



Telescopic Mast Straddle Crane TMSC Family



Operation & Maintenance Manual

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Responsibilities of Owners/Users

Deflection

It is the responsibility of the user/purchaser to advise the manufacturer where deflection may be critical to the application.

Inspection and Maintenance

The crane shall be inspected and maintained in proper working order in accordance with the manufacturer's operating/maintenance manual and safe operating practices.

Only trained personnel and authorized personnel shall be permitted to perform maintenance/service operations on the crane.

Maintenance/service personnel shall have:

- Read and/or have explained and understood, the manufacturer's operating/maintenance manual, and all safety rules and labels, prior to performing any maintenance/service operations on the equipment.
- Full time unlimited access to the manufacturer's operating/maintenance manual.

Removal from Service

Any crane not in safe operating condition such as, but not limited to, excessive leakage, missing rollers, pins, or fasteners, any bent or cracked structural members, cut or frayed electric, hydraulic, or air lines, damaged or malfunctioning controls or safety devices, etc. shall be removed from service until it is repaired to the original manufacturer's standards.

Repairs

All repairs shall be made by qualified personnel in conformance with the manufacturer's instructions.

Operators

Only trained personnel and authorized personnel shall be permitted to operate the crane.

Before Operation

Before using the crane, the operator shall have:

- Read and/or have explained, and understood, the manufacturer's operating instructions and safety rules.
- Inspected the crane for proper operation and condition. Any suspect item shall be carefully examined and a determination made by a qualified person as to whether it constitutes a hazard. All items not in conformance with the manufacturer's specification shall be corrected before further use of the crane.

During Operation

The crane shall only be used in accordance with the manufacturer's operating/maintenance manual.

- Do not overload the crane.
- Ensure that all safety devices are operational and in place.

Modifications or Alterations

Modifications or alterations of equipment shall be made only with written permission from the original manufacturer. These changes shall be in conformance with all applicable provisions of applicable standards and shall be as safe as the equipment was before modification. These changes shall also satisfy all safety recommendations of the original equipment manufacturer for the particular application of the crane.

General Information

You are now the proud owner/user of an Air Technical Industries, hydraulic-operated crane.

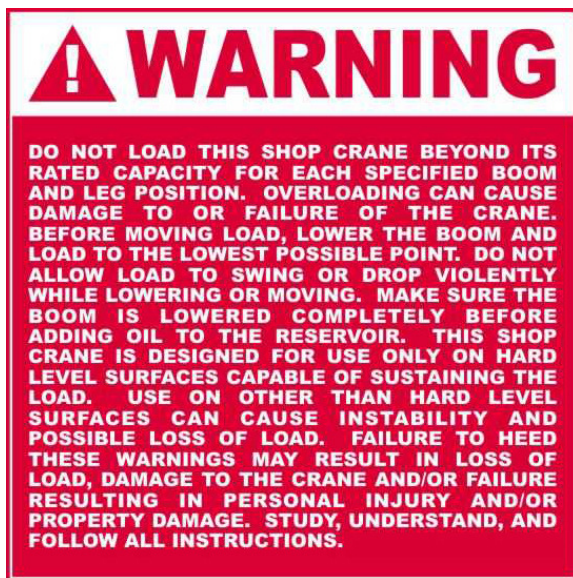
The Telescopic Mast Straddle Crane is designed for heavy duty lifting, loading and positioning. It is engineered for maximum safety and stability. This ruggedly constructed cranes will give dependable, long lasting performance.

Special Warnings, Cautions & Restrictions

Safe Operation

Do not operate the crane with anyone on the unit or its load. When climbing the ladders to secure any loads, be sure to use a climbing belt and tie-off to prevent any injury from falling.

WARNING LABELS



**WARNING: MUST TIE OFF
WHEN CLIMBING LADDER**

**WARNING: DO NOT OPERATE OR TOW
CRANE WHILE OPERATOR IS ON LADDER**

Inspection

Upon receipt of the equipment, inspect thoroughly for damage sustained in transit. Make note of any noticeable or potential damage on the bill of lading. After unpacking, inspect for any concealed damage and report immediately to the freight carrier.

Installation and Start-Up

This equipment has been delivered partially disassembled for shipping. A means of safely lifting the parts into position is needed for the reassembly process. You will need:

- Any lifting equipment (such as a tow motor) with a capacity of 3000 lbs and capable of lifting to 135" from the floor.
- A come-a-long
- 5 lbs sledge hammer
- various wrenches for 1" to 1 3/4" bolts

A-frame style leg braces have been provided to aid in the assembly process.

Assembly

Refer to the diagrams and layouts on the following pages corresponding to the instructions below.

1. Arrange side A (parts 9A, 9D, 11A, 11B, 12A) of the crane in a horizontal position according to layout 1.
2. Run the corresponding hoses through the cross brace (part 11A) and bolt the assembly.
3. Raise the assembly to the vertical position and secure it with the A-frame style leg braces provided (layout 3).
4. Arrange side B (parts 9B, 9C, 11C, 11D, 12B) of the crane in a horizontal position according to layout 2.
5. Run the corresponding hoses through the cross brace (part 11D) and bolt the assembly.
6. Raise the assembly to the vertical position and secure it with the A-frame style leg braces provided (layout 3).
7. Position the 2 sides parallel to each other.
8. Place and fasten the I-beams (parts 21A and B) according to layout 4
9. Connect all the hoses. They have been all marked to match each other.
10. Remove the plug on the hydraulic tank's fill port and replace it with a ventilated plug.
11. Wire the unit to its power supply.
12. Raise and lower the unit a few times to test its function and work any air out of the hydraulic system.

Bleeding Air from Hydraulic System

The repeated connecting and dis-connecting of hydraulic lines through the process of factory assembly and testing, dis-assembly for shipping, and final assembly may cause excessive air to be introduced into the hydraulic system. It is likely that it will be necessary to bleed the hydraulic lines prior to starting normal operation.

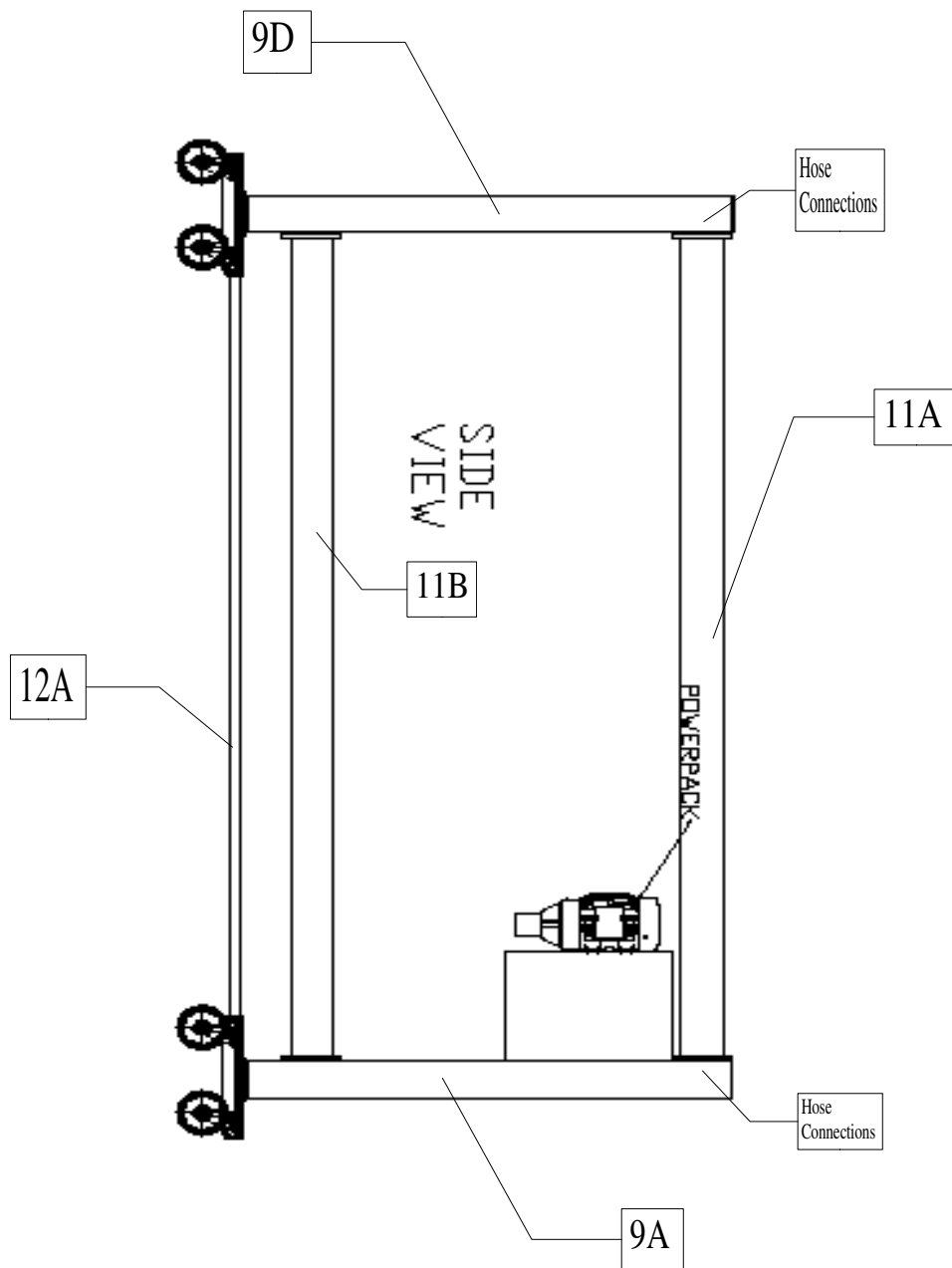
1. Lower crane completely.
2. The lines coming from the manifold on the top of the tank control the downward motion. Follow each line to its connector at each individual leg. Crack the line as close to the leg as possible, AFTER the quick-disconnect.
3. Activate the UP push button. You will hear air escaping.
4. When oil begins to escape, reconnect the line.
5. Repeat for each cylinder at each leg.

Cycle the unit and check for correct operation. If necessary, perform the same procedure on the lines that control the upward motion.

1. Raise the crane completely.
2. The lines coming from the flow dividers control the upward motion. Follow each line to its connector at each individual leg. Crack the line as close to the leg as possible, AFTER the quick-disconnect.
3. Activate the DOWN push button. You will hear air escaping.
4. When oil begins to escape, reconnect the line.
5. Repeat for each cylinder at each leg.

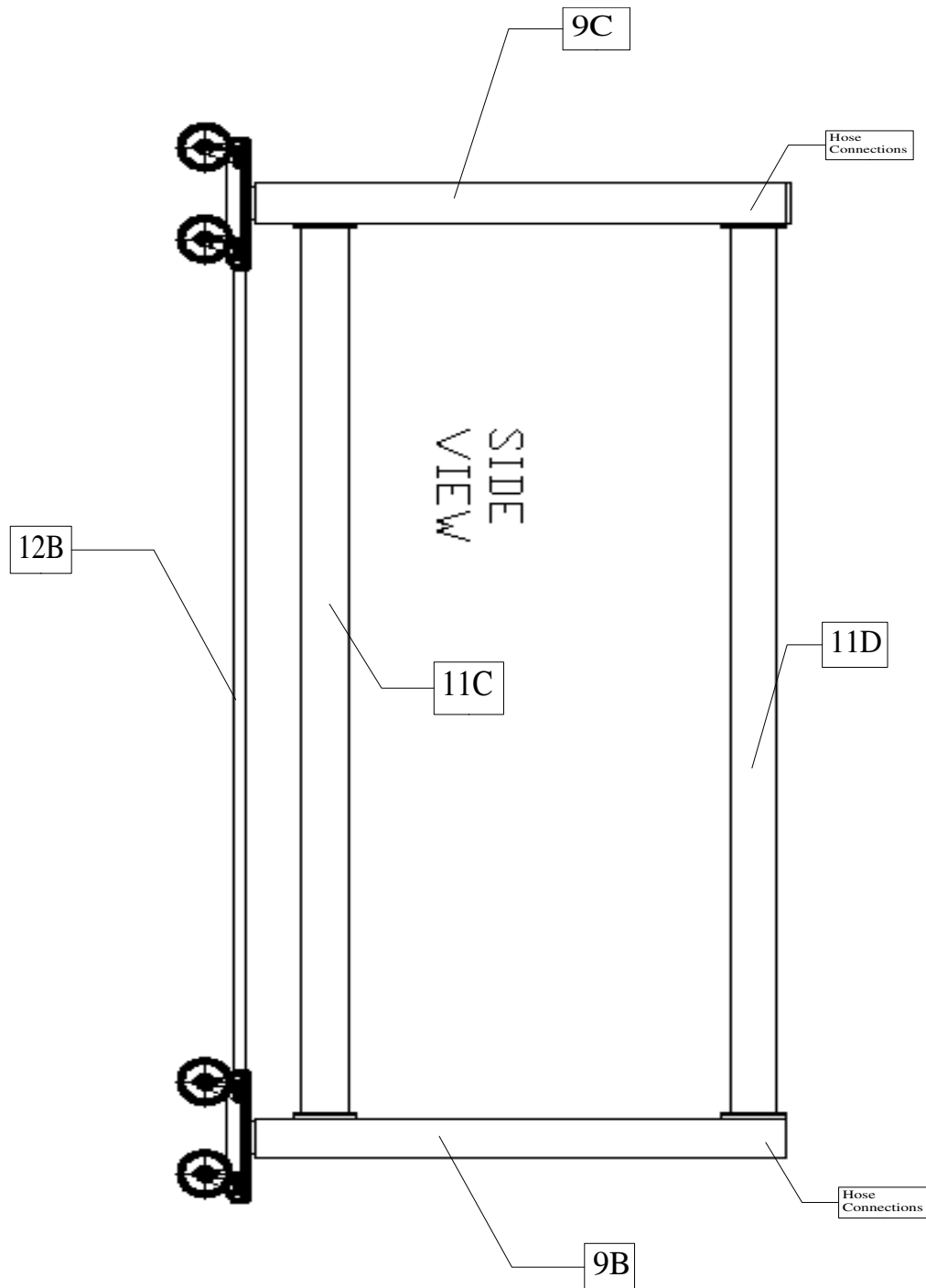
Layout 1

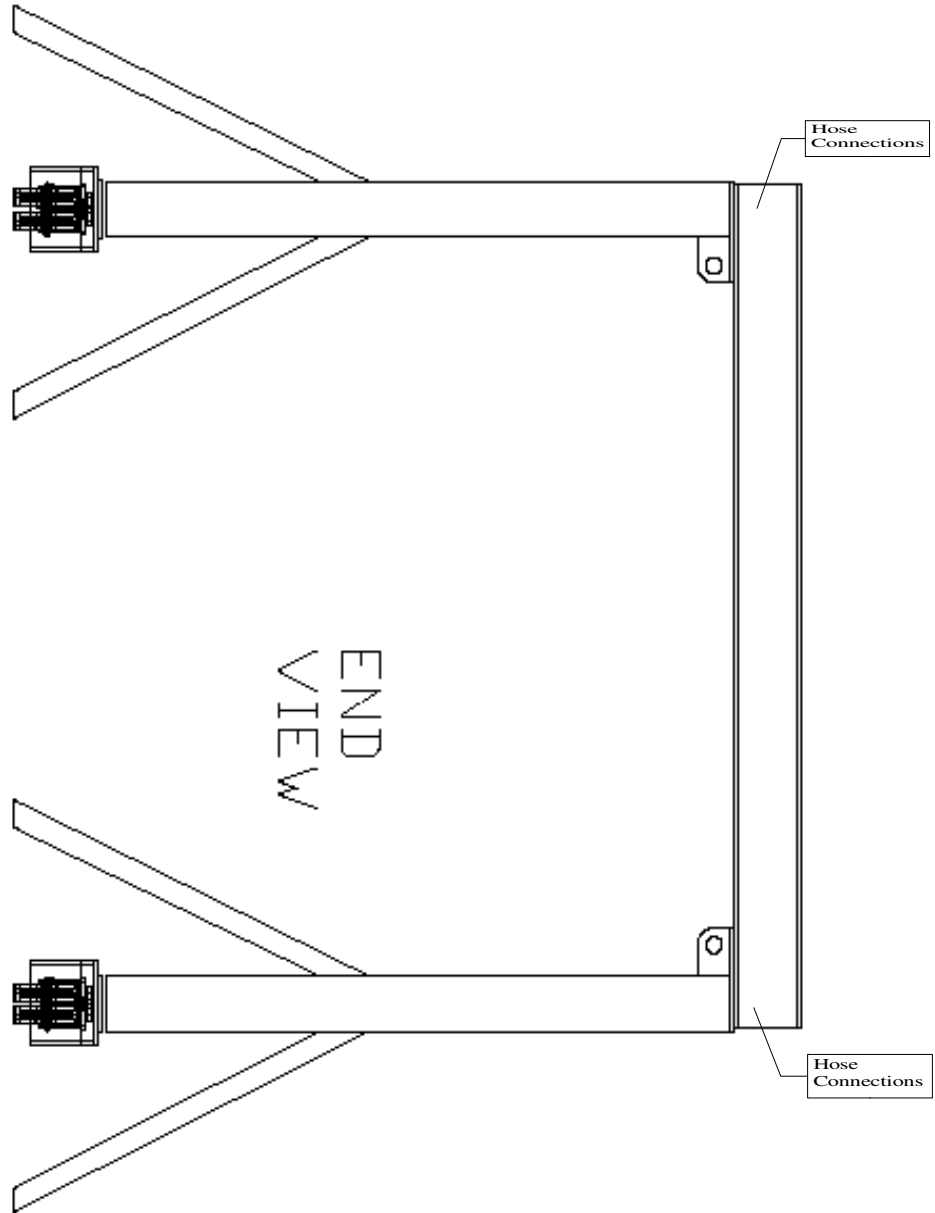
Side A



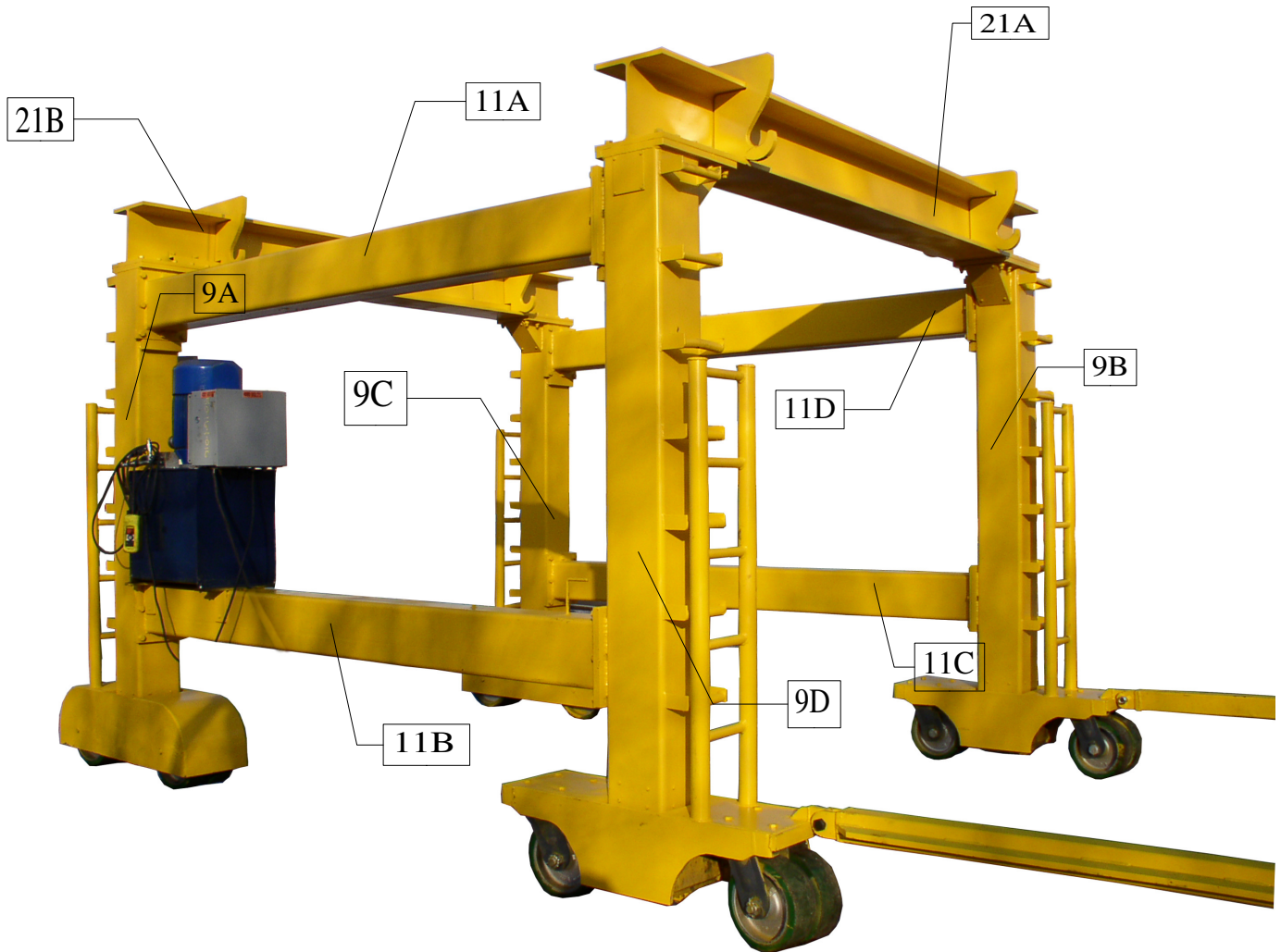
Layout 2

Side B





Layout 4



TESTING AND OPERATION

Qualifications

Crane operation, to be safe and efficient, requires skill, the exercise of extreme care and good judgment, alertness and concentration, and a rigid adherence to proven safety rules and practices as outlined in applicable and current ANSI and OSHA safety standards.

In general practice, no person should be permitted to operate a crane:

- (a) Who cannot speak the appropriate language or read and understand the printed instructions;
- (b) Who is not of legal age to operate this type of equipment;
- (c) Whose hearing or eyesight is impaired (unless suitably corrected~with good depth perception);
- (d) Who may be suffering from heart or other ailments which might interfere with the operator's safe performance;
- (e) Unless the operator has carefully read and studied the operation manual supplied by the Crane Manufacturer;
- (f) Unless the operator has been properly instructed;
- (g) Unless the operator has demonstrated his instructions through practical operation;
- (h) Unless the operator is familiar with rigging equipment and practices.

Operation

Before operating the crane, the crane operator should carefully read and study the operation manual supplied with the crane by the Crane Manufacturer and note any special instructions not given previously by the proper instructor or supervisor.

With the mainline switch open (power off) the crane operator should operate each master switch or push button in both directions so as to get the "feel" of each device and also determine that they do not bind or stick in any position. If any of them do, before doing anything else, the operator should report the condition to the proper supervisor.

Prior to lifting a load, ensure that all casters are turned straight so that the wheels are in-line along the length of the crane. In other words, the wheels should be perpendicular to the main lifting beams.

WARNING: Do not operate the crane with anyone on the unit or its load. When climbing the ladders to secure any loads, be sure to use an approved climbing belt and tie-off to prevent any injury from falling.

WARNING: This crane is not intended for lifting people or for lifting material over people.

Learning the Controls

Having observed the feel of the controllers, the crane operator is now ready to try the crane with power applied. After checking to be sure no one is on or near the crane, switch the power on.

Press the raise button. The crane should raise evenly and with no vibration. Raise and lower the crane a few times to familiarize yourself with its movement and the placement of the controls.

NOTE: After each lifting cycle, lower the mast completely ensuring that each leg returns to the fully lowered position. This is an important step to ensure smooth, level lifting over many cycles. The legs are mechanically linked as well as hydraulically synchronized with flow dividers, however there is some allowable variance in these features so it is normal that the mast could become a few inches out of level. Re-setting the mast at the lowered position each time will prevent excessive out-of-level issues that could cause operational problems.

Testing the Unit

Air Technical Industries strictly tests all of its products before they leave the facility. This testing procedure insures that all finished products exceed operational capacities and all safety standards. The Telescopic Mast Straddle Crane has been designed and manufactured in accordance with ASME B30.1 Jacks, Industrial Rollers, Air Casters, and Hydraulic Gantries. In the event that any equipment should need to be re-tested off site, these are the procedures to be used.

1. Make sure the unit is on a flat, level surface and all corners/wheels are touching the ground.
 2. Secure the unit's maximum test load to the lifting hook/yoke(s) nearest to the mast(s). ***Always use lifting chains or straps with capacities that exceed the load to be lifted.**
 3. Begin by raising the test load 1" off the ground to be sure it is safely secured.
 4. Check for any excessive drift in the cylinders or flexing of the structural weldments. Note that there will be some minor flexing of the unit due to the inherent elasticity of steel. This is normal.
 5. Once there is confidence in the unit's stability, raise the crane to ¼ of its maximum lift height. Hold until the load is stable and recheck the unit for excessive drift and stress.
 6. Once there is confidence in the unit's stability, continue to raise the crane to its maximum height. Hold until the load is stable and recheck the unit for excessive drift and stress. Lower the crane and remove the load.
- *Note: Never push or pull the unit from the sides while under load. Only push or pull the unit with the tow-bar (sold separately).**

Inspection Criteria

As part of initial certification or annual inspection and testing, the following criteria should be used to verify that the crane is in proper working order and that it remains in suitable operating condition according to the original design specifications specified below.

1. Inspect structural (welded) connections for wear or cracks. Repair as needed.
2. Inspect mechanical (bolted) connections – tighten or replace as necessary. Fasteners are grade 5 bolts.
3. Inspect hydraulic connections – tighten or replace as necessary. Maximum operating pressure is 2250 psi, but relief pressure should be set lower to accommodate the actual maximum lifting capacity. If an apparent oil leak is identified, tighten connection, wipe away any excess oil, and observe. Replace only if leak persists.
4. Inspect lifting hooks (lift links) for damage. Discontinue use if there are any nicks or cuts deeper than 3/16" or any permanent deformation greater than 1/4".
5. Inspect wheels for excessive damage and repair/replace as necessary.
6. Inspect legs in the retracted position to ensure legs are level and parallel. Discontinue use and consult manufacturer if greater than 1° variance from vertical.
7. Inspect UHMW wear plates between legs. Wear plates are 1/2" thick. Replace if worn down to less than 3/8" thick.
8. Operate crane Up/Down function. Crane should raise within 3 seconds after depressing Up button. Operate both Up and Down functions individually and ensure that the controls operate properly and that the function stops when the button is released.
9. Inspect level raising of crane mast. Operate lift Up to about half of maximum travel and check the stroke at each leg. Maximum variance between any two legs should be 2". If greater than 2", bleed air from system. Run several cycles fully up and down, ensuring that the mast returns to fully lowered position after each cycle.
10. Proof load test – proof test to 110% of rated capacity (see testing instructions above). Operate mast travel to maximum allowable extension ensuring that the load is lifted at least 12" off the ground.
11. Inspect drift of mast during proof load test. Mast should drift no more than 2" in 10 minutes. If greater than 2" in 10 minutes drift, bleed air from system or inspect for hydraulic leaks.
12. Inspect beam deflection during proof load test. Maximum deflection should be 1/200 of crane span. Some bending or twisting of the beams during use is normal, however inspect beams after proof test for any permanent deformation.

Maintenance Instructions

The Telescopic Mast Straddle Cranes are designed to give many years of trouble free service and requires only the following routine maintenance procedures:

Daily before operating

1. Check battery
2. Check all controls
3. Check limit switches
4. Check to see that all bolts are tightening
5. Check hydraulic fittings
6. Make sure that all cables and hoses are intact and undamaged

Weekly

Do a quick visual inspection of the unit:

1. Check for leaks
2. Hoses and control cables are intact and undamaged
3. Charge batteries (frequency must be determined based on use)

Monthly

1. Check fluid level of hydraulic tank – units are furnished with Citgo AW-46 hydraulic fluid, which can be substituted with Shell No. 29 or other compatible non-foaming hydraulic oil.

Semi Annual

1. Grease any pivot points and or grease zerks
2. Run cylinders on unit to limits in and out to check for leaks
3. Inspect control cables on pendant control for nicks, cuts, or damage

Cylinders

Dis-assembly of the mast is necessary to access the lift cylinders.

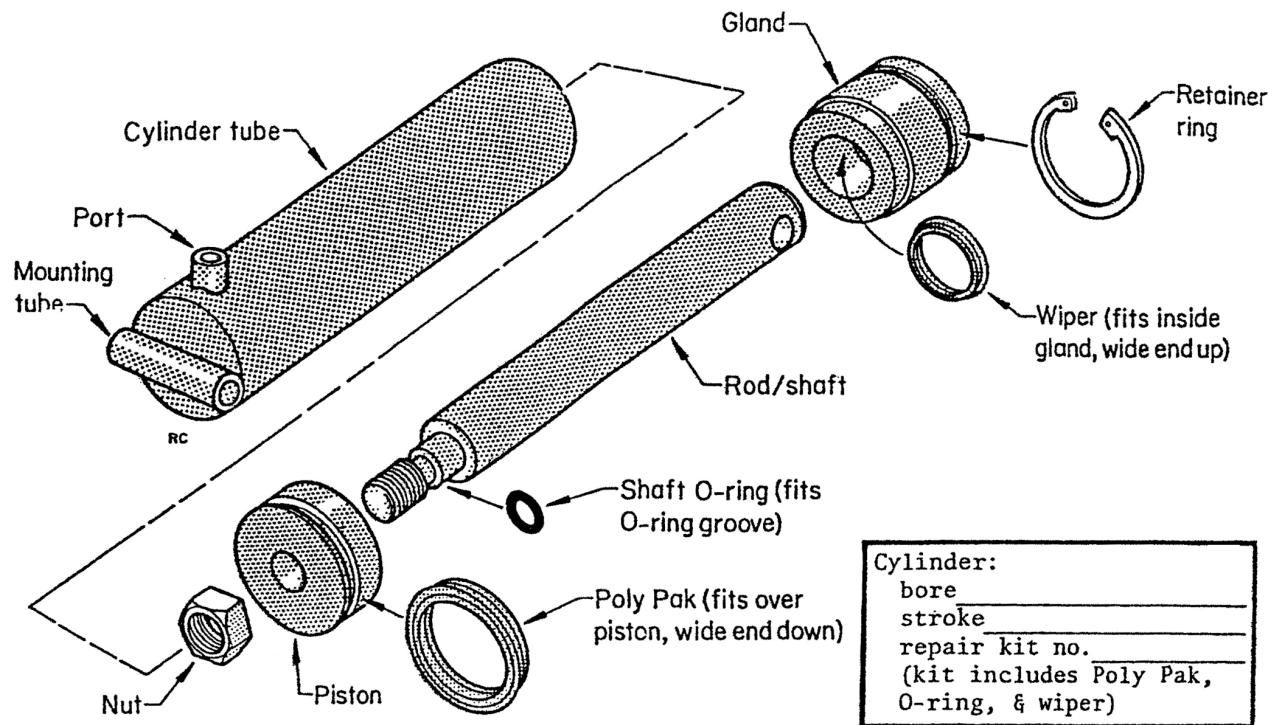
1. Unbolt the mast from the I-beam (part #21)
2. Lower the mast to a horizontal position
3. Unbolt the caster base (# W1) from the mast
4. Extend the cylinder until the cylinder mount head (part #7) is exposed
5. Unbolt the cylinder shaft from the cylinder mount head
6. Remove the 4 allen head bolts from the top of the mast(part #13)
7. Remove the cylinder from the inside of the mast

Disassembling the Hydraulic Cylinder

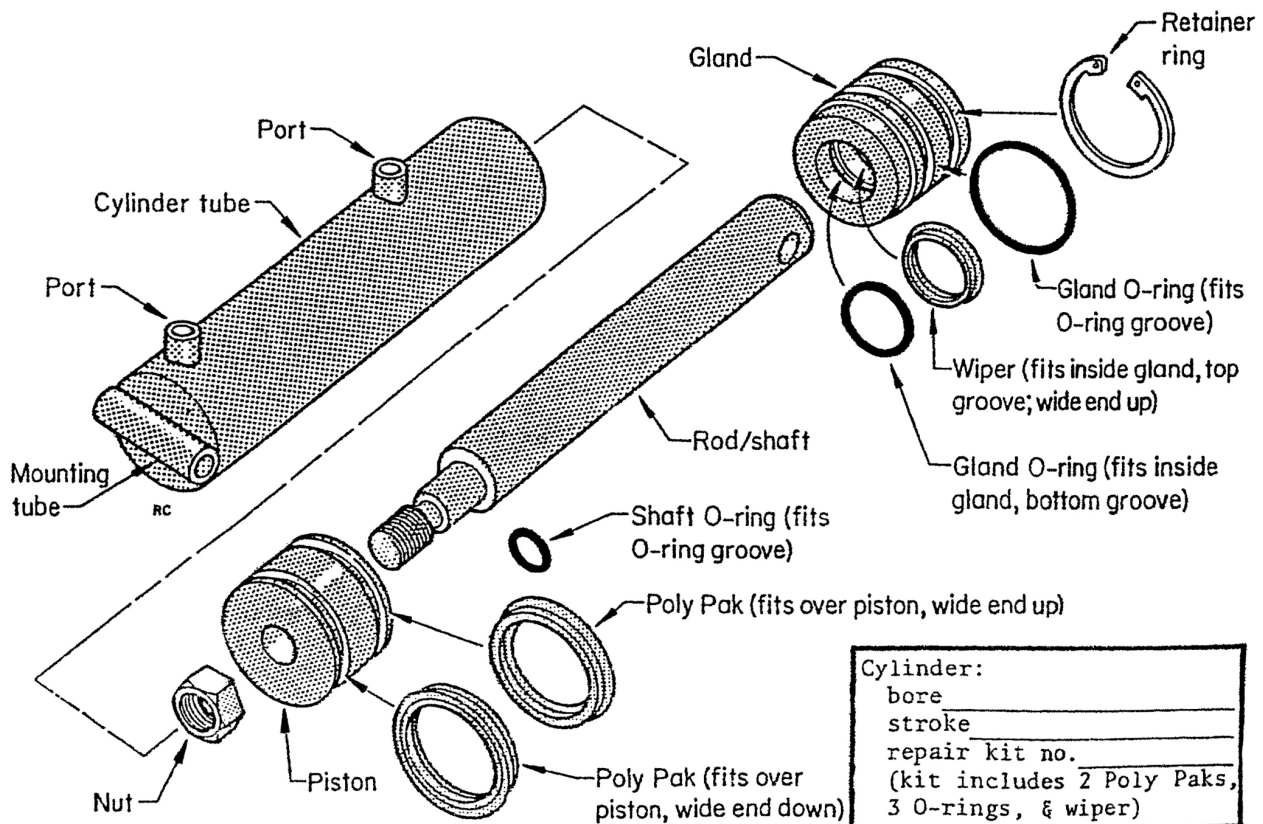
1. Disconnect the hydraulic hose at the cylinder port; catch leaking fluid in a container.
2. Disconnect rod/shaft end of the cylinder from top cylinder-shaft bracket (yoke).
3. Disconnect cylinder at bottom cylinder mounting bracket. Place cylinder in vise and tighten firmly but not enough to damage cylinder tube; NOTE: if a vise is not available, the cylinder can be left connected at the bottom cylinder mounting bracket. Work can be performed after tilting the cylinder tube to a convenient working angle.
4. Pull cylinder rod/shaft out until piston touches gland. NOTE: Care must be taken to avoid damaging rod/shaft.
5. Using retainer ring tool, grip the retainer ring, tighten, and remove retainer ring and gland at the same time. Pull rod straight out and all components will become visible, the piston will have pushed all the components out.
6. Remove nut at end of the rod/shaft to replace O-ring when rebuilding cylinder. Cylinder rebuilding kits from ATI contain all necessary wipers and O-rings to completely rebuild your cylinder. Model number and single or double acting cylinder description would be required.
7. Following the illustration, determine where all the parts go and reinstall each component without mixing new and used parts. Double check to see that wipers are installed with the wide end facing the proper direction.

Reassembling the Hydraulic Cylinder

1. Make sure all components are on rod shaft and nut is tightened.
2. Add light grease around inside lip of cylinder tube to help insert piston.
3. Place rod/shaft assembly over cylinder tube and push rod/shaft until piston is halfway down inside of tube. Slide gland with retainer ring into position. Using the retainer ring tool, grip retainer ring snap on inside of cylinder tube groove.
4. Reconnect cylinder to lift brackets. Reconnect all hydraulic hoses. Hook up to power source and check operation. You will notice that cylinder operation will be much "tighter" than before.



Typical Single-acting cylinder assembly



Typical Double-acting cylinder assembly

Troubleshooting

Trouble	Check
Lift will not raise	1. Check the power supply and electrical circuit – Pump motor starter (if provided) On new installations of the 3 phase motors, if the lift does not start raising in approximately 10 seconds, reverse line leads. WARNING: Do not run the pump backwards or with hydraulic oil. 2. Check oil level (WARNING: do not overfill.) – With lift in full up position, oil level should be 1 to 2 inches above bottom of the tank. 3. Lowering valve stuck in open position – Flush lowering valve by operating up and down controls simultaneously.
Lift raises slower than specified rate or will raise only partial load	1. Check line voltage under load condition – Low voltage affects speed and capacity. 2. Suction line may leak – Tighten fittings. 3. Relief valve may leak – Remove foreign matter from the valve and adjust to ¼ turn beyond what is required to lift load. 4. Inspect Lowering valve – Disassemble valve and look for foreign material under valve seat. 5. Check filter in tank for foreign material
Lift slowly settles with lowering valve closed	1. Inspect check valve – remove cap, spring and ball and inspect for foreign matter. 2. Flush lowering valve – By operating up and down controls simultaneously. This should be done with no load. 3. Disassemble lowering valve – Look for foreign material under valve seat 4. Air may be in system – bleed lines, see pg 5.
Lift will not lower	1. Check the power supply and electrical circuit. 2. Check that the flow control valve is not closed. 3. Velocity fuse(s) may be locked up – see below.
Lift does not raise/lower evenly	1. Despite the use of hydraulic flow dividers, a few inches of variation between legs is normal. Reduce the amount of this variation by lowering the unit completely between each cycle of lift.

Procedure for un-locking velocity fuse(s)

Close flow control valve completely.

Activate UP push button for 2-3 seconds.

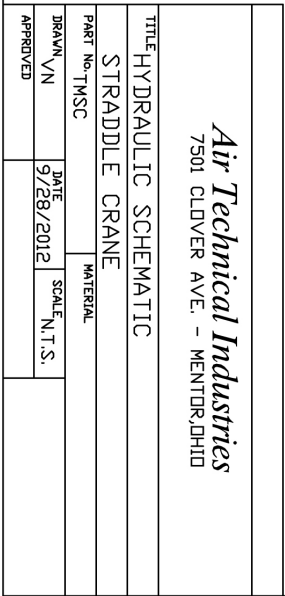
Activate DOWN button and hold, at the same time **slowly** open the flow control valve.

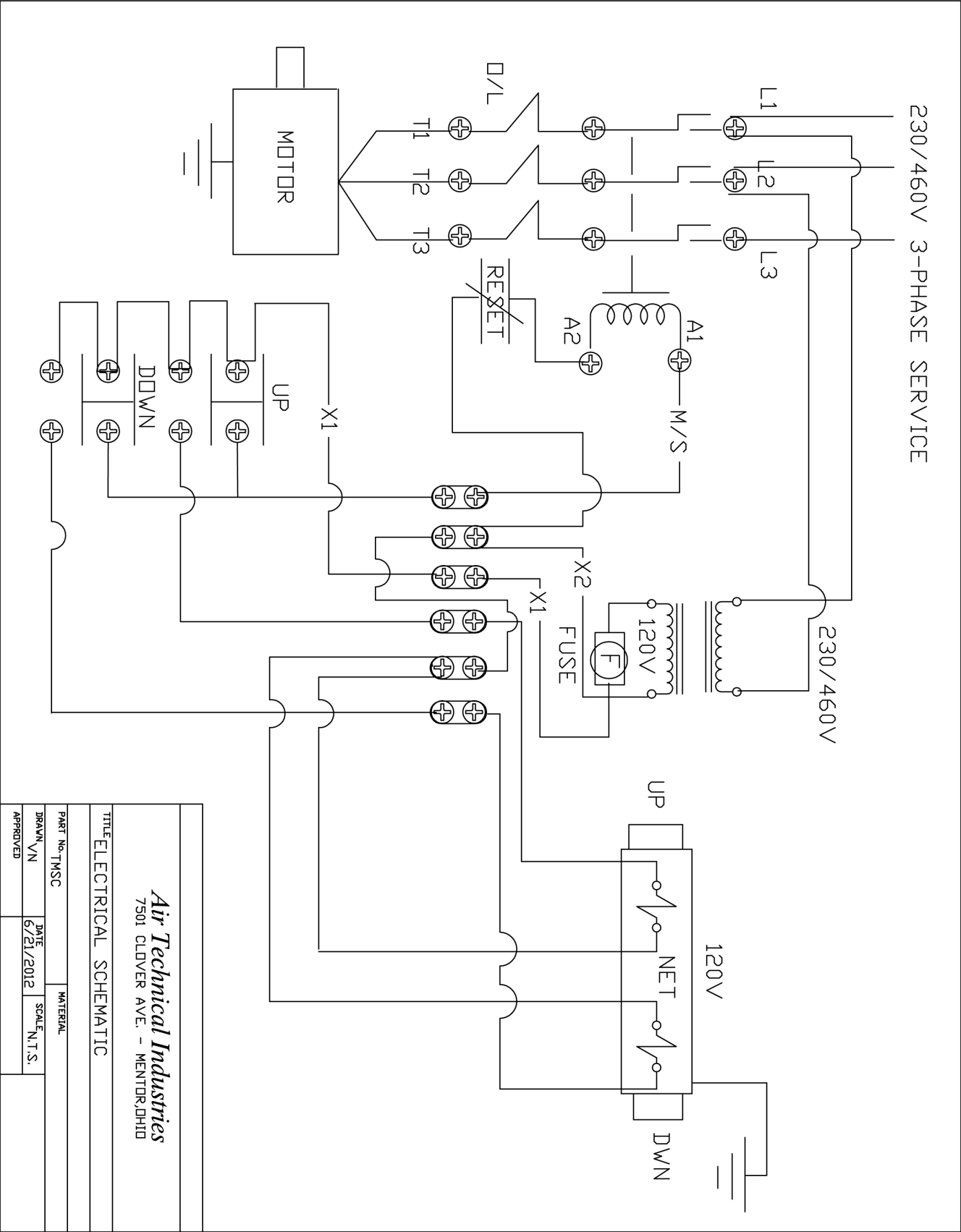
Once the crane begins to lower, open the flow control valve half way.

Verify that all legs are lowering at the same time.

Parts list

Item	1		Motor			Item				
HP	QTY	VOLTS	PHASE	TYPE	Part Number	3/4"	10"	Hydraulic Hose with M/F ends		M2HOSE040100
25	1	220/440	3	Shaft	PESM25220	3/4"	24"	Hydraulic Hose with M/F ends		M2HOSE040240
Item	2		Pump			3/4"	36"	Hydraulic Hose with M/F ends		M2HOSE040360
HP	QTY	SIZE		TYPE	Part Number	3/4"	48"	Hydraulic Hose with M/F ends		M2HOSE040480
25	1	21.13		Shaft	PHP2113GM	3/4"	84"	Hydraulic Hose with M/F ends		M2HOSE040840
Item	3		Control valve			3/4"	96"	Hydraulic Hose with M/F ends		M2HOSE040960
Bailey			D08	110v	PHV4W110X	3/4"	108"	Hydraulic Hose with M/F ends		M2HOSE040108
Item	4		Valve Subplate			1 1/2"	10"	Hydraulic Hose with M/F ends		M2HOSE050100
Bailey			D08	Side Port	PHSPO4PRT	1 1/2"	24"	Hydraulic Hose with M/F ends		M2HOSE050240
Item	5		Check Valve			1 1/2"	36"	Hydraulic Hose with M/F ends		M2HOSE050360
Bailey		1 1/2"	25hp			1 1/2"	48"	Hydraulic Hose with M/F ends		M2HOSE050480
Item	6		Pressure Gauge		PHGAUGE5K					
Item	7		Hydraulic Filter		PHFILT25G					
Item	8		Coupling Half							
		7/8"	150 Series		PH150C078	Item	15	Flow Control Valve		
Item	9		Coupling Half			25	3/4"	Flow Control		PH05MFCV0
		1 7/8"	150 Series		PH150C178	Item	16	Wheels		
Item	10		Spider		PHSPIDER0	Dual	12"x3"	Dual Caster w/swivel lock		PWDSC123L
Item	11		Prim. Flow Divider		PHFDPM261	Dual	12"x3"	Dual Caster w/swivel Lock/Brake		PWDSC123B
Item	12		Sec. Flow Divider		PHFDPM262	Item	17	Pushbutton		
Item	13	3/8"	Vent Plug		PH03VENT0	2		2 Button		PE2STAPB0
Item	14		Hydraulic Hose			Item	18	Pilot Valve		
1/4"	10"	Hydraulic Hose with M/F ends			M2HOSE020100	Bailey		For the D08 main valve		PHP4W110X
1/4"	24"	Hydraulic Hose with M/F ends			M2HOSE020240	Item	19	Relief Valve		
1/4"	36"	Hydraulic Hose with M/F ends			M2HOSE020360		3/8"	Pressure Relief Valve		PHMPRRV20
1/4"	48"	Hydraulic Hose with M/F ends			M2HOSE020480	Item	20	Motor Mounting Bolts		
1/4"	84"	Hydraulic Hose with M/F ends			M2HOSE020840		4	3/8"-16 UNC x 1 1/2" lg, gr.8 bolt		PF0616068HHC
1/4"	96"	Hydraulic Hose with M/F ends			M2HOSE020960	Item	21	Powerpack Mounting Bolts		
1/4"	108"	Hydraulic Hose with M/F ends			M2HOSE020108		8	1/2"-13 UNC x 2" lg, gr.5 bolt		PF0813085HHC
3/8"	10"	Hydraulic Hose with M/F ends			M2HOSE030100	Item	22	Hydraulic quick-disconnects		
3/8"	24"	Hydraulic Hose with M/F ends			M2HOSE030240		8	3/8" quick-disconnects, m/f		PHQD38000
3/8"	36"	Hydraulic Hose with M/F ends			M2HOSE030360	Item	23	Hydraulic quick-disconnects		
3/8"	48"	Hydraulic Hose with M/F ends			M2HOSE030480		8	1/2" quick-disconnects, m/f		PHQD12000
3/8"	84"	Hydraulic Hose with M/F ends			M2HOSE030840					
3/8"	96"	Hydraulic Hose with M/F ends			M2HOSE030960					
3/8"	108"	Hydraulic Hose with M/F ends			M2HOSE030108					





Warranty

Air Technical Industries warrants that its products shall be free from defects in material and workmanship under normal and ordinary usage when owned by the original purchaser for a period of twelve months from the date the products are shipped from Air Technical Industries. Hydraulic and electrical components are warranted for 90 days. The customer must cease use of the product pending Air Technical Industries' substantiation of any warranty claim. In the event that a product defect shall occur during the warranty period, Air Technical Industries shall provide replacement parts free of charge. Any unauthorized repairs on said products will render the warranty null and void. Labor to replace defective components is not included in the warranty; nor is any downtime or rental charges. By accepting product delivery, purchaser agrees to the terms of this warranty. Unless otherwise agreed upon in writing, Air Technical Industries makes no other warranties expressed or implied, which extends beyond the description of the goods. Due to their unique design and construction, Air Technical Industries' products are not crated. Contact us for specific crating charges.

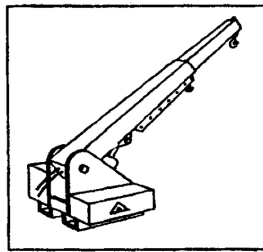
It is Air Technical Industries' policy that any and all returns must have a return goods authorization on file before any return will be accepted or credit will be issued. A return goods authorization form may be obtained by calling our customer service department. Any parts or products must be returned and inspected to validate any warranty or defect claim prior to any credit being issued. Any items returned without authorization on file will not be issued a credit as no claim has been established.

To establish a valid claim the customer must use the following procedure:

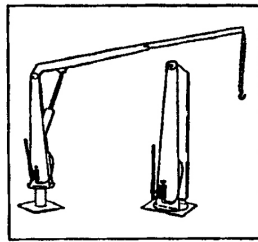
- Call Air Technical Industries customer service department for a Return Goods Authorization form
- Sign and return by fax a copy for Air Technical Industries file.
- Use this form as a packing slip for return shipment
- Return all parts or products for inspection to validate claim.

RETURN AND CREDIT POLICY

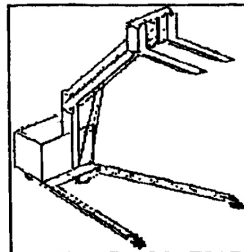
It is Air Technical Industries' policy that any and all returns or warranty claims once established to our satisfaction as a valid claim will be issued a CREDIT on the customer's account. This credit can be used within 1 year from the date of Credit Memo towards the purchase of new products, replacement parts, and/or service. At no time will a cash refund be issued. If a credit is issued under special circumstances, that credit can only be used as specified in a written agreement made between Air Technical Industries and the customer. This agreement must be made at the time the claim is established.



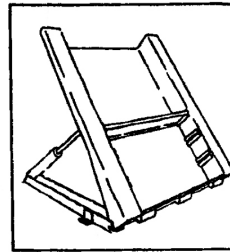
JibMaster



Truck mounted Foldable Crane



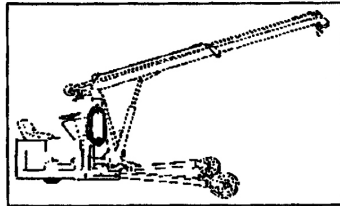
Universal Lift



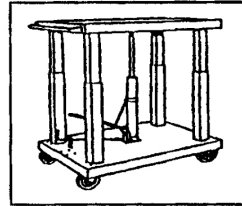
Zero-Low Crate Positioners



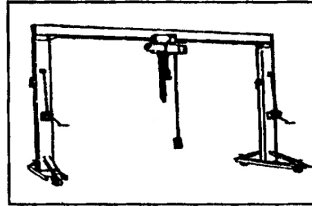
Lift & Tilt Tables



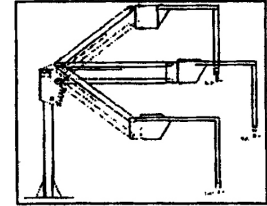
Port-O-Giant



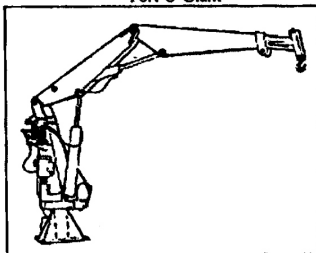
Post Tables



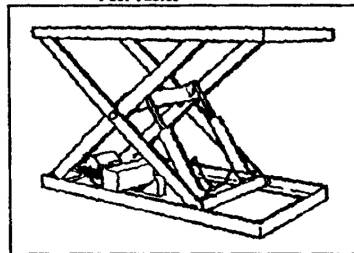
Gantry Cranes



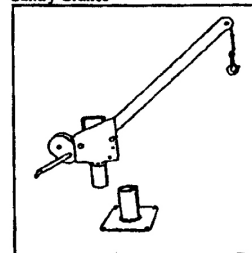
Articulating Manipulator



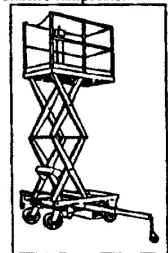
Knuckle Cranes



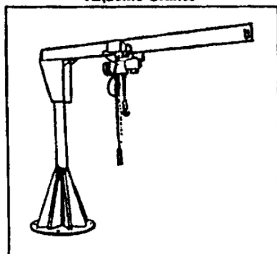
Scissor Lift Tables



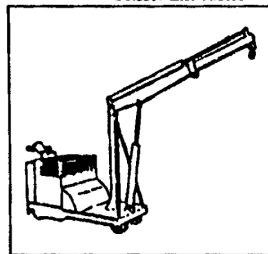
Truck Mounted Pick-Up Crane



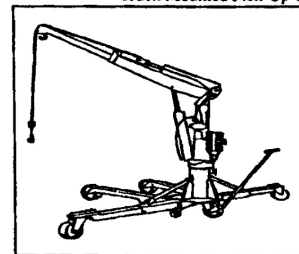
Maintenance Lifts



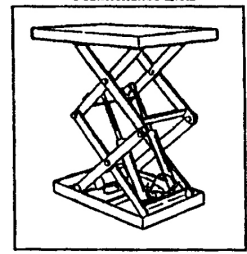
Floor Mounted Jib Cranes



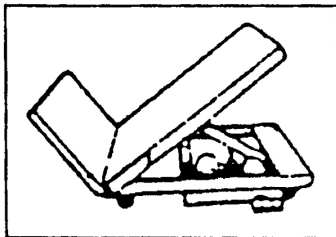
Reversible Boom Crane



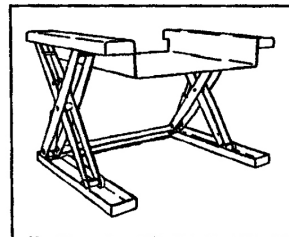
Super Master



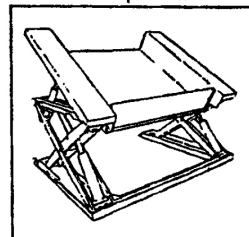
Double Scissor Lift Table



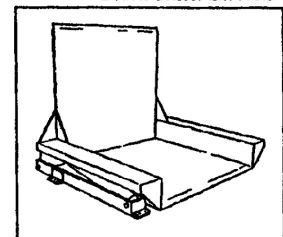
Crate Positioner



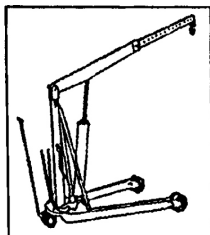
Zero-Low Lift Table



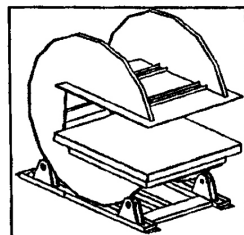
Zero-Low Up-Enders/Positioner



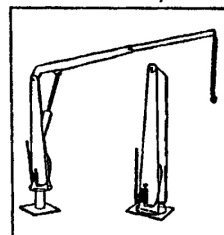
Zero-Low Lift & Tilt



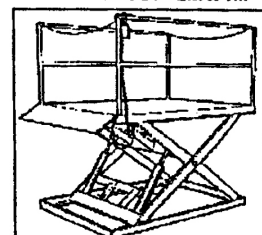
Husky Master



Upender-Inverter



Truck Mounted Foldable Crane



Magic Dock Scissor Lift