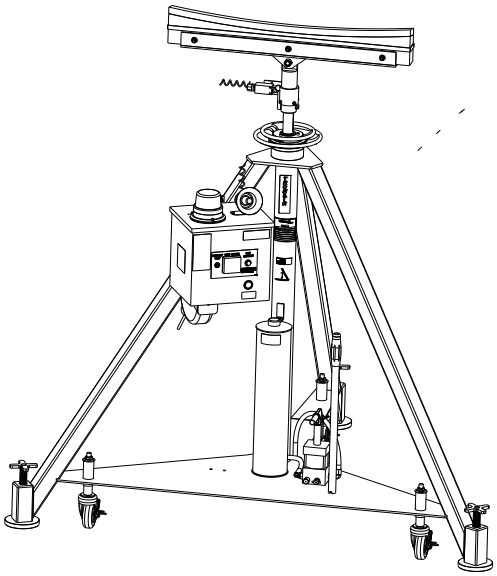
OPERATION & SERVICE MANUAL



Model: 03A5846C0100
1 Ton Tailstand with Alarm

10/2014 – Rev. 02

Tronair, Inc.
1 Air Cargo Pkwy East
Swanton, OH 43558

Phone: (419) 866-6301 | 800-426-6301
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REVISION	DATE	TEXT AFFECTED
01	12/2013	Original release
02	10/2014	Major revision

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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: One Ton Tailstand with Alarm
Model Number: 03A5846C0100 See Nameplate for Serial Number

Manufactured By: ***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

1.1 USAGE

The device is intended to stabilize an aircraft by its fuselage during maintenance with an alarm warning system within the maximum rated capacity of the tailstand.

1.2 LIST OF DRAWINGS

Reference Illustrated Parts List.

2.0 SAFETY INFORMATION

2.1 ALARM AND WARNING SYSTEMS

The tailstand has an alarm system that alerts the operator of a load shift to the fuselage of aircraft applied to the top of the cradle. The unit attached to the tailstand sounds a loud 120 dB alarm (warbling tone) until the aircraft is lifted off of the cradle.

2.2 WARNING AND DANGER SIGNS

WARNING! Electrical Shock! Caution: This tailstand produces voltages and current sufficient to cause burns and death by electric shock! Always inspect cables and plugs for damage before use. Do not use if damaged.

WARNING! Batteries! Batteries give off flammable hydrogen gas and can explode if ignited. Acid and arcing from a ruptured battery can cause fires and additional damage.

Lockout! If working near the batteries disconnect the negative battery cable, at the battery.

Loud Noise Hazard! Ear protection must be worn while operating or testing this equipment.

2.3 COMPONENT SAFETY FEATURES

- **Ram Locknut** prevents lowering of the ram. The Ram Locknut must be lowered as the cradle is lifted into position
- **CE Hand Pump With Check Valve** prevents unintentional decent of aircraft if relief valve fails
- **Mechanical Lock Nut Retaining Ring**

2.4 FUNCTIONAL SAFETY FEATURES

- **Pressure Relief Valve** prevents overload during raising operations.

2.5 FEATURES FOR OPERATOR SAFETY

- Cautions And Instruction Labels Located on Tailstand
- Ram Locknut

2.6 ENVIRONMENTAL SAFETY FEATURES

Tailstand is non-polluting.

2.7 PROTECTION SYSTEMS

None

2.8 CLOSED CIRCUITS

Reference Figure 1. See APPENDIX II 12 VDC Electrical Schematics

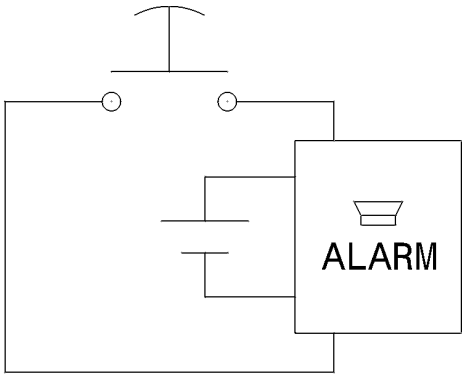


FIGURE 1 – Closed Circuits

2.9 INTERLOCKING

None

2.10 NECESSARY PERSONAL PROTECTIVE EQUIPMENT

CAUTION!

Always wear safety glasses.

2.0 SAFETY INFORMATION *(continued)*

2.11 SAFETY GUIDELINES

CAUTION!

1. **Lower and seat locknut after ram height is set.**
2. **DO NOT place hands on top of tailstand near base of ram while lowering tailstand extension. Pinch point exists between tube tailstand.**
3. **ALWAYS install tailstand AFTER aircraft has been jacked to working position.**
4. **Never put hands between aircraft and tailstand cradle.**
5. **With ram completely collapsed check hydraulic fluid level with vent cap removed. Fluid level should be ¾ to ½ in (1.9 to 1.3 cm) from top of tank.**
   - **Replenish with MIL-PRF-5606 fluid as required.**

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

6. **NEVER load tailstand by lowering jacks. ALWAYS lower and remove tailstand BEFORE lowering aircraft.**
7. **DO NOT allow prolonged exposure to the sounding alarm. The alarm sound may cause permanent hearing loss. Hearing protection required.**
8. **DO NOT place objects in the path of the alarm's horn opening that may limit the audible range and reduce the effectiveness of the alarm.**

2.12 CONDITIONS FOR SAFE USE

- Use in a clean dry environment, on a hard level surface
- Operate between 25° F and 100° F (-4º C and 38º C)

2.13 OPERATOR QUALIFICATIONS

This tailstand is intended to be used by a 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 tailstand.

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

2.14 ADDITIONAL SAFETY MEASURES

This tailstand must be used in accordance with this Technical manual, and in accordance with the aircraft manufacturer's jacking and stabilizing procedures.

3.0 SPECIFICATIONS

- Capacity: 2,000 lbs (907 kg)
- Closed Height: 75 in (190 cm)
- Mechanical Extension: 13 in (33 cm)
- Hydraulic Extension: 42 in (107 cm)
- Fully Extended: 130 in (330 cm)
- Weight: 410 lbs (186 kg)

4.0 PACKAGING AND STORAGE

4.1 PACKAGING REQUIREMENTS

Tailstand is to be packaged as required to prevent damage to legs or cradle equipment during shipment.

4.2 HANDLING

Tailstand can be rolled by hand on its casters.

4.3 STRAPPING

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

4.4 PACKAGING PROTECTION

No special packaging material for cushioning or suspension is required.

4.5 LABELING OF PACKAGING

Packaging should be labeled **DO NOT DROP**.

4.0 packaging and storage continued on following page.

4.0 PACKAGING AND STORAGE *(continued)*

4.6 STORAGE COMPATIBILITY

No special considerations.

4.7 STORAGE ENVIRONMENT

- Store tailstand between 5° F and 120° F (-15º C and 49º C)
- Always store tailstand with ram all the way down
- Tailstand must be stored in a clean and dry environment
- Batteries can be stored without charging for 6 months

4.8 STORAGE SPACE AND HANDLING FACILITIES

- Weight: 410 lbs (186 kg)
- Minimum Closed Height: 75 in (190 cm)
- Mechanical Extension: 13 in (33 cm)
- Maximum Height Obtainable: 130 in (330 cm)
- Width: 63 ½ in (161.3 cm)
- Length: 72 9/16 in (184.3 cm)

5.0 TRANSPORTATION

Lifting can be accomplished by crane and strap through top of tripod, or by fork truck under lower tripod support.
Approximate weight 410 lbs (186 kg)

6.0 ASSEMBLY

6.1 GENERAL INSTRUCTIONS

1. 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.
2. All replacement parts must be the same as or better than the original parts supplied.
3. No modifications are allowed as they may adversely affect the tailstand's safety performance.

6.2 PRE-USE CHECKS

1. Refer to the Illustrated Parts List to identify and ensure that all parts are present.
2. Generally check over unit and ensure the tightness of all nuts and bolts.

6.3 PERSONNEL REQUIREMENTS

This tailstand is to be assembled by qualified technicians familiar with aircraft maintenance systems.

6.0 ASSEMBLY *(continued)*

6.4 ASSEMBLY STEPS

1. Fasten cradle assembly to extension with one (1) ⅝ - 18 x 2 ½ inch hex head bolt, ⅝ inch flatwashers, and ⅝ - 18 elastic stopnut. Reference Figure 2.
2. Open electrical panel door and reconnect negative lead wire (green wire B) to battery negative terminal security door with door latch.
3. **End user required to attach single phase outlet plug to the end of input cable.**

NOTE: Plug AC cord into outlet to reset battery charger. AC cord will need to be plugged into outlet whenever the battery is disconnected or battery voltage is below 10.5 V.

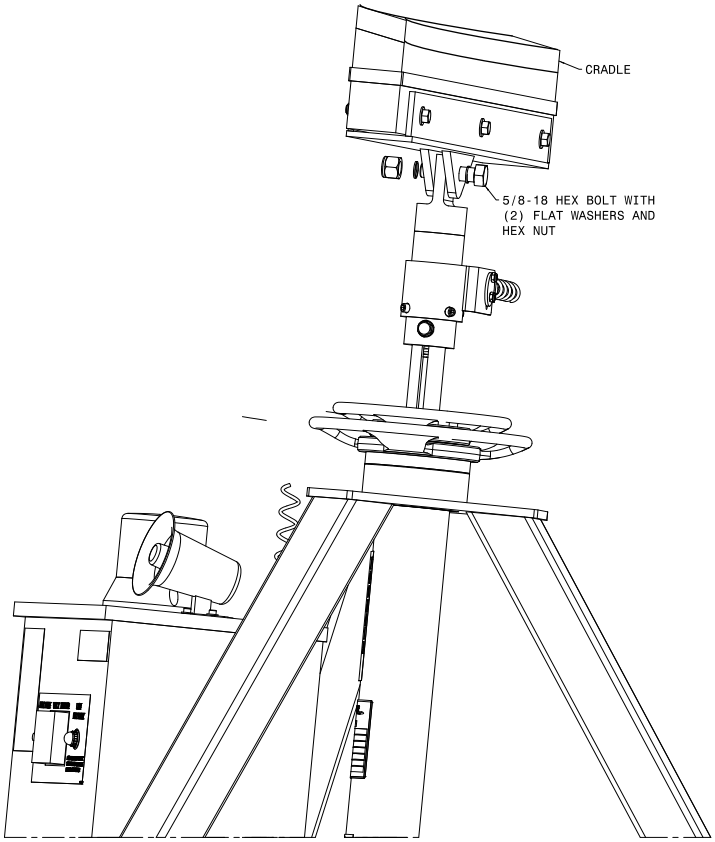


Figure 2

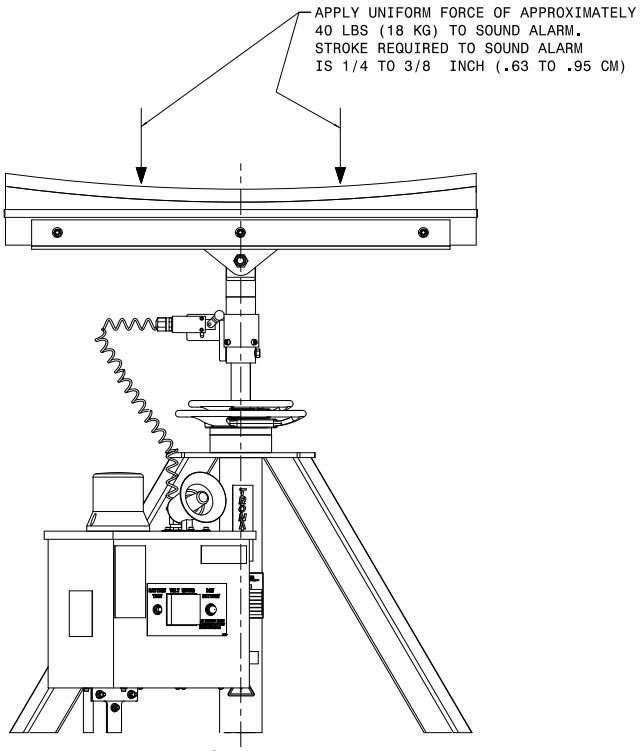


Figure 3

6.5 INSPECTION AND TEST PROCEDURES

1. It is recommended every 90 days to visually inspect all welds, cradle, extension pin, and extension pin holes in the base and extension tubing for defects. If defects are found, remove tailstand from active service until repairs are made
2. To test battery voltage press momentary battery switch
3. Test alarm by slowly applying a force evenly distributed across the top of the cradle. The cradle head will lower and engage a limit switch. A loud alarm will then sound when the force reaches approximately 40 lbs (18.1 kg) or cradle stroke ¼ inch to ⅜ inch (.63 cm to .95 cm). If alarm does not sound, refer to the Troubleshooting section. Reference Figure 3

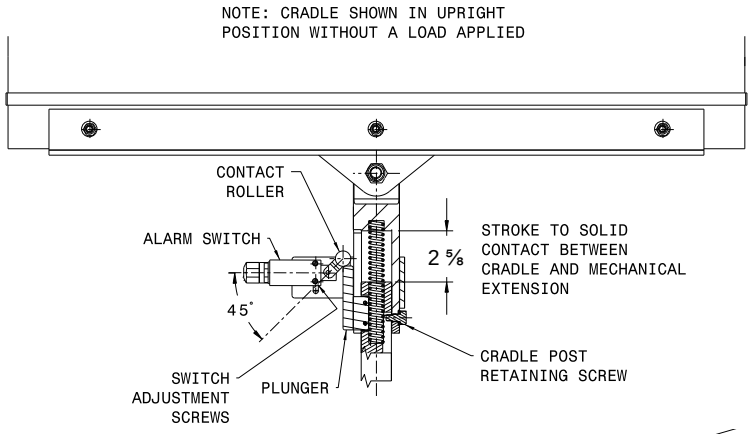
7.0 OPERATION

7.1 OPERATING PARAMETERS

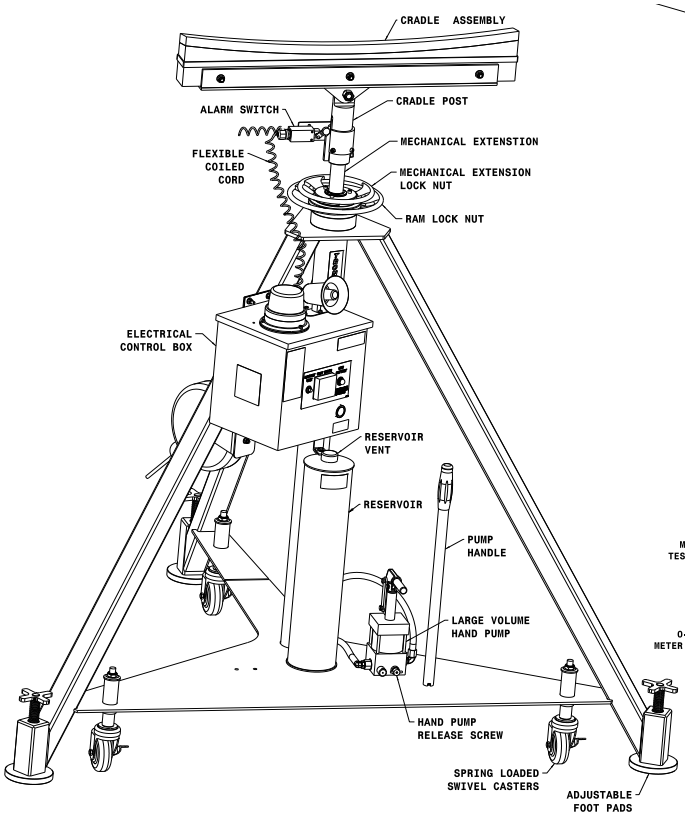
1. The user shall work in accordance with this manual
2. The employer of the operator shall provide all necessary training
3. Operate between 25° F and 100° F (-4º C and 38º C)

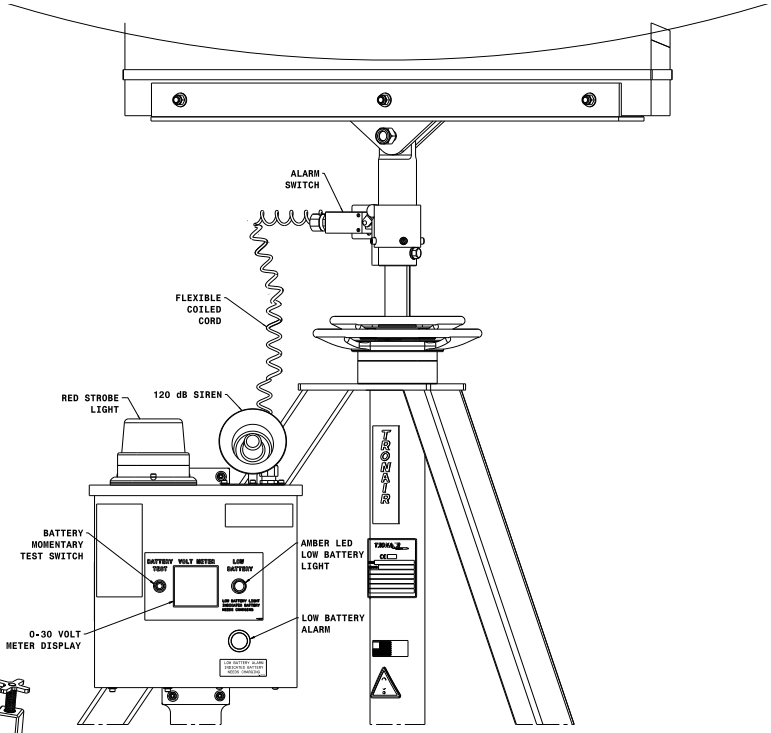
7.2 NUMERICAL VALUES

- Minimum Closed Height: 75 in (190 cm)
- Mechanical Extension: 13 in (33 cm)
- Hydraulic Extension: 42 in (107 cm)
- Maximum Height Obtainable: 130 in (330 cm)
- Weight: 410 lbs (186 kg)
- Input Voltage: AC 115/230, 50/60 Hz
- Battery Charger: 12 volt, 5 amp
- Battery: 12 volt, 7.2 amp hours
- Alarm (Battery Powered): 12 vdc at 24 amps
- Alarm Horn: 120 dB



7.3 OPERATOR CONTROLS





See illustrations

7.4 OPERATING INSTRUCTIONS

The user should be familiar with the following statements prior to using the tailstand:

CAUTION!

1. **Lower and seat locknut after ram height is set.**
2. **DO NOT place hands on top of tailstand near base of ram while lowering tailstand extension. Pinch point exists between tube tailstand.**
3. **ALWAYS install tailstand AFTER aircraft has been jacked to working position.**
4. **Never put hands between aircraft and tailstand cradle.**
5. **With ram completely collapsed check hydraulic fluid level with vent cap removed. Fluid level should be 2 in (5.1 cm) from top of tank.**
   - **Replenish with MIL-PRF-5606 fluid as required.**

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

7.4 OPERATING INSTRUCTIONS *(continued)*

6. **NEVER load tailstand by lowering jacks. ALWAYS lower and remove tailstand BEFORE lowering aircraft.**
7. **DO NOT allow prolonged exposure to the sounding alarm. The alarm sound may cause permanent hearing loss. Hearing protection required.**
8. **DO NOT place objects in the path of the alarm's horn opening that may limit the audible range and reduce the effectiveness of the alarm.**

7.4.1 Rules For Operating

a. The user shall work in accordance with this manual
b. The employer of the operator shall provide all necessary training
c. Operate between 25° F and 100° F (-4º C and 38º C)

7.4.2 Operation

1. Tailstand is placed into designated fuselage position after the aircraft has been jacked to desired height
2. Tailstand is removed before jacks lower aircraft

7.4.3 Alarm Test

When a force of approximately 40 lbs (18.1 kg) is applied to the top of the cradle, the cradle head will lower and depress the plunger switch. This will activate the alarm which sounds a loud 120 dB warbling tone until the force is removed from cradle. Hearing protection required.

7.4.4 Battery Test

Press battery momentary test switch located in front of electrical box. Battery voltage can be read on volt meter display.

NOTE: Plug AC cord into outlet to charge battery when low volt light comes on and alarm sounds. Battery voltage will be approximately 10.6 volts and will take less than 1 hour to recharge. Battery discharge time is approximately 1 week.

NOTE: When battery voltage drops to 7.00 volts or below the battery charger will not work. Charge battery with auxiliary charger.

CAUTION!

Depressing the battery momentary test switch does not provide a check for the entire electronic circuit!

7.4.5 Tailstand Jacking Instructions

1. Place tailstand on a hard, level surface
2. Lower adjustable pads to contact floor
3. Raise mechanical extension to desired height
4. Close pump release valve and operate pump
5. Lower ram locknut while extending ram. Keep within 1 inch of bottom of extending ram
6. Do not continue to operate hand pump after ram is 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 Tailstand:

1. Lower tailstand
2. If ram locknut is tight, raise ram slightly to release nut ¼ inch from tripod
3. Loosen pump release valve slightly to slowly lower ram
4. Raise ram locknut while lowering ram
5. Lower mechanical extension to fully collapsed position

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

CAUTION!

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

Always wear safety glasses.

8.0 TRAINING

Training of operating personnel is the responsibility of the employer. This tailstand 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 backup rings once removed. Cut and damaged rings normally result in fluid leakage
- At this time flush old hydraulic fluid and dirt from over-all system and replenish with new, clean hydraulic fluid
- No modifications shall be carried out which adversely affect the compliance of the tailstand with draft standard 2006/42/EC

9.2 MAINTENANCE SCHEDULE

Check Fluid Level..... Each Use
Lubricate Casters ..... 3 Months
Cleaning ..... Annually Or As Needed

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

9.2.1 Storage/Low Usage

If tailstand is not being used on a regular basis, every 90 days the tailstand should be fully extended and retracted to exercise the seals and to prevent rust build up on the cylinder I.D. While ram is extended, clean the threads and spray with DoALL RPM, LPS, or equivalent that is water repellent and will not harm BUNA “N” O-rings.

9.3 SERVICING TAILSTAND

To Disassemble Tailstand For Seal Replacement:

1. Raise ram high enough to allow removal of the three 5/16 – 18 socket head cap screws with guide ring and mounting plate
2. Raise ram where the ram assembly can be lifted from the tailstand cylinder

To Re-assemble Tailstand:

1. Re-assemble in reverse order of above

NOTE: Lubricate cylinder, ram and o-ring(s) for assembly:
Lubricate inner cylinder wall with MIL-PRF-5606 hydraulic fluid
Apply suitable o-ring lubricant grease to installed o-ring and to o-ring lead-in chamfer at opening of cylinder

NOTE: To minimize air entrapment under the rams. Actuate cylinder with hand pump several inches and release. This will circulate oil and bleed out air.

2. Spray I.D. of cylinder and O.D. of rams with DoALL RPM, LPS or equivalent water repellent that will not harm the Buna “N” O-rings to protect surfaces from rusting when not in use
3. Ensure locknut retaining ring is present on second stage ram to prevent nut removal after seal kit installation

NOTE: Dispose of hydraulic fluid per local and federal regulations.

9.4 REMOVING AND SERVICING PUMP

NOTE: If pump is found faulty, call the factory for replacement or replace seals as follows:

1. Review Appendix IV HC-2602 Hand Pump Parts List
2. Clamp suction hose from reservoir and remove hose from pump
3. Uncouple fitting of hydraulic hoses from pump, dis-assemble hand pump as required
4. Remove pump and related parts from tailstand as required
5. Replace O-rings and backup ring. (See Appendix IV for kits available.)
6. Re-assemble in reverse order.

9.5 TAILSTAND FUNCTION LOAD TEST

NOTE: If function load testing is required perform without cradle assembly and cradle post (review section 7.3 Operator Controls):

1. Take all necessary precautions to prevent injury.
2. Always extend ram against a load and never against the tailstand itself.
3. Do not exceed a test load equal to the tailstand rated capacity plus 5% to10%.
4. Install cradle post assembly and cradle assembly. Re-test alarm and strobe light operation (review section 6.5 Inspection and Test Procedures)

10.0 TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	ACTION
Electrical		
Alarm/strobe light will not operate	Alarm switch	Check adjustment
	Defective alarm	Check voltage
	Battery power depleted	Charge battery
	Defective limit switch	Replace limit switch
	Broken wire connection	Check wire connection between limit switch and alarm
	Cradle head did not lower far enough to contact limit switch	Check for movement
Low battery light	Indicates low battery	Charge battery
Alarm produces an erratic or low sound	Defective alarm	Replace alarm
Battery Charger		
Charger not working	No input or output power, not charging	See Appendix III
Tailstand		
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 ram(s)	Damaged o-ring, backup ring or inner cylinder wall	Remove ram(s) as a unit from cylinder. Inspect parts. Replace o-ring and defective part(s)
Tailstand 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
Ram(s) 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)
Ram(s) raises and falls 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
Tailstand fails to lower	Ram locknut not loosened	Raise jack ¼ inch and release locknut
	Vent screw closed	Open vent screw
	O-Ring (pinched or rolled)	Replace o-ring and back-up ring, clean up cylinder wall of debris

11.0 PROVISION OF SPARES

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

11.1 PARTS LIST

Reference following pages for ordering information of Replacement Parts and Kits.

When ordering Replacement Parts/Kits, please specify Model & Serial Number of your product.

12.0 IN-SERVICE SUPPORT

Contact Tronair for technical services and information.

13.0 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*.**

14.0 APPENDICES

APPENDIX I	12 VDC Wiring Schedule –Control Box
APPENDIX II	12 VDC Electrical Schematics INS-2234
APPENDIX III	75 Watt Charger Installation Manual
APPENDIX IV	HC-2602 Hand Pump (400 psi) Parts List
APPENDIX V	Safety Data Sheet Hydraulic Fluid
APPENDIX VI	Declaration of Conformity

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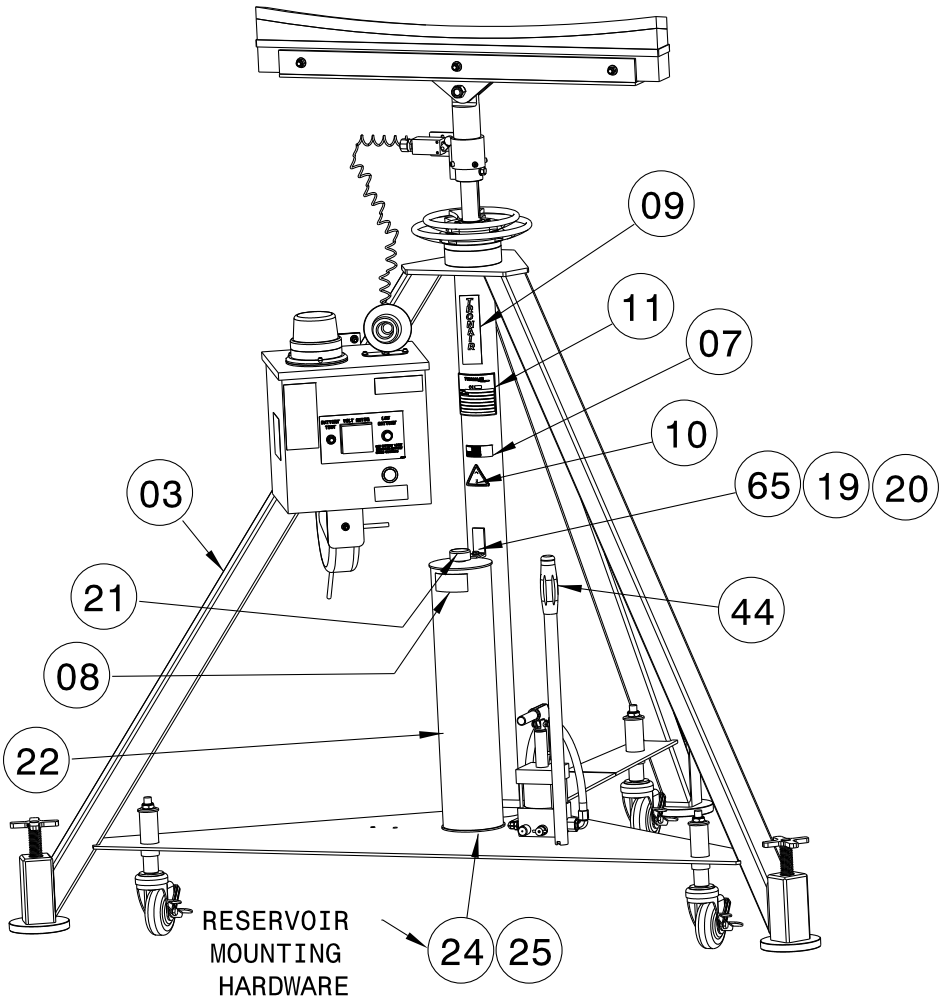
Parts List

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



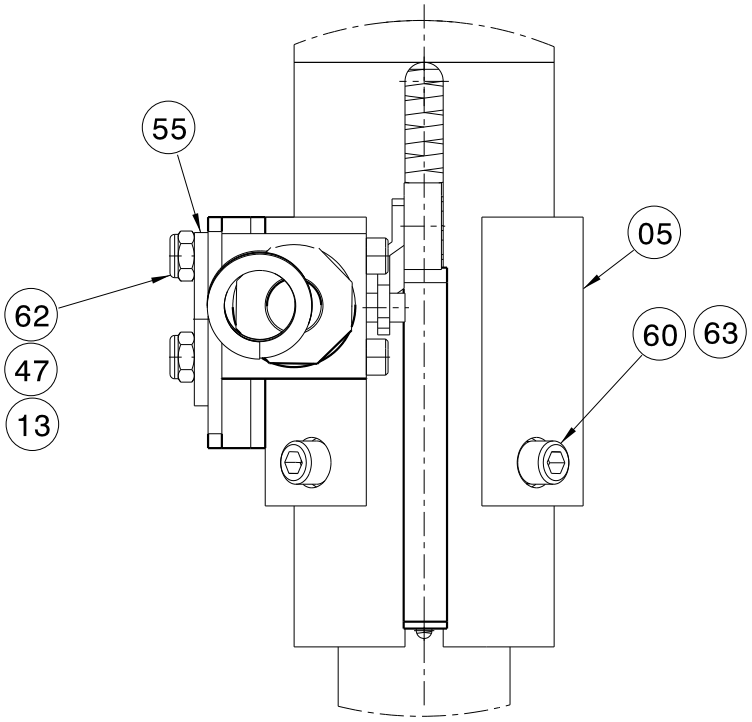
Item	Part Number	Description	Qty
3	Z-8286-01	Weldment, Jack	1
7	V-1001	Label, Made In USA	1
8	V-1102	Label, MIL-PRF-5606	1
9	V-1198	Label, Tronair	1
10	V-1805	Label, ISO General Warning	1
11	V-2118	Label, Serial Number	1
19	G-1202-1050	ESN, ¼ - 20	4
20	G-1250-1050N	Flatwasher, ¼ Narrow	5
21	H-1045	Breather	1
22	HJ-580-06-01	Weldment, Reservoir	1
24	G-1100-107010	Bolt, HH GR5, ⅜ - 16 x 1 Long	2
25	G-1251-1070R	Lockwasher, ⅜ Regular	2
44	H-1009-01	Handle, Pump	1
65	G-1100-105010	Bolt, HH GR5, ¼ - 20 x 1 Long	1
Not Shown	N-2212-05-S	Plug, Square Head (for shipping)	1

Parts List

Item	Part Number	Description	Qty
	K-4882	**Kit, Reservoir Replacement**; consists of:	
19	G-1202-1050	ESN, ¼ - 20	4
20	G-1250-1050N	Flatwasher, ¼ Narrow	5
21	H-1045	Breather	1
22	HJ-580-06-01	Weldment, Reservoir	1
65	G-1100-105010	Bolt, HH GR5, ¼ - 20 x 1 Long	1
Not Shown	N-2208-01-S	Tee, Male Branch ⅛ NPT	1
Not Shown	N-2205-02-S	Plug, Hollow Hex ⅛ NPT	1
Not Shown	N-2412-09	Connector, Straight Male, ⅛ NPT x ⅜ Barb	1
Not Shown	TF-1047-04-09.0	Hose, ⅜ Grey	1

Parts List

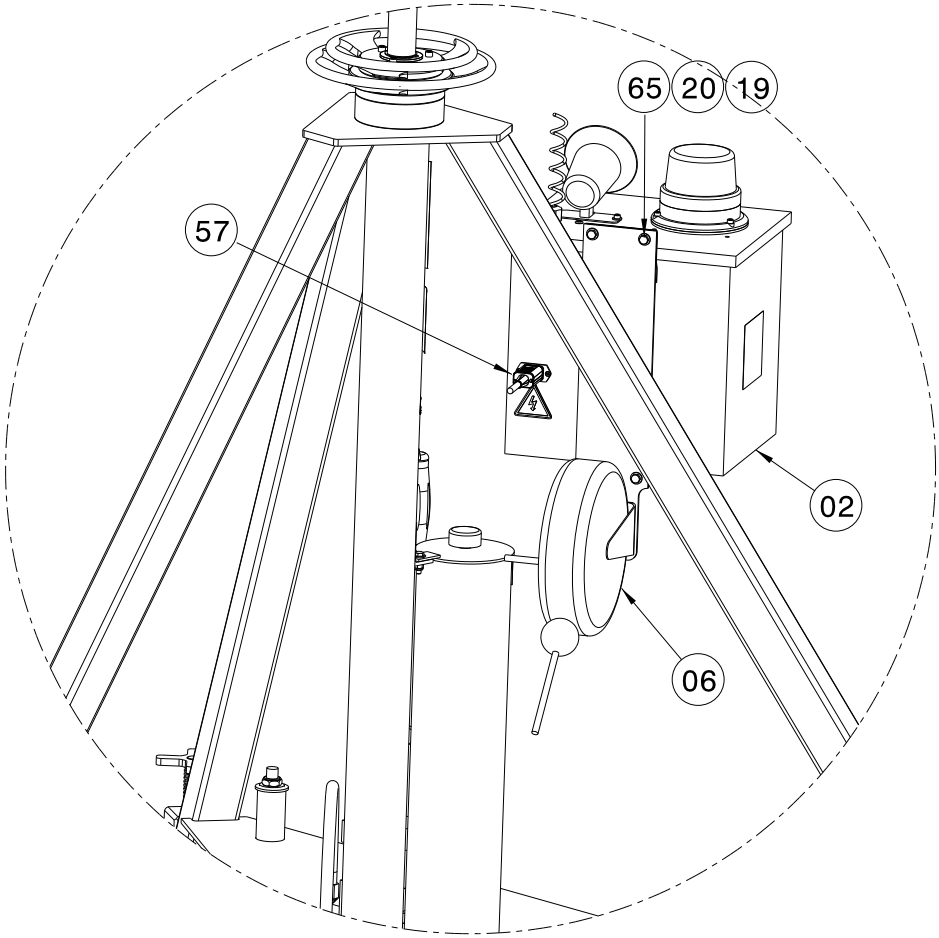
When ordering replacement parts/kits, please specify model, serial number and color of your unit.



Item	Part Number	Description	Qty
5	Z-8294-01	Weldment, Switch Mount	1
13	G-1203-1030	EJN, #10 – 24	2
47	G-1151-103214	Screw, Socket HD CAP, #10 – 24 x 1 ½ Long	2
55	J-5634-01	Washer, Custom	1
60	G-1251-1050HC	Lockwasher, ¼ High Collar	4
62	G-1250-1030N	Flatwasher, #10 Narrow	2
63	G-1151-105204	Screw, Socket HD CAP, ¼ - 20 x ½ Long	4

Parts List

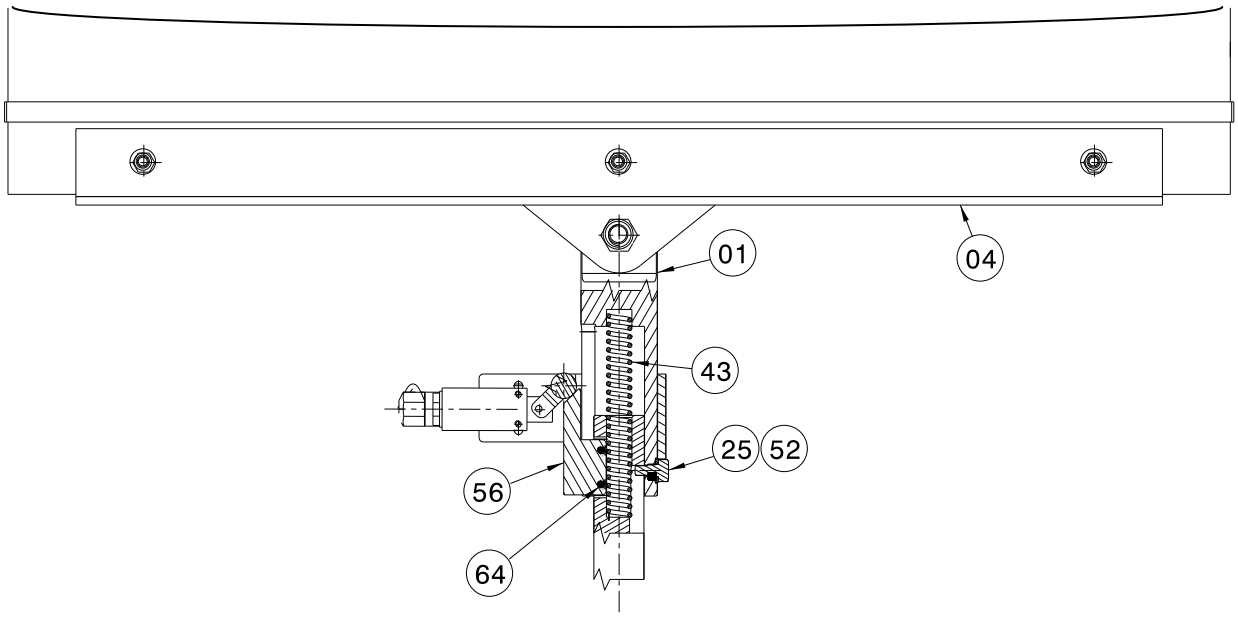
When ordering replacement parts/kits, please specify model, serial number and color of your unit.



Item	Part Number	Description	Qty
2	Z-8326	Assembly, Control Box	1
6	EC-2810	Reel, Retractable Electric Cord	1
19	G-1202-1050	ESN, ¼ - 20	5
20	G-1250-1050N	Flatwasher, ¼ Narrow	15
57	EC-2811	Connector, Universal Plug	1
65	G-1100-105006	Bolt, HH GR5, ¼ - 20 x ¾ Long	4

Parts List

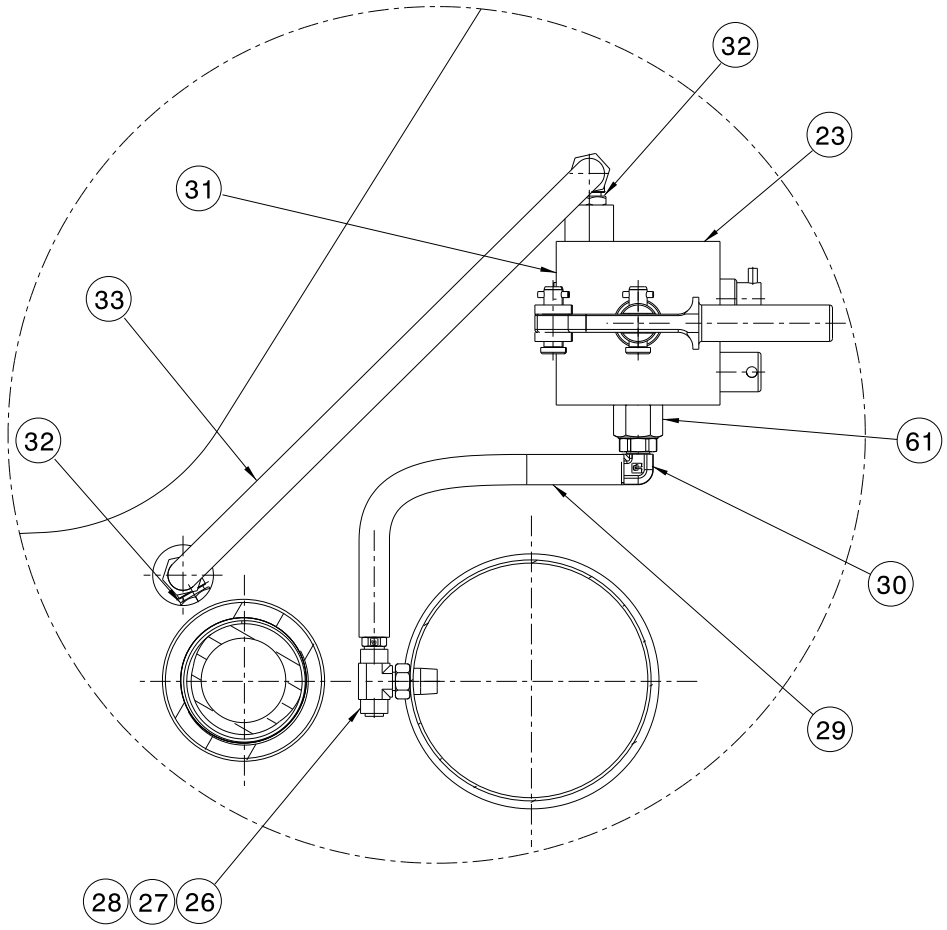
When ordering replacement parts/kits, please specify model, serial number and color of your unit.



Item	Part Number	Description	Qty
1	R-2908	Post, Cradle	1
4	Z-8293	Assembly, Cradle	1
25	G-1251-1070R	Lockwasher, ⅜ Regular	1
43	H-3733-15	Spring, Medium Duty Die, ¾ OD x ⅜ ID x 7 ½ Long, 41 lb/in	1
52	R-2849	Bolt, Modified	1
56	J-5804	Arm, Alarm	1
64	G-1668	Screw, Ø 3/16 Shoulder	2

Parts List

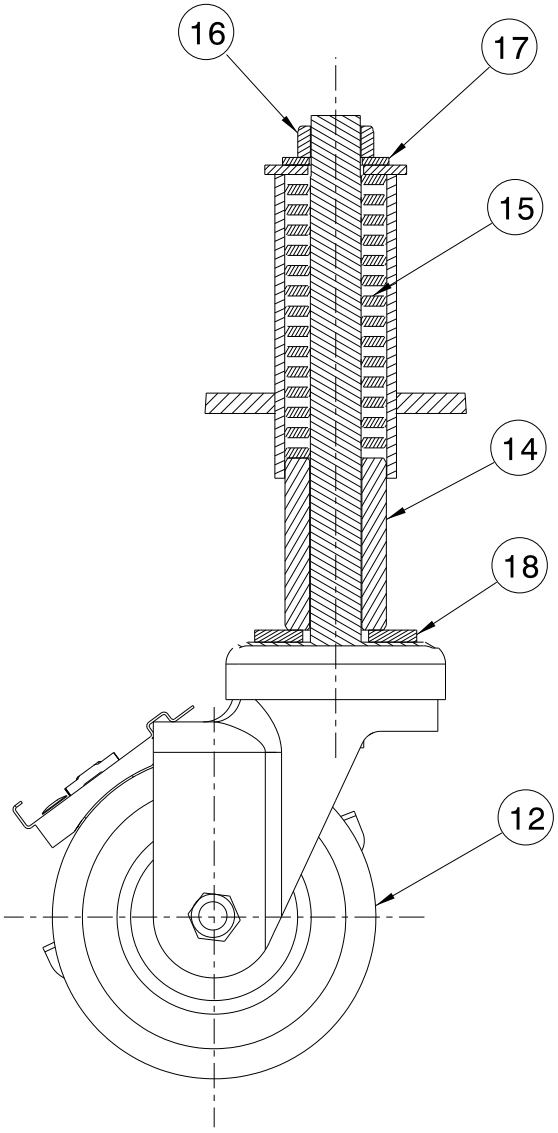
When ordering replacement parts/kits, please specify model, serial number and color of your unit.



Item	Part Number	Description	Qty
23	HC-2602	Pump, Hydraulic Hand	1
26	N-2208-01-S	Tee, Male Branch ⅛ NPT	1
27	N-2205-02-S	Plug, Hollow Hex ⅛ NPT	1
28	N-2412-09	Connector, Straight Male, ⅛ NPT x ⅜ Barb	1
29	TF-1047-04-09.0	Hose, ⅜ Grey	1
30	N-2890	Elbow, SAE #6 to ⅜ Barb, 90º Brass	1
31	N-2066-06-S-B	Plug, O-ring Hex, SAE #6	1
32	N-2001-08-S-B	Elbow, Straight Thread, SAE #6 x ⅜ 37º JIC	2
33	TF-1043-06*22.5	Assembly, Hose, #6 MB	1
61	N-2463-05-S-B	Fitting, Reducer SAE #8 to #6	1
	K-4879	**Kit, Pump Replacement**; consists of:	
23	HC-2602	Pump, Hydraulic Hand	1
29	TF-1047-04-09.0	Hose, ⅜ Grey	1
30	N-2890	Elbow, SAE #6 to ⅜ Barb, 90º Brass	1
31	N-2066-06-S-B	Plug, O-ring Hex, SAE #6	1
32	N-2001-08-S-B	Elbow, Straight Thread, SAE #6 x ⅜ 37º JIC	1
61	N-2463-05-S-B	Fitting, Reducer SAE #8 to #6	1
Not Shown	G-1100-107010	Bolt, HH GR5, ⅜ - 16 x 1 Long	2
Not Shown	G-1251-1070R	Lockwasher, ⅜ Regular	2

Parts List

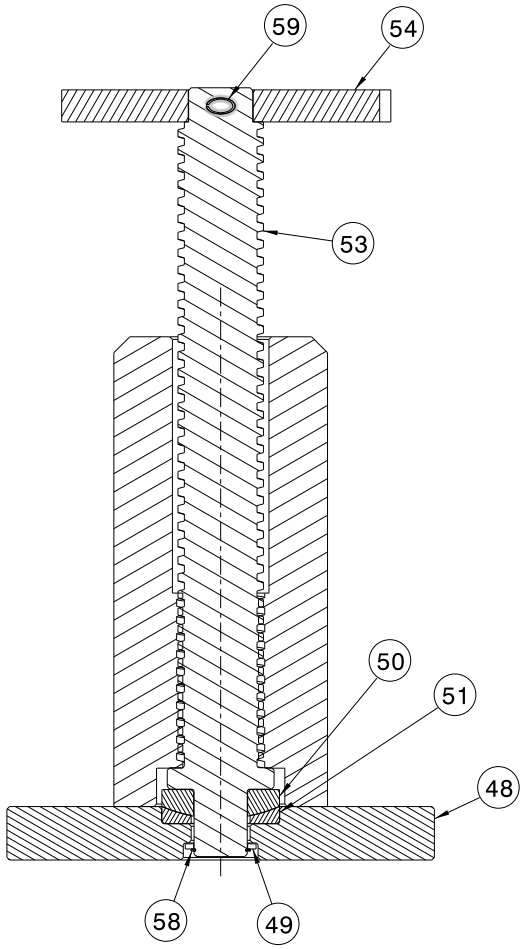
When ordering replacement parts/kits, please specify model, serial number and color of your unit.



Item	Part Number	Description	Qty
12	U-1154	Caster, Swivel with Lock	3
14	R-2704	Bushing, Caster Guide	3
15	H-3416-07	Spring, Compression	3
16	G-1203-1105	EJN, ⅝ - 18	3
17	G-1250-1100N	Flatwasher, ⅝ Narrow	3
18	G-1250-1110W	Flatwasher, ¾ Wide	3

Parts List

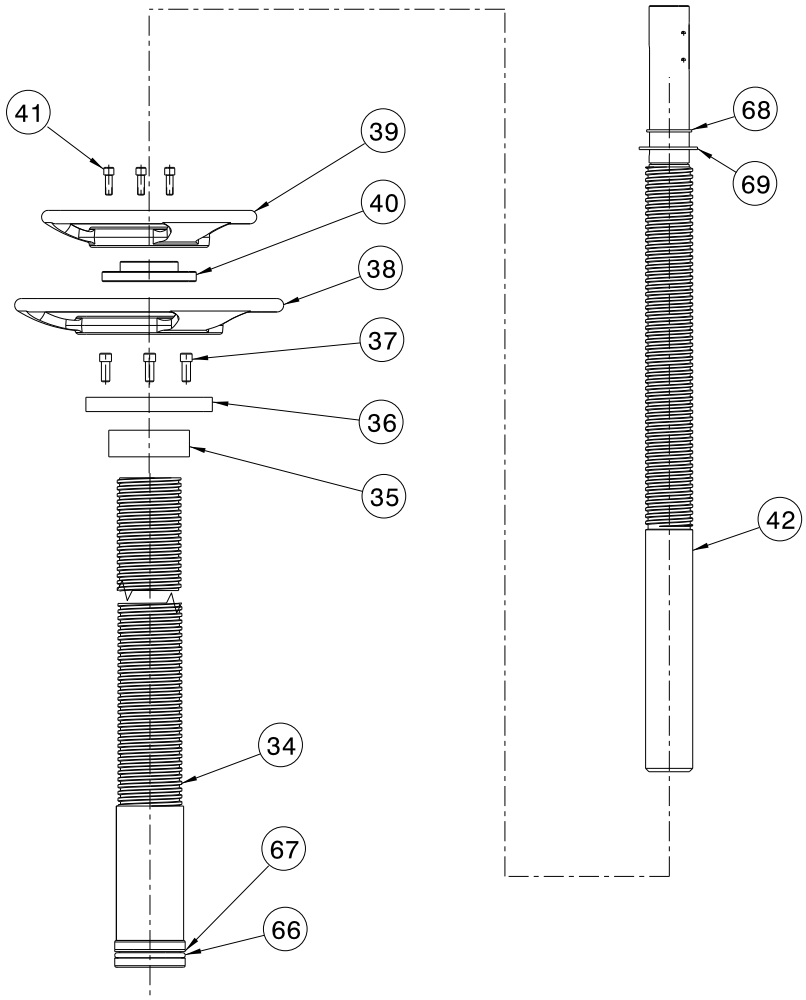
When ordering replacement parts/kits, please specify model, serial number and color of your unit.



Item	Part Number	Description	Qty
48	R-2853-01	Pad, Floor	3
49	G-1255-10	Washer, AN Retainer	3
50	R-2851	Washer, Convex Spherical	3
51	R-2850	Washer, Concave Spherical	3
53	R-2844	Screw, Adjustment	3
54	J-5638-01	Handle	3
58	G-1392-62-S	Ring, External	3
59	G-1303-19140	Pin, Roll SST, 3/19 x 1 ½ Long	3

Parts List

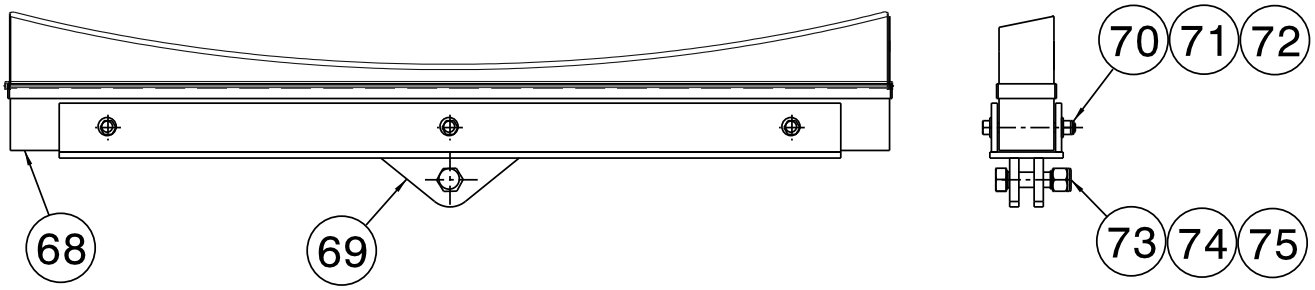
When ordering replacement parts/kits, please specify model, serial number and color of your unit.



Item	Part Number	Description	Qty
34	HJ-522-05	Assembly, Ram	1
35	HJ-512	Ring, Guide	1
36	HJ-513	Plate, Mounting	1
37	G-1151-106206	Screw, Socket HD CAP, 5/16 – 18 x ¾ Long	3
38	H-3731	Nut, 5 Ton Stop	1
39	H-3730	Nut, 5 Ton Stop	1
40	R-2824	Insert, Threaded	1
41	G-1151-105206	Screw, Socket HD CAP, ¼ - 20 x ¾ Long	3
42	R-2823	Extension, Screw	1
66	HC-2000-331	O-ring	1
67	HC-2021-01	Ring, Backup	1
68	J-5806	Washer, Retainer	1
69	G-1392-150-S	Ring, External Retaining	1
	K-4886	**Kit, Ram Seal Replacement**; consists of:	
35	HJ-512	Ring, Guide	1
66	HC-2000-331	O-ring	1
67	HC-2021-01	Ring, Backup	1

Parts List

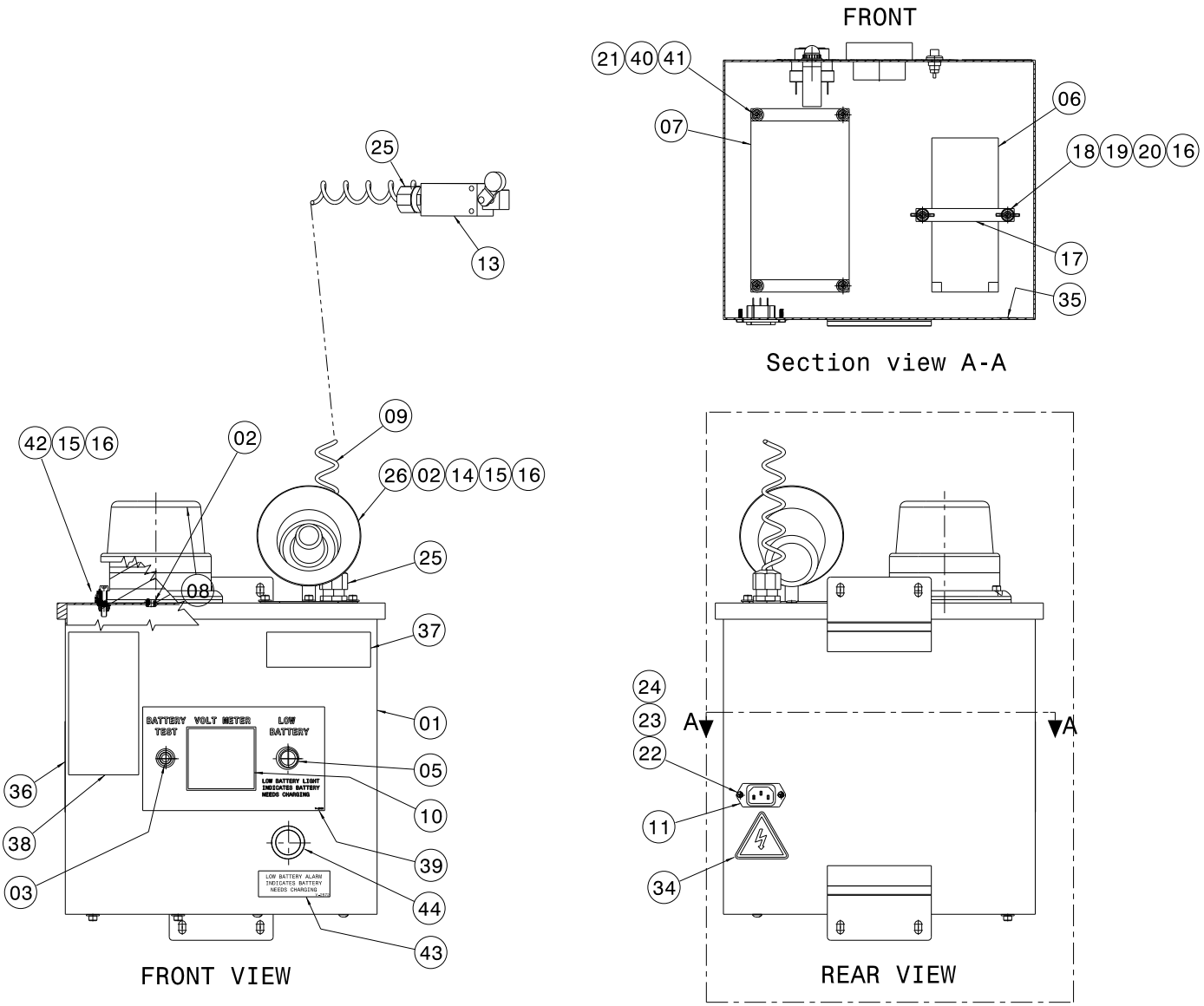
When ordering replacement parts/kits, please specify model, serial number and color of your unit.



Item	Part Number	Description	Qty
	K-4884	**Kit, Cradle Assembly**; consists of:	
69	Z-4165-01	Weldment, Cradle Support	1
70	G-1100-107534	Bolt, HH GR5, ⅜ - 24 x 3 ½ Long	3
71	G-1250-1070N	Flatwasher, ⅜ Narrow	6
72	G-1202-1075	ESN, ⅜ - 24	3
73	G-1100-110524	Bolt, HH GR5, ⅝ - 18 x 2 ½ Long	1
74	G-1250-1100N	Flatwasher, ⅝ Narrow	2
75	G-1202-1105	ESN, ⅝ - 18	1

Parts List

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



Parts List

Item	Part Number	Description	Qty
1	Z-8328-01	Machining, Enclosure	1
2	13036	Gromet, ENG Panel	2
3	12011	Switch, Momentary	1
5	EC-2008	Lamp, LED Assembly (Amber)	1
6	EC-2714	Battery, 12V 7.2AH	1
7	EC-2723	Charger, Battery 14V 75W	1
8	EC-2754	Strobe Light, Red	1
9	EC-2717	Cable, Coiled 18AWG 2CON	1
10	EC-2720	Meter, Panel 0-30VDC	1
11	EC-2721	Socket, Power Input 10A	1
13	JP-205	Switch, Battery Compartment/Steering Limit	1
14	G-1151-103206	Screw, 10-24 HEX SOC HD CAP ¾ Long	3
15	G-1202-1030	ESN, #10-24	6
16	G-1250-1030N	Flatwasher, #10 Narrow	13
17	J-5639-01	Strap, Battery	1
18	G-1151-103244	Screw, 10-24 HEX SOC HD CAP 4 ½ Long	2
19	G-1238-03	Nut, Wing #10-24	2
20	G-1251-1030R	Lockwasher, #10 Regular	2
21	G-1151-102204	Screw, #8-32 HEX SOC HD CAP ½ Long	4
22	G-1498-101004	Screw, #6-32 FLT HD PH SS ½ Long	2
23	G-1501-1010	ESN, #6-32 SS	2
24	G-1503-1010N	Flatwasher, #6 Narrow SS	2
25	JP-108	Grip Cord	2
26	EC-2725	Alarm, Siren 12VDC 120DB	1
34	V-1050	Label, Electrical Shock	1
35	V-1665	Label, Ground	1
36	V-1845	Label, Serial Number CE	1
37	V-2097	Label, Warning Harmonized	1
38	V-2294	Label, Danger	1
39	V-2506	Label, Control Panel	1
40	G-1202-1020	ESN, #8-32	4
41	G-1250-1020N	Flatwasher, #8 Narrow	8
42	G-1151-103210	Screw, 10-24 HEX SOC HD CAP 1 Long	3
43	V-2572	Label, Low Battery Warning Alarm	1
44	EC-2809	Alarm, Low Battery Warning	1
Not Shown	EC-1326-03	Disconnect, Female	2
Not Shown	EC-2051	Connector, Compact 5 Conductor	4
Not Shown	EC-2115	Wire, 18 GA MTW Black	30
Not Shown	EC-2116	Wire, 18 GA MTW Green	30
Not Shown	EC-2368	Wire, 18 AWG MTW Yellow	30
Not Shown	17097	Wire 16 AWG White	30
Not Shown	17150	Wire 16 AWG Green	30
Not Shown	17158	Wire 16 AWG MTW Yellow	30
Not Shown	17110	Terminal, #8 Red Ring	1

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APPENDIX I

Wiring Schedule
12 VDC Control Box

TRONAIR®	ASSEMBLY WIRING SCHEDULE Page 1 of 1	DOCUMENT NUMBER: INS-2235	
Model: 03A5646C0100		DATE: 10/2014	REV: 03

NOTE: REFER TO INS-2234

WIRE LETTER	WIRE SIZE/ COLOR	WIRE LENGTH (INCH)	FROM	TO
A	16/YELLOW	10	24VDC BATTERY1 TERMINAL **(PLUS)**	5-WAY CONNECTOR **(1)**
B	16/GREEN	10	24VDC BATTERY1 TERMINAL **(MINUS)**	5-WAY CONNECTOR **(2)**
C	18/GREEN	10	BATTERY CHARGER V01 MAIN TERMINAL **(MINUS)**	5-WAY CONNECTOR **(3)**
D	18/RED	N/A	5-WAY CONNECTOR **(4)**	STROBE LIGHT RED WIRE
E	18/YELLOW	18	5-WAY CONNECTOR **(1)**	BATTERY CHECK SWITCH **(SW1)**
F	18/BLACK	8	BATTERY CHECK SWITCH **(SW1)**	VOLT METER TERMINAL **(PLUS)**
G	18/GREEN	18/8	5-WAY CONNECTOR **(2)**	VOLT METER M1 TERMINAL **(MINUS)** / LOW VOLT LAMP L1 TERMINAL **(MINUS)** / LOW BATTERY ALARM TERMINAL **(MINUS)**
H	14/BLACK	12	POWER INPUT SOCKET S1 TERMINAL **(LINE)**	BATTERY CHARGER INPUT TERMINAL **(LINE)**
I	18/BLACK	36	BATTERY CHARGER RELAY I01 TERMINAL **(N/C)**	LOW VOLT LAMP L1 TERMINAL **(PLUS)** / LOW BATTERY ALARM TERMINAL **(PLUS)**
J	16/GREEN	12	5-WAY CONNECTOR **(2)**	BATTERY CHARGER V02 BATT TERMINAL **(MINUS)**
K	14/GREEN	12	CHASSIS BOX TERMINAL **(GND)**	POWER INPUT SOCKET S1 TERMINAL **(GND)**
L	14/WHITE	12	BATTERY CHARGER TERMINAL **(N)**	POWER INPUT SOCKET S1 TERMINAL **(N)**
M	18/GRN/YEL	12	CHASSIS BOX TERMINAL **(GND)**	FRONT DOOR GROUND STUD
N	18/YELLOW	10	5-WAY CONNECTOR **(1)**	BATTERY CHARGER RELAY I01 TERMINAL **(COM)**
O	16/YELLOW	10	5-WAY CONNECTOR **(1)**	BATTERY CHARGER V02 BATT TERMINAL **(PLUS)**
P	18/BLACK	N/A	5-WAY CONNECTOR **(3)**	STROBE LIGHT BLACK WIRE
Q	18/BLACK	N/A	5-WAY CONNECTOR **(3)**	ALARM SIREN TERMINAL
R	18/RED	N/A	5-WAY CONNECTOR **(4)**	ALARM SIREN TERMINAL
S	14/GRN/YEL	30	CHASSIS BOX TERMINAL **(GND)**	BATTERY CHARGER TERMINAL **(GND)**
LIMIT SWITCH CABLE				
	18/WHT		BATTERY CHARGER V01 MAIN TERMINAL **(PLUS)**	LIMIT SWITCH SW2 TERMINAL **(14)**
	18/BLK		LIMIT SWITCH SW2 TERMINAL **(13)**	5-WAY CONNECTOR **(4)**

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APPENDIX II

INS-2234
12 VDC Electrical Schematic

APPENDIX III

75 Watt Charger Installation Manual

Design, Manufacture
& Supply of
Power Related Products

PSU's, Chargers, AC-DC Converters,
Turnkey Enclosures & Batteries,
Custom Design Solutions

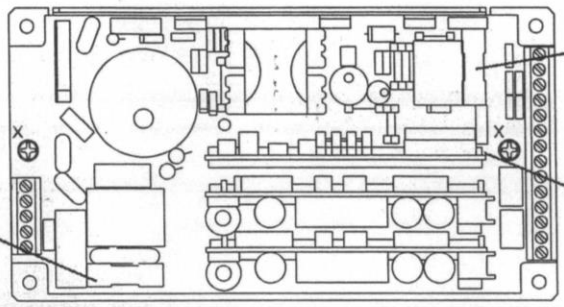
75WATT CHARGER INSTALLATION MANUAL

SAFETY INSTRUCTIONS

a The PSU must be reliably connected to earth.
b. In accordance with IEC415 No.5017, a label showing the protective earth symbol should be placed adjacent to the installation earth.

INPUT VOLTAGE SELECTION AND FUSING

The PSU operates from a universal input supply voltage of 100-236 Vac @ 50/60Hz.



Both the input and output fuses are accessed by removing the cover (held in place by two screws 'X').
Both fuses must be replaced by fuses with the same type and rating.

SITING THE THERMISTOR

The thermistor MUST be connected for correct operation. The thermistor is used to sense the battery temperature and should be placed within the vicinity of the system batteries.

OUTPUT VOLTAGES AND CURRENT RATING

12V UNIT

OUTPUT	VOLTAGE	CURRENT (MAX.)
1	14.4V	4.75A
2	13.6V	1.0A

24V UNIT

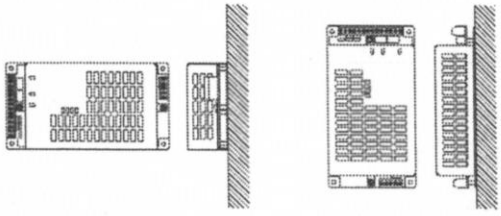
OUTPUT	VOLTAGE	CURRENT (MAX.)
1	28.8V	2.8A
2	27.2V	1.0A

The maximum power output from the PSU is 75W. Any combination of currents can be taken from each output (up to their respective maxima) provided that this be =<75W.
The PSU is for use in a maximum ambient of 40 °C.
Output 2 is temperature compensated to provide a variable float voltage when charging sealed lead acid batteries.
The temperature is sensed by a thermistor incorporated into the PSU.

	TYPE	INPUT/OUTPUT	NORMAL	FAULT(ACTIVE)	FAULT CONDITION
IO1	VFR	OUT	CLOSED	OPEN	BATTERY LOW or NO BATTERY or BATTERY TEST FAIL
IO2	VFR	OUT	CLOSED	OPEN	MAINS SUPPLY FAULT
IO3	TTL	OUT	HIGH	LOW	SYSTEM FAULT (ALL FAULT CONDITIONS)
IO4	TTL	OUT	10K PULLUP HIGH	ACTIVE LOW	FORCE BATTERY TEST (LOW TO TEST)

FINAL MOUNTING PANEL

The Power Supply Unit can be mounted via its chassis in two positions.
A DIN rail mounting kit is available as a optional extra.
(Vxl Power Part No. 14613-000)



TRONAIR®

APPENDIX IV

HC-2602
Hand Pump Parts List

Model: HC-2602
400 psi
Hand Pump

***

Parts List
With Illustrations

10/2014 – Rev. 02

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

Tronair, Inc.
1 Air Cargo Pkwy East
Swanton, OH 43558

Phone: (419) 866-6301 | 800-426-6301
Web: www.tronair.com
Email: sales@tronair.com

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.

Parts List

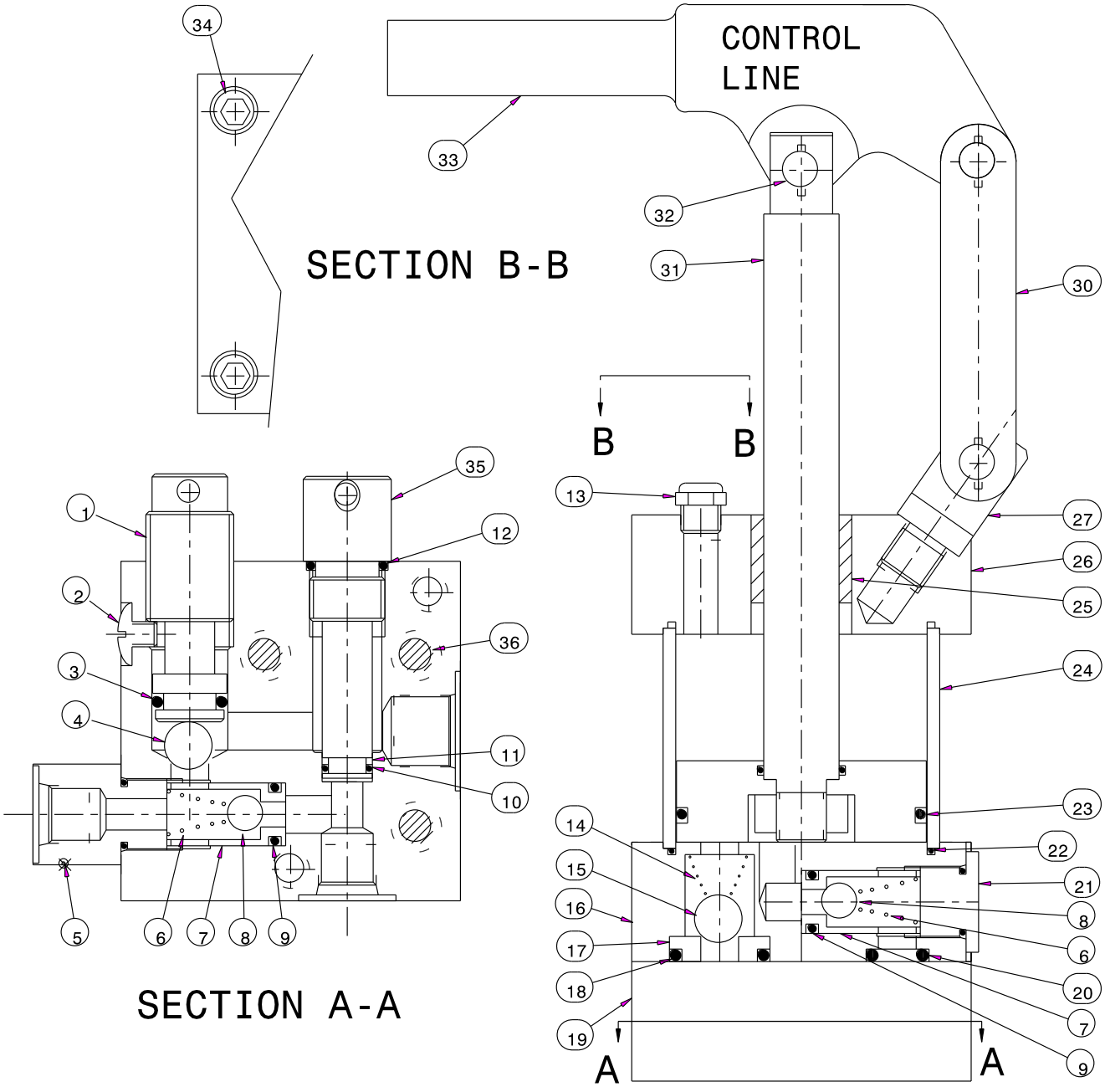
This pump is compatible with MIL-PRF-5606/MIL-PRF-83282 Hydraulic Fluids only.

Reference Parts List Illustration on following page

Item	Part Number	Description	Qty
1	502-000P	Release Screw	1
2	CXD-000003-004	Release Screw Retainer	1
4	513-000	Ball	1
5	6410-8-6	SAE Adapter	1
6	TA-2201	Spring	2
7	CXD-120025-004	Check Body	2
8	11-A-0.375-25	Ball	2
13	KBV-125	Breather Vent	1
14	TA-2237	Spring	1
15	513-000	Ball	1
16	CXD-120025-002	Intermediate cover	1
17	CXD-120025-003		1
19	CXD-120025-001	End Cover	1
21	6408HHP-6	Plug	1
24	CXC-120025-003	Tube	1
25	SS-2432-14	Bushing	1
26	CXC-920028-002	Top Housing	1
27	508-000P	Pivot	1
30	512-000P	Strap	2
31	CXC-120025-008	Piston & Rod Assembly	1
32	510-001	Pin Linkage Assembly	3
33	509-C00P	Handle	1
34	09-ADDF-05-24 x 56	Tie Rod	4
35	CXD-140004-001	Relief	1
36	09-ADDF-05-24 x 24	SOC HD CAP SCR	3
	K-4880	**Kit, Seal Replacement**; consists of:	
3	01-206-A070	O-ring	1
9	01-111-A070	O-ring	2
10	01-012-A070	O-ring	1
11	02-012-TL62	Ring Backup	1
12	01-114-A070	O-ring	1
18	01-210-A070	O-ring	1
20	01-204-A070	O-ring	1
22	01-037-A070	O-ring	1
23	01-228-A070	O-ring	1

Parts List Illustration

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



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.

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

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/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

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.

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--

1 = NTP CARC	3 = IARC 1	5 = IARC 2B
2 = NTP SUS	4 = IARC 2A	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

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.

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

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.

Internal Use Only

MHC: 2A, 0, 0, 0, 1, 1 PPEC: C

DGN: 2005454XUS (552975)

APPENDIX VI

Declaration of Conformity

DECLARATION of CONFORMITY

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

Tailstand with Alarm
03A5846C0100

Relevant provisions complied with by the machinery:
2006/42/EC

Relevant standards complied with by the machinery:
EN ISO 12100-1
C22.1-12
NFPA 70

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

Patrick Finch

Quality Assurance Representative

Tronair, Inc.
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