

Heavy Rescue

Session 4

Air Bags, Air Tools, and Other Lifting Tools




Suffolk County Fire Academy


1

Course Overview

4 Sessions

- **Session 1** – Vehicle Components/Construction, Size-up and Vehicle Stabilization, Basic Extrication Tools, and Extrication
- **Session 2** – Airbags/Vehicle Safety Systems, Other Extrication Tools and Techniques
- **Session 3** – Hybrid/Alternative Fuel Vehicles, Advanced Vehicle Stabilization and Extrication
- **Session 4** – Air Bags, Air Tools, and Other Lifting Tools, Final Exam and Course Evaluation.

**** ALL SESSIONS REQUIRE PPE ****



2

Session Objectives

- Identify the components of rescue air bag systems
- Explain the operational principles and safety considerations of air bag systems
- Define cribbing and the procedures for its use
- Identify other tools that may be useful to lift a vehicle during a “person-under” scenario.
- Identify various pneumatic tools, and their components, used during vehicle extrication
- Explain the procedures for pneumatic tool use during vehicle extrication.

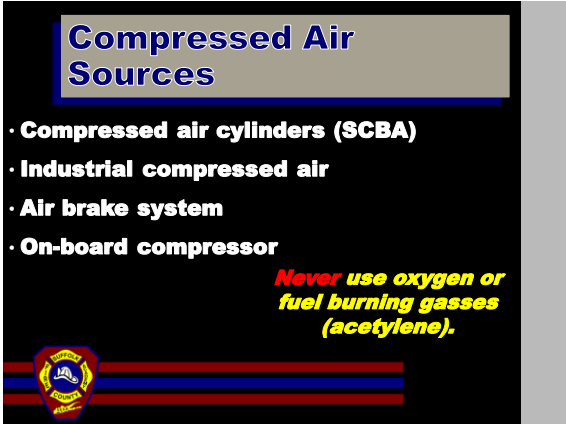
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6

Compressed Air Sources



7

Two-Stage Regulator

- Reduces air pressure from air source to manufacturer's recommended pressure
 - Components:
 - High pressure inlet gauge
 - Low pressure outlet gauge
 - Flow control knob
 - Shut-off
 - Male Hose fitting
- Do not use high pressure (tool/strut) regulator with air bag system.**



8

Two-Stage Regulator



9

High Pressure Hoses

- Vary in length and color
- Use multiple colors to coordinate air bag inflation/deflation.




10

Dead-Man Controller

- Controls air flow from regulator to high pressure air bags
- Components:
 - Up and down buttons
 - Pressure gauges
 - Female hose fitting

Do not use high pressure (tool/strut) controller with air bag system.



11

Dead-Man Controller




G-2



12

High Pressure Air Bags

- Operating pressures from 88 psi to 150 psi
- Lifting from 1.5 tons to 73.4 tons
- Lifting heights from 3" to 20"
- Weights of bags from 2 lbs to 48 lbs
- Constructed of Kevlar

Note: Different manufacturers will have different operating pressures (I.e. Paratech operates at 118 psi, blow-off at 135 psi or 150psi / 165 psi - G2).



13



Paint Lift Height and Tonnage On Face of Each Bag (Both Sides). New Generation Bags Come Pre-labeled.



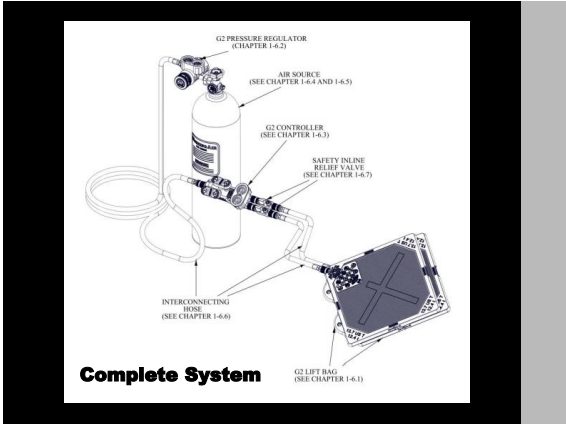
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In-Line Relief Valve

- Protects bags from over inflation
- Allows bags to be inflated and disconnected from system without air loss.



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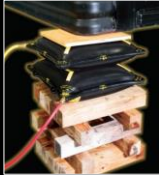
17



18

High Pressure Air Bag Size-up



- 6-sided approach
- What must be moved?
- How heavy is the object
 - Usually not lifting full weight
- Where will it go once it is lifted
- Do we have adequate stabilization equipment
 - Control the lift
 - Padding and cribbing
 - Vehicle stabilization.



19

High Pressure Air Bag Positioning


- Always use 2 air bags
 - Larger bag on bottom
 - Back-up
 - Take-up space
- Fittings outward, opposite, pre-connected
- Center bags to each other and lift
- **Never** place anything between bags.

20

High Pressure Air Bag Operations

- Crib to the lift (lift an inch, crib an inch)
- Inflate bottom bag first
- Inflation / deflation done slowly (controlled)
- Avoid sharp object and high heat contacts
- **Never** stack more than 2 bags
- **Never** inflate to capacity (avoid "pillowing").



21

High Pressure Air Bag Operations

Air Bag Rule of Thumb:

- Can lift the bag's tonnage capacity 1"
- Or**
- Can lift the height of the bag at 1/2 the tonnage capacity.



22

High Pressure Air Bag Personnel Positioning

- One firefighter remote from lift (opposite) to observe
- Check all sides/top as lift progresses
- Only one officer/firefighter calls the lift
- Change air supply at 100 psi
- Deflation (controlled):
 - Deflate top bag first, then bottom bag
 - Bleed excess pressure.



23



Padding

24

Suspension Capture

If lift is not performed on the suspension, it will lower as the vehicle is raised



25


Suspension Capture

By capturing the suspension (ratchet strap, chain), lift is immediately gained



26

Box Cribbing



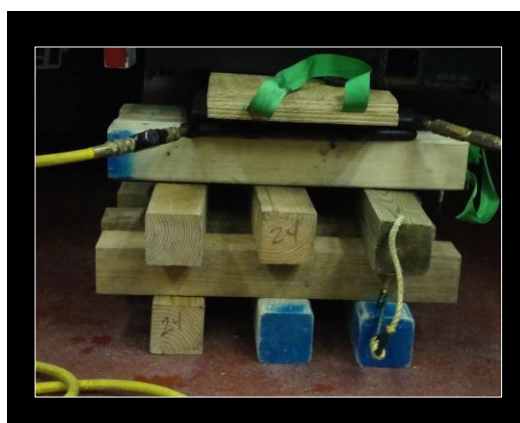
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Box Cribbing

- **Overlap ends by width of material**
- **No more than 3x height to width of box crib**
 - **Ex. 2' long cribbing = 6' max height**
- **4x4 = 6,000 lbs. per contact point**
- **6x6 = 11,000 lbs. per contact point**
- **Center load.**



28



29

Low Pressure Air Bags



30

Low Pressure Air Bags

- **Uses:**
 - MVA's
 - Filling voids (trench operations)
 - Floatation device
 - Industrial lifting applications
- **Lifting heights from 17" to 40"**
- **Lifting weights from 3 tons to 17 tons**
- **Working pressure 7.25 psi**
- **Must be fully inflated.**

31



32



33

Other Lifting Tools



34

Floor Jack

- Depending on incident, may be the quickest method to remove victim




35

Bottle Jack

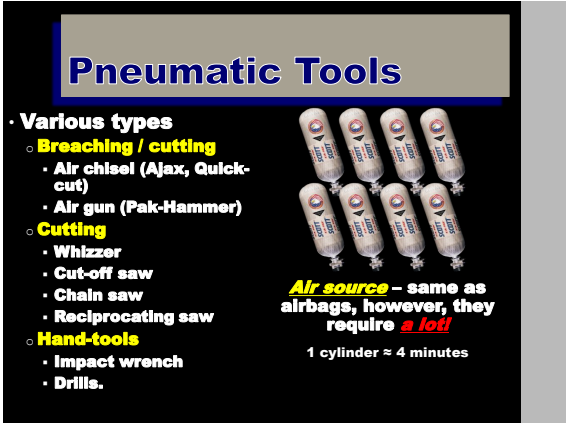
- Smaller profile
- More precise lift.




36



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39

Pneumatic Tool Operation

- Check air source
- Attach two stage regulator to air source
- Confirm air source reading
- Attach hose from regulator to tool
- Set regulator pressure 90 – 120psi depending on tool (Some tools may require higher pressure)
- Insert correct bit/blade (if applicable)
- Keep tool close to work (do not dry fire)
- Check connections during work.



40

Air Chisel

- **Vehicle extrication**
 - Through roof (vehicle on side)
 - Through floor pan (vehicle on side)
 - Vehicle "skin" peel
 - Trunk tunnel
 - Bolt / hinge shear.
- **Operation**
 - Select correct bit for task
 - Start slow to gain purchase
 - Monitor air supply.



Never use on glass

41

Air Chisel





Works well in conjunction with Sawzall


42

Whizzer

- Adapted for fire department use
- Abrasive cutting blade (approx. 3")
- Operating pressure at 90 psi
- Begin with low rpm then increase speed
- Produces heat and sparks.



Consider the use of in-line relief valve to better control speed.



43

Summary



44

Summary

- High pressure air bag systems consist of:
 - Air source
 - Regulator
 - Air hose
 - Controller
 - Air bags
- Must have adequate stabilization equipment before we begin a lift (cribbing)
- Always use two bags, centered to each other and the lift (larger bag on bottom).


45

Summary (Cont'd)

- **Crib to the lift (lift an inch, crib an inch)**
- **Never place anything between the bags or stack more than two bags**
- **Overlap box cribbing the width of the material**
- **Consider other lifting tools (floor jack, bottle jack)**
- **Pneumatic tools require a large supply of air.**

46

Questions



47