may result in personal injury or death and/or damage to aircraft or equipment.

To Lower Aircraft:

1. Lower all jacks simultaneously.
2. If ram locknut is tight, raise jack slightly to release nut ¼ inch from tripod.
3. Loosen pump release valve slightly to slowly lower aircraft.

NOTE: When using jack during washing operations, completely cover top of jack near ram seal.

**CAUTION!**

Do not place hands on top of jack near ram locknuts while lowering jack. Pinch points exist between top of jack and threads on ram.

Always wear safety glasses.

8.0 TRAINING

Training of operating personnel is the responsibility of the employer. This jack must be used in accordance with aircraft manufacturer's instructions.

9.0 MAINTENANCE

9.1 GENERAL

- All maintenance and/or repair work should be done using good workmanship practices and proper tools.
- The work area should be clean and free of dirt.
- When O-rings and backup rings are removed, every effort should be made to avoid the contact of tools with the critical surfaces of parts. Surface deformities could cause degradation of seals and failure.
- It is good practice to replace both O-rings and back-up rings once removed. Cut and damaged O-rings normally result in fluid leakage.
- If cylinder bore is found to be rusty, it may be honed to a maximum diameter of .002 in (.05 mm) over on diameter and a surface finish of 16 micro inches. If pitting in the bore cannot be removed by this process, the jack cylinder must be replaced before the jack can be returned to service.
- At this time, flush old hydraulic fluid and dirt from overall system and replenish with new, clean hydraulic fluid.
- When refilling the hydraulic system the characteristics of the hydraulic fluid used in the jack and the level of the hydraulic fluid as it is noted on the jack shall be observed.
- Jacks shall be maintained and repaired in accordance with the manufacturer's instructions. Such maintenance and repair shall be carried out by qualified persons.
- No modifications shall be carried out which adversely affect the compliance of the jack with draft standard 98/37/EEC.

9.2 MAINTENANCE SCHEDULE

Check Fluid Level.....	Each Use
Lubricate Casters	3 Months
Cleaning	Annually Or As Needed
Capacity Test (105%-110% of jack's rated capacity)	Annually

NOTE: Wipe with soft cloth only, do no pressure wash or spray water directly at ram seal.

9.2.1 Storage/Low Usage

If jack is unused for 90 days, raise ram to full hydraulic extension, spray ram with DoALL RPM, LPS or equivalent water repellent, BUNA N compatible lubricant.

9.3 REPAIRS

Field repairs should be limited to the replacement of parts. Physically damaged parts should be scrapped or returned for evaluation.

9.0 MAINTENANCE (continued)

9.4 SEAL REPLACEMENT

Reference Figures 1-3

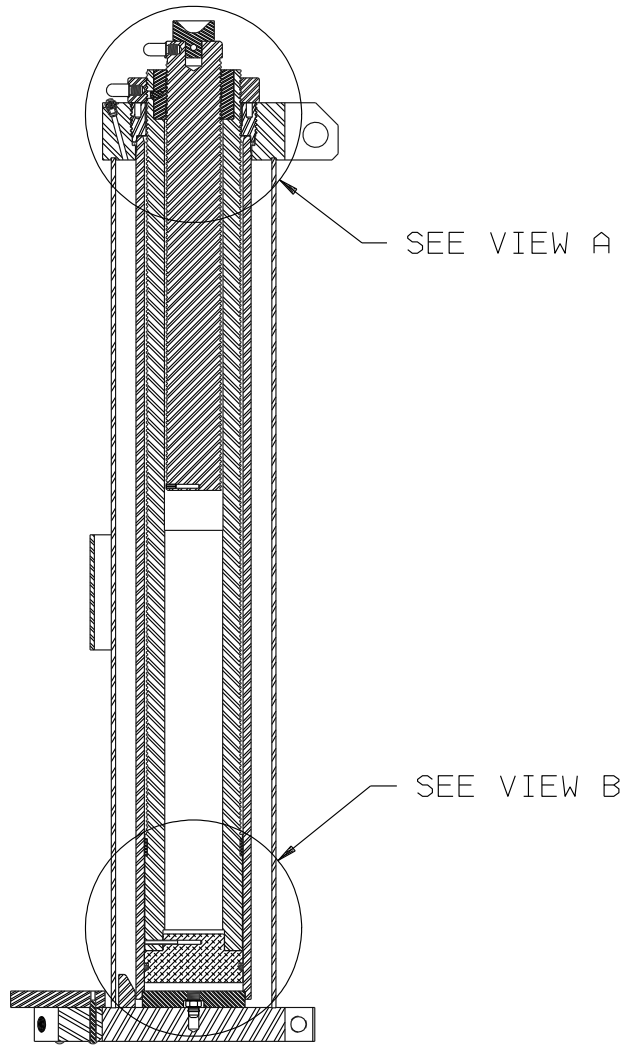


FIGURE 1

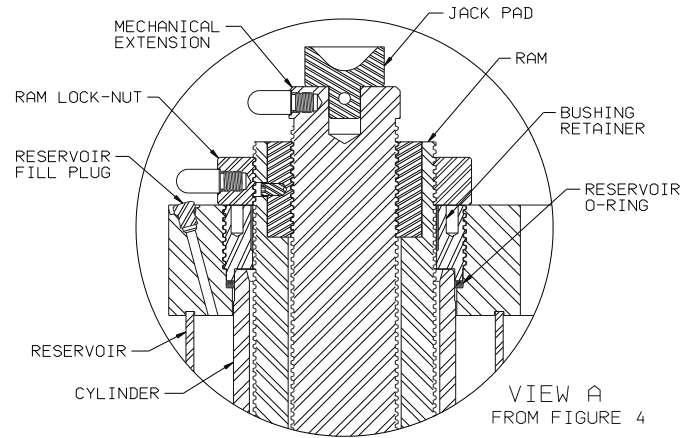


FIGURE 2 – View A from Figure 1

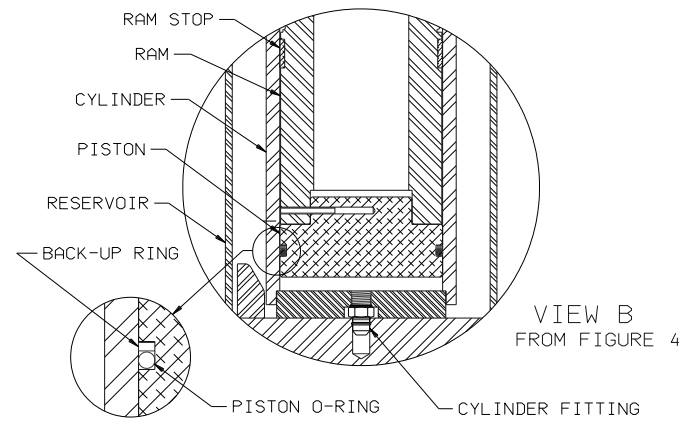


FIGURE 3 – View B from Figure 1

9.4.1 Ram

1. Pump the ram out until it is fully extended. Firmly support the ram and remove the retainer bushing. Use a spanner wrench (see 9.4.3 Optional Tools) or equivalent.
2. Carefully remove the ram assembly. Be sure not to lose the two (2) aluminum ram stops located towards the bottom of the ram.

NOTE: Be very careful not to move or loosen cylinder. Jack will not build pressure if cylinder seals are broken. If cylinder is disturbed and seals are broken, see Figure 3 for proper cylinder seal replacement.

3. Remove O-ring and backup ring and replace with new seals in respective places. Reference Figure 3. Be sure to coat O-rings with MIL-PRF-5606 hydraulic fluid before reassembly.
4. Reassemble in reverse order being careful not to damage the seals or disturb cylinder.

NOTE: To minimize air entrapment under the ram, raise the oil level in the cylinder to the chamfer of the cylinder prior to ram insertion.

9.4 SEAL REPLACEMENT (continued)

Reference Figures 1-3

9.4.2 Cylinder

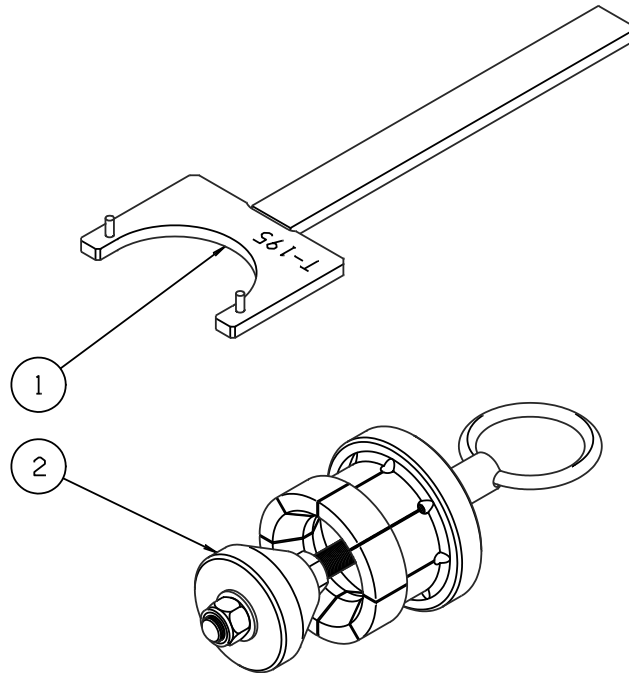
Under normal circumstances the cylinder fitting seals will never need to be replaced. If, when changing the ram, O-rings the cylinder fitting seals are broken and/or pressure will not build in jack when assembled, new cylinder fitting O-rings will need to be installed. The cylinder fitting O-rings are provided in the K-3179 Seal Replacement Kit. Use these only if necessary.

To remove cylinder and replace the O-rings, Tool Kit K-3180 must be used (see 9.4.3 Optional Tools). Kit number K-3180 is available from Tronair and Tronair Distributors only.

To Remove Cylinder:

1. Remove ram assembly as described in Figure 2.
2. Use tool kit K-3180 to remove cylinder. When lifting out cylinder be extra careful not to damage fitting on bottom of cylinder.
3. If cylinder bore is found to be rusty, it may be honed to a maximum diameter of 6.010 inches (15.2654 cm) and a surface finish of 16 micro inches. If pitting in the bore cannot be removed by this process, the jack cylinder must be replaced before the jack can be returned to service.
4. Replace O-rings.
5. Re-install cylinder; again being careful not to damage fitting on bottom of cylinder.
6. Re-install ram assembly as described in Figure 2.

9.4.3 Optional Tools



Item	Part Number	Description	Where Used
1	T-195	Wrench, Spanner	Retainer Bushing Removal/Installation
2	K-3180	Kit, Cylinder Lift Tool	Cylinder Removal/Installation

9.4 SEAL REPLACEMENT (continued)**9.4.4 Removing and Servicing Tandem Hand Pump**

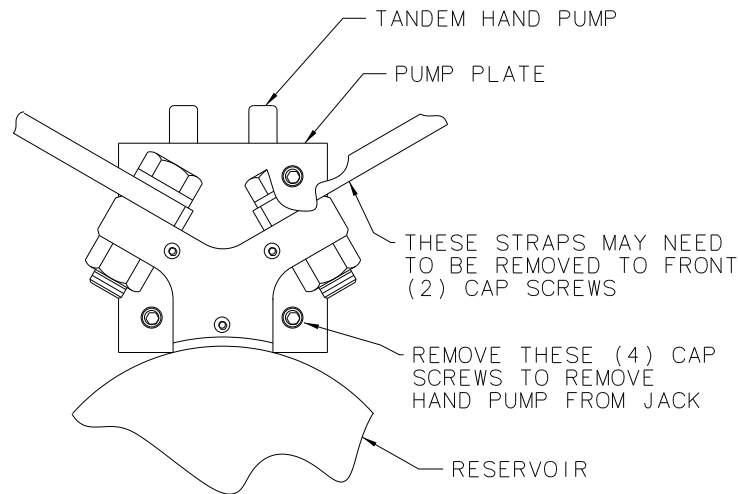
If pump is found faulty, call Tronair for replacement or repair pump per Appendix I HC-2470 Hand Pump Parts List.

1. Lower jack until it is completely retracted.

NOTE: Jack must be fully retracted before any hoses are removed to prevent major fluid spills.

2. Clamp suction (push on) hoses and remove hoses from pump.
3. Uncouple fitting of hydraulic hoses and tubing from pump.
4. Remove pump from jack by removing four (4) counter bored cap screws on bottom side of pump plate, *See illustration.*

NOTE: Straps may have to be removed to get to two (2) front cap screws.



BOTTOM SIDE OF TANDEM HAND PUMP PORTION OF JACK

5. Make necessary repairs to pump (See APPENDIX I HC-2470 Hand Pump Parts List for applicable replacement parts and kits).
6. Reassemble in reverse order.

9.4.5 Pneumatic Pump

See Appendix II - Haskel Pump information for complete parts list and repair information.

10.0 TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	ACTION
Fluid leakage at pump piston or pump body	Damaged backup ring, o-ring, piston or pump body	Remove piston and pump body. Inspect for damage. Replace defective part(s). Replace removed o-ring and backup ring
External fluid leakage at rams	Damaged o-ring, backup ring or inner cylinder wall.	Remove rams as a unit from cylinder. Inspect parts. Replace o-ring and defective part(s)
Jack fails to lift rated load	Release valve not closed properly	Fully tighten release valve
	Low fluid level	Fill to correct fluid level
	Pressure relief valve improperly adjusted	Adjust or replace release valve
	Leakage at inlet or outlet check ball	Inspect valve body for wear or replace valve body and check balls
	Vent screw closed	Open vent screw
Rams will not support load after manual or pneumatic pump up	Leaking ram o-ring seals	Check for external leakage, if present replace defective seal and back up ring
	Leaking pressure check valve	Inspect valve body for wear or replace valve body and check balls
	Leaking pressure relief valve	Remove release valve, inspect ball and ball seat in pump block. Replace effective part(s)
Rams raise and fall with each manual pump stroke	Release valve open	Fully tighten release valve
	Inlet check valve not seated or sticking	Pump rapidly to dislodge or replace valve body
	Pressure check valve not seated or sticking	Pump rapidly to dislodge or replace valve body
Jack fails to lower	Ram locknut not loosened	Raise jack ¼ inch and release locknut
	Vent screw closed	Open vent screw

11.0 PROVISION OF SPARES

11.1 SOURCE OF SPARE PARTS

Spare parts may be obtained from the manufacturer:

TRONAIR, Inc.

1 Air Cargo Pkwy East

Swanton, Ohio 43558 USA

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

Fax: (419) 867-0634

E-mail: sales@tronair.com

Website: www.tronair.com

12.0 GUARANTEES/LIMITATION OF LIABILITY

Tronair products are warranted to be free of manufacturing or material defects for a period of one year after shipment to the original customer. This is solely limited to the repair or replacement of defective components. This warranty does not cover the following items:

- a) Parts required for normal maintenance
- b) Parts covered by a component manufacturers warranty
- c) Replacement parts have a 90-day warranty from date of shipment

If you have a problem that may require service, contact Tronair immediately. Do not attempt to repair or disassemble a product without first contacting Tronair, any action may affect warranty coverage. When you contact Tronair be prepared to provide the following information:

- a) Product Model Number
- b) Product Serial Number
- c) Description of the problem

If warranty coverage is approved, either replacement parts will be sent or the product will have to be returned to Tronair for repairs. If the product is to be returned, a Return Material Authorization (RMA) number will be issued for reference purposes on any shipping documents. Failure to obtain a RMA in advance of returning an item will result in a service fee. A decision on the extent of warranty coverage on returned products is reserved pending inspection at Tronair. Any shipments to Tronair must be shipped freight prepaid. Freight costs on shipments to customers will be paid by Tronair on any warranty claims only. Any unauthorized modification of the Tronair products or use of the Tronair products in violation of cautions and warnings in any manual (including updates) or safety bulletins published or delivered by Tronair will immediately void any warranty, express or implied.

The obligations of Tronair expressly stated herein are in lieu of all other warranties or conditions expressed or implied. **Any unauthorized modification of the Tronair products or use of the Tronair products in violations of cautions and warnings in any manual (including updates) or safety bulletins published or delivered by Tronair will immediately void any warranty, express or implied and Tronair disclaims any and all liability for injury (WITHOUT LIMITATION and including DEATH), loss or damage arising from or relating to such misuse.**

13.0 APPENDICES

APPENDIX I	Hydraulic Schematic
APPENDIX II	Haskel Air Pump Manufacturer Data
APPENDIX III	HC-2470 Hand Pump Parts List
APPENDIX IV	Declaration of Conformity
APPENDIX V	Safety Data Sheet – MIL-PRF-5606 Hydraulic Fluid
APPENDIX VI	Maintenance Schedule

Parts List

When ordering replacement parts/kits, please specify Model, Serial Number & color (if applicable) of your product.

Reference Illustrations on following pages.

Item	Part Number	Description	Qty
2	Z-3030-01	Weldment, Solid Leg	3
3	Z-2546-00	Weldment, Handle	1
6	K-3333	Assembly, Blowgun	1
7	H-2267	Pump, Air	1
8	N-2009-11-S	Connector, Male	1
10	TF-1047-04*25.0	Hose, Gray Push-On, 25" long	1
11	N-2203-04	Nipple, Pipe, 1/4 NPT	1
12	TF-1043-03*21.0	Assembly, Hose, 21" long	1
13	N-2005-08-S	Elbow, Male	1
14	N-2207-04-S	Tee, Female	1
15	N-2260-09-SS	Nipple, Pipe, 1/4 NPT x 4" long	1
16	N-2204-04-S	Connector, Pipe, 1/4 NPT	1
17	HC-1856	Gauge, Pressure	1
18	N-2016-05-S	Tee, Run Swivel Nut	2
19	N-2001-08-S-B	Elbow, Straight Threaded	2
20	HC-2470	Pump, Tandem Hand	1
21	Z-3060	Assembly, Hydraulic Tube	1
22	HJ-557	Pad, Jack	1
23	Z-3021	Assembly, Extension Ram (Includes Item 22)	1
24	TR-1444	Nut, Extension	1
25	Z-3022	Assembly, Ram Nut	1
26	N-2053-05-S-B	Plug, Hex Head	1
♦ 27	Z-4439	Assembly, Cylinder	1
♦ 29	TR-1446	Bushing, Retainer	1
♦ 35	N-2557	Fitting, Cylinder Gap	1
39	N-2523-04	Fitting, 1/2 NPT Vent Plug	1
NS	N-2026-03-B	Swivel, JIC 37°	1
NS	TF-1047-04*07.0	Hose, Gray Push-On, 7" long	1
1	K-2432	Kit, Leg Pin Replacement; consists of:	
	R-1596	Pin, Leg	1
	G-1392-150S	Ring, External Retaining	2
4	K-2433	Kit, Caster Replacement; consists of:	
	U-1063	Caster	1
	G-1100-107512	Bolt, Hex Head, Grade 5, 3/8-24 x 1-1/4" long	4
	G-1202-1075	Stopnut, 3/8-24 Elastic	4
	G-1250-1070N	Flatwasher, 3/8 Narrow	8
5	K-2434	Kit, Leg Strap Replacement; consists of:	
	J-2274-01	Strap, Solid, Leg	1
	G-1100-112524	Bolt, Hex Head, Grade 5, 1-14 x 2-1/2" long	1
	G-1100-112530	Bolt, Hex Head, Grade 5, 1-14 x 3" long	1
	G-1202-1125	Stopnut, 1-14 Elastic	1
	G-1250-1130N	Flatwasher, 1 Narrow	2
	G-1251-1130R	Lockwasher, 1 Regular	1

Parts List

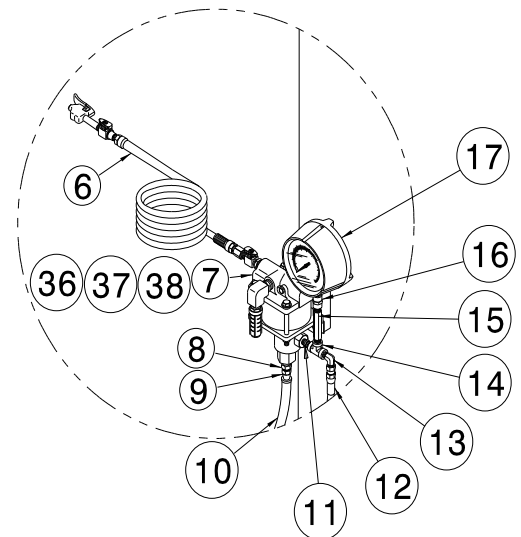
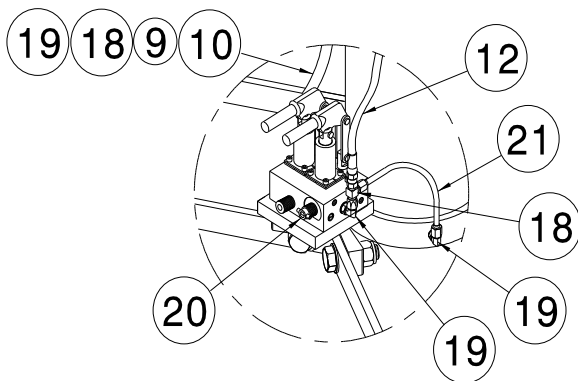
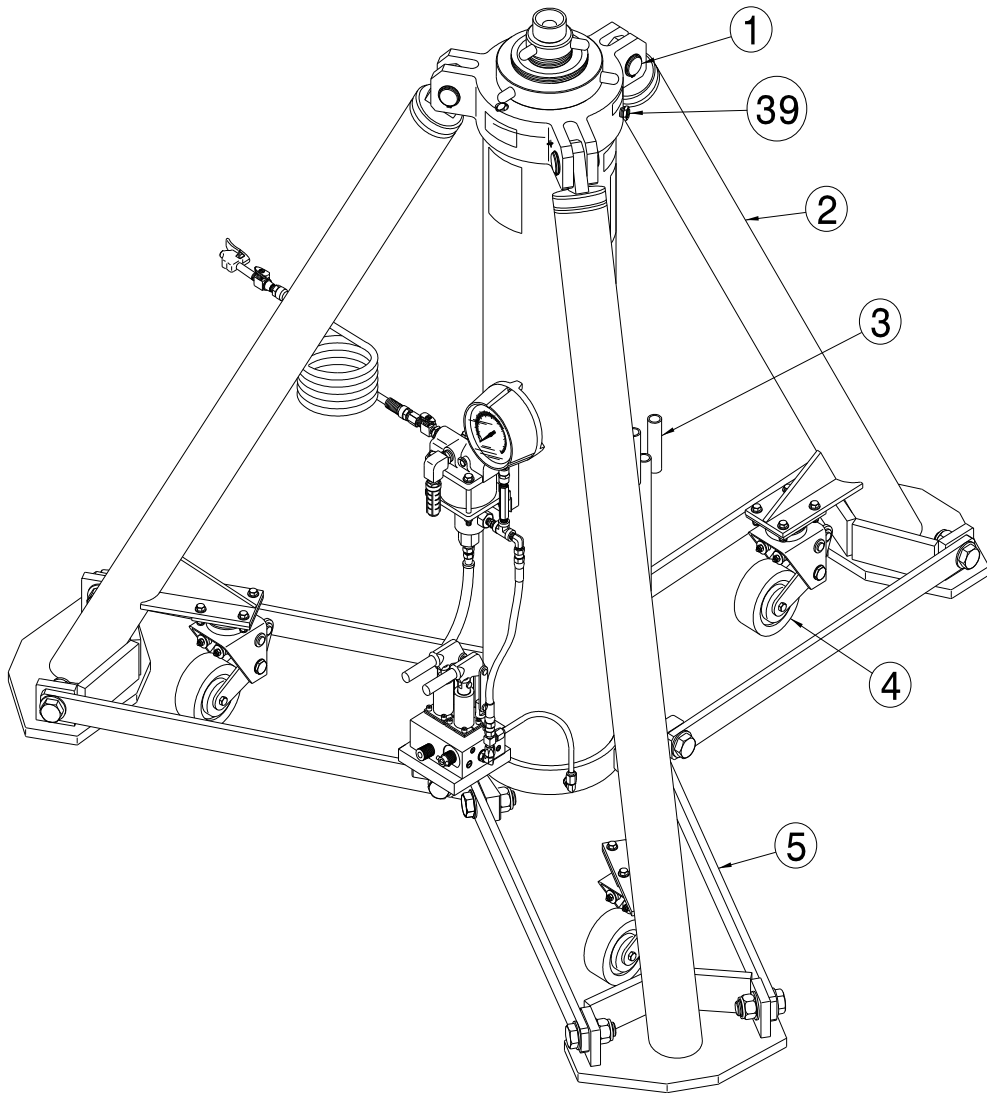
When ordering replacement parts/kits, please specify Model, Serial Number & color (if applicable) of your product.

Reference Illustrations on following pages.

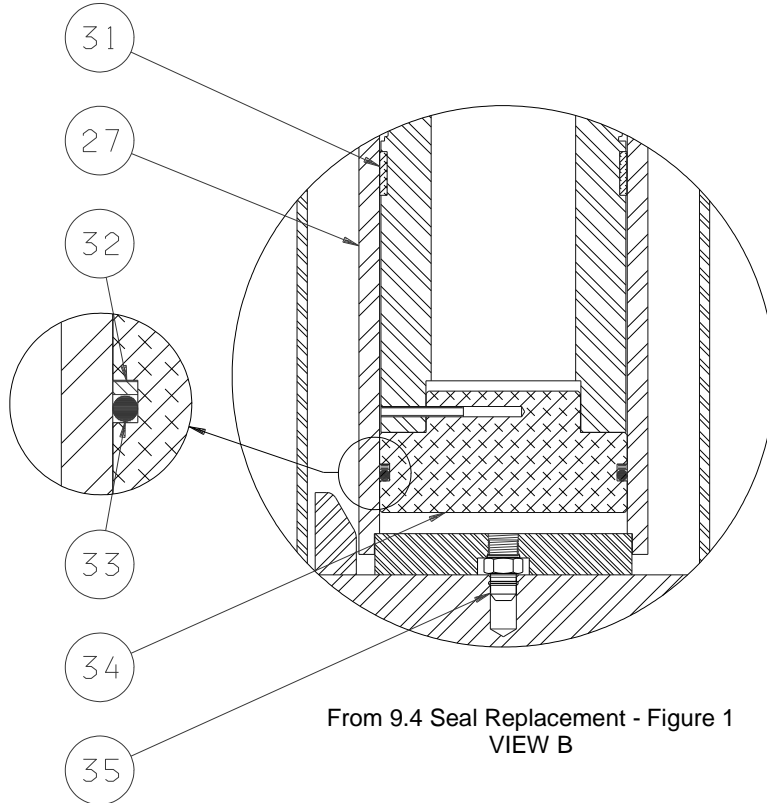
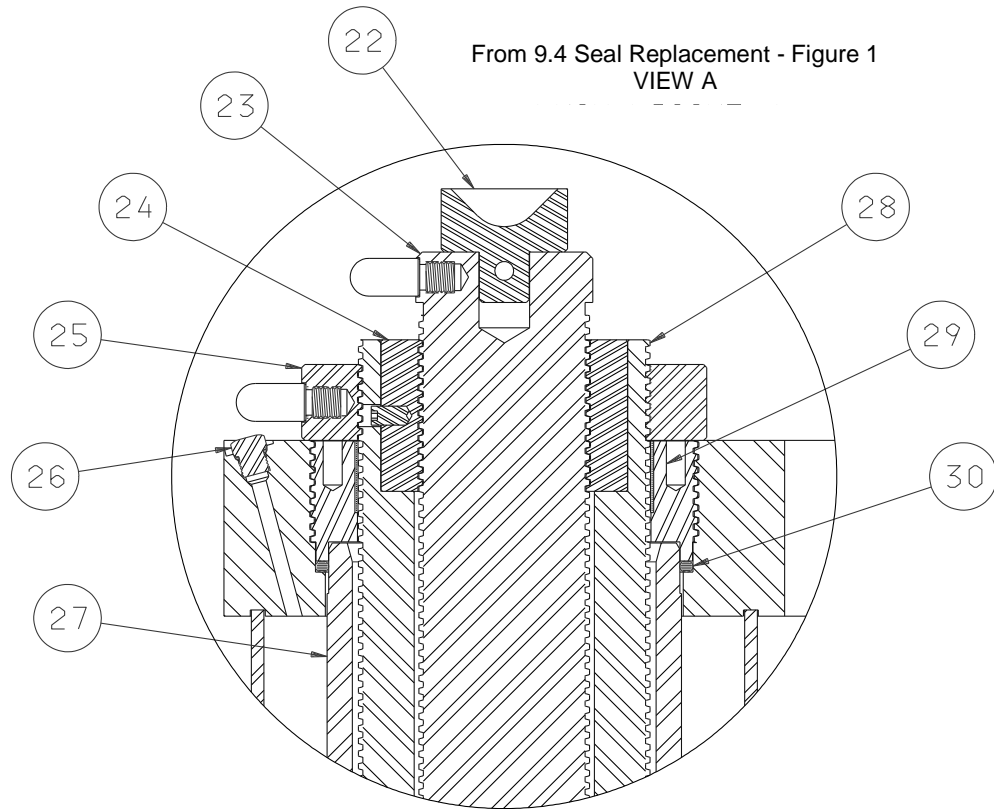
Item	Part Number	Description	Qty
◆ 28	K-3176	Kit, Ram Replacement; consists of:	
	TR-1443-01	Ram	1
	R-1959	Piston	1
	G-1300-25200	Pin, Roll, 1/4" diameter x 2" long	1
	INS-1331	Instruction, Piston Removal/Installation	1
30-33	K-3179	Kit, O-ring Replacement; consists of:	
30	HC-2000-441	O-ring, Reservoir	1
32	HC-2020-433	Backup Ring, Piston	1
33	HC-2000-433	O-ring, Piston	1
NS	HC-2000-014	O-ring, Cylinder Fitting	1
◆ 31	K-3177	Kit, Ram Stop Replacement; consists of:	
	TR-1693	Stop, Ram	2
◆ 34	K-3178	Kit, Piston Replacement; consists of:	
	R-1592	Piston	1
	G-1300-25200	Pin, Roll, 1/4" diameter x 2" long	1
	INS-1331	Instruction, Piston Removal/Installation	1
For Reference Only:			
36	K-3173	Kit, Repair Fluid Seal	(Reference Haskel Literature)
37	K-3174	Kit, Repair Air Seal	
38	28442	Lubricant, Haskel Seal	(Reference Haskel Literature)

- ◆ **When purchasing this replacement part, the O-ring kit, K-3179, must be purchased before removing old parts. (New O-rings must be installed every time the jack is disassembled).**

Parts List Illustrations



Parts List Illustrations

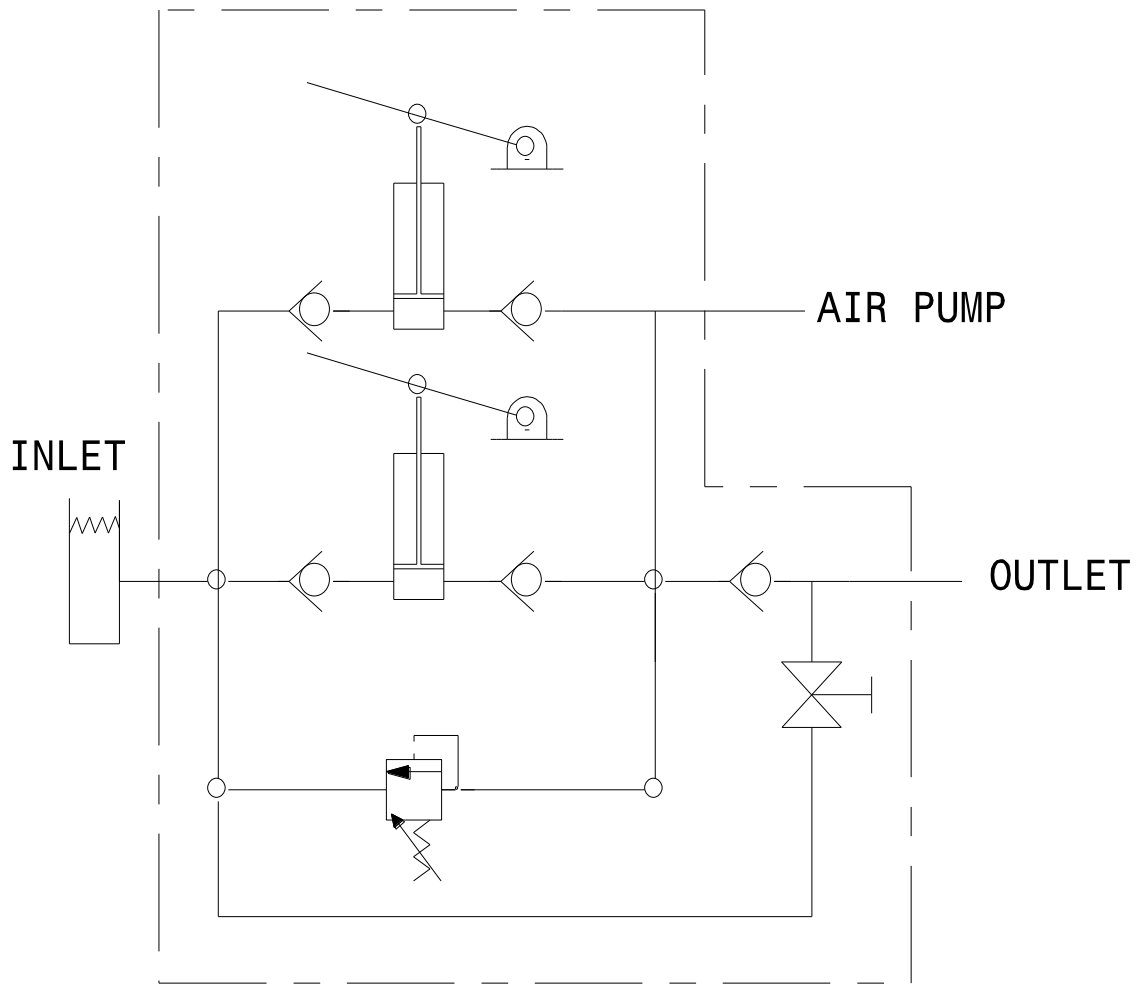




APPENDIX I

Hydraulic Schematic

Hydraulic Schematic



HYDRAULIC SCHEMATIC



APPENDIX II

Haskel Air Pump Manufacturer Data



SAFETY INFORMATION

PUMPS, GAS BOOSTERS AND AIR PRESSURE AMPLIFIERS (LIQUID, AIR OR GAS DRIVEN)

► CAUTION ◀

**HIGH PRESSURE GAS OR LIQUID CAN BE DANGEROUS IF IMPROPERLY HANDLED.
EYE PROTECTION, RESPIRATORS AND GLOVES SHOULD BE USED PER MSDS**

1. BEFORE INSTALLATION:

- 1.1 Study the technical data received with the unit. Do not hesitate to call your distributor or Haskel, Inc., on any question.
- 1.2 Determine the maximum system pressure that might be encountered for the drive input, pump input, & pump output.
 - 1.2.1 Be certain that the data confirms the unit is rated for those pressures at all three connections.
 - 1.2.2 Be certain that your connecting piping, fittings, gauges, and accessories are rated properly at all three ports and that relief valve or burst disc protection is provided for any potential over pressure.
- 1.3 Review the compatibility of the gas and/or liquids with all components and piping (particularly oxygen gas where each component exposed to the gas should be specifically cleaned, labeled, and designed for oxygen service).
- 1.4 Do not use oxygen gas boosters to pump any other gas.

2. INSTALLATION:

- 2.1 Inspect all connections for contaminants and clean as needed before tightening. If system is for oxygen gas, follow specific special inspection and cleaning procedures to ensure removal of any hydrocarbon contamination.
- 2.2 Fasten unit securely to mounting surface before tightening piping connections.
- 2.3 Use back up wrench to hold unit fitting while tightening connecting fitting.
- 2.4 Stop and inspect for any indication of cross-threading or galling (particularly stainless steel to stainless steel fittings).
- 2.5 Assure that system isolation valves are installed on the drive input, fluid input and fluid discharge lines. Also make sure that bleed down valves are installed so that pressure can be vented off from all connections to the pump.

3. OPERATION:

- 3.1 Be certain you have an understanding of the complete system before operating. Question anything that is unclear.
- 3.2 Equalize inlet & outlet pressures slowly first. Always open fluid inlet and outlet valves (to and from the pump sections) before opening drive valve. (Inlet gas will free flow through all pumps & boosters when inlet pressure exceeds outlet)
- 3.3 Open all valves slowly. Do not use quick acting valves such as 1/4 turn type - particularly in oxygen gas systems.
- 3.4 Presume that ALL installations will eventually leak due to vibration, wear or accident. Consider ALL fluids (except air & water) to be potentially hazardous if confined in a closed area. Therefore, operate only in a well ventilated area.

4. MAINTENANCE:

- 4.1 Prior to performing any maintenance, close all three isolation valves and vent all pressure to zero. **THIS IS CRITICAL. INJURY MAY RESULT IF MAINTENANCE IS ATTEMPTED WHILE THE UNIT IS PRESSURIZED.**
- 4.2 Perform maintenance in accordance with the Operating & Maintenance Manual. Make sure that replacement seals and O-rings are of fluid compatible material. Do not modify the unit in any way without contacting the factory.

Haskel International, Inc.
100 East Graham Place, Burbank, CA 91502 USA
Tel. 818/843-4000 • Fax 818/841-4291

Haskel (Asia) Pte. Ltd.
Siang How Whs., #01-09, 50 Tagore Lane, Singapore 787494
Tel. 65 455-7559 • Fax 65 455-2841

Haskel Energy Systems Ltd.
North Hylton Road, Sunderland SR5 3JD, England, UK
Tel. 44 191 549-1212 • Fax 44 191 549-0911

Haskel (Australia) Pty. Ltd.
P.O. Box 728, Toowong, Brisbane, Qld. 4066, Australia
Tel. 61 7 3277-9118 • Fax 61 7 3277-6129



Safety Precautions

OXYGEN

Oxygen is a colorless, odorless, and tasteless gas. It makes up about 21 percent of our atmosphere.

WARNING

Oxygen supports and can greatly accelerate combustion.

Oxygen, as a liquid or cold gas, may cause severe frostbite to the eyes or skin. Do not touch frosted pipes or valves. If exposure to liquid oxygen or cold gas occurs, restore tissue to normal body temperature (98.6°F) as rapidly as possible, followed by protection of the injured tissue from further damage and infection. Call a physician immediately. Rapid warming of the affected part is best achieved by using water at 108°F. Under no circumstances should the water temperature be over 112°F, nor should the frozen part be rubbed either before or after rewarming. The patient should not smoke or drink alcohol. Keep warm and at rest.

Use a pressure-reducing regulator when withdrawing gaseous oxygen from a cylinder or other high-pressure source.

Keep Combustibles Away From Oxygen and Eliminate Ignition Sources.

Many substances which do not normally burn in air and other substances which are combustible in air may burn violently when a high percentage of oxygen is present. DO NOT permit smoking or open flame in any area where oxygen is stored, handled, or used. Keep all organic materials and other flammable substances away from possible contact with oxygen, particularly oil, grease, kerosene, cloth, wood, paint, tar, coal, dust, and dirt which may contain oil or grease. Avoid spills of liquid oxygen. Do not walk on or roll equipment over spills.

Keep All Surfaces Which May Come In Contact With Oxygen Clean to Prevent Ignition.

Even normal industrial soot and dirt can constitute a combustion hazard. Do not place liquid oxygen equipment on asphalt, or on any surface which may have oil or grease deposits. Use cleaning agents which will not leave organic deposits on the cleaned surfaces. In handling equipment which may come in contact with oxygen, use only clean gloves or hands washed clean of oil. Do not lubricate oxygen equipment with oil, grease, or unapproved lubricants.

Maintain Adequate Ventilation.

To prevent accumulation of oxygen in areas containing oxygen equipment and to minimize combustion hazards, adequate ventilation must be provided.

Liquid Oxygen Is Extremely Cold.

(297 deg. F. below zero)

COVER EYES AND SKIN.

Accidental contact of liquid oxygen or cold oxygen gas with the eyes or skin may cause severe frostbite. Handle liquid so that it will not splash or spill. Protect your eyes with safety goggles or face shield, and cover the skin to prevent contact with the liquid or cold gas, or with cold pipes and equipment. Clean, protective gloves without gauntlet that can be quickly and easily removed and long sleeves are recommended for arm protection. Cuffless trousers should be worn outside boots or over high-top shoes to shed spilled liquid. If clothing should be splashed with liquid oxygen or otherwise saturated with oxygen gas, air out clothing immediately. Such clothing should not be considered safe to wear for at least 30 minutes, since it will be highly flammable and easily ignited while the concentrated oxygen remains.

Containers, Equipment, and Replacement Parts Must Be Suitable for Oxygen Service.

Use only equipment, cylinders, containers and apparatus designed for use with oxygen. Many materials, especially some non-metallic gaskets and seals, constitute a combustion hazard when in oxygen service, although they may be acceptable for use with other gases. Make no substitutions for recommended equipment, and be sure all replacement parts are compatible with oxygen and cleaned for oxygen service. Keep repair parts in sealed clean plastic bags until ready for use.

Regulators.

Before attaching regulator to cylinder, inspect the regulator very carefully. Make visually certain that the regulator and the inlet filter are free of oil, grease or other hydrocarbon-type contaminants. These contaminants may be ignited when the cylinder valve is opened and would burn violently in an enriched oxygen atmosphere. Replace the inlet filter if broken, missing or found contaminated. When filter is missing or damaged, the regulator should also be reconditioned and the high pressure gauge replaced. Before attaching the regulator to the cylinder valve, crack the cylinder valve momentarily to blow out any dust or dirt that might have accumulated in the cylinder valve outlet. Connect the regulator to the valve, back out the pressure adjusting screw until it turns freely and then open the cylinder valve very slightly and very slowly so the inlet pressure gauge moves slowly to the Cylinder pressure. Then open the cylinder valve all the way. To minimize chance of injury, stand to one side of the regulator when opening the cylinder valve.



APPENDIX III

**HC-2470
Hand Pump Parts List**



**Model: HC-2470
Tandem Hand Pump**

**Parts List
With Illustrations**

12/2009 – Rev. 01

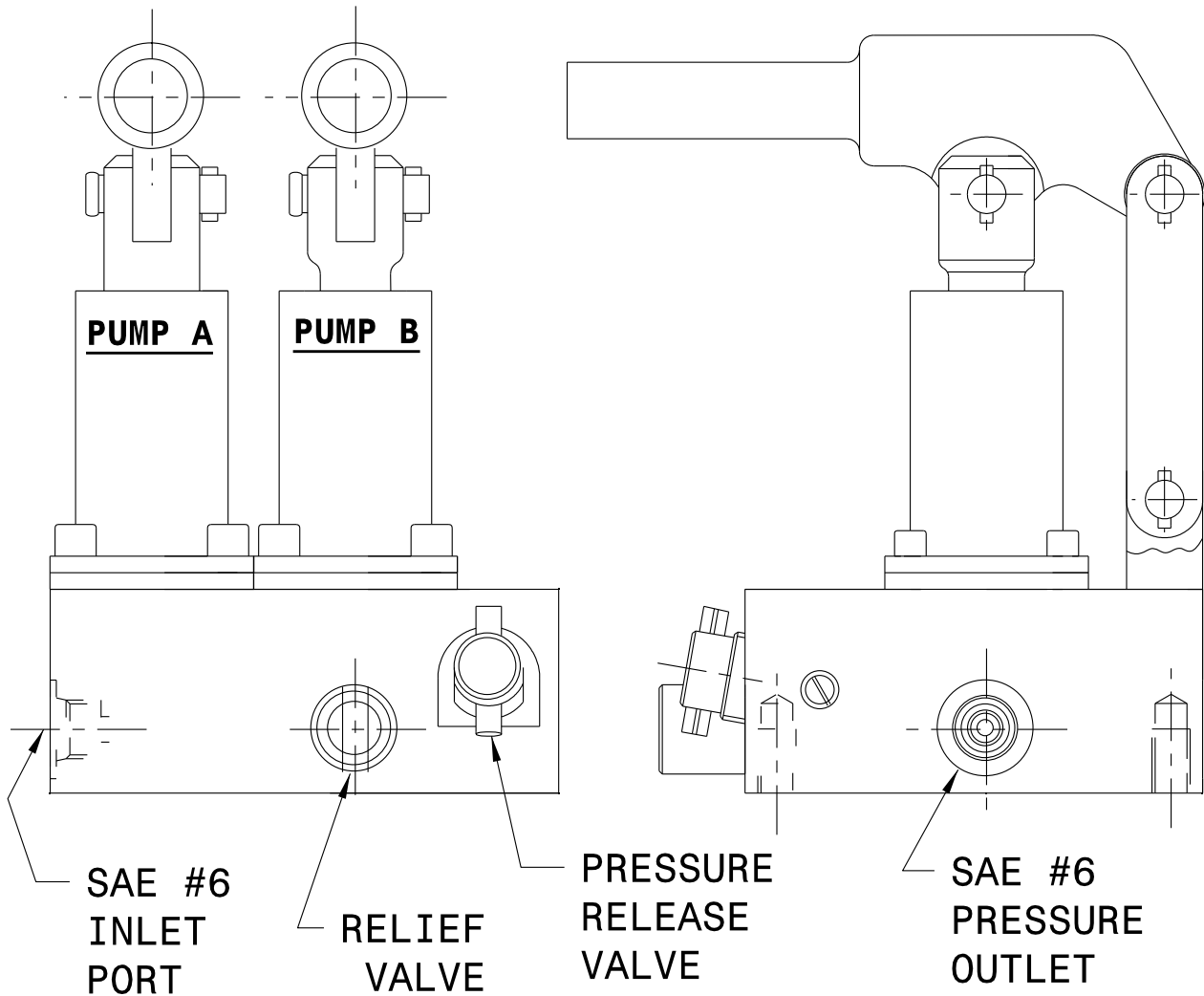
**** When ordering Replacement Parts/Kits, please specify Model, Color and Serial Number of your Unit.****

**Model: HC-2470
Tandem Hand Pump**

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.

Parts List

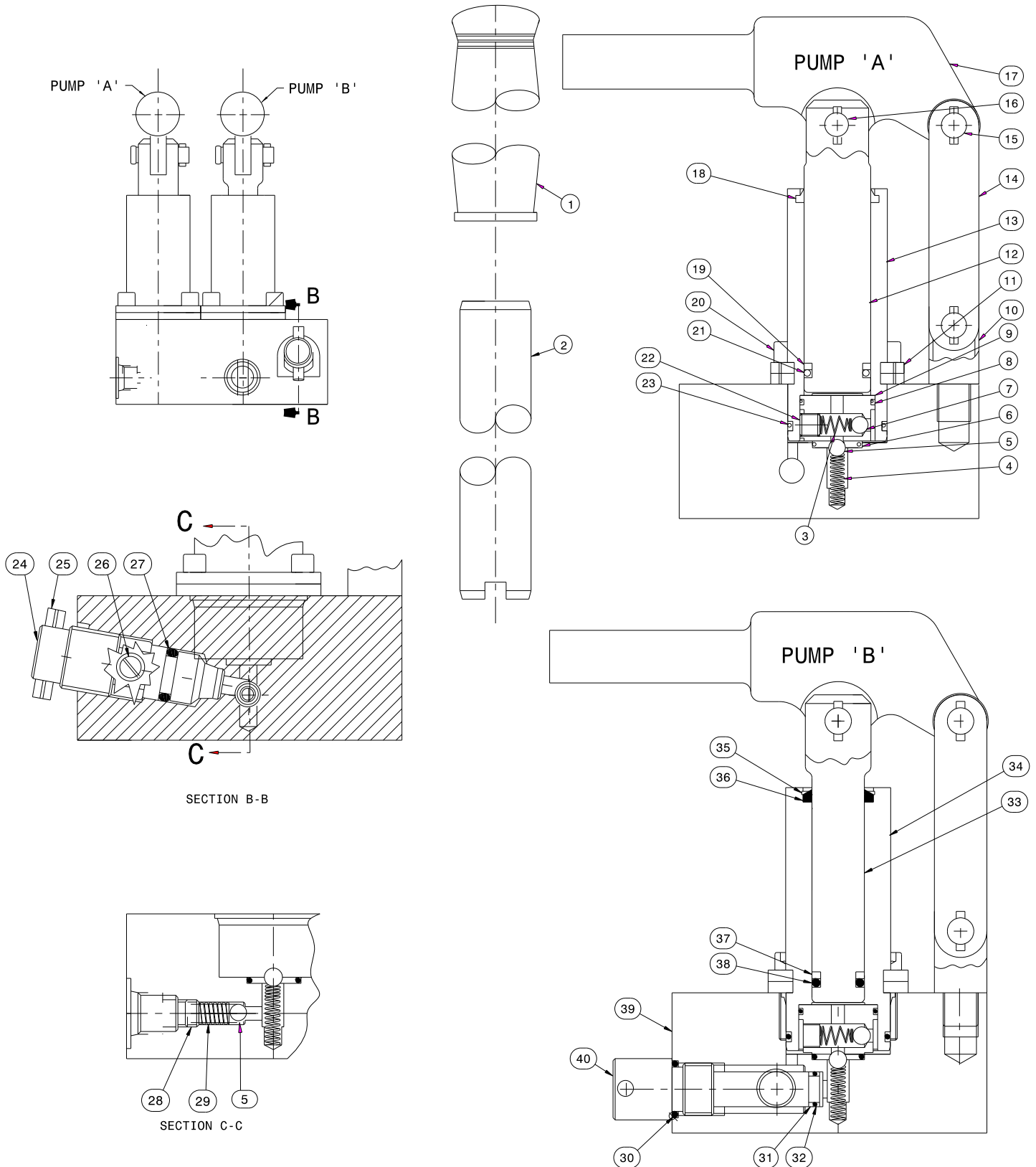
This pump is compatible with MIL-H-5606/MIL-H-83282 Hydraulic Fluids only.



TRONAIR

12/2009 – Rev. 01

Parts List



This pump is compatible with MIL-PRF-5606/MIL-PRF-83282 Hydraulic Fluids only.

TRONAIR

12/2009 – Rev. 01

Parts List

This pump is compatible with MIL-PRF-5606/MIL-PRF-83282 Hydraulic Fluids only.

ITEM	PART NUMBER	DESCRIPTION	QTY
1		Grip Handle	2
2		Handle	2
10		Pivot	2
11		Flange Half	8
20		Screw	8
25		Roll Pin	1
39		Body	1
	K-4369	Kit, Release Screw; consists of:	
24		Retainer, Screw	1
26		Screw, Release	1
	K-4368	Kit, Relief Screw; consists of:	
40		Assembly, Relief	1

ITEM	PART NUMBER		DESCRIPTION	QTY
	PUMP A	PUMP B		
	K-4366	K-4366	Kit, Seal Replacement; consists of:	
6			O-ring, Buna	2
8			O-ring, Buna	2
18			Wiper	1
19			Backup	1
21			O-ring, Buna	1
23			O-ring, Buna	2
27			O-ring, Buna	1
30			O-ring, Buna	1
31			Backup, Split	1
32			O-ring, Buna	1
36			Wiper	1
37			Backup	1
38			O-ring, Buna	1
	K-1068	K-1068	Kit, Linkage; consists of:	
14			Strap	4
15			Assembly, Pin Linkage	4
16			Assembly, Clevis Pin	2
17			Bracket, Pump Handle	2
	K-4367	K-4367	Kit, Internal Parts; consists of:	
3			Spring, Inlet Check	2
4			Spring, Outlet Check	2
5			Ball, Outlet Check	3
7			Ball	2
9			Body, Valve	2
22			Plug, Pipe	2
28			Lock, Screw	1
29			Spring, Ball Check	1

Parts list continued on following page

**Model: HC-2470
Tandem Hand Pump**

ITEM	PART NUMBER		DESCRIPTION	QTY
	PUMP A	PUMP B		
	K-1777	NA	Kit, Piston/Cylinder; consists of:	
..... 9			Body, Valve	2
..... 12			Piston	1
..... 13			Tube	1
..... 35			Retainer, Wiper	1
	NA	K-1778	Kit, Piston/Cylinder; consists of:	
..... 9			Body, Valve	1
..... 33			Piston	1
..... 34			Tube	1
..... 35			Retainer, Wiper	1
	NA	K-1906	Kit, Piston/Seal; consists of:	
..... 33			Piston	1
..... 37			O-ring, Piston	1
..... 38			Ring, Back-up.....	1

NOTE: Entire pump assembly can be purchased.



APPENDIX IV

Declaration of Conformity



DECLARATION of CONFORMITY

The design, development and manufacture is in accordance with European Community guidelines

Axle Jack
02A7850C0100

Relevant provisions complied with by the machinery:

98/37/EEC

Relevant standards complied with by the machinery:

EN ISO 12100-1

Identification of person empowered to sign on behalf of the Manufacturer:

A handwritten signature in cursive script that reads "Patrick Finch". The signature is written in black ink and is positioned above a horizontal line.

Quality Assurance Representative



APPENDIX V

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

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
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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.

NFPA Hazard ID:	Health: 1	Flammability: 2	Reactivity: 0
HMIS Hazard ID:	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.

SECTION 3	COMPOSITION / INFORMATION ON INGREDIENTS
------------------	---

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).

SECTION 4	FIRST AID MEASURES
------------------	---------------------------

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 (CO₂) 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

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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 GENELEC 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/m ³	N/A	ACGIH
DISTILLATES (PETROLEUM), HYDROTREATED LIGHT [total hydrocarbon vapor]	Non-Aerosol	TWA	200 mg/m ³	Skin	ACGIH
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	Mist.	TWA	5 mg/m ³	N/A	OSHA Z1
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	Inhalable fraction.	TWA	5 mg/m ³	N/A	ACGIH
HYDROTREATED LIGHT NAPHTHENIC DISTILLATE (PETROLEUM)	Mist.	TWA	5 mg/m ³	N/A	ACGIH
HYDROTREATED MIDDLE DISTILLATE (PETROLEUM)	Mist.	TWA	5 mg/m ³	N/A	OSHA Z1
HYDROTREATED MIDDLE DISTILLATE (PETROLEUM)	Inhalable fraction.	TWA	5 mg/m ³	N/A	ACGIH
TRIPHENYL PHOSPHATE		TWA	3 mg/m ³	N/A	OSHA Z1
TRIPHENYL PHOSPHATE		TWA	3 mg/m ³	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/m³ - ACGIH TLV (inhalable fraction), 5 mg/m³ - 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.

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
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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
Inhalation	
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.

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Ingestion	
Acute Toxicity: No end point data for material.	Minimally Toxic. Based on assessment of the components.
Skin	
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.
Eye	
Serious Eye Damage/Irritation: No end point data for material.	May cause mild, short-lasting discomfort to eyes. Based on assessment of the components.
Sensitization	
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.
Aspiration: Data available.	May be fatal if swallowed and enters airways. Based on physico-chemical properties of the material.
Germ Cell Mutagenicity: No end point data for material.	Not expected to be a germ cell mutagen. Based on assessment of the components.
Carcinogenicity: No end point data for material.	Not expected to cause cancer. Based on assessment of the components.
Reproductive Toxicity: No end point data for material.	Not expected to be a reproductive toxicant. Based on assessment of the components.
Lactation: No end point data for material.	Not expected to cause harm to breast-fed children.
Specific Target Organ Toxicity (STOT)	
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--

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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

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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.

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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

SECTION 16	OTHER INFORMATION
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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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MHC: 2A, 0, 0, 0, 1, 1

PPEC: C

DGN: 2005454XUS (552975)

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APPENDIX VI

Maintenance Schedule

Single-Stage Tripod Jacks

Tronair recommends performing preventative maintenance on all jacks, which should include a 90-day routine inspection and a 12-month load test.

Model Number _____ Serial Number _____

Maintenance Performed By _____ Date _____

90-Day Maintenance:

- Check hydraulic system for leaks including the following:
 - Hydraulic lines; hoses and fittings
 - Hand pump; cylinder, fittings and seals
 - Reservoir; welds and fittings
 - Air operated pump (optional equipment); fittings, air side and oil side seals
- Check jack structure for corrosion, bending, cracking and excessive wear including the following:
 - Ball lock pins
 - Mechanical extension
 - Welded joints; tripod legs, cylinder and foot pads
 - Ram lock nuts; gouge marks and cracks in threads
 - Jack pads
- Check fluid level with rams fully retracted. See manual or reservoir tag for proper level height
- Extend rams and visually inspect for corrosion, foreign matter, excessive wear and leaks around ram seals. Remove any foreign matter
- Check air operated pump if equipped (reference air operated pump service manual)
- Check paint condition, touch-up areas that are exposed
- Actuate the hand pump and raise the ram to full extension at least once.
Do not over pressurize once fully extended
- Apply DoAll, RPM, LPS or equivalent water repellant that is Buna N compatible to the rams
- Open release valve and verify that rams fully retract
- Lubricate casters (if applicable)
- Torque ram retaining cap
(refer to product Operation and Safety Manual or following page for location and torque specification)

Annual (12-Month) Maintenance:

- Check hydraulic fluid for contamination (dirt/water) drain and flush if required
- Perform 90-day maintenance checklist
- Capacity test (105% - 110% of jack's rated capacity)

NOTE: The jack may be returned to Tronair for load testing, or sent to a local hydraulic repair shop. Please contact Tronair to obtain a "Return Material Authorization Number" (RMA #) before sending any product to Tronair.