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**MAXI-FORCE AIR BAG SYSTEM**

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## MAXI-FORCE AIR BAG SYSTEM

### General

The Maxi-Force Air Bag System is an air operated lifting tool used to assist in the physical rescue of victims in a variety of situations.

### I. COMPONENTS

The standard Maxi-Force Air Bag system in use by the Los Angeles City Fire Department is comprised of the following (Photo 1):

- A. One dual "dead man" safety relief and control valve
- B. One high pressure regulator
- C. Three in line safety relief valves
- D. Four air hoses (red, yellow, green and blue)
- E. Three air lifting bags (2 - 22 ton, 1 - 12 ton)
- F. One air supply adapter
- G. Cribbing

#### A. Dual "Dead Man" Safety Relief and Control Valve (Photo 2)

Pre-set at the factory at 118 psi. This valve will allow 118 psi working pressure for maximum inflation of the air bags. If the inflation button is held until pressure within the valve exceeds 118 psi, the relief valve will activate.

#### B. High Pressure Regulator (Photo 3 & 4)

This regulator is attached to a standard 30 or 60 minute SCBA bottle. (Both bottles have a working pressure of 4500 psi.) Adjust pressure between 125-135 psi, to provide 118 psi working pressure at the dual safety relief and control valve. When attaching to the SCBA bottle, the last 1/4 turn should be accomplished by turning both the threaded inlet fitting and regulator together until hand tight.

PHOTO 1 - Standard Maxi-Force Air Bag System

**NO PHOTO**

PHOTO 2 - Dual "Dead Man" Safety Relief Control Valve

**NO PHOTO**

PHOTO 3 AND 4

High Pressure Regulator

**NO PHOTO'S**

C. In-Line Safety Relief Valve (Photo 5)

These relief valves allow the air bags to remain inflated after the dual "dead man" safety relief and control valve is disconnected. Safety relief valves will:

1. Relieve if pressure exceeds 135 psi. This will protect air bags against over inflation.
2. The operator can use more than two bags with one dual safety relief and control valve. The in-line relief valve can be closed and the dual control valve disconnected without a loss of air through the hose lines.

D. Air Hoses

The air hoses are different colors for identification purposes. By connecting different colored hoses to each bag, the operator can eliminate confusion in multiple bag operations.

Each of the air hoses is equipped with a male and female "quick-disconnect" fitting and safety lock ring. (These fittings are made of brass and may crack if the bag rolls onto fitting.) All safety lock rings shall be placed in the locked position when in use. Each hose is 16 feet long, with a working pressure of 250 psi.

E. Air Lifting Bags

Air bags are of similar construction to a modern automotive tubeless tire. Air bags are constructed of neoprene rubber compounds encasing kevlar cords, and are extremely durable and resistant to damage. Each side of the air bag has a non-slip surface marked with an "X" which will help to center the bag under the load.

F. Adapter (Photo 6)

The adapter allows for an auxiliary air source to be used such as:

- Apparatus On-Board Air System
- Portable Air Compressor

NOTE: It can also be used to extend a hose length (i.e., air chisel hose to air bag hose)

PHOTO 5

In-Line Safety Relief Valve

**NO PHOTO**

PHOTO 6

Auxiliary Air Source Adapter

**NO PHOTO**

G.        Cribbing

The cribbing provided should be considered a minimum:

- 4"X6"X2' (4)
- 24"X24" Plywood (2)
- Wedges (4)

It is recommended that companies add additional cribbing to their inventory.

FIGURE #1

Box Cribbing

**NO PHOTO**

FIGURE #2

**NO PHOTO**

II. BASIC OPERATIONS (Figure #3)

A. The following is a common operational sequence using the Los Angeles Fire Department Maxi-Force Air Bag System:

- Connect the high pressure regulator (B) to the air bottle (A). When attaching to the SCBA bottle, the last 1/4 turn should be accomplished by turning both the threaded inlet fitting and regulator together until hand tight.
- Attach hoselines as necessary.
- Be sure high pressure regulator adjustment knob (B) is fully opened,(counterclockwise), close outlet valve.
- Open air cylinder (A) fully but slowly; regulator damage could occur if opened quickly.
- Connect pressure regulator (B) to the dual safety relief and control valve (C).
- Set the pressure regulator adjusting knob (B) at 125-135 psi, open outlet valve.
- Connect the in-line safety relief valve (D) at the dual safety relief and control valve (C).

NOTE: Placing the in-line safety relief valve at the bag should be avoided as this can make connecting and disconnecting the supply hose difficult and dangerous.

- Connect hose between the air bag (E) and the in-line safety relief and control valve (D).
- Open in-line safety relief valve (D).
- Inflate or deflate the bag or bags using the buttons on the dual safety relief and control valve body. Do not inflate the bag over 30 psi without a load.

FIGURE #3

**NO PHOTO**

- B. Single Bag Lift (Photo 7 & 8)- A single bag lift can be accomplished by adhering to the following safety practices:
- Center bag under object to be moved.
  - Inflate bag slowly checking for possible load shift. .
  - Always crib as object is raised (rule of thumb is lift an inch, crib an inch).
  - Gradually remove cribbing as bag is being deflated.
  - Deflate bag slowly.

PHOTO 7 and 8

Single Bag Lift

**NO PHOTO**

- C. Stacked two bag lift (Photo 9 & 10) - A stacked two bag lift can be accomplished by adhering to the following safety practices:
- The larger bag shall always be on the bottom.
  - Stacked bags must be centered under the object to be moved.
  - Air hoses should be connected to the bags so that the connection points are facing different directions. This will prevent air hoses from getting tangled and eliminate confusing supply lines.
  - Inflate one bag at a time as follows: Partially inflate bottom bag first, then partially inflate top bag. Alternate this sequence until desired height or safe maximum inflation is achieved.
  - Always add cribbing as object is raised. (Lift an inch crib an inch.)
  - Gradually remove cribbing as bags are being deflated
  - To deflate the bags, first partially deflate the top bag then partially deflate the lower bag, continue this sequence until operation is complete.
- D. Side By Side Two Bag Lift
- Inflate one bag at a time as follows:  
  
Partially inflate one bag then, partially inflate second bag. Alternate this sequence until desired height or safe maximum inflation is achieved.
  - Always add cribbing as object is raised. (Lift an inch crib an inch.)
  - Gradually remove cribbing as bags are being deflated.
  - To deflate the bags, first partially deflate one bag then partially deflate the second bag. Continue this sequence until operation is complete.

PHOTO 9 and 10

Stacked Two Bag Lift

**NO PHOTO**

### III. SAFETY CONSIDERATIONS

The following are safety guidelines developed through use of the Maxi-Force Air Bag System:

- Only members involved with the air bag operations should " be in the work area.
- All members in work area shall wear proper protective clothing.
- One member shall be assigned as the safety observer.
- People involved in air bag operations should be alert to unsafe weight shifting.
- Members working in a squatting position should keep their body weight on the balls of their feet for a quick escape.
- Never work under a load supported only by air bags. Loads must be securely cribbed prior to members working under the load.
- Never inflate air bags against sharp objects.
- Never inflate air bags against objects hotter than 220 degree F.
- Place bags in a position to maximize surface area making contact with the object.

Always stabilize the object to be lifted. Remember, for every action there is an equal reaction. Determine which direction this reaction may occur and stabilize the object to prevent unsafe movement.

When stabilizing a vehicle, chock a minimum of one front wheel and one rear wheel on each side.

### IV. MAINTENANCE

Since their introduction, air bags have proven invaluable not only in extrication but in heavy lifting or moving, and shoring. In order for air bag systems to remain in good and safe operating condition a maintenance program is mandatory.

A. Air Bags

- Thoroughly inspect the maxi-force air bag after each use.
- Remove any foreign objects that may be on the bag surface, such as broken glass and debris.
- Wash bag with soap and water. Avoid getting water in the bag. If water does get in, allow bag to dry before next use.
- Small cuts on the neoprene surface can be repaired with rubber cement.
- For larger cuts, holes or abrasions, tag with F-175 and send to Supply and Maintenance for repair or replace.
- Check the nipple on the bag for damage, and insure that it is threaded securely into bag.
- To leak test a bag: Inflate bag to 30 psi. Place inflated bag into water or a soap-solution. If bubbles appear, this indicates a leak. If bag leaks, it must be forwarded to the Supply and Maintenance Division for repair. Disregard bubbles around the bag inlet, it will not affect the safe operation of the bag.

B. Hoses

- Keep the couplings clean and dry.
- Inspect for damage after each use.

C. Dual Safety Relief and Control Valve

- Keep couplings clean and dry.
- If parts are broken or damaged, send to Supply and maintenance for repair.
- Keep safety relief valves free of foreign objects. If a safety relief valve is held open by a foreign object and it is not possible to blow it out by activating the deflating device, then the complete upper part of the valve must be taken off, and the foreign object removed. The upper part of the valve must then be reattached tightly.

D. High Pressure Regulator

- Keep it clean and dry.
- Do not lubricate the high pressure regulator.

V. SPECIFICATIONS

The following specifications are for two sizes of air bags of the Maxi-Force Air Bag System:

1. K-12 (Kevlar) Air Bag

- a. Size: 7/8"X15"X15"
- b. Maximum Lifting Capacity: 12 tons at 118 psi  
NOTE: This maximum lifting capacity is from 0" to 1".  
The higher the lift, the less lifting capacity.
- c. Maximum Lifting Height: 8"
- d. Maximum Air Capacity: 3.0 Cubic Feet of Air
- e. Weight: 6 Pounds
- f. Inflation Time: 3 Seconds
- g. Bag is tested at 236 psi and bust tested at 700 psi.

2. K-22 (Kevlar) Air Bags

- a. Size: 7/8"X20"X20"
- b. Maximum Lifting Capacity: 21.8 Tons at 118 PSI  
NOTE: This maximum lifting capacity is from 0" to 1".  
The higher the lift, the less lifting capacity.
- c. Maximum Lifting Height: 10"
- d. Maximum Air Capacity: 7.3 Cubic Feet of Air
- e. Weight: 12 Pounds
- f. Inflation Time: 7 Seconds
- g. Bags are tested at 236 psi and burst tested at 600 psi.