



**EMERGENCY EQUIPMENT
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Vol. 1

09-00-1

REV 3, May 03/05

CHAPTER 9 – EMERGENCY EQUIPMENT

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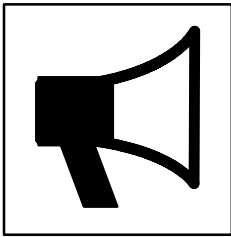
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1. **INTRODUCTION**

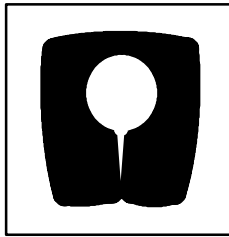
This chapter describes the systems and equipment which are essential to the safety of the passengers and crew during a fire, rapid decompression, ditching and emergency evacuation. The aircraft emergency equipment includes the following:

- Oxygen equipment
- Evacuation devices (ELT)
- Fire fighting equipment
- Over water emergency equipment
- First aid equipment.

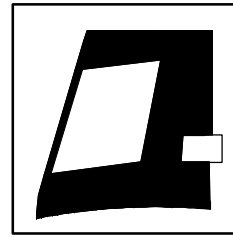
Placards containing symbols are used to indicate the location of the emergency equipment.



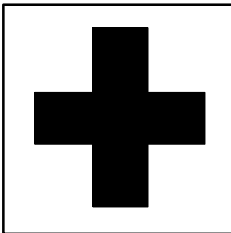
MEGAPHONE



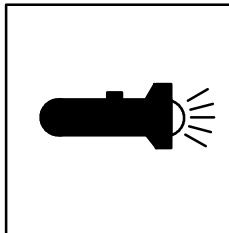
LIFE VEST



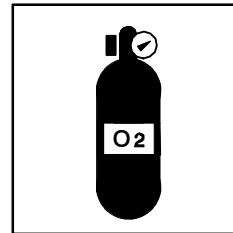
SMOKE HOOD
(PROTECTIVE BREATHING
EQUIPMENT)



FIRST AID KIT



FLASHLIGHT




OXYGEN CYLINDER



HALON FIRE
EXTINGUISHER

Placard
Figure 09-10-1

	EMERGENCY EQUIPMENT Oxygen	Vol. 1	09-20-1
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1. **OXYGEN**

The oxygen systems supply oxygen to the flight crew and passengers in emergencies such as depressurization, decompression, smoke, fumes, first aid and during certain aircraft operations. The aircraft oxygen systems consists of two independent oxygen systems. One system supplies stored oxygen to the flight compartment crew and the other supplies generated oxygen to the passengers and flight attendants. In addition, portable oxygen bottles are provided in specific areas in the passenger compartment.

A. **Crew Oxygen System**

The crew oxygen system consists of an oxygen bottle, a ground servicing panel and three face masks.

B. **Crew Oxygen Bottle**

The crew oxygen bottle contains 50.0 cubic feet (1.419 liters) of oxygen and is located in an enclosure behind the entrance storage compartment. Normal bottle charge pressure is 1850 psi at 70°F (12.76 MPa at 21°C). The enclosure is well ventilated with a permanent flow of ECS air to the under floor avionics compartment. The air is then dumped overboard through the outflow valve.

The bottle assembly consists of a manual (lever type) shut-off valve, regulator, pressure gauge, pressure transducer, pressure switch, and a pressure relief valve.

The bottle outlet is monitored by a pressure transducer. If the outlet pressure decreases below 1410 psig (9.721 MPa), the EICAS will display an OXY LO PRESS caution message on the primary page.

Output pressure is regulated to between 60 and 85 psig. If the output exceeds 94 psig, a low pressure relief valve opens venting the oxygen. The cylinder is protected from over pressure by a frangible high pressure relief valve. If the cylinder pressure reaches 2500 to 2775 psig, the valve ruptures and the oxygen is vented overboard through the high pressure discharge indicator on the left side of the forward fuselage.

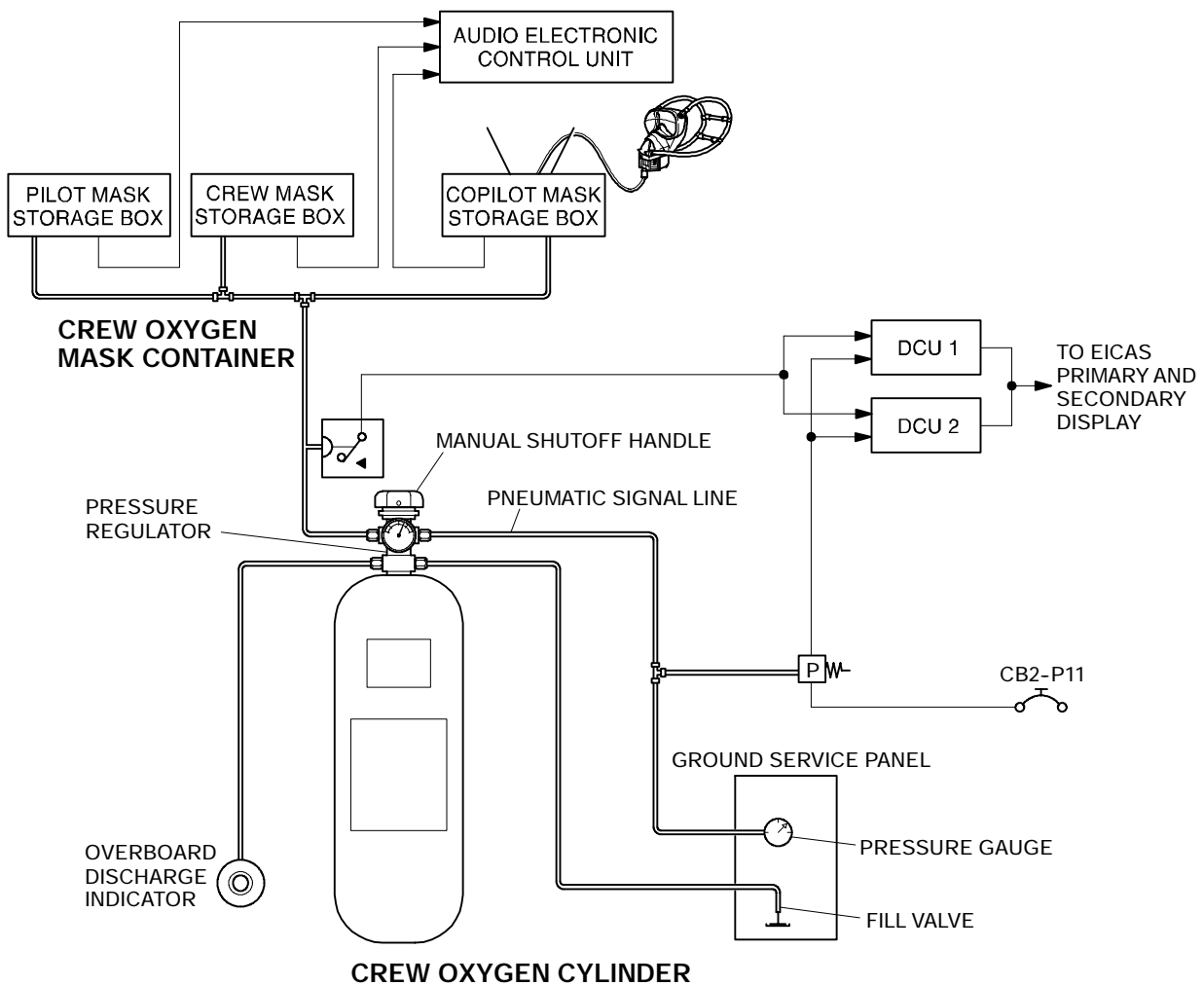
The pressure switch monitors the outlet pressure from the regulator. If the pressure decreases below 45 psig, an OXY LO PRESS caution message will be displayed on the EICAS primary page.

NOTE

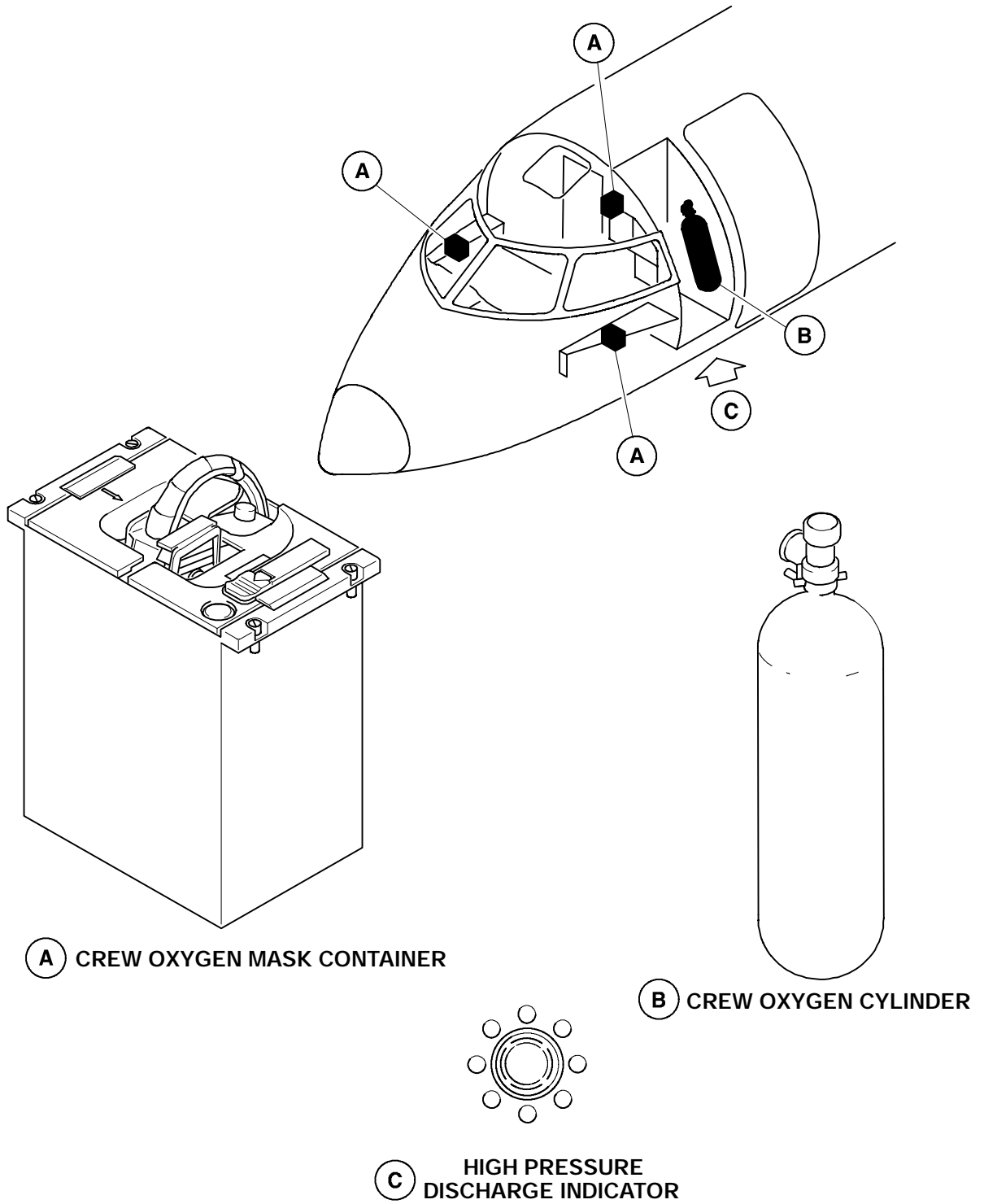
If the OXY LO PRESS caution message is displayed, the crew should refer to the dispatch requirements charts.

When the contents of the oxygen bottle is vented through the high pressure discharge indicator, a green snap disc dislodges, presenting a visual indication that the oxygen cylinder contents have been vented. The oxygen servicing panel is located on the right side of the forward fuselage. The service panel contains a fill port, a pressure servicing chart and a pressure gauge. Check valves in the fill and supply lines, prevent loss of oxygen when the bottle is removed or when the cylinder replenishment source is disconnected.

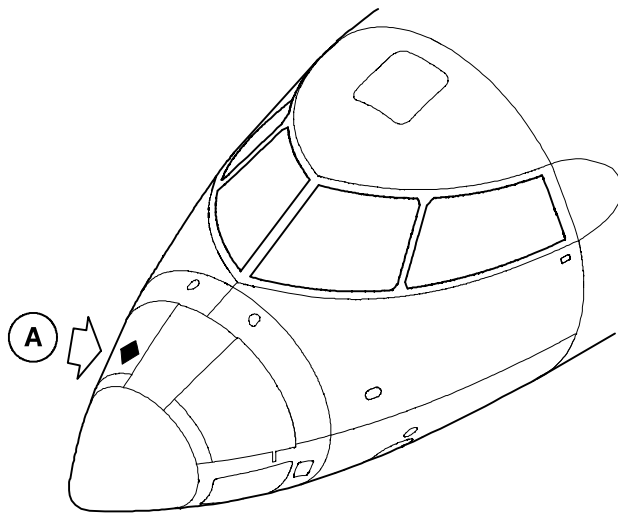
	Flight Crew Operating Manual CSP C-013-067	
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Crew Oxygen System – Schematic
Figure 09-20-1



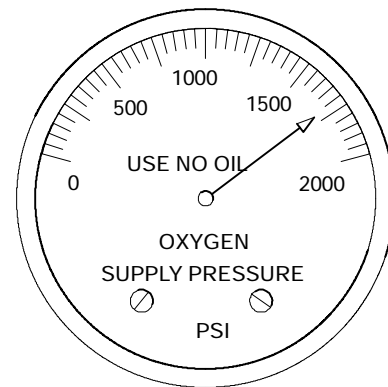
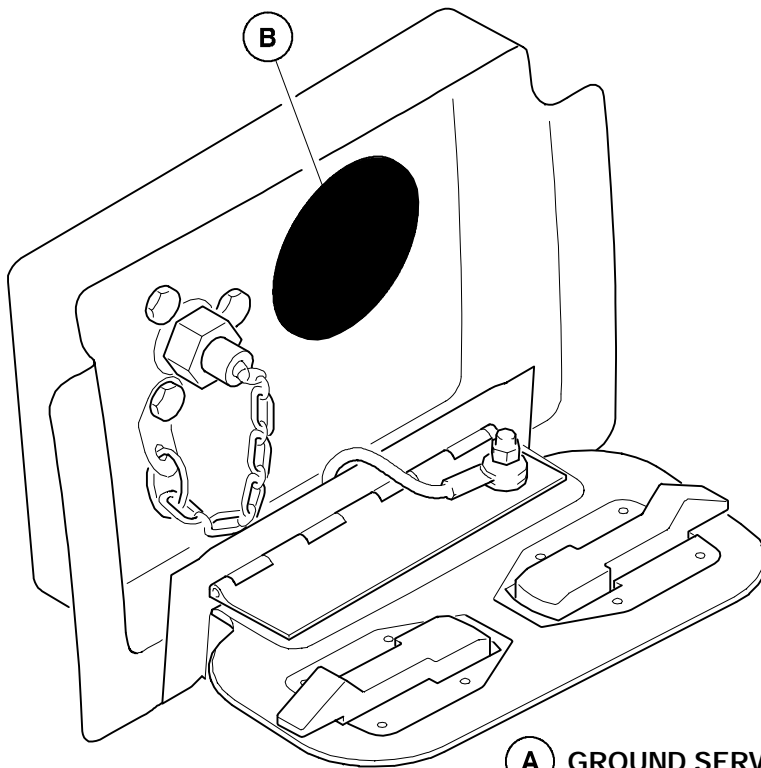
Crew Oxygen System Components
Figure 09-20-2



OXY. CYL. SERVICING
CHARGE CYL. AT RATE
NOT TO EXCEED
200 PSI/MIN
TO "FULL" PRESSURE

FULL PRESS. PSI	AMBIENT TEMP. °C
1990	38
1900	27
1805	16
1710	5
1620	-7
1530	-18
1435	-29
1340	-40

**MAX. FILL PRESSURE VERSES
TEMPERATURE CORRECTION CHART**



**B GROUND SERVICE PANEL
PRESSURE GAUGE**

A GROUND SERVICE PANEL

Ground Service Panel
Figure 09-20-3



**EMERGENCY EQUIPMENT
Oxygen**

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C. Crew Oxygen Mask

The crew oxygen masks are located in stowage boxes. One for the pilot, one for the copilot and one for the 3rd flight crew position. The crew mask is a full face mask and includes an oxygen regulator, a pneumatically controlled inflatable harness, a flow-control knob, a mixture-control lever and a microphone. To release the mask from the stowage box, the operator squeezes the red release levers and holds them. This action opens the quick-release doors, frees the mask and inflates the harness. The operator then dons the mask. The red levers are then released, which deflates the harness, causing the mask to install correctly on the operator's head. <1033>

Oxygen is supplied to the mask regulator at about 78 psig (538 kPa). The regulator control (N/100% positions) allows the user to select a mixture of oxygen and air or pure oxygen.

- When the regulator control is set to the N position, a mixture of ambient air and pressurized oxygen is supplied to the mask on demand.
- With the control set to the 100% position, pure oxygen is supplied to the mask on demand.

The flow control knob is used to adjust the oxygen flow. If the knob is turned clockwise to the EMERGENCY position, the mask is supplied a constant flow of 100% oxygen at a positive pressure. To test the oxygen flow, press the flow control knob, which momentarily supplies oxygen to the mask.

When cabin altitude is more than 30,000 feet (9,144 meters), the mask supplies pure oxygen regardless of the N/100% switch position.

To remove the mask, the red release levers on the mask are squeezed, which inflates the harness to allow the mask to be removed from the operators head.

Blinker

Shows yellow cross when oxygen is flowing or when harness is inflated. Black, indicates no oxygen flow.

Oxygen On Flag (white)

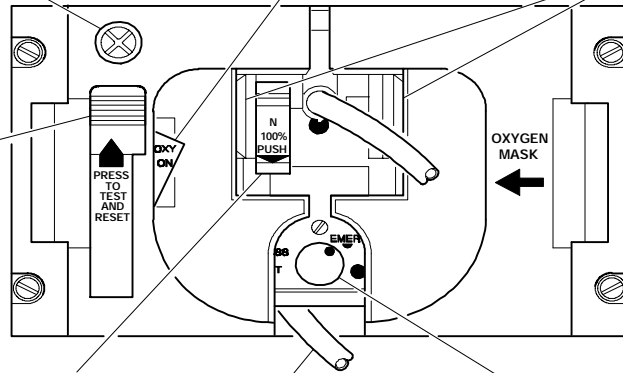
In view when mask is out to indicate that oxygen shut-off valve is open.

Release Levers (red)

Squeeze to unlock container doors, grasp levers and hose and pull to withdraw mask.

Test/Reset Lever

Press to test oxygen flow.



N/100% Regulator Control

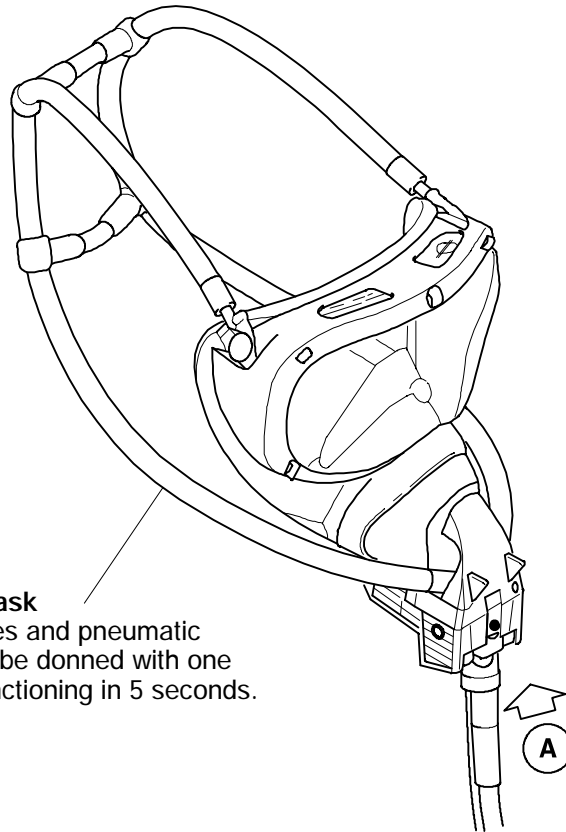
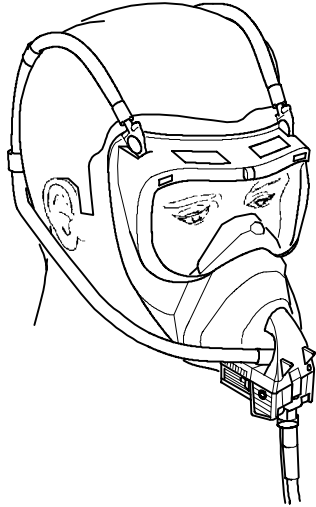
- N - Provides a mixture of ambient air with oxygen.
- 100% - Provides 100% oxygen.

Oxygen Supply Hose

Flow Control Knob

Used to adjust the supply pressure.

Crew Oxygen Mask
Figure 09-20-4

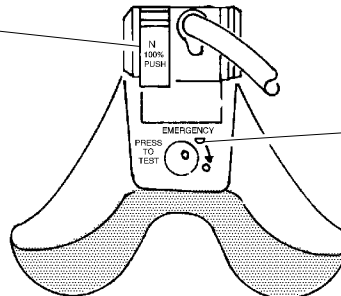


Full Face Mask

Mask, goggles and pneumatic harness can be donned with one hand and functioning in 5 seconds.

N/100% Regulator Control

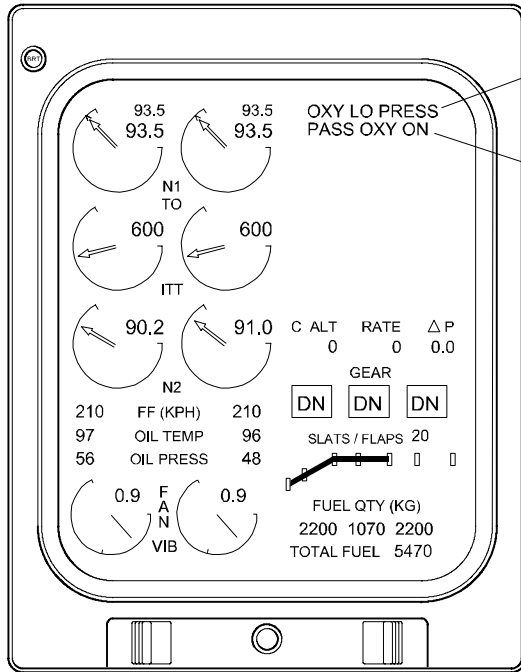
- N - Provides a mixture of ambient air with oxygen.
- 100% - Provides 100% oxygen.



Flow Control Knob
Used to adjust supply pressure.

(A)

Full Face Mask <1033>
Figure 09-20-5

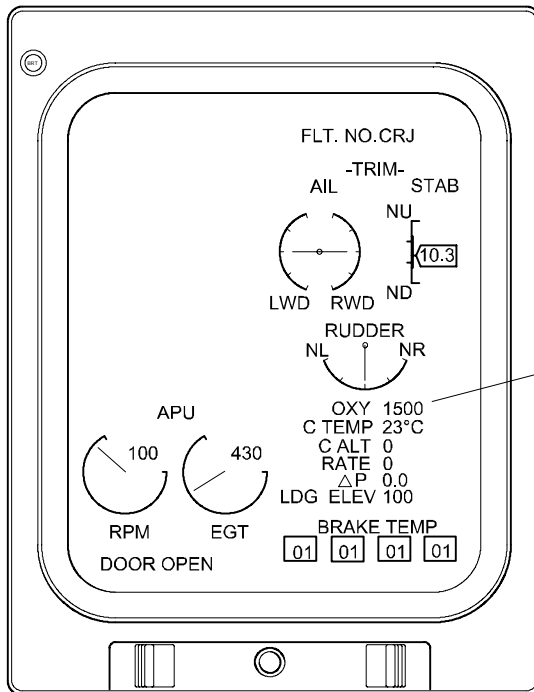


Primary Page

OXY LO PRESS caution (amber)
Indicates that the flight compartment oxygen bottle is low.

- Check dispatch requirements.

PASS OXY ON caution (amber)
Indicates that the passenger oxygen system has been activated.



Status Page

Crew Oxygen System Pressure Readout
Indicates oxygen system pressure in increments of 10 psi.

- Amber < 1410 psi
- Green ≥ 1410 psi

EICAS Oxygen Display <1001>
Figure 09-20-6



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Oxygen**

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D. Minimum Flight Crew Oxygen Pressure

NOTE

The EICAS indication of the oxygen pressure is corrected for OAT.

Table 1 defines the oxygen system pressure as indicated on the EICAS which corresponds to the quantity of oxygen necessary to perform an emergency descent followed by a continuous cruise at 10,000 feet with normal (N) mask setting (FAR 121.333).

Table 2 defines the oxygen system pressure as indicated on the EICAS which corresponds to the quantity of oxygen necessary to perform an unpressurized continuous cruise at 10,000 feet for 15 minutes with normal (N) mask setting (JAR OPS 1.780).

Table 1 - 50 cu. ft. Oxygen Bottle		
Minimum Pressure (psi)	2 Crew	1175
	3 Crew	1629

Table 2 - 50 cu. ft. Oxygen Bottle (JAA)		
Minimum Pressure (psi)	2 Crew	378
	3 Crew	436

The utilization of the above table is as follows:

- If oxygen pressure is greater than that given in Table 1, then there is enough oxygen to perform an emergency descent from 41,000 feet to 10,000 feet in 10 minutes, followed by 110 minutes of cruise at 10,000 feet.
- If oxygen pressure is between the values given in Tables 1 and 2, then there is enough oxygen to cruise at 10,000 feet for 15 minutes in an unpressurized cabin. <JAA>
- If oxygen pressure is lower than that given in Table 2, the oxygen bottle has to be refilled. <JAA>



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Oxygen**

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E. Crew Oxygen Consumption Data (As per FAR 121.333)

The following tables show the total time (in hours and minutes) that oxygen will be available at various mask settings, during various flight conditions, at initial bottle pressures of 1410 psi (pressure threshold that triggers OXY LOW PRESS message on the EICAS) and 1850 psi (max. crew oxygen bottle pressure). A margin of safety of 10% was subtracted from the full charge of 1850 psi in all cases.



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Oxygen**

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LEVEL FLIGHT AT CABIN PRESSURE ALTITUDE OF 8,000 FEET <1033>				
Crew members	2		3	
Initial Bottle Pressure	1400 psi	1850 psi	1400 psi	1850 psi
Normal Mask Setting	2 ^h 48'	3 ^h 47'	1 ^h 52'	2 ^h 32'
100% Mask Setting	0 ^h 38'	0 ^h 51'	0 ^h 25'	0 ^h 34'
Emergency Mask Setting	0 ^h 35'	0 ^h 48'	0 ^h 24'	0 ^h 32'

DESCENT (10 Min.) FROM 41,000 feet TO LEVEL FLIGHT AT SAFE ALTITUDE <1033> (100% MASK SETTING FOR DESCENT AND NORMAL MASK SETTING FOR LEVEL FLIGHT)				
Crew members	2		3	
Initial Bottle Pressure	1400 psi	1850 psi	1400 psi	1850 psi
Cabin Pressure Altitude	10,000 Feet	3 ^h 13'	4 ^h 25'	2 ^h 04'
	14,000 Feet	3 ^h 08'	4 ^h 16'	2 ^h 02'
	18,000 Feet	2 ^h 43'	3 ^h 31'	1 ^h 47'
	21,000 Feet	2 ^h 16'	2 ^h 59'	1 ^h 31'

DESCENT (10 Min.) FROM 41,000 feet TO LEVEL FLIGHT AT SAFE ALTITUDE <1033> (100% MASK SETTING FOR BOTH DESCENT AND LEVEL FLIGHT)				
Crew members	2		3	
Initial Bottle Pressure	1400 psi	1850 psi	1400 psi	1850 psi
Cabin Pressure Altitude	10,000 Feet	0 ^h 47'	1 ^h 02'	0 ^h 33'
	14,000 Feet	0 ^h 53'	1 ^h 11'	0 ^h 37'
	18,000 Feet	1 ^h 03'	1 ^h 24'	0 ^h 43'
	21,000 Feet	1 ^h 11'	1 ^h 35'	0 ^h 48'



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F. Passenger Oxygen System

The passenger oxygen system provides chemically generated oxygen for all cabin occupants in the event of cabin depressurization.

The oxygen generators and oxygen masks are installed as part of the passenger service unit panel and are available at all passenger seats, in the lavatories and at the flight attendant stations.

All oxygen compartment doors will open to present the oxygen masks automatically if cabin altitude reaches 14,500 ± 500 feet.

If the automatic system fails to open the doors, or if it is necessary to override the automatic system, the flight crew can operate the (guarded) PASS OXY switchlight on the overhead panel to open the oxygen doors in the passenger service units. As a back-up to electrically opening the doors, each individual oxygen compartment door can be opened manually through a release hole in the door.

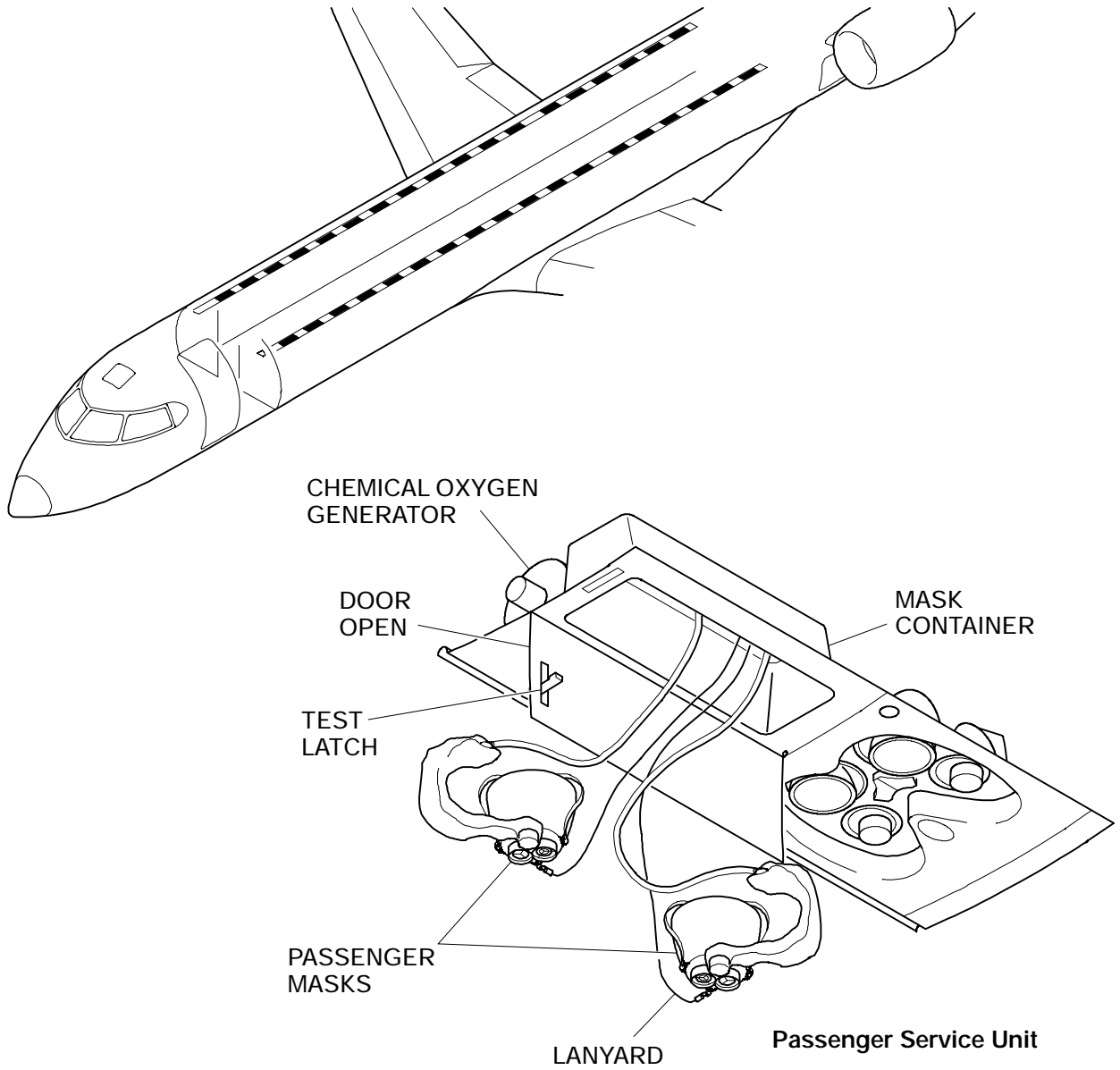
When the oxygen compartment doors are open, the passengers will pull the oxygen mask to their face, which pulls a lanyard connected to the firing pin of the chemical oxygen generator. This initiates the flow of oxygen to the passenger's oxygen mask. A flow indicator in the supply tube will show green when oxygen is flowing. The reservoir bags on the passenger oxygen masks begins to fill with oxygen. The chemical oxygen generator supplies approximately 22 minutes of oxygen to each mask.<1071>

WARNING

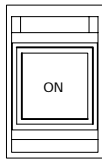
The oxygen generator surface temperature may reach 260 °C (500 °F) when generating oxygen. Do not touch or attempt to remove generator. Burn injury can result. If an active generator is inadvertently removed from the compartment, the generator must be placed in a metal container such as a lavatory or galley sink. The generator's heat will scorch other materials or fabrics.

NOTE

Odor similar to scorched cloth may be created by activation of generator. The odor does not affect the purity of the oxygen supply and there is no fire hazard.



PASS OXY



Overhead Panel

PASS OXY (Guarded)
Used when passenger oxygen system auto-deployment has failed or to override the auto-deployment system.

- ON (white) light indicates that oxygen system has deployed.

Passenger Oxygen System
Figure 09-20-7



**EMERGENCY EQUIPMENT
Oxygen**

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G. Portable Oxygen System

The portable oxygen system is available to supply oxygen to the crew or the passengers during an emergency.

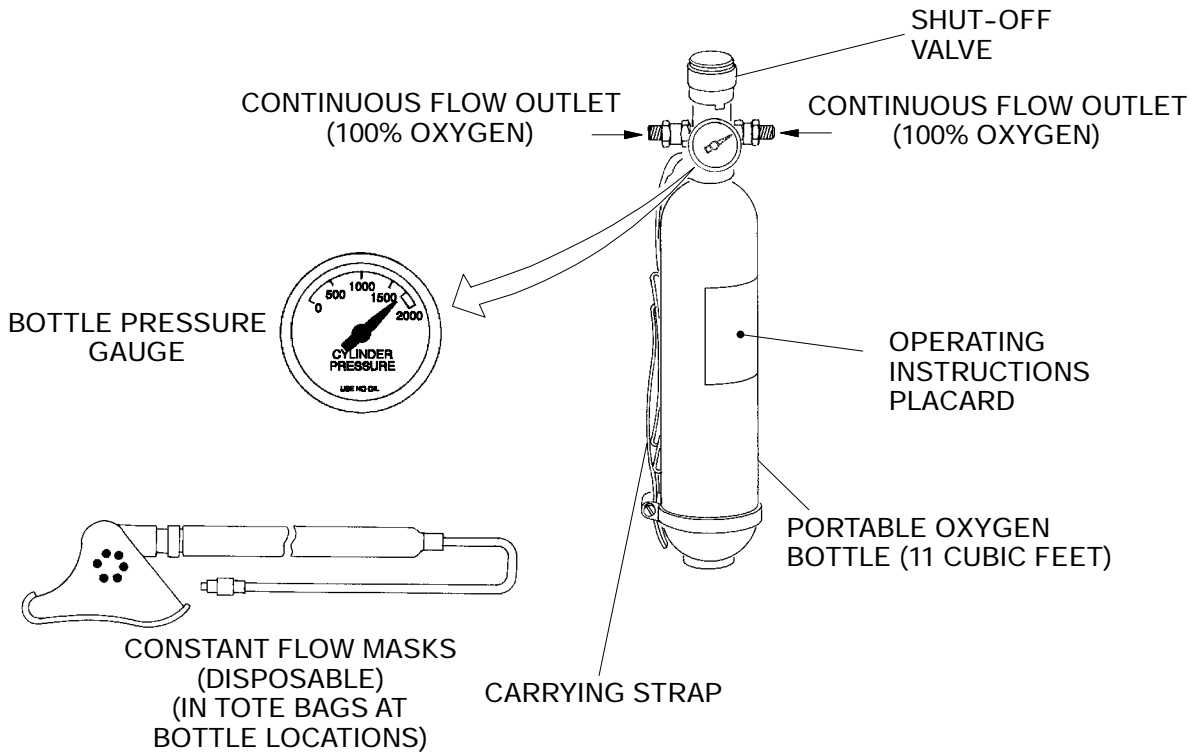
The portable oxygen bottles are provided, as protective breathing units, to be used for protection against smoke and harmful gases. In addition, the portable oxygen bottles can also be used for first aid purposes.

Portable oxygen bottles, with disposable masks, are located near each flight attendant station. The portable oxygen bottles allow the flight attendants to move about the passenger compartment during an emergency. The portable oxygen cylinders and masks can also supply therapeutic oxygen for first aid. Each cylinder has two regulator outlets which are color coded and pre-set to provide appropriate flow rates. An instruction decal located on the cylinder provides clear, easy to read operating instructions.

The contents gauge on each portable oxygen bottle indicates from 0 to 2000 psi with a red band between 1800 to 2000 psi. The bottle is fully charged when the gauge needle indicates in the red band.

WARNING

Take precautions to ensure that oxygen bottles do not come into contact with oil, grease, or other contaminants during handling. An explosion could result if this happens.



Portable Oxygen System
Figure 09-20-8



**EMERGENCY EQUIPMENT
Oxygen**


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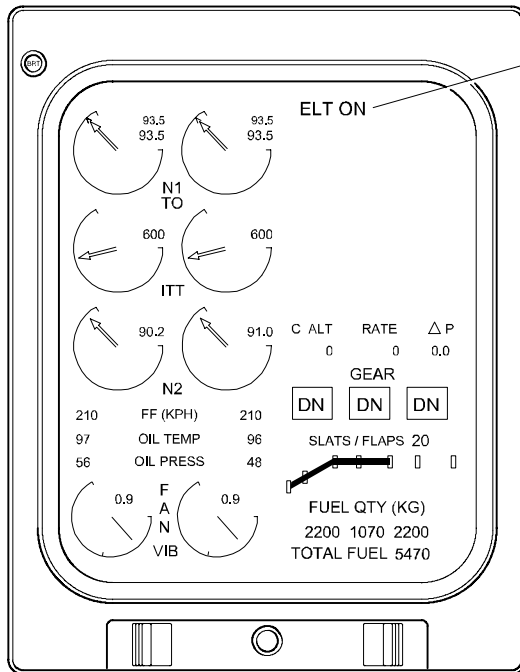
H. System Circuit Breakers

SYSTEM	SUB-SYSTEM	CB NAME	BUS BAR	CB PANEL	CB LOCATION	NOTES
Oxygen	Passenger Oxygen	PASS OXYGEN MANUAL DEPLOY R	BATTERY BUS	1	P8	
		PASS OXYGEN MANUAL DEPLOY L			P9	
		PASS OXYGEN AUTO DEPLOY R		2	P9	
		PASS OXYGEN AUTO DEPLOY L			P10	
	Crew Oxygen	CREW OXYGEN MONITOR			P11	

	EMERGENCY EQUIPMENT Emergency Locator Transmitter	Vol. 1	09-30-1
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1. **EMERGENCY LOCATOR TRANSMITTER**

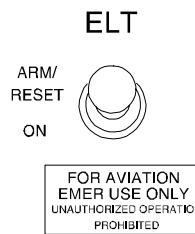
The satellite capable emergency locator transmitter (ELT) is located in the aft equipment compartment and is automatically activated during an aircraft crash. The ELT transmits a standard swept tone on 121.5, 243.0 and 406.0 MHz for satellites. The two position ELT switch is located in the flight compartment on the overhead panel and is labeled ARM/RESET and ON. The switch is used to test, arm and reset the unit. During normal flight operations, the ELT switch is in the ARM/RESET position. The ELT can be manually activated by selecting the ELT switch to ON. To reset the unit after it has been activated automatically, the switch is selected to the ON position, then back to the ARM/RESET position. <1092>



Primary Page


ELT ON caution (amber)
Indicates that ELT has been activated.

ELT
Used to test, arm
and reset transmitter.



Overhead Panel

Emergency Locator Transmitter <1001>
Figure 09-30-1

	EMERGENCY EQUIPMENT Fire Fighting Equipment	Vol. 1	09-40-1
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1. **FIRE FIGHTING EQUIPMENT**

Portable fire extinguishers, fire protection gloves and protective breathing equipment are provided to fight a fire occurring inside the flight or passenger compartment.

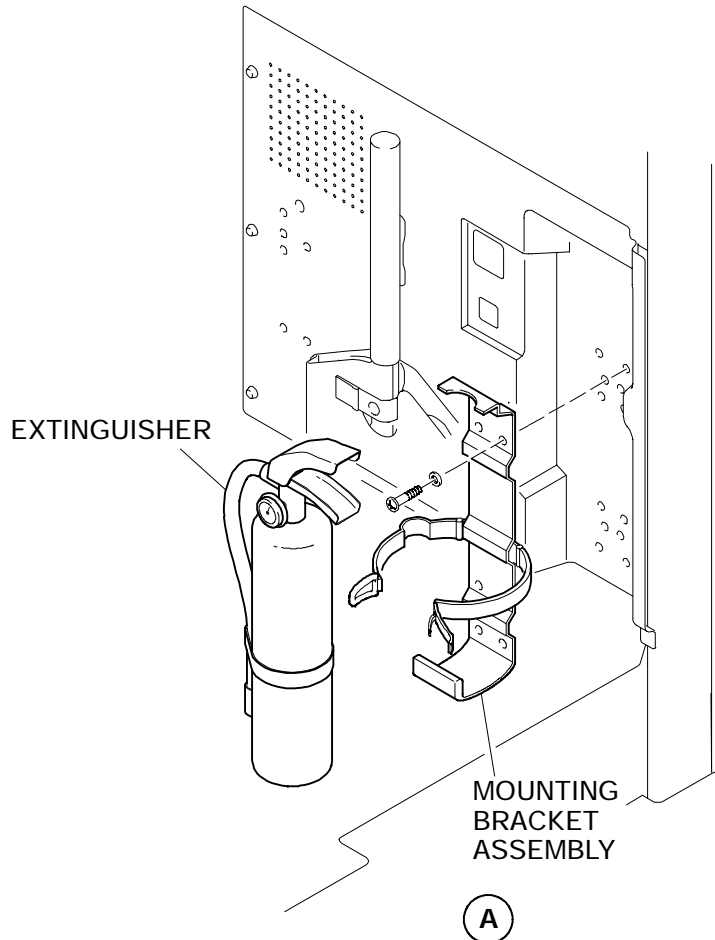
A. **Portable Halon Fire Extinguishers**

There are four hand-operated fire extinguishers containing Halon 1211 in the aircraft. One is located in the cockpit, one in the entrance storage compartment, one is on the right aft lower bulkhead and one is located in the left fwd overhead bin. Halon 1211 is effective on electrical, oil and fuel fires, and is suitable for use in cold weather.

Effective discharge time of a 3-1/2 pound bottle is 10 to 12 seconds. Ventilate the compartment promptly after successfully extinguishing the fire to reduce gasses produced by the fire and Halon.


WARNING

If a fire extinguisher is to be discharged in the flight compartment, all flight crew must wear oxygen masks with EMERGENCY selected (100% oxygen). Crew exposure to high levels of Halon vapors may result in dizziness, impaired coordination, and reduced mental sharpness.



NOTE
Flight compartment
extinguisher shown.

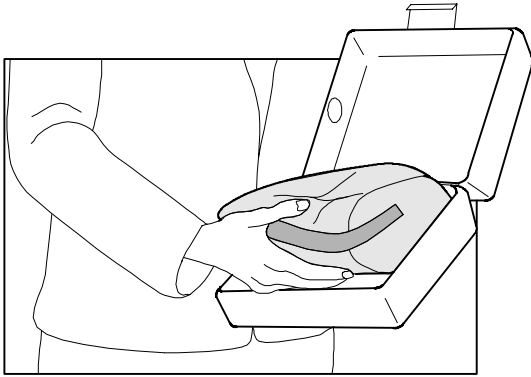
Portable Halon Fire Extinguisher – Typical
Figure 09-40-1

	EMERGENCY EQUIPMENT Fire Fighting Equipment	Vol. 1	09-40-3
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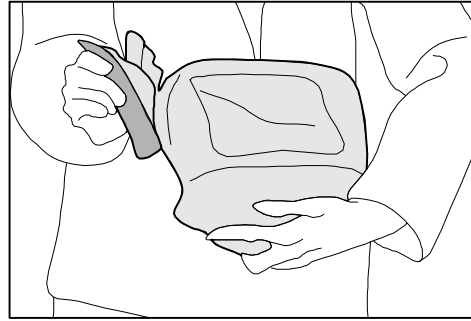
B. Protective Breathing Equipment

The protective breathing equipment consists of four protective breathing units (PBUs). The PBUs are self-contained smoke hoods with on-demand oxygen regeneration systems that prevent injury to crew members from smoke inhalation. Each PBU is in a vacuum-sealed bag, and is kept in a storage container with a tamper-proof seal. One PBU is installed in the flight compartment on the bulkhead behind the Copilots seat. Another is in the forward storage compartment. One is located on the bulkhead behind the last row of seats on the left side of the aircraft and one is located in the left forward overhead bin.

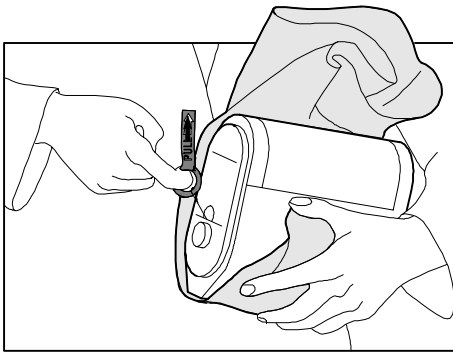
	Flight Crew Operating Manual CSP C-013-067	
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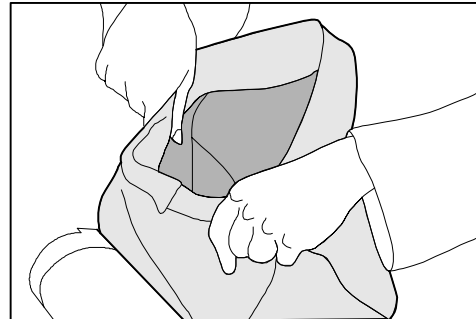
1. Remove device from storage case.



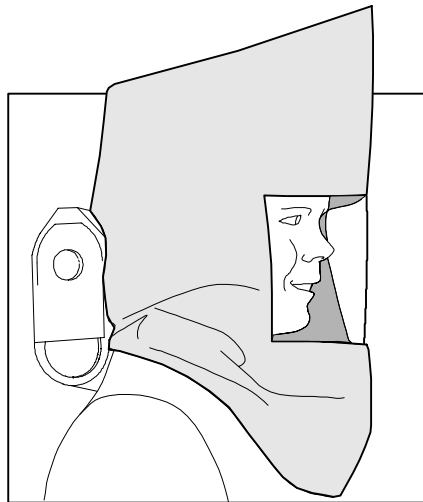
2. Tear off red pull strip and remove device from protective cover.



3. Pull activation ring, on the life support pack, in the direction indicated.




4. With the life support pack away from user, grasp hole in neck seal with thumbs, insert chin into hole and pull hood across face and over head.



5. Pull hood down until headband firmly engages forehead (approximately 15 minutes of respiration protection).

Protective Breathing Equipment
Figure 09-40-2

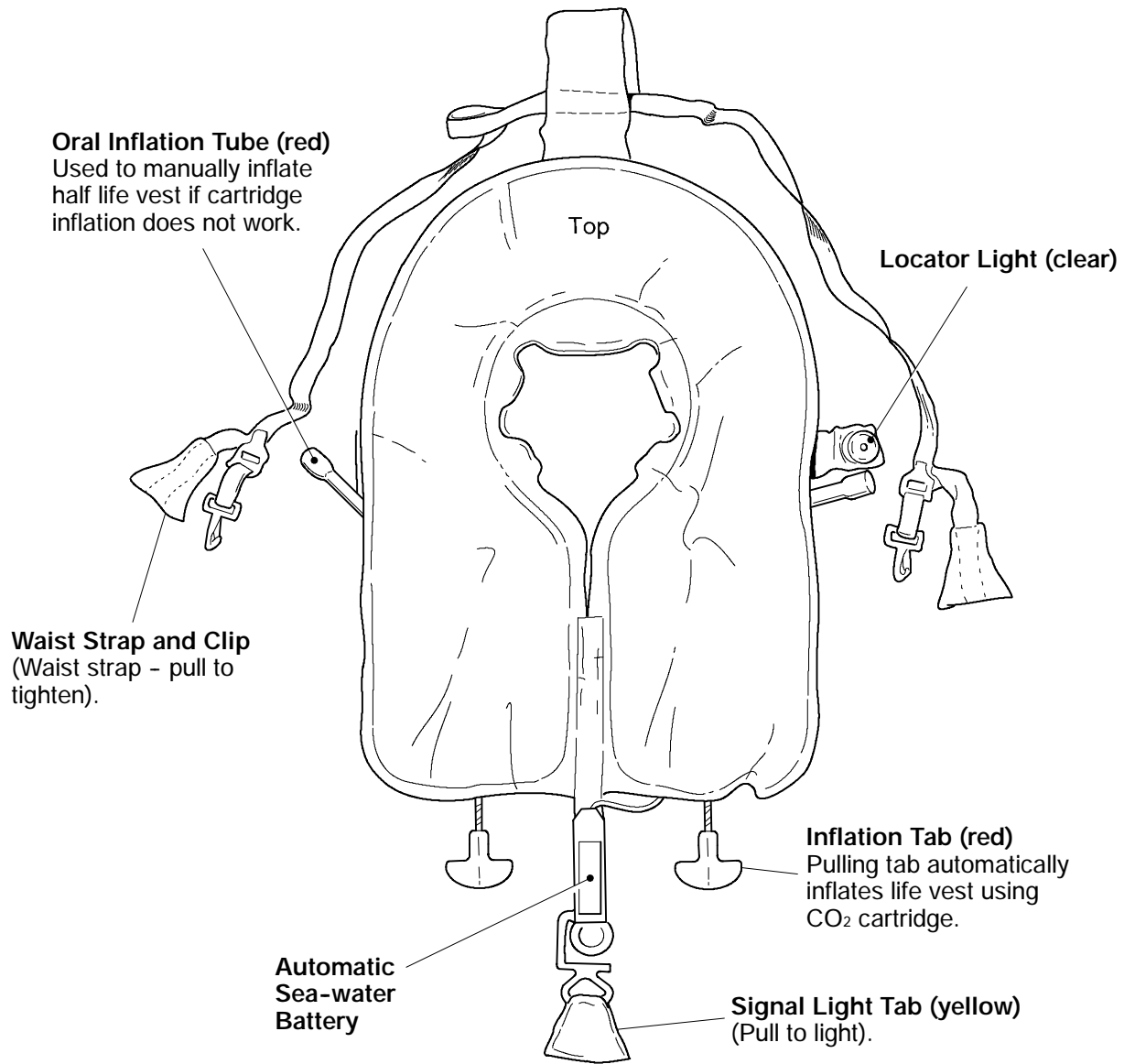
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1. OVER WATER EMERGENCY EQUIPMENT

A life vest is provided for each member of the flight crew. One life vest is stowed under each pilot seat, one life vest is stowed adjacent to the 3rd crew seat and one is adjacent to each flight attendants seat.

Each life vest includes a manual and an oral inflation system, a locator light, and a system for automatic battery plug removal during life vest deployment.

Each passenger seat cushion serves as a floatation device.



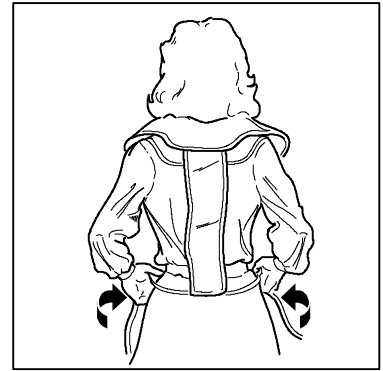
Life Vest
Figure 09-50-1



1. Locate and remove the life vest.



2. Put the life vest over head...



3. ...with the back piece behind.



4. Fasten rings to catch.



5. Pull straps tight.



6. Jerk down on red inflation tabs.



7. Should it become necessary, life vest can be orally inflated by blowing into red oral inflation tubes.



Inflate life vest just before leaving the airplane!
If using overwing emergency exit inflate life vest when on the wing.

Life Vest Operation
Figure 09-50-2




**EMERGENCY EQUIPMENT
Over Water Emergency Equipment**

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	EMERGENCY EQUIPMENT Flight Compartment Emergency Equipment	Vol. 1	09-60-1
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1. FLIGHT COMPARTMENT EMERGENCY EQUIPMENT

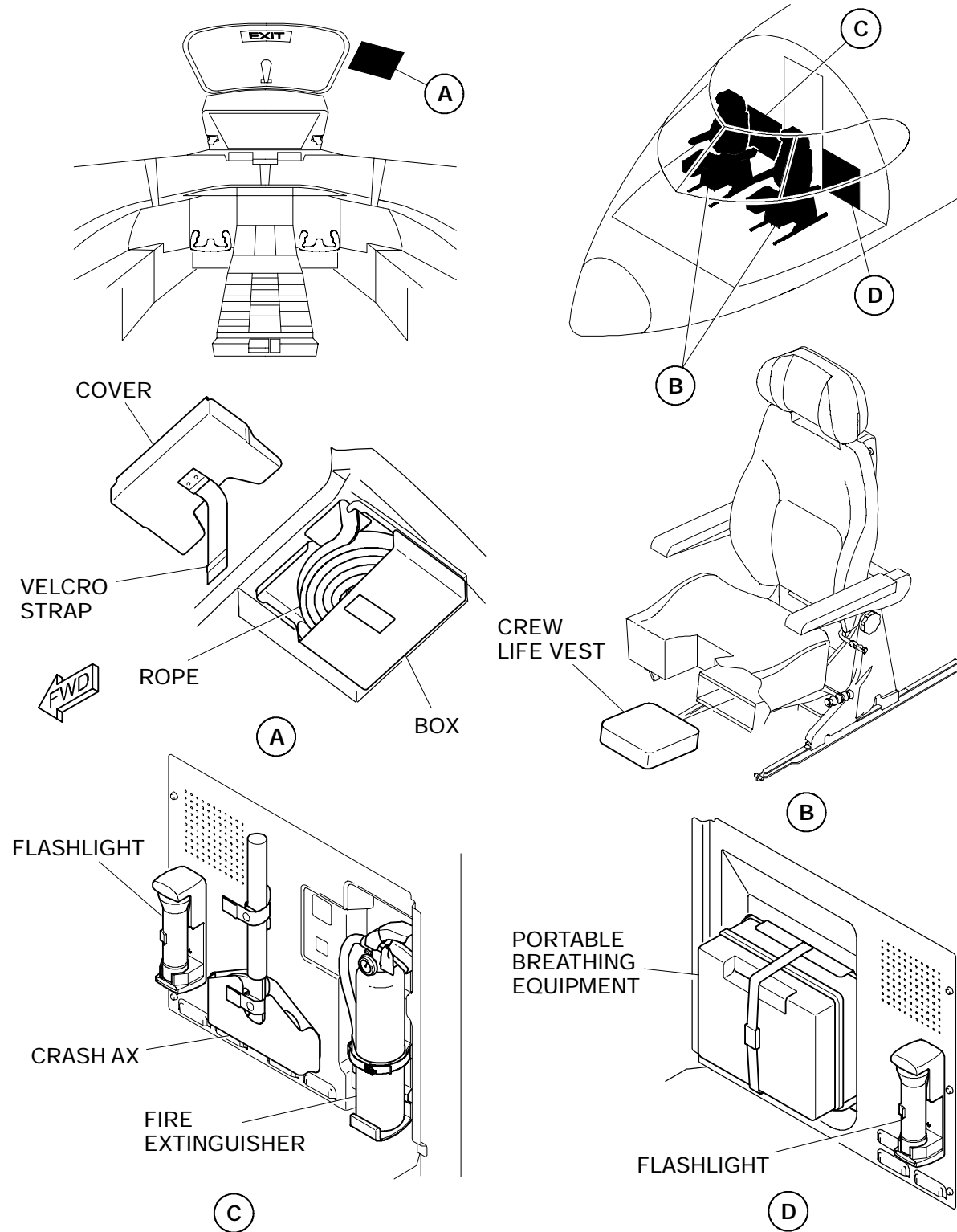
Emergency equipment that is located in the flight compartment includes:

- Crash axe
- Fire Extinguisher (Refer to 09-40-1)
- Portable Breathing Equipment (Refer to 09-40-5)
- Crew life vests (Refer to 09-50-1)
- Escape rope

The crash axe is mounted on the lower flight compartment bulkhead behind the copilot.

A flashlight is mounted on the lower flight compartment bulkhead behind each pilot. Each flashlight is powered using two, standard type, D-cell batteries.

The escape rope is installed in the upper right head-liner. It has a cover that is secured with a Velcro strap. The rope is used by the flight compartment crew in an emergency to exit the aircraft through the overhead escape hatch and lower themselves to the ground.



Flight Compartment Emergency Equipment
Figure 09-60-1