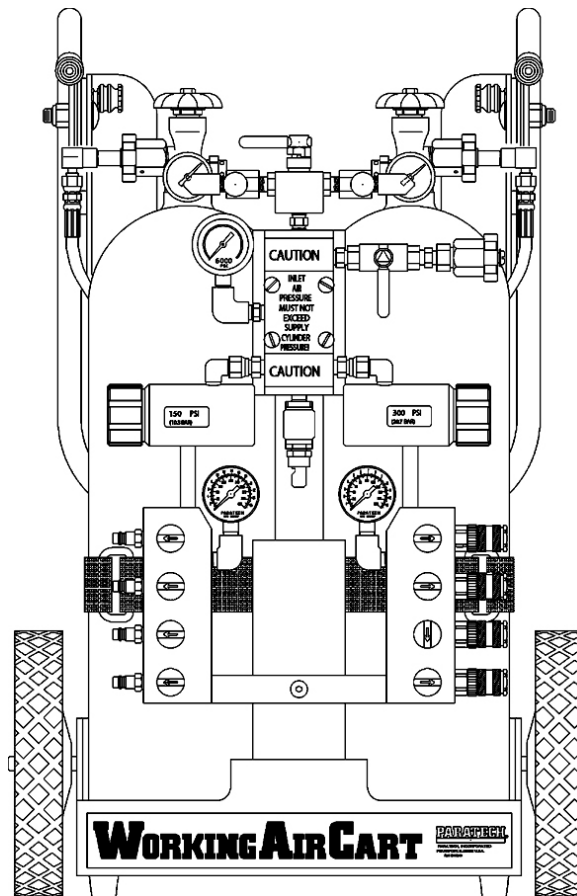




# OPERATION AND MAINTENANCE MANUAL FOR WORKING AIR CART



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PN 22-800209

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## FOREWORD

This technical manual conforms to Military Specifications MIL-M-38784 General Style and Format Requirements, MIL-M-7298 Commercial Equipment Technical Manual, and MIL-M-15071 Equipment and Systems Content Requirements for Technical Manuals. The manual contains description, operating instructions, theory of operation, scheduled maintenance recommendations, troubleshooting, corrective maintenance, and parts lists for the 22-800200 Working Air Cart manufactured by Paratech Incorporated, 1025 Lambrecht Road, Frankfort, Illinois 60423-1648.

All pertinent data relative to the Working Air Cart is contained herein without specific reference to other publications. Refer to the table of contents for the arrangement of the contents within this publication.

This manual consists of one volume arranged in four chapters as follows:

Chapter 1 – General Information and Safety Precautions

Chapter 2 – Operation

Chapter 3 – Scheduled Maintenance

Chapter 4 – Parts List



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# **SAFETY FIRST**

**Personnel safety and the prevention of equipment damage were primary considerations during the design and expected utilization of the Working Air Cart. When the Working Air Cart is used properly, an extremely safe and efficient method of delivering mobile working air is realized.**

**Please read and understand the following safety points, as well as this entire Working Air Cart manual before attempting to use the equipment.**

- **Always wear the correct personal protective equipment when using this equipment including eye protection, safety footwear, helmet and gloves.**
- **Check that the CGA fitting (nuts) connected to the air cart cylinders are tight, and make sure all drain valves and control bank valves are closed.**
- **Make sure all hoses connected to the Working Air Cart are fully inserted and locking rings are in the closed position before using any devices attached to the Working Air Cart.**
- **When changing a cylinder, ALWAYS make sure that the cylinder hose pressure has been released (close cylinder valve and open drain valve) before taking the CGA fitting (nut) off of the cylinder.**
- **When finished with the Working Air Cart, close both cylinders and open drain valves to release all pressure in the system**



CHAPTER 1  
GENERAL INFORMATION AND SAFETY PRECAUTIONS

### 1-1 SAFETY PRECAUTIONS.

Refer to the Safety Summary preceding Chapter 1, General Information and Safety Precautions, for safety precautions necessary for the protection of personnel and equipment.

### 1-2 INTRODUCTION.

This technical manual provides instructions for the operation, maintenance, and parts support for the 22-800200 Working Air Cart manufactured by Paratech Incorporated, 1025 Lambrecht Road, Frankfort, Illinois 60423-1648.

### 1-3 EQUIPMENT FUNCTION.

**WARNING**

The Working Air Cart, as the name implies, provides pressurized working air to air-dependent components, not breathing air to humans or animals. **Do not** connect the Working Air Cart to a breathing air respirator.

The Working Air Cart (refer to figure 1-1) is a portable self-contained unit designed to provide, from a single supply source, continuous regulated working air simultaneously to a variety of components, such as:

a. Air Bag Systems and Rescue Support Systems utilized during emergency situations such as building collapse, structural containment or stabilization, vehicular extrications, industrial entrapment, and excavation collapse and containment.

b. Portable pneumatic impact tools designed for forcible entry (piercing, cutting, and breaking) during fire fighting and rescue operations as well as light/medium duty breaking/breaching of masonry walls and digging/tunneling operations.

### 1-4 EQUIPMENT DESCRIPTION.

The Working Air Cart is a lightweight portable unit incorporating a high pressure manifold with two regulated air manifolds, each with multiple outlets, and a wheeled cart to contain the manifolds and air cylinders. Refer to Chapter 3 for a more detailed description of the Working Air Cart's components.

#### 1-4.1 High Pressure Manifold.

a. The high pressure manifold incorporates a high pressure (supply pressure) gauge to monitor cylinder air conveyed to the 150 and 300 psi low pressure regulators. The high pressure gauge is marked in 1,000 psi increments from 1,000 to 6,000 psi and is scribed in 200 psi increments. The gauge is also marked each 10,000 kPa from 10,000 to 40,000 kPa and is scribed in 1,000 kPa increments. (See also table 1-1.)

Table 1-1. Psi Equivalents

10.3 bar	=	150 psi
13.8 bar	=	200 psi
17.2 bar	=	250 psi
20.7 bar	=	300 psi
21.4 bar	=	310 psi
27.6 bar	=	400 psi
1 bar	=	100 kPa = 14.5 psi

b. A shut-off valve is provided between a CGA 347 adapter and the high pressure manifold to permit access to alternate sources of working air: either the air cylinders mounted on the cart, an external cascade system, an in-plant source, a mobile air compressor, or an air truck.

c. The CGA 347 inlet/outlet high pressure adapter provides: an accommodation for charging the cart-mounted air cylinders, a provision to access other alternate working air sources, or a high pressure (up to 5,500 psi) outlet connection.

d. A 3-way diverter valve connected at the top of the high pressure manifold permits isolation of either or both mounted air cylinders, thereby switching inlet/outlet working air either to or from either or both (but not simultaneously) of the mounted air cylinders. When in the "OFF" position, working air to the cart is being supplied through the CGA 347 inlet/outlet high pressure adapter from a remote high pressure air source. When in the "ON" position, working air is being supplied from the integral air cylinder (depending upon which air cylinder the 3-way diverter valve handle is facing).

e. Inline bleed valves are located between the 3-way diverter valve and the high pressure hose assemblies interconnected to the working air cylinders. These valves permit bleeding internal air trapped between each air cylinder (with the air cylinder valve closed) and the couplings and nipples on the low pressure manifolds (when the 3-way diverter valve is oriented toward that cylinder).

f. A low pressure alarm (whistle) is provided at the bottom of the high pressure manifold to caution operating personnel that the pressure in the air cylinder or alternate working air source (whichever is currently being used) is between 400 and 500 psi, which then necessitates replacement and recharging accompanied by a switchover to the alternate working air cylinder (if two air cylinders are provided on the Working Air Cart).

1-4.2 **150 Psi and 300 Psi Low Pressure Regulators.**

- a. Each pressure regulator is a self-contained, direct-acting, pressure-reducing type utilizing spring-loading to balance the outlet pressure and thereby reduce the effect of decaying or variations in the inlet pressure.
- b. Each pressure regulator incorporates a piston sensor and soft seated main valve to provide bubble tight services. The adjusting mechanism, activated by a hand adjusting knob, provides the desired setting sensitivity while maintaining a low operating torque.

1-4.3 **150 Psi Regulated Air Manifold.**

- a. The 150 psi regulated air manifold contains four quick connect nipples (each with its own shut-off) to accommodate mating hoses connected to tools and/or other components that require no more than a 150 psi air supply.
- b. Both the 150 psi and the 300 psi (see below) regulated air manifolds incorporate identical pressure gauges to monitor the regulated delivery pressure to the corresponding nipples and couplings. Each pressure gauge is marked in 20 psi increments from 0 to 400 psi and is scribed every 10 psi. Each pressure gauge is also marked at each bar from 0 to 26 bar and is scribed every 0.5 bar (see gauge). [1 bar = 100 kPa.]

1-4.4 **300 Psi Regulated Air Manifold.**

- a. The 300 psi regulated air manifold contains four quick connect couplings (each with its own shut-off) to accommodate mating hoses connected to tools and/or other components that require no more than a 300 psi air supply. (See 1-4.3b above for information on the pressure gauge.)

1-4.5 **Cart.** The cart is a lightweight framework incorporating two semi pneumatic ball bearing wheels, a footstand, and adjustable bar handle that swings to various positions providing stability when the cart is on an incline and/or lying on its back over uneven surfaces. This design also enables better use and mobility by personnel of varying heights. Also provided on the cart are Velcro™ straps to restrain each air cylinder more securely.

1-5 **RELATIONSHIP OF UNITS.**

Refer to figure 1-1 for a pictorial illustration of the Working Air Cart.

1-6 **REFERENCE DATA.**

Reference data pertaining to the Working Air Cart are summarized for quick reference in table 1-2.

1-7 **EQUIPMENT, ACCESSORIES AND DOCUMENTS SUPPLIED.**

1-7.1 **Equipment Supplied.** Data pertaining to the dimensions and weight of the Working Air Cart are presented in table 1-2.

1-7.2 **Accessories.** The 22-800200 Working Air Cart is com-

plete as supplied (with air cylinders) and requires no accessories for its designed use as an air supply for air bag systems, rescue support systems, and pneumatic impact tools. The 22-800201 Working Air Cart is complete as supplied (less air cylinders) and requires only the addition of two 3,000 psi air cylinders (part number 22-800080).

1-7.3 **Documents Supplied.** In addition to this publication, supplementary documentation (Paratech publication 22-895309) is available for the regulators (part numbers 22-895300A and 22-895300B) provided with the Working Air Cart.

Table 1-2. Reference Data

Manufacturer.....	Paratech, Incorporated 1025 Lambrecht Road Frankfort, Illinois 60423-1648
CAGE Code.....	30978
Maximum Inlet Pressure.....	5,500 psi.(379.2 bar*)
Maximum Regulated Delivery Pressure	
150 Psi Regulator .....	150 psi (10.3 bar)
300 Psi Regulator.....	300 psi (20.7 bar)
Regulated Air Delivery Connections	
150 Psi Regulator.....	four quick connect nipples
300 Psi Regulator.....	four quick connect couplings
High Pressure Inlet/Outlet Connection.....	CGA 347 Male
Overall Dimensions	
Weight (with two empty cylinders).....	110 lbs (50 kg)
Weight (with two filled cylinders).....	122.2 lbs (55.55 kg)
Height.....	33 in (84 cm)
Width.....	22 in (56 cm)
Depth.....	16.75 in (42.55 cm)

\* 1 bar = 100 kPa

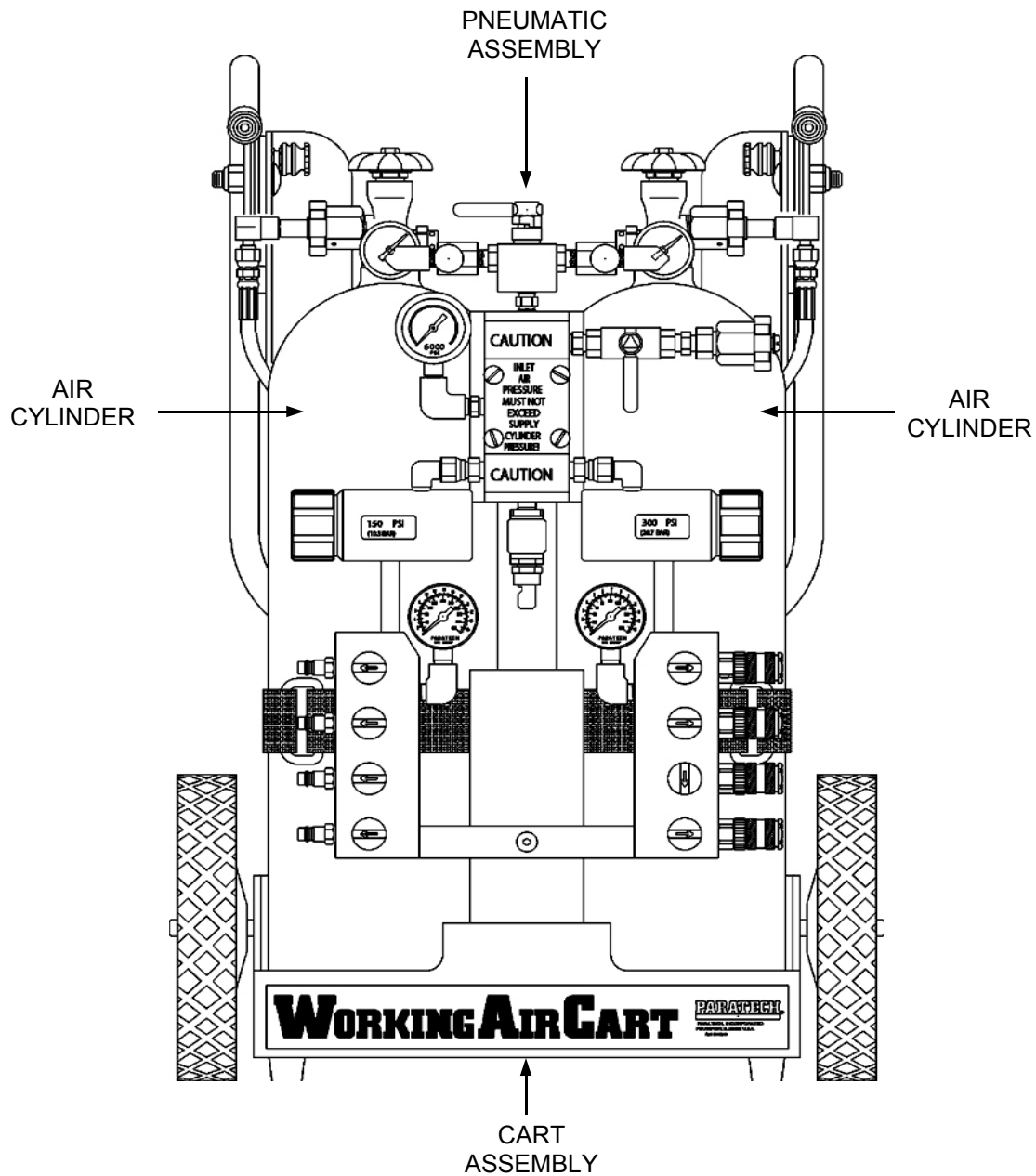


Figure 1-1. 22-800200 Working Air Cart, General View



## CHAPTER 2 OPERATION

### 2-1 INTRODUCTION.

The working air cart is a portable self-contained unit designed to provide, from a single supply source, continuous regulated working air to air bag systems, rescue support systems, and portable pneumatic impact tools.

### 2-2 PREPARATION FOR USE.

#### 2-2.1 General.

a. Remove all dust, dirt, oil, or grease from the couplings, nipples, and air cylinder connectors (see figure 2-1). Do not use the working air cart without first cleaning off any contaminants.

b. Inspect the couplings, nipples, and air cylinder connectors for any damage that will permit air leakage. Do not use the working air cart if an air leakage condition exists.

c. Swing the cart bar handle by releasing two (2) lock pins. This will accommodate personnel of varying heights to prevent inadvertent contact between the cart and the operator during transport to the working site.

d. If the operating site is rough, uneven, or inclined, swing the cart bar handle in order to provide a back rest for the cart or to permit a more stable platform at the working site. Adjusting the handle so the two straight ends lay on the ground will provide stabilizing pegs so the cart will not easily move.

#### 2-2.2 If Using Integral Air Cylinder(s) As An Air Supply Source.

a. If necessary, close the shut-off valve (handle in vertical position) and verify the CGA 347 adapter protective cap is tight.

b. As required, orient the 3-way diverter valve handle forward.

c. Verify both bleed valves are fully closed (knob full clockwise).

d. Check the gauge on the air cylinder(s) to verify they are fully charged or near fully charged (4,500 psi for high pressure cylinders, 3,000 for medium pressure or 2,216 psi for lower pressure cylinders). Do not jeopardize an operation by starting out with any air cylinder that is not fully charged. Consideration should be given to the total air supply required for a given operation. Spare, fully charged, air cylinder(s) should be available in the event they are needed.

e. If necessary, position an air cylinder on the cart and orient such that the air cylinder gauge is facing forward. Secure in position with the two Velcro™ straps.

f. If necessary, remove the protective cap from the air cylinder nipple. Hand tighten the air cylinder connector

onto the air cylinder nipple. Verify the air cylinder connector is tightened sufficiently to prevent leakage.

g. Repeat preceding steps d. through f. if a second air cylinder is to be installed onto the cart.

h. Turn the adjusting knob on the 150 and 300 psi regulators full counterclockwise to close the internal needle valve (no flow through the pressure regulator).

i. If necessary, place the shut-off knobs on the 150 and 300 psi low pressure manifolds in the vertical (closed) position.

j. Connect the delivery hose(s) to the quick disconnect delivery nipple(s) and/or coupling(s) on the 150 and/or 300 psi low pressure manifold(s). Be sure the quick disconnect mechanism is fully engaged and locked in position to assure leak-free connection(s).

#### 2-2.3 If Using An External Air Supply Source To Charge Either Or Both Integral Air Cylinders.

a. Orient the 3-way diverter valve handle toward the integral air cylinder requiring charging.

b. Verify both the 150 and 300 psi regulators are fully closed (full counterclockwise).

c. Verify both bleed valves are fully closed (knob full clockwise).

d. Remove the CGA 347 adapter protective cap. Verify the CGA 347 adapter is clean and not damaged. This will assure a leak-proof connection.

e. Connect a hose assembly from the external high pressure air source (5,500 psi maximum) to the CGA 347 adapter, tightening the connection firmly. Be sure the high pressure source does not exceed the capacity of the air cylinder being charged.

f. Open the air cylinder valve on the air cylinder to be charged.

g. Open the shut-off valve.

h. Operate/open the external high pressure air source to supply compressed air to the integral air cylinder. When the air cylinder is fully charged (pressure indicated on the air cylinder gauge), close the air cylinder valve. The high pressure gauge will indicate supply pressure to the high pressure manifold.

i. If no further charging of air cylinders is required, shut off the external high pressure air source and perform the following steps j through l, and then orient the 3-way diverter valve handle forward. If the alternate air cylinder is also to be charged, proceed to the following step m.



j. Close the shut-off valve.

k. Open the bleed valve associated with the air cylinder just charged to bleed out compressed air from the delivery hose, the high pressure hose, and the high pressure manifold. Then close the bleed valve.

l. Disconnect the delivery hose from the CGA 347 adapter and install the protective cap on the adapter.

m. Open the air cylinder valve on the alternate integral air cylinder.

n. Close the shut-off valve.

o. Orient the 3-way diverter valve handle toward the alternate integral air cylinder requiring charging.

p. Open the shut-off valve.

q. Permit the external high pressure air source to supply compressed air to the alternate integral air cylinder. When the air cylinder is fully charged (pressure is indicated on the air cylinder gauge), close the air cylinder valve. The high pressure gauge will indicate supply pressure to the high pressure manifold.

r. Shut off the external high pressure air source.

s. Open the bleed valve associated with the air cylinder just charged to bleed out compressed air from the delivery hose, the high pressure hose, and the high pressure manifold. Then close the bleed valve.

t. Close the shut-off valve.

u. Disconnect the delivery hose from the CGA 347 adapter and install the protective cap on the adapter.

v. Orient the 3-way diverter valve handle forward.

## 2-3 CONTROLS AND INDICATORS.

2-3.1 **Controls.** The following controls are provided on the working air cart.

a. **Air Cylinder Valve.** Each air cylinder valve controls the delivery of the compressed working air which is contained in the respective air cylinder. When in the fully closed (clockwise) position, no compressed air is available at the outlet nipple on the air cylinder. When in the fully open (counterclockwise) position, compressed air (pressure indicated by the air cylinder gauge) is available at the delivery nipple on the air cylinder.

b. **Air Cylinder Connector.** Each air cylinder connector provides the attachment accommodation between the air cylinder and the respective high pressure hose to the high pressure manifold.

c. **Bleed Valve.** Each bleed valve provides a means for bleeding residual compressed air trapped within the high pressure line between the air cylinder last used (making sure its air cylinder valve is closed) and the 3-way diverter valve after first repositioning the 3-way diverter valve to the alternate air cylinder.

d. **3-Way Diverter Valve.** The 3-way diverter valve permits compressed air to be supplied to the high pressure manifold from either air cylinder (when the handle is oriented in the direction of the air cylinder supplying compressed air) or from an external air source (when the handle is oriented in the center position facing the front of the cart) which may be connected to the CGA 347 adapter.

e. **Shut-Off Valve.** The shut-off valve permits the CGA 347 adapter to be used as an inlet for compressed air to the high pressure manifold from an external cascade system, an in-plant source, a mobile air compressor, or an air truck when the 3-way diverter valve is in the "OFF" position. When the 3-way diverter valve is in either "ON" position, the shut-off valve permits a mounted and discharged air cylinder to be pressurized (refilled) from any of the external sources indicated above. In addition, when the 3-way diverter valve is in the "ON" position, the shut-off valve permits the CGA 347 adapter to provide another connection for high pressure compressed air directly from either mounted air cylinder (depending upon the orientation of the 3-way diverter valve handle).

f. **150 Psi Regulator.** The 150 psi regulator provides regulated delivery air up to 150 psi (10.3 bar) to the 150 psi manifold for distribution to air bag systems, portable pneumatic impact tools, and other components that require no more than 150 psi operating air pressure. The pressure adjustment knob is turned to control the delivery pressure—counterclockwise to decrease and clockwise to increase.

g. **300 Psi Regulator.** The 300 psi regulator provides regulated delivery air up to 300 psi (20.7 bar) to the 300 psi manifold for distribution to rescue support systems, portable pneumatic impact tools, and other components that require no more than 300 psi operating air pressure. The pressure adjustment knob is turned to control the de-

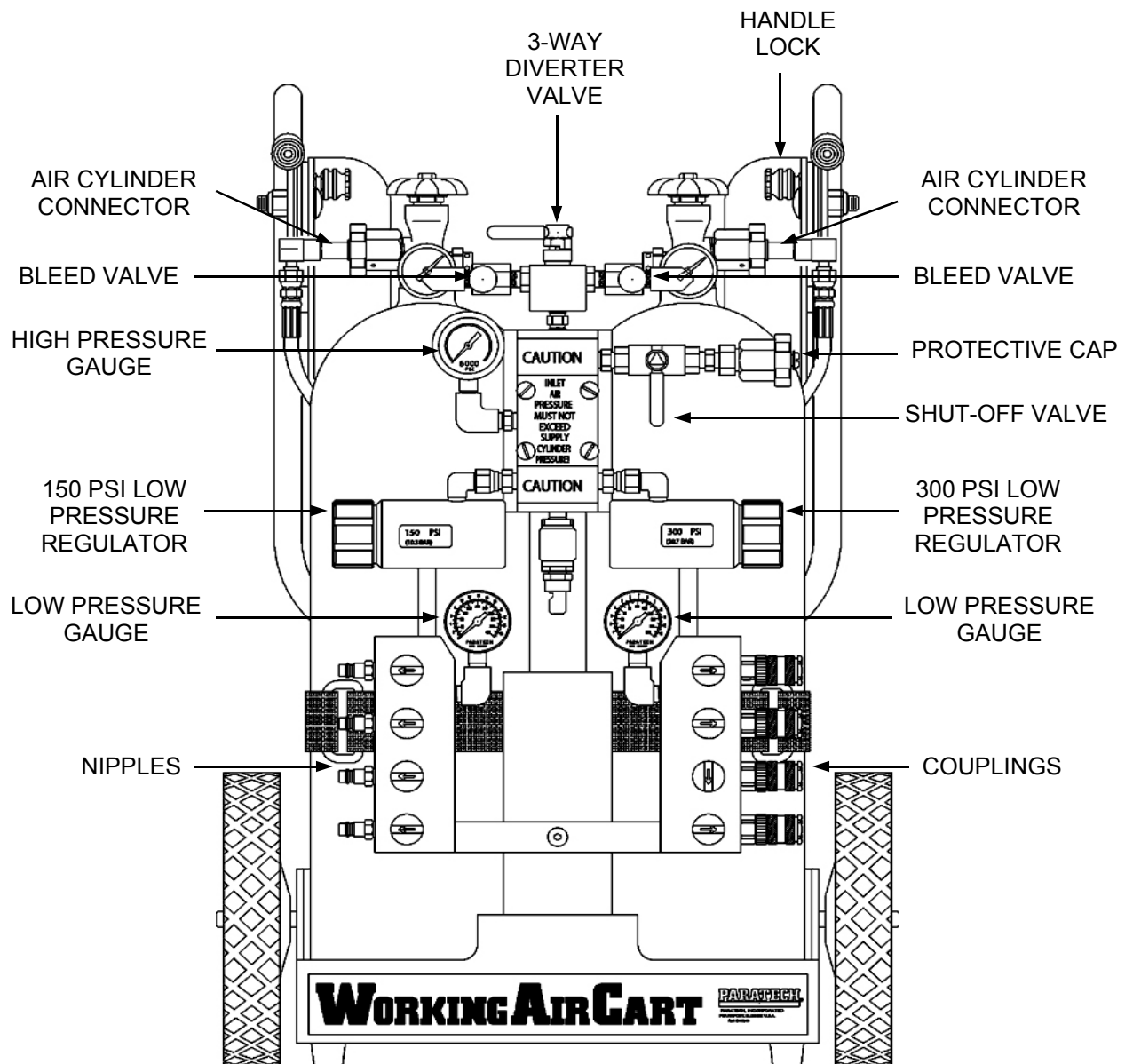


Figure 2-1.  
Operating Controls and Indicators

livery pressure—counterclockwise to decrease and clockwise to increase.

h. **Control Knobs.** Each control knob controls either a nipple or a coupling on the 150 and 300 psi low pressure manifolds to provide working air to an associated air bag system, rescue support system, portable pneumatic impact tool, or other connected component. The control knobs move only 90 degrees—horizontal is the “ON” position and vertical is the “OFF” position.

2-3.2 **Indicators.** The following indicators are provided on the working air cart.

a. **Air Cylinder Gauge.** The air cylinder gauge indicates the compressed air pressure within the associated air cylinder, regardless of the position of the air cylinder valve.

b. **High Pressure Gauge.** The high pressure gauge indicates the supply air pressure within the high pressure manifold, regardless of whether the high pressure cylinder is being pressurized from either integral air cylinder or any external air pressure source. The gauge is marked in 1,000 psi increments from 1,000 psi to 6,000 psi and is scribed in 200 psi increments. The gauge is also marked at each 10,000 kPa from 10,000 kPa to 40,000 kPa and is scribed every 1,000 kPa. [1 bar = 100 kPa = 14.5 psi.]

c. **Low Pressure Gauges.** Both the 150 psi and the 300 psi regulated air manifolds incorporate identical low pressure gauges. Each of these two low pressure gauges indicates the regulated delivery pressure available at the nipples and couplings. Each gauge is marked in 20 psi increments from 0 to 400 psi and is scribed every 10 psi. Each low pressure gauge is also marked at each bar from 0 to 26 bar and is scribed every 0.5 bar. [1 bar = 100 kPa = 14.5 psi.]

d. **Low Pressure Alarm.** The low pressure alarm (whistle) cautions operating personnel that the pressure in the air cylinder or alternate working air source, whichever is currently being used, is between 400 and 500 psi and necessitates replacement and recharging, accompanied by a switchover to the alternate working air cylinder or to a different working air source.

#### 2-4 NORMAL OPERATING PROCEDURE.

### WARNING

The working air cart, as the name implies, provides working air to air-dependent components, not breathing air to humans or animals. **Do not** connect the working air cart to a breathing air respirator.

a. Connect delivery hoses to the quick disconnect nipples and/or couplings on the 150 or 300 psi low pressure manifolds, depending upon whether the working air is being supplied to air bag systems, rescue support systems, and/or portable pneumatic impact tools or similar systems.

Be sure each quick disconnect mechanism is fully engaged and locked in position to assure leak-free connection.

b. Open the air cylinder valves on **BOTH** air cylinders to enable compressed air to be supplied to the connected apparatus. Each air cylinder gauge indicates the compressed air pressure within the associated air cylinder regardless of the position of the air cylinder valve. The high pressure gauge indicates the supply air pressure to both the 150 and 300 psi regulators.

### NOTE

It may be necessary first to bleed any residual compressed air from the connections associated with the air cylinders before opening both air cylinder valves.

c. Orient the 3-way diverter valve handle toward either air cylinder to supply working air to both the 150 and 300 psi low pressure manifolds. The low pressure alarm will momentarily sound.

d. Open (turn horizontal) the appropriate control knobs on the low pressure manifolds to supply working air to whatever apparatus has been connected. The 150 and 300 psi low pressure gauges should indicate 0 psi—until the apparatus has been turned on.

### WARNING

**Do not** adjust the low pressure regulators (either the 150 or the 300 psi units) to exceed the maximum pressure rating of *any* component in *any* attached system apparatus.

e. Adjust the 150 and/or 300 psi pressure regulators (counterclockwise to decrease, clockwise to increase) as required, after turning on the attached apparatus, in order to supply more precise regulated delivery air. Make the final adjustment in the increase direction to provide the most accurate and consistent pressure settings. The delivery air pressure will be indicated on the respective 150 and/or 300 psi low pressure gauges.

f. The working air cart supplies compressed air from only one air cylinder at a time. The second air cylinder is a reserve and should be used when the low pressure alarm sounds to denote a low pressure (between 400 and 500 psi) condition in the high pressure manifold. When this condition occurs, orient the 3-way diverter valve handle toward the alternate air cylinder while the system remains operational. This enables no interruption in service and allows the depleted air cylinder to be replaced or recharged.

### NOTE

If an additional source of compressed air has been attached to the working air cart, orienting the 3-way diverter valve handle facing forward will immediately access that source. This then would allow both air cylinders to be replaced at the same time. The working air cart's design for such alternative replenishment and supply of compressed air assures continuous non-stop operation of all attached apparatus.

g. To stop providing delivery air to any particular attached system or apparatus, turn the associated control knob(s) on the low pressure manifold to the closed (vertical) position. All such control knobs function as shut-off valves.

h. When no further compressed air is required, or a normal shutdown of all equipment is desired, refer to shutdown procedures as explained in paragraph 2-5.

**2-4.1 Replacing A Depleted Air Cylinder.** The working air cart's design permits replacing or recharging a depleted air cylinder even while delivering working air to all attached apparatus *without interruption*. Replace a depleted air cylinder according to the following instructions.

### CAUTION

Recharging a depleted air cylinder while still mounted on the working air cart is possible, but it is not recommended. For any operation involving recharging air cylinders, refer to those instructions and safety precautions that are provided by the manufacturers or suppliers of such cylinders. The better recommendation is always to keep additional and accessible fully charged air cylinders in constant reserve.

a. Orient the 3-way diverter valve handle toward the alternate air cylinder to continue supplying delivery air to all attached apparatus.

b. Close the air cylinder valve on the depleted air cylinder.

c. Open the bleed valve associated with the depleted air cylinder to bleed out compressed air from the high pressure line. Then close the bleed valve.

### WARNING

**Do not** attempt to disconnect the air cylinder connector while there is pressurized air still in the high pressure line or hose because possible injury to personnel or damage to the air cylinder connector may result.

d. Rotate the air cylinder connector to release the high pressure line or hose from the nipple on the depleted air cylinder.

e. Release the two Velcro™ straps securing the depleted air cylinder and remove the air cylinder from the cart.

f. Mount a replacing fully charged air cylinder onto the cart, positioning and orienting the cylinder so that the air cylinder gauge is facing forward. Secure the cylinder with the two Velcro™ straps.

g. Remove the protective cap from the fully charged air cylinder nipple. Hand tighten the air cylinder connector onto the air cylinder nipple. Verify the air cylinder connec-

tor is tightened just enough to prevent leakage. **Do not** overtighten or possible damage to the air cylinder connector may occur.

h. Open the air cylinder valve on the fully charged air cylinder in preparation for the next switchover.

## 2-5 SHUTDOWN.

For normal operations it is important to follow these instructions in this exact order:

a. At the conclusion of working air cart use, close both air cylinder valves. If any outside compressed air source has also been connected to the working air cart, close off that source as well.

b. Orient the 3-way diverter valve handle forward to the center "OFF" position.

c. Disconnect all apparatus air delivery hoses from the quick connect nipples and couplings at both the 150 and 300 psi low pressure manifolds.

d. Open both bleed valves to bleed out any compressed air from the high pressure lines and hoses as well as the high and low pressure manifolds. Then close both bleed valves.

e. If the working air cart was laid on its back, utilizing the bar handle for support, raise the cart to its vertical position and readjust the bar handle's positioning to suit the personnel involved with rolling and transporting the cart.

f. Perform the after-use maintenance that is specified in Chapter 3.

### NOTE:

ALL COMPRESSED AIR SHOULD BE REGULATED TO MAXIMIZE SAFETY. PARATECH DOES NOT RECOMMEND, AT ANY TIME, USING THE CGA 347 INLET ADAPTER AS AN ALTERNATE OUTLET CONNECTION *WITHOUT* AN AIR REGULATION DEVICE.



## CHAPTER 3 MAINTENANCE

### 3-1 INTRODUCTION.

The working air cart requires little maintenance to ensure optimum performance. This chapter describes preventative maintenance, troubleshooting, and corrective maintenance procedures.

### 3-2 PREVENTATIVE MAINTENANCE.

Preventative maintenance of the pressure regulators is accomplished in accordance with the working air cart maintenance schedule shown in table 3-1.

### 3-3 GENERAL MAINTENANCE.

#### 3-3.1 General.

General maintenance should be performed as detailed in this chapter using the maintenance schedule prescribed in table 3-1. This chapter provides the step-by-step procedures which are necessary to verify that the working air cart is operating satisfactorily.

#### 3-3.2 Surface Cleaning.

#### WARNING

Dry cleaning solvent (such as Stoddard's Solvent or the equivalent) is potentially dangerous. Avoid repeated or prolonged breathing of vapors and skin contact with the liquid. ***Do not use*** near any open flame, arcing equipment, or other ignition sources. Always use eye protection and protective clothing while using such solvents.

#### WARNING

Serious injury could occur if compressed air is directed against the skin. ***Do not use*** compressed air unless the pressure is, or has been, reduced to 30 psi (207 kPa) or less. When working with compressed air, always use

eye protection, chip guards, protective clothing, and any other safety equipment that may be required by local health authorities and/or the Occupational Safety and Health Administration (OSHA).

a. Keep the exterior of the working air cart clean of all dust, dirt, grit, oil, and grease accumulations. No special cleaning procedures are required besides occasionally wiping or otherwise cleaning these substances off the cart. Wipe exterior surfaces with a lint-free cotton machinery wiping towel lightly dampened with clean water. Then dry the surfaces thoroughly with a clean dry lint-free cotton machinery wiping towel or very low pressure compressed air. Compressed air may be used for cleaning in less accessible areas.

b. Stubborn substance deposits may be removed with a dry cleaning solvent (such as Stoddard's Solvent or equivalent) and a soft bristle or wire brush. Thread sealant may be cleaned off cart parts by heating the part with a heat gun (not a torch) and then applying the solvent and scrubbing with a soft bristle or wire brush.

#### 3-3.3 Inspection.

a. ***Do not*** paint any part of the working air cart except the frame. If touch-up painting is required, refer to paragraph 3-3.4. Check for loose hardware and cracked or deformed parts. Check for O-ring seal leakage in **both** a static (meaning fully pressurized but non-operating) and dynamic (meaning fully pressurized *and* operating) condition.

b. During operation, verify that the delivery pressure gauge reads a relatively constant pressure regardless of the inlet pressure and flow rate. Also check for air leakage around any connection or main housing fitting. Any leakage of air at these mating interfaces denotes either a loose connection or a defective O-ring seal *which must be replaced*.

Table 3-1. Maintenance Schedule

Frequency	Maintenance Requirement	Applicable Paragraph
During Use	Check for erratic movement of the delivery pressure gauge needle. Check for air leakage at all connections and from all components.	3-3.3
After Use	Clean all dust, dirt, oil, and grease from the working air cart.	3-3.2
Quarterly	If not used periodically for its intended use or training, the working air cart should be field tested to ensure its integrity and flawless operational capability.	2-2, 2-4 and 2-5

3-3.4 **Painting And Touch-Up.** If the painted finish on exposed metal portions of the frame ever becomes damaged, corrosion may be prevented by touching up the bare spots.

a. Prepare the surface using #000 or #340 grit sandpaper to clean the surface down to the bare metal and until a bright smooth finish is obtained.

b. Thoroughly clean and dry the prepared surface and then apply one coat of zinc chromate primer. After applying the zinc chromate primer, allow to dry and then lightly sand. Use a clean dry cloth to remove loose sanding dust.

c. Apply a coat of light blue (OSHA safety blue) enamel in sufficient thickness to completely cover the primer and provide a satisfactory appearance. Air dry the enamel.

### 3-3.4 **Tools And Test Equipment Required.**

No special tools are required to perform the scheduled preventative maintenance procedures. The only test equipment is a set of calibrated test gauges required during verification of the operating adjustment and the relief pressure testing of the pressure regulators. Refer to Paratech publication 22-895309 for this verification and testing information.

### 3-3.5 **Adjustments.**

## CAUTION

During any corrective maintenance procedure requiring pressure readings, be certain that qualified personnel use proper tools and calibrated test gauges that are accurate to within  $\pm 2\%$  of the indicated reading. If such tools and gauges are not available, return a working air cart that requires servicing to Paratech.

The only adjustments that may be performed on the working air cart are the normal operating adjustment of the pressure adjustment knob and the pressure relief adjustment to assure that the maximum regulated pressure does not exceed 150 psi (10.3 bar) on the 22-895300A pressure regulator, or 300 psi (20.7 bar) on the 22-895300B pressure regulator. The pressure adjusting knob adjustment is made prior to and during normal operation to control and maintain the desired delivery pressure. The relief valve adjustment is made whenever the relieving pressure varies from the factory setting by more than  $+0 - 10\%$ . Increasing or decreasing the relief spring compression with the relief adjusting screw will result in a corresponding pressure relief increase or decrease. Refer to Paratech publication 22-895409 to make the necessary checks and adjustments to the pressure regulators.

### 3-3.6 **Alignment.**

No alignment is required on any part of the working air cart.

### 3-4 **WORKING AIR CART REPAIR.**

No particular order of parts removal is required to disassemble the working air cart. The exploded views (figures 3-1 and 3-2) are indexed in one possible order of disassembly, with the attaching parts following the part attached. When repairing the working air cart, remove only those parts found broken, cracked, deformed or otherwise damaged, and subassemblies which require further disassembly for the replacement of parts exhibiting similar damage. Complete disassembly is not recommended or necessary. During disassembly, be sure to work in a clean area and place all disassembled parts on clean shop wipes. If clamping is required, use pads to prevent scratching/scoring/abrading the clamped parts. When repairing the pressure regulators, remove and replace only those parts determined to be broken, cracked, deformed, or otherwise damaged.

### 3-5 **TROUBLESHOOTING.**

Troubleshooting data is presented in the form of a conventional troubleshooting chart. Troubleshooting is required only when malfunctions are detected either during normal operation or during periodic servicing of the working air cart. Refer to figures 3-1 and 3-2 for parts identified by index numbers within the table.

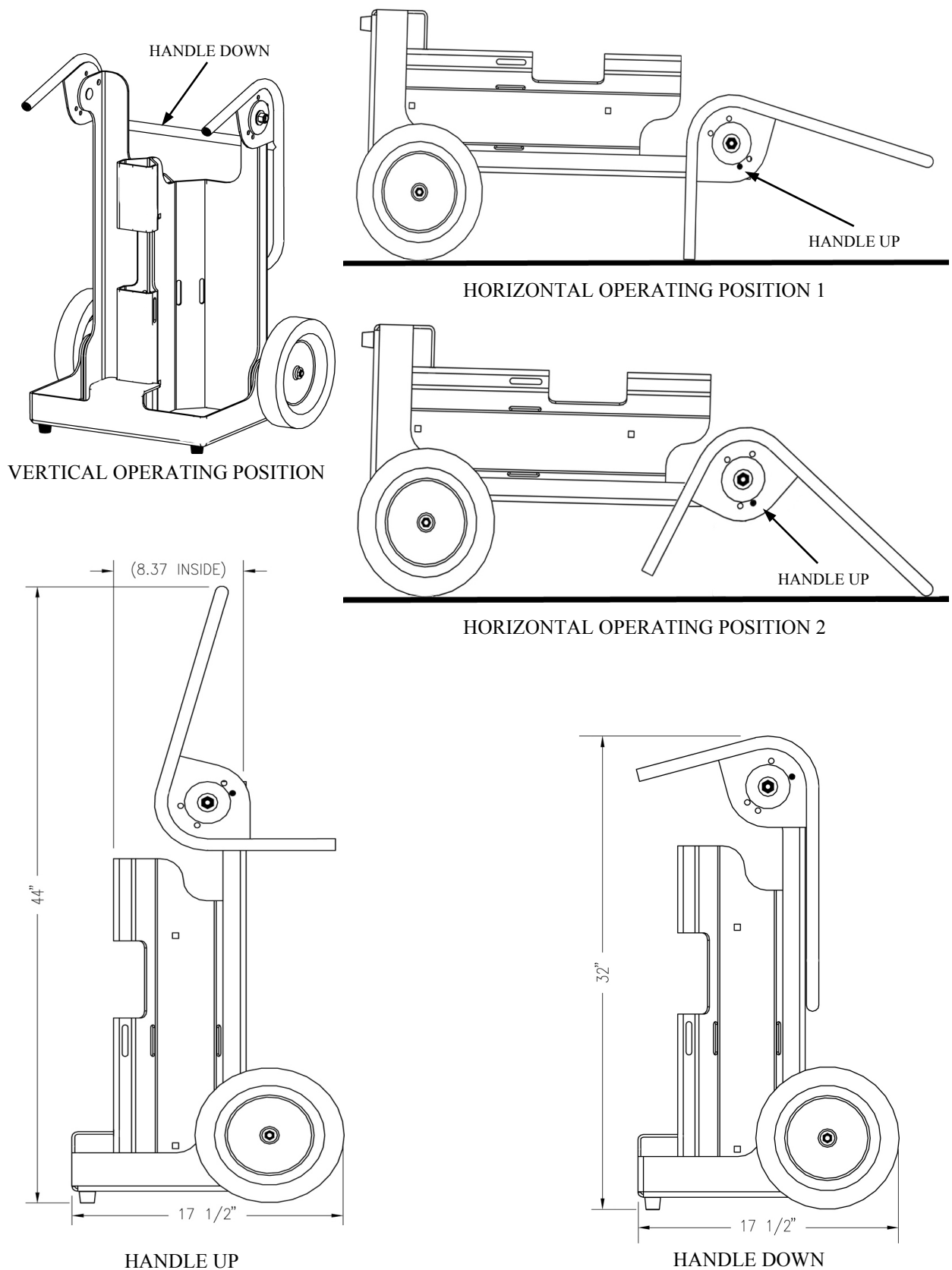


Figure 3-1 Working Air Cart Without Air Cylinders or Pneumatic Assembly



Figure and Index Number	Description	Quantity	CAGE	Part Number
3-2	PNEUMATIC ASSEMBLY	1		
-1	MANIFOLD ASSEMBLY – LEFT SIDE	1		22-890493
-2	MANIFOLD ASSEMBLY – RIGHT SIDE	1		22-890493
-3	CART REGULATOR 150 PSI	1		22-895300A
-4	CART REGULATOR 300 PSI	1		22-895300B
-5	MANIFOLD HIGH PRESSURE	1		22-801086
-6	GAUGE 0-6000 PSI	1		22-890612
-7	GAUGE 0-400 PSI	2		22-890617
-8	3-WAY BALL VALVE 3K63-20-20 ¼” NPTF SS	1		22-801076
-9	BALL VALVE 6000PSI K63-5-5 ¼” NPTM SS	1		22-801082
-10	LOW PRESSURE WARNING WHISTLE	1		22-801084
-11	BLEED VALVE 6000PSI AQUA ENV. MOD. 712	2		22-801078
-12	NIPPLE 6000PSI CGA-347 FEM ASSY	2		22-895350
-13	ADAPTER CGA-347 X ¼ NPTF #SS-347-1	1		22-057080
-14	PROTECTIVE CAP FOR CGA-347 FEM	1		22-801094
-15	¼” NPTM BRASS 3”LG NPL (McM 4568K135)	2		22-895614
-16	BRACE FOR MANIFOLDS	1		22-800214
-17	HOSE 3/16” H.P. 5000 PSI, JIC#4 32” LG	2		22-801088
-19	¼” NPTM H.P. CONN. PARKER 4-4 MHS-SS	2		22-057074
-20	¼” NPTM – 3/8” JIC F STRAIGHT	2		22-801066
-21	90° ELBOW 1/4 “ NPTM – 3/8 JIC M	2		22-800222
-22	90° ELBOW 1/4 “ NPTF	1		22-801072
-23	90° ELBOW 1/4 “ NPT M/F BRASS (#4-4 SE-B)	2		22-801068
-24	90° ELBOW 1/4 “ NPTF – ¼” JIC M	2		22-801046
-25	45° ELBOW 1/4 “ M 37° FLARE X ¼” NPTM SS	2		22-801048
-26	LABEL ‘CAUTION HIGH PRESSURE’	1		22-801086L
-27	LABEL ‘300 PSI’	1		22-890493L
-28	LABEL ‘150 PSI’	1		22-890494L
-29	CAP SCREW 5/16-18 SOC BUT HD 2”LG SS	4		22-801064
-30	WASHER, PLAIN 5/16” A SER N S.S	4		22-670564
-31	SCREW 5/18 – 18 BUTT HD 3/4.” LG SS	3		22-015734

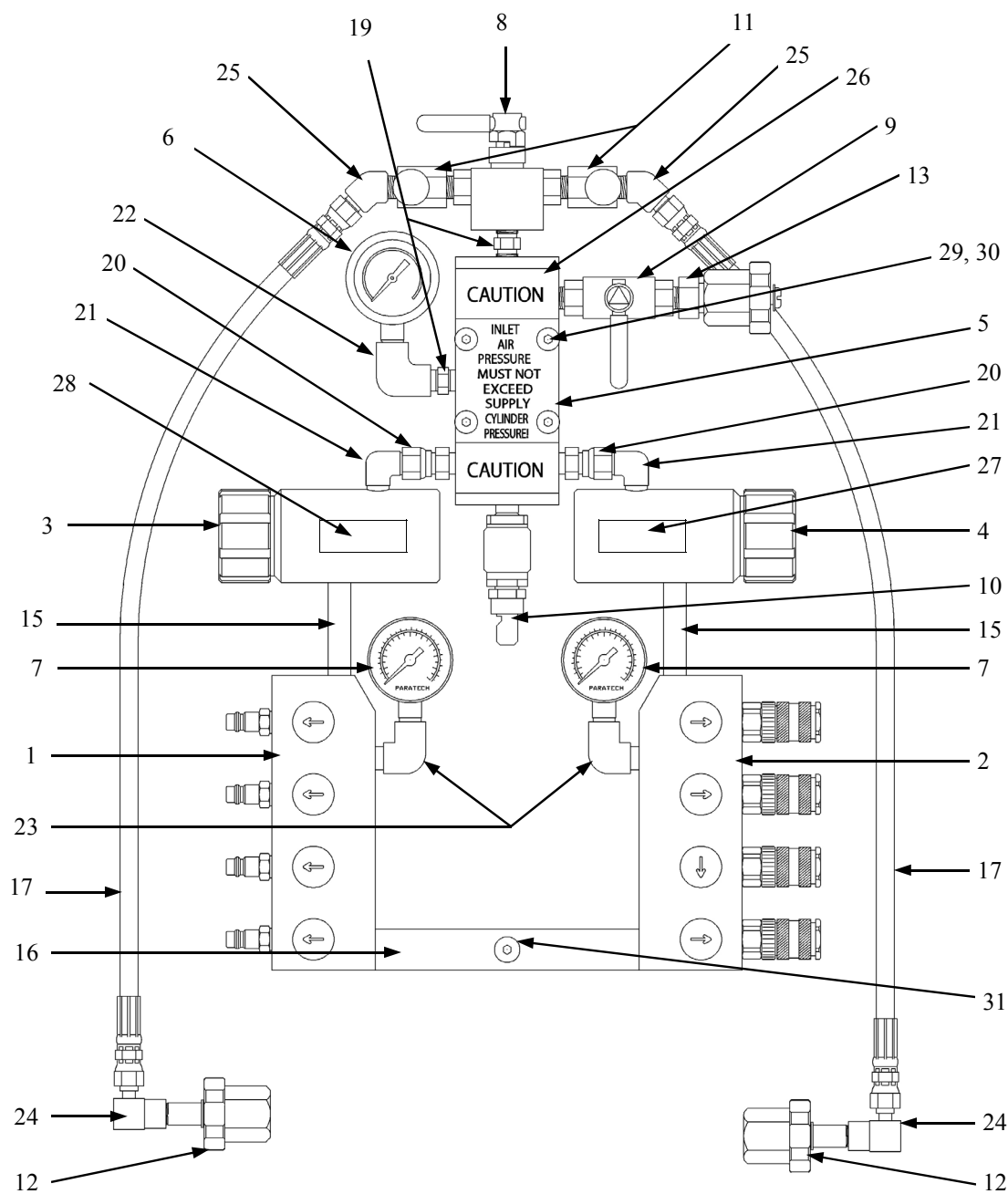
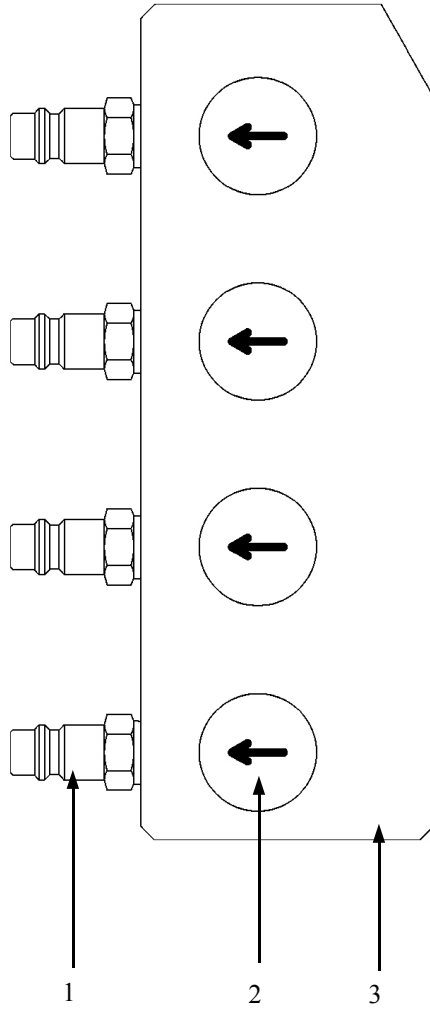


Figure 3-2 Working Air Cart—Pneumatic Assembly

Figure and Index Number	Description	Quantity	CAGE	Part Number
3-3	LEFT MANIFOLD ASSY FOR CART	1		22-890493
-1	NIPPLE 1/4" MALE	4		22-890681
-2	KNOB FOR IN LINE VALVE	4		22-890486
-3	BODY 4X1/4"NPTF LEFT	1		22-890497

Figure and Index Number	Description	Quantity	CAGE	Part Number
3-4	RIGHT MANIFOLD ASSY FOR CART	1		22-890494
-1	CPLG 1/4"NPSM - OPEN	4		22-890681
-2	KNOB FOR IN LINE VALVE	4		22-890486
-3	BODY 4X1/4"NPTF RIGHT	1		22-890496

LEFT SIDE



RIGHT SIDE

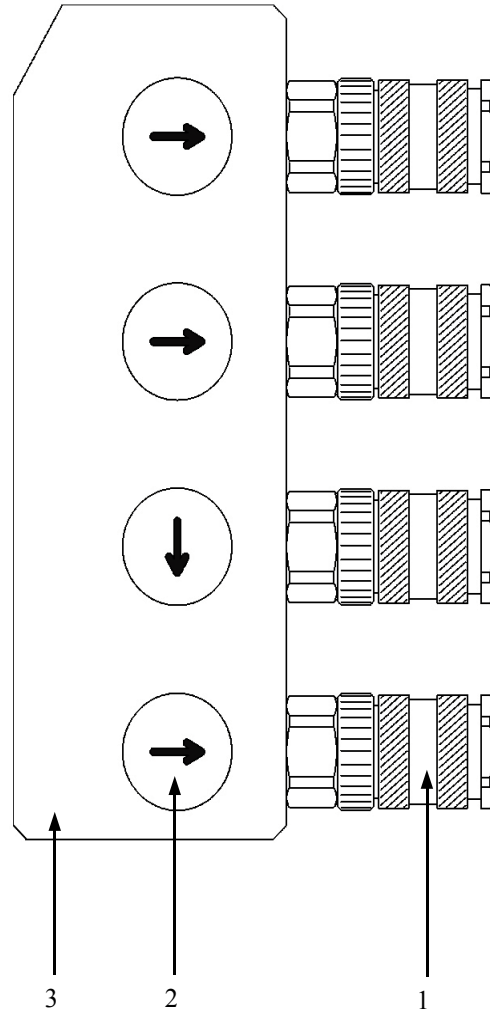


Figure 3-3  
Working Air Cart Manifold Assembly, Left Side

Figure 3-4  
Working Air Cart Manifold Assembly, Right Side



Table 3-2. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
External device(s) fails to function properly.	<p>Improper operation of external device(s).</p> <p>Malfunction of external device(s).</p> <p>No or low working air pressure supplied to external device(s).</p>	<p>Refer to publication(s) supplied with the external device(s) and operate them properly.</p> <p>Replace malfunctioning external device(s).</p> <p>Refer to following troubles.</p>
No working air pressure supplied to external device(s).	<p>Delivery hose(s) disconnected from external device(s).</p> <p>Air cylinder valve not opened (high pressure gauge indicates 0 psi and air cylinder gauge indicates at least 400-500 psi).</p> <p>3-way diverter valve oriented to wrong position.</p> <p>Control knob(s) turned to wrong position.</p>	<p>Reconnect delivery hose(s) and verify dual lock coupling(s) are properly engaged and locked.</p> <p>Open valve on air cylinder.</p> <p>Orient 3-way diverter valve to air cylinder with sufficient pressure (indicated on the air cylinder gauge) and with that air cylinder valve open.</p> <p>Turn control knob(s) to horizontal ("ON") position to permit free flow of working air to external device(s).</p>
Low working air pressure supplied to external device(s).	<p>Air cylinder turned on, but high pressure gauge indicates less than required psi and air cylinder gauge indicates less than 400-500 psi pressure.</p> <p>Air leakage in system between air cylinder and regulator(s). With regulator(s) closed, air cylinder gauge and high pressure gauge should read the same.</p> <p>Delivery hose(s) crimped or crushed.</p> <p>Regulator(s) not adjusted to pressure required by external device(s). Pressure indicated on low pressure gauge(s) is below that required.</p>	<p>Low pressure in air cylinder and low pressure alarm malfunctioning. Switch air cylinders, refill low or depleted air cylinder, and replace malfunctioning low pressure alarm.</p> <p>Tighten any connection that exhibits air leakage or replace mating malfunctioning parts. Verify shut-off valve and bleed valves are fully closed.</p> <p>Free up delivery hose(s) to permit free flow of working air to external device(s).</p> <p>Adjust regulator(s) to working air pressure consistent with that required by external device(s). If low pressure gauge(s) indicate proper pressure, gauge(s) may be defective. If not, check manifold body, couplings, and nipples for working air leakage.</p>

Table 3-2. Troubleshooting (Continued)

TROUBLE	PROBABLE CAUSE	REMEDY
Low working air pressure supplied to external device(s). (continued)	Defective regulator(s).	Refer to Paratech publication 22-895409 to troubleshoot and repair malfunctioning regulator(s).
	Defective low pressure gauge (s).	Replace defective low pressure gauge(s).
	Control knob(s) only partially opened.	Turn control knob(s) to full horizontal ("ON") position to permit free flow of working air to external device(s).

## CHAPTER 4 PARTS LIST

### 4-1 INTRODUCTION.

This chapter lists all parts that are contained in the 800200 Working Air Cart. The parts list is used to identify and locate all repair parts, including all attaching hardware supplied. The parts should be ordered by part number when ordered from Paratech Incorporated, 1025 Lambrecht Road, Frankfort, Illinois 60423-1648.

### 4-2 LIST OF MAJOR COMPONENTS.

A list of major components by CID number is presented in table 4-1.

Table 4-1. List of Major Components

Manufacturer's Model or Identification Number	Page Number	Component Name	Quantity
22-800200	4-2	Working Air Cart	1
22-801010	4-2	Cart Assembly	1
22-890493	4-3	Left Side Manifold	1
22-890494	4-3	Right Side Manifold	1
22-895300A	4-4	150 PSI Regulator	1
22-895300B	4-4	300 PSI Regulator	1

### 4-3 PARTS LIST TABLES.

The 800200 Working Air Cart parts are listed in table 4-1. The tables contain five columns which are described below:

4-3.1 **Figure And Index Number Column.** This column shows the figure and index number of each part listed. Tables 4-1 and 4-2 relate to illustrations contained in chapter 3, more specifically to figures 3-1 and 3-2. The index numbers which identify the individual parts are separated from the figure number by a hyphen. Index numbers run consecutively.

4-3.2 **Description Column.** This column describes each part (by noun name and modifiers) in sufficient detail for clarity. Descriptions are successively indented to the right to show assembly and part relationships.

4-3.3 **Quantity Column.** Numbers specified in this column signify the total quantities of each part required per assembly per working air cart.

4-3.4 **CAGE Column.** The assemblies and parts are identified by the five digit code 30978. This code number, in accordance with *Federal Supply Cataloging Handbook H4-1*, identifies Paratech Incorporated, 1025 Lambrecht Road, Frankfort, Illinois 60423-1648, as the manufacturer of all parts.

4-3.5 **Part Number Column.** The part number column contains a Paratech Incorporated identifying number for each part listed.

### 4-4 LIST OF MANUFACTURERS.

The manufacturer's (vendor's) code number (30978) which is used in the parts list tables is in accordance with *Federal Supply Cataloging Handbook H4-1* and identifies Paratech Incorporated, 1025 Lambrecht Road, Frankfort, Illinois 60423-1648, as the manufacturer of all parts.



Table 4-3 Working Air Cart Assembly Parts List

Figure and Index Number	Description	Quantity	CAGE	Part Number
3-2	PNEUMATIC ASSEMBLY	1		
-1	MANIFOLD ASSEMBLY – LEFT SIDE	1		22-890493
-2	MANIFOLD ASSEMBLY – RIGHT SIDE	1		22-890493
-3	CART REGULATOR 150 PSI	1		22-895300A
-4	CART REGULATOR 300 PSI	1		22-895300B
-5	MANIFOLD HIGH PRESSURE	1		22-801086
-6	GAUGE 0-6000 PSI	1		22-890612
-7	GAUGE 0-400 PSI	2		22-890617
-8	3-WAY BALL VALVE 3K63-20-20 ¼” NPTF SS	1		22-801076
-9	BALL VALVE 6000PSI K63-5-5 ¼” NPTM SS	1		22-801082
-10	LOW PRESSURE WARNING WHISTLE	1		22-801084
-11	BLEED VALVE 6000PSI AQUA ENV. MOD. 712	2		22-801078
-12	NIPPLE 6000PSI CGA-347 FEM ASSY	2		22-895350
-13	ADAPTER CGA-347 X ¼ NPTF #SS-347-1	1		22-057080
-14	PROTECTIVE CAP FOR CGA-347 FEM	1		22-801094
-15	¼” NPTM BRASS 3”LG NPL (McM 4568K135)	2		22-895614
-16	BRACE FOR MANIFOLDS	1		22-800214
-17	HOSE 3/16” H.P. 5000 PSI, JIC#4 32” LG	2		22-801088
-19	¼” NPTM H.P. CONN. PARKER 4-4 MHS-SS	2		22-057074
-20	¼” NPTM – 3/8” JIC F STRAIGHT	2		22-801066
-21	90° ELBOW 1/4 “ NPTM – 3/8 JIC M	2		22-800222
-22	90° ELBOW 1/4 “ NPTF	1		22-801072
-23	90° ELBOW 1/4 “ NPT M/F BRASS (#4-4 SE-B)	2		22-801068
-24	90° ELBOW 1/4 “ NPTF – ¼” JIC M	2		22-801046
-25	45° ELBOW 1/4 “ M 37° FLARE X ¼” NPTM SS	2		22-801048
-26	LABEL ‘CAUTION HIGH PRESSURE’	1		22-801086L
-27	LABEL ‘300 PSI’	1		22-890493L
-28	LABEL ‘150 PSI’	1		22-890494L
-29	CAP SCREW 5/16-18 SOC BUT HD 2”LG SS	4		22-801064
-30	WASHER, PLAIN 5/16” A SER N S.S	4		22-670564
-31	SCREW 5/18 – 18 BUTT HD 3/4.” LG SS	3		22-015734

Table 4-3. Working Air Cart-Manifold Assembly Parts List, Left Side

Figure and Index Number	Description	Quantity	CAGE	Part Number
3-3	LEFT MANIFOLD ASSY FOR CART	1		22-890493
-1	NIPPLE 1/4" MALE	4		22-890681
-2	KNOB FOR IN LINE VALVE	4		22-890486
-3	BODY 4X1/4"NPTF LEFT	1		22-890497

Table 4-4. Working Air Cart-Manifold Assembly Parts List, Right Side

Figure and Index Number	Description	Quantity	CAGE	Part Number
3-4	RIGHT MANIFOLD ASSY FOR CART	1		22-890494
-1	CPLG 1/4"NPSM - OPEN	4		22-890681
-2	KNOB FOR IN LINE VALVE	4		22-890486
-3	BODY 4X1/4"NPTF RIGHT	1		22-890496

Table 4-4. Code To Name List

CAGE	Manufacturer's or Vendor's Name and Address
30978	Paratech Incorporated, 1025 Lambrecht Road, Frankfort, Illinois 60423-1648

