

DA 42 AFM

Supplement S04



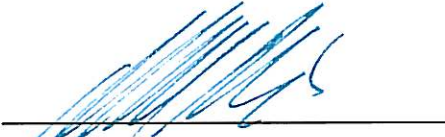
Continuous Flow
Oxygen System

SUPPLEMENT S04

TO THE AIRPLANE FLIGHT MANUAL DA 42

CONTINUOUS FLOW OXYGEN SYSTEM

Doc. No. : 7.01.05-E
Date of Issue : 09-Jan-2006
Design Change Advisory : OÄM-42-055

Signature : 
DAI DO Representative : M. Reichel
Stamp : M. Reichel
Date of approval : 16. FEB. 2006



The technical information contained in this document has been approved under the authority of DOA No. EASA.21J.052.

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9-S04-1



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0.1 RECORD OF REVISIONS

Rev. No.	Reason	Chapter	Page(s)	Date of Revision	Approval Note	Approval Date	Date Inserted	Signature
1	Improvements	all	all	01-Mar-2006				
2	OÄM 42-055/b	all	all	06-Jun-2006	Rev. 2 to AFM Supplement S04 to AFM Doc.No. 7.01.05-E is approved under the authority of DOA No. EASA 21J.052	11-Aug-2006		
3	OÄM 42-055/i, Diagrams improved, Corrections	0	9-S04-3 through 9-S04-6	10-Nov-2011	Rev. 3 to AFM Supplement S04 to AFM Doc.No. 7.01.05-E is approved under the authority of DOA No. EASA 21J.052	21-Nov-2011		
		5, 6, 7, 8	9-S04-14 through 9-S04-34					

0.2 LIST OF EFFECTIVE PAGES

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1. GENERAL

The DA 42 can be equipped with an optional continuous flow oxygen system. It distributes supplemental oxygen for each pilot and passenger up to 18,000 ft.

2. OPERATING LIMITATIONS

None.

3. EMERGENCY PROCEDURES

3.8 SMOKE AND FIRE

3.8.6 CABIN SMOKE ABOVE 10,000 FT

1. OXYGEN check ON

initiate an emergency descent:

2. FLAPS UP
3. LANDING GEAR DOWN
4. POWER lever IDLE
5. Airspeed as required

WARNING

Max. structural cruising speed $V_{NO} = 155$ KIAS

Never exceed speed in smooth air $V_{NE} = 194$ KIAS

when passing 10,000 ft:

6. OXYGEN OFF
7. Land at the nearest suitable airfield.

END OF CHECKLIST

3.8.7 CABIN FIRE ABOVE 10,000 FT

1. OXYGENpush OFF

initiate an emergency descent:

2. FLAPSUP
3. LANDING GEAR.....DOWN
4. POWER lever.....IDLE
5. Airspeed.....as required

WARNING

Max. structural cruising speed $V_{NO} = 155$ KIAS

Never exceed speed in smooth air $V_{NE} = 194$ KIAS

6. Land at the nearest suitable airfield.

END OF CHECKLIST

3.9 OTHER EMERGENCIES

3.9.9 OXYGEN PRESSURE LOSS ABOVE 10,000 FT

1. OXYGENpush OFF
2. Oxygen pressure.....checked, note down

initiate an emergency descent:

3. FLAPSUP
4. LANDING GEAR.....DOWN
5. POWER lever.....IDLE
6. Airspeed.....as required

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WARNING

Max. structural cruising speed $V_{NO} = 155$ KIAS

Never exceed speed in smooth air $V_{NE} = 194$ KIAS

when passing 10,000 ft:

- 7. Oxygen pressure check

if oxygen pressure is constant, continue flight:

- 8. Airspeed check
- 9. LANDING GEAR UP
- 10. POWER lever as required
- 11. Airspeed as required

if oxygen pressure drops, abort flight:

- 8. Land at the nearest suitable airfield.

WARNING

A leak in the oxygen system may excessively increase the risk of fire.

END OF CHECKLIST

4A. NORMAL OPERATING PROCEDURES

4A.6 CHECKLISTS FOR NORMAL OPERATING PROCEDURES

NOTE

This supplement has been created in compliance with the requirement and rules of JAR-23; limit altitude according rules of JAR-OPS1.

4A.6.1 PRE-FLIGHT INSPECTION

I. Cabin check

front baggage compartment:

- a) Front baggage compartmentcheck, no flammable fluids, oils and greases are in the nose baggage compartment.

oxygen system:

- a) Cannulas.....visual inspection
b) Maskvisual inspection

NOTE

There must be 4 cannulas (or at least one for each occupant) and 1 mask (type: MSK-AEM) on board. Further 4 connection hoses are required. The cannulas and masks must be accessible during flight.

- c) Oxygen pressure.....check, note down
d) Oxygen duration chartobserve/ calculate duration (refer to Chapter 5)

END OF CHECKLIST

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4A.6.21 FLIGHT ABOVE 10,000 FT USING OXYGEN SYSTEM

before climbing above 10,000 ft:

1. Oxygen pressure check
2. Cannula, mask and hose..... adjust to face (refer to Chapter 7)
3. Delivery hose..... plug into outlet assigned to seat
4. OXYGEN push/pull knob pull ON

NOTE

When the oxygen system is turned on, oxygen will flow continuously at the appropriate rate of flow selected for the altitude with minor adjustments to the needle valve thumb wheel.

5. Cannula hose flowmeter..... adjust to altitude

NOTE

Check each occupant's oxygen cannula adjustment and flowmeter setting. Recheck oxygen pressure indication from time to time.

NOTE

Always place the flowmeter in a position where it is in the normal scan area of the user.

WARNING

Smoking is in no case permitted in the DA 42. It is especially dangerous while the oxygen system is in use.

WARNING

If the oxygen pressure gauge indicates a cylinder pressure of 200 psi, initiate descent to reach an altitude below 10,000 ft.

after descending below 10,000 ft:

1. Delivery hoseunplug, or turn needle valve thumb wheel clockwise
2. OXYGEN push/pull knobPUSH OFF
3. Cannula, mask and hosedisplace from face, as required

END OF CHECKLIST

4B. ABNORMAL OPERATING PROCEDURES

None.

5. PERFORMANCE

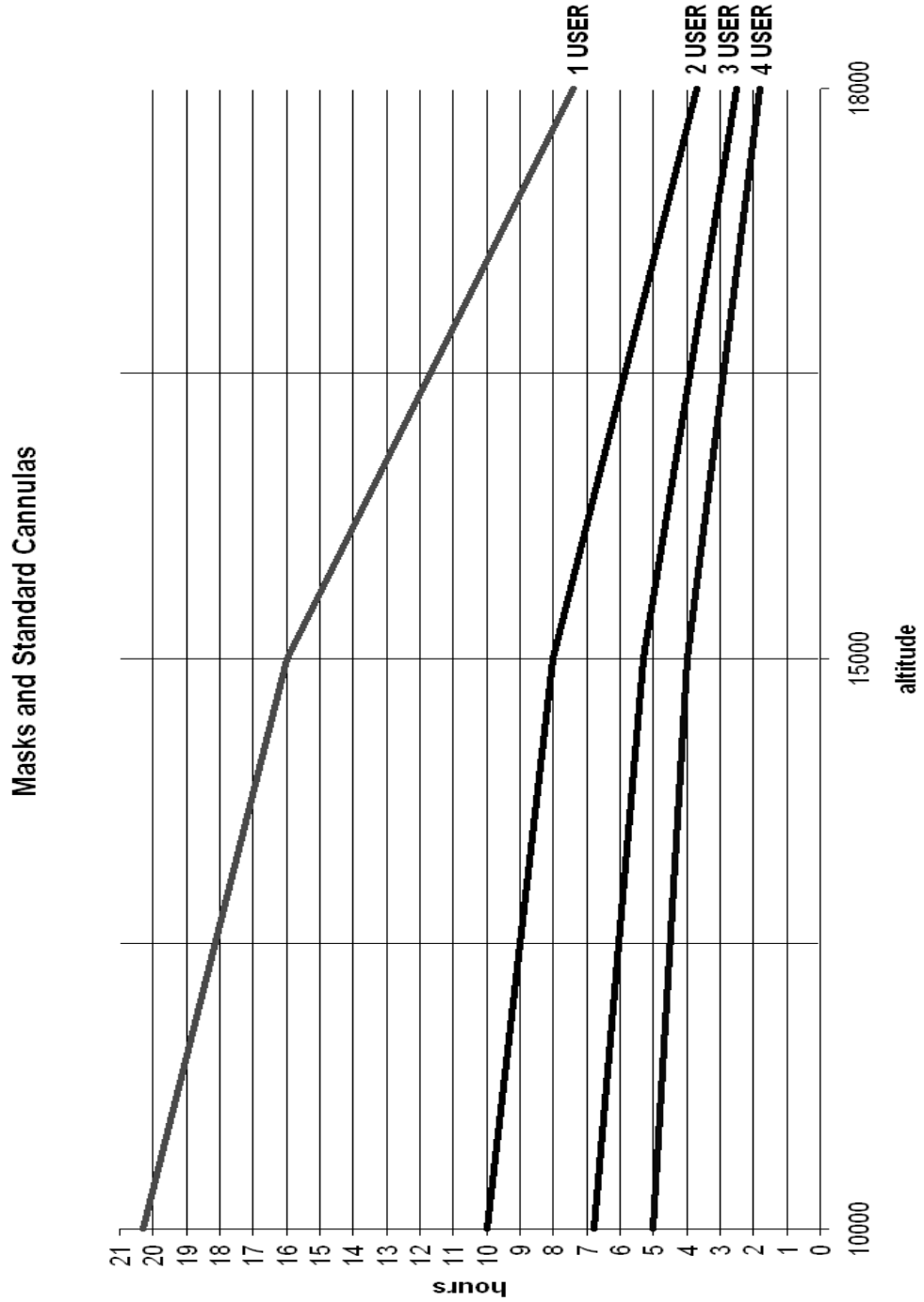
5.3 PERFORMANCE TABLES AND DIAGRAMS

5.3.14 OXYGEN SYSTEM

a) Duration quick check table and diagram - masks and standard cannulas

**Duration using masks and standard cannulas (hours), Oxygen cylinder filled
with 1850 PSI,**

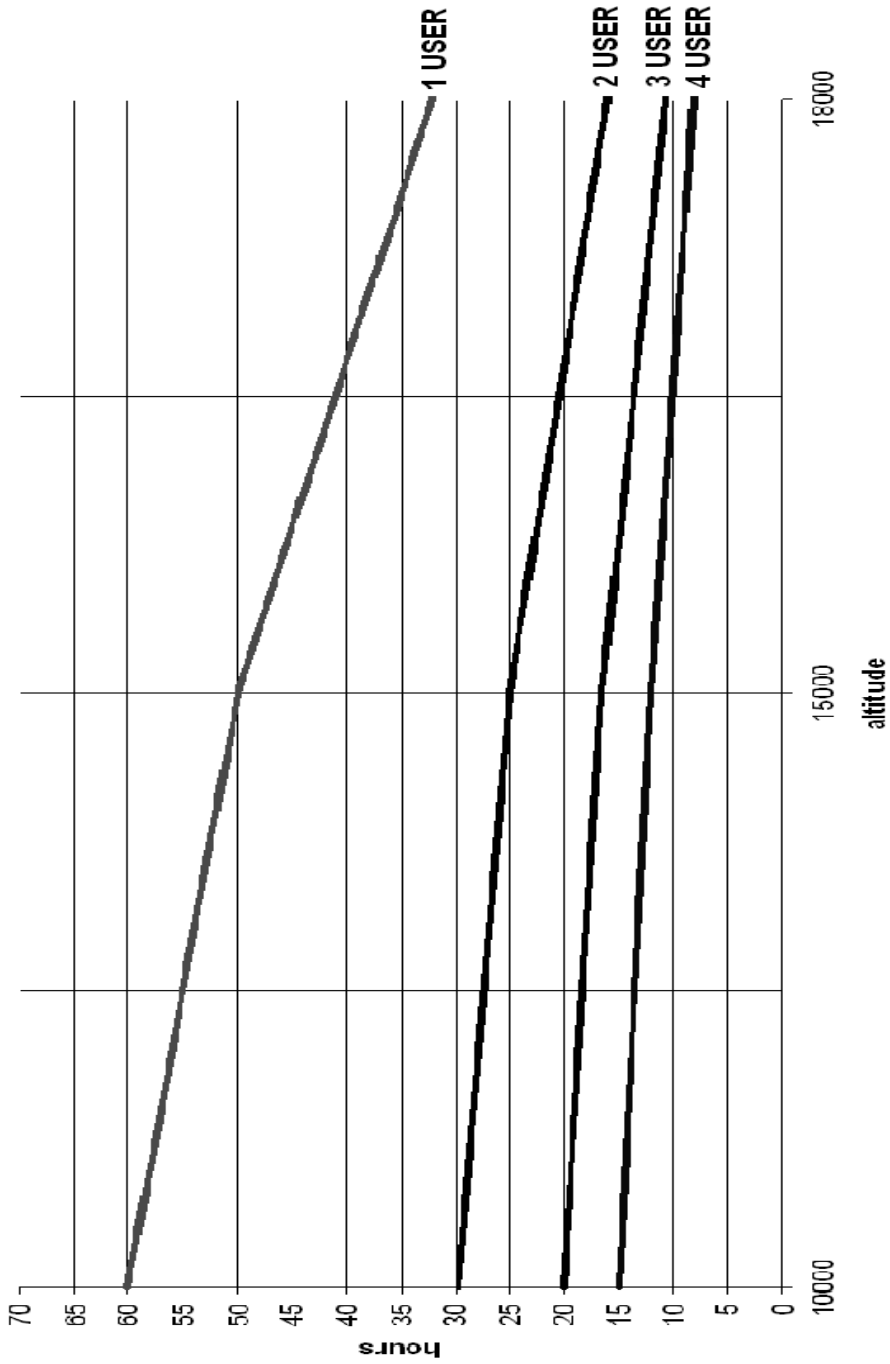
Number of users	10,000 ft (MSL)	15,000 ft (MSL)	18,000 ft (MSL)
1	20.3	16	7.4
2	10	8	3.7
3	6.8	5.3	2.5
4	5	4	1.8



b) Duration quick check table and diagram – Oxysaver® cannulas

**Duration using Oxysaver® cannulas (hours),
Oxygen cylinder filled with 1850 PSI**

Number of users	10,000 ft (MSL)	15,000 ft (MSL)	18,000 ft (MSL)
1	60	50	32
2	29.8	25	16
3	20	16.5	10.6
4	15	12	8



c) Exact duration calculation of the oxygen system

The duration of supplying supplemental oxygen to the occupants provided by the Aerox continuous flow oxygen system depends on the following facts:

-) Oxygen cylinder pressure
-) number of users- and types of dispensing equipment- individual oxygen mass flow
-) flight altitude

The exact calculation of the oxygen duration is shown below step by step:

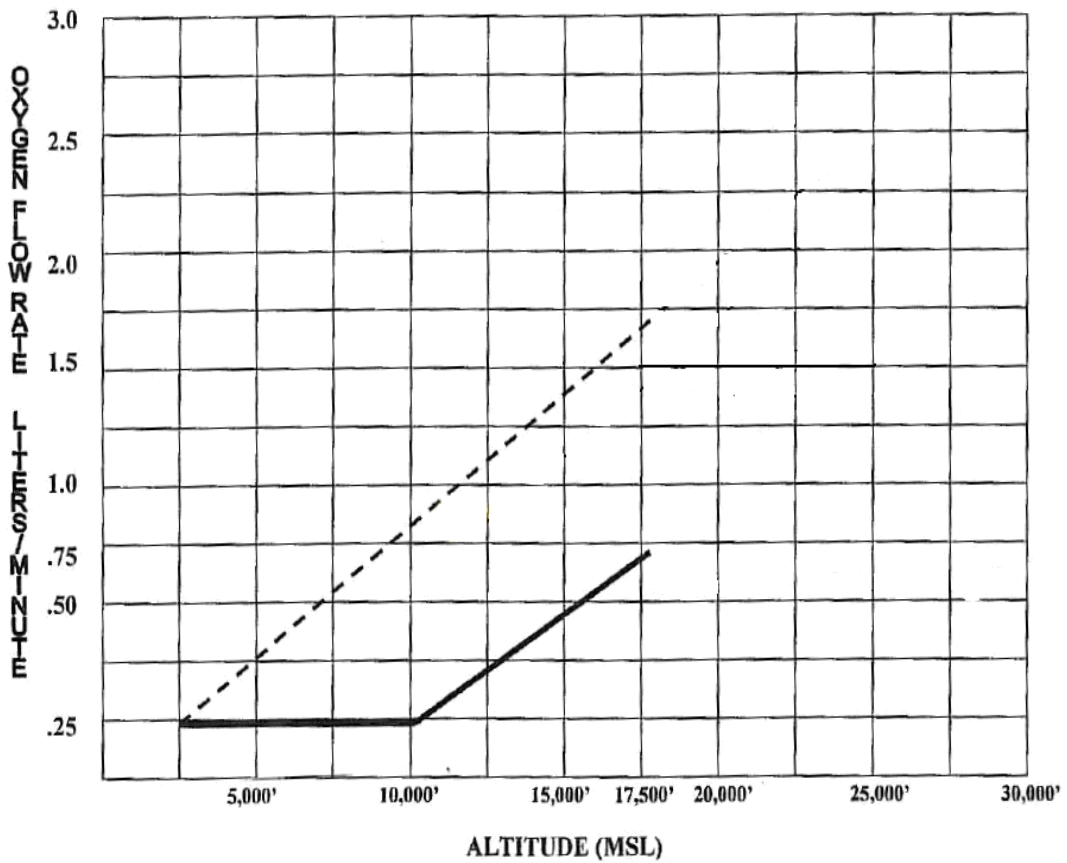
Step 1- Evaluation of the Oxygen cylinder pressure

The actual oxygen cylinder pressure is indicated on the oxygen pressure gauges, one installed on the upper right hand side of the instrument panel and the other installed in the oxygen compartment next to the filler port. Resultant of this pressure the oxygen pressure variable P_o can be calculated:

$$P_o = \frac{\text{Pressure} - 200\text{PSI}}{1850}$$

Step 2- Evaluation of the individual oxygen mass flow

The individual mass flow depends on the type of the dispensing equipment and on the expected main flight altitude:



Mask or Regular Cannula - - - - -
Oxsaver® Cannula —————

The figure mentioned above and the table below shows the required mass flow depending on the flight altitude and the used dispensing equipment:

Main flight altitude	Mass flow [l/min] Oxysaver cannula	Mass flow [l/min] Mask or regular/ standard cannula
10.000ft	0,25	0,80
11.000ft	0,31	0,92
12.000ft	0,37	1,04
13.000ft	0,43	1,16
14.000ft	0,48	1,28
15.000ft	0,53	1,40
16.000ft	0,59	1,52
17.000ft	0,65	1,64
18.000ft	0,70	1,76

The mass-flow-variable F_m is calculated as shown below:

$$F_m = \frac{1}{User1 + User2 + User3 + User4}$$

“User X” is the required individual mass flow according to the chart / diagram mentioned above.

Step 3- Final calculation

Finally the oxygen duration is calculated as shown below:

$$P_o \times F_m \times 23,6 = duration[hours]$$

Example:

Oxygen pressure: 1650 PSI

Expected flight altitude: 16.000ft

Number of persons on board: 3

Used dispensing equipment: 2x Oxysaver cannulas , 1 x Mask

Step 1:

$$P_o = \frac{1650 - 200 \text{ PSI}}{1850} = 0,784$$

Step 2:

$$F_m = \frac{1}{0,59 + 0,59 + 1,52} = 0,3704$$

Step 3:

$$0,784 \times 0,3704 \times 23,6 = 6,9h$$

Result: The oxygen system is able to supply 6,9 h supplemental oxygen to the occupants in 16.000ft. After 6,9h 200 PSI will be left in the oxygen cylinder.

6. MASS AND BALANCE

6.4 FLIGHT MASS AND CENTER OF GRAVITY

6.4.1 MOMENT ARMS

The most important lever arms aft of the Datum Plane:

Item	Lever Arm	
	[m]	[in]
Oxygen cylinder	0.82	32.3

6.4.3 CALCULATION OF LOADING CONDITION

When operating the airplane near the forward flight mass CG limit, note that a full oxygen tank shifts the CG approximately 2 mm (0.08 in) forward.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.14 OXYGEN SYSTEM

7.14.1 GENERAL

A four-place oxygen system provides the supplementary oxygen necessary for continuous flight at high altitude. An oxygen cylinder is located in the center section of the forward baggage compartment, in its own enclosed, vented compartment. A combined pressure regulator/shutoff valve attached to the cylinder automatically reduces pressure to the delivery pressure required for the operating altitude. The oxygen cylinder filler valve is located on the LH side of the oxygen compartment next to the cylinder in the forward baggage compartment.

The 50 cubic feet (1.41 cubic meters) capacity oxygen cylinder may be filled to 1850 psi while installed in the airplane and has a pressure gauge located next to the filler valve to indicate the amount of oxygen in the cylinder. An identical gauge is located on the upper RH side of the instrument panel (above the circuit breaker panel).

The oxygen supply shut-off control is located on the LH side below the instrument panel. It is cable connected to the oxygen regulator valve, controlling the oxygen system by pulling the green control knob out for "ON" and pushing the same knob in for system supply "OFF". The system should be left "OFF" when not in use.

Four (4) oxygen ports, two forward and two aft, are located in positions convenient to all four occupants. These ports are serviced directly from the oxygen cylinder.

The oxygen ports are located (1 each) in the map pocket recess for the pilot and co-pilot. The passenger oxygen ports are located overhead in the "roll-over bar" next to the cabin speaker. The individual cannula or mask supply tubes are plug-in connected to each port and contain the individual flow adjustments (flow meter-needle valve) for each occupant. Note that these ports are serviced directly from the oxygen regulator valve.

It is the pilot's responsibility to instruct each passenger in the use of this oxygen system prior to flight and to assure that there is adequate and comfortable supply of oxygen aboard for each occupant.

The oxygen cylinder, when fully charged, contains 50 cubic feet (1.41 cubic meters) of aviator's breathing oxygen under a pressure of 1850 psi at 21 °C (70 °F). Filling pressures will vary due to the ambient temperatures in the filling area and the rise of temperature resulting from the compression of the oxygen. Due to these factors merely filling the cylinder to 1850 psi will not result in a properly filled cylinder. Fill oxygen cylinders to the pressures indicated in the table shown below, based of the filling area's ambient temperature.

The oxygen system is limited to 1850 psi at 21°C (70 °F) ambient temperature.

Ambient Temperature °C (°F)	Max. Filling Pressure [psi]	Ambient Temperature °C (°F)	Max. Filling Pressure [psi]
-18 (0)	1650	10 (50)	1875
-12 (10)	1700	16 (60)	1925
-7 (20)	1725	21 (70)	1975
-1 (30)	1775	27 (80)	2000
4 (40)	1825	32 (90)	2050

WARNING

Oil, grease or other lubricants in contact with oxygen creates a serious hazard. Such contact must be avoided when handling oxygen equipment.

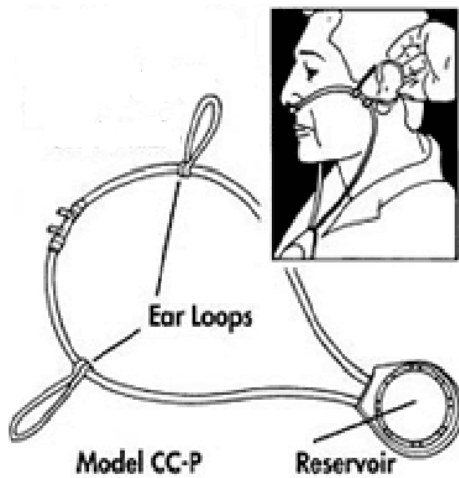
7.14.2 USE OF CANNULAS AND MASKS

Attachment and adjustment

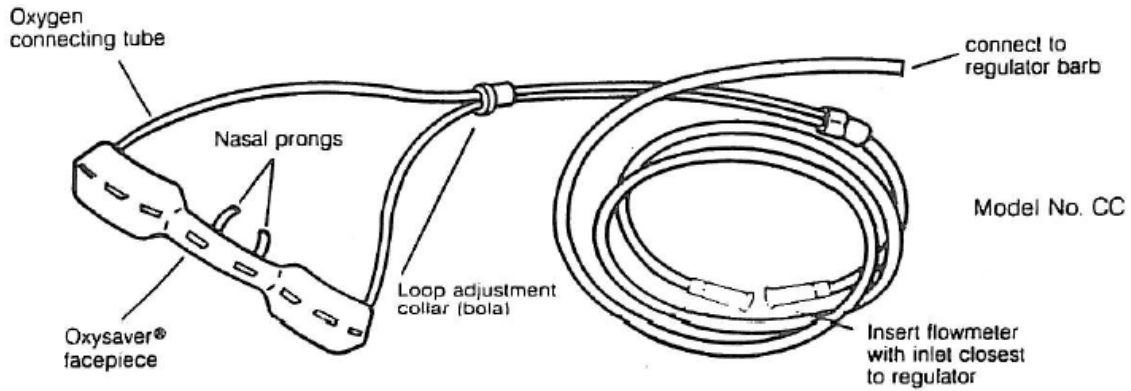
a) Standard cannulas



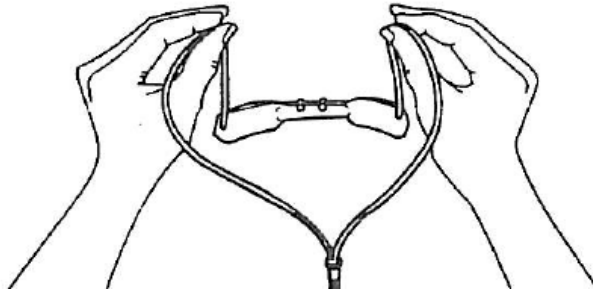
b) Oxysaver® cannulas – Pendant model



c) Oxysaver® cannulas



1. Slide the loop adjustment collar (bola) down to enlarge the size of the loop:



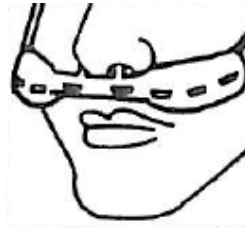
2. With the back of the facepiece toward you, pick up the Oxysaver with one of the small flexible plastic tubes in each hand, as if putting on eyeglasses:



3. Place the flexible plastic tubing over your ears (as if putting on glasses) and under your chin or pass the tubing over your ears and around the back of your head:



4. The facepiece should rest on your upper lip under your nose, with the oxygen delivering prongs extending well into and pointing towards the back of your nose. You may rotate these prongs for maximum comfort.



5. Slide the bola up toward your chin to hold the cannula snugly and comfortably against your face.

6. Screw the brass hose tip onto the manifold

NOTE

The use of each Oxysaver cannula system is to be logged by the hour and the system replaced with a new unit at 200 hours of use! Use the LOG delivered with each Oxysaver cannula.

c) *Masks*

1. Remove the rubber band from the reservoir bag and allow it to deploy.
2. Attach Aerox flowmeter to the oxygen hose of mask and then to the oxygen system.

NOTE

The reservoir bag must be in good condition and inflated before use!

3. Position the bottom of the mask as low as possible under the chin while positioning the narrow portion of the mask on the bridge of the nose.
4. Position the cradle above the ears so that it straddles the crown of the head.
5. Hook the lower headband straps below the ears and around the back of the neck.
6. Adjust the upper headband by pulling both straps at the same time.
7. Adjust the lower headband straps in the same manner.
8. Remove the mask to adjust the straps.
9. Do not over-tighten the straps.



NOTE

Return mask to Aerox for service 3 years from manufacture date.
Manufacture date code is located on the re-breather bag.

10. Plug in the microphone plug in the applicable microphone jack (type: MSK-AEM only)

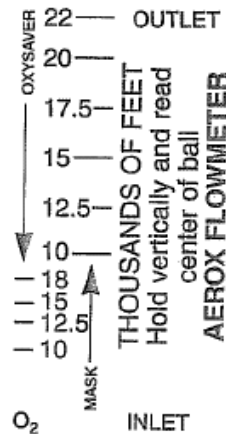
d) *Flowmeter installation/adjustment*

1. Connect the flowmeter between the cannula /mask tube (outlet) and the delivery hose (inlet).

NOTE

When assembling the tube to the flowmeter, only push the tube as far as the second ferrule.

2. Connect the cannula/mask assembly to the assigned outlet manifold.
3. Hold the flowmeter in vertical position and turn the needle valve screw installed on the connector counterclockwise. Adjust flowrate to current altitude by using the correct flowmeter scale.



NOTE

For regular / "standard"- cannulas the "MASK" scale must be used.

CAUTION

Failure to use appropriate scale will result in incorrect oxygen consumption.

NOTE

When adjusted to the correct altitude the dispensing unit will deliver enough supplemental oxygen as required by “normal” people. Some people will require more oxygen. In that case adjust the flowmeter to a higher altitude.

4. Check flowmeter regularly to ensure adequate flow.

7.14.3 APPROVED OXYGEN

The AEROX continuous oxygen system uses aviator's breathing oxygen in accordance with MIL-PRF-27210 only.

CAUTION

Do not use oxygen with a lower purity grade than prescribed by MIL-PRF-27210.

CAUTION

The oxygen cylinder is limited to a pressure of 1850 psi at 21°C (70 °F) ambient temperature..

7.14.4 APPROVED DISPENSING EQUIPMENT

Type	Description	Man.
CC	Conserving cannula Oxysaver brand (adult)	AEROX
CC-P	Conserving cannula Oxysaver brand (adult) pendant	AEROX
CR-A	Cannula regular style (adult)/ "standard"- cannula	AEROX
CR-C	Cannula regular style (child)/ "standard"- cannula	AEROX
MSK-AS	Silicone mask without microphone, (Quick Donning Type)	AEROX
MSK-AEM	Silicone mask with microphone, (Quick Donning Type)	AEROX

NOTE

Each cannula and mask must be equipped with a Puritan Bennett style connector and an Aerox flowmeter (type: FM or FMNV)

NOTE

The Aerox oxygen system, installed in the DA 42 must not be used with any other dispensing equipment.

NOTE

There must be 4 cannulas (or at least one for each occupant) and 1 mask (type: MSK-AEM) on board. The cannulas and masks must be accessible during flight.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

The cannulas and masks can be cleaned with soap and water using a clean, lint-free cloth.

8.1 REPLENISHMENT OF THE CYLINDER

CAUTION

Do not carry flammable fluids, oils and greases, in the nose baggage compartment!

1. Oxygen gauge (instrument panel) check
2. LH front baggage door open

WARNING

Do not smoke during refilling!

3. Baggage compartment all items removed
4. Baggage compartment check for oil or oil residue

WARNING

Oxygen in conjunction with oil will result in a fire hazard!

CONTINUED

5. De-icing fluid tankcheck, closed and clean
6. Refill coveropen
7. Refill valve cover.....open
8. Oxygen gauge (refill panel).....checked, same pressure as indicated
on instrument panel gauge
9. Filling station outlet portconnect
10. Filling station outlet portcheck fixed

Slightly open the cylinder valve of the filling station and check oxygen flow. The oxygen cylinder is limited to a pressure of 1850 psi at 21°C (70 °F) ambient temperature.

WARNING

Do not fill the cylinder to a pressure above 1850 psi at 21°C
(70°F) ambient temperature.

NOTE

Refilling of a fully depleted cylinder will take about 3.5 minutes.

when the pressure is reached:

11. Filling station valve.....close
12. Filling station outlet portdisconnect slightly
13. Refill valve cover.....fixed
14. Refill coverclose
15. Baggage compartment.....close, as required

END OF CHECKLIST



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