

OXYGEN

2A-35-10: General

The structural and pressurization systems of the GV airplane have been designed to operate at altitudes up to and including 51,000 feet with a fail-safe concept to minimize any possibility of exposing the crew and passengers to these critical altitudes. Should the need arise, however, high-pressure gaseous oxygen systems are installed to provide oxygen to all occupants. There are two types of oxygen systems installed on the GV airplane: the crew / passenger oxygen system and the portable oxygen system.

With the portable oxygen system installed, the flight crew is provided with the same level of protection while disconnected from the airplane crew / passenger oxygen system. The type of portable oxygen system is selected by the airplane owner and is installed during airplane outfitting. Information describing this system should be placed in Chapter 2C: Outfitted Systems.

The oxygen system is divided into the following subsystems:

- 2A-35-20: Crew / Passenger Oxygen System

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1. General Description:

The crew / passenger oxygen system is a pressure-demand type oxygen system. In the event of airplane decompression, it provides an emergency oxygen source to the flight crew, jump seat observer and cabin passengers.

Although very similar in function, there are two types of crew / passenger oxygen systems installed in GV airplanes. The visible difference between these two types of systems is the number of pressure gauges installed on the OXYGEN SYSTEM control panel and oxygen servicing panel. Airplane serial number (SN) 501 through 506 have a single gauge at each location, whereas SN 507 and subsequent have two gauges at each location. Both types of systems will be discussed in this description.

Regardless of SN, the following units and components compose the crew / passenger oxygen system:

- Oxygen Cylinder / Regulator Assemblies
- Oxygen Servicing Panel
- OXYGEN SYSTEM Control Panel
- PASSENGER OXYGEN Control Panel
- Crew Mask / Regulator Assemblies
- PASS OXYGEN TEST Switch (SN 645 & subs)

2. Description of Subsystems, Units, and Components:

A. Oxygen Cylinder / Regulator Assemblies:

(1) SN 507 & Subsequent:

(See Figure 1.)

Each of the two oxygen cylinders (crew and passenger) is constructed as a seamless aluminum liner with a filament overwrap of Kevlar. They have a capacity of 115 cubic feet each and are normally pressurized to 1850 psi. They are installed under the floorboards in the main entrance door area. A manual ON/OFF knob

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is installed on each cylinder regulator to allow or inhibit oxygen flow directly at the cylinder.

A regulator is attached to the neck of each cylinder. The primary function of the regulator is to reduce high cylinder pressure to a nominal delivery pressure. In addition to its primary function, the regulator provides five ports for the following connections:

(a) Supply Lines:

A supply line exits each cylinder pressure regulator, later joining to form a common supply line. A check valve is installed on each cylinder supply line to prevent system backflow.

The common supply line transfers oxygen to the OXYGEN SYSTEM control panel, then to the crew mask / regulator assemblies. Oxygen is also delivered by the common supply line to the PASSENGER OXYGEN control panel, where it may be further distributed to the left and right side passenger masks. Provisions also exist for the passenger cylinder supply line to deliver oxygen to therapeutic oxygen outlets, when such optional outlets are installed.

Pressure switches are installed between each cylinder pressure regulator and check valve to monitor pressure in the cylinder supply line. If a switch senses a line pressure below a predetermined value, a discrete is sent to Data Acquisition Unit (DAU) #1. DAU #1 in turn causes the Crew Alerting System (CAS) to display an amber CREW OXYGEN OFF and/or PAX OXYGEN OFF caution message. The purpose of these messages is to caution the flight crew that the oxygen cylinder has been manually shut off at the cylinder.

(b) Fill Lines:

Fill lines are installed to transfer oxygen from an external source connected to the oxygen servicing panel to the oxygen cylinders via the regulator assemblies. Beginning as a single line at the servicing panel, the line is then divided into a dedicated line for each oxygen cylinder.

(c) Oxygen Servicing Panel Gauge Line:

Dedicated oxygen servicing panel gauge lines for the crew and passenger oxygen cylinders are installed to allow viewing of oxygen pressures on two gauges located on the oxygen servicing panel.

A pressure gauge sensor is also installed on each line to sense oxygen pressure on the gauge line. Sensed pressures are transmitted as electrical signals to dedicated pressure gauges located on the OXYGEN SYSTEM control panel. The crew oxygen cylinder gauge line sensor receives power from the Left Essential DC bus through the CREW OXY IND circuit breaker. The passenger oxygen cylinder gauge line sensor receives power from the Right Essential DC bus. The passenger oxygen system circuit breaker name and location are determined during airplane outfitting.

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(d) Overboard Discharge Line:

An overboard discharge line is installed to vent oxygen overboard through a port located adjacent to the oxygen servicing panel. Overboard discharge will occur under the following conditions:

- Regulated oxygen pressure exceeds 90 psi.
- Oxygen cylinder pressure exceeds 2,600 psi.
- Oxygen temperature exceeds 225 (± 5)° F.

The overboard discharge port is covered by a overboard discharge disk. In addition to preventing contaminants from entering the overboard discharge line, the disk serves as a visual indicator to the flight crew that an overboard discharge has occurred. It is green in color and labeled OXY. H.P. RELIEF.

(e) Oxygen Cylinder Direct Reading Gauge:

A direct reading gauge is installed on each oxygen cylinder regulator in order to obtain oxygen cylinder pressure directly from the cylinder.

(2) SN 501 - 506:

(See Figure 4.)

Each of the two oxygen cylinders (crew and passenger) is constructed as a seamless aluminum liner with a filament overwrap of Kevlar. They have a capacity of 115 cubic feet each and are normally pressurized to 1850 psi. They are installed under the floorboards in the main entrance door area. A manual ON/OFF knob is installed on each cylinder regulator to allow or inhibit oxygen flow directly at the cylinder.

A regulator is attached to the neck of each cylinder. The primary function of the regulator is to reduce high cylinder pressure to a nominal delivery pressure. In addition to its primary function, the regulator provides five ports for the following connections:

(a) Supply Lines:

A supply line exits each cylinder pressure regulator, later joining to form a common supply line. A check valve is installed on each cylinder supply line to prevent system backflow.

The common supply line transfers oxygen to the OXYGEN SYSTEM control panel, then to the crew mask / regulator assemblies. Oxygen is also delivered by the common supply line to the PASSENGER OXYGEN control panel, where it may be further distributed to the left and right side passenger masks. Provisions also exist for the common cylinder supply line to deliver oxygen to therapeutic oxygen outlets, when such optional outlets are installed.

Pressure switches are installed between each cylinder pressure regulator and check valve to monitor pressure in the cylinder supply line. If a switch senses a line pressure below a predetermined value, a discrete is sent to Data Acquisition

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Unit (DAU) #1. DAU #1 in turn causes the Crew Alerting System (CAS) to display an amber CREW OXYGEN OFF and/or PAX OXYGEN OFF caution message. The purpose of these messages is to caution the flight crew that the oxygen cylinder has been manually shut off at the cylinder.

(b) Fill Lines:

Fill lines are installed to transfer oxygen from an external source connected to the oxygen servicing panel to the oxygen cylinders via the regulator assemblies. Beginning as a single line at the servicing panel, the line is then divided into a dedicated line for each oxygen cylinder.

(c) Oxygen Servicing Panel Gauge Line:

Oxygen servicing panel gauge lines are installed to allow viewing of the crew and passenger oxygen cylinder pressures on a common gauge located on the oxygen servicing panel. A gauge line is installed on each cylinder pressure regulator, later joining to form a common line at the oxygen servicing panel gauge.

A pressure gauge sensor is also installed on the single gauge line to sense oxygen pressure on the gauge line. Sensed pressure is transmitted as an electrical signal to a common pressure gauge located on the OXYGEN SYSTEM control panel. The sensor receives power from the Left Essential DC bus through the CREW OXY IND circuit breaker.

(d) Overboard Discharge Line:

An overboard discharge line is installed to vent oxygen overboard through a port located adjacent to the oxygen servicing panel. Overboard discharge will occur under the following conditions:

- Regulated oxygen pressure exceeds 90 psi.
- Oxygen cylinder pressure exceeds 2,600 psi.
- Oxygen temperature exceeds 225 (± 5)° F.

The overboard discharge port is covered by a overboard discharge disk. In addition to preventing contaminants from entering the overboard discharge line, the disk serves as a visual indicator to the flight crew that an overboard discharge has occurred. It is green in color and labeled OXY. H.P. RELIEF.

(e) Oxygen Cylinder Direct Reading Gauge:

A direct reading gauge is installed on each oxygen cylinder regulator in order to obtain oxygen cylinder pressure directly from the cylinder.

B. Oxygen Servicing Panel:

(1) **SN 507 & Subsequent:**

(See Figure 3.)

The oxygen servicing panel is located under access door 124CR on the right forward fuselage. The panel consists of an external high

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pressure filler valve and pressure gauges for crew and passenger oxygen cylinders. The filler valve, with chain and cap, is connected via the fill line to the oxygen cylinder regulator and provides a point for servicing the airplane oxygen system. The pressure gauges allow oxygen cylinder pressures to be checked at the panel.

(2) **SN 501 - 506:**

(See Figure 5.)

The oxygen servicing panel is located under access door 124CR on the right forward fuselage. The panel consists of an external high pressure filler valve and a common pressure gauge. The filler valve, with chain and cap, is connected via the fill line to the oxygen cylinder regulator and provides a point for servicing the airplane oxygen system. The common pressure gauge allows both oxygen cylinder pressures to be checked at the panel.

C. OXYGEN SYSTEM Control Panel:

(1) **SN 507 & Subsequent:**

(See Figure 2.)

The OXYGEN SYSTEM control panel is located on the copilot's right console panel. It contains two pressure gauges, CREW and PASSENGER, each displaying oxygen cylinder pressure as sensed by the respective pressure gauge sensor installed on the oxygen servicing panel gauge dedicated line. The control panel also contains an ON/OFF toggle valve switch that controls oxygen flow to the crew and passenger oxygen systems.

(2) **SN 501 - 506:**

(See Figure 6.)

The OXYGEN SYSTEM control panel is located on the copilot's right console panel. It contains a common pressure gauge that displays both oxygen cylinder pressures as sensed by the pressure gauge sensor installed on the oxygen servicing panel gauge common line. The control panel also contains an ON/OFF toggle valve switch, labeled CREW/PASSENGER, that controls oxygen flow to the crew and passenger oxygen systems.

D. Mask/Regulator (All GV Airplanes):

(See Figure 8.)

Oxygen is supplied to the crew by quick donning mask/regulators with an inflating harness, inflation valve, microphone, hose with quick-disconnect fitting and a communication harness. Each mask is contained in a quick-release storage unit which contains a PRESS-TO-TEST AND RESET control switch, flow blinker and a quick-disconnect supply hose fitting. The mask/regulator may be tested while in the stowed position.

The sliding NORMAL/100% control on the mask/regulator provides diluted oxygen, regulated by altitude and demand while in the normal position. A pressure flow of 100% oxygen is supplied when the slide is set to 100%.

The PRESS-TO-TEST/EMERGENCY control, located on the mask/regulator, has three functions:

- Pressed in momentarily, it is used to verify that the regulator valve

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will supply oxygen under constant pressure.

- In NORMAL (fully counterclockwise), it allows the regulator to provide diluter-demand flow.
- In the EMERGENCY (fully clockwise) position, it sets the regulator to provide constant pressure of undiluted oxygen.

The PRESS-TO-TEST AND RESET control switch, located on the mask/regulator storage container, allows leak testing of the regulator while stowed. When the control switch is pressed the flow indicator (blinker), also on the storage container, will display a yellow cross (+) and then return to black, indicating that the regulator is leak-tight. If the blinker remains yellow, a leak in the system should be assumed and investigated.

The mask/regulators are normally kept in storage containers located on the pilot's side console, copilot's side console and behind the system monitor/test panel. When the mask is removed from the storage container, the open doors activate a shutoff valve, allowing oxygen to flow to the mask. The blinker will display a yellow cross (+) when oxygen is flowing.

The mask is removed from the storage container by grasping the hose/harness with three fingers (middle, ring and small), while keeping the thumb and forefinger open, and withdrawing the mask.

NOTE:

Do not grasp the inflation valve (red ears) while withdrawing mask.

E. PASSENGER OXYGEN Control Panel (All GV Airplanes):

(See Figure 2 or Figure 6.)

The PASSENGER OXYGEN control panel is installed to control oxygen flow, annunciate oxygen flow and display system pressure to the passenger oxygen masks. It is located immediately aft of the OXYGEN SYSTEM control panel on the copilot's right console panel, and has the following components:

(1) OFF / AUTO / MAN Knob:

The OFF / AUTO / MAN knob controls the oxygen flow to the passenger oxygen masks. In the OFF position, oxygen flow to the passenger oxygen masks is inhibited. The AUTO position allows the PASSENGER OXYGEN control panel to deploy (drop) the passenger oxygen masks automatically when sensed cabin altitude reaches 13,000 ft. Oxygen flow to the passenger oxygen masks is then regulated based on cabin altitude. Manual selection to the MAN position deploys the passenger oxygen masks and provides a constant preset flow.

(2) PASS OXYGEN ON Annunciator:

When oxygen flow through the PASSENGER OXYGEN control panel is sensed, a pressure switch inside the PASSENGER OXYGEN control panel closes, causing a discrete to be sent to Data Acquisition Unit (DAU) #1. DAU #1 in turn causes the Crew Alerting System (CAS) to display an amber PAX OXYGEN ON caution message and associated caution chime. The pressure switch also causes the PASS OXYGEN ON annunciator on the control panel to

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illuminate amber (or green, depending on serial number).

(3) **OXYGEN SUPPLY PRESSURE Indicator:**

The OXYGEN SUPPLY PRESSURE indicator displays oxygen system pressure available to the passenger oxygen masks.

(4) **ALT TEST Port:**

The ALT TEST port is used by maintenance personnel to check the automatic operation of the PASSENGER OXYGEN control panel.

NOTE:

The type, quantity and location of passenger masks is selected by the airplane owner and installed during airplane outfitting.

F. PASS OXYGEN TEST Switch (SN 645 & subs):

(See Figure 9.)

SN 645 and subsequent airplanes have a PASS OXYGEN TEST switch installed on the cockpit overhead panel in the SYSTEM TEST section. Depressing and holding this switch causes the following actions:

- The TEST legend in switch illuminates
- An amber PAX OXYGEN ON caution message to be displayed on CAS, with associated caution chime
- The PASS OXYGEN ON annunciator (PASSENGER OXYGEN control panel) illuminates amber (or green, depending on serial number).

All annunciations are removed when the switch is released.

3. Controls and Indications:

(See the applicable figures on the following pages.)

A. Crew Alerting System (CAS) Messages (All GV Airplanes):

CAS messages associated with the crew / passenger oxygen system are:

Area Monitored:	CAS Message:	Message Color:
Crew Oxygen Cylinder Supply Line	CREW OXYGEN OFF	Amber
Passenger Oxygen Cylinder Supply Line	PAX OXYGEN OFF	Amber
PASSENGER OXYGEN Control Panel	PAX OXYGEN ON	Amber

B. Circuit Breakers (CBs) (All GV Airplanes):

The crew / passenger oxygen system is protected by the following CBs:

Circuit Breaker:	Circuit Breaker Panel:	Location:	Power Source:
CREW OXY IND	LEER	G-6	L ESS DC Bus
Passenger Oxygen	Varies	Varies	R ESS DC Bus

4. Flight Manual Limitations (All GV Airplanes):

A. Oxygen Departure Pressures:

The quantity of oxygen required varies with the flight profile. Use Figure 7 to determine the required oxygen quantity for each flight.

B. Additional Certification Requirements:

The following airplane certification requirements are in addition to the requirements of applicable operating rules. The most restrictive requirements (certification or operating) must be observed.

(1) **Availability Of Crew Masks:**

Above Flight Level 250, crew masks must be in the quick-donning position which allows donning within five (5) seconds.

(2) **Use Of Crew Masks:**

On airplanes with Scott ATO MC 10-15-157/-158 crew masks, hats and " earmuff" type headsets must be removed prior to donning crew oxygen masks.

NOTE:

Headsets and eyeglasses worn by crewmembers may interfere with quick-donning capabilities.

(3) **Maximum Cabin Altitude For Use:**

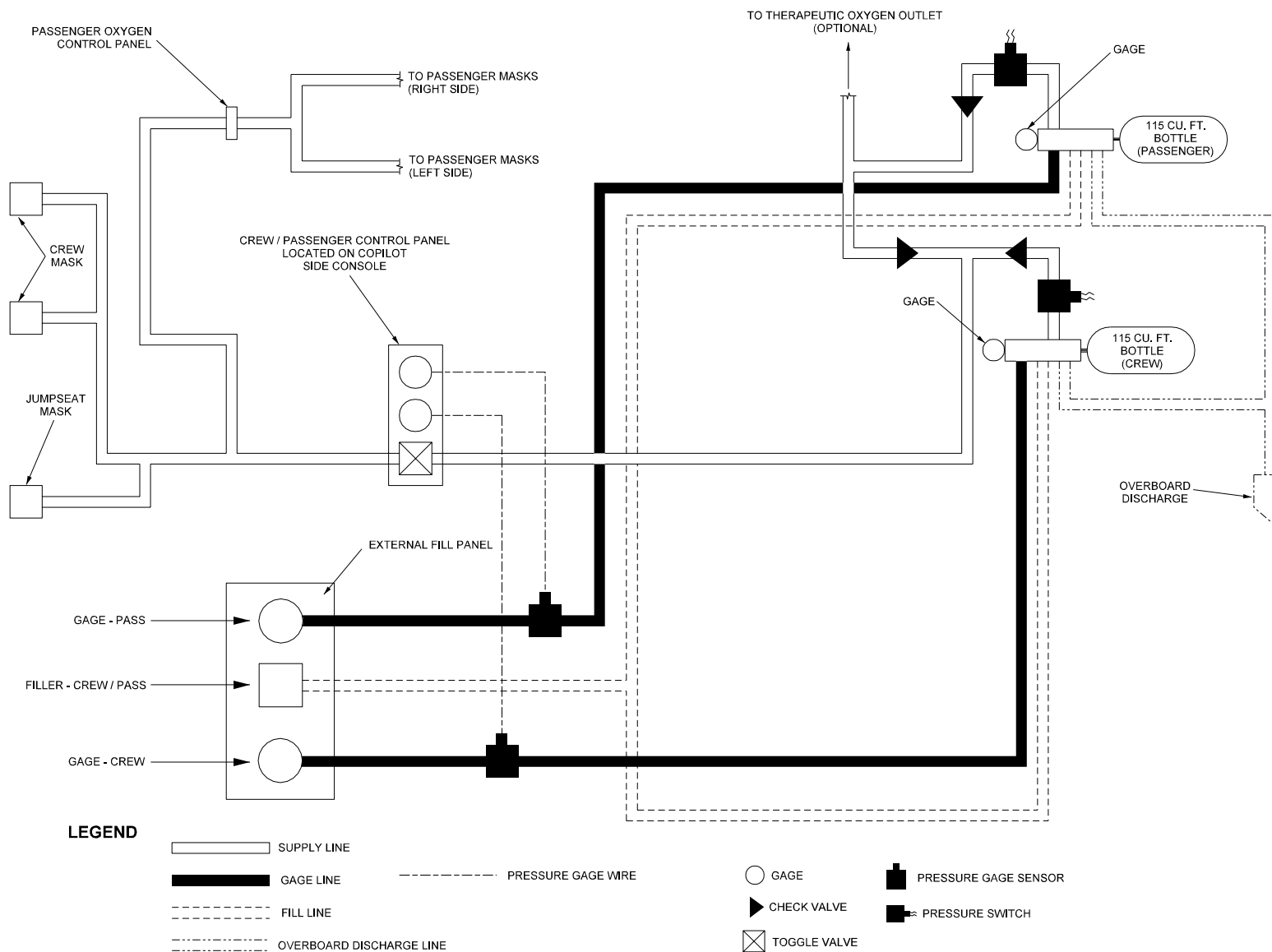
Crew and passenger oxygen masks are not approved for use above 40,000 ft cabin altitude.

WARNING

PASSENGER MASKS ARE INTENDED FOR USE DURING AN EMERGENCY DESCENT TO AN ALTITUDE NOT REQUIRING SUPPLEMENTAL OXYGEN.

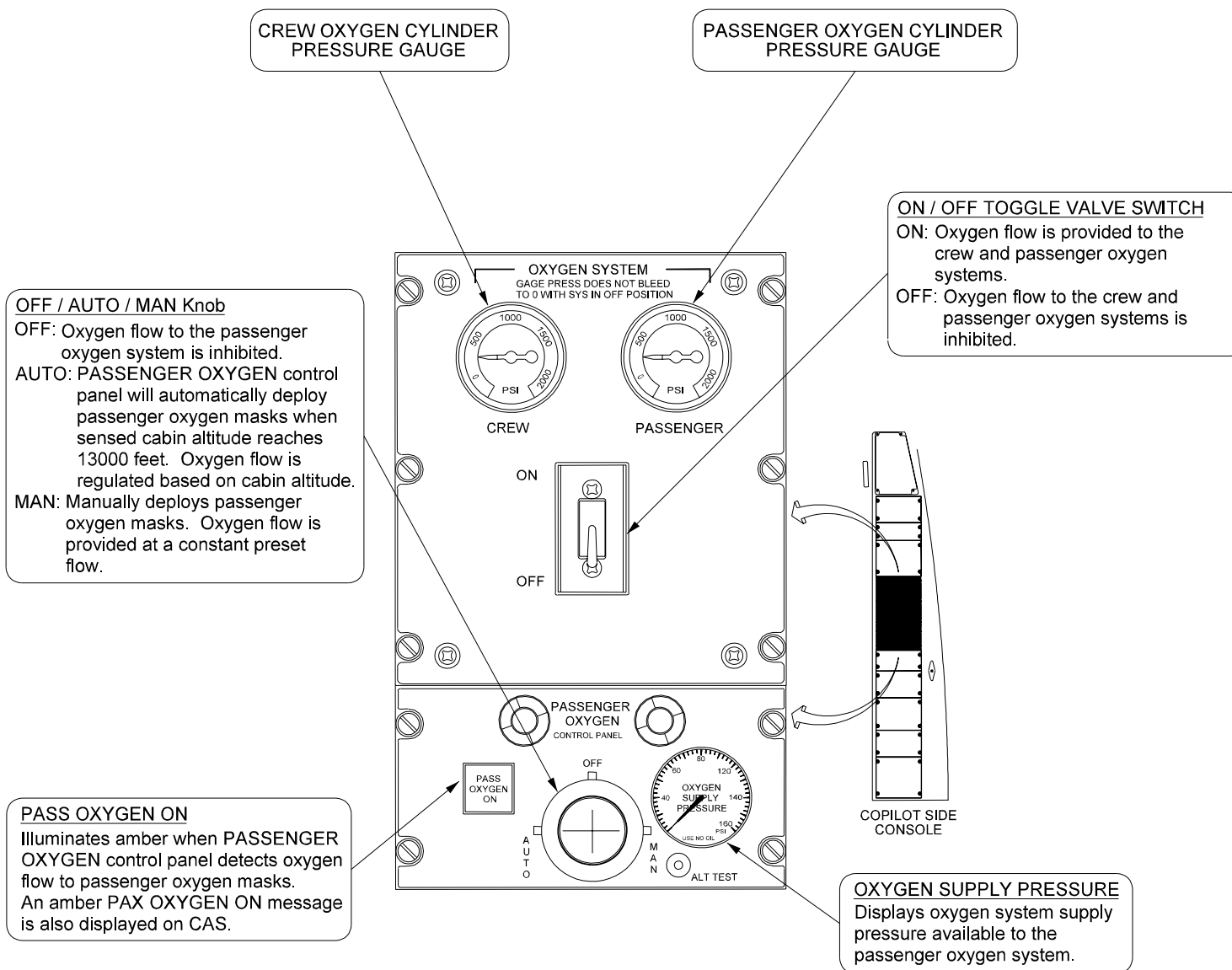
WARNING

PASSENGER MASKS WILL NOT PROVIDE SUFFICIENT OXYGEN FOR PROLONGED OPERATION ABOVE 34,000 FT CABIN ALTITUDE. PROLONGED OPERATION ABOVE 25,000 FT CABIN ALTITUDE WITH PASSENGERS ABOARD IS NOT RECOMMENDED.



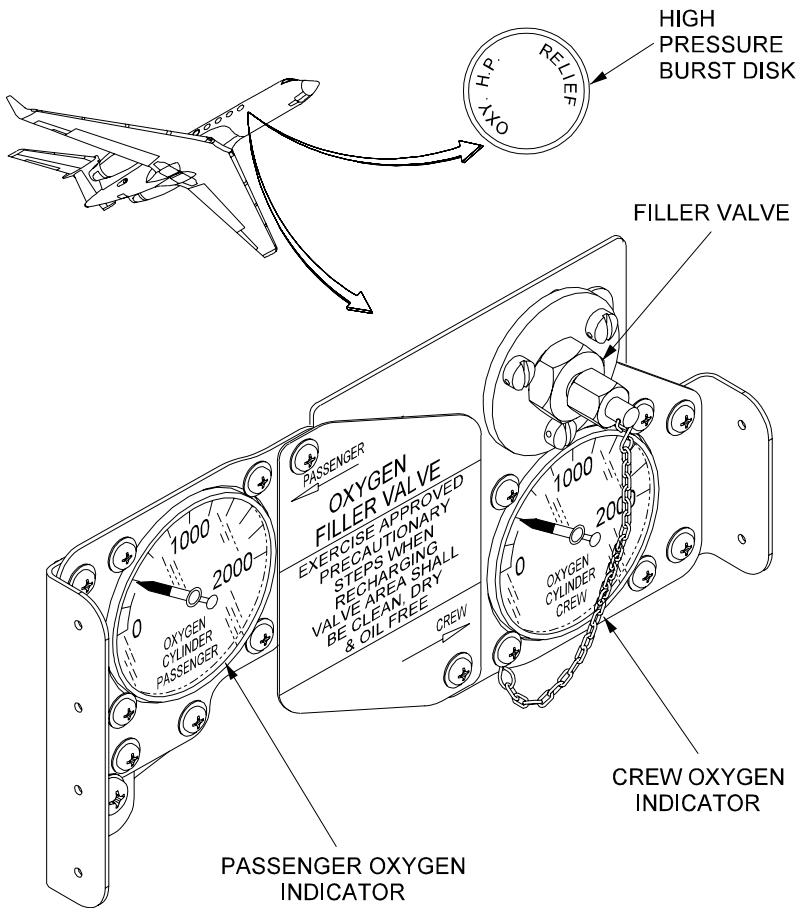
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Crew / Passenger Oxygen System Simplified Block Diagram: SN 507 and Subsequent
Figure 1



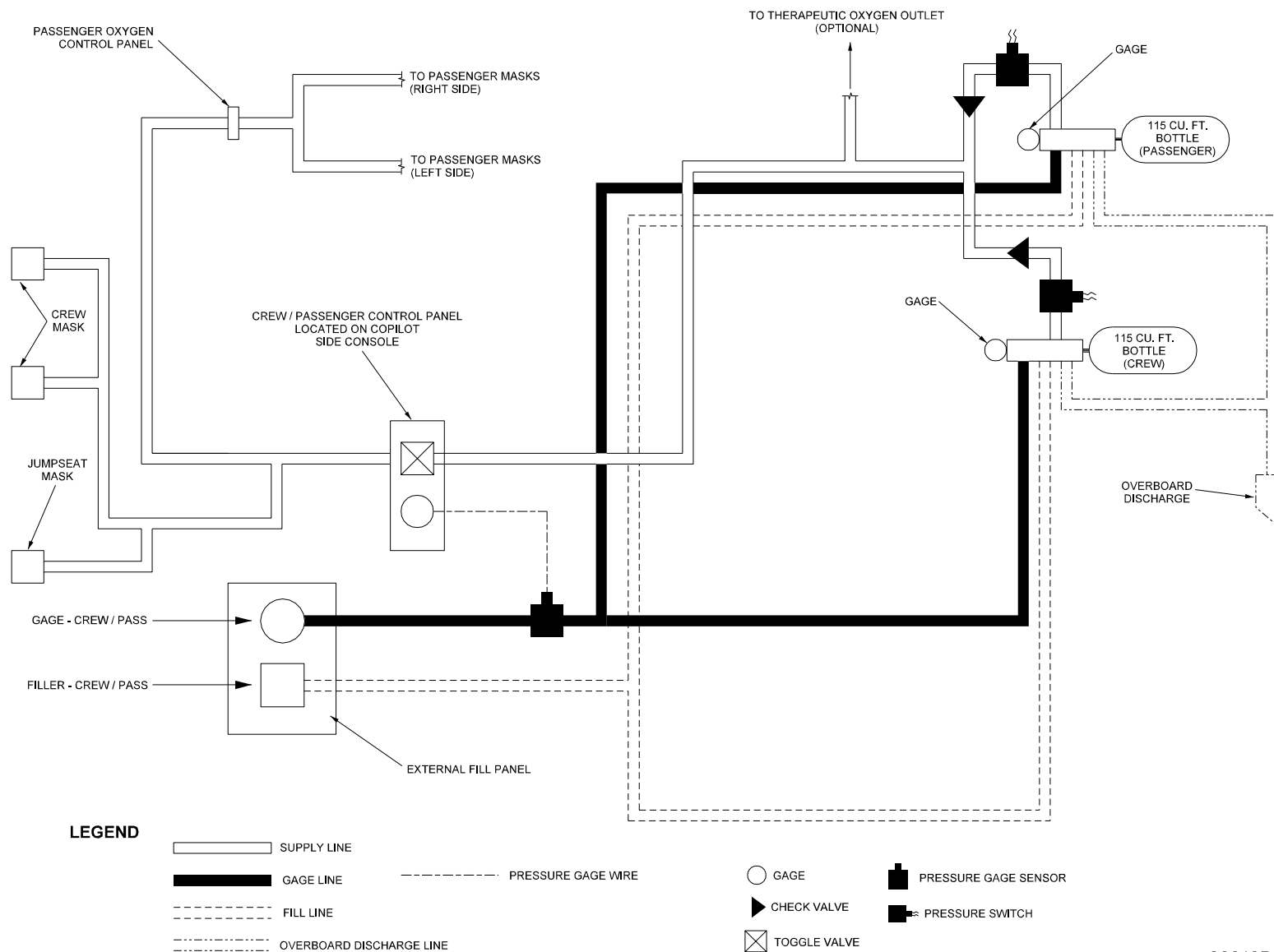
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OXYGEN SYSTEM
Control Panel: SN 507
and Subsequent
Figure 2



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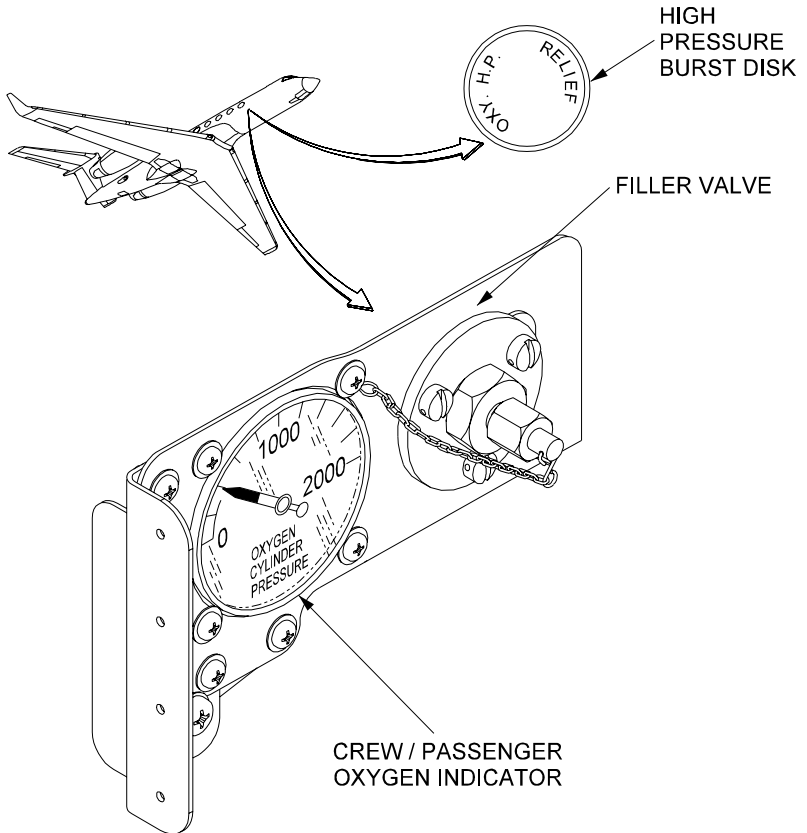
Oxygen Servicing Panel And Overboard Discharge Disk: SN 507 and Subsequent Figure 3



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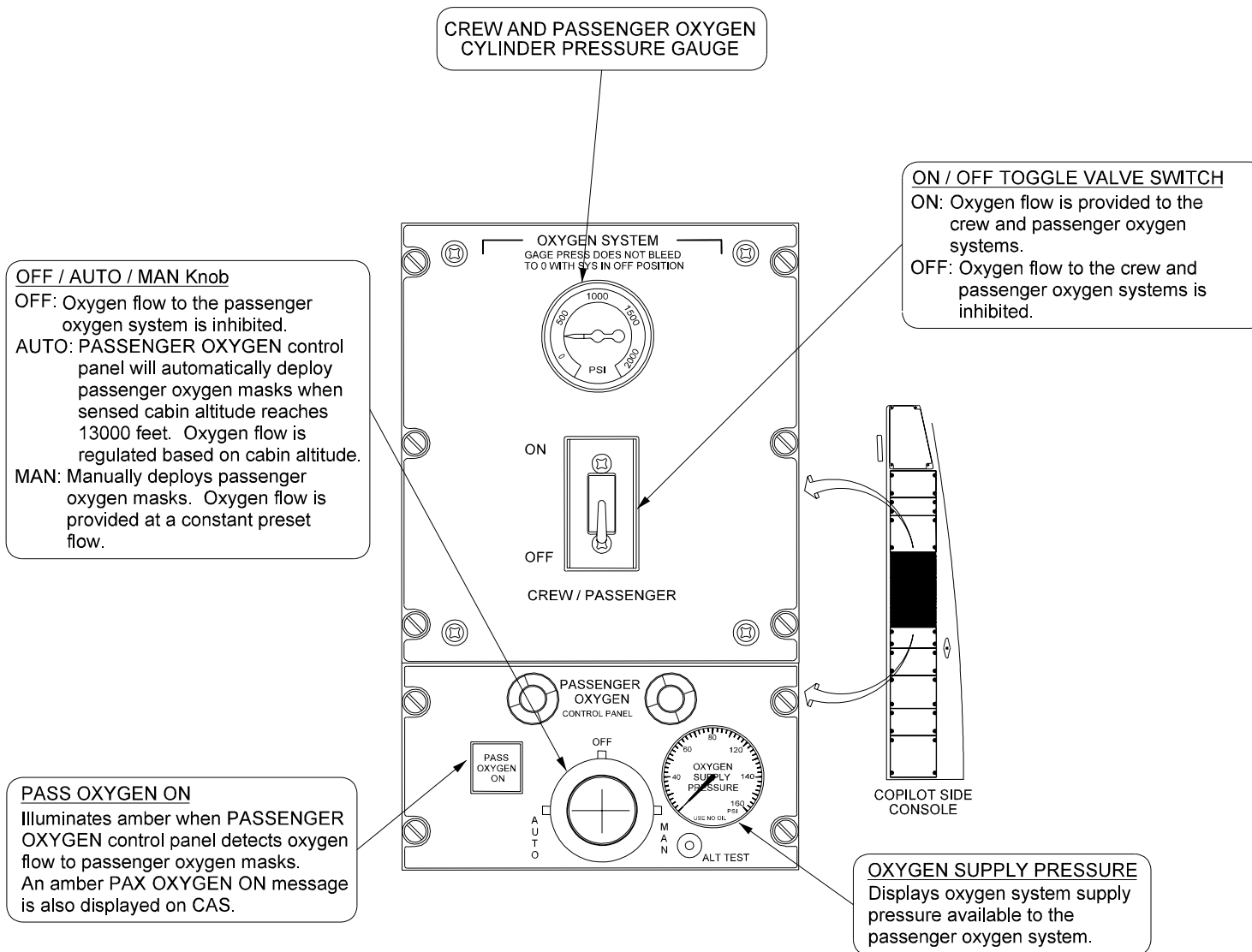
Crew / Passenger Oxygen System Simplified Block Diagram: SN 501 – 506
Figure 4

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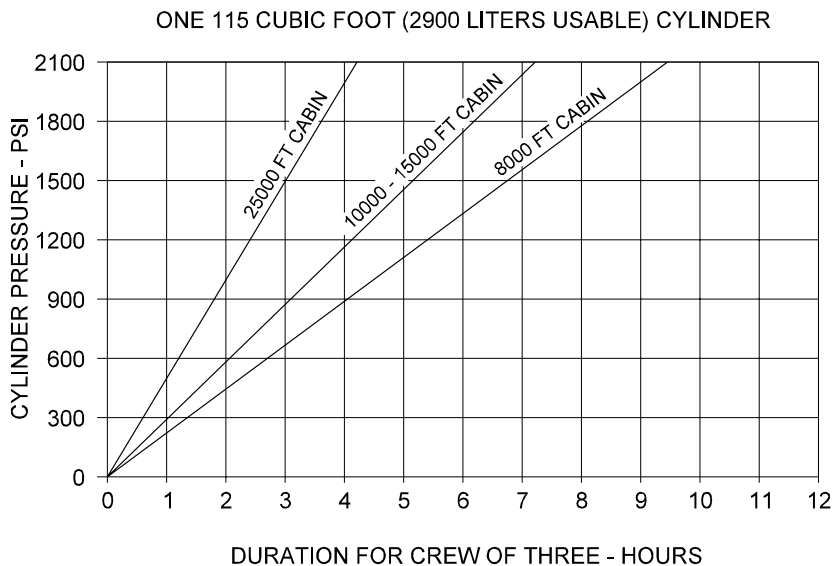
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Oxygen Servicing Panel And Overboard Discharge Disk: SN 501 – 506
Figure 5



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OXYGEN SYSTEM
Control Panel: SN 501 –
506
Figure 6

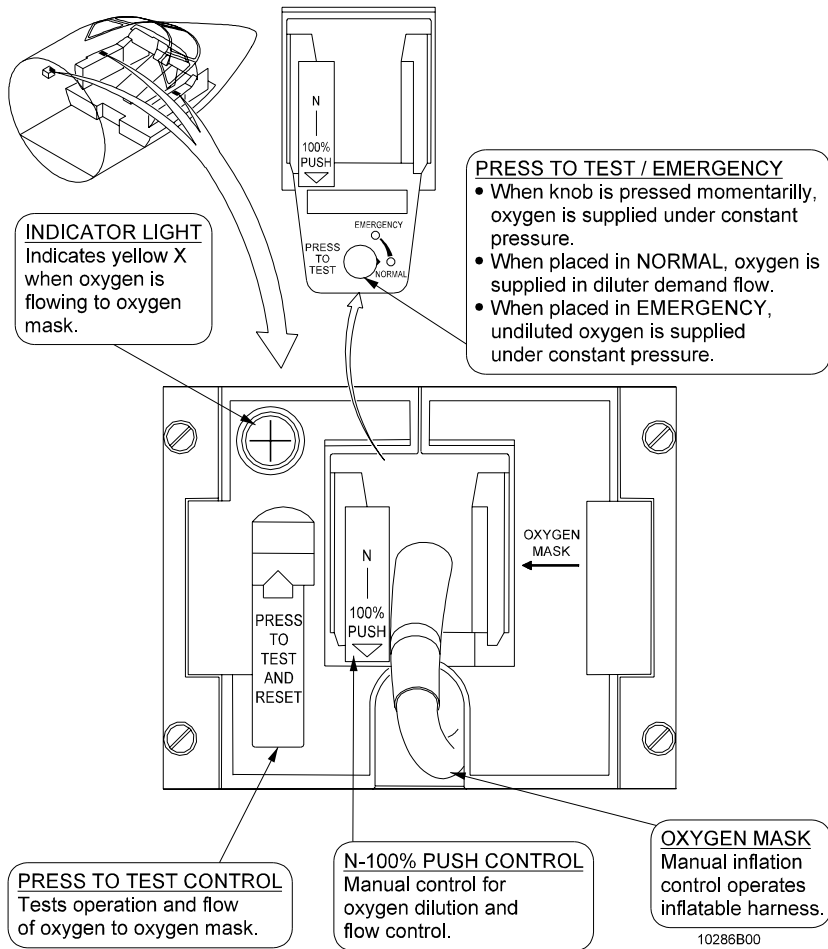


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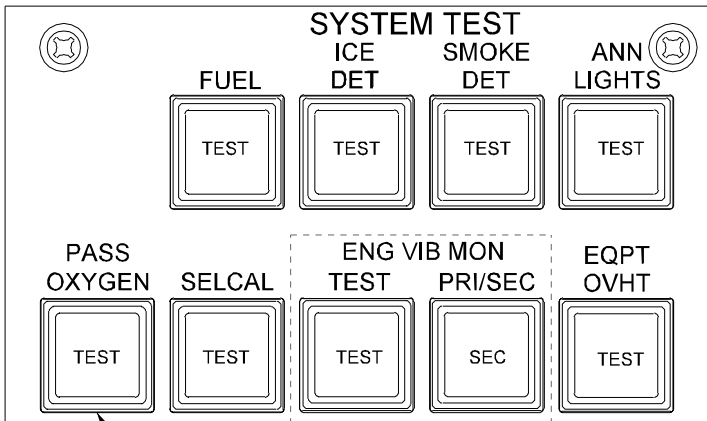
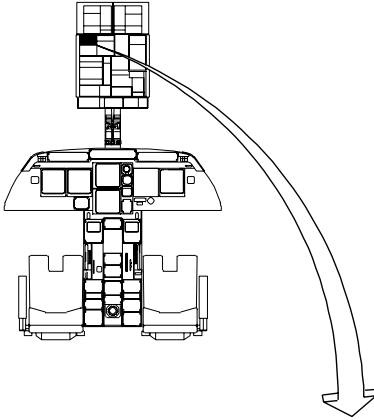
Oxygen Duration Versus Cabin Altitude: All GV Airplanes
Figure 7

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Quick-Donning Oxygen Mask: All GV Airplanes
Figure 8



PASS OXYGEN TEST

Depressing and holding switch causes the following actions:

- TEST legend in switch illuminates.
- Amber PAX OXYGEN ON message is displayed on CAS; chime sounds.
- PASS OXYGEN ON annunciator on PASSENGER OXYGEN control panel illuminates.

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PASS OXYGEN TEST Switch: SN 645 and Subsequent
Figure 9