

GULFSTREAM G550

OPERATING MANUAL

OXYGEN

2A-35-10: General

The G550 has a dual tank oxygen system to provide an alternate breathing source to the flight crew and passengers in the event of a cabin pressurization failure or the presence of smoke or fumes within the aircraft. Both tanks are identical, each with a capacity of one hundred fifteen cubic feet (115 ft³) normally pressurized to eighteen hundred (1,800) psi. The tanks are plumbed together to form a single oxygen source that is available to both cockpit and cabin. The tanks are physically located beneath the cabin floor in the vicinity of the main entrance doorway. The tanks are serviced through a panel on the aircraft exterior on the right side, beneath the first two cabin windows. The service panel contains a single filler connection for both tanks and a pressure gage for each tank.

Cockpit indicators and controls enable monitoring the fill levels of the tanks, and activating the masks stowed in the cabin overhead, initiating the flow of oxygen to the cabin masks with a manual switch command or automatically in the event of depressurization. An additional therapeutic oxygen outlet is installed in the cabin interior with mask and hose to provide for medical emergencies. The location of the outlet is determined by the interior furnishings arrangement selected by the customer.

Each crew member, including the occupant of the observer seat, has a dedicated oxygen mask with integrated microphone that provides uninterrupted communications through the Audio Control Panels (ACPs).

In addition to the cockpit masks, a portable or "walk-around" oxygen bottle is installed aft of the copilot seat. The bottle provides a limited duration breathing supply to enable a crew member to perform tasks in the cabin during depressurization.

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

1. General Description:

The aircraft oxygen system incorporates two cylinders or bottles that contain a total of two hundred thirty cubic feet (230 ft³) of gaseous oxygen pressurized to a nominal eighteen hundred (1,800) psi. The two bottles are identical and interchangeable, each manufactured from seamless aluminum and coated with KelvarT fabric to resist rupture. The bottles are designated as crew and passenger supplies, but both bottles are plumbed together into a common supply line just prior to the oxygen system control panel on the copilot side console. Pressure regulators on the bottles reduce system pressure to fifty-five to sixty (55 - 60) psi prior to the supply line to prevent the presence of high pressure flow in the cockpit. Switches and selectors on the cockpit control panel open valves to supply a low pressure flow of oxygen to either or both the cockpit and passenger compartment. Although both oxygen bottles act as a single system, each is equipped with a shutoff valve, dedicated pressure regulator, pressure transducer, direct reading gage, pressure and temperature relief valves and a low pressure switch that provide the following functions:

- Shutoff valve - shuts off the bottle outlet for removal and installation of the bottles
- Pressure regulator - reduces the bottle pressure from the maximum of eighteen hundred psi plus or minus fifty (1,800 ±50 psi) down to a supply pressure of fifty-five to sixty (55-60) psi to conform to the structural limits of the system plumbing and provide a comfortable pressure for human inhalation. The regulator will close the supply valve when the pressure

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within the tank drops to two hundred (200) psi, indicating that the tank is approaching depletion. When the supply valve closes, a low pressure switch in the supply line will detect the drop in pressure in the supply line and signal that line pressure is forty-five (45) psi or below.

- Pressure transducer - an electrical sensor powered by twenty-eight volt direct current (28v DC) mounted on the tank regulator to transmit pressure readings to the cockpit oxygen pressure gages
- Direct reading gage - each tank has a direct reading gage on the oxygen service panel that is connected by tubing to the oxygen tank
- Pressure and temperature relief valves - all relief valves are plumbed to a common overboard vent line. The vent line is capped with a green overboard discharge disc located on the exterior of the aircraft above and to the right of the oxygen service panel. If any of the relief valves opens to discharge excess pressure, the green disc will rupture, indicating the loss of oxygen. One relief valve will open if pressure in the supply lines exceeds ninety (90) psi, another valve will open if pressure in the bottle exceeds twenty-six hundred (2,600) psi or if the bottle temperature exceeds two hundred twenty-five degrees Fahrenheit (225°F).
- Low pressure switch - a low pressure switch, installed in the supply plumbing of each bottle, is set at a threshold of forty-five (45) psi. Each switch will electrically signal Modular Avionics Unit (MAU) #1 if normal supply line pressure falls to the trip point. The MAU will communicate the low pressure condition to the Monitor and Warning System (MWS) that will in turn prompt the display of a Crew Alerting System (CAS) message to inform the flight crew of impending bottle exhaustion.

Although both the flight crew and passengers share the common oxygen system, the methods of delivery are different because of the disparate usage requirements. The flight crew can be supplied with either supplemental oxygen that is combined with ambient air to provide a breathable mixture to sustain extended flight at high cabin altitudes, normal one hundred percent (100%) oxygen inhaled on demand in the event of depressurization, or emergency pressurized flow of one hundred percent (100%) oxygen if depressurization occurs at very high altitudes or if there is toxic smoke or fumes in the cockpit.

The passenger oxygen supply is provided to maintain cabin occupant respiration until the aircraft is able to descend to an altitude where ambient air is dense enough that oxygen is no longer required.

2. Description of Subsystems, Units and Components:

A. Passenger Oxygen Supply:

Oxygen is delivered to the occupants of the cabin through yellow flexible cup-like masks commonly used in airline operations. The masks are stored in compartments overhead each seat and are deployed either automatically if the cabin is depressurized or through manual command by a switch on the cockpit oxygen control panel. The number of masks installed on the aircraft will depend upon the seating configuration chosen by the customer, but will always exceed the number of occupants by at least ten percent (10%) to provide a margin for mask inoperability or for small children not assigned a seat. Masks are also installed in lavatory and galley areas.

Automatic deployment of the masks is signalled by an aneroid sensor that

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starts oxygen flow to the cabin masks and opens the storage compartment doors if the cabin altitude exceeds thirteen thousand feet, plus or minus five hundred feet (13,000 \pm 500 ft). For automatic deployment to take place, the rotary switch on the PASSENGER section of the oxygen control panel on the copilot side console must be set to the AUTO position. Activation of the passenger oxygen system is signalled by the illumination of the green PASS OXYGEN ON legend within the indicator to the left of the rotary switch. The operating status of the passenger oxygen system is also communicated to MAU #1 and forwarded to the MWS that initiates a CAS message informing the flight crew that the passenger oxygen system is on. When the cabin masks are deployed, a tone or chime is sounded over the aircraft overhead speaker system and the NO SMOKING signs and/or icons are automatically illuminated. Passengers don the masks by placing them over the face and securing them in place with an elastic band that fits around the head. When the aircraft descends to achieve a cabin altitude of twelve thousand plus or minus five hundred feet (12,000 \pm 500 ft), oxygen flow to the masks is shut off, since this at this level the atmosphere will supply sufficient ambient oxygen for breathing.

If it is deemed necessary by the flight crew, the passenger masks can be manually deployed by selecting the rotary switch to the MAN position. Mask deployment will be accompanied by the same signals and indications as when automatic deployment occurs.

NOTE:

The flight crew must ensure that the rotary switch is selected back to the appropriate AUTO or OFF position when passenger oxygen is no longer required.

B. Flight Crew Oxygen:

The cockpit is equipped with oxygen masks for the pilot, copilot and observer positions. A regulator is integrated into the masks to provide on demand oxygen flow that is combined with ambient cabin air, only pure oxygen or positive pressurized pure oxygen flow. The masks are stowed in readily accessible compartments and are the quick-donning type that require only one hand to grasp and put in place over the face. The masks are held securely over the nose and mouth by a harness of elastic inflatable tube-type straps. The mask are pulled out of the storage compartment by grasping two red colored plastic tabs on each side of the front of the mask. When the tabs are squeezed, the inflatable tubes are expanded with system oxygen, allowing the mask to be positioned over the head. Once in position, the red tabs are released and the tubes deflate, allowing the elastic of the tubes to hold the mask securely over the face. The tension in the mask harness can be adjusted with a comfort toggle on the front of the mask. The toggle is pulled up and a roller beneath the toggle is rotated to adjust the tension with which the mask is held against the face.

When the mask is pulled out of the storage compartment, two gate-type doors on the enclosure are pushed aside, starting the flow of oxygen to the mask. A push lever on the right side of the front of the mask is used to select either normal (supplemental) oxygen or a supply of one hundred

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percent (100%) oxygen to the mask. Normal or one hundred percent (100%) oxygen is furnished on demand - i.e. by normal inhalation. A rotary knob on the front of the mask can be used to select emergency oxygen that provides a positive pressurized oxygen flow to the mask instead of on demand inhalation. The masks are certified to a cabin altitude of forty thousand feet (40,000 ft) and the masks will automatically switch to positive pressurized flow if the cabin altitude exceeds thirty-five thousand feet (35,000 ft).

Each mask has an integrated microphone installed within the breathing area of the mask. The microphone is activated by selecting the MIC button on the Audio Control Panel (ACP) to the extended or mask position (if the button is depressed only the headset boom microphone has inputs to the ACP). The microphone is keyed using the normal RADIO / ICS toggle switch on the control yoke. The observer position uses the RADIO / ICS toggle switch on the radio jack box beneath the ACP.

The masks have a deflector on the top to direct a small flow of oxygen to the interior of smoke masks when they are in use to prevent condensation on the interior of the plastic lens. (Smoke masks are donned only after the oxygen mask has been onto the face of the wearer.)

Oxygen is available to the flight crew at any time provided the CREW / PASSENGER switch on the oxygen control panel is positioned to ON. The switch is located directly below the two bottle quantity gages on the copilot side console. With the switch in the ON position, valves open to allow oxygen to the masks and to the rotary selector knob on the PASSENGER section of the panel.

Crew masks may be tested without extracting them from the storage containers by depressing a PRESS TO TEST AND RESET button beside the mask on the face of the container. When the button is depressed, a blinking "cat-eye" indicator above the button will open showing a yellow background to indicate flow of oxygen to the mask. When the mask is in use the indicator will blink open whenever oxygen is inhaled. When the test button is released the "cat-eye" should close, showing no yellow background. If the indicator does not close, a leak in the mask is indicated. The emergency oxygen flow function can also be tested with a push button on the face of the mask, but requires that the mask be extracted from the storage container. There is no indication of emergency flow other than the noise associated with the pressurized release of oxygen.

After oxygen is no longer needed, the masks are stowed back the respective container by first squeezing the red harness inflation tabs on the side of the mask to inflate the harness so that it can be removed from the head. After the mask and harness are removed, the tabs are released to deflate the harness allowing the mask to fit back within the stowage compartment. The mask should always be stowed with the selector to the one hundred percent (100%) position so that the mask is configured for any subsequent immediate use.

C. OXYGEN SYSTEM Control Panel:

The oxygen system control panel is located on the copilot side console and is divided into two sections. The forward section is labelled OXYGEN SYSTEM, and contains two electrically powered gages that show the amount of oxygen in each crew and passenger bottle, indexed in pounds

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per square inch (psi). When full, each bottle pressure should read eighteen hundred psi plus or minus fifty (1,800 ±50 psi). Above the gages is the notation: GAGE PRESS DOES NOT BLEED TO 0 WITH SYS IN OFF POSITION. Since the gages are electrical and not direct reading, turning off the system selector switch does not effect gage readings. The system selector switch is a toggle switch located below the gages. The switch has two positions: OFF and ON and is labelled CREW / PASSENGER since it controls the flow from both bottles as both are plumbed together. The switch should be selected to the ON position for all flight operations to allow oxygen to be supplied to the flight compartment masks and to the rotary mode control switch for passenger compartment oxygen.

Immediately aft of the OXYGEN SYSTEM panel section is a panel labelled PASSENGER OXYGEN CONTROL PANEL. The panel contains a gage indicating the pressure of the oxygen supplied to the passenger cabin, an annunciator that illuminates the text label PASS OXYGEN ON when the system is in use and a rotary mode control switch to select the type of operation of the passenger oxygen system. The switch has three positions: OFF to prevent oxygen flow to the cabin, AUTO to allow the aneroid switch to automatically deploy oxygen masks in the cabin in the event of a depressurization, and MAN to manually deploy the masks in the cabin.

D. Passenger Oxygen System Test Switch:

A pushbutton on the SYSTEM TEST panel on the cockpit overhead will test the indications of passenger oxygen system operation. The pushbutton, labelled PASS OXYGEN, will illuminate with the legend TEST when the button is depressed, and cause the green PASS OXYGEN ON light on the PASSENGER OXYGEN control panel to illuminate, the amber CAS message "Passenger Oxygen On" to appear on the CAS display, and the NO SMOKING signs / icons to illuminate accompanied by an aural chime / tone over the aircraft speaker system.

E. Oxygen Service Panel:

The oxygen service panel is located on the aircraft exterior on the right hand side approximately below the first two cabin windows. The panel is accessible by releasing the locking tabs holding the panel door shut. Within the panel is a direct reading gage for the crew and passenger bottles and a filler adapter. Both bottles are serviced by connecting an oxygen servicing cart to the filler adapter. The bottles are filled by using an ambient temperature vs pressure chart. The nominal full level is eighteen hundred (1,800) psi at seventy degrees Fahrenheit (70°F) or twenty-one point one degrees centigrade (21.1°C).

F. Oxygen System Overpressure Discharge Disc:

A green plastic disc is installed on the skin of the aircraft above and forward of the oxygen service panel beneath a label reading CAUTION VENT - DO NOT BLOCK. The disc seals the overpressure discharge vent line of the oxygen system. If pressure within the bottles exceeds twenty-six hundred (2,600) psi through overfilling or if the temperature of the bottles reaches two hundred twenty-five degrees Fahrenheit (225°F) an overpressure valve on the tanks will open, releasing oxygen into the overpressure vent line and rupturing the green plastic disc sealing the line. The excess pressure limit is to protect the structural integrity of the bottles and the temperature limit is to ensure that the bottles are emptied if there is a fire

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aboard the aircraft so that the contents of the bottles do not contribute to the severity of the flames.

G. Portable Oxygen Bottle:

A portable or “walkaround” oxygen bottle is a commonly elected installation, located aft of the copilot seat. The bottle is equipped with a mask of the same type as the drop-down masks of the passenger system, attached to the bottle with a hose. The mask and hose are stowed in a bag container alongside the bottle. A direct reading gage on the side of the bottle indicates the amount of oxygen remaining for use. The bottle also has a shoulder strap to allow the user freedom for both hands while using the bottle. The bottle allows one of the flight crew to leave the cockpit during a depressurization to provide aid to passengers or to troubleshoot pressurization problems in the cabin or baggage compartment. If the bottle is used, it should be replenished prior to the next flight.

3. Controls and Indications:

See Figure 2 through Figure 5.

A. Crew Alerting System (CAS) Messages:

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

| Area Monitored: | CAS Message: | Message Color: |
|--|----------------------|----------------|
| Crew oxygen bottle supply line pressure 45 psi or lower | Crew Oxygen Off | Amber |
| Passenger oxygen bottle supply line pressure 45 psi or lower | Passenger Oxygen Off | Amber |
| Passenger oxygen system pressurized | Passenger Oxygen On | Amber |

B. Circuit Breakers (CBs):

The following CBs protect the crew / passenger oxygen system:

| Circuit Breaker: | Circuit Breaker Panel: | Location: | Power Source: |
|------------------|------------------------|-----------|---------------|
| CREW OXY IND | LEER | G-6 | L ESS DC Bus |
| PAX OXY IND | Galley | F-5 | R ESS DC Bus |

4. Flight Manual Limitations:

A. Oxygen Departure Pressures:

The quantity of oxygen required varies with the flight profile. Use Figure 4 to determine the required oxygen quantity for each flight.

B. Additional Certification Requirements:

The following aircraft 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.

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(2) Use Of Crew Masks:

On aircraft 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 crew members 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

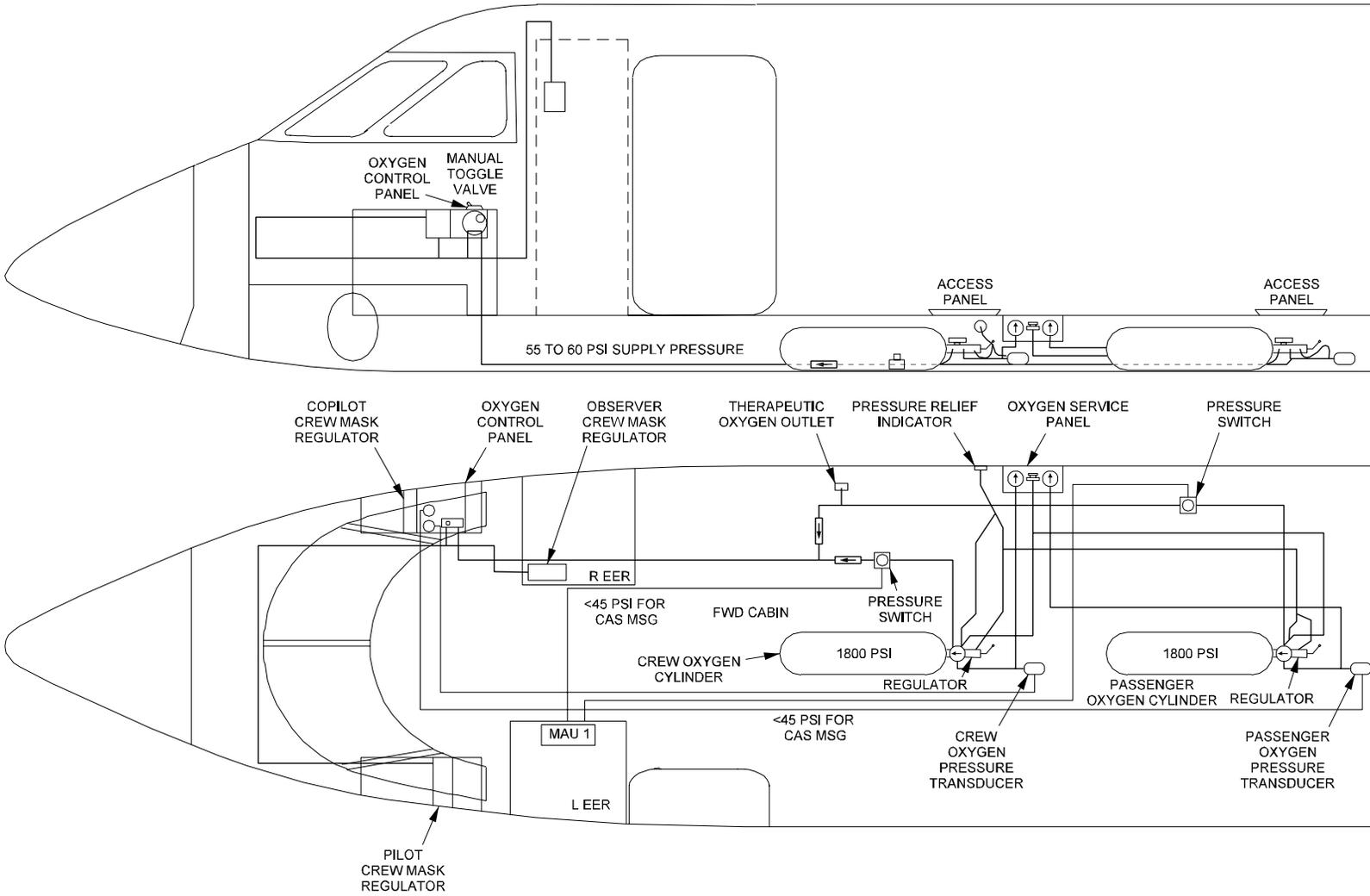
PASSENGER MASKS ARE INTENDED FOR USE DURING AN EMERGENCY DESCENT TO AN ALTITUDE NOT REQUIRING SUPPLEMENTAL OXYGEN.

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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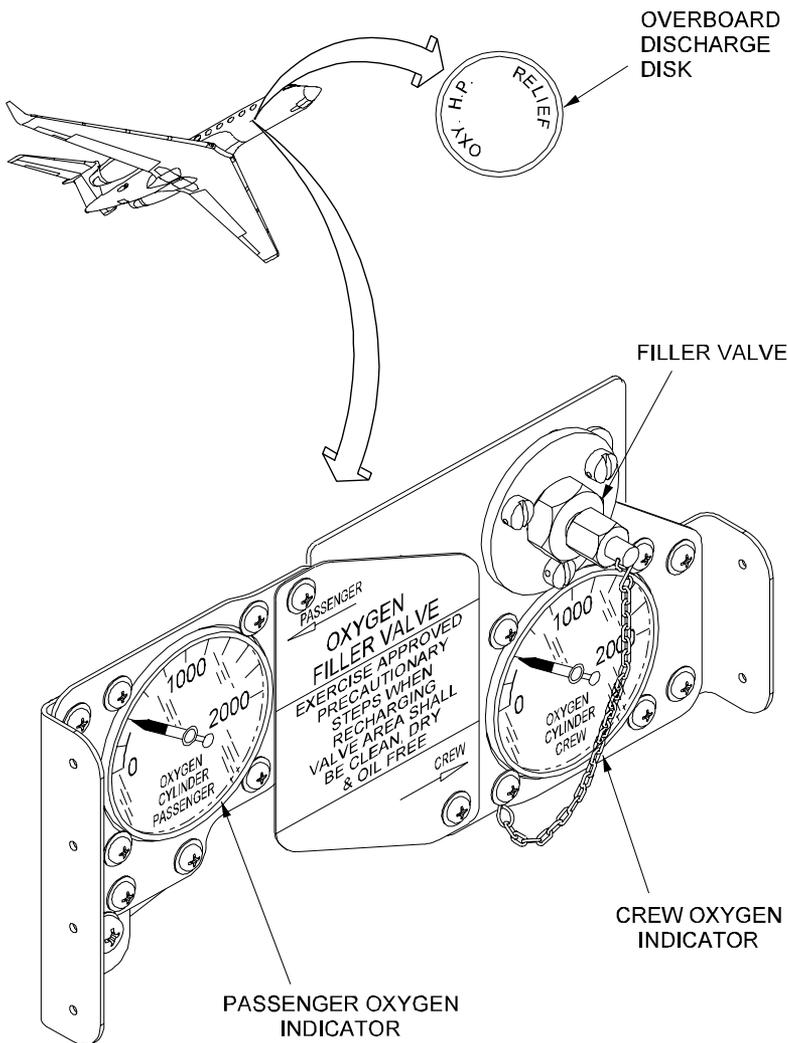


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Oxygen System
Figure 1 (Sheet 2 of 2)

2A-35-00

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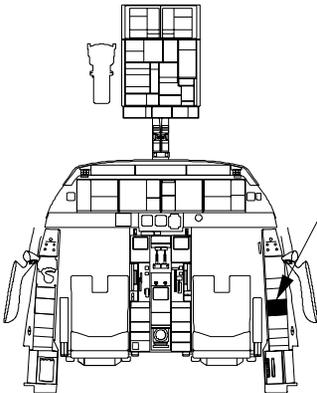


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Oxygen Servicing Panel and Overboard Discharge Disk
Figure 2

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SEE DETAIL A

CREW OXYGEN CYLINDER
PRESSURE GAUGE

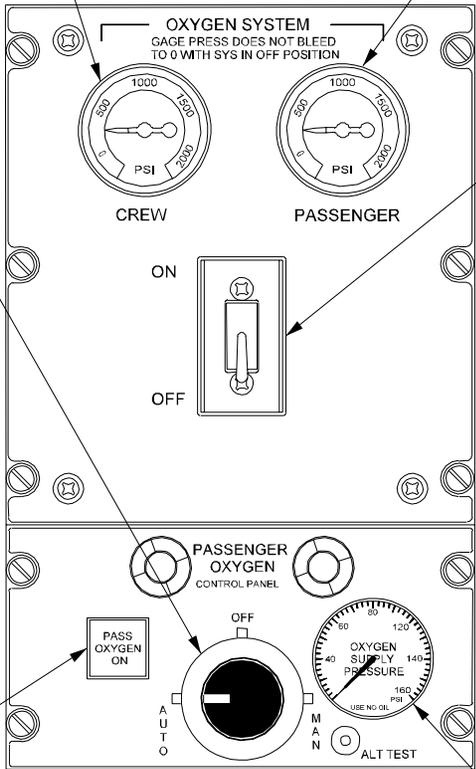
PASSENGER OXYGEN CYLINDER
PRESSURE GAUGE

OFF / AUTO / MAN Knob

OFF: Oxygen flow to the passenger oxygen system is inhibited.
AUTO: PASSENGER OXYGEN control panel will automatically deploy passenger oxygen masks when sensed cabin altitude reaches 13000 feet. Oxygen flow is regulated based on cabin altitude.
MAN: Manually deploys passenger oxygen masks. Oxygen flow is provided at a constant preset flow.

ON / OFF TOGGLE VALVE SWITCH

ON: Oxygen flow is provided to the crew and passenger oxygen systems.
OFF: Oxygen flow to the crew and passenger oxygen systems is inhibited.



PASS OXYGEN ON

Illuminates green when PASSENGER OXYGEN control panel detects oxygen flow to passenger oxygen masks. An amber Passenger Oxygen On message is also displayed on CAS.

OXYGEN SUPPLY PRESSURE

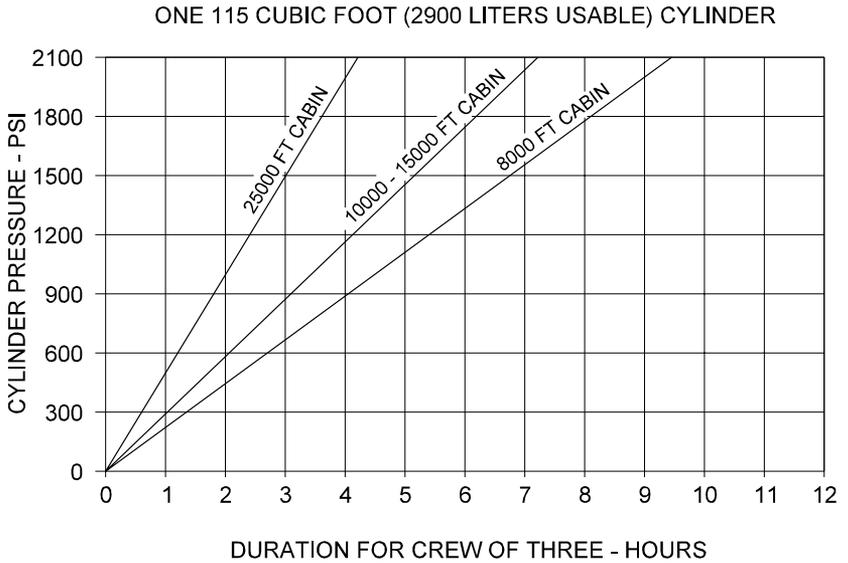
Displays oxygen system supply pressure available to the passenger oxygen system.

DETAIL A

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OXYGEN SYSTEM
Control Panel
Figure 3

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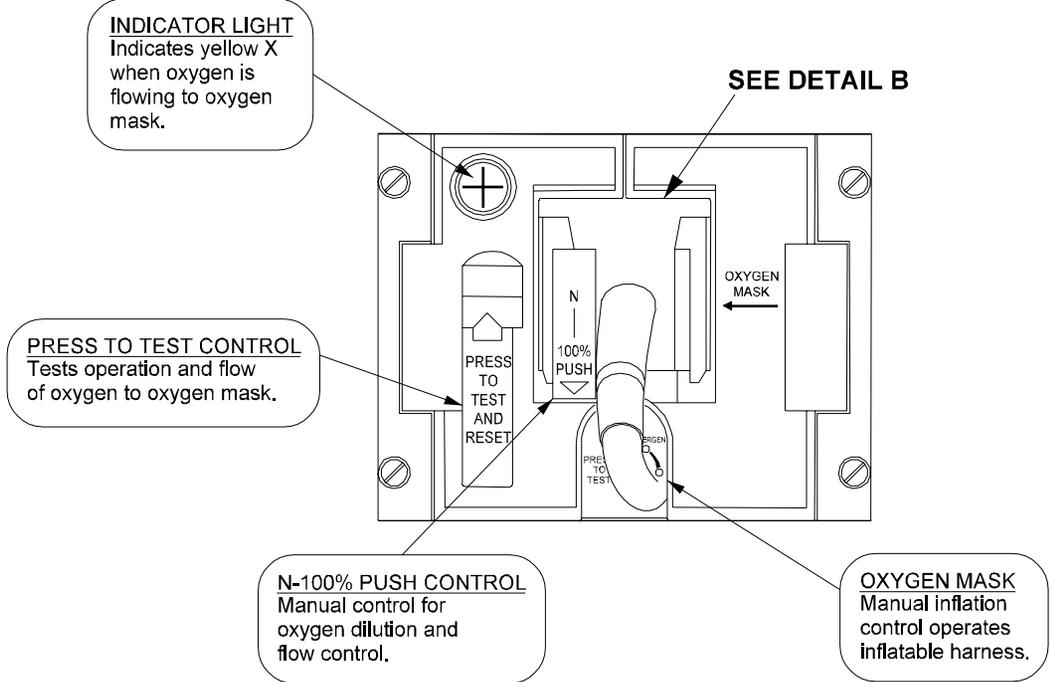
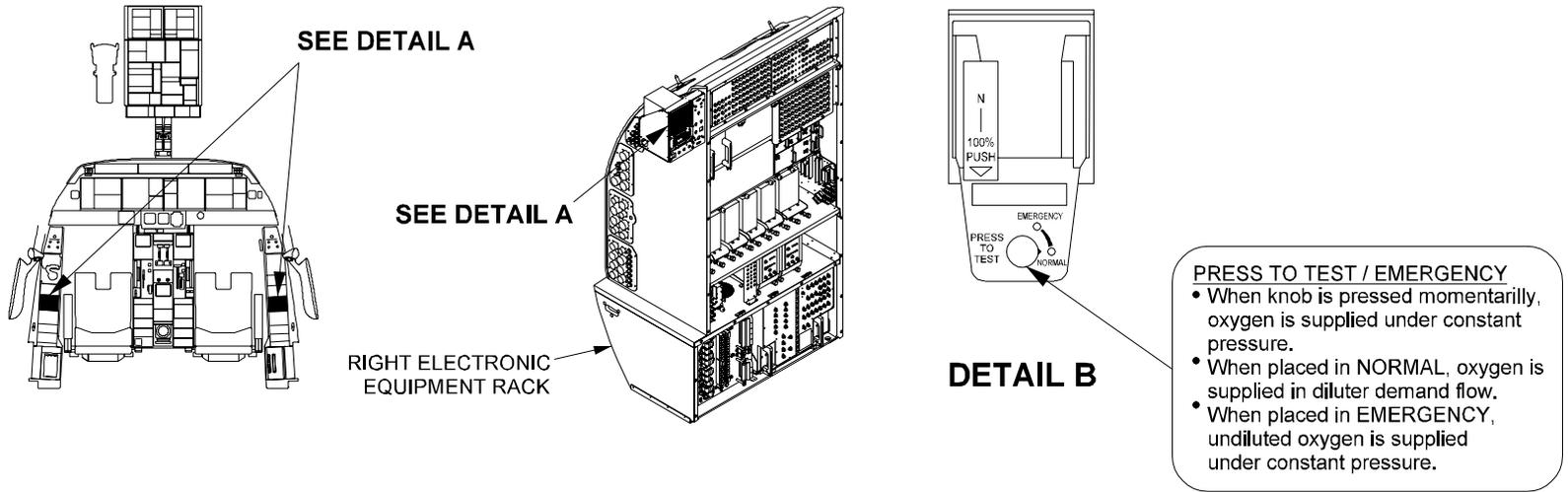


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Oxygen Duration Versus Cabin Altitude
Figure 4

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DETAIL A

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Quick-Donning Oxygen Mask
Figure 5

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