PARATECH®

OPERATION, PREVENTIVE MAINTENANCE AND PARTS SUPPORT MANUAL

FOR

MAXIFORCE® G2 AIR LIFTING BAG SYSTEM

14 JANUARY 2016

PN 22-890800G2

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I – VALIDATION

Except as stated in II, the technical manual identified above has been satisfactorily validated in accordance with all requirements of the applicable contract. The technical manual is hereby certified to be accurate and complete, and the information, instruction, text, and illustration conform in all respects to the applicable general and detailed specifications.

II – EXCEPTIONS

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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 and parts lists for MAXIFORCE® G2 Air Lifting Bag Systems manufactured by Paratech Incorporated, 1025 Lambrecht Road, Frankfort, Illinois 60423-7000.

All pertinent data relative to the MAXIFORCE® G2 Air Lifting Bag Systems 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 MAXIFORCE® G2 Air Lifting Bag Systems. When MAXIFORCE® G2 Air Lifting Bag Systems are properly used in combination with good common sense, an extremely safe method of applying force is realized.

Although the following safety first list is quite extensive, the majority of the precautions are just good common sense for any personnel qualified in the use of lift bags. However, some of the precautions are not obvious and Paratech strongly recommends that all operating/assisting/maintenance personnel read and understand the complete safety first procedures in order to ensure personnel and equipment safety.

Since there are four distinct operational phases of lift bag use: Prior to Inflation, During Inflation and While Inflated, During Deflation, and After Removal, the safety first list is charted to reflect these applications. As shown in the following table, during each operational phase, each safety procedure may be required Always (**A**), If Time Permits (**ITP**), or Depending Upon Application (**DUA**).

SAFETY FIRST PROCEDURE	PRIOR TO INFLATION	DURING INFLATION AND WHILE INFLATED	DURING DEFLATION	AFTER REMOVAL
Regardless of the condition of lift bag use, SAFETY FIRST is primary to prevent injury or death and/or equipment damage.	**A**	**A**	**A**	**A**
All personnel at the immediate lift bag site must be trained and qualified.		**A**	**A**	
All personnel at the immediate lift bag site must be properly suited up (protective clothing, helmet, eye protection, gloves, footwear, etc.) at all times	**ITP**	**A**	**A**	
Never exceed the maximum inflation pressure marked on the lift bag. (150 psi/10.3 bar)		**A**		
Do not handle hoses or lift bags while the system is pressurized.		**A**	**A**	
Do not connect or disconnect system components when the system is pressurized. The only exception is disconnection of a safety in-line relief valve from a controller. Refer to the technical manual for multiple lift bag use.		**A**	**A**	

Observance of the following safety first procedures will assure the safe and efficient utilization of the MAXIFORCE® G2 Air Lifting Bag System

SAFETY FIRST PROCEDURE	PRIOR TO INFLATION	DURING INFLATION AND WHILE INFLATED	DURING DEFLATION	AFTER REMOVAL
Always be on the opposite side of any expected movement.	**A**	**DUA**	**A**	
Always stand clear of a load that is only supported by lift bag(s). Never be below a lift bag supported load that has no blocking or cribbing for positive support. Always **"Lift and inch, crib an inch"**	**A**	**A**	**A**	
Use blocking, shoring and cribbing where ever possible to support and sustain loads.	**A**	**A**	**A**	
Use locking rings on couplings to prevent release of air pressure due to accidental disengagement of system components.	**A**	**A**	**A**	
Always center load on lift bag or it may be violently ejected from under load during pressurization.	**DUA**	**A**	**A**	
Be extremely careful to stabilize, as much as possible, unstable (off-center) loads.	**A**	**A**	**A**	
Be careful that hoses are not kinked.	**A**	**A**	**A**	**A**
Check visually that equipment is not damaged (scuffs, kinks, tears, ply separation, etc.) and audibly for the leakage of air.	**ITP**			**A**
Never stack more than two lift bags on each other during operation.	**A**			
If required to stack two lift bags for increased height, always place smaller bag centered on the top.	**A**			
Use proper sized lift bag(s) for the load conditions encountered.	**A**			
During transport of lift bags, carry in such a way so as to protect the inflation nipple even though the nipple is recessed. Use two men on large lift bags over 30 pounds (14kg).	**A**			**A**
Protect bag with thermal blanket, plywood, etc. whenever a lift bag will contact a surface in excess of 150°F (65°C).	**ITP**			**A (storage)**
Never use a lift bag where contact temperatures are in excess of 220°F (105°C).	**A**			**A (storage)**

SAFETY FIRST PROCEDURE	PRIOR TO INFLATION	DURING INFLATION AND WHILE INFLATED	DURING DEFLATION	AFTER REMOVAL
Never work in the dark. Use flash lights or flood lights to provide shadow-free illumination of work area.	**ITP**	**ITP**	**ITP**	
Inflate only enough to achieve desired lift.		**A**		
If force must be applied to a small diameter or small area object, always use plywood, rubber mud flaps, etc. between the lift bag and the object to distribute the load more evenly over the lift bag surface. Otherwise safe maximum lifting force cannot be applied.		**A**		
Always evaluate the condition prior to execution in order to determine which size lift bag to use and where to apply it to achieve the desired result.	**ITP**			
Always inflate a lift bag slowly to prevent possible shifting of load. Stop if load begins to shift, stabilize and block load before continuing.		**A**		
Be sure all valves between air source and lift bag(s) are in a closed position before turning on air source to system. This will prevent an uncontrolled lift. Also open air supply source slowly to prevent damage to regulator.	**A**			
Never lift with a lift bag directly in contact with sharp or pointed objects that may puncture, abrade or otherwise damage the lift bag.	**DUA**			
Always have 3 points of contact to ensure a stable foundation when lifting unsecured loads.	**DUA**			
Undue haste could result in injury to personnel and damage/render the lift bag system useless.	**A**	**A**	**A**	**A**
Keep as far away as possible from lift bag(s). Hose length governs this safety first procedure.		**A**	**A**	
Never inflate a lift bag over 30 psi (2 bar) when not under load.				**A (maintenance)**

CHAPTER 1
GENERAL INFORMATION

1-1 SAFETY PRECAUTIONS

Refer to the Safety First procedures Chapter 1, General Information and Safety Precautions for the procedures to be observed to assure safe and efficient utilization of MAXIFORCE® G2 Air Lifting Bag Systems.

1-2 SCOPE OF MANUAL

This technical manual provides instructions for the operation, preventive maintenance and parts support for MAXIFORCE® G2 Air Lifting Bag Systems manufactured by Paratech Incorporated, 1025 Lambrecht Rd, Frankfort, Illinois 60423-7000.

1-3 ARRANGEMENT

Refer to the Table of Contents for arrangement of the subject matter in this manual.

1-4 EQUIPMENT FUNCTION

1-4.1 MAXIFORCE® G2 Air Lifting Bag Systems are multi-application, portable inflation systems used for lift and displacement of heavy objects, up to 178,400 lbs (80,920 kilograms), while requiring less than 1 inch (25 centimeters) of bag insertion clearance. Total capable lift (utilizing two stacked bags) is 40 inches (100 centimeters). Inflation may be obtained from any air source (self-contained compressed air cylinder, air compressor, truck air brake system, building compressed air system, foot pump, etc.) capable of supplying 150 psi (10.3 bar) pressure.

1-4.2 MAXIFORCE® G2 Air Lifting Bag Systems are designed for use in emergency situations such as building collapse, structural containment, vehicular extrications, industrial entrapment, and excavation collapse and containment.

1-4.3 In addition to use during emergency situations, MAXIFORCE® G2 Air Lifting Bag Systems are also used effectively used for:

a. Preventive and/or corrective maintenance procedures where positioning and aligning heavy equipment and machinery in mills, manufacturing facilities and maintenance shops is required such as removing wheels, pulleys and gears from large machinery.

b. Lifting or shifting pipelines requiring welding and maintenance.

c. Breaking out granite and marble blocks and slabs in quarrying operations.

d. Re-railing railroad and mining cars, pre-stressing support columns, general maintenance requiring lifting in rail, mining, underground and subway work.

e. Lifting operations underwater or on unstable, soft ground (mud, sand, snow, strewn debris, etc.) where conventional jacking equipment tends to sink.

f. Since the lift bags contain no spark producing parts, they may also be used safely in explosive environments.

1-5 INTERRELATIONSHIP OF COMPONENTS.

Refer to figure 1-1 for the interrelationship of the six basic components (air source, G2 pressure regulator, G2 controller, safety inline relief valve, interconnecting hose, and G2 lift bag) comprising MAXIFORCE® G2 Air Lifting Bag Systems and their relative sizes.

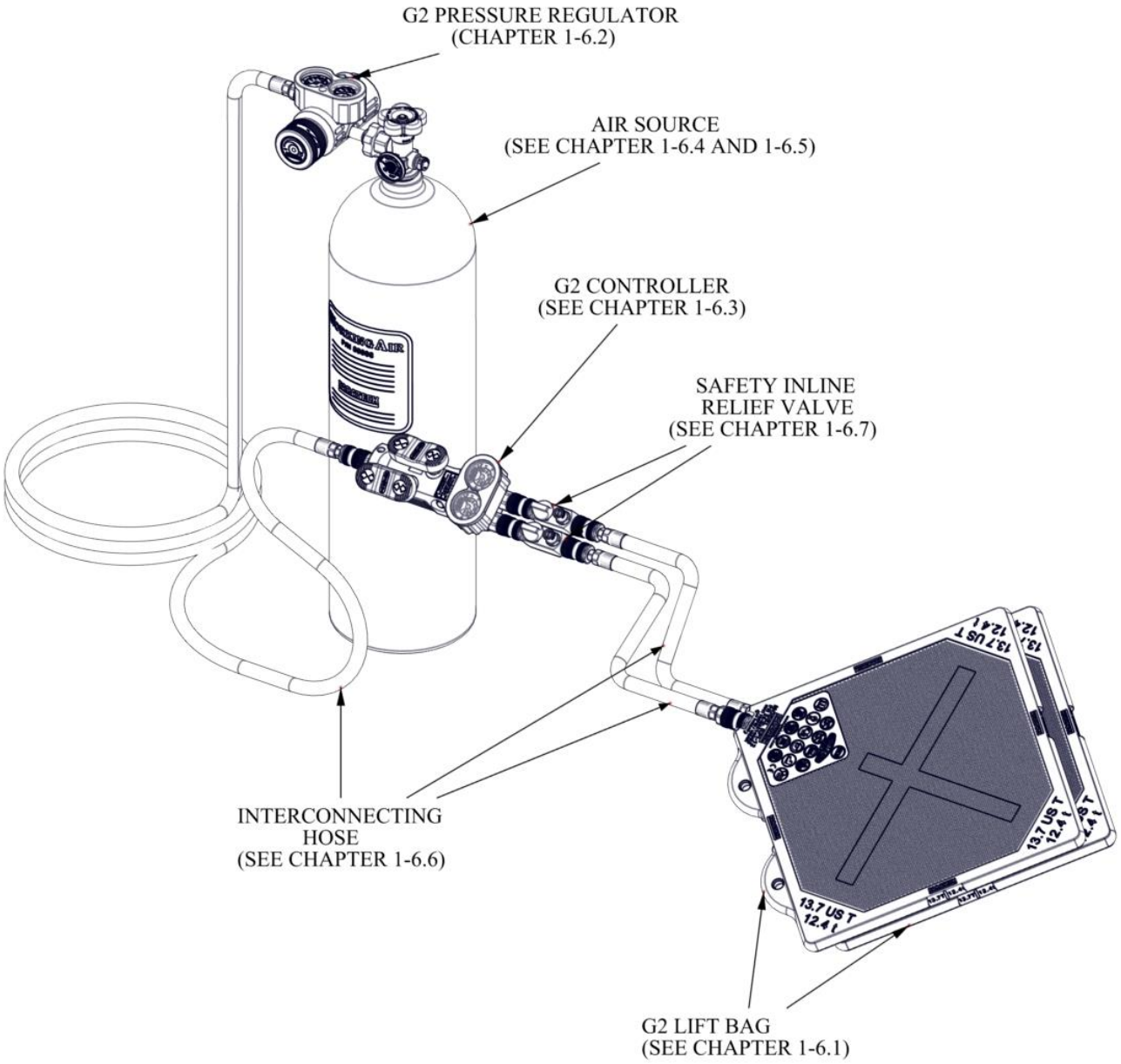


Figure 1-1. MAXIFORCE® G2 Air Lifting Bag System

For further component explanation, see the chapter shown under the component within figure 1-1. See Chapter 2 “OPERATION” for component connection and system operation.

1-6 **EQUIPMENT DESCRIPTION**

1-6.1 **G2 LIFT BAG**

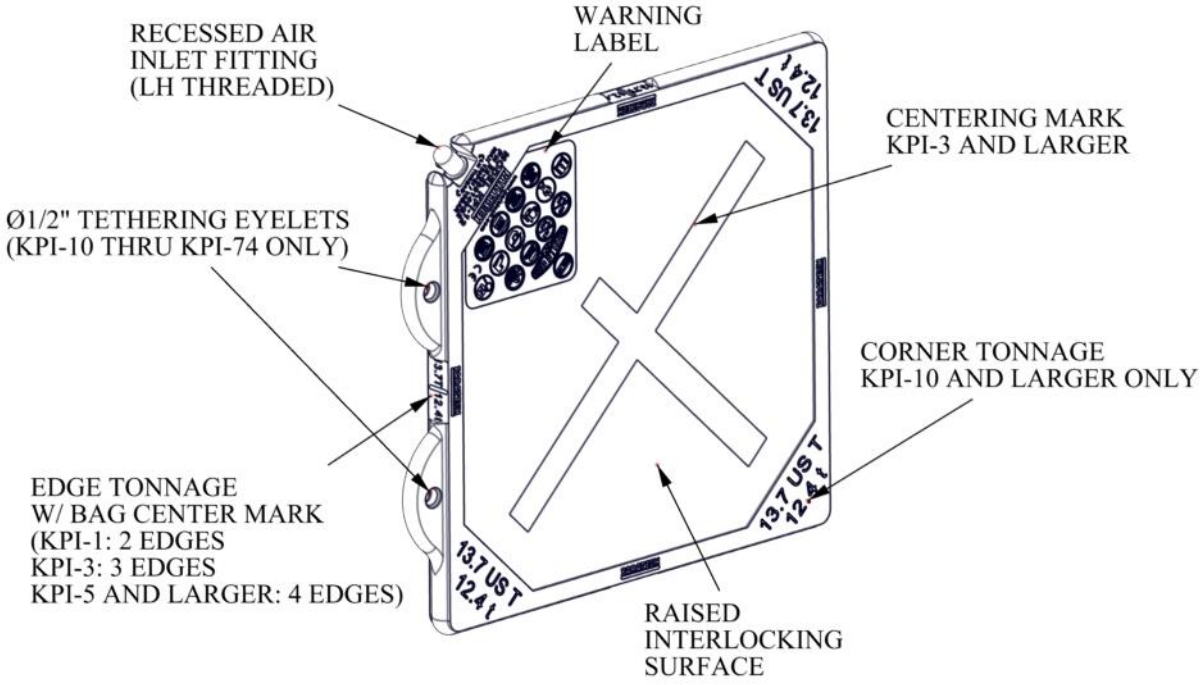


Figure 1-2. MAXIFORCE® G2 Lift Bag

MAXIFORCE® G2 Lift Bags (figure 1-2) are composite items fabricated from neoprene, reinforced with six layers (three per side) of Kevlar reinforced fabric for strength and rigidity even at full inflation pressure of 150 psi (10.3 bar).

All Lift Bags incorporate molded raised interlocking surfaces designed for maximum friction and holding capability.

All air bags, except the KPI-1, have a bright yellow "X" molded into each side to provide high visibility during pre-inflation centering.

The left hand threaded air inlet fitting is recessed to help protect the fitting from damage. A tethered nipple cap is provided to protect from contamination and also to help protect the outside surface of the fitting. The tether is to prevent accidental loss of the cap.

Tethering eyelets are molded into larger air bags to be used to assist in transport and insertion positioning prior to inflation.

Corners and edges has the maximum tonnage molded into the bag and filled with bright yellow silicone adhesive to help identify and quickly select an air bag in low light situations. The edge tonnage has a center mark to identify the center of the bag in low insertion applications where the center of the bag cannot be seen.

A yellow, symbol driven, warning label is permanently molded into the bag surface for quick reference and reminders of safety related warnings and information.

Each Lift Bag is proof tested at twice the operating (full inflation) pressure and has a minimum burst pressure of four times the operating 150 psi (10.3 Bar) pressure. Refer to Table 1-1 for a summary of the technical data for each MAXIFORCE® G2 Lift Bag.

1-6.2 **G2 PRESSURE REGULATOR.**

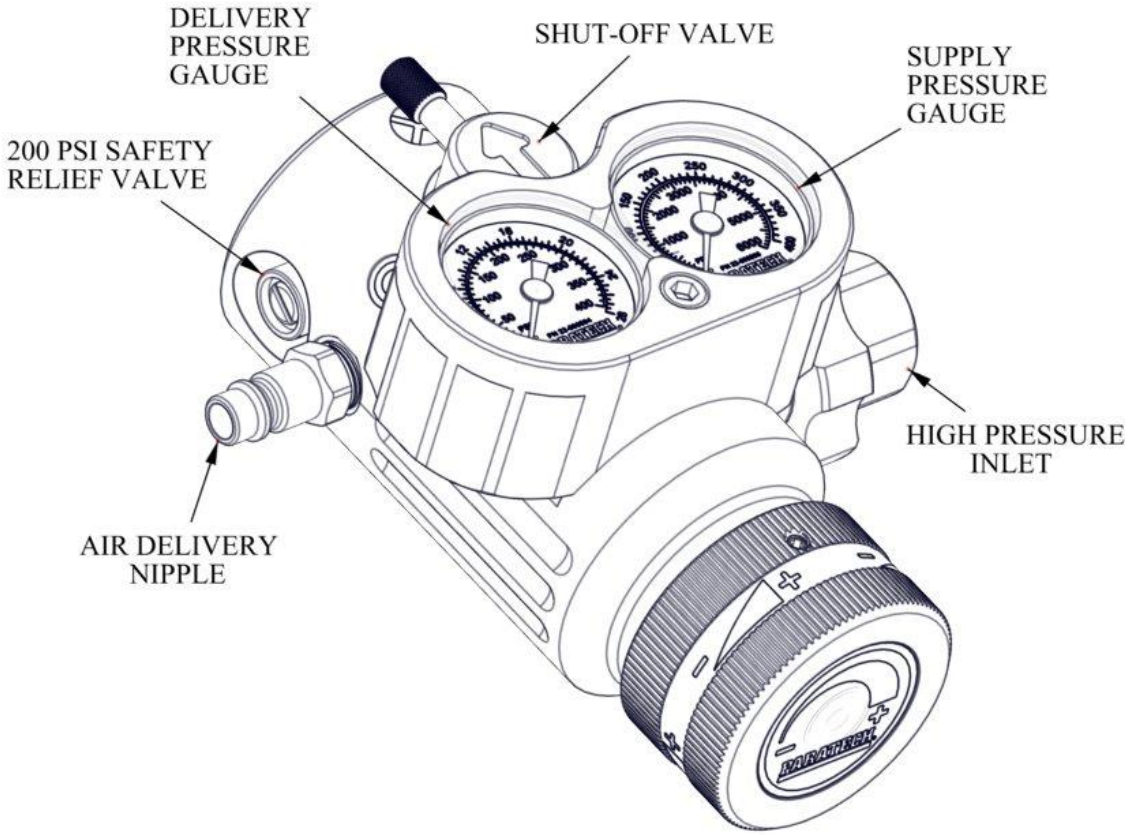


Figure 1-3 G2 Pressure Regulator

The G2 pressure regulator (figure 1-3) reduces inlet pressure of up to 5,500 psi (379 bar) to 0 psi (0 bar). The pressure regulator is designed to mate with a CGA-346/347 adapter fitting. Other fittings are available such as CGA-580 (nitrogen cylinder adapter), DIN nipple and nut assembly and British nipple and knob assemblies are also available.

The G2 pressure regulator incorporates a piston sensor and soft seated main valve to provide bubble tight service. The adjusting knob is sensitive to settings yet low operating torque.

The G2 pressure regulator will operate with any breathing air. When using any gaseous media, it is necessary to remove moisture to prevent "icing"; a condition that occurs at high expansion ratios during regulator operation. A 10 micron internal filter is incorporated in the pressure regulator. Coarser filters are available if excessive contamination is a problem.

The shut-off valve is either opened to permit regulated delivery air to pressurize the lift bag system or closed to prevent (seal off) regulated delivery air. The pressure adjustment knob is turned to control the delivery pressure up to 200 psi (13.8 bar) maximum.

A 200 psi (13.8 bar) safety relief valve is installed to prevent delivery pressures exceeding 200 psi (13.8 bar).

Supply and delivery pressure gauges are installed to monitor their respective pressures.

1-6.3 **G2 CONTROLLERS.**

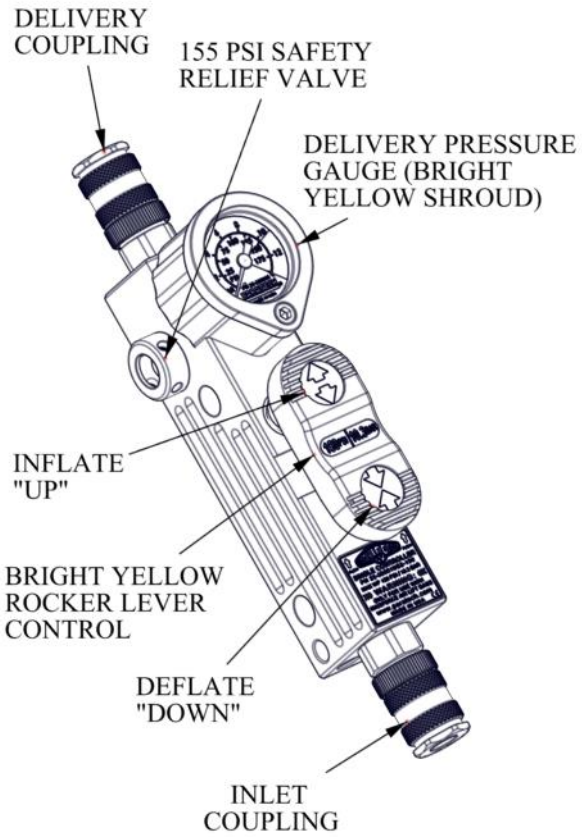


Figure 1-4. Single 150 psi ALB Controller G2

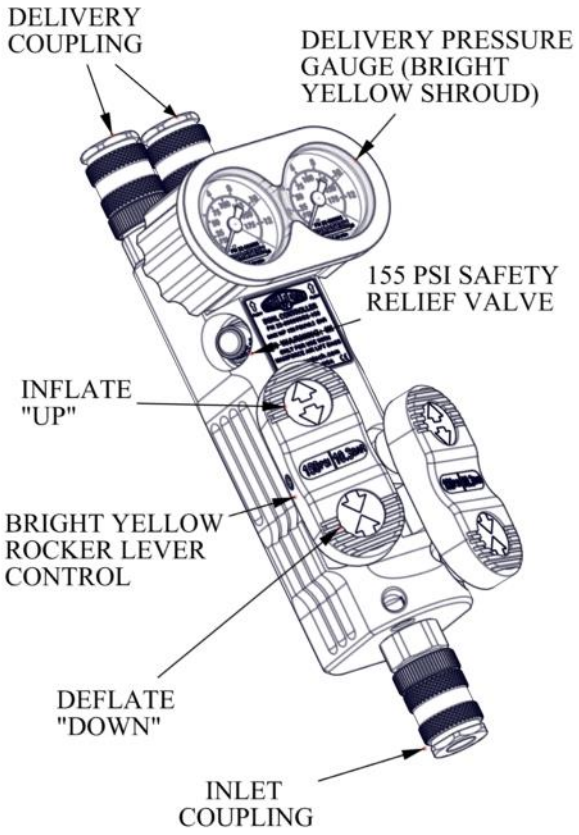


Figure 1-5. Dual "Deadman" 150 psi ALB Controller G2

Two controllers are available for use with MAXIFORCE® G2 Air Lifting Bag Systems. First, the single 150 psi ALB controller G2 (figure 1-4) which is single input/single output. Second, the dual "deadman" 150 psi ALB controller G2 (figure 1-5) which is single input/dual output. Each are easily identified for use with 150 psi by bright yellow gauge shroud and rocker lever.

Both controllers incorporate locking, quick connect, couplings to prevent accidental disconnection during use.

Bright yellow rocker lever controls permit regulated air pressure to inflate the lift bag or deflate to relieve system air pressure to collapse the lift bag. The rocker lever inflates "UP" and deflates "DOWN" by activating control valve assemblies beneath their respective side of the lever. The lever insures that the up and down controls cannot be operated at the same time.

The delivery gauges are provided to monitor the air pressure applied to the lift bag(s). They are protected by an aluminum gauge shroud to help protect gauges from accidental damage.

155 psi (10.7 bar) non-adjustable safety relief valves are installed into the controller to limit the applied air pressure and prevent over pressurizing. Due to the tolerance associated with the mechanical vent relief valves; controllers are set 5 psi (0.4 bar) higher to 155 psi (10.7 bar) to insure the system always gets to 150 psi (10.3 bar) operation.

The dual "deadman" controller has a second set of controls that are identical yet independent from the first set so two air bags can be controlled at the same time yet independently. If using the dual "deadman" controller in a single lift bag operation, either set can be used.

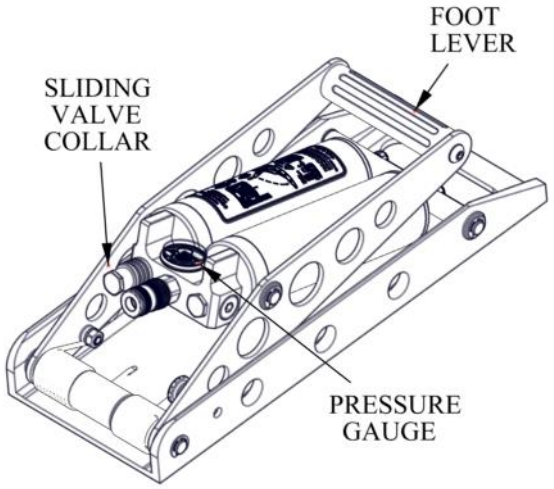


Figure 1-6. Manual Compressor

1-6.4 **MANUAL COMPRESSOR.** The manual compressor (figure 1-6) is a foot/hand lever operated compressor used to deliver pressurized air to the air bag. A sliding valve collar permits isolating one of the two cylinders thereby increasing the delivered pressure and decreasing the delivered volume by a factor of 2.

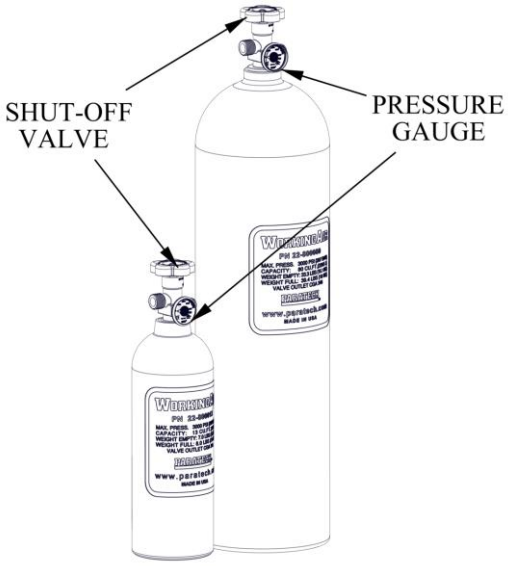


Figure 1-7. Air Cylinder

1-6.5 **AIR CYLINDER.** The air cylinder (figure 1-7) is used to store compressed air for use on the air bag. The shut off valve that permits or prevents the flow of compressed air to the G2 regulator.

The pressure gauge measures the amount of pressure within the tank.

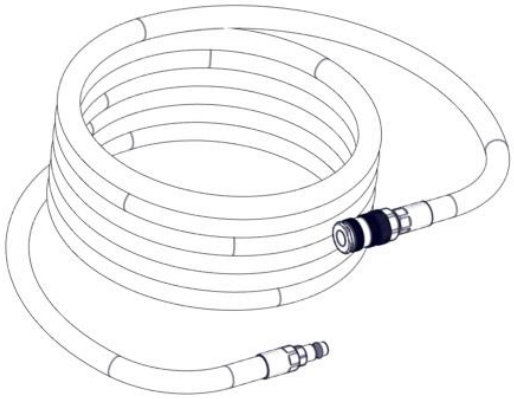


Figure 1-8. Hoses

1-6.6 **HOSES.** Hoses (figure 1-8) are used to convey air from the air supply source to the lift bag(s). All hoses are equipped with locking, quick connect, fittings to prevent their accidental disconnection.

All hoses are general purpose Ø3/8" inside diameter PVC (vinyl) core, single spiral poly yarn braid reinforced and a PVC abrasion resistant cover.

The service temperature range is -15°F to +150°F (-25°C to +65°C). All hoses have a working pressure of 300 psi (20.7 Bar) with a 4:1 safety factor.

Available hose lengths are 16 foot (5meter), 32 foot (10 meter) and 50 foot (15 meter). Available color in all lengths are red, yellow, blue, green, grey, and black.

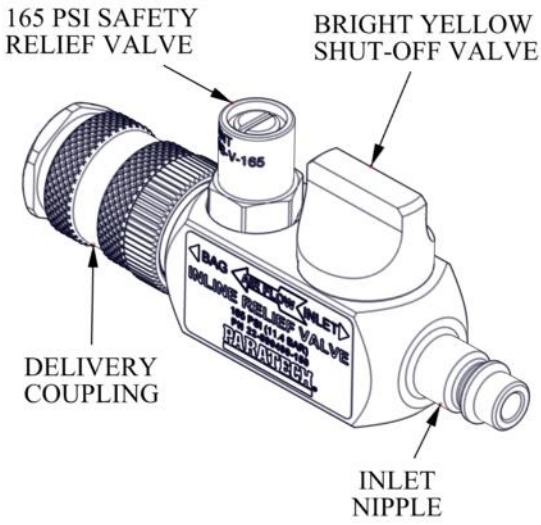


Figure1-9. G2 Inline Relief Valve

1-6.7 **G2 INLINE RELIEF VALVE.** The G2 safety inline relief valve (figure 1-9) is designed to keep MAXIFORCE® G2 lift bags fully and properly inflated when the lift bag(s) are; 1. Disconnected from the controller and 2. When excess pressure must be automatically relieved due to shifting loads and/or temperature changes.

The safety inline relief valve consists of an air inlet and outlet with locking ring quick connect fitting. A shut-off valve is used to isolate the lift bag and a non-adjustable safety relief valve designed to relieve lift bag pressures in access of 165psi. Inline relief valves for 150 psi are easily identified by a bright yellow shut off knob.

1-6.8 **FITTINGS.** A variety of adapters, couplings and air fittings are available to permit alternate air sources to inflate the MAXIFORCE® G2 lift bag(s) or enable various air powered tools and accessories to be equipped with the same fittings permitting convenience of operation and/or combining equipment resources such as hoses, regulators, self-contained compressed air cylinders, etc.

1-7 **REFERENCE DATA.** Reference data pertaining to MAXIFORCE® G2 lift bags system components are summarized for quick reference in Tables 1-1 and 1-2.

1-8 **EQUIPMENT, ACCESSORIES, DOCUMENTS.**

1-8.1 **EQUIPMENT SUPPLIED.** Data pertaining to the dimensions and weight of MAXIFORCE® G2 lift bags are presented in Table 1-2.

1-8.2 **ACCESSORIES.** Accessories used in conjunction with MAXIFORCE® G2 lift bag systems are listed with sufficient descriptive information regarding their use and application in Chapter 4, Parts List.

1-8.3 **DOCUMENTS.** No documents other than this publication are required as supporting literature for MAXIFORCE® G2 lift bag system.

Table 1-1. MAXIFORCE G2 Lift Bag Reference Data

LIFT BAG CONSTANTS:

Base Material	Neoprene
Reinforcing Material	Kevlar
Number of Reinforcing Layers (Each Side)	3
Surface Type	Molded Non-Slip
Short Term Temperature Range °F (°C)	-75 (-60) to +200 (+105)
Continuous Duty Temperature Range °F (°C)	-40 (-40) to +150 (+65)
Maximum Working Pressure PSI (Bar)	150 (10.3)
Test Pressure PSI (Bar)	300 (20.6)

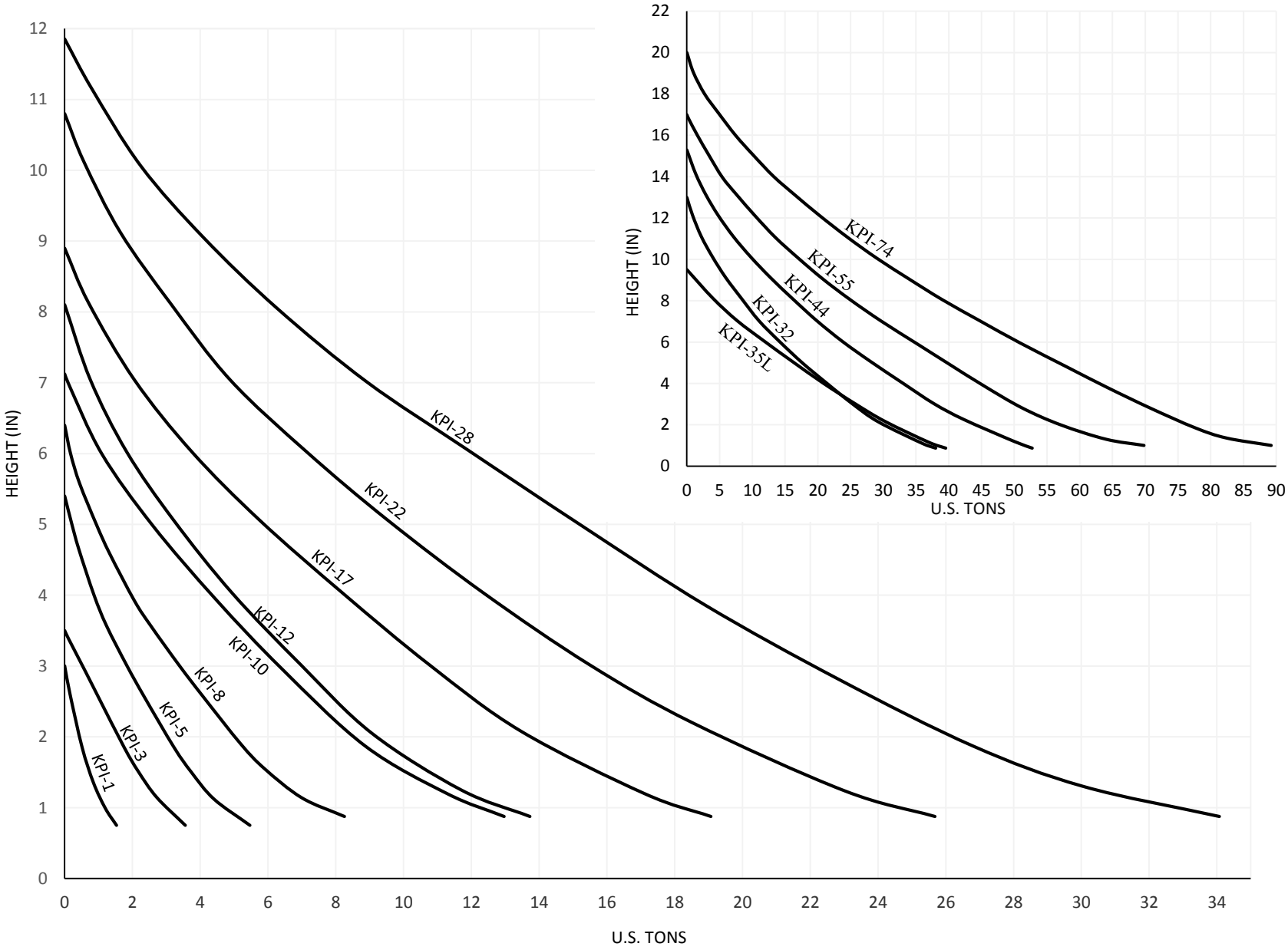


Table 1-1. MAXIFORCE® G2 Lift Bag Reference Data (Continued)

MAXIFORCE AIR BAGS TECHNICAL DATA

PN	MODEL	DIMENSIONS W/O EYELETS & NIPPLE		STORAGE DIMENSIONS (W/EYELETS)		WEIGHT		MAX LIFT CAPACITY		MAX WORK PRESSURE		MAX LIFT HEIGHT		MAX AIR CAPACITY	
		mm	INCH	mm	INCH	KG	LBS	METRIC TON	US TONS	BAR	PSI	mm	INCH	LITERS	CU. FT
22-888110G2	KPI-1	152 X 152 X 19	6 X 6 X 0.75	178 X 178 X 19	7.0 X 7.0 X 0.75	0.6	1.2	1.3	1.5	10.3	150	76	3.0	3.74	0.13
22-888120G2	KPI-3	152 X 305 X 19	6 X 12 X 0.75	178 X 331 X 19	7.0 X 13.0 X 0.75	1.0	2.3	3.2	3.5	10.3	150	89	3.5	10.30	0.36
22-888130G2	KPI-5	254 X 254 X 19	10 X 10 X 0.75	280 X 280 X 19	11.0 X 11.0 X 0.75	1.4	3.1	4.9	5.4	10.3	150	137	5.4	23.34	0.82
22-888135G2	KPI-8	305 X 305 X 22	12 X 12 X 0.88	331 X 331 X 19	13.0 X 13.0 X 0.75	2.5	5.5	7.5	8.2	10.3	150	163	6.4	47.47	1.68
22-888138G2	KPI-10	305 X 457 X 22	12 X 18 X 0.88	338 X 338 X 22	13.1 X 19.0 X 0.88	3.7	8.3	11.7	12.9	10.3	150	180	7.1	84.23	2.97
22-888140G2	KPI-12	381 X 381 X 22	15 X 15 X 0.88	381 X 564 X 22	16.3 X 16.3 X .88	4.0	8.8	12.4	13.7	10.3	150	206	8.1	95.05	3.36
22-888150G2	KPI-17	381 X 533 X 22	15 X 21 X 0.88	381 X 564 X 22	15.0 X 22.2 X 0.88	5.4	12.0	17.3	19.0	10.3	150	226	8.9	159.67	5.64
22-888160G2	KPI-22	508 X 508 X 22	20 X 20 X 0.88	508 X 539 X 22	20.0 X 21.2 X 0.88	7.2	15.9	23.2	25.6	10.3	150	274	10.8	239.48	8.46
22-888165G2	KPI-28	508 X 660 X 22	20 X 26 X 0.88	508 X 691 X 22	20.0 X 27.2 X 0.88	9.1	20.1	30.9	34.0	10.3	150	299	11.8	354.48	12.52
22-888170G2	KPI-32	610 X 610 X 22	24 X 24 X 0.88	610 X 640 X 22	24.0 X 25.2 X 0.88	10.0	22.0	34.4	38.0	10.3	150	330	13.0	404.24	14.28
22-888180G2	KPI-35L	381 X 1066 X 22	15 X 42 X 0.88	412 X 1096 X 22	16.2 X 43.2 X 0.88	11.1	24.5	35.8	39.5	10.3	150	241	9.5	323.03	11.41
22-888190G2	KPI-44	711 X 711 X 22	28 X 28 X 0.88	712 X 745 X 22	28.0 X 29.3 X 0.88	13.6	30.0	47.8	52.7	10.3	150	388	15.3	712.50	25.16
22-888195G2	KPI-55	812 X 812 X 25	32 X 32 X 1	813 X 872 X 25	32.0 X 34.3 X 1	20.5	45.2	63.3	69.7	10.3	150	432	17.0	1098.94	38.81
22-888200G2	KPI-74	939 X 939 X 25	37 X 37 X 1	940 X 999 X 25	37.0 X 39.3 X 1	26.3	58.0	80.9	89.2	10.3	150	508	20.0	1623.31	57.33

Table 1-1. MAXIFORCE® G2 Lift Bag Reference Data (Continued)

CHAPTER 2
OPERATION

2-1 INTRODUCTION

2-1.1 MAXIFORCE® G2 Lifting Bag Systems are multi-application, portable inflation systems used for lift and displacement of heavy rigid objects, up to 178,400 pounds (80,920 kilograms), while requiring less than 1 inch (2.5 centimeters) of bag insertion clearance. Total capable lift (utilizing two stacked lift bags) is 40 inches (100 centimeters). Inflation may be obtained from any air source (self-contained compressed air cylinder, air compressor, truck air brake system, building compressed air system, foot pump, etc.) capable of supplying 150 psi (10.3 Bar) pressure.

2-1.2 MAXIFORCE® G2 Lifting Bag Systems are designed for use in emergency situations such as building collapse, structural containment, vehicular extrication, industrial entrapment, and excavation collapse and containment. The specific situation requiring the use of a MAXIFORCE® G2 Lifting Bag System will generally determine the size and quantity of lift bag(s) to be utilized in combination with each other.

See Chapter 2-8 (page 2-5) for application examples.

2-2 SYSTEM FUNCTIONAL OPERATION.

Functionally, an interconnected MAXIFORCE® G2 Life Bag System operates as follows:

a. A self-contained air cylinder, air compressor, foot pump or alternate air supply provides the necessary volume and pressure to pressurize the system and ultimately inflate the lift bag.

b. After a lift bag(s) is properly positioned for a lift/displacement, the air supply is "turned on". High pressure air is reduced by the pressure regulator to a usable 165 psi (11.3 Bar)

c. The reduced air pressure is supplied via an air hose to a 150 psi ALB controller G2. The controller permits air to flow via air hose(s) to either one or two lift bags permitting a controlled lift/displacement. In the line between the controller and the lift bag(s) are inline relief valve(s) to maintain proper pressure in the lift bags while disconnected from the controller.

d. As air flows into the lift bag, it increases in height resulting in a corresponding lift/displacement. Maximum lift/displacement force occurs at approximately one inch of inflation height (minimum reduction of the lift bag cross section). As additional air flows into the lift bag, the cross section reduces as the height increases resulting in a corresponding reduction in lift/displacement capacity.

e. When the lift bag(s) are to be partially or fully deflated, control(s) on the controller are operated to perform this function as well as prevent any further inlet pressure from flowing beyond the controller.

f. At the conclusion of operation, the air supply is "turned-off", any residual system air pressure is relieved ("bled off") through the controller, the system components are disconnected, inspected and stored for later use.

2-3 COMPONENT INTERCONNECT PRIOR TO INFLATION.

WARNING

Refer to the SAFETY FIRST instructions preceding chapter 1 for those safety first procedures to be followed for each specific operational phase of the application at hand. Regardless of the lift bag applications or environmental conditions, strict adherence to SAFETY FIRST is essential to prevent personnel injury/death and/or equipment damage. It may make a difference between saving a life or endangering/sacrificing another life.

2-3.1 The following procedures describe in detail a typical interconnection of the previously described components comprising a MAXIFORCE® G2 Air Lifting Bag System. This procedure can be accomplished by trained personnel in less than one minute. If the specific application does not require the use of all of the referenced components or some of the components are not available, elimination of the non-applicable steps and proceed with the interconnection. Any adapters,

couplings and/or fittings required in conjunction with the components are addressed generally but not specific during the interconnection. It is assumed these parts are available and will be installed where required in the system.

2-3.2 Refer to Table 1-1 to determine the required lift bag(s) for the load/displacement and full inflation height demands for the application at hand. Once proper lift/displacement and height configuration is determined and the individual components selector, it is only necessary to clean, where required, the individual components sufficiently to clear them of any contaminates that would prevent their full engagement and proper locking to each other and to interconnect the components.

WARNING

Refer to the SAFETY FIRST instructions preceding chapter 1 and adhere to applicable "prior to inflation" procedures.

WARNING

Most steps within this chapter discuss component connection. Check that the quick connect coupling is fully engaged and locked into position to assure a leak free connection. Be certain to turn the safety locking ring on any quick connect coupling to the locked position as shown in figure 2-1.

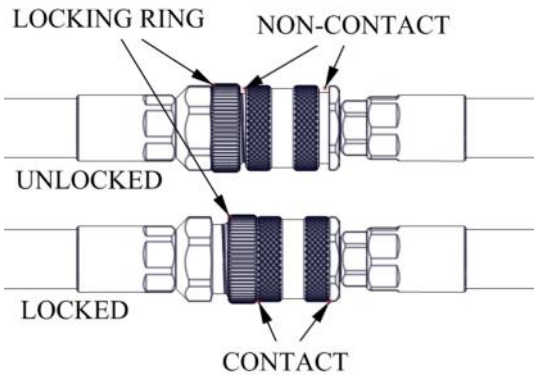


Figure 2-1 Quick Connect Coupling Safety Locking Ring

a. Remove all dust, dirt, oil or grease from the MAXIFORCE® G2 Air Lifting Bag System components. Do not use any system components without first cleaning off any contaminants.

b. Inspect all inlet and delivery fittings for any damage that will permit air leakage. Do not use any component if an air leakage condition is suspected or exists.

c. Attach the high pressure inlet of the G2 pressure regulator to the air supply. Tighten connection to prevent air leakage. Do not over tighten.

d. Check that the G2 pressure regulator shut-off valve is closed (full clockwise). Check that the G2 pressure regulator pressure adjusting knob is full counterclockwise to close the internal needle valve (no flow through the G2 pressure regulator).

e. Attach an air hose quick connect coupling to the G2 pressure regulator air delivery nipple using the appropriate interconnecting fittings as required.

f. Attach the inlet quick connect coupling on a 150 psi ALB controller G2 to the air hose quick connect nipple.

g. Attach the inlet quick connect nipple on a G2 safety inline relief valve to the delivery quick connect coupling on a 150 psi ALB controller G2. Check that the G2 safety inline relief valve shut-off valve is closed (full clockwise).

h. If using a dual "deadman" 150 psi ALB controller G2, attach the inlet quick connect nipple on a second G2 safety inline relief valve to the second delivery quick connect coupling on the dual "deadman" 150 psi ALB controller G2. Check that the G2 safety inline relief valve shut-off valve is closed (full clockwise).

i. Attach an air hose quick connect nipple to the G2 safety inline relief valve delivery quick connect coupling using the appropriate interconnecting fittings as required. Connect additional lengths of air hose of the same color as required.

j. If a second G2 safety inline relief valve is used, attach air hose quick connect nipple to the second G2 safety inline relief valve delivery coupling using the appropriate interconnecting fittings as required. A different colored air hose should be used to permit the rapid and positive identification of the lift bag connected to each side of the controller. Connect additional lengths of air hose of the same color as required.

k. Attach a lift bag nipple to the air hose quick connect coupling.

l. If a second lift bag is being used, attach the second lift bag nipple to the other air hose quick connect coupling.

m. The MAXIFORCE® G2 Air Lifting Bag System is now fully interconnected and can be positioned with any required shoring and/or cribbing, and inflated for a lift/displacement.

2-4 NORMAL OPERATING PROCEDURE DURING INFLATION.

Proceed as follows to inflate the lift bag(s) after the individual components are interconnected, (per chapter 2-3) the lift bag(s) are positioned and the necessary shoring and/or cribbing is in position.

WARNING

Refer to the SAFETY FIRST instructions preceding chapter 1 and adhere to the applicable "during and while inflated" procedures.

WARNING

Be sure **all** shut-off valves are in a closed position prior to opening the air supply to the system; this will prevent an uncontrolled lift/displacement.

a. **Slowly** open (turn counter-clockwise) the air supply to the G2 pressure regulator. The supply pressure will be indicated on the air supply pressure gauge as well as on the G2 pressure regulator supply pressure gauge. The delivery pressure gauge on the G2 pressure regulator should indicate 0 psi.

WARNING

Do not adjust the G2 pressure regulator to exceed the maximum pressure rating of any component in the system apparatus or 165 psi (11.3.bar) whichever is less.

b. Adjust the G2 pressure regulator pressure adjusting knob (turn clockwise) to increase the delivery pressure from 0 psi to 165 psi (11.3 bar).

c. **Slowly** open (turn counter-clockwise) the G2 pressure regulator shut-off valve. The delivery pressure should remain at 165 psi (11.3 bar).

d. Open the shut-off valve on the G2 safety inline relief valve(s).

NOTE:
When operating the lift bag, always inflate slowly and only lift or move the amount necessary.

e. Press the inflate side of the rocker lever of the 150 psi ALB controller G2 or dual "deadman" 150 psi ALB controller G2 repeatedly to **slowly** inflate the lift bag to the required height or 150 psi (10.3 bar). Inflating the lift bag(s) slowly will minimize the possibility of shifting. If a second lift bag is interconnected to the controller, operate the second rocker lever to **slowly** inflate the second lift bag. The lift bags may be inflated simultaneously or alternately as desired by the operator.

f. With the lift bag inflated to the desired height/ pressure close (turn clockwise) the shut-off valve on the G2 safety inline relief valve(s).

g. If additional lift bags are required for the application, proceed as follows:

1. Determine the lift bag to remain inflated and in position. Be sure the shut-off valve on the associated G2 safety inline relief valve.

2. Before disconnecting the G2 safety inline relief valve from the G2 controller, be sure to release the pressure between the components by pressing the "deflate" side of the rocker lever. Be sure the gauge on the controller reads 0 psi before disconnection. Release the safety locking ring on the quick connect coupling between the G2 controller and the G2 safety inline relief valve. Disengage the coupling lock ring to release the G2 safety inline relief valve from the G2 controller.

3. Attach the inlet port quick connect nipple on a G2 safety inline relief valve to the outlet port quick connect coupling on the G2 controller. Check that the G2 safety inline relief valve shut-off valve is closed (full clockwise).

4. Attach an air hose quick connect nipple to the G2 safety inline relief valve delivery coupling using the appropriate interconnecting fittings as required. Connect additional lengths of air hose as required.

5. Attach a G2 lift bag nipple to the air hose quick connect coupling.

6. Press the inflate side of the rocker lever of the 150 psi ALB controller G2 or dual "deadman" 150 psi ALB controller G2 repeatedly to **slowly** inflate the lift bag to the required height or 150 psi (10.3 bar). Inflating the lift bag(s) slowly will minimize the possibility of shifting.

7. Adhere to procedural steps 1 through 6 to add any additional quantity of lift bags required for the application.

2-5 CHANGING AIR CYLINDERS.

NOTE

If the air source for a given application requires the use of air cylinder, it should be changed during inflation whenever the air cylinder pressure falls below 200 psi (13.8 Bar).

a. Close (turn clockwise) the air cylinder and the G2 pressure regulator shut-off valves. The supply pressure gauge on the pressure regulator should indicate 0 psi. The delivery pressure gauge will indicate the regulated pressure until the internal pressure is relieved, any residual system air pressure will be relieved through the controller.

b. Turn the G2 pressure regulator pressure adjusting knob full counter clockwise to close the internal needle valve (no flow through the pressure regulator).

c. As required, turn the nut on the G2 pressure regulator high pressure inlet or interconnecting air cylinder to pressure regulator fitting to the unlocked position. Disengage the inlet nipple to release the air cylinder from the G2 pressure regulator.

d. Attach the high pressure inlet on the G2 pressure regulator to a full air cylinder. Tighten all connections just enough to prevent air leakage. Do not over tighten.

e. Slowly open (turn counter clockwise) the air supply to the G2 pressure regulator. The supply pressure will be indicated on the air supply pressure gauge as well as on the G2 pressure regulator supply pressure gauge. The delivery pressure gauge on the G2 pressure regulator should indicate 0 psi.

f. Adjust the G2 pressure regulator pressure adjusting knob (turn clockwise) to increase the delivery pressure from 0 psi to 165 psi (11.3 Bar)

g. **Slowly** open (turn counter clockwise) the G2 pressure regulator shut-off valve. The delivery pressure should remain at 165 psi (11.3 Bar).

2-6 NORMAL OPERATING PROCEDURE DURING DEFLATION.

NOTE

If a lift bag(s) is to be removed after it is deflated, shoring or cribbing must be in position, as required, to restrain the load permitting the removal of the lift bag(s).

a. To either partially or fully deflate an inflated lift bag(s**) disconnected** from a controller, open and close as required the shut-off valve on the G2 safety inline relief valve to slowly achieve the desired deflation. The lift bag design prevents it from deflating rapidly. Alternately opening and closing the shut-off valve will permit a more slowly controlled deflation. This prevents any quick load movements that may cause damage or personnel injury. Repeat for any additional lift bag(s) disconnected from the controller that can be partially or fully deflated.

b. To either partially or fully deflate an inflated lift bag (s) **connected** to a controller, press and release the deflate side of the rocker lever repeatedly to **slowly** deflate the lift bag. Repeat for an additional lift bag connected to the controller if it can be partially or fully deflated.

c. Gather the system components together in preparation for movement to another work area or for disconnection, post inspection and storage.

2-7 COMPONENT DISCONNECTION AFTER DEFLATION.

The following procedures describe in detail a typical disconnection of the previously described components

comprising a MAXIFORCE® G2 Air Lifting Bag System. This procedure can be accomplished by trained personnel in less than one minute. If the specific application did not require the use of all of the referenced components or some of the components are not available, eliminate the non-applicable steps and proceed with the disconnection. Any adapters, couplings and/or air fittings used in conjunction with the components are not addressed during the disconnection.

a. After the lift bag(s) has been removed from its lift/ displacement position and the interconnected system components are gathered together, check that the supply pressure gauge and delivery pressure gauge on the G2 pressure regulator indicate 0 psi.

1. If the supply pressure gauge indicates a pressure other than 0 psi turn off the air supply. Any residual system air pressure will be relieved through the controller. If a significant pressure is still indicated, the air supply shut-off valve is probably defective and air leakage should be anticipated when the air supply is disconnected from the G2 pressure regulator.

2. If the delivery pressure gauge on the G2 pressure regulator indicates a pressure other than 0 psi, be sure the air supply is turned off and press the deflate side of the rocker lever to exhaust air from the system.

b. Turn the safety locking ring on the air hose quick connect coupling, interconnecting the lift bag, to the unlocked position. Disengage the coupling lock ring to release the lift bag from the air hose.

c. Turn the safety locking ring on the G2 safety inline relief valve quick connect coupling, interconnecting the air hose, to the unlocked position. Disengage the coupling lock ring to release the air hose from the G2 safety inline relief valve.

d. Turn the safety locking ring on the 150 psi ALB controller G2 quick connect coupling, interconnecting the G2 safety inline relief valve, to the unlocked position. Disengage the coupling lock ring to release the G2 safety inline relief valve from the 150 psi ALB controller G2.

e. If a dual “deadman” 150 psi ALB controller G2 is used with two G2 safety inline relief valves and associated lift bags, repeat preceding steps b through d.

f. Turn the safety locking ring on the air hose quick connect coupling, interconnecting the G2 pressure regulator to the unlocked position. Disengage the coupling lock ring to release the air hose from the G2 pressure regulator.

g. As required, turn the safety locking ring on the air source fitting quick connect coupling, interconnecting the G2 pressure regulator to the unlocked position. Disengage the coupling lock ring or other fitting to release the pressure regulator from the air source.

h. If the components are not to be immediately reused, perform the post operation inspection and storage in accordance with Chapter 3.

2-8 **APPLICATIONS.**

2-8.1 MAXIFORCE® G2 Air Lifting Bag Systems are multi-application, portable inflation systems used for lift and displacement of heavy rigid objects, up to 178,400 pounds (80,920 kilograms), while requiring less than 1 inch (2.5 centimeters) of bag insertion clearance. Total capable lift (utilizing two stacked lift bags) is 40 inches (100 centimeters).

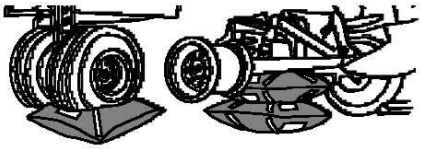
2-8.2 As shown in figure 2-2, MAXIFORCE® G2 Air Lifting Bag Systems are designed for use in emergency situations such as building collapse, structural containment, vehicular extrications, industrial entrapment, and excavation collapse and containment.

2-8.3 In addition to use during emergency situations, MAXIFORCE® G2 Air Lifting Bag Systems are also effectively used for:

a. Preventive and/or corrective maintenance procedures where positioning and aligning heavy equipment and machinery in mills, manufacturing facilities and maintenance shops is required such as removing wheels, pulleys and gears from large machinery.

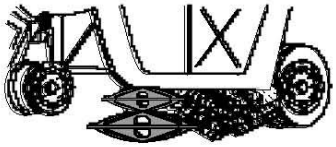
b. Lifting or shifting pipelines requiring welding and maintenance.

c. Breaking out granite and marble blocks and slabs in quarrying operation

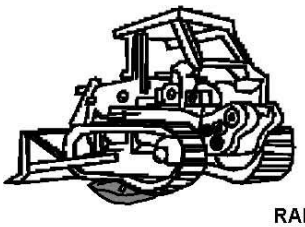


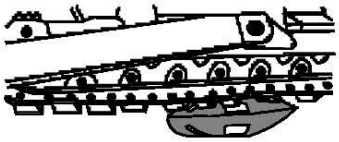
AIRCRAFT FLAT TIRE
SUPPORT & REPAIR

HALF-TRAK TIRE REPAIR

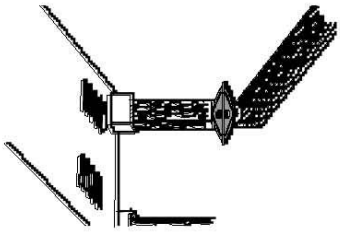


VEHICLE JACKING OPERATION

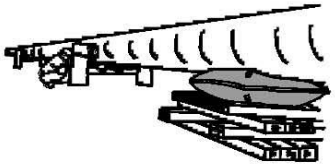




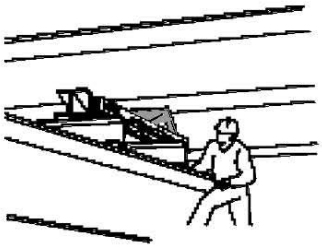
RAISING EARTH MOVER
MIRED IN MUD



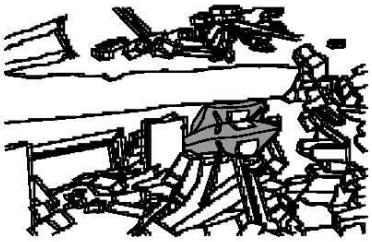
POSITIONING OF HEAVY MACHINERY



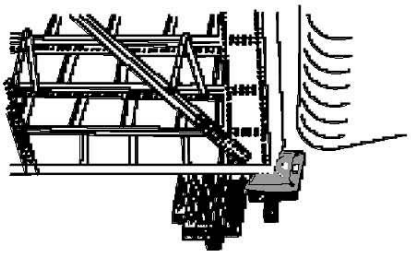
RAISING PIPELINE FOR INSPECTION



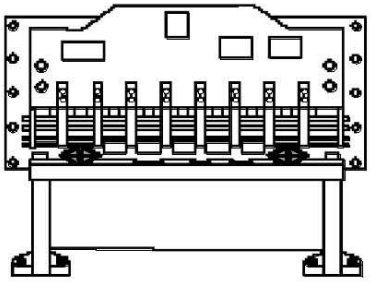
LIFTING SECTION OF COLLAPSED
HIGHWAY OVERPASS



RAISING SECTION OF COLLAPSED
BUILDING TO ALLOW RESCUE ACCESS

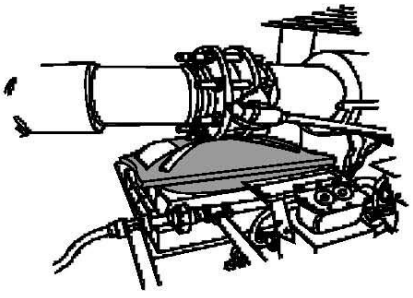


JACKING UP CANAL LOCK GATE
DURING MAINTENANCE

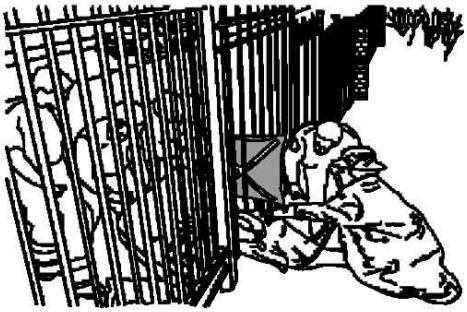


LIFTING AND STABILIZING CUTTER

OPENING DOOR OF GRINDING
MACHINE TO FREE VICTIM'S ARM



ALIGNING AND STABILIZING
PIELINE SECTIONS



PRYING OPEN FENCE TO RESCUE
TRAPPED ANIMAL

Figure 2-2

d. Re-railing railroad and mining cars, pre-stressing support columns, general maintenance requiring lifting in rail, mining, underground and subway work.

e. Lifting operations underwater or on unstable, soft ground (mud, sand, snow, strewn debris, etc.) where conventional jacking equipment tends to sink.

f. Since the lift bags contain no spark producing parts, they may also be used safely in explosive environments.

2-8.4 In addition to the SAFETY FIRST Procedures in the front of this publication, the following general application notes and procedures should be followed whenever a MAXIFORCE G2 Air Lifting Bag System is to be employed.

a. All procedures should be used as guidelines, not absolute dictates. Any previous application may, as a result of a seemingly inconsequential change, require modification or possibly completely new procedures to achieve the same result.

b. Lift bags are relatively lightweight. The maximum weight is 60 pounds (27.2 kg). All lift bags over 8 pounds incorporate at least two lifting eyelets.

c. If a lift bag is being used to lift or displace a thin surface or material, use plywood between the lift bag and the surface to more evenly distribute the applied force.

d. If a lift bag will be used on an icy, greasy or otherwise slick surface, use a granular material such as sand between the lift bag and the surface to increase the coefficient of friction, thereby preventing the lift bag from slipping.

e. Build support cribbing/bracing height to a point that just allows the lift bag(s) to be inserted. Safety cribbing/bracing must be installed as the load is being lifted, remembering the generally applied rule to "lift an inch, crib an inch". Care must be exercised to avoid injury and damage in the event of a drop and/or load shift (figure 2-3). The top support cribbing/bracing layer must be sufficiently solid to prevent a cribbing/bracing shift and collapse during inflation when the lift bag(s) take on the characteristic double dome shape. Build safety cribbing/bracing after the desired lift to minimize the drop distance in the event of air loss after inflation. After full safety cribbing/bracing is in place, the lift bag may be slowly deflated and removed, and the support cribbing/bracing removed, allowing the load to rest fully on the safety cribbing/bracing.

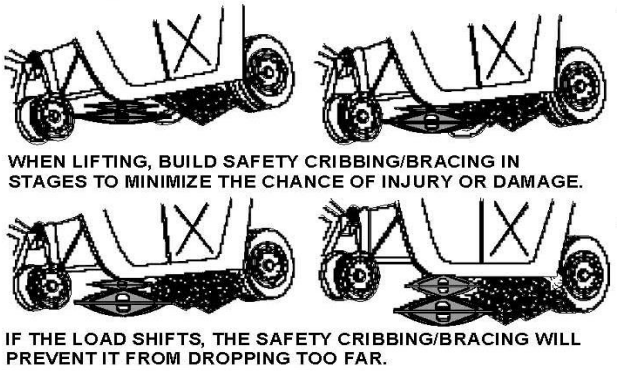


Figure 2-3. Correct Method of Safety Cribbing/Bracing

f. Lifting capacity does not increase by stacking 2 lift bags one on top of the other; only the lifting height increases. Lifting capacity is controlled by the smaller bag capacity. Use lift bags, side-by-side, to additively increase capacity by inflating the lift bags simultaneously. (Figure 2-4)

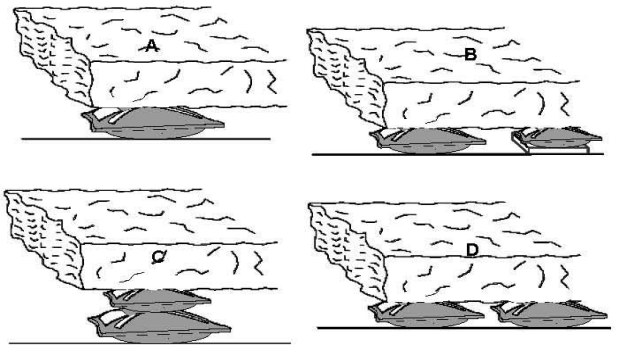


Figure 2-4. Lift bag Stacking and Tandem Combinations

g. If the lift requirement demands the use of two stacked lift bags, (figure 2-5) the smaller lift bag be on top (A) and the bottom lift bag inflated first until top lift bag contacts with the load (B). The top lift bag is then inflated to achieve the desired lift(C). If additional lift is required at full inflation of the top lift bag is further inflated (D).

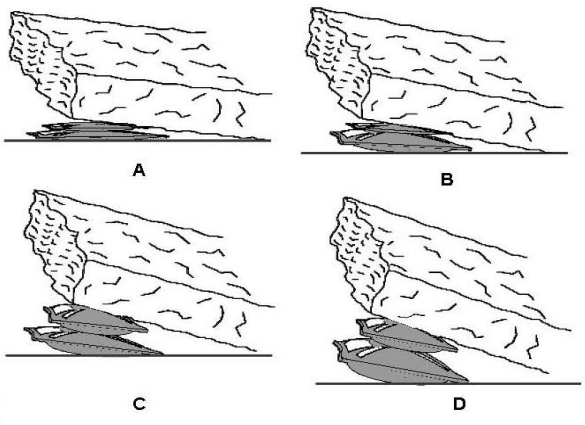


Figure 2-5. Correct Method for Inflating Stacked Lift Bags

h. When lifting large cylindrical objects (Figure 2-6), use a lift bag on both sides of cylinder and wedges to provide an even lift.

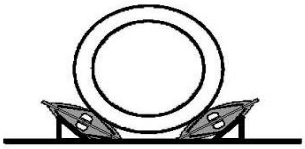


Figure 2-6. Correct Method of Inflating Stacked Lift Bags

2-9 **LIFT BAG CHEMICAL COMPATIBILITY**

Use the following chemical compatibility table only as a guide in determining the MAXIFORCE® G2 Lift Bag resistance to solvents, acids, salts and other chemical solutions. Each commodity is assigned an alpha character to denote its expected effect upon the lift bag. The specific ratings in this table are based upon published literature from various polymer suppliers and manufacturers and "Chemical Resistance Guide for Elastomers II" published by Compass Publications, copyright 1994. Paratech is unable to guarantee their accuracy and therefore assumes no liability for the use thereof.

A. - EXCELLENT SERVICE
Long service may be expected with little reduction in properties due to the exposure. Suitable for continuous service.

B. - GOOD SERVICE
Good service may be expected, but properties will be affected by the exposure. Usually suitable for continuous and intermittent service.

C. - FAIR SERVICE
Fair service may be expected if exposure is limited or infrequent. Not recommended for continuous use but may give some service if it is the only option available.

U. - NOT RECOMMENDED FOR CONTINUOUS USE

BLANK - INSUFFICIENT INFORMATION
The table positions which are not rated indicate insufficient information at the time of publication to determine an accurate rating.

A

Acetamide ..... B
Acetic Acid 5% ..... A
Acetic Acid 30% ..... A
Acetic Acid, Hot High Press C
Acetic Acid, Glacial ..... U
Acetic Anhydride ..... A
Acetone C
Acetophenone ..... U
Acetyl Acetone ..... U
Acetyl Chloride ..... U
Acetylene ..... B
Acetylene Tetrabomide ..... B
Acrylonitrile C
Adipic Acid ..... A
Aero Lubriplate ..... A
Aero Safe 2300 ..... U
Aero 2300W ..... U
Aero Shell IAC ..... B
Acero Shell 7A Grease ..... B
Aero Shell 17 Grease ..... B
Aero Shell 750 ..... U
Aerozene 50 (50% Hydrazine 50%UDMH) ..... U
Air- Below 300°F (148.9°C) ..... A
Air Above 300°F (148.9°C) ..... U
Alkazene ..... U
Alum-N3Cr-K ..... A
Aluminum Acetate ..... B
Aluminum Bromide ..... A
Aluminum Chloride ..... A
Aluminum Fluoride ..... A
Aluminum Nitrate ..... A
Aluminum Phosphate ..... A
Aluminum Salts ..... A
Aluminum Sulfate ..... A
Ambrex 33 Mobil ..... B
Amines, Mixed ..... B
Ammonia Anhydrous (Liquid) ..... A
Ammonia Gas, Cold ..... A
Ammonia Gas, Hot ..... B
Ammonia & Lithium Metal Solution . U
Ammonium Carbonate ..... A
Ammonium Chloride ..... A
Ammonium Hydroxide (Concentrate) A
Ammonium Nitrate ..... A
Ammonium Nitrite ..... A
Ammonium Persulfate Solution ..... A
Ammonium Persulfate 10% ..... A
Ammonium Phosphate ..... A
Ammonium Phosphate, Mono-Basic . A
Ammonium Phosphate, Dibasic ..... A
Ammonium Phosphate, Tribasic ..... A
Ammonium Salts ..... A
Ammonium Sulfate ..... A
Ammonium Sulfide ..... A
Amyl Acetate ..... U
Amyl Alcohol ..... A
Amyl Borate ..... A
Amyl Chloride ..... U
Amyl Chloranaphthalene ..... U
Amyl Naphthalene ..... U
Anderol L-774 (diester) ..... U
Anderol L-826 (diester) ..... U
Anderol L-829 (diester) ..... U
Ang-25 (Glyceral Ester) ..... B
Ang-25 (di-ester Base) (TG749) ..... U
Anhydrous Ammonia ..... A
Anhydrous Hydrazine ..... B
Anhydrous Hydrogen Fluoride ..... U
Anline ..... U
Anline Dyes ..... B
Anline Hydrchloride ..... U
Anline Oils ..... U
Animal Fats ..... B
Animal Fats (Lard Oil) ..... B
AN-O-3 Grade M ..... B
An-O-6 ..... B
AN-O-366 ..... B
AN-VV-O-366b Hydr Fluid ..... B
Ansul Ether ..... U
Aqua Regia ..... U
Argon ..... U
Aroclor 1248 ..... U
Aroclur 1254 ..... U
Aroclur 1260 ..... A
Aromatic Fuel 50% ..... U
Arsenic Acid ..... A
Arsenic Trichloride ..... A
Askarel ..... U
Asphalt Emulsion ..... U
Asphalt Topping ..... B
ASTM Oil #1 ..... A
ASTM Oil #2 ..... B
ASTM Oil #3 ..... B
ASTM Oil #4 ..... U
ASTM Reference Fuel A ..... B
ASTM Reference Fuel B ..... U
ASTM Reference Fuel C ..... U
ATL-857 ..... U
Atlantic Dominion F ..... B
Aurex 903R Mobil ..... B
Automatic Transmission Fluid ..... B
Automotive Brake Fluid ..... B

B

Bardol B ..... U
Barium Chloride ..... A
Barium Hydroxide ..... A
Barium Salts ..... A
Barium Sulfate ..... A
Barium Sulfide ..... A
Bayol D ..... B
Beer ..... A
Beet Sugar Liquors ..... A
Benzaldehyde ..... U
Benzene ..... U
Benzenesulfonic Acid ..... A
Benzine ..... B
Benzochloride ..... U
Benzoic Acid ..... A
Benzophenol ..... U
Benzyl Alcohol ..... B
Benzyl Benzoate ..... U
Benzyl Chloride ..... U
Black Point 77 C
Black Suphate Liquors ..... A
Blast Furnace Gas ..... U
Bleach Solutions ..... U
Borax ..... A
Bordeaux Mixture ..... B
Boric Acid ..... A
Boron Fluids (HEF) ..... U
Brake Fluid (Non-Petroleum) ..... B
Bray GG-130 ..... U
Brayco 719-R (WH-910) ..... B
Brayco 885 (MIL-L-6085A) ..... U
Brayco 910 ..... B
Bret 710 ..... B
Brine ..... A
Brom-113 ..... U
Brom-114 ..... B
Bromine ..... U
Bromine Anhydrous ..... U
Bromine Pentafluoride ..... U
Bromine Trifluoride ..... U
Bromine Water ..... B
Bromobenzene ..... U
Bromochloro Trifluoroethane ..... U
Bunker Oil ..... B
Butadiene ..... B
Butane ..... A
Butane 2, 2-Dimethyl ..... B
Butane 2, 3-Dimethyl ..... B
Butanol (Butyl Alcohol) ..... A
1-Butene, 2-Ethyl ..... U
Butter ..... B
Butyl Acetate ..... U
Butyl Acetate Ricinoleate ..... U
Butyl Acrylate ..... U
Butyl Alcohol ..... A
Butyl Amine ..... U
Butyl Benzoate ..... U
Butyl Butyrate ..... U
Butyl Carbitol C
Butyl Cellosolve ..... U
Butyl Cellosolve Adipate ..... U
Buty Ether ..... U
Butyl Oleate ..... U
Butyl Stearate ..... U
Butylene C
Butyraldehyde ..... U
Butyric Acid ..... U

C

Carbon Tetrachloride ..... U
Carbonic Acid ..... A
Castor Oil ..... A
Cellosolve ..... U
Cellosolve Acetate ..... U
Cellosolve Butyl ..... U
Celloguard ..... A
Cellulube A60 (Now Fyrquel) ..... U
Cellolube 90, 100, 150, 220, 300, 500 U
Cellutherm 2505A ..... U
Cetane (Hexadecane) ..... B
China Wood Oil (Tung Oil) ..... A
Chloracetic Acid ..... A
Chlorodane C
Chlorextol ..... B
Chlorinated Salt Brine ..... U
Chlorinated Solvents, Dry ..... U
Chlorinated Solvents, Wet ..... U
Chlorine, Dry C
Chlorine, Wet C
Chlorine Dioxide ..... U
Chlorine Dioxide (8% CI as NACIO2 in solution) ..... U
Chlorine Trifluoride ..... U
Chloroacetone C
Chloroacetic Acid ..... U
Chlorobenzene ..... U
Chlorobenzene, (Mono) ..... U
Chlorobromo Methane ..... U
Chlorobutadiene ..... U
Chlorododecane ..... U
Chloroform ..... U
O-Chloronaphthalene ..... U
1-Chloro 1-Nitro Ethane ..... U
Chlorosulfonic Acid ..... U
Chlorotoluene ..... U
Chlorox ..... B
O-Chlorphenol ..... U
Chrome Alum ..... A
Chrome Plating Solutions ..... U
Chromic Acid ..... U
Chromic Oxides 88 Wt % Aqueous Solution ..... U
Circo Light Process Oil ..... B
Citric Acid ..... A
City Service Koolmotor - AP Gear Oil 140-E.P. Lube ..... B
City Service #65, #120, #250 ..... B
Cobalt Chloride ..... A
Cobalt Chloride, 2N ..... A
Cocoa nut Oil ..... A
Cod Liver Oil ..... B
Coffee ..... A
Coke Oven Gas ..... U
Coliche Liquors ..... A
Convelex 10 ..... U
Coolanol (Monsanto) ..... A
Copper Acetate ..... B
Copper Chloride ..... A
Copper Cyanide ..... A
Copper Salts ..... A
Copper Sulfate ..... A
Copper Sulfate 10% ..... A
Copper Sulfate 50% ..... A
Corn Oil ..... A
Cottonseed Oil ..... A
Creosols ..... U
Creosote C
Creosote, Coal Tar ..... B
Creosote, Wood Tar ..... B
Creosylic Acid ..... U
Crude Oil ..... U
Cumene ..... U
Cutting Oil ..... B
Cyclohexane ..... U
Cyclohexanol ..... B
P-Cymene ..... U

D

Decalin ..... U
Decane ..... U
Delco Brake Fluid ..... B
Denatured Alcohol ..... A
Detergent Solutions ..... B
Developing Fluids (Photo) ..... A
Dextron ..... B
Diacetone ..... U
Diacetone Alcohol ..... U
Diazon C
Dibenzyl Ether ..... U
Dibenzyl Sebacate ..... U
Dibromoethyl Benzene ..... U
Dibutylamine ..... U
Dibutyl Ether ..... U
Dibutyl Phthalate ..... U
Dibutyl Sebacate ..... U
O-Dichlorobezene ..... U
P-Dichlorobenzene ..... U
Dichloro-Butane ..... U
Dichloro-Isopropyl Ether ..... U
Dicyclohexylamine ..... U
Diesel Oil ..... B
Di-Ester Lubricant MIL-L7808 ..... U
Di-Ester Synthetic Lubricant ..... U
Diethylamine ..... B
Diethyl Benzene ..... U
Diethyl Ether ..... U
Diethyl Sebacate ..... U
Diethylene Glycol ..... A
Difluorodibromomethane ..... U
Disobutylene ..... U
Disococtyl Sebacate ..... U
Disopropyl Benzene ..... U
Disopropyl Ketone ..... U
Dimethyl Aniline ..... U
Dimethyl Formamide ..... U
Dimethyl Phthalate ..... U
Dinitro Tuluene ..... U
Dioctyl Phthalate ..... U
Dioctyl Sebacate ..... U
Dioxane ..... U
Diozolane ..... U
Dipentene ..... U
Diphenyl ..... U
Diphenyl Oxides ..... U
Dow Chemical 50-4 ..... B
Dow Chemical ET378 ..... U
Dow Chemical ET588 ..... B
Dow Corning-3 ..... A
Dow Corning-4 ..... A
Dow Corning-5 ..... A
Dow Corning-11 ..... A
Dow Corning-33 ..... A
Dow Corning-44 ..... A
Dow Corning-55 ..... A
Dow Corning-200 ..... A
Dow Corning-220 ..... A
Dow Corning 510 ..... A
Dow Corning-550 ..... A
Dow Corning-705 ..... A
Dow Corning-710 ..... A
Dow Corning-1208 ..... A
Dow Corning-4050 ..... A
Dow Corning-6620 ..... A
Dow Corning-F60 ..... A
Dow Corning-F61 ..... A
Dow Corning-XF60 ..... A
Dow Guard ..... A
Dowtherm Oil ..... U
Dowtherm A or E ..... U
Dowtherm 209, 50% Solution ..... B
Drinking Water ..... B
Dry Cleaning Fluids ..... U
DTE Light Oil ..... B

E

Elco 28-EP Lubricant C
Epichlorohydrin ..... U
Epoxy Resins ..... A
Esam-6 Fluid ..... B
Esso Fuel 208 ..... B
Esso Golden Gasoline ..... U
Esso Motor Oil C
Esso Transmission Fluid (TypeA) ..... B
Esso WS3812 (MIL-L-7808A) ..... U
Esstic 42, 43 ..... B
Ethane ..... B
Ethanol ..... A
Ethanol Amine ..... B
Ethers ..... U
Ethyl Acetate-Organic Ester ..... U
Ethyl Acetoacetate ..... U
Ethyl Acrylate ..... U
Ethyl Acrylic Acid ..... B
Ethyl Alcohol ..... A
Ethyl Benzene ..... U
Ethyl Benzoate ..... U
Ethyl Bromide ..... U

Ethyl Cellosolve ..... U
Ethyl Cellulose ..... B
Ethyl Chlorocarbonate ..... U
Ethyl Chloroformate ..... U
Ethyl Cyclopentane C
Ethyl Ether ..... U
Ethyl Formate ..... B
Ethyl Hexanol ..... A
Ethyl Mercaptan C
Ethyl Oxalate ..... U
Ethyl Pentachlorobenzene ..... U
Ethyl Silicate ..... A
Ethylene ..... A
Ethylene Chloride ..... U
Ehtylene Chlorohydrin ..... B
Ethylene Diamine ..... A
Ethylene Dibromide ..... U
Ethylene Dichloride ..... U
Ethylene Glycol ..... A
Ethylene Oxide ..... U
Ethylene Trichloride ..... U
Ethylmorpholene Stannous Octoate (50/50 Mixture) .....

F

F-60 Fluid (Dow Corning) ..... A
F-61 Fluid (Dow Corning) ..... A
Fatty Acids ..... B
FC-43 Heptacosofluorotributylamine A
FC75 Fluorocarbon ..... A
Ferric Chloride ..... A
Ferric Nitrate ..... A
Ferric Sulfate ..... A
Fish Oil ..... A
Fluoroboric Acid ..... A
Fluorine (Liquid) C
Fluorobenzene ..... U
Fluorocarbon Oils ..... A
Fluorolube ..... A
Fluorinated Cyclic Esters ..... U
Fluosilicic Acid ..... A
Formaldehyde C
Formic Acid ..... A
Freon, 11 ..... U
Freon, 12 ..... A
Freon, 12 and ASTM Oil #2 (50/50 Mixture) ..... B
Freon, 12 ans Suniso 4G -(50/50 Mixture) ..... B
Freon, 13 ..... A
Freon 13B1 ..... A
Freon, 14 ..... A
Freon, 21 ..... B
Freon, 22 ..... A
Freon, 22 and ASTM Oil (50/50 Mixture) ..... B
Freon, 31 ..... A
Freon, 32 ..... A
Freon, 112 ..... B
Freon, 113 ..... A
Freon, 114 ..... A
Freon, 114B2 ..... A
Freon, 115 ..... A
Freon, 142b ..... A
Freon, 152a ..... A
Freon, 218 ..... A
Freon, C316 ..... A
Freon, C318 ..... A
Freon, 502 ..... A
Freon, 502 ..... A
Freon, BF ..... B
Freon, MF ..... U
Freon, TF ..... A
Freon, TA ..... A
Freon, TC ..... A
Freon, TMC ..... B
Freon, T-P35 ..... A
Freon, T-WD602 ..... B
Freon, PCA ..... A
Fuel Oil ..... B
Fuel Oil, Acidic ..... B
Fuel Oil, #6 ..... U
Fumaric Acid ..... B
Fuming Sulpharic Acid - (20/25% Oleum) ..... U
Furan (Furfuran) ..... U
Furfural ..... B
Furfuraldehyde ..... B
Furfaryl Alcohol ..... U
Furyl Carbinol ..... U
Fryquel A60 ..... U
Fryquel 90,100,150,220,300,500 ..... U

G

Gallic Acid ..... B
Gasoline ..... B
Gelatin ..... A
Girling Brake Fluid ..... B
Glacial Acetic Acid ..... U
Glauber's Salt ..... A
Glucose ..... A
Glue (Depending ion Type) ..... A
Glycerine-Glycerol ..... A
Glycols ..... A
Green Suphate Liquor ..... B
Gulfcrown Grease ..... B
Gulf Endurance Oils ..... B
Gulf FR Fluids (Emulsion) ..... B
Gulf FRG-Fluids ..... A
Gulf FRP-Fluids ..... U
Gulf Harmony Oils ..... B
Gulf High Temperature Grease ..... B
Gulf Legion Oils ..... B
Gulf Paramount Oils ..... B
Gulf Sucurity Oils ..... B

H

Halothane ..... U
Hannifin Lube A ..... A
Heavy Water ..... B
HEF-2 (High EnergyFuel) ..... U
Helium ..... A
N-Heptane ..... B
N-Hexaldehyde ..... A
Hexane ..... B
N-Hexane-1 ..... B
Hexyl Alcohol ..... B
High Viscosity Lubricant, U4 ..... B
High Vicosity lubricant, H2 ..... B
Hilo MS #1 ..... U
Houghto-Safe 271 (Water and Glycol Base) ..... B
Houghto-Safe 620 (Water/Glycol) ..... B
Houghto-Safe 1010, Phosphate Ester U
Houghto-Safe 1120, Phosphate Ester U
Houghto-Safe 5040 (Water/OilEmulsion) ..... B
Hydraulic Oil (Petroleum Base) ..... B
Hydrazine ..... B
Hydrobromic Acid ..... U
Hydrobromic Acid 40% ..... B
Hydrocarbons (Saturated) ..... B
Hydrochloric Acid Hot 37% ..... U
HydrochloricAcid Cold 37% ..... B
Hydrochloric Acid 3 Molar C
Hydrochloric Acid Concentrated ..... U
Hydrocyanic Acid ..... B
Hydro-Drive, MIH-50 (Petroleum Base) ..... B
Hydro-Drive, MIH-10 (Petroleum Base) ..... B
Hydrofluoric Acid, 65% Max. Cold .. A
Hydrofluoric Acid, 65%Min.Cold ..... U
Hydrofluoric Acid, 65%Max. Hot C
Hydrofluoric Acid, 65% Min. Hot ..... U
Hydrofluosilicic Acid ..... B
Hydrogen Gas, Cold ..... A
Hydrogen Gas, Hot ..... A
Hydrogen Peroxide (1) ..... B
Hydrogen Peroxide 90%(1) ..... U
Hydrogen Sulfide Dry, Cold ..... A
Hydrogen Sulfide Dry, Hot ..... B
Hydrogen Sulfide Wet, Cold ..... A
Hydrogen Sulfide Wet, Hot ..... B
Hydrolube-Water/Ethylene Glycol ..... B
Hydroquinone ..... U
Hydyne ..... B
Hyjet ..... U
Hyjet III ..... U
Hyjet S ..... U
Hyjet W ..... U
Hypochlorous Acid ..... U

I

Industron FF44 ..... B
Industron FF48 ..... B
Industron FF53 ..... B
Industron FF80 ..... B
Iodine ..... U
Iodine Pentafluoride ..... U
Isobutyl Alcohol ..... A
Iso-Butyl N-Butyrate ..... U

Isododecane ..... B
Iso-Octane..... B
Isophorone (Ketone) ..... U
Isopropanol ..... A
Isopropyl Acetate..... U
Isopropyl Alcohol ..... A
Isopropyl Chloride ..... U
Isopropyl Ether ..... U

J

JP 3 (MIL-J-5624) ..... U
JP 4 (MIL-J-5624) ..... U
JP 5 (MIL-J-5624..... U
JP-6(MIL-J-25656) ..... U
JP X (MIL-F-25604)..... B

K

Kel F Liquids Kerosene C
Keystone #87HX-Grease ..... U

L

Lactams-Amino Acids ..... B
Lactic Acid, Cold..... A
Lactic Acid, Hot..... U
Lacquers ..... U
Lacquer Solvents ..... U
Lactic Acids..... A
Lard, Animal Fats ..... B
Lavender Oil ..... U
Lead Acetate ..... B
Lead Nitrate ..... A
Lead Sulfamate ..... A
Lehigh X1169 ..... B
Lehigh X1170 ..... B
Light Grease ..... U
Ligroin (Petroleum Ether or Benzine) B
Lime Bleach..... B
Lime Sulphur ..... A
Lindol, Hydraulic Fluid (Phosphate Ester Type) ..... U
Linoleic Acid ..... U
Linseed Oil ..... A
Liquid Oxygen ..... U
Liquid Petroleum Gas (LPG) ..... B
Liquimoly ..... B
Lubricating Oils, Diester..... C
Lubricating Oils, Petroleum Base ..... B
Lubricating Oils, SAE 10, 20, 30, 40, 50..... B
Lye Solutions..... A

M

Magnesium Chloride..... A
Magnesium Hydroxide ..... B
Magnesium Sulfate ..... A
Magnesium Sulfite..... A
Magnesium Salts..... A
Malathion.....
Maleic Acid ..... U
MCS 312..... U
MCS 352..... U
MCS 463..... U
Mercuric Chloride ..... A
Mercury..... A
Mercury Vapors ..... A
Mesityl Oxide (Ketone)..... U
Methane ..... B
Methanol ..... A
Methyl Acetate..... B
Methyl Acetoacetate..... U
Methyl Acrylic Acid ..... B
Methyl Alcohol ..... A
Methyl Benzoate ..... U
Methyl Bromide ..... U
Methyl Butyl Ketone..... U
Methyl Carbonate..... U
Methyl Cellosolve ..... B
Methyl Chloride ..... U
Methyl Chloroformate..... U
Methyl D-Bromide ..... U
Methyl Cyclopentane ..... U
Methylene Chloride..... U
Methyl Dichloride ..... U
Methyl Ether C
Methyl Ethyl Keton (MEK) ..... U
Methyl Ethyl Ketone Peroxide ..... U
Methyl Formate..... B
Methyl Isobutyl Ketone (MIBK)..... U
Methyl Isopropyl Ketone ..... U
Methyl Methacrylate ..... U
Methyl Oleate..... U
Methyl Salicylate ..... U
MIL-L-644B C
MIL-L-2104B..... A
MIL-L-2105B..... A
MIL-G-2108..... A
MIL-S-3136B, Type I Fuel ..... B
MIL-S-3136B, Type II Fuel ..... U
MIL-S-3136B, Type III Fuel..... U
MIL-S-3136B, Type IV..... A
MIL-S-3136B, Type V..... B
MIL-S-3136B, Type VI..... U
MIL-S-3136B, Type VII C
MIL-L-3150A ..... B
MIL-G-3278..... U
MIL-L-3503 ..... B
MIL-L-3545B..... B
MIL-C-4339C ..... U
MIL-G-4343B ..... B
MIL-L-5020A ..... B
MIL-J-5161F..... U
MIL-C-5545A ..... B
MIL-H-5559A..... B
MIL-F-5566 ..... B
MIL-G-5572..... U
MIL-F-5602 ..... B
MIL-H-5606B ..... B
MIL-J-5624G, JP-3 ..... U
MIL-J-5624G, JP-4 ..... U
MIL-J-5624, JP-5 ..... U
MIL-L-6081C..... B
MIL-L-6082C..... B
MIL-H-6083C ..... B
MIL-L-6085A..... U
MIL-L-6086B..... A
MIL-A-6091 ..... A
MIL-L-6387..... A
MIL-C-6529C..... B
MIL-F-7024A..... U
MIL-H-7083A ..... B
MIL-G-7118A C
MIL-G-7187 ..... U
MIL-G-7421A C
MIL-H-7644 ..... B
MIL-L-7645..... B
MIL-G-7711A ..... U
MIL-L-7808F ..... U
MIL-L-7870A..... B
MIL-C-8188C..... U
MIL-A-8243B ..... B
MIL-L-8383B..... A
MIL-H-8446B ..... B
MIL-I-8660B..... A
MIL-L-9000F ..... B
MIL-T-9188B..... U
MIL-L-9236B..... U
MIL-E-9500..... A
MIL-L-10295A..... B
MIL-L-10324A..... B
MIL-G-10924B ..... U
MIL-L-11734B..... C
MIL-O-11773..... C
MIL-P-12098..... B
MIL-H-13862 ..... B
MIL-H-13866A ..... B
MIL-H-13910B ..... B
MIL-H-13919A ..... B
MIL-L-14107B..... A
MIL-L-15016..... B
MIL-L-15017..... B
MIL-15018B..... A
MIL-L-15019A..... A
MIL-L-15719A..... B
MIL-G-15793..... C
MIL-F-16884..... C
MIL-F-16929A..... C
MIL-L-16958A..... B
MIL-F-17111..... B
MIL-L-17331D..... B
MIL-L-17353A..... C
MIL-L-17672B..... A
MIL-L-18486A..... A
MIL-G-18709A ..... A
MIL-H-19457B ..... U
MIL-F-19605..... C
MIL-L-19701..... C
MIL-L-2126- ..... B
MIL-G-21568A ..... A
MIL-H-22072 ..... B
MIL-H-22251 ..... B
MIL-L-22396..... A

MIL-L-23699A C
MIL-G-23827A C
MIL-G-25013D ..... B
MIL-F-25172 C
MIL-L-25336B C
MIL-F-25524A C
MIL-G-25537A ..... B
MIL-F-25558B ..... B
MIL-F-25576C C
MIL-H-25598 ..... B
MIL-F-25656B ..... U
MIL-L-25681C ..... B
MIL-G-25760A C
MIL-L-25968 C
MIL-L-26087A ..... A
MIL-G-27343 ..... A
MIL-P-27402 ..... B
MIL-H-27601A ..... B
MIL-G-27617
MIL-I-27686D ..... B
MIL-L-27694A ..... A
MIL-L-46000A C
MIL-H-46001A ..... A
MIL-L-46002 ..... A
MIL-H-46004 ..... B
MIL-P-46064A ..... B
MIL-H-81019B ..... B
MIL-S-81087 ..... A
MIL-H-83282 ..... B
Milk ..... A
Mineral Oils ..... A
Mobil 24 DTE ..... B
Mobil HF ..... B
Mobil Delvac 1100, 1110, 1120, 1130B
Mobil Nivac 20 and 30 ..... A
Mobil Velocite C ..... B
Mobilgas WA200, Type Automatic
Trans. Fluid ..... B
Mobil Oil SAE 20 ..... B
Mobiltherm 600 ..... B
Mobilux ..... B
Mono Bromobenzene ..... U
Mono Chlorobenzene ..... U
Mono Ethanolamine ..... U
Monomethyl Aniline ..... U
Monmethyl Ether ..... A
Monmethyl Hydrazine ..... B
Monoitroluene & DinitrotolueneÊ
(40/60 Mix.) ..... U
Monovinyl Acetylene ..... B
Mopar Brake Fluid ..... B
Mustard Gas ..... A

N

Naptha ..... U
Napthalene ..... U
Naphthalenic Acid ..... U
Natural Gas ..... A
Neatsfoot Oil ..... U
Neon ..... A
Neville Acid ..... U
Nickel Acetate ..... B
Nickel Chloride ..... B
Nickel Salts ..... B
Nickel Sulfate ..... A
Niter Cake ..... A
Nitric Acid (1) 3 Molar ..... U
Nitric Acid (1) Concentrated ..... U
Nitric Acid Dilute ..... B
Nitric Acid (1) Red Fuming(RFNA) .. U
Nitric Acid (1)Inhibited, Red fuming
(IRFNA) ..... U
Nitrobenzene ..... U
Nitrobenzine ..... U
Nitroethane C
Nitrogen ..... A
Nitrogen(Tetroxide(N2O4)(1)) ..... U
Nitromethane C
Nitropropane ..... U

O

O-A-548A ..... B
O-T-6324b ..... U
Octachloro toluene ..... U
Octadecane ..... B
N-Octane ..... U
Octyl Alcohol ..... B
Oleic Acid C
Oleum (Fuming Sulfuric Acid) ..... U
Oleum Spirits C
Olive oil ..... B
Oronite 8200 ..... A
Oronite 8515 ..... A
Orthochloro Ethyl Benzene ..... U
Ortho-Dichlorobenzene ..... U
OS 45 Type III(OS45) ..... A
OS 45 Type IV (OS45-1) ..... A
OS70 ..... A
Oxalic Acid ..... B
Oxygen, Cold ..... A
Oxygen, Cold 200-400°F ..... U
Ozone C

P

P-S-66lb. C
P-D-680 C
Paint Thinner, Duco ..... U
Palmitic Acid ..... B
Para-dichlorobenzene ..... U
Par-al-Ketone ..... U
Parker O Lube ..... A
Peanut Oil ..... B
Pentane, 2 Methyl ..... B
Pentane, 2-4 Dimethyl ..... B
Pentane, 3 Methyl ..... B
N-Pentane ..... A
Perchloric Acid ..... B
Perchloroethylene ..... U
Petroleum Oil, Crude ..... B
Petroleum Oil, Below
250°F(121.1°C) ..... B
Petroleum Oil, Above
250°F(121.1°C) ..... U
Phenol ..... U
Phenol, 70%/30% H2O ..... U
Phenol, 85%/15% H2O ..... U
Phenylbenzene ..... U
Phenyl Ethyl Ether ..... U
Phenyl Hydrazine ..... U
Phorone ..... U
Phosphoric Acid 20% ..... B
Phosphoric Acid 45% ..... B
Phosphoric Acid, 3 Molar C
Phosphoric Acid, Concentrated ..... U
Phosphorous Trichloride Acid ..... U
Pickling Solution ..... U
Picric Acid, H2O Solution ..... B
Picric Acid, Molten ..... U
Pinene C
Pine Oil ..... U
Piperidine ..... U
Plating Solutions, Chrome ..... U
Plating Solutions, Others
Pnuematic Service ..... A
Polyvinyl Acetate Amulsion ..... B
Potassium Acetate ..... B
Potassium Chloride ..... A
Potassium Cupro Cyanide ..... A
Potassium Cyanide ..... A
Potassium Dichromate ..... A
Potassium Hydroxide ..... A
Potassium Nitrate ..... A
Potassium Salts ..... A
Potassium Sulfate ..... A
Potassium Sulfite ..... A
Prestone Antifreeze ..... A
PRL-High Temp. Hydr. Oil ..... B
Producer Gas ..... B
Propane ..... B
Propane Propionitrile ..... B
Propyl Acetate ..... U
N-Propyl Acetone ..... U
Propyl Alcohol ..... A
Propyl Nitrate ..... U
Propylene Oxide ..... U
Pyranol, Transformer Oil ..... B
Pyranol ..... U
Pydraul, 10E, 29ELT ..... U
Pydraul, 30E, 50E, 65E, 90E ..... U
Pydraul, 115E ..... U
Pydraul, 230E, 312C, 540C ..... U
Pyridine Oil ..... U
Pyrogard 42, 43, 53, 55 (Phosphate
Ester) ..... U
Pyrogard, C, D ..... B
Pyrolingneous Acid ..... U
Pyrolube ..... U
Pyrrole ..... U

R

Radiation C
Rapeseed Oil ..... B

Red Oil (MIL-H-5606) ..... B
Red Line 100 Oil ..... B
RJ-1 (MIL-F-25558) ..... B
RP-1 (MIL-R-25576) ..... B

S

Sal Ammoniac ..... A
Salicylic Acid C
Salt Water ..... A
Santo Safe 300 ..... U
Sewage ..... B
Shell Alvania Grease #2 ..... B
Shell Carnea 19 and 29 ..... U
Shell Diala ..... B
Shell Iris 905 ..... A
Shell Iris 3XF Mine Fluid (Fire Resist. Hydr.) ..... B
Shell Iris Tellus #27, Pet. Base ..... B
Shell Iris Tellus #33 ..... B
Shell Iris UMF (5% Aromatic) ..... B
Shell Lo Hydrax 27 and 29 ..... B
Shell Macoma 72 ..... B
Silicate Esters ..... A
Silicone Greases ..... A
Silicone Oils ..... A
Silver Nitrate ..... A
Sinc;air Opaline CS-EP Lube ..... B
Skelly, Solvent B, C, E ..... U
Skydrol 500 ..... U
Skydrol 7000 ..... U
Soap Solutions ..... A
Socony Vacuum AMV AC781 (Grease) ..... B
Socony Vacuum PD959B ..... B
Soda Ash ..... A
Sodium Acetate ..... B
Sodium Bicarbonate (Baking Soda) ... A
Sodium Bisulfite ..... A
Sodium Borate ..... A
Sodium Carbonate (Soda Ash) ..... A
Sodium Chloride ..... A
Sodium Cyanide ..... A
Sodium Hydroxide ..... B
Sodium Hypochlorite ..... B
Sodium Metaphosphate ..... B
Sodium Nitrate ..... B
Sodium Perborate ..... B
Sodium Peroxide ..... B
Sodium Phosphate (Mono) ..... B
Sodium Phosphate (Dibasic) ..... A
Sodium Phosphate (Tribasic) ..... B
Sodium Salts ..... B
Sodium Silicate ..... A
Sodium Sulfate ..... A
Sodium Sulfide ..... A
Sodium Sulfite ..... A
Sodium Thiosulfate ..... A
Sovasol #1, 2 and 3 ..... B
Sovasol #73 and 74 ..... B
Soybean Oil ..... A
Spry ..... B
SR-6 Fuel ..... U
SR-10 Fuel ..... U
Standard Oil Mobilube GX90-EP Lube ..... B
Stannic Chloride ..... B
Stannic Chloride 50% ..... U
Stannous Chloride ..... A
Staulfer 7700 ..... U
Steam, Below 350°F (176.7°C) ..... U
Steam, Above 350°F (176.7°C) ..... U
Stearic Acid ..... B
Stoddard Solvent C
Styrene ..... U
Styrene (Monomer) ..... U
Sucrose Solutions ..... A
Sulfite Liquors ..... B
Sulfur ..... A
Sulfur Chloride ..... U
Sulfur Dioxide, Wet ..... B
Sulfur Dioxide, Dry ..... U
Sulfur Dioxide, Liquodified under pressure ..... U
Sulfur Hexaflouride ..... A
Sulfur Liquors ..... B
Sulfur Molten C
Sulfur Trioxide ..... U
Sulfuric Acid Dilute ..... B
Sulfuric Acid Concentrated ..... U
Sulfuric Acid 20% Oleum ..... U
Sulfuric Acid 3 Molar C
Sulfurous Acid ..... B
Sunoco SAE 10 ..... B
Sunoco #3661 ..... B
Sunoco All Purpose Grease ..... B
Sunsafe(Fire Resist Hydr.Fluid) ..... B
Super Shell Gas ..... B
Swan Finch EP Lube ..... U
Swan Finch Hypoid-90 ..... B

T

TT-N-95a C
TT-N-97B C
TT-I-735b ..... B
TT-S-735, Type I ..... B
TT-S-735, Type II C
TT-S-735, TypeIII C
TT-S-735, Type IV ..... A
TT-S-735, Type V ..... B
TT-S-735, Type VI ..... B
TTT-656b ..... U
Tannic Acid ..... B
Tannic Acid, 10% ..... A
Tar Bituminous C
Tartaric Acid ..... A
Terpineol ..... U
Tertiary Butyl Alcohol ..... B
Tertiary Butyl Catechol ..... B
Tertiary Butyl Mercaptan ..... U
Tetrabromomethane ..... U
Tetrabutyl Titanate ..... B
Tetrachloroethylene ..... U
Tetraethyl Lead C
Tetraethyl Lead "Blend ..... "U
Tetrahydrofuran ..... U
Tetralin ..... U
Texaco 3450 Gear Oil ..... U
Texaco Capella A and AA ..... B
Texaco Meropa #3 ..... B
Texaco Regal B ..... U
Texaco Uni-Temp. Grease ..... B
Texamatic "A" Transmission Oil ..... B
Texamatic 1581 Fluid ..... B
Texamatic 3401 Fluid ..... B
Texamatic 3525 Fluid ..... B
Texamatic 3528 Fluid ..... B
Texas 1500 Oil ..... B
Thiokol TP-908 ..... B
Thiokol TP-95 ..... B
Thionyl Chloride ..... U
Tidewater Oil-Beedol ..... B
Tidewater Oil-Multigear 140, EP Lube ..... B
Titanium Tetrachloride ..... U
Toluene ..... U
Toluene Diisocyanate ..... U
Transformer Oil ..... B
Transmission Fluid Type A ..... B
Triacetin ..... B
Triayl Phosphate ..... U
Tributoxyethyl Phosphate ..... U
Tributyl Mercaptan ..... U
Tributyl Phosphate ..... U
Trichloroacetic Acid ..... U
Trichloroethane ..... U
Trichloroethylene ..... U
Tricresyl Phosphate ..... B
Triethanol Amine ..... U
Triethyl Aluminum ..... U
Triethyl Borane ..... U
Triflouroethane ..... U
Trinitrotoluene ..... A
Trioctyl Phosphate ..... U
Tripoly Phosphate ..... B
Tung Oil (China Wood Oil) ..... B
Turbine Oil ..... U
Turbine Oil #15 (MIL-L-7808A) ..... U
Turbine Oil #35 ..... B
Turpentine ..... U
Type I, Fuel (MIL-S-3136) ..... B
Type II Fuel (MIL-S-3136) ..... U
Type III Fuel (MIL-S-3136) ..... U

U

Ucon Hydrolube J-4 ..... B
Ucon Lubricant LB-65 ..... A
Ucon Lubricant LB-135 ..... A
Ucon Lubricant LB-285 ..... A
Ucon Lubricant LB-300 ..... A
Ucon Lubricant LB-625 ..... A
Ucon Lubricant LB-1145 ..... A
Ucon-Lubricant 50-HB55 ..... A

Ucon-Lubricant 50-HB100 ..... A
Ucon Lubricant 50-HB260 ..... A
Ucon Lubricant 50-HB660 ..... A
Ucon Lubricant 50-HB5100 ..... A
Ucon Oil LB-385 ..... A
Ucon Oil LB-400X ..... A
Ucon 50-HB-280X (Polyacrylon Glycol Deriv.) ..... A
Univis 40 (Hydr. Fluid) ..... B
Univolt #35 (Mineral Oil) ..... B
Unsymmetrical Dimethyl Hydrazine (UDMH) ..... B

V

VV-B-680 ..... B
VV-G-632 ..... A
VV-G-671c ..... A
VV-H-910 ..... B
VV-I-530a ..... B
VV-K-211d C
VV-K-220a ..... B
VV-L-751b ..... B
VV-L-800 ..... B
VV-L-820b ..... B
VV-L-825a, Type I ..... A
VV-L-825a, Type II ..... A
VV-L-825a, Type III ..... B
VV-O-526 ..... A
VV-P-216a ..... B
VV-P-236 ..... B
Varnish ..... U
Vegetable Oil C
Versilube ..... A
Vinegar ..... B
Vinyl Chloride ..... U

W

Wagner 21B Brake Fluid ..... B
Water ..... A
Wemco C ..... B
Whiskey and Wines ..... A
White Pine Tar ..... U
White Oil ..... B
Wolmar Salt ..... B
Wood Alcohol ..... A
Wood Oil ..... B

X

Xylene ..... U
Xylidenes-Mixed-Aromatic Amines .. U
Xylol ..... U
Xenon ..... A

Z

Zeolites ..... A
Zinc Acetate ..... B
Zinc Chloride ..... A
Zinc Salts ..... A
Zinc Sulfate ..... A

CHAPTER 3
MAINTENANCE AND STORAGE

3-1 **GENERAL.**

The major components and accessories of a MAXIFORCE® G2 Air Lifting Bag System require little maintenance to ensure optimum performance. However, this maintenance must be performed to ensure personnel and equipment safety, and the assurance that when the system is to be utilized, it will function as designed and intended. This chapter provides preventive and corrective maintenance procedures that are necessary to verify that the MAXIFORCE® G2 Air Lifting Bag System will operate satisfactorily.

Do not drag or drop the bag on the nipple area, as this can cause breakage of the brass inflation fitting and render the bag useless. ***BREAKAGE OF THE BRASS INFLATION FITTING IS NOT COVERED UNDER WARRANTY.***

3-2 **PREVENTIVE MAINTENANCE PLAN.**

Preventive maintenance of the MAXIFORCE® G2 Air Lifting Bag System is accomplished in accordance with paragraphs 3-3 and 3-4.

3-3 **POST OPERATION PREVENTIVE MAINTENCE**

Because of the contaminants present where a MAXIFORCE® Air Lifting Bag System is generally used (maintenance sites, construction sites, accident sites, etc.), it is important that the system components be thoroughly cleaned, inspected and prepared for their next use before being placed in storage.

3-3.1 **CLEANING**

Do not use any petroleum based product to clean components of the MAXIFORCE® Air Lifting Bag System. Petroleum based products could adversely react with the non-metallic parts of the system components and may result in a component failure when none should be expected or tolerated.

a. Keep the exterior of all components clean of all dirt, grit, oil and grease accumulations. Except for the lift bag(s), wipe the exterior surfaces with a lint free cotton machinery wiping towel **LIGHTLY** dampened with soap and warm water solution. Be particularly careful to remove all dirt, sand, grit, etc. from quick connect couplings and nipples. Swirl in a bucket with the soap and water solution until clean. Rinse with a wiping towel **LIGHTLY** dampened with clean water. Then dry the surfaces thoroughly with a clean, dry wiping towel or low pressure compressed air. Also clean the lift bag with a soap and warm water solution, but scrub the lift bag with a stiff bristle broom or brush and rinse by spraying with cold water. If the cleaning solution or rinse water gets into the lift bag through the nipple, allow the lift bag to dry thoroughly before its next use.

3-3.2 **INSPECTION.**

a. While the lift bag is still wet with the cleaning solution, inflate to 30 psi and check for air bubbles denoting a leak(s). Except for air leakage from between the air inlet fitting and the male nipple, replace rather than attempt to repair a leaking lift bag. If air leakage is detected from around the male nipple threads, proceed as follows:

1. Deflate the lift bag.

2. Disconnect the quick connect coupling from the lift bag male nipple.

WARNING

The nipple of the MAXIFORCE® G2 air bag has LEFT HANDED threads. When removing or installing a replaceable male nipple from/into a lift bag inlet fitting, be sure to hold the air bag over inlet fitting stationary while turning the male nipple. (LEFT HANDED) Allowing it to turn, will loosen its bond with the lift bag. During operation, this will result in air leakage or possibly the ejection of the fitting, resulting in a hazardous condition and rendering the lift bag useless.

3. Unscrew the lift bag **left handed** male nipple by inserting a 3/16” hex key into the hex socket located in the air inlet hole of the fitting and rotating it **clockwise**. Be sure to hold the air bag over the inlet fitting stationary.

4. Clean the interfacing threads and inspect the male nipple for visual damage. If damaged, discard. If not damaged, install back into the inlet fitting by turning it counter-clockwise. **The nipple is to be torqued to 84 in.*lbs (7 ft.*lbs).**

5. Reconnect the lift bag to an air source, reinflate to 30 psi and recheck for air leaks. If none are found, deflate the lift bag, disconnect the quick connect coupling and install the tethered protective cap over the male nipple in preparation for storage.

b. After a lift bag is clean and dry, all surfaces should be thoroughly inspected for cuts, abrasion, air bubbles and bulges (ply separation), and other similar damage. Remove all debris from the surface. Minor surface cuts and abrasion can be repaired with rubber cement and should not be considered a problem unless they are deep enough to expose the Kevlar reinforcement layer.

c. Inspect hose assemblies for cuts, cracks, crimps and brittleness. Inspect the hose quick connect coupling and nipple for secureness of attachment and burrs, nicks, corrosion and other similar damage that would prevent a leak proof interconnection.

d. Refer to the separate instruction manuals provided with the G2 pressure regulator and G2 controllers to inspect these components.

e. If during the last three (3) months the MAXIFORCE® G2 Air Lifting Bag System and accessories have not been used for training or actual operational functions, they should be field tested to ensure they do not leak and are fully operational in preparation for their next use.

3-3.3 **REPAIR**

The only repairs authorized on the MAXIFORCE® G2 Air Lifting Bag System components are those designated in the separate instruction manuals provided with the G2 pressure regulator and 150 psi ALB controllers G2, and the following procedures detailing replacement of the quick connect couplings and nipples.

a. AIR HOSE NIPPLE REPLACEMENT. Refer to figure 3-1 and replace a worn or otherwise damaged air hose nipple in accordance with the following procedure.

1. Square cut the air hose just behind the ferrule to release the nipple. Discard the nipple but the ferrule can be reused if not damaged.

2. Screw the ferrule counterclockwise fully onto the hose and back the ferrule out 1/2 turn. There should be approximately 1/16 inch clearance between the ferrule inside shoulder at the end of the hose.

3. Hold the ferrule stationary and turn the nipple clockwise into the ferrule until it is fully seated.

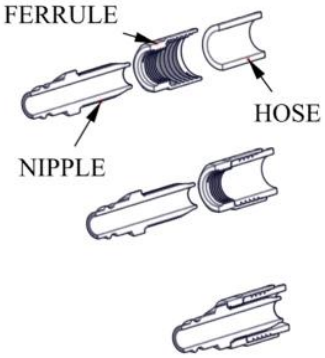


Figure 3-1. Air Hose Nipple Replacement

b. AIR HOSE QUICK CONNECT COUPLING REPLACEMENT. Refer to figure 3-2 and replace a worn or otherwise damaged air hose quick connect coupling in accordance with the following procedure.

1. Square cut the air hose just behind the ferrule to release the quick connect coupling stem and the assembled ferrule (quick connect coupling). Discard the quick connect coupling but the ferrule can be reused if not damaged.

2. Unscrew the ferrule from the quick connect coupling stem. Screw the ferrule, counterclockwise, fully onto the hose and back the 1/2 turn. There should be approximately 1/16 inch clearance between the ferrule inside shoulder at the end of the hose.

3. Hold the ferrule stationary and turn the quick connect coupling stem clockwise into the ferrule until it is fully seated.

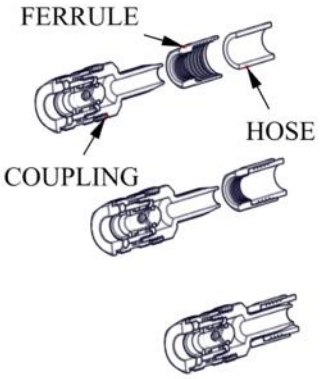


Figure 3-2. Air Hose Quick Connect Coupling Replacement

c. COMPONENT QUICK CONNECT COUPLING AND NIPPLE REPLACEMENT. The quick connect couplings and nipples assembled into the G2 pressure regulator, 150 psi ALB controllers G2 and the G2 safety inline relief valve are screw-type fittings. When their replacement is required, it is only necessary to unscrew the damaged part (quick connect coupling and/or nipple), remove and discard the "O" ring and screw in a replacement part using a new "O" ring. If an "O" ring is not used, be sure to wrap the male threads with two turns of teflon tape to assure a leak free connection.

3-4 **STORAGE.**

3-4.1 Regardless of storage of the MAXIFORCE® G2 Air Lifting Bag System components at a stationary, mobile or at a movable facility requires the following:

a. The short term (1 hour or less) temperature range must be within the limits of -75°F (-60°C) to +220°F (+105°C). The continuous temperature range must be within the limits of -40°F (-40°C) to +150°F (+65°C).

b. The components must be protected from any extreme environmental conditions where blowing dust, sand, grit and other similar materials could cause damage. If these environmental conditions are likely to be encountered, plastic wrap all components for protection.

c. Regardless of whether the lift bag(s) are to be stored flat or upright, the inlet nipple shall be covered with the tethered protective cap over the inlet nipple.

3-4.2 Additional storage requirements of the MAXIFORCE® G2 Air Lifting Bag System components are required in a truck or at a movable facility requires the following:

a. System components designed for 150 psi operation (G2 pressure regulator, 150 psi ALB controller G2, G2 safety inline relief valve and other metallic items) that are stored in a truck compartment where they are subjected during transport to constant bumping will eventually be damaged. It is strongly recommended that these components be stored in their own cushioned cartons. It is further recommended that all components be strapped down, braced or otherwise secured within the compartment during transport.

CHAPTER 4
PARTS LIST

4-l **INTRODUCTION.** This chapter lists available standard and optional parts for the MAXIFORCE® Air Lifting Bag System. 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 60423-7000.

4-2 **LIST OF MAJOR COMPONENTS.**

The MAXIFORCE® Air Lifting Bag System is comprised of the user selected major components denoted in table 41.

Figure 4-2 Index Number	Qty	Component Name	Page No.
1-2	1	Air Source	4-2
3-4	1	G2 Pressure Regulator	4-2
5-6	1	G2 Controllers	4-3
7	1	Air Hose	4-3
8-21	1	G2Lift Bag	4-4
22	1	Safety Inline Relief Valve	4-5
37-72	1	Adapters and Fittings	4-6
73-75	1	Rachet and Belt, and Lift Slings	4-8
76-82	1	Miscellaneous	4-9
83-84	1	Working Air Cart	4-9

Table 4-1. List of Major Components

4-3 **PARTS LIST TABLES.**

The MAXIFORCE® Air Lifting Bag System parts are listed in table 4-2. The table contains 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. Table 4-2 relates to illustrations contained in chapter 4. 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.** The DESCRIPTION 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 relationship.

4-3.3 **QUANTITY COLUMN.** Quantities specified in the QUANTITY column are the total number of each part required per assembly.

4-3.4 **CAGE COLUMN.** The assembly and parts are identified by the five digit code 30978. The code number, in accordance with Federal Supply Cataloging Handbook H-4-1, identifies Paratech Incorporated, 1025 Lambrecht Road, Frankfort, IL 60423-7000 as the manufacturer of all parts.

4-3.5 **PART NUMBER COLUMN.** The part number column contains an identifying number for each part listed. Vendor numbers are shown where applicable.

4-4 **LIST OF MANUFACTURERS.**

Manufacturer's (vendor's) code number (30978) used in parts list tables is in accordance with Federal Supply Cataloging Handbook H-4-1 and identifies Paratech Incorporated, 1025 Lambrecht, Road, Frankfort, IL 60423-7000 as the manufacturer of all parts.

Table 4-2 MAXIFORCE Lifting Bag System Components Parts List

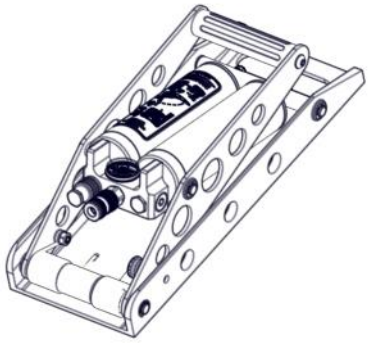
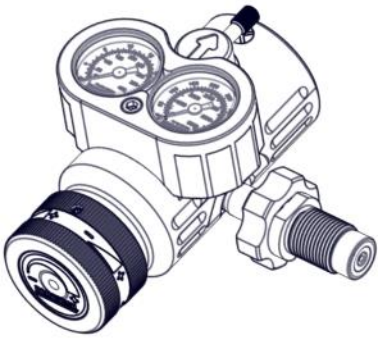
Figure and Index Number	Description	Quantity	CAGE	Part Number
	AIR SOURCE			
4-2-1	AIR CYLINDER, With valve and gauge, 13 cu ft (368 litres)…..	1	30978	800013
-1	AIR CYLINDER, With valve and gauge, 80 cu ft (2,265 litres)…	1	30978	800080
-2	MANUAL AIR COMPRESSOR (hand/foot pump)……..	1	30978	800400
	 1			
	 2			
	G2 PRESSURE REGULATORS			
4-2-3	PRESSURE REGULATOR, Piston Type, 5500 to 0 psi…… (379 to 0 bar), CGA 346/347 inlet	1	30978	895401G2
-4	PRESSURE REGULATOR, Piston Type, 5500 to 0 psi…… (379 to 0 bar) DIN inlet	1	30978	895401DG2
	 3			
	 4			

Figure and Index Number	Description	Quantity	CAGE	Part Number
	G2 CONTROLLERS			
4-2-5	CONTROLLER, Single 150 psi ALB Controller G2……..	1	30978	889510G2-150
-6	CONTROLLER, Dual "Deadman" 150 psi ALB Controller G2	1	30978	890900G2-150

5

6

	AIR HOSE			
4-2-7	AIR HOSE, Black, 3/8 inch (9.5 mm) dia. X 16 ft (4.9 m) long…	1	30978	890513
-7	AIR HOSE, Blue, 3/8 inch (9.5 mm) dia. X 16 ft (4.9 m) long…..	1	30978	890514
-7	AIR HOSE, Yellow, 3/8 inch (9.5 mm) dia. X 16 ft (4.9 m) long..	1	30978	890515
-7	AIR HOSE, Red, 3/8 inch (9.5 mm) dia. X 16 ft (4.9 m) long…...	1	30978	890516
-7	AIR HOSE, Green, 3/8 inch (9.5 mm) dia. X 16 ft (4.9 m) long…	1	30978	890517
-7	AIR HOSE, Grey, 3/8 inch (9.5 mm) dia. X 16 ft (4.9 m) long….	1	30978	890518
-7	AIR HOSE, Black, 3/8 inch (9.5 mm) dia. X 32 ft (9.8 m) long…	1	30978	890522
-7	AIR HOSE, Blue, 3/8 inch (9.5 mm) dia. X 32 ft (9.8 m) long…..	1	30978	890523
-7	AIR HOSE, Yellow, 3/8 inch (9.5 mm) dia. X 32 ft (9.8 m) long..	1	30978	890520
-7	AIR HOSE, Red, 3/8 inch (9.5 mm) dia. X 32 ft (9.8 m) long…...	1	30978	890521
-7	AIR HOSE, Green, 3/8 inch (9.5 mm) dia. X 32 ft (9.8 m) long…	1	30978	890524
-7	AIR HOSE, Grey, 3/8 inch (9.5 mm) dia. X 32 ft (9.8 m) long….	1	30978	890525
-7	AIR HOSE, Black, 3/8 inch (9.5 mm) dia. X 50 ft (15.2 m) long..	1	30978	890546
-7	AIR HOSE, Blue, 3/8 inch (9.5 mm) dia. X 50 ft (15.2 m) long…	1	30978	890543
-7	AIR HOSE, Yellow, 3/8 inch (9.5 mm) dia. X 50 ft (15.2 m) long	1	30978	890542
-7	AIR HOSE, Red, 3/8 inch (9.5 mm) dia. X 50 ft (15.2 m) long….	1	30978	890541
-7	AIR HOSE, Green, 3/8 inch (9.5 mm) dia. X 50 ft (15.2 m) long..	1	30978	890544
-7	AIR HOSE, Grey, 3/8 inch (9.5 mm) dia. X 50 ft (15.2 m) long...	1	30978	890545

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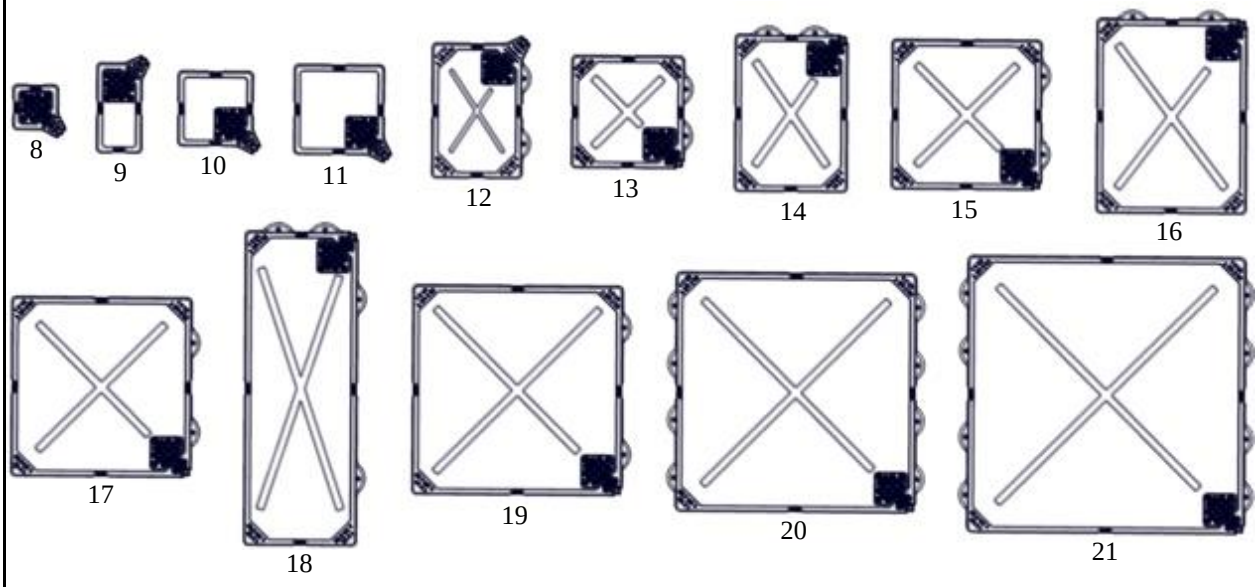
Figure and Index Number	Description	Quantity	CAGE	Part Number
	LIFT BAGS (See Table 1-1 for Physical Characteristics)			
4-2-8	LIFT BAG, Model KPI-1, 1.5 ton (1,360 kg) capacity……..	1	30978	888110G2
-9	LIFT BAG, Model KPI-3, 3.5 ton (3,175 kg) capacity……..	1	30978	888120G2
-10	LIFT BAG, Model KPI-5, 5.4 ton (4,898 kg) capacity……..	1	30978	888130G2
-11	LIFT BAG, Model KPI-8, 8.2 ton (7,438 kg) capacity……..	1	30978	888135G2
-12	LIFT BAG, Model KPI-10, 12.9 ton (11,702 kg) capacity…….	1	30978	888138G2
-13	LIFT BAG, Model KPI-12, 13.7 ton (12,428 kg) capacity…….	1	30978	888140G2
-14	LIFT BAG, Model KPI-17, 19.0 ton (17,236 kg) capacity…….	1	30978	888150G2
-15	LIFT BAG, Model KPI-22, 25.6 ton (23,223 kg) capacity…….	1	30978	888160G2
-16	LIFT BAG, Model KPI-28, 34.0 ton (30,844 kg) capacity…….	1	30978	888165G2
-17	LIFT BAG, Model KPI-32, 38.0 ton (34,437 kg) capacity…….	1	30978	888170G2
-18	LIFT BAG, Model KPI-35L, 39.5 ton (35,833 kg) capacity……..	1	30978	888180G2
-19	LIFT BAG, Model KPI-44, 52.7 ton (47,808 kg) capacity…….	1	30978	888190G2
-20	LIFT BAG, Model KPI-55, 69.7 ton (63,230 kg) capacity…….	1	30978	888195G2
-21	LIFT BAG, Model KPI-74, 89.2 ton (80,920 kg) capacity…….	1	30978	888200G2
				
	LIFT BAG SETS			
	LIFT BAG SET, 3 Bag, 91.0 U.S. ton (82.6 metric ton)…… (consists of 1 each of index numbers: 14, 16, 17)	1	30978	889048G2
	LIFT BAG SET, 5 Bag, 102.9 U.S. ton (93.4 metric ton)…….. (consists of 1 each of index number: 13 and 2 each of item number: 14, 15)	1	30978	889050G2
	LIFT BAG SET, 5 Bag, 117.5 U.S. ton (106.6 metric ton)…… (consists of 1 each of index number: 9 and 2 each of item numbers: 14, 17)	1	30978	889052G2
	LIFT BAG SET, 9 Bag, 151.3 U.S. ton (137.2 metric ton)…… (consists of 1 each of index number: 8, 9, 10, 13, 17 and 2 each of item number: 14, 15)	1	30978	889092G2

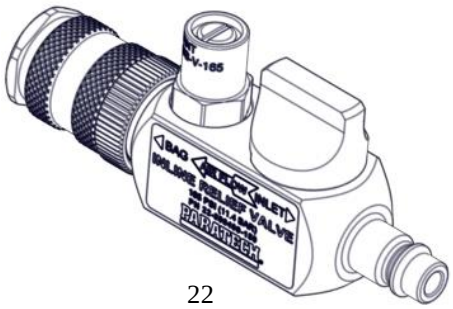
Figure and Index Number	Description	Quantity	CAGE	Part Number
	LIFT BAG SETS (Continued)			
	LIFT BAG SET, 8 Bag, 218.4 U.S. ton (198.0 metric ton)…… (consists of 1 each of index numbers: 13, 18 and 2 each of index numbers: 14, 15, 17)	1	30978	889117G2
	LIFT BAG SET, 11 Bag, 242.2 U.S. ton (219.4 metric ton)…….. (consists of 1 each of index number: 8, 9, 10, 13, 19; and 2 each of index numbers: 14, 15, 17)	1	30978	889136G2
	LIFT BAG SET, 8 Bag, 285.8 U.S. ton (259 metric ton)……... (consists of 1 each of index number: 13, 18 and 2 each of index numbers: 15, 17, 19)	1	30978	889140G2
	LIFT BAG SET, 7 Bag, 277.7 U.S. ton (251.8 metric ton)…… (consists of 1 each of index number: 13, 14, 15, 17, 18, 19, 21)	1	30978	889234G2
	LIFT BAG SET, 10 Bag, 288.1 U.S. ton (261.2 metric ton)…….. (consists of 1 each of index numbers: 8, 9, 10, 13, 14, 15, 17, 18, 19, 21)	1	30978	889245G2
	LIFT BAG SET, 14 Bag, 412.9 U.S. ton (374.6 metric ton)…….. (consists of 1 each of index numbers: 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21)	1	30978	889346G2
	SAFETY INLINE RELIEF VALVE			
4-2-22	RELIEF VALVE, Safety inline, 165 psi (11.4 bar)……	1	30978	890490-150
	 22			
	ADAPTERS AND AIR FITINGS			
4-2-23	NIPPLE, 1/4 inch NPTM (fits MAXIFORCE and Vetter)…….	1	30978	890667
-24	NIPPLE, 1/8 inch NPTM (fits MAXIFORCE and Vetter)…….	1	30978	890668
-25	NIPPLE, 1/8 inch NPTM……	1	30978	890683
-26	NIPPLE, 1/4 inch NPTF…….	1	30978	890682
-27	NIPPLE, 1/4 inch NPTM……	1	30978	890681
-28	NIPPLE, 1/2 inch NPTF…….	1	30978	890685
-29	NIPPLE, 1/2 inch NPTM……	1	30978	890684
-30	NIPPLE, 3/8 inch NPTF…….	1	30978	890777
-31	NIPPLE, 3/8 inch NPTM……	1	30978	890718
-32	NIPPLE, ALB 3/8-24 LH thread……	1	30978	890686
-33	NIPPLE, Strut Inlet 1/8 inch NPSM…….……..	1	30978	796065
-34	NIPPLE, 3/8 inch hose stem……...	1	30978	890691
-35	NIPPLE, 3/8 inch (9.5 mm) hose, locking……..	1	30978	890672
-36	NIPPLE, 3/8 inch hose stem with ferrule……	1	30978	890691 & 90624

Figure and Index Number	Description	Quantity	CAGE	Part Number
	ADAPTERS AND AIR FITINGS (Continued)			
-37	PROTECTOR, Nipple……	1	30978	890695
-38	PROTECTOR, Nipple G2……...	1	30978	890709T
-39	COUPLING, 1/4 inch NPTF……...	1	30978	890711
-40	COUPLING, 1/4 inch NPTM……	1	30978	890712
-41	COUPLING, 1/4 inch NPSM open…….	1	30978	890703
-42	COUPLING, 1/4 inch NPTM open…….	1	30978	890704
-43	COUPLING, 1/4 inch NPSM with O-ring……..	1	30978	890721A
-44	COUPLING, 3/8 inch NPTF……...	1	30978	890716
-45	COUPLING, 3/8 inch NPTM……	1	30978	890714
-46	COUPLING, 3/8 inch hose stem with ferrule…….	1	30978	890700
-47	COUPLING, 3/8 inch hose stem…….	1	30978	890700A
-48	COUPLING, 1/2 inch NPTF……...	1	30978	890720
-49	COUPLING, 1/2 inch NPTM……	1	30978	890710
-50	FITTING, 3/8 inch (9.5 mm) hose x 3/8 in. (9.5 mm) hose splice.	1	30978	890673
-51	FITTING, 3/8 in. (9.5 mm) hose x 1/4 in. NPTF……	1	30978	890675
-52	FITTING, 3/8 inch (9.5 mm) hose x 1/4 in. NPTM……	1	30978	890674
-53	FERRULE, for 3/8" hose stem……	1	30978	890624
-54	NIPPLE, Double male…….	1	30978	890730

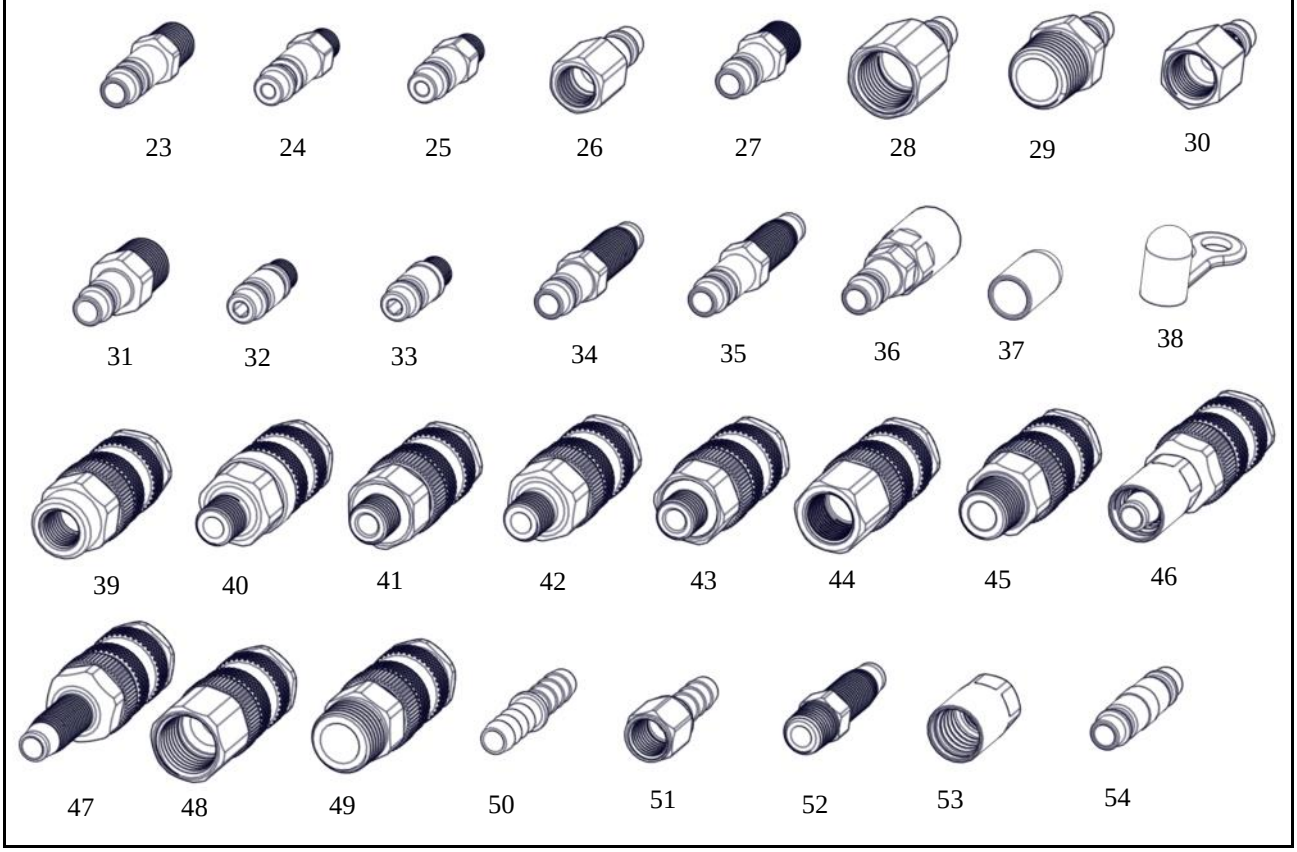


Figure and Index Number	Description	Quantity	CAGE	Part Number
	ADAPTERS AND AIR FITINGS (Continued)			
-55	NIPPLE, Industrial double male with valve……..……	1	30978	890732
-56	NIPPLE, Male and locking tire chuck…….……....	1	30978	890731
-57	NIPPLE AND GLAD HAND…….	1	30978	890734
-58	Y, With two 1/4 inch NPTM couplings……..	1	30978	890735
-59	Y, With two 1/4 inch NPTM couplings and MAXIFORCE nipple	1	30978	890736
-60	Y, with three couplings……...	1	30978	890740
-61	NIPPLE, Male and tire valve inflator…….	1	30978	890737
-62	NIPPLE, Male and 12 inch (30.5 cm) hose and clamp……...	1	30978	890738
-63	NIPPLE, With industrial twist lock and valve……	1	30978	890749
-64	COUPLING, Industrial, 1/4 inch NPTF…….	1	30978	890751
-65	COUPLING, Industrial, 1/4 inch NPTM……	1	30978	890752
-66	NIPPLE, Industrial, 1/8 inch NPTM……..	1	30978	890760
-67	NIPPLE, Industrial, 1/4 inch NPTM……..	1	30978	890761
-68	NIPPLE, Industrial, 3/8 inch NPTM……..	1	30978	890762
-69	NIPPLE, Industrial, 1/4 inch NPTF……	1	30978	890763
-70	ADAPTER, CGA-346 high pressure air and CGA-580 nitrogen..	1	30978	895380
-71	CONNECTOR, Dual tank, with check valves, CGA-346/347…..	1	30978	800130
-72	CONNECTOR, Dual tank, with check valves, DIN fittings……..	1	30978	800135

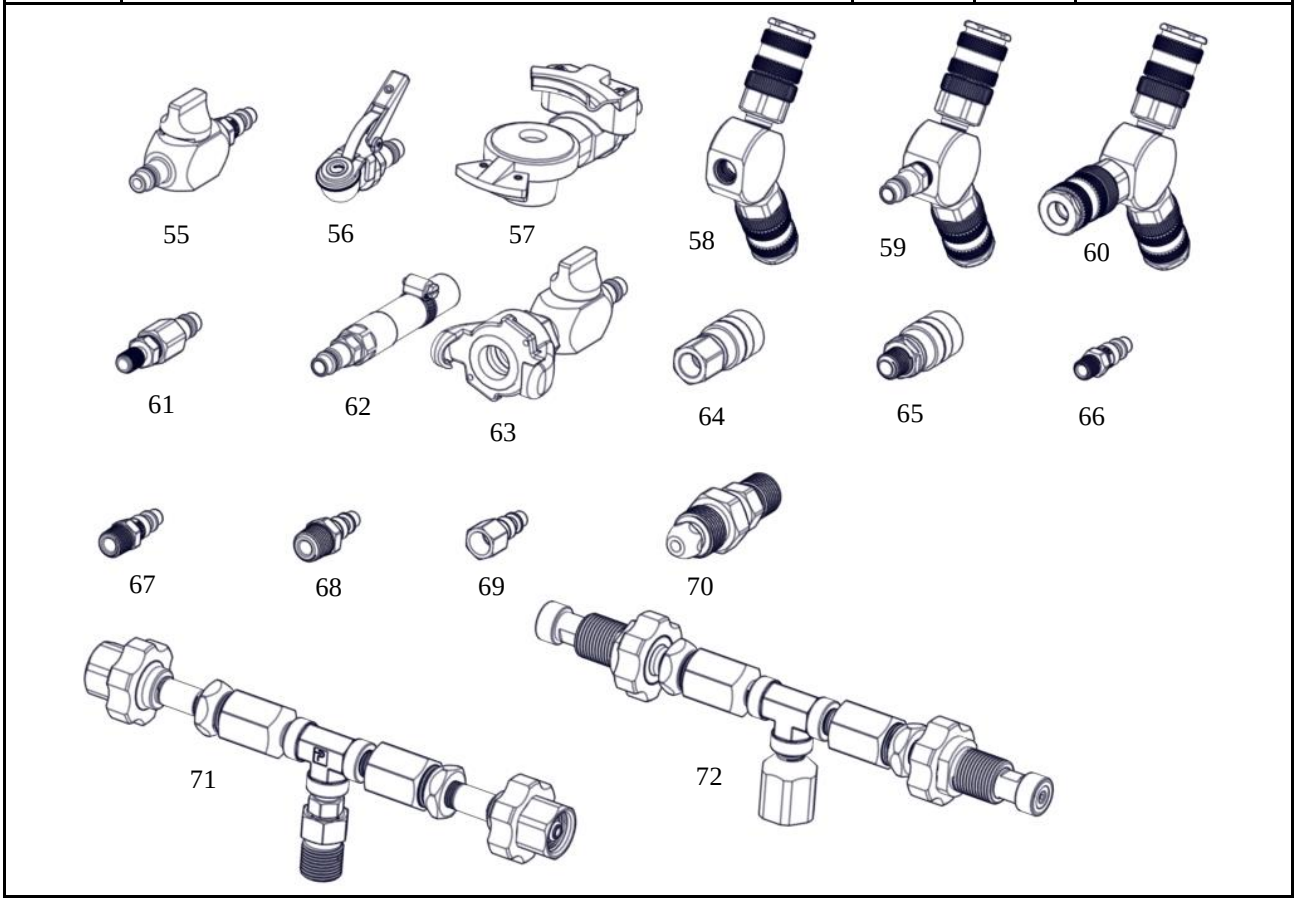
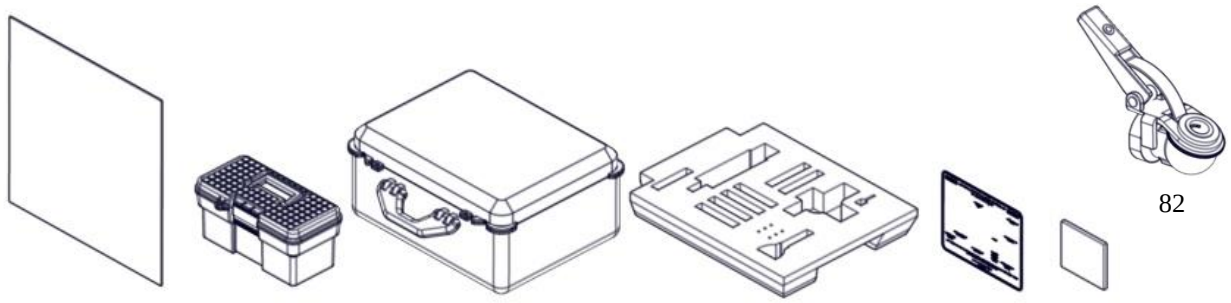
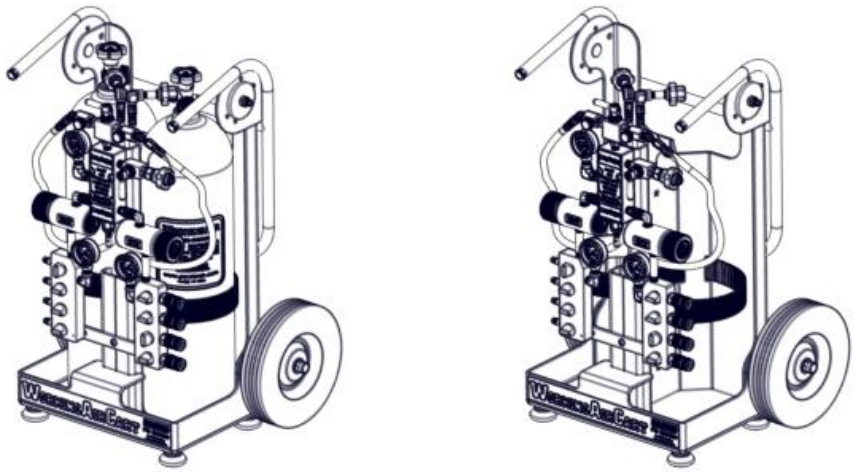


Figure and Index Number	Description	Quantity	CAGE	Part Number
	MISCELLANEOUS			
4-2-76	SHEET, Neoprene, 20 in. (508 cm) x 20in. (50.8 cm)…….. x 1/8 in (0.32 cm)	1	30978	890466
-77	STORAGE CASE, 13 x 6 x 4.75 in. (33 x 15.2 x 12.1 cm)……..	1	30978	000905
-78	STORAGE CASE, CUSTOM U.S., master control package…… Exterior = 24.83 x 19.69 x 11.88 in. (63.07 x 50.01 x 30.18 cm)	1	30978	890337
-79	150 PSI MASTER CONTOL KIT G2 INSERT……..	1	30978	890324
-80	LABEL, 150 PSI VIEW PARTS G2…….	1	30978	890150G2L
-80	LABEL, 10 BAR VIEW PARTS G2 DIN……	1	30978	890150G2DL
-81	DVD VIDEO, MAXIFORCE TRAINING……...	1	30978	890000
-82	TIRE CHUCK, Locking 1/4 NPTF……...	1	30978	890750



76 77 78 79 80 81 82

	WORKING AIR CART			
-83	WORKING AIR CART, U.S……	1	30978	800200
-83	WORKING AIR CART, Metric……	1	30978	800200D
-84	WORKING AIR CART, U.S. (without cylinders)……	1	30978	800201
-84	WORKING AIR CART, Metric (without cylinders)……	1	30978	800201D



83 84

Figure and Index Number	Description	Quantity	CAGE	Part Number
	CONTROL PACKAGES			
	CONTROL KIT, U.S. (consists of 1 of each item number: 3, 6,…… 7 [16 ft black], 7 [16 ft yellow], 7 [16 ft red])	1	30978	890351G2-150
	CONTROL KIT, Metric (consists of 1 of each item number: 4, 6,… 7 [16 ft black], 7 [16 ft yellow], 7 [16 ft red])	1	30978	890351G2D-10
	VEHICLE MAINTENANCE KIT, (consist 1 of each item number: 6, 7 [16 ft black], 7 [16 ft yellow], 7 [16 ft red]; 2 each of index number: 19, 22)	1	30978	889360G2-150
	MASTER CONTROL KIT, U.S. (consists of 1 each of index…….. number: 3, 6, 7 [16 ft black], 7 [16 ft blue], 7 [16 ft yellow], 7 [16 ft red], 7 [16 ft green], 55, 56, 63, 78, 79, 80; 2 each of index number: 26, 59; 4 each of index number: 22, 32)	1	30978	890300G2-150
	MASTER CONTROL KIT, Metric (consists of 1 each of index…… number: 4, 6, 7 [16 ft black], 7 [16 ft blue], 7 [16 ft yellow], 7 [16 ft red], 7 [16 ft green], 55, 56, 63, 78, 79, 80; 2 each of index number: 26, 59; 4 each of index number: 22, 32)	1	30978	890300G2D-10
	US&R LIFT BAG KITS			
	US&R LIFT BAG KIT, (consists of 1 each of index number: 3, 6,... 7 [16 ft black], 7 [16 ft blue], 7 [16 ft yellow], 7 [16 ft red], 7 [16 ft green], 14, 16, 18, 19, 55, 56, 63, 78, 79, 80; 2 each of index number: 8, 9, 10, 13, 21, 26, 59; 4 each of index number: 32; 14 each of index number: 22)	1	30978	889351G2-150
	US&R LIFT BAG KIT, (consists of 2 each of index number: 3, 6,... 7 [16 ft black], 7 [16 ft blue], 7 [16 ft yellow], 7 [16 ft red], 7 [16 ft green], 14, 16, 18, 19, 55, 56, 63, 73, 79, 80; 4 each of index number: 8, 9, 10, 13, 21, 26, 59; 8 each of index number: 32;28 each of index number: 22)	1	30978	889350G2-150
	PNEUMATIC COMPONENTS AND ADAPTER KIT			
	PNEUMATIC COMPONENTS AND ADAPTER KIT……. (consists of 1 each of index numbers: 25, 26, 27 28, 29, 34, 39 43, 47, 48, 49, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63 77; and 2 each of item number: 53)	1	30978	890729

4-5 EXPLODED ASSEMBLIES

The following figures illustrate the various components of the two controllers and one pressure regulator used with the MAXIFORCE® Air Lifting Bag System. They are accompanied by their parts lists for easy identification and individual components.

Any repairs of these assemblies should be performed according to the specifications documented in their own Operation and Maintenance Manuals obtained from Paratech Incorporated, 1025 Lambrecht Road, Frankfort Illinois, 60423-7000 U.S.A.

4-5.1 **SINGLE 150 PSI ALB CONTROLLER G2**

Item Number	Description	Quantity	CAGE	Part Number
1	BODY, SINGLE CONTR G2, BLACK…….	1	30978	796106B
2	STEM BODY LONG, DEADMAN……...	1	30978	890918
3	STEM VALVE, DEADMAN……	2	30978	890919
4	O-RING AS-011 (5/16X.070) BN70…….	2	30978	550170
5	TETRASEAL .301X.066WX.134LG……	2	30978	890940
6	SPRING, BUTTON C0600-063-1250S…….	2	30978	890923
7	SCR 6-32 PHI FLAT HD 1/2"LG SS……	2	30978	890930
8	LABELS: UP&DOWN PUSH BUTT SET……...	1	30978	890934
9	STEM BODY SHORT, DEADMAN……	1	30978	890917
10	O-RING AS-016 5/8X.070 BN 70……	1	30978	890946
11	PLUG……..	1	30978	890945
12	SPRING SEAT FOR CONTROLLER……...	1	30978	890955
13	SPRING .360 OD X .026X 1"LG SS…….	1	30978	796257
14	BALL 3/8 RIGID HDPE……	1	30978	15795
15	GAUGE 1.5” 150PSI 1/8 BACK MT……	1	30978	890605
16	GAUGE GUARD, SINGLE CONTR. G2, YELLOW……..	1	30978	890936Y
17	LABEL ……..	1	30978	150PSI
18	CPLG 1/4-20 NPS M (W O-RING)……..	2	30978	890703
19	SCR 1/4-20 X 1.75 SHD CAP SS……..	1	30978	670561
20	BLIND BUTTON……..…	2	30978	890911
21	ROCKER ARM, YELLOW……...	1	30978	890916Y
22	POST FOR ROCKER ARM……..	1	30978	890914
23	1/4-20 X 1/2” SHD CAP SCR SS……..	1	30978	670568
24	VENT RELIEF VALVE 155 PSI……...	1	30978	890588
25	PROTECTOR CAP FOR SAFETY VALVE……	1	30978	890938
26	LABEL, SINGLE ALB CONTR. G2 150PSI……	1	30978	890860G2L
27	SCREW SHAFT FOR ROCKER……...	1	30978	890913
28	CURVED DISC SPRING……..	1	30978	890915

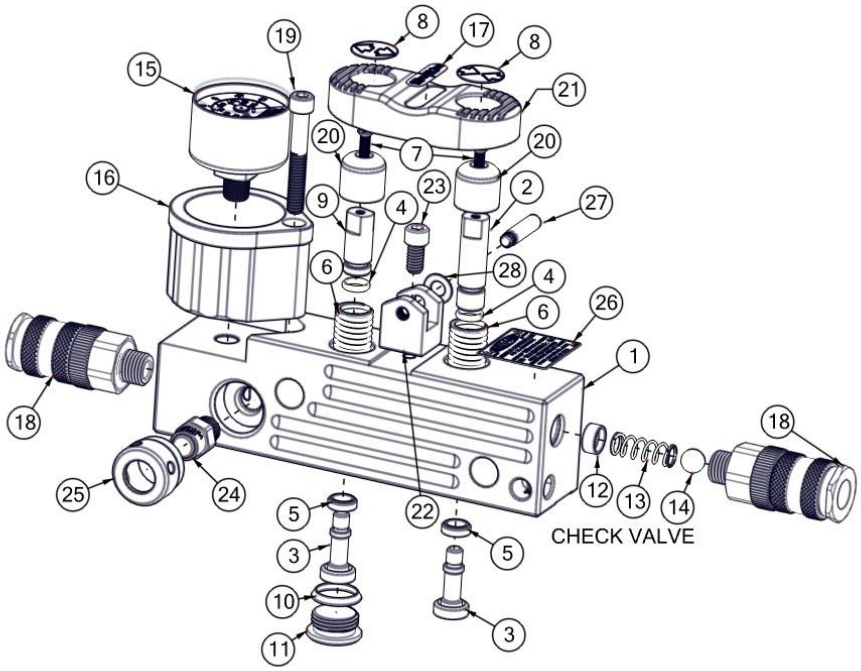


Figure 4-1. Single 150 psi ALB Controller G2

4-5.2 **DUAL "DEADMAN" 150 PSI ALB CONTROLLER G2**

Item Number	Description	Quantity	CAGE	Part Number
1	BODY DUAL DEADMAN ROCKER, BLK……	1	30978	890902
2	STEM BODY LONG, DEADMAN……..	2	30978	890918
3	STEM VALVE, DEADMAN……	4	30978	890919
4	O-RING AS-011 (5/16X.070) BN70…….	4	30978	550170
5	TETRASEAL .301X.066WX.134LG……	4	30978	890940
6	SPRING, BUTTON C0600-063-1250S…….	4	30978	890923
7	SCR 6-32 PHI FLAT HD 1/2"LG SS……	4	30978	890930
8	LABELS: UP&DOWN PUSH BUTT SET……...	2	30978	890934
9	STEM BODY SHORT, DEADMAN……	2	30978	890917
10	O-RING AS-016 5/8X.070 BN 70……	2	30978	890946
11	PLUG……..	2	30978	890945
12	SPRING SEAT FOR CHECK VALVE…….	1	30978	890955
13	SPRING .360 OD X .026X 1"LG SS…….	1	30978	796257
14	BALL 3/8 RIGID HDPE……	1	30978	15795
15	GAUGE 1.5" 150 PSI 1/8 BACK MT……..……	2	30978	890605
16	DOUBLE GAUGE SHROUD, YELLOW……	1	30978	890922Y
17	LABEL 150 PSI…….	2	30978	150PSI
18	CPLG 1/4-20 NPS M (W O-RING)……...	3	30978	890703
19	SCR 1/4-20 X 1.75 SHD CAP SS……..	1	30978	670561
20	BLIND BUTTON……...	4	30978	890911
21	ROCKER ARM, YELLOW……...	2	30978	890916Y
22	POST FOR ROCKER ARM…….	2	30978	890914
23	1/4-20 X 1/2" SHD CAP SCR SS……..	2	30978	670568
24	VENT RELIEF VALVE 155 PSI……..	2	30978	890588
25	PLATE, GAUGE BOTTOM……..	2	30978	890922A
26	LABEL, DUAL DEADMAN G2 150PSI……..	1	30978	890870G2L
27	SCREW SHAFT FOR ROCKER……...	2	30978	890913
28	CURVED DISC SPRING……..	2	30978	890915

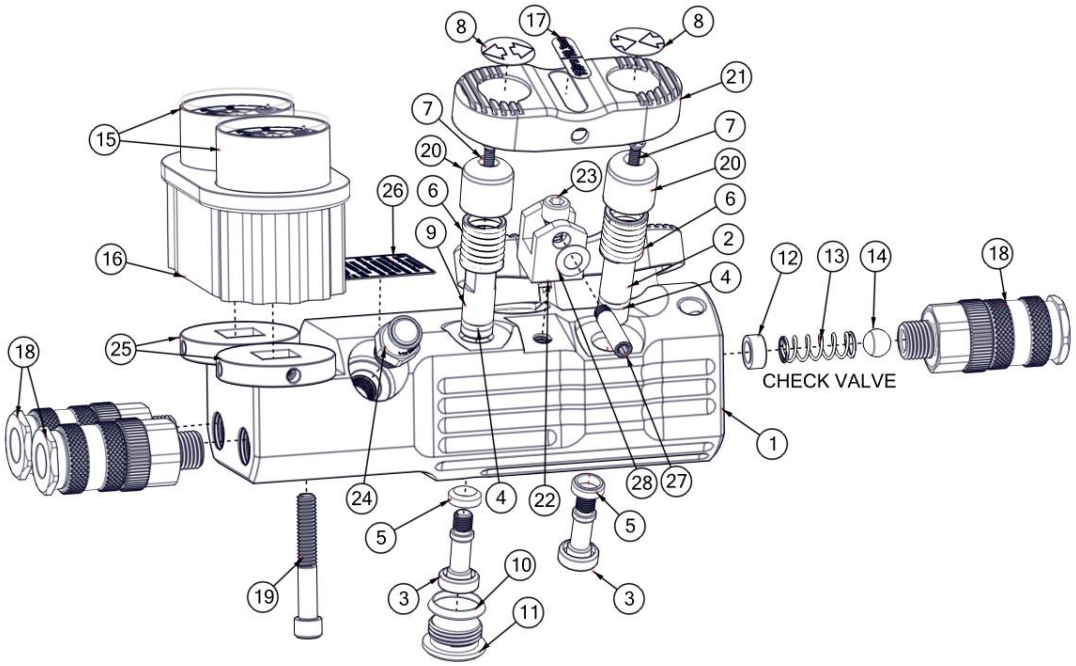


Figure 4-2. Dual "Deadman" 150 psi ALB Controller G2

4-5.3 **G2 PRESSURE REGULATOR**

Item Number	Description	Quantity	CAGE	Part Number
1	HOUSING FOR 895401G2……..	1	30978	895403
1	HOUSING FOR 895400G2……..	1	30978	895404
2	VENT RELIEF VALVE 200 PSI……..	1	30978	890220
2	VENT RELIEF VALVE 300 PSI……..	1	30978	890589
3	GAUGE 1.5” 400 PSI 1/8 BACK MT……..	1	30978	890594
4	GAUGE 1.5” 6000 PSI 1/8 BACK MT…….	1	30978	890596
5	GAUGE SHROUD FOR G2 REG…….	1	30978	89890922R
6	1/4-20 SOC HD CAP SCR 1” SS……..	1	30978	670534
7	CARTRIDGE ASSEMBLY:……	1	30978	895408
8	END CAP, CARTRIDGE……..	1	30978	895416
9	BALL 5/32 440-C SS GRADE 24…….	1	30978	891135
10	SPRING, NEEDLE VALVE……..	1	30978	895222
11	FILTER, SINTER. FOR REGULATOR……...	1	30978	895415
12	SPACER FOR CARTRIDGE……	1	30978	895414
13	SEAT, MAIN, CARTR. REGULATOR……	1	30978	895412
14	O-RING AS-010 (1/4 X.070) NB90……..	1	30978	895513
15	NEEDLE, MAIN REG VALVE, CARTR……	1	30978	895411
16	O-RING AS-015 (9/16 X.070) 90BN……	1	30978	890252
17	CARTRIDGE HOUSING, REGULATOR……	1	30978	895413
18	SEAT, VENT…….	1	30978	895418
19	O-RING AS-010 (1/4 X.070) BN90……..	1	30978	895513
20	O-RING AS-121 (1-1/16 X.103) BN70…….	1	30978	895247
21	PISTON, VENT REG……	1	30978	895417
22	DISC SPRING 20mm X 10.2 X .9mm……..	17	30978	895272
23	PIN – 20mm DISC GUIDE……	1	30978	895322
24	REAR CAP FOR DISC REG W/KNOB……...	1	30978	895344
25	KNOB FOR REGULATOR……...	1	30978	895345
26	LABEL, PRESSURE ADJUSTM. STRIP……	1	30978	895313
27	SCREW, PRESS ADJ. KNOB, REG……	1	30978	895326
28	LABEL 1.5” DIA FOR REG. KNOB……	1	30978	895311
29	SET SCR #10-24 X 1/2” LG CUP SS……	1	30978	895291
30	SPRING PIN 3/32 X 5/16 SS…….	1	30978	890935
31	VALVE KNOB 90 DEG FOR G2 REG……	1	30978	890334
32	O-RING AS-013 (7/16 X.070) BN70……	2	30978	550174
33	O-RING 5/16 X.070 POLYURETH. 90……	2	30978	890489
34	LEVER ……..	1	30978	796253
35	RET. RING EXT BASIC 9/16” SHAFT……	1	30978	890487
36	RND LABEL OFF, RED……...	1	30978	LBLOFF
37	RND LABEL ON, GREEN……	1	30978	LBLON
38	LABEL FOR 895401G2 REG……...	1	30978	895401G2L
38	LABEL FOR 895401DG2 REG…….	1	30978	895401DG2L
38	LABEL FOR 895400G2 REG……...	1	30978	895400G2L
38	LABEL FOR 895400DG2 REG…….	1	30978	895400DG2L
39	NIPPLE FOR 895401G2 REG…..……	1	30978	890681
39	CPLG FOR 895400G2 REG……..	1	30978	890704
40	NIPPLE 5500 PSI (379 BAR) CGA……..	1	30978	895351
40	NIPPLE – DIN……...	1	30978	895367
41	O-RING ¼ X.070 POLYURETHANE 90…….	1	30978	550195
41	O-RING AS-111 (7/16 X.103) BN70……	1	30978	891154
42	HAND-TIGHT NUT CGA 347/346……..	1	30978	895356
42	HAND NUT ASSY – DIN…….	1	30978	895364

4-5.3 **G2 PRESSURE REGULATOR (Continued)**

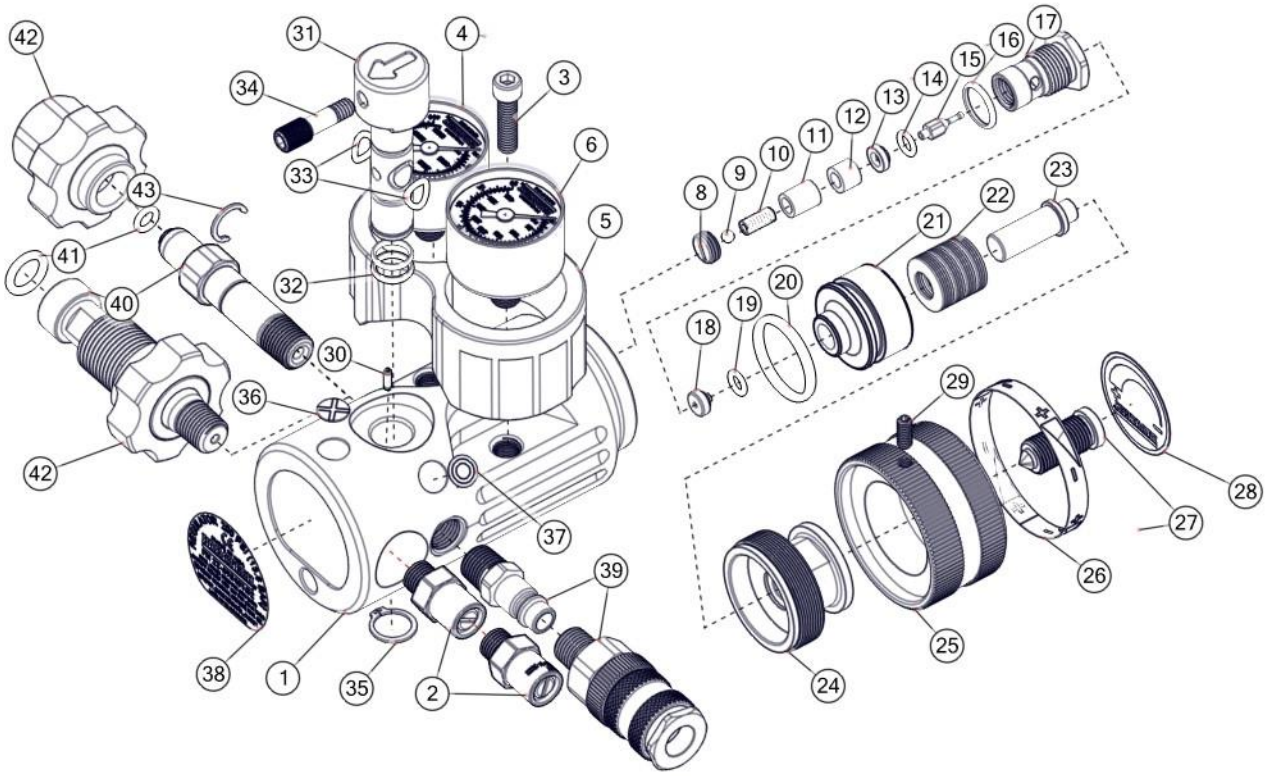


Figure 4-3. G2 Pressure Regulator

MAXIFORCE G2 WARRANTY

Each **MAXIFORCE G2** or component thereof, manufactured by Paratech Incorporated, has been thoroughly inspected and properly adjusted before shipment to insure the highest quality and the greatest possible reliability.

Paratech Incorporated (hereinafter referred to as "Seller") hereby warrants the **MAXIFORCE G2** or component thereof to the original retail buyer only against defects in material and workmanship under normal use and service for a period of 3-years from the date of purchase. This warranty shall constitute the sole warranty of the Seller with respect to the **MAXIFORCE G2** or component thereof. **THE SELLER HEREBY DISCLAIMS AND EXCLUDES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** The Seller neither assumes nor authorizes any other person to assume for it any other obligations or liabilities in connection with the sale or use of this product.

Should there be any defects in the material or workmanship of the **MAXIFORCE G2**, buyer should return the defective product to the factory for inspection with shipping prepaid, within 3-years of the date of purchase, and a copy of original receipt. If inspection shows that the **MAXIFORCE G2** or a component thereof is defective and that such defects were not caused by negligence, misuse, accident or unauthorized service, the product sold hereunder will be repaired or replaced at the option of the Seller, without charge, FOB at the factory, Frankfort, Illinois.

THIS REMEDY SHALL BE THE EXCLUSIVE REMEDY FOR BREACH OF WARRANTY WITH RESPECT TO THE MAXIFORCE G2 OR COMPONENTS THEREOF. THE SELLER SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY WITH RESPECT TO THE MAXIFORCE G2 AND COMPONENTS THEREOF FROM ANY DELAY IN THE PERFORMANCE OF THE REMEDY HEREUNDER.

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