



WHERE TECHNOLOGY » *TAKES FLIGHT*

Special Operations Long Range (SOLR) Oxygen System



Prepared by:

SOLR Products



SOLR OXCON3000



SOLR ISO PRE BREATHING

Pre-Breathing Solutions

Filling Solutions



SOLR OXYGEN BOOSTER PUMP

SOLR Products



SOLR3000 BAILOUT BOTTLE



SOLR ISO 4500 BAILOUT BOTTLE

Bailout Bottles

MASKS



SOLR MASK, 100% O2

SOLR Products

Testing Equipment



SOLR PORTABLE TEST STAND

The Need for Oxygen

The lower density of oxygen at high altitude causes several physiological problems, including:

Hypoxia: *State of oxygen deficiency in blood cells and tissues*

Blurred vision, tunnel vision, fatigue, headache, nausea, apprehension, etc.

Hyperventilation: *Rate and depth of respiration is abnormally altered*

Usually in response to fear or anxiety/stress. Causes Dizziness and Hypoxia to the brain, can lead to muscle tightening (does not occur with hypoxia) and pain

Decompression Sickness (DCS): *Caused by reduction of environmental pressure sufficient to cause the formation of nitrogen bubbles in body tissues*

Factors include rate of ascent, altitude, duration amongst others. Consequence is Joint Pain or Bends (Type I DCS) or Neurological or Cardio-Pulmonary Symptoms (Type II DCS)

Trapped Gas: *Gas trapped in the body causing discomfort*

Gastrointestinal tract, ears, sinuses, teeth

Prevention

We can reduce the risks that parachutist are exposed to hypoxia by:

Correctly maintaining equipment

Following set procedures

- In the US compliance with Air Force Manual 11-409 is mandatory

De-nitrogenation (Pre-Breathing)

- 30 Minutes of pre-Breath time purges approximately 40% Nitrogen (N₂) from the body
- 60 minutes will purge 60% of N₂

Cabin Pressurization



SOLR History & Development

Oxygen Systems

Our product line is the SOLR (Special Operations Long Range) which includes:

- Oxygen Masks
- Individual bailout bottles of multiple sizes
- Individual or collective Pre-Breather equipment
- Support equipment (booster pumps, test stand etc.)

Airborne Systems can provide

- Complete training for O2 Technicians & Operators
- On-site customer support available
- Equipment overhaul & repair



SOLR Development

Why did we develop the SOLR?

Desire for lighter-weight systems (legacy cylinders are steel vs. current aluminum)

Need for longer-duration systems (higher pressures)

Simplified and rapid setup in the cargo area

Benefits of in-house collaboration with parachute R&D team

True Leap Ahead – This is Airborne Systems business model

Our O2 Manufacturing and Service Facility

Included in our O2 suite, is an ISO Class 7 cleanroom. This cleanroom is held to the same standard found at many medical device and pharmaceutical plants. This provides a clean environment to assemble our systems and limit debris and dust from entering the systems

FACILITY DESIGN AND OPERATION

- HEPA-filtered air

- Controlled Airflow and Pressures

- Laboratory Equipment for process validation and verification

- Oxygen cleaning capabilities

- Cleanroom is third-party validated to ensure compliance with ISO standards

- Personnel are highly trained and experienced

- All work is accomplished in a controlled area

The Room!





SOLR Equipment Overview

SOLR Oxygen Mask

FUNCTIONS:

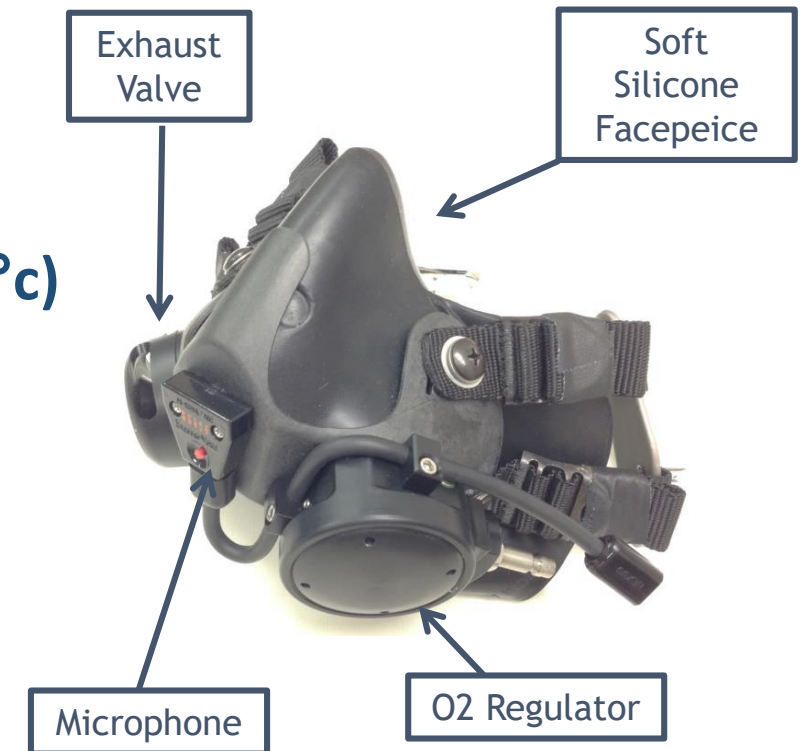
Physiological Protection at High Altitudes against hypoxia

SOLR Oxygen Mask



SOLR Oxygen Mask

- Lightweight and comfortable
- Simple design – On demand - No dilution - 100% O₂
- Anti-Suffocation valve
- For use up to 35,000 ft. MSL (10,668m)
- Operating temperature range -65°F to 160°F (-54 to 71°C)
- Compatible with SOLR / PHAOS Bailout Bottles
- 5 sizes (XSN to LW)
- Easy maintenance



SOLR Bailout Bottle's

FUNCTIONS:

- Provides an autonomous source of oxygen to the jumper after exit from the aircraft

Bailout Bottles
available in different sizes
and pressures



SOLR-3000 Bailout Bottle



- Bottle: 122 cu.in (2 liters) at 3,000 psi (207 bar)
- Composite (aluminum liner/ carbon fiber wrapping)
- DOT certified
- Service pressure 45 ± 5 psi
- Weight empty 5.5 lbs. (2.5 kg)
- Altitude Range – up to 35,000 ft. MSL (10668m)
- Operating temperature range -65°F to 160°F (-54 to 71°C)
- Service intervals: Inspection @30 months / overhaul @60 months
- Universal compatibility (PHAOS / POM masks & oxygen consoles in service)

SOLR ISO 4500 Bailout Bottle

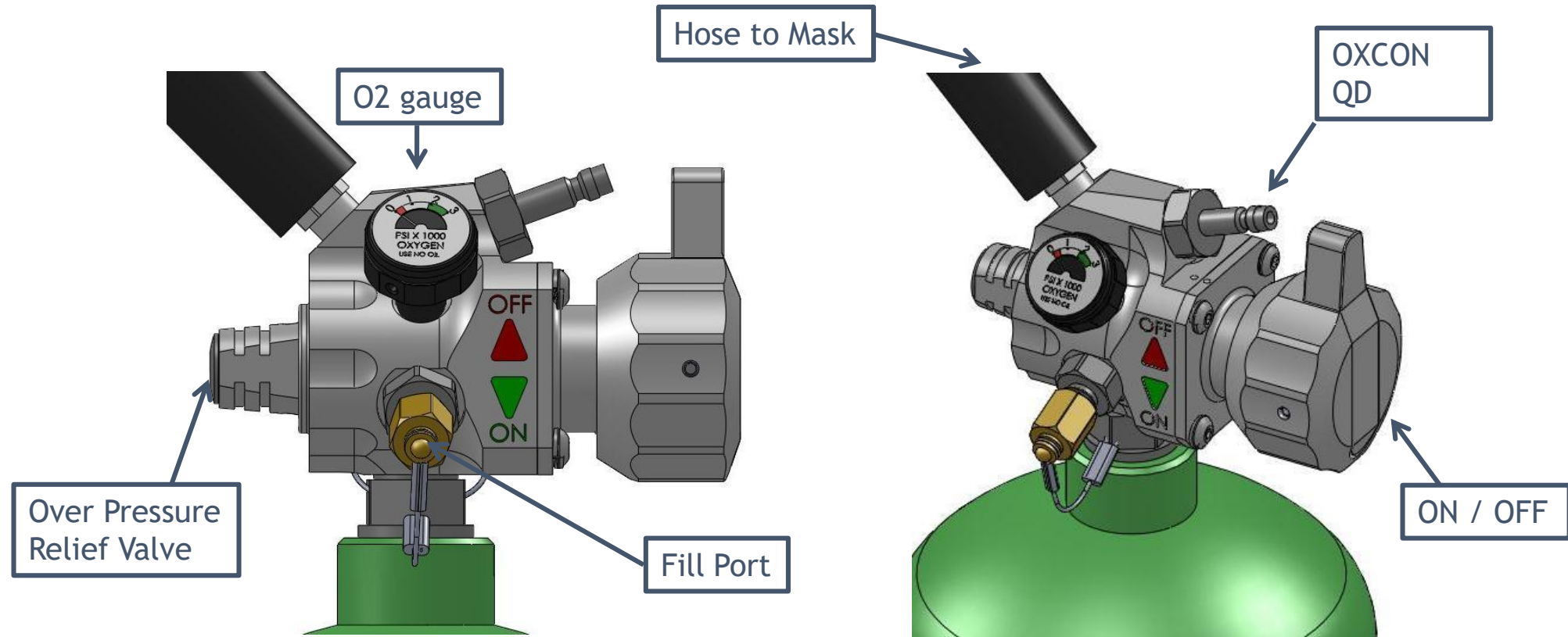
Same manifold as SOLR3000, ISO 11119-2 certified cylinder, same service intervals, altitude and temperature ranges as the other SOLR Bailout Bottles

- Bottle: 122 cu.in (2L) at 4,500 psi (310 bar)
- ISO 11119-2 certificate notated on cylinder



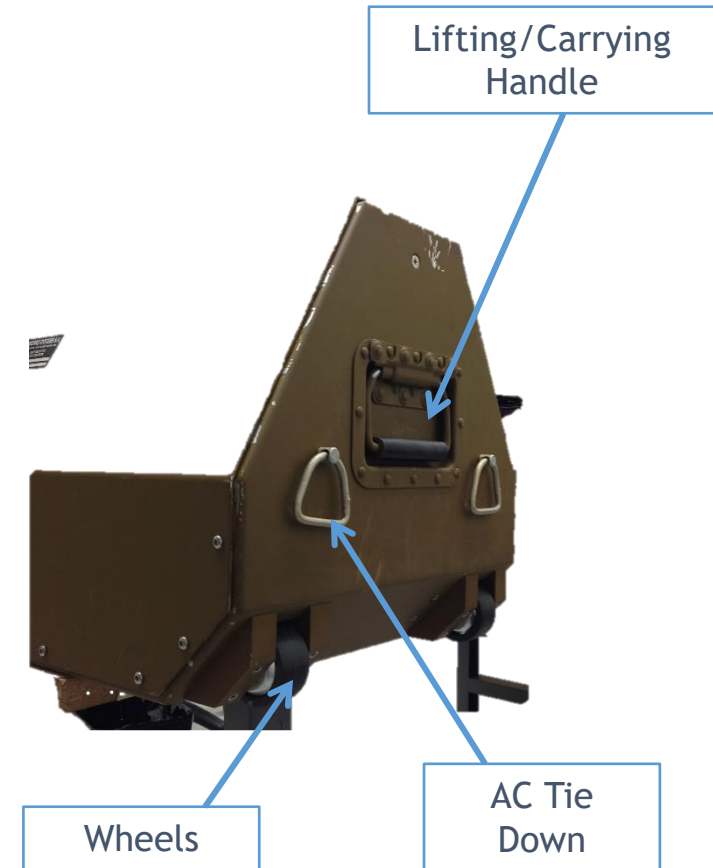
SOLR Manifold

All Bailout Bottles share the same Manifold (only difference is the pressure gauge)



OXCON 3000 Oxygen Console

- 8 Connection points
 - Expansion kit available, connect up to 12 jumpers
- 3 High Pressure O2 cylinder. 2700 cu.in. (44L) total, 3000 PSI.
- Rugged construction
- Gauges and in-line flow blinkers



OXCON Oxygen Console

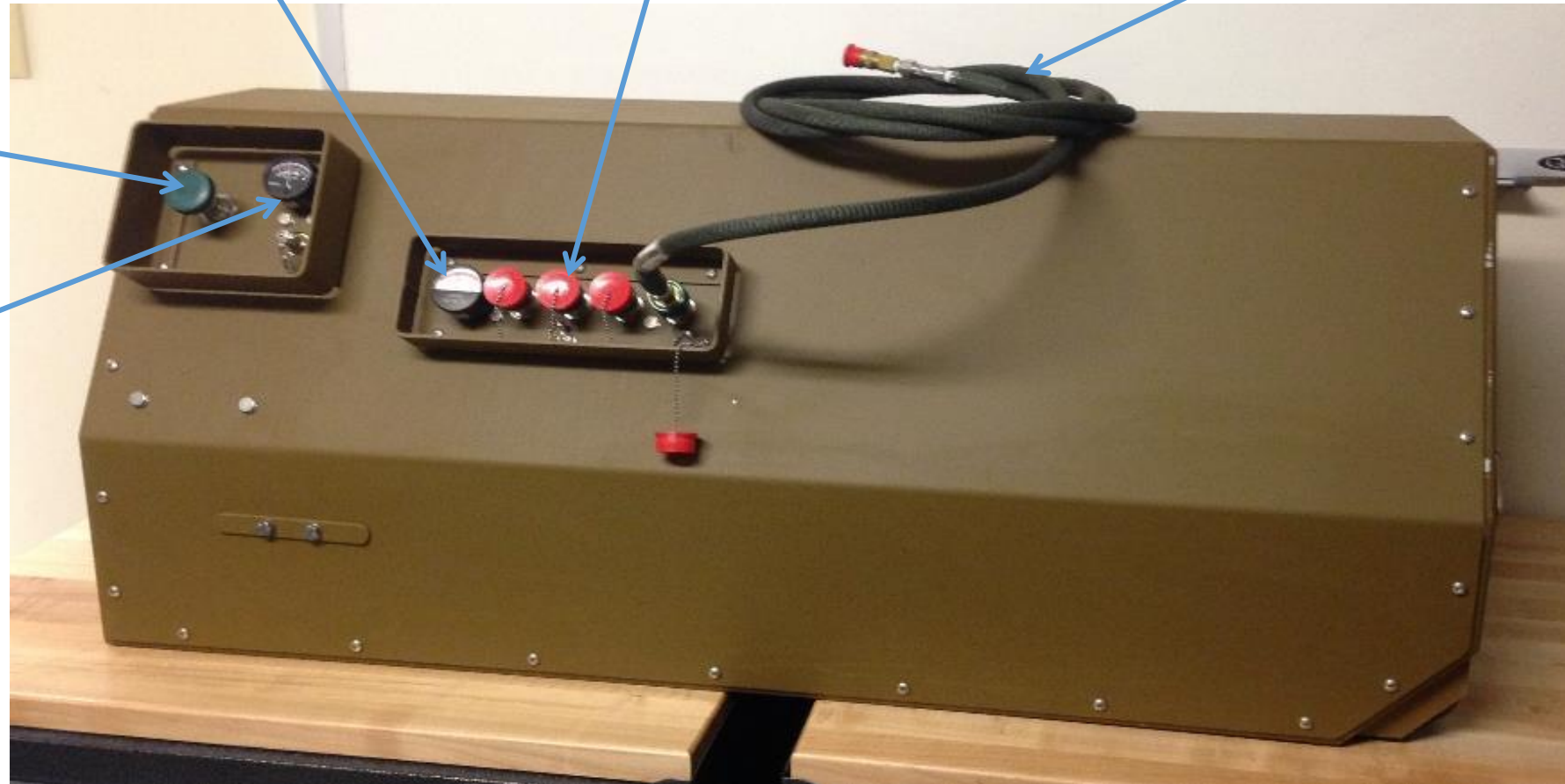
Outlet Pressure Gauge

Connections

Oxygen Supply Hose With Flow Blinker

On/OFF Valve

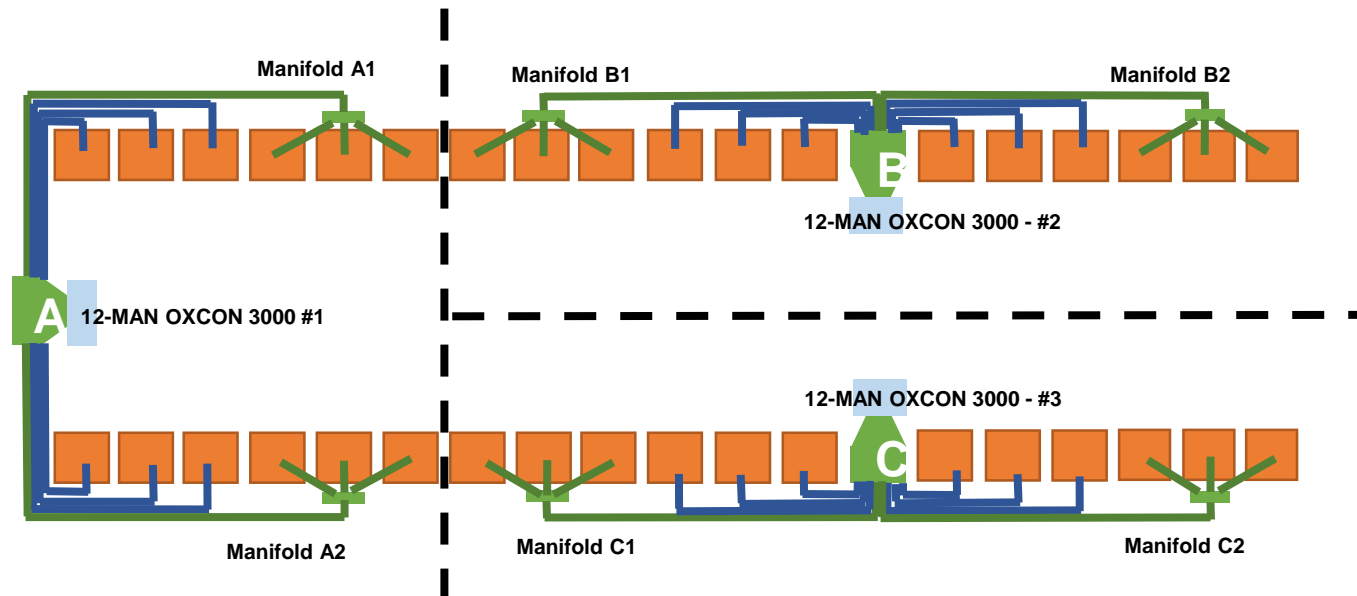
Contents
Gauge



Expansion Kit

A kit can be attached to a Oxcon to increase the number of ports available

- Up to 12 jumpers per console
- Streamline set-up in the cargo area

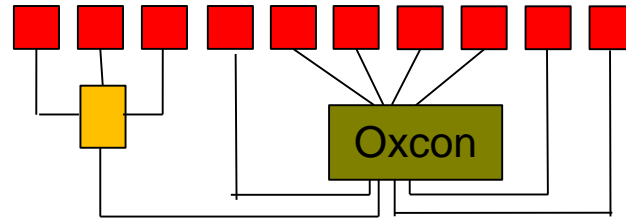




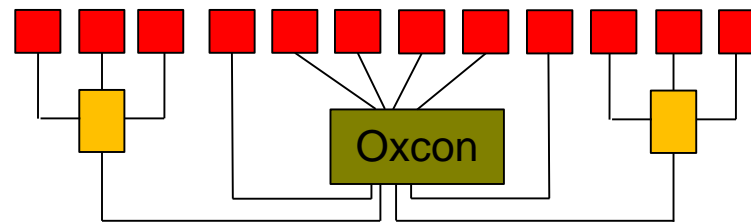
Expansion Kit

2 Options

One kit:
10-man



Two kits:
12-man



From the
console



To the
jumpers

SOLR ISO 4500 Pre-Breather

**Portable, giving jumpers the ability to start pre-breathing outside the aircraft
and then mount the 4500 Pre-Breather inside the aircraft**

305 cu in (5L) Cylinder at 4,500 psi (310 bar) service pressure

Always ON, for safe and simple operations

Pre-Breathing Time: up to 140 minutes @ 10,000 ft MSL

Temperature: -65 to 160°F (-53.9 to 71.1 °C)

Altitude: (ceiling) 35,000 ft MSL (10668m)

Hose with built in flow/blink indicator



SOLR Pre-Breather Attachment Assembly

Holds 2 SOLR Pre-Breathers

Pockets for hoses

Mountable on aircraft side wall and/or seats backs

Dependent on aircraft type

4 tie down straps & bottle strap for securing

Rugged design



Capacities, Pressures & Duration

	SOLR ISO 4500 Pre- Breather	SOLR 122 Cu- In BB 3000psi	SOLR 122 Cu- In BB 4500 psi	6-Man OXCON 3000 psi	8-Man OXCON 3000 psi	SOLR 4500 Pre-Breather
Capacity O2 Total Cu-In / Liters	305 cu-In = 5L	122 Cu-In = 2 L	122 Cu-In = 2 L	2700 Cu-In = 44.24 L	2700 Cu-In = 44.24 L	285 Cu-In = 4.67 L
Pressure psi = Bar	4500 psi = 310 bar	3000 psi = 207 bar	4500 psi = 310 bar	3000 psi = 207 bar	3000 psi = 207 bar	4500 psi = 310 bar
Volume O2 Per Jumper (L)	1550	414	620	1526	1144	1447
Duration (Min) at 12 Liters per min	129 O2 volume available to the jumper for the descent	34	51	127 O2 volume available to the jumper for Pre-Breathing	95	120

Average human breaths approx. 8 liters per min at rest

A exact figure can not be given for duration as many factors will effect each individual such as fitness level, anxiety, altitude etc.

SOLR - Oxygen Booster Pump

Purpose: To take the oxygen from the bulk supply/storage cylinder and increase the pressure up to 4500 psi to fully fill the SOLR bailout bottles to their maximum capacity

- No drive air required (no air compressor)
- Electrically driven (standard 110v / 15 amp circuit)
- 220V/50 Hz version also available
- Simple and quick installation
- Easy operation
- Can fill 4 bottles at once
- Automatic shut down at desired pressure



SOLR - Oxygen Replenishment Cart

Same principle of operation as the Oxygen Booster Pump

- **Designed for transportation**
- **Can fill 8 bottles at once**
- **Electrical motor**
- **Easy operation**
- **Selectable Low & High Pressures with Automatic shut down**
- **Pressure Relief valves for safety**
- **Internal fan to prevent gas overheating**



Maintenance Levels & Service Life

	Level 1	Level 2	Level 3
SOLR 3000 Bailout Bottles, OXCON / Pre-Breathers and Oxygen Masks	Before use/after and/or every 6 months	30 months	60 months

Total service life: Cylinders must be hydro-tested every 5 years, and can't be used for more than 15 years. Manifolds and other component parts are on condition.

Level	Consisting of:
1	Unit level consisting of checking & cleaning to ensure item is in good working condition.
2	<p>Depot level maintenance, in a controlled environmental consisting of thorough inspection to ensure no broken or damaged components, Check for internal and external leaks where appropriate and ensures all torque values meet specifications.</p> <p>Some sub-assemblies (as detailed in the level 2 technical manual) can be replaced if needed.</p>
3	Performed at an approved Airborne Systems Service Center. Consists of complete overhaul, key components (such as pressure seats and filters) are replaced, other components condition is assessed and replaced as required. Cylinders are sent for hydro testing. All components are cleaned, re-assembled, reset and tested.

OBP - Maintenance Levels

	Level I	Level II	Level III
Oxygen Booster Pump	40 Hours or 1 year	200 Hours or 5 years	400 hours or 10 years

Total service life: of OBP and component parts is on condition.

Level	Consisting of:
1	Unit level consisting of checking & cleaning to ensure item is in good working condition.
2	Depot level maintenance, thorough cleaning and inspection to ensure no damaged components. Fan belt, piston seals, by-pass and check valves replaced. Outlet vales x 6 serviced. Check for leaks and where appropriate ensures all torque values meet specifications.
3	Performed at an approved Airborne Systems Service Center. Consists of complete overhaul in a clean room, key components are replaced, other components condition is assessed and replaced as required. All components are cleaned, re-assembled, reset and tested. Then packaged and returned to the user.

SOLR Portable Test Stand

Fits into a Pelican Case (model 1550 : 52 x 43 x 21 cm, 14 kg)

User Friendly

Allows all maintenance checks up to and including level 2 for the SOLR mask and all types of bottles (bailout, pre-breather and Oxcon)

Self contained/ no need for a power supply!

The Test Stand only requires an Oxygen bottle to function

Such as a charged SOLR 3000 Bailout bottle



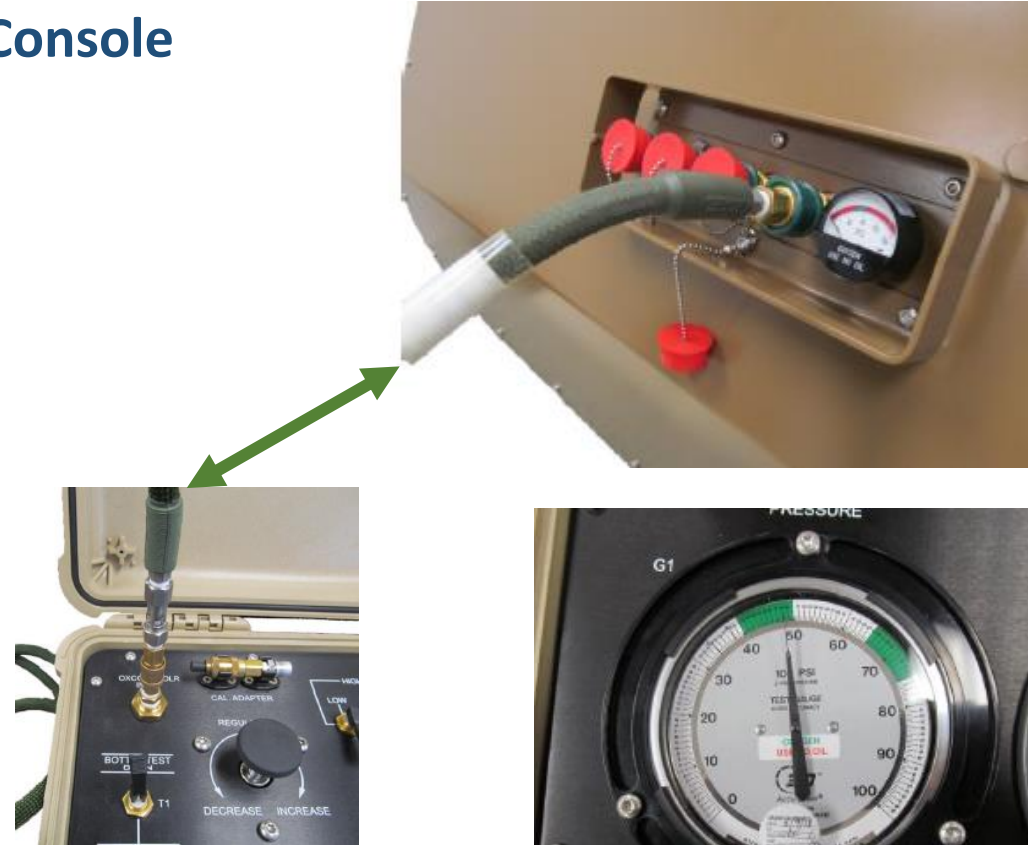
SOLR Portable Test Stand



The PTS allows for a quick check of all equipment before a mission, all the way to the back of the plane in the most severe and remote environment

Testing of Bailout Bottle, OXCON & Mask

Bailout bottle, Pre-breathe Console



Quick View GO - NO GO Gauges

Testing SOLR Oxygen Mask

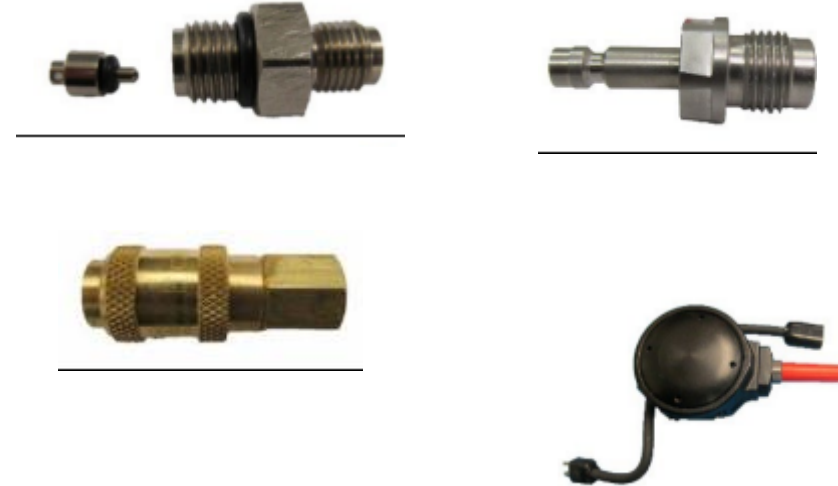


Quick View GO - NO GO Gauges

Accessory Items



Pelican Cases for Transporting Product



Spare Parts

Additional Oxygen Solutions

- Looking for SOLR Product with modifications for your group's need?
 - See your Business Development Manager, will work to find a solution
- Specialty length hoses, specialty cases, etc.
- See Brian McCaffrey or Nick Lorch to jump with a mask and bailout bottle, or to see a Portable Test Stand or Oxygen Booster Pump

Thank You

Please visit our website for any additional info, with more details on our products, videos, specification sheets, and more

www.airborne-sys.com

Follow us on Facebook





Thank you!