SECTION 6-13

OXYGEN

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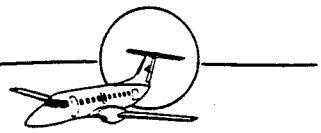
GENERAL

The EMB-120 RT Brasilia oxygen system supplies oxygen to the flight crew and passengers.
The airplane may be optionally equipped with either a gaseous or a chemical oxygen system.
In the gaseous oxygen system, a 115 cu.ft oxygen cilinder supplies oxygen to the flight crew, attendant and passengers.
In the chemical oxygen system, chemical generators supply oxygen to the attendant and passengers, and a 40 cu.ft cylinder supplies oxygen to the flight crew.
The two oxygen systems are separetely described in this section.
The components and equipment that are common to both versions are presented at the end of this section and complement the information necessary for the correct understanding of the operation of each specific oxygen system.

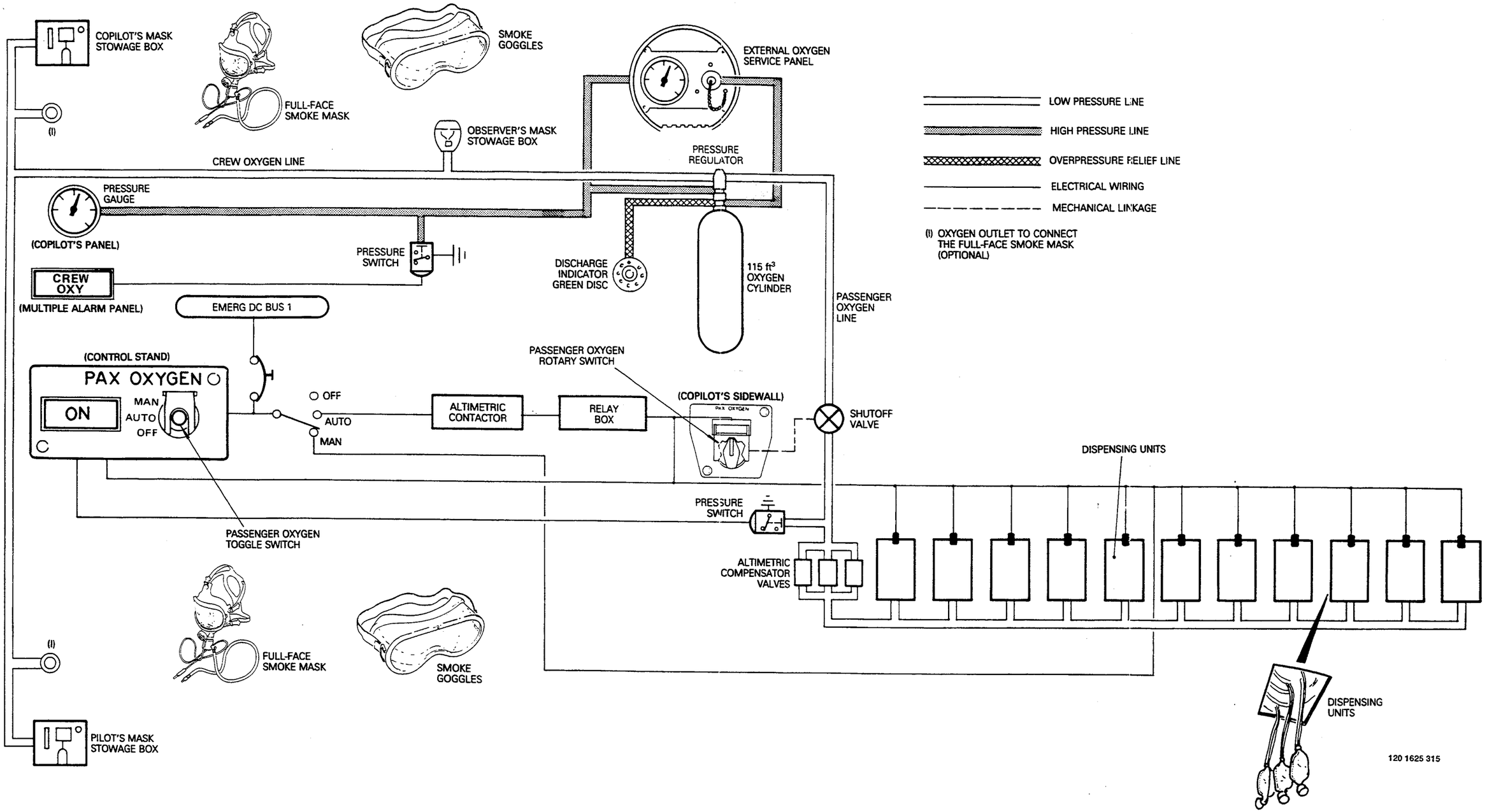


GASEOUS OXYGEN SYSTEM

The gaseous oxygen system is the conventional high pressure gaseous type in which the oxygen is stored in a 115 cu.ft cylinder at high pressure, being distributed under low pressure to the flight crew, attendant and passenger masks.
The gaseous oxygen system is subdivided into flight crew and passenger oxygen subsystems.

FLIGHT CREW OXYGEN SUBSYSTEM

In the flight crew oxygen subsystem, the crew masks are permanently fed by the oxygen flow from the 115 cu.ft cylinder, thus being always ready for use. A quick-donning diluter/demand mask for the flight crew is available in each mask stowage box.
One portable oxygen cylinder, two pairs of smoke goggles, and one full-face smoke mask complement the flight crew oxygen subsystem.
Some airplanes may be optionally equipped with two additional full-face smoke masks and one pair of smoke goggles.



GASEOUS OXYGEN SYSTEM SCHEMATIC

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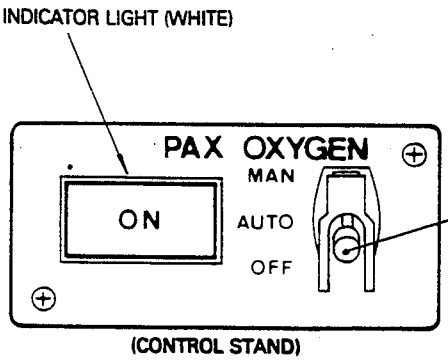
PASSENGER OXYGEN SUBSYSTEM

The passenger oxygen subsystem is fed by the 115 cu.ft cylinder which provides oxygen flow to the passenger and attendant continuous flow masks installed in the dispensing units. The dispensing units are located along the cabin and toilet ceiling.
Passenger oxygen supply is controlled by the flight crew by means of two control panels located in the cockpit.
The system operates automatically provided that the Passenger Oxygen rotary switch and the Passenger Oxygen toggle switch are in the AUTO position. In this condition, when cabin altitude exceeds 14000 ±500 ft, an altimetric contactor sends an electric signal to open the shutoff valve and the dispensing unit doors.
Opening the shutoff valve pressurizes the passenger oxygen line. As the dispensing unit door opens, the masks drop, thus being available for use. Pulling the mask to the user's face, the individual supplying valve will open, allowing oxygen supply to that mask.
Three altimetric compensator valves installed in the passenger oxygen line regulate the oxygen flow according to the cabin altitude.
An ON indicator light, installed on the control stand, illuminates when the passenger oxygen line is pressurized and the dispensing unit doors are energized to open.

WARNING: SHOULD THE CABIN ALTITUDE EXCEED 14000 FT, CHECK THE ON LIGHT ILLUMINATED IN THE CONTROL STAND. IF THE LIGHT IS EXTINGUISHED, LIFT THE SAFETY GUARD AND SET THE PASSENGER OXYGEN TOGGLE SWITCH TO MAN. SHOULD THE ON LIGHT STILL BE EXTINGUISHED, TURN THE PASSENGER OXYGEN ROTARY SWITCH TO MAN.

NOTE: Passenger oxygen supply is restricted to thirty minutes of use. After this time, the passenger oxygen line must be depressurized by setting to OFF the Passenger Oxygen rotary switch, installed in the copilot's sidewall.

Energization for opening the dispensing unit doors causes the NO SMOKING sign to illuminate, provided that the No Smoking switch is in the AUTO position.
For airplanes whose switch does not have an AUTO position, the NO SMOKING sign should be turned on manually.
One portable oxygen cylinder complements the passenger oxygen subsystem.
Some airplanes may be optionally equipped with one additional portable oxygen cylinder and two full-face smoke masks.



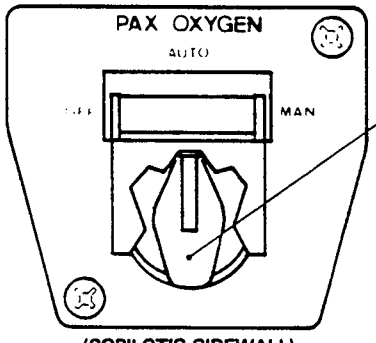
(CONTROL STAND)

PASSENGER OXYGEN TOGGLE SWITCH

MAN - Guarded and momentary position. Manually activates the passenger oxygen system, by-passing the altimetric contactor. In this position, the passenger line is pressurized and the dispensing unit doors are energized to open.

AUTO - Normal position. The dispensing unit doors and the shutoff valve are automatically energized to open, by means of the altimetric contactor actuation, when the cabin altitude exceeds 14000 ± 500 ft.

OFF - Passenger oxygen system inoperative. To be used in cargo configuration.



(COPILOT'S SIDEWALL)

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PASSENGER OXYGEN ROTARY SWITCH

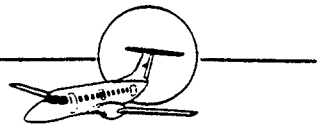
MAN - Guarded position. Opens manually the shutoff valve, pressurizing the passenger oxygen line.

AUTO - Normal position. The shutoff valve is automatically energized to open, by means of an altimetric contactor, through the command of the Passenger Oxygen toggle switch.

OFF - Guarded position. Closes manually the shutoff valve, depressurizing the passenger oxygen line. To be used in cargo configuration.

NOTE: The airplanes S/N 120.280 and on are not equipped with safety guard.

PASSENGER OXYGEN SUBSYSTEM CONTROLS AND INDICATORS



OXYGEN CYLINDER (115 CU.FT)

The 115 cu.ft oxygen cylinder, installed in the attendant cabinet, provides a usable capacity of 2950 liters at 1850 psi.

The oxygen cylinder recharging is performed through an external service panel located on the right side of the front fuselage.

The quantity of available oxygen can be monitored by means of two pressure gauges, one installed on the copilot's panel and the other one on the external oxygen service panel.

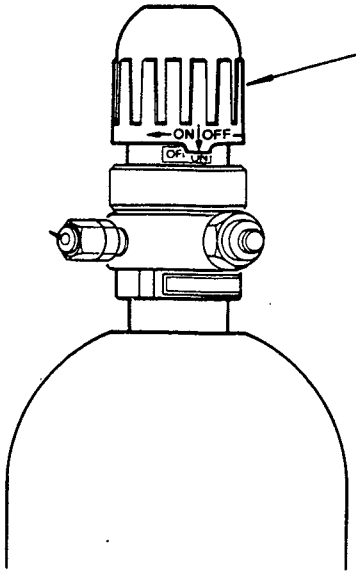
The high pressure oxygen stored in the cylinder is reduced by means of an integrated shutoff/regulator valve installed in the cylinder top. The shutoff/regulator valve controls the oxygen outlet pressure (70 ± 10 psi) to the flight crew and passenger distribution lines. A relief valve opens should the outlet pressure exceed 90 psi.

The oxygen cylinder is also protected against overpressure by a safety disc installed in the shutoff/regulator valve. The disc is designed to blow out if the cylinder internal pressure increases up to the range of 2450 psi (at 71°C)/2770 psi (at 21°C). Once the safety disc blows out, a complete oxygen cylinder discharge will take place.

The cylinder overpressure discharging is externally indicated by means of the blowout of a discharge indicator green disc, located close to the external oxygen service panel.

If the cylinder pressure drops to below 375 ± 25 psi, a pressure switch in the high pressure line is actuated, and the CREW OXY amber light in the multiple alarm panel illuminates.

The illumination of the CREW OXY light indicates an oxygen reserve time of 35 minutes for each flight crew member (pilot, copilot and observer), provided the passenger oxygen line is not pressurized.



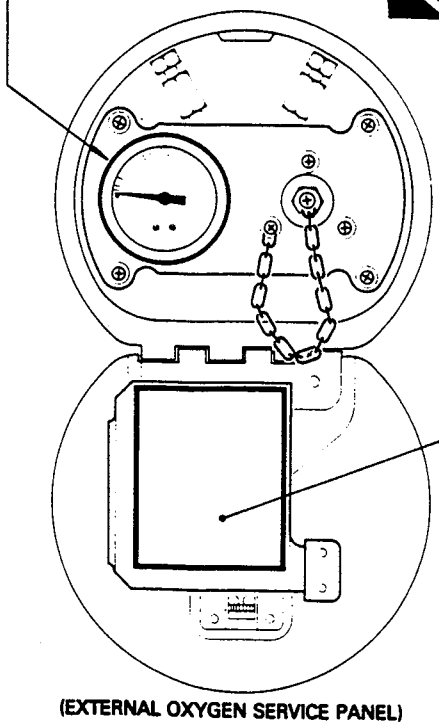
OXYGEN CYLINDER SHUTOFF/REGULATOR VALVE

ON – Opens the low pressure outlet line.

OFF – Closes the low pressure outlet line.

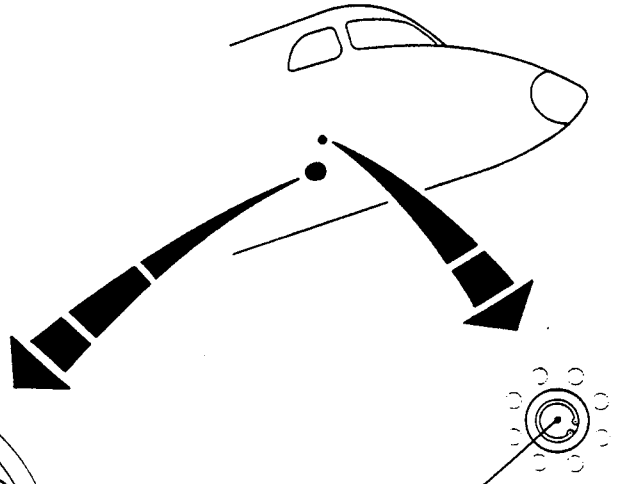
PRESSURE GAUGE (ALSO AVAILABLE ON COPILOT'S PANEL)

A red radial indicates the maximum allowable pressure (1850 psi), at the temperature of 21°C (70°F).



(EXTERNAL OXYGEN SERVICE PANEL)

OXYGEN RECHARGING CURVE



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DISCHARGE INDICATOR GREEN DISC

VISIBLE – Indicates that no cylinder overpressure discharge has been occured (safety disc not blown out).

NOT VISIBLE – Indicates that a cylinder overpressure discharge has been occured (safety disc blown out).

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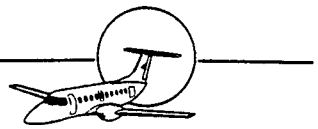
OXYGEN CYLINDER CONTROLS AND INDICATORS



MINIMUM OXYGEN CYLINDER PRESSURE FOR DISPATCH

The tables below show the minimum oxygen system pressure for dispatch to meet consumption requirements, as a function of the number of passengers.

NOTE: The minimum oxygen pressures for dispatch were calculated at an ambient temperature of 21°C (70°F). For other temperatures, refer to the Oxygen Pressure Correction as a Function of the Temperature chart at the end of this Section.

Crew comprising pilot, copilot, observer and attendant.

NUMBER OF PAX	INDICATED PRESSURE (PSI)	NUMBER OF PAX	INDICATED PRESSURE (PSI)
01	780	16	1140
02	800	17	1160
03	820	18	1180
04	850	19	1210
05	870	20	1230
06	900	21	1260
07	920	22	1280
08	940	23	1300
09	970	24	1330
10	990	25	1350
11	1020	26	1380
12	1040	27	1400
13	1060	28	1420
14	1090	29	1450
15	1110	30	1470

Crew comprising pilot, copilot and attendant.

NUMBER OF PAX	INDICATED PRESSURE (PSI)	NUMBER OF PAX	INDICATED PRESSURE (PSI)
01	600	16	960
02	620	17	990
03	650	18	1010
04	670	19	1030
05	700	20	1060
06	720	21	1080
07	740	22	1110
08	770	23	1130
09	790	24	1150
10	820	25	1180
11	840	26	1200
12	870	27	1230
13	890	28	1250
14	910	29	1280
15	940	30	1300

OXYGEN SYSTEM DURATION

The oxygen system duration in hours and minutes is shown in the table below.

PRESSURE (PSI)	CREW	NUMBER OF PASSENGERS														
		02	04	06	08	10	12	14	16	18	20	22	24	26	28	30
1850	3	10:40	6:22	4:31	3:29	2:50	2:23	2:03	1:48	1:36	1:26	1:18	1:11	1:06	1:01	0:56
	4	9:13	5:30	3:54	3:00	2:26	2:03	1:46	1:33	1:22	1:14	1:07	1:01	0:56	0:52	0:48
1500	3	7:46	4:37	3:16	2:31	2:03	1:43	1:28	1:17	1:08	1:01	0:55	0:51	0:46	0:43	0:40
	4	6:19	3:45	2:39	2:02	1:39	1:23	1:11	1:02	0:55	0:49	0:44	0:40	0:37	0:34	0:31
1400	3	6:57	4:07	2:55	2:15	1:49	1:31	1:18	1:08	1:01	0:54	0:49	0:45	0:41	0:38	0:35
	4	5:30	3:15	2:18	1:46	1:25	1:11	1:01	0:53	0:47	0:42	0:38	0:34	0:31	*	*
1300	3	6:07	3:38	2:34	1:58	1:36	1:20	1:08	1:00	0:53	0:47	0:42	0:39	0:35	0:32	0:30
	4	4:40	2:46	1:57	1:29	1:12	1:00	0:51	0:44	0:39	0:35	0:31	*	*	*	*
1200	3	5:17	3:08	2:12	1:42	1:22	1:08	0:58	0:51	0:45	0:40	0:36	0:33	0:30	*	*
	4	3:51	2:16	1:35	1:13	0:58	0:48	0:41	0:36	0:31	*	*	*	*	*	*
1000	3	3:38	2:08	1:30	1:09	0:55	0:46	0:39	0:33	*	*	*	*	*	*	*
	4	2:11	1:16	0:53	0:40	0:31	*	*	*	*	*	*	*	*	*	*
800	3	1:58	1:09	0:47	0:35	*	*	*	*	*	*	*	*	*	*	*
	4	0:32	*	*	*	*	*	*	*	*	*	*	*	*	*	*

* – Airplane not cleared for dispatch.

NOTES: 1 – Indicated values are computed according to emergency descent profile. In addition, the system has provisions for two hours of oxygen for each crew member (pilot, copilot and observer).

2 – The CREW column refers to the number of crew members:
(3) – Pilot, copilot and attendant.
(4) – Pilot, copilot, attendant and observer.

3 – The PRESSURE column refers to the pressure read on the oxygen pressure gauge.

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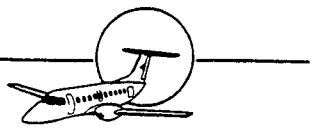


CHEMICAL OXYGEN SYSTEM

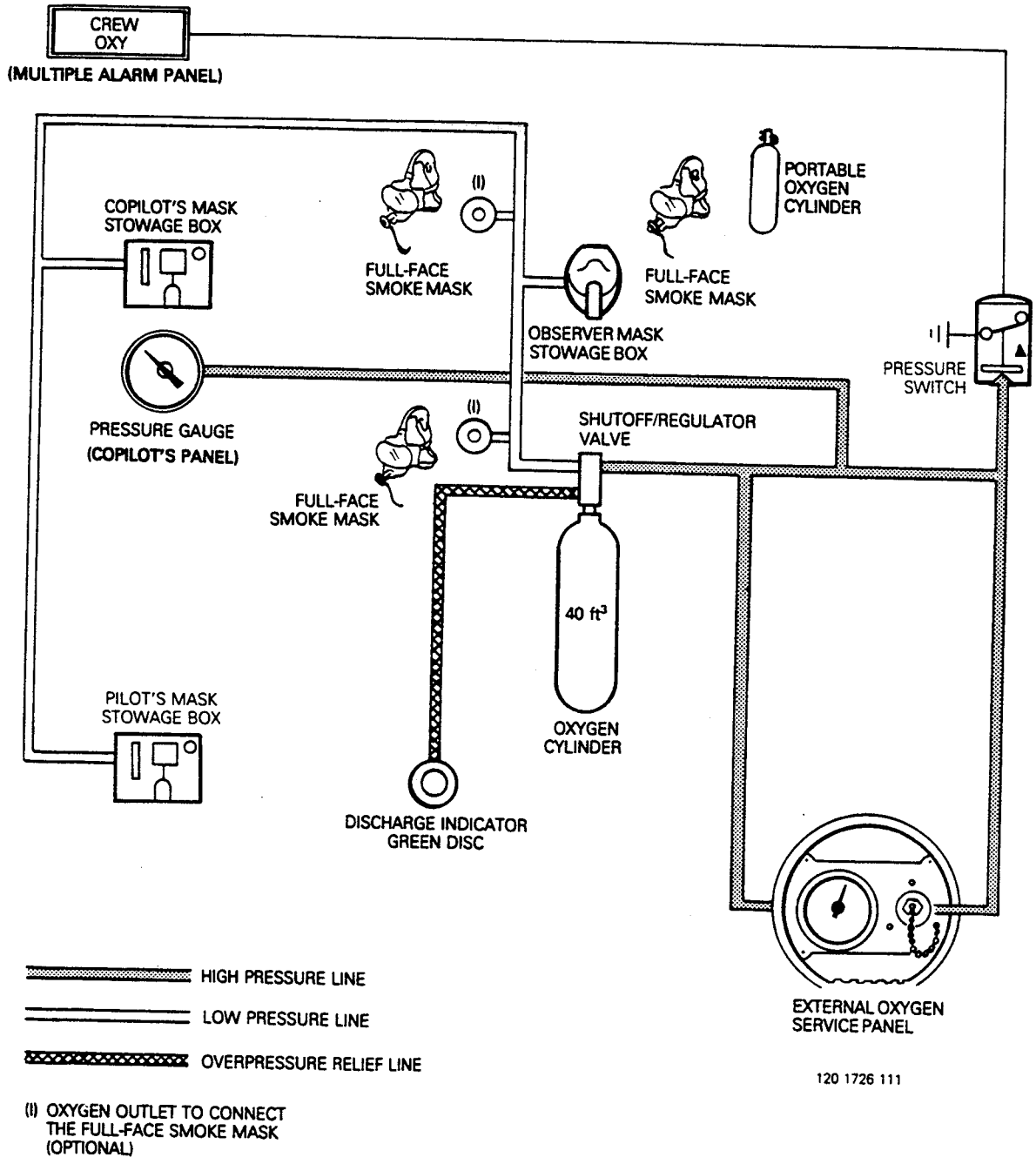
The chemical oxygen system is divided into two different and separated subsystems: one flight crew oxygen subsystem (gaseous) and one passenger oxygen subsystem (chemical).

FLIGHT CREW OXYGEN SUBSYSTEM

This oxygen subsystem is a conventional high pressure gaseous type, in which the oxygen is stored in a 40 cu.ft cylinder at high pressure and distributed under low pressure to the flight crew masks. The flight crew oxygen masks are permanently fed by the oxygen flow from the cylinder, thus being always ready for use.

A quick-donning diluter/demand mask for the flight crew is available in each mask stowage box. One portable oxygen cylinder, two pairs of smoke goggles, and one full-face smoke mask complement the flight crew oxygen subsystem.

Some airplanes may be optionally equipped with two additional full-face smoke masks and one pair of smoke goggles.



FLIGHT CREW OXYGEN SUBSYSTEM SCHEMATIC

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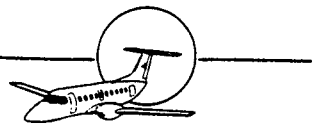


OXYGEN CYLINDER (40 CU.FT)

The 40 cu.ft oxygen cylinder, installed in the attendant cabinet, provides a usable capacity of 979 liters at 1850 psi.

The oxygen cylinder recharging is performed through an external service panel located on the right side of the front fuselage.

The quantity of available oxygen can be monitored by means of two pressure gauges, one installed on the copilot's panel and the other one on the external oxygen service panel.

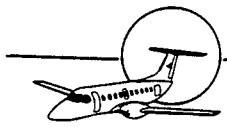
The high pressure oxygen stored in the cylinder is reduced by means of an integrated shutoff/ regulator valve installed in the cylinder top. The shutoff/regulator valve controls the oxygen outlet pressure (70 ± 10 psi) to the flight crew distribution lines. A relief valve opens should the outlet pressure exceed 90 psi.

The oxygen cylinder is also protected against overpressure by a safety disc installed in the shutoff/ regulator valve. The disc is designed to blow out if the cylinder internal pressure increases up to the range of 2450 psi (at 71°C)/2770 psi (at 21°C). Once the safety disc blows out, a complete oxygen cylinder discharge will take place.

The cylinder overpressure discharging is externally indicated by means of the blowout of a discharge indicator green disc, located close to the external oxygen service panel.

If the cylinder pressure drops to below 375 ± 25 psi, a pressure switch in the high pressure line is actuated, and the CREW OXY amber light in the multiple alarm panel illuminates.

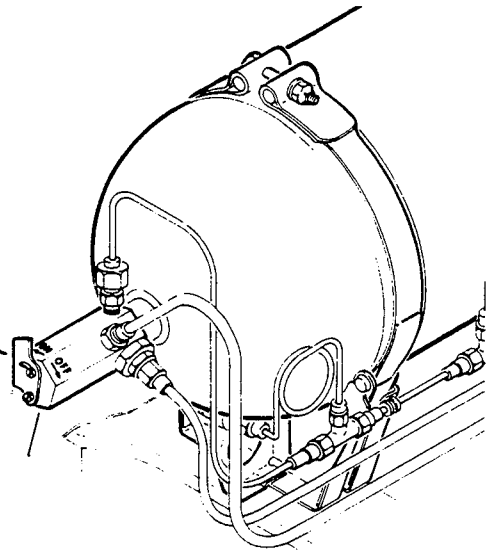
The illumination of the CREW OXY light indicates an oxygen reserve time of 12 minutes for each flight crew member (pilot, copilot and observer).



OXYGEN CYLINDER SHUTOFF/REGULATOR VALVE

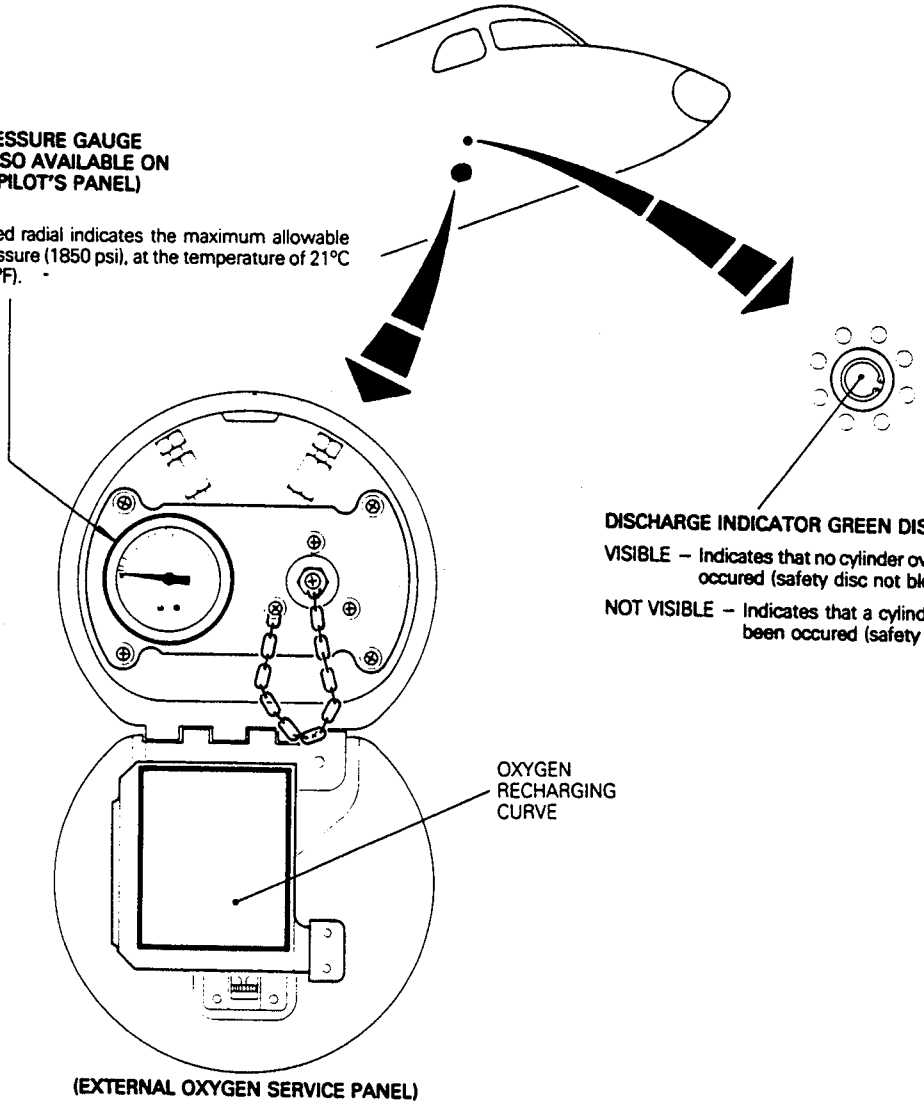
ON – Opens the oxygen distribution to the crew.

OFF – Closes the oxygen distribution to the crew.



PRESSURE GAUGE (ALSO AVAILABLE ON COPILOT'S PANEL)

A red radial indicates the maximum allowable pressure (1850 psi), at the temperature of 21°C (70°F).



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DISCHARGE INDICATOR GREEN DISC

VISIBLE – Indicates that no cylinder overpressure discharge has been occured (safety disc not blown out).

NOT VISIBLE – Indicates that a cylinder overpressure discharge has been occured (safety disc blown out).

(EXTERNAL OXYGEN SERVICE PANEL)

OXYGEN CYLINDER CONTROLS AND INDICATORS

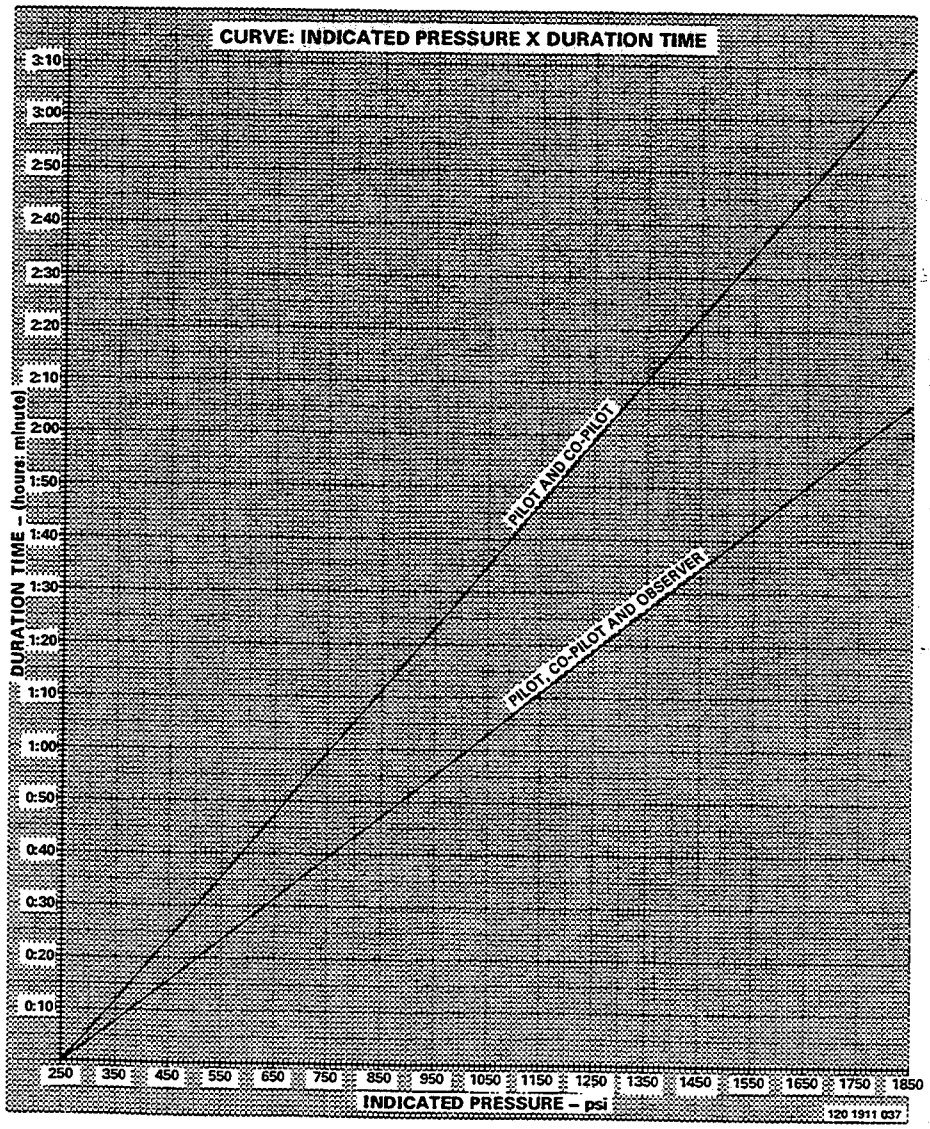
16-13I-001

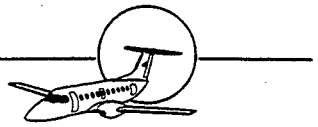
MINIMUM OXYGEN CYLINDER PRESSURE FOR DISPATCH

- Flight crew constituted by pilot and copilot: 1270 psi.
- Flight crew constituted by pilot, copilot, and observer: 1780 psi.

NOTE: The minimum oxygen pressures for dispatch were calculated at an ambient temperature of 21°C (70°F). For other temperatures, refer to the Oxygen Pressure Correction as a Function of the Temperature chart at the end of this Section.

FLIGHT CREW OXYGEN SUBSYSTEM DURATION FOR EMERGENCY DESCENT





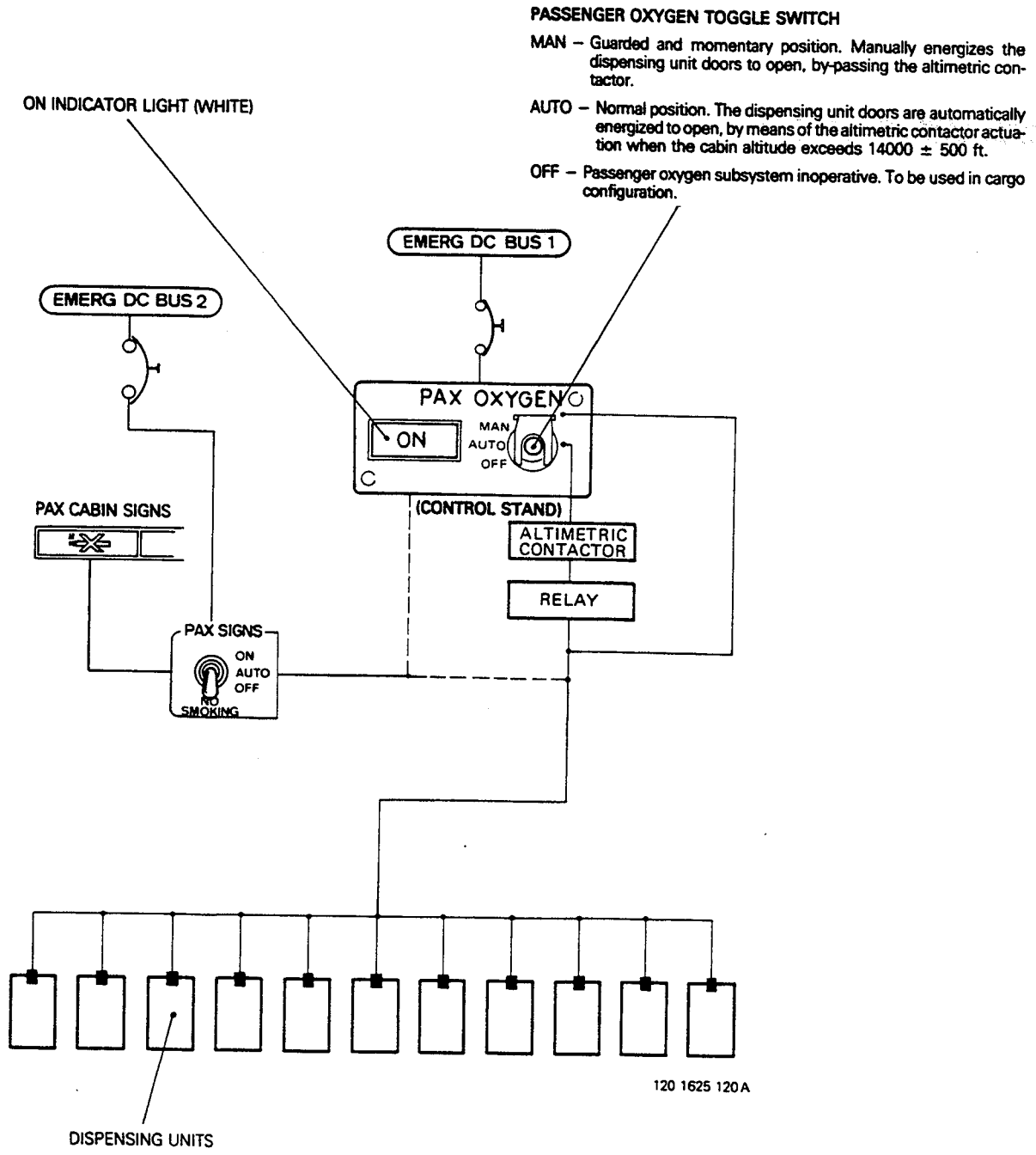
PASSENGER OXYGEN SUBSYSTEM

The passenger oxygen subsystem consists of chemical generators and continuous flow masks installed in the dispensing units. The dispensing units are located along the cabin and toilet ceiling. The passenger oxygen subsystem operates automatically, provided the Passenger Oxygen toggle switch, located on the control stand, is in the AUTO position. In this condition, when cabin altitude exceeds 14000 ± 500 ft, an altimetric contactor sends an electric signal to open the dispensing unit doors. As the dispensing unit doors open, the masks drop, thus being available for use. Pulling the masks to the user's face causes the chemical generator to be activated, then supplying oxygen to the masks connected to that dispensing unit, with the necessary rate for approximately 12 minutes. An ON indicator light, installed on the control stand, illuminates when the dispensing unit doors are energized to open.

WARNING: SHOULD THE CABIN ALTITUDE EXCEED 14000 FT, CHECK THE ON LIGHT ILLUMINATED IN THE CONTROL STAND. IF THE LIGHT IS EXTINGUISHED, LIFT THE SAFETY GUARD AND SET THE PASSENGER OXYGEN TOGGLE SWITCH TO MAN.

CAUTION: ONCE ACTUATED, EACH CHEMICAL GENERATOR SUPPLIES OXYGEN CONTINUOUSLY, REGARDLESS OF WHETHER THE MASKS CONNECTED TO IT ARE BEING USED OR NOT.
WHEN OXYGEN IS SUPPLIED, HIGH TEMPERATURE IS PRODUCED IN THE OXYGEN CHEMICAL GENERATOR.

Energization for opening the dispensing unit doors causes the NO SMOKING sign to illuminate, provided that the No Smoking switch is in the AUTO position.
For airplanes whose switch does not have an AUTO position, the NO SMOKING sign should be turned on manually.
One portable oxygen cylinder complements the passenger oxygen subsystem.
Some airplanes may be optionally equipped with one additional portable oxygen cylinder and two full-face smoke masks.



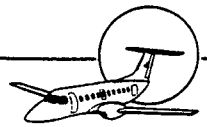
PASSENGER OXYGEN SUBSYSTEM SCHEMATIC

GASEOUS AND CHEMICAL OXYGEN SYSTEM COMMON EQUIPMENT

Some items of equipment which make up the gaseous and the chemical oxygen systems are identical.

These items, such as crew and passenger oxygen masks, portable oxygen cylinders, smoke goggles, and full-face smoke masks, are described herein to provide additional information for a complete understanding of the operation of each version of the oxygen systems.

The chart for oxygen pressure correction as a function of the temperature as well as schematics showing the location of the oxygen system components are also presented here.

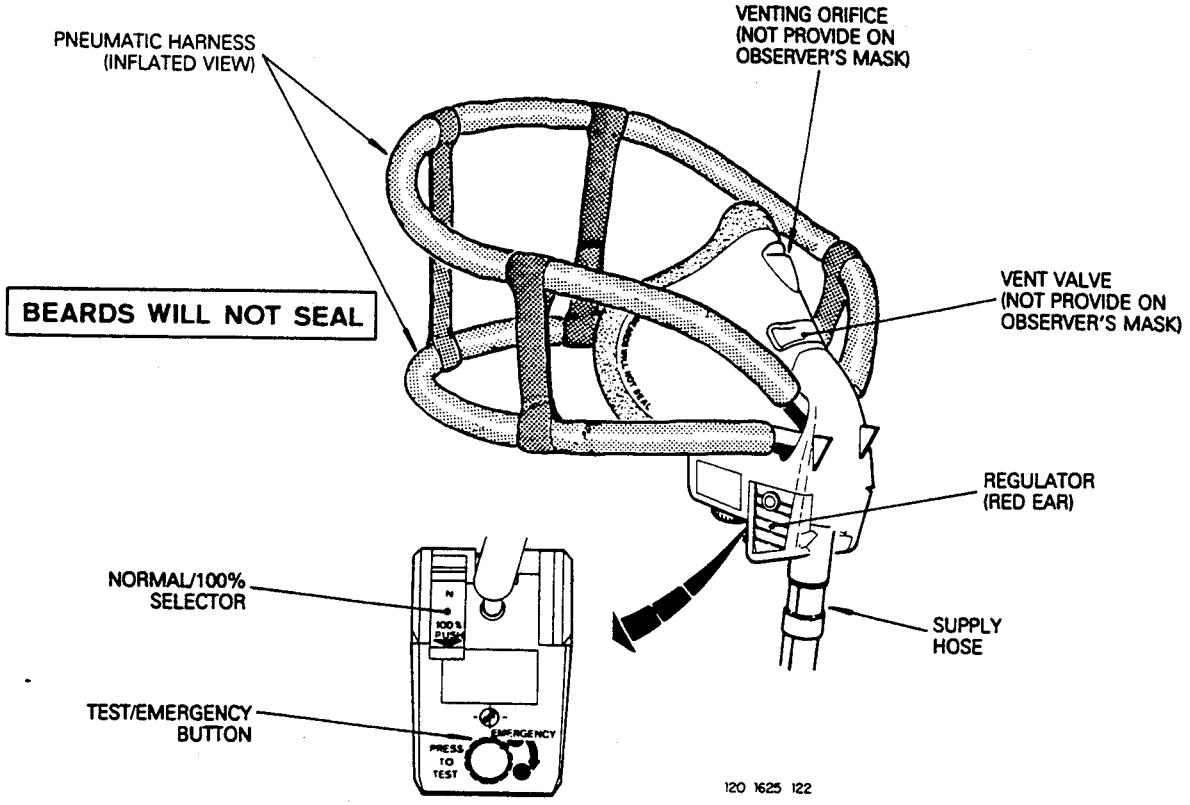


CREW OXYGEN MASK

The crew masks are the quick-donning oro-nasal type and allow oxygen flow by demand, or under pressure, if required.
The quick-donning operation is as follows: hold the mask firmly with one hand by the regulator (red ears) and pull it out of the box. The harness inflates rapidly and assumes a shape large and rigid enough to allow the user to don it quickly. Releasing the regulator ears deflates the harness, securing the mask to the user's face.
The crew masks can also be connected to the portable oxygen cylinder outlets, by means of an adapter contained in the oxygen cylinder bag.
A carbon microphone and a microphone connector are supplied as parts of the mask assembly. A vent valve and a venting orifice are incorporated into the mask (refer to Smoke Goggles, in this Section).
The mask operation modes are controlled through the Normal/100% selector and Test/Emergency button, as shown in the figure below.

OBSERVER OXYGEN MASK

The observer mask is similar to the crew masks, with the exception that the observer mask includes a flow indicator installed in the supply hose but has no vent valve or venting orifice.
The flow indicator turns green when adequate oxygen pressure is being supplied to the mask.



MASK OPERATION MODES

NORMAL/100% SELECTOR

NORMAL – Oxygen diluted with ambiental cabin air is supplied on demand. The mixture ratio depends on cabin altitude. Above 33000 ft, pure oxygen is supplied.

100% – Pure oxygen is supplied on demand at all cabin altitudes. This mode must be selected when protective breathing is required.

TEST/EMERGENCY BUTTON

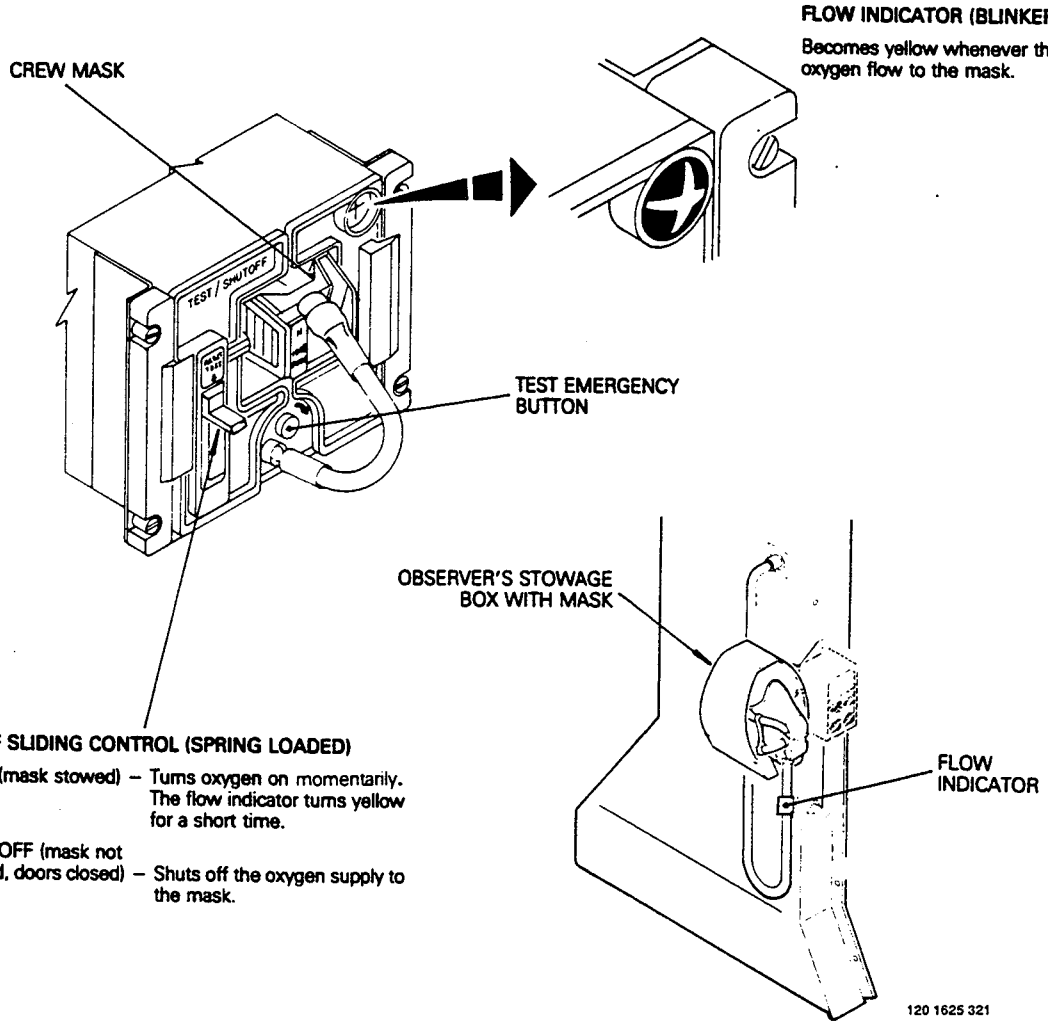
EMERGENCY – Pure oxygen is supplied under pressure at all cabin altitudes. This mode must be selected when using the smoke goggles.

TEST – Test pressure supply to regulator.

CREW AND OBSERVER OXYGEN MASK

CREW MASK STOWAGE BOX

The crew mask stowage boxes, integrated in the cockpit lateral consoles, are directly connected to the oxygen distribution line and to the communication system. The boxes incorporate a shutoff valve which keep the mask regulator unpressurized when in the stowed position. Additionally, a Test/Shutoff sliding control and a flow indicator (blinker) allow testing the equipment in its place.
When the mask is stowed, the shutoff valve remains closed. Once the mask is removed from its place, the door, and consequently, the shutoff valve open allowing oxygen flow to the mask.
During mask use, if the stowage box doors are closed, an OXY ON flag at the left door edge will appear, indicating that the shutoff valve remains open. In order to stop the oxygen flow with the mask in use, it is necessary to close the box doors and actuate the Test/Shutoff sliding control.
The observer mask stowage box is installed on the cockpit partition, near the observer seat.



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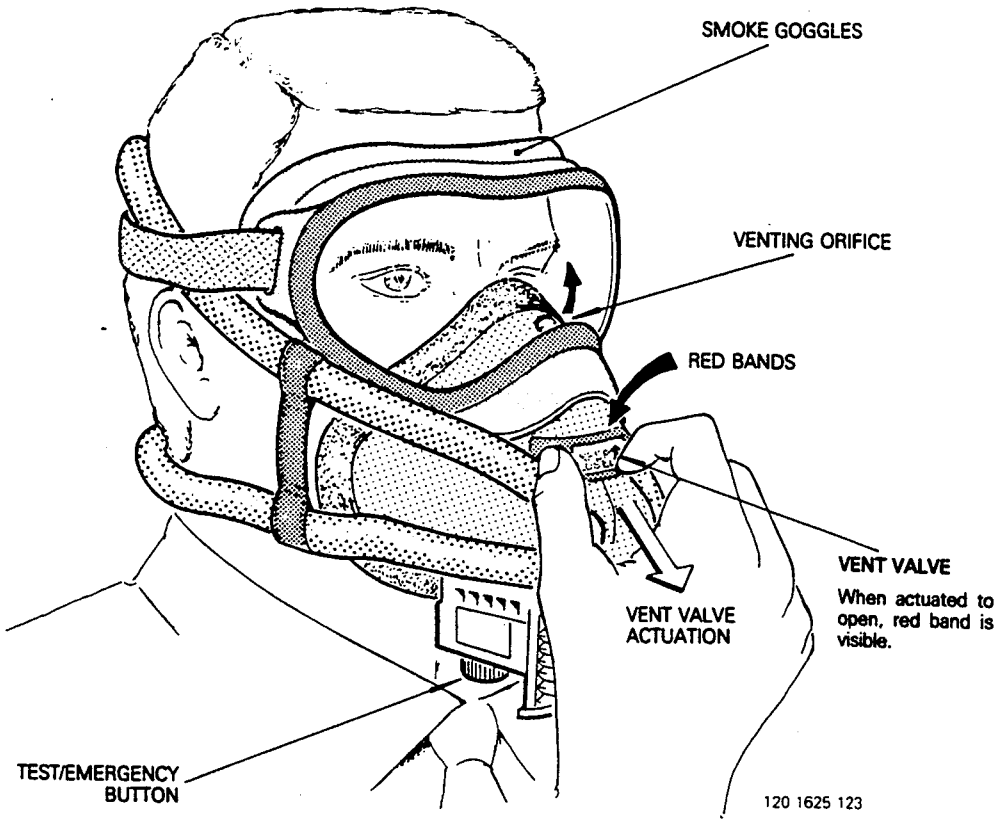
SMOKE GOGGLES

The smoke goggles were designed for use in conjunction with the crew mask assembly when operating in environments containing smoke or harmful gases.
The vent valve, located on the crew mask shell, should be manually actuated by the user to allow direct communication between the venting orifice and the goggles. With the mask Test/Emergency button selected to the Emergency position, a metered oxygen flow will be directed to the goggles so as to allow continuous venting and prevent any ingress or harmful gases.



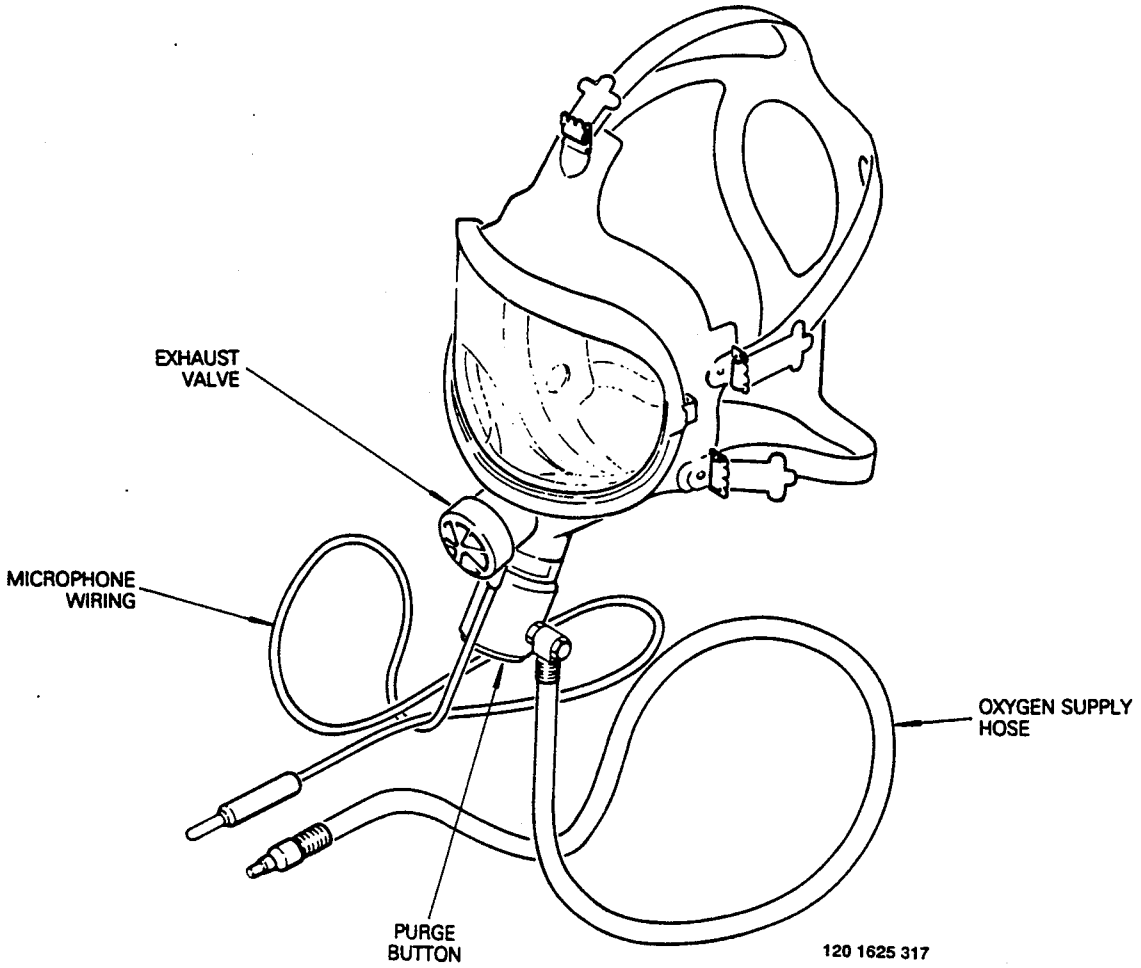
FULL-FACE SMOKE MASK

The full-face smoke mask can be used with a portable oxygen cylinder when fighting fires and/or working in toxic gas environments.

A 100% demand regulator with a purge button is attached directly to the mask facepiece. Pressing the purge button creates a positive pressure in the facepiece to force any smoke or contaminants out through the exhaust valve, so flushing the mask.

The full-face smoke mask is provided with a microphone, allowing the user to maintain radio communication with the crew or air traffic control.

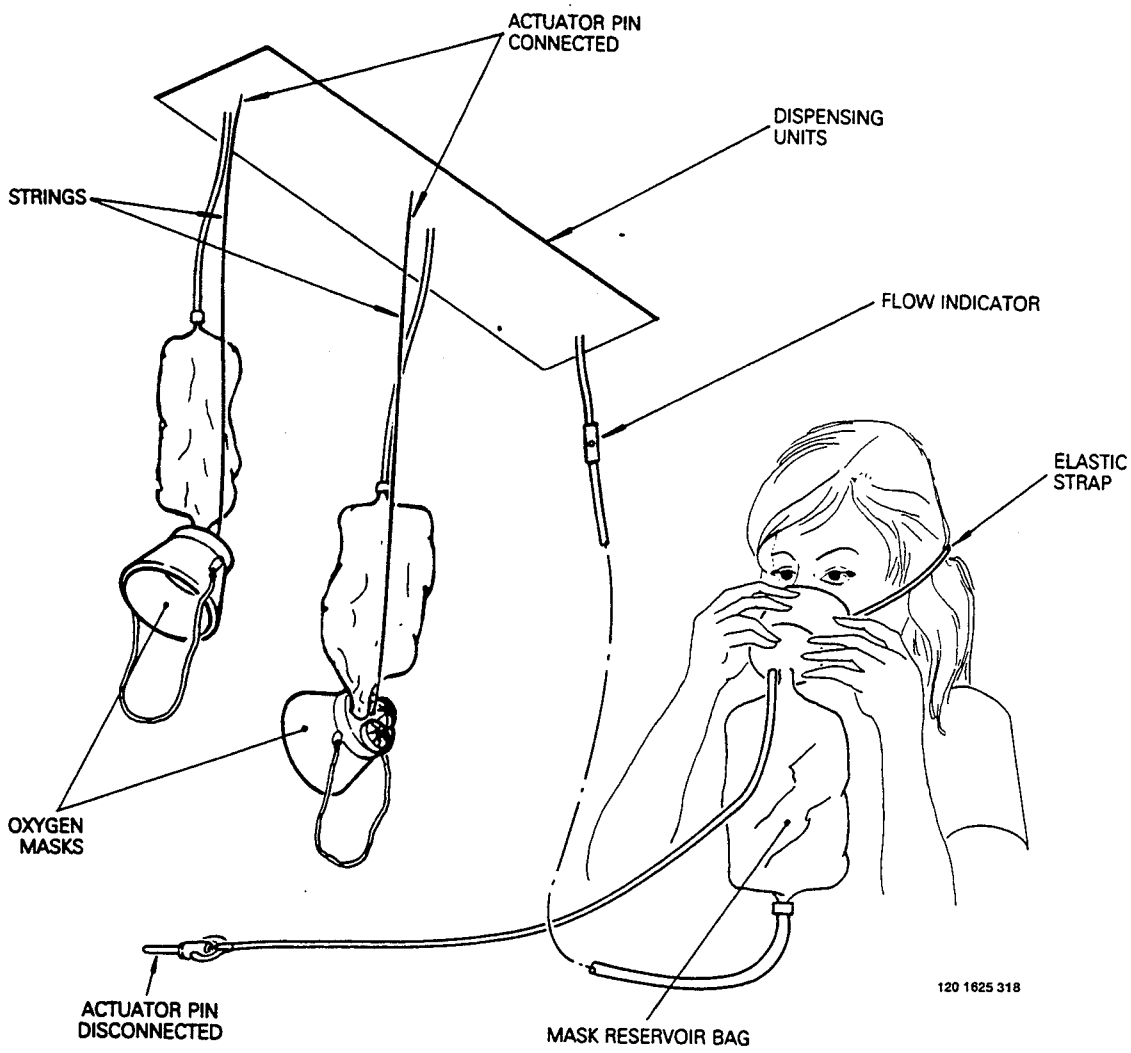
Optionally, some airplanes have provisions to connect the full-face smoke mask directly to the crew oxygen line.



PASSENGER OXYGEN MASKS

The passenger oxygen mask is designed to conform to facial contours. An elastic strap allows the mask to be properly held to the face.
The passenger masks becomes available for use by means of automatic or manual actuation of the dispensing unit doors.
To use the mask, the passenger must pull it against the face.
Pulling the mask against the face will activate a continuous supply of oxygen to the mask reservoir bag.
A flow indicator installed on the supply hose turns green when adequate oxygen pressure is being supplied to the mask.

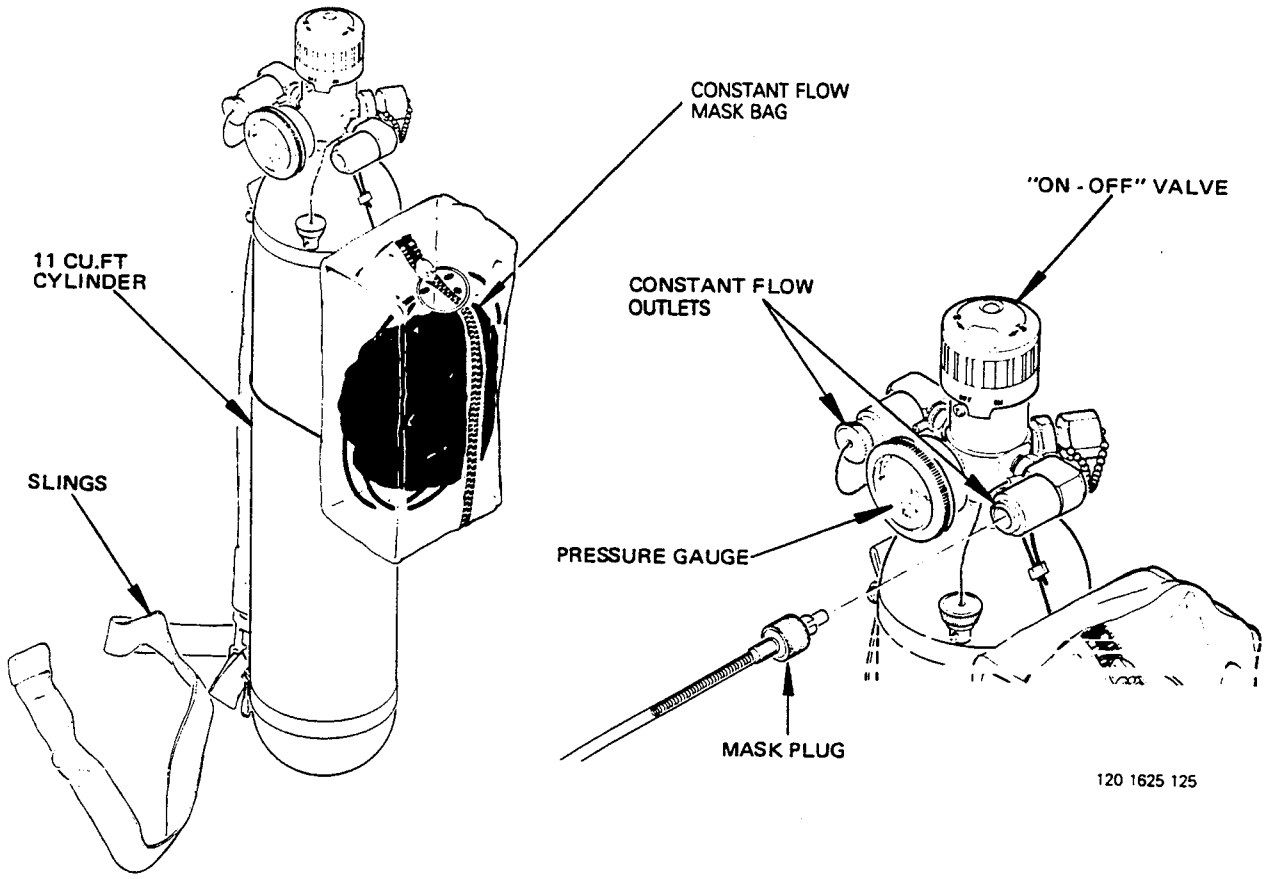
WARNING: DURING OXYGEN SUPPLY, THE NO SMOKING SIGN MUST BE ON AND STRICTLY OBSERVED.



PORTABLE OXYGEN CYLINDER

One portable oxygen cylinder is installed in the cockpit for crew use. One or two cylinders are available in the passenger cabin for first aid and walk-around use.
The cylinder has a capacity of 11 cu.ft, containing 286 liters of usable oxygen. The regulator installed on the cylinder top is the ON-OFF type and regulates the outlet pressure to 60-90 psi. A gauge provides cylinder pressure monitoring. The cylinder is equipped with two outlets that allow the constant-flow masks, crew masks or full-face smoke masks to be connected. A small bag, with a constant-flow mask, as well as an adapter for crew mask connection accompany the cylinder.
The minimum pressure of the portable oxygen cylinder installed in the cockpit is 1800 psi for dispatch, whereas the minimum pressure of the portable oxygen cylinder installed in the passenger cabin is 1200 psi for dispatch.

NOTE:
- These pressure values were calculated for a maximum utilization period of 30 minutes.
- The minimum oxygen pressure for dispatch were calculated at an ambient temperature of 21°C (70°F). For other temperatures, refer to Oxygen Pressure Correction as a Function of the Temperature chart at the end of this Section.



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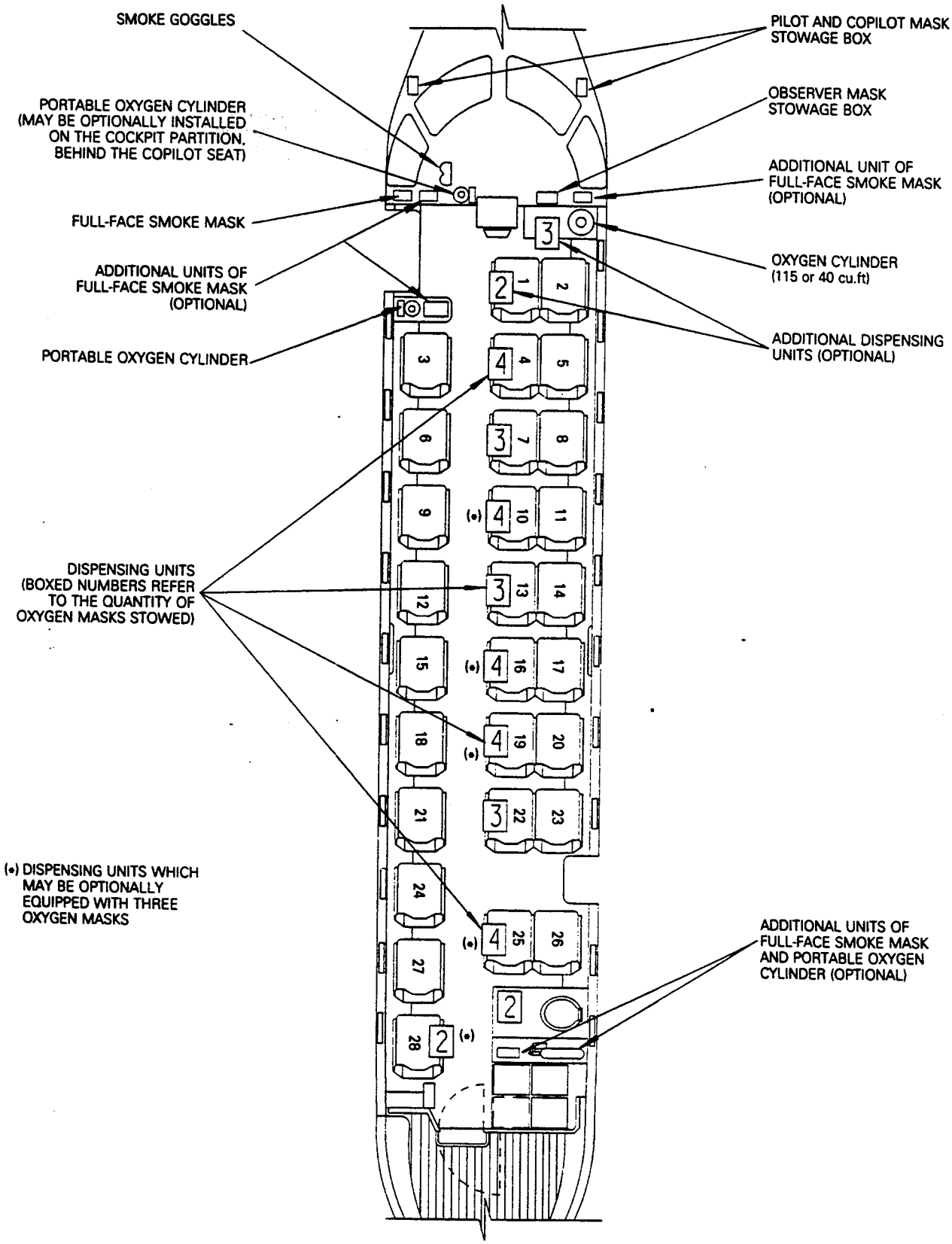

OXYGEN SYSTEM COMPONENT LOCATION
(TYPICAL 28 PAX CONFIGURATION WITH REAR TOILET)

120 1625 323

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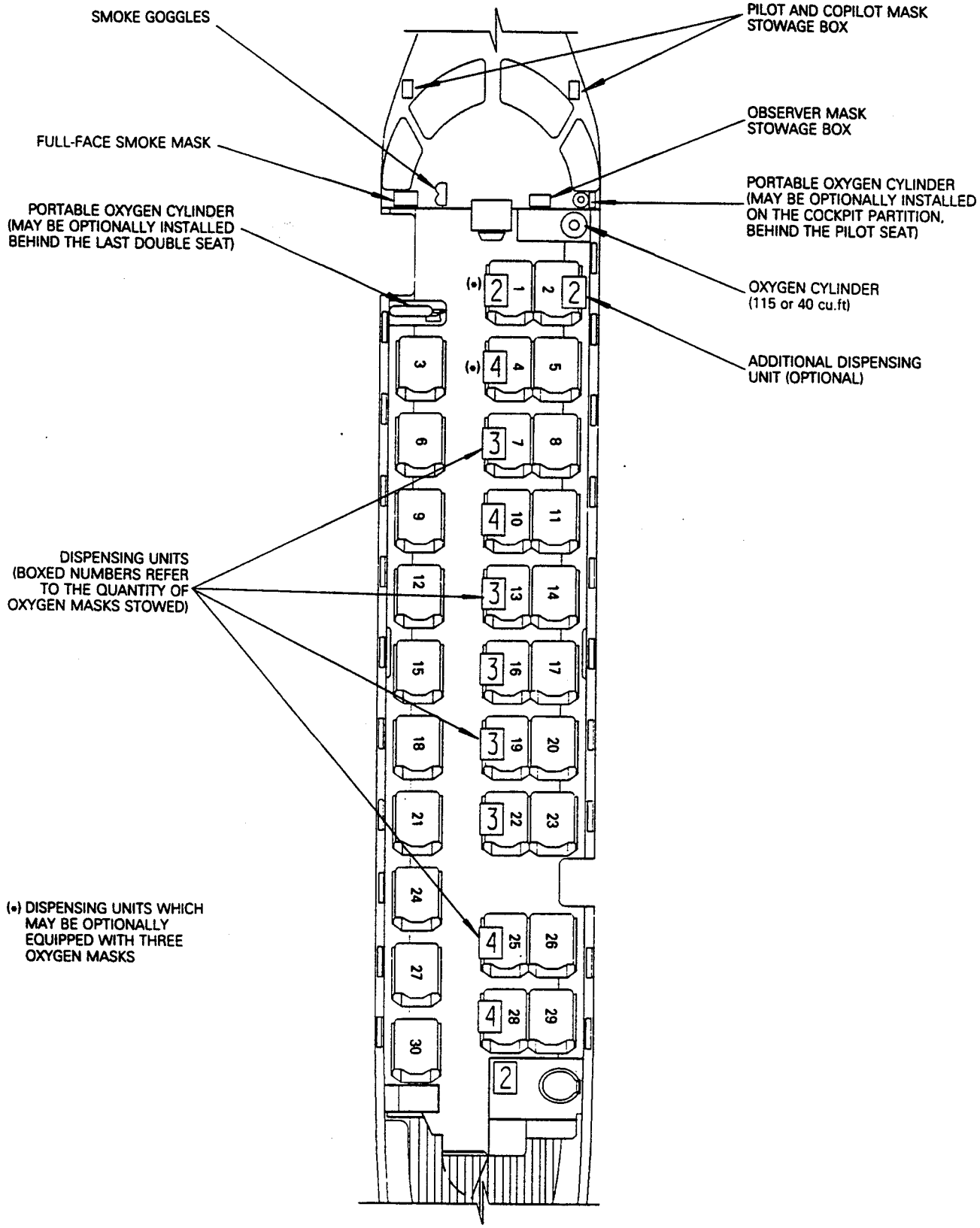

OXYGEN SYSTEM COMPONENT LOCATION
(TYPICAL 30 PAX CONFIGURATION WITH REAR TOILET)

120 1625 324

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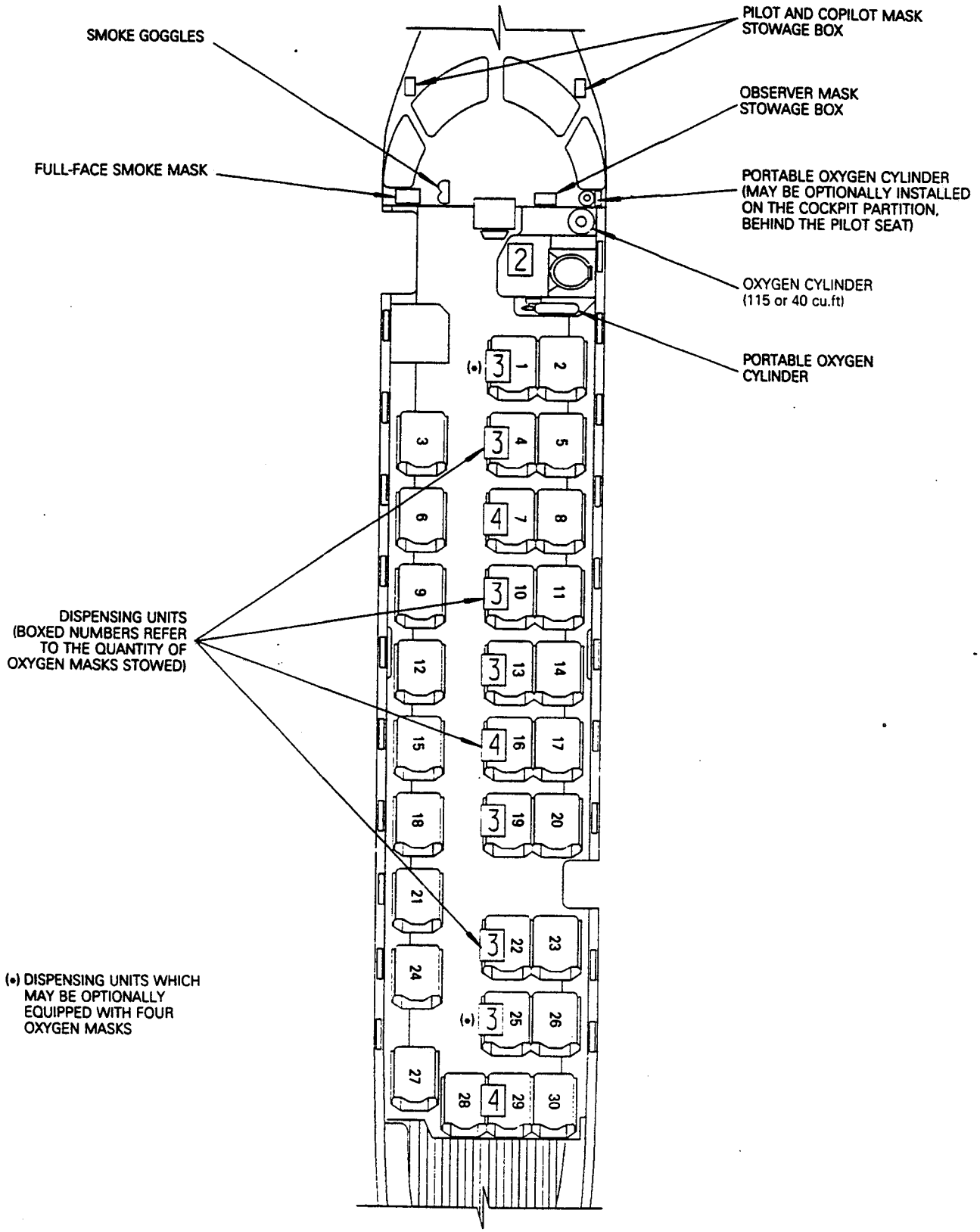

OXYGEN SYSTEM COMPONENT LOCATION
(TYPICAL 30 PAX CONFIGURATION WITH FORWARD TOILET)

120 1625 325

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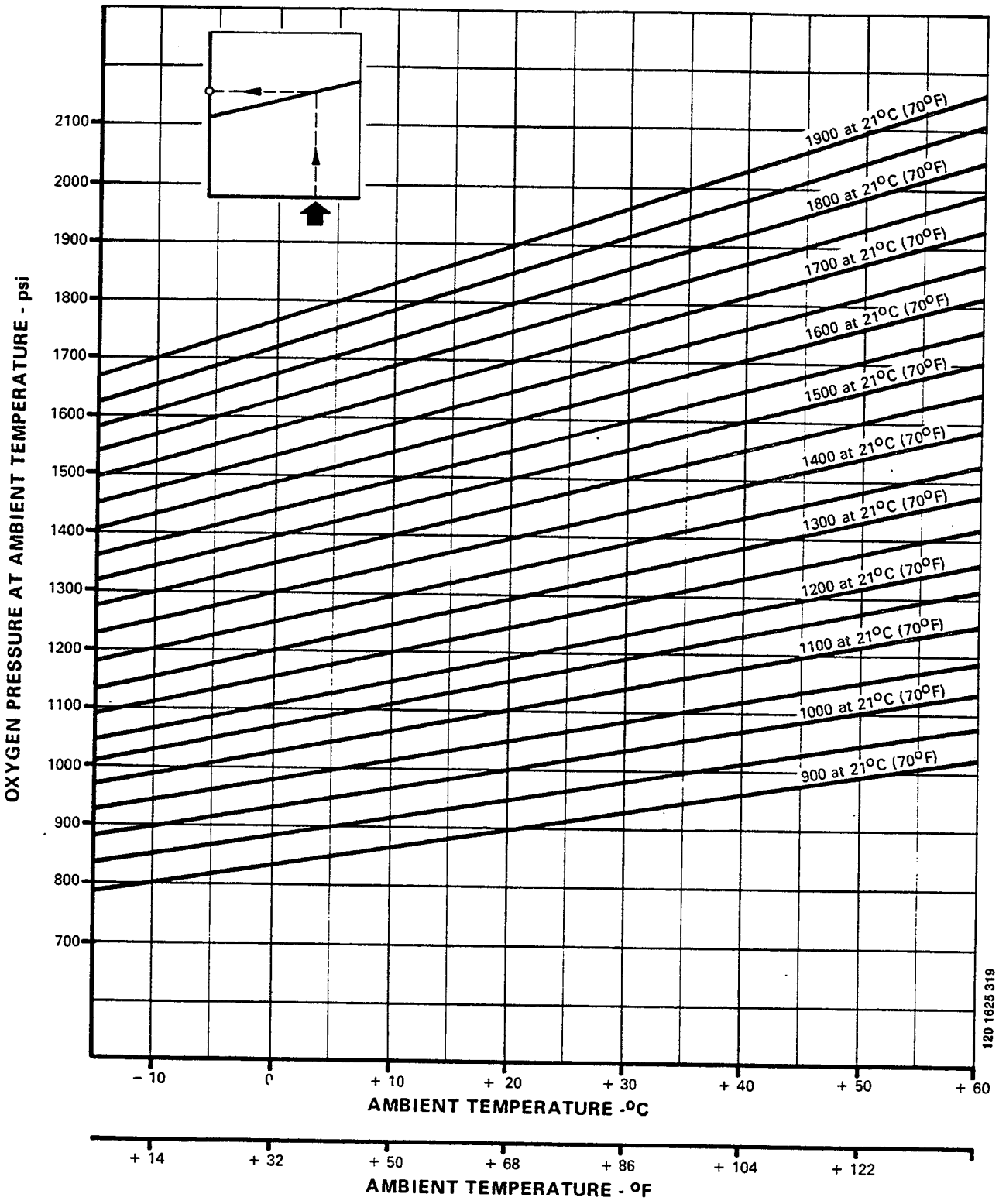

OXYGEN PRESSURE CORRECTION AS A FUNCTION OF THE TEMPERATURE

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