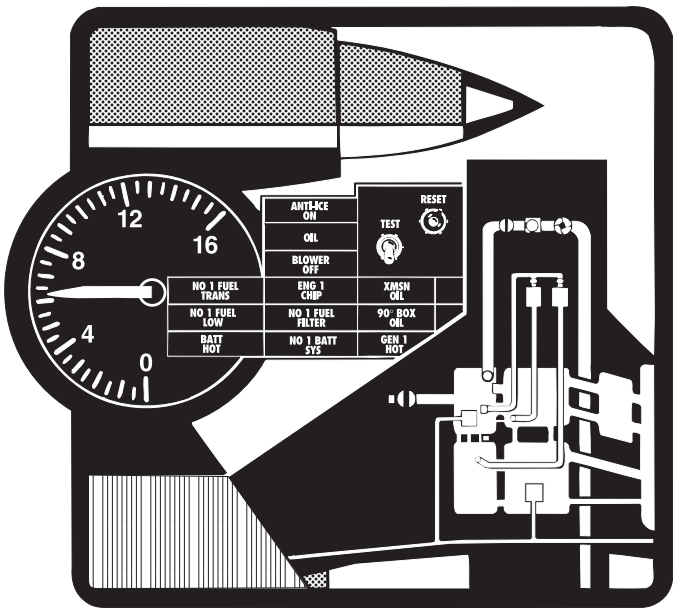
CHAPTER 17
MISCELLANEOUS SYSTEMS



INTRODUCTION

This chapter covers the oxygen system and squat switch (weight-on-wheels sensing) systems on the Citation Mustang. Oxygen is available to the crew and passengers during pressurization system malfunctions or when required. One squat switch on each landing gear indicates when weight is on the wheel. The squat switches provide signals to various aircraft systems.

GENERAL

The oxygen system includes the crew and passenger distribution systems (Figure 17-1). Oxygen is available to the crew at all times and is available to the passengers either automatically above a cabin altitude of approximately 14,800 feet, or manually at any altitude by the oxygen control valve.

The squat switches provide signals to various aircraft systems, controls and indications to adjust them for different operation, depending on whether the aircraft is in flight or on the ground. The specific role of the squat switch in each aircraft system is described in detail in that system chapter of this manual.

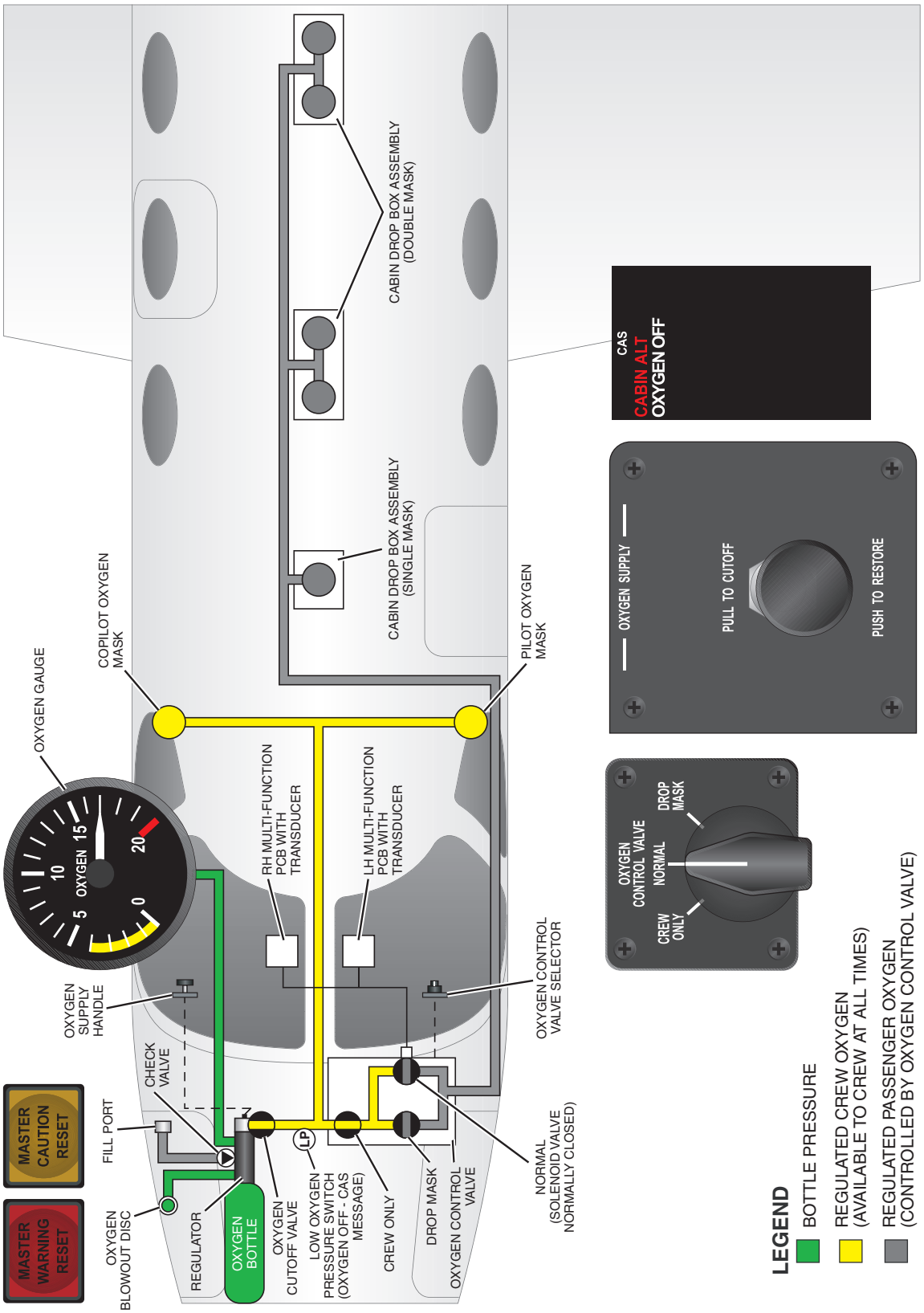


Figure 17-1. Oxygen System Schematic

OXYGEN SYSTEM

DESCRIPTION

The Mustang oxygen system is primarily for emergency use, but also allows limited-duration nonemergency use. It provides breathable low-pressure oxygen (at approximately 70 psi) to crew and passengers through individual oxygen masks.

The system uses a single bottle of compressed oxygen to supply both crew masks and passenger masks. A regulator controls overall system pressure, and a shutoff valve (controlled by an oxygen supply valve labeled OXYGEN SUPPLY in the cockpit) enables or disables the system. Another cockpit control labeled OXYGEN CONTROL VALVE selects distribution modes.

An oxygen gauge indicates the pressure (and indirectly, volume) of oxygen in the bottle. A crew alerting system (CAS) message indicates when insufficient oxygen is available. If oxygen supply is shut off or if pressure in the system is too low, an amber OXYGEN OFF message appears.

Individual controls on crew masks adjust their oxygen flow.

COMPONENTS

The system includes:

- Oxygen bottle (with integral shutoff valve and pressure regulator)
- Oxygen masks (crew and passenger)
- Oxygen control valve

Oxygen Bottle

A single bottle holds all compressed oxygen for the system. It is on the right side of the nose storage compartment and has a 623-liter (22-cubic-feet) useable capacity with 1,133-liter (40-cubic-feet) option. Oxygen is stored in the bottle at a pressure between 1,600 and 1,800 psig.

A shutoff valve and pressure regulator on the bottle control the flow of oxygen to the distribution system (Figure 17-1). The regulator reduces oxygen system pressure to 70 psi downstream of the bottle. The shutoff valve on the bottle is normally open in flight. It is mechanically controlled in the cockpit by the OXYGEN SUPPLY control knob.

Crew Oxygen Masks

Each crewmember is supplied with a quick-donning mask with a built-in microphone and regulator (Figure 17-2). Each oxygen mask is stowed immediately outboard and aft of each crewmember in a container above the outboard shoulder of each crewmember (Figure 17-3) and is equipped with an inline flow indicator (Figure 17-4). A flow indicator indicates to the crew that oxygen is received.

Figure 17-2. Standard Crew Masks

The mask is quick-donning by pressing the red sides of the nosepiece, which causes the harness to inflate and easily slip over the head.

The mask is a diluter/pressure-demand type with 100% oxygen provided by pushing a lever/tab on the bottom-right corner of the mask to the 100% position.

Figure 17-3. Crew Oxygen Mask, Stowed (Pilot Side)

Figure 17-4. Flow Indicator

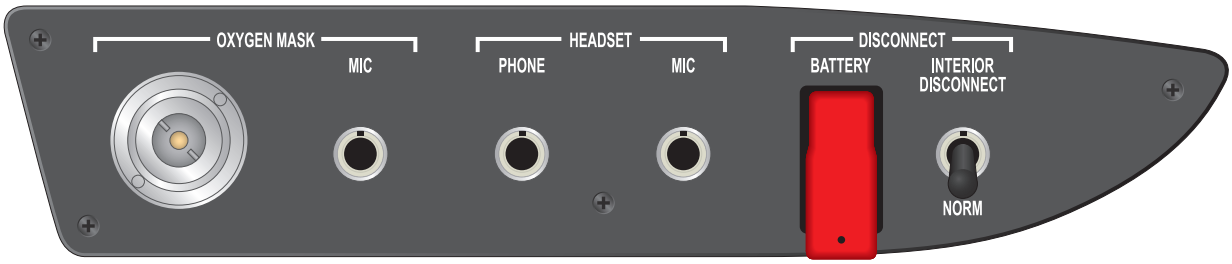
To qualify as a quick-donning mask, the crew oxygen mask must be properly stowed in the receptacle behind, above, and outboard of each crewmember on the forward cabin divider, and must be set to 100%.

NOTE

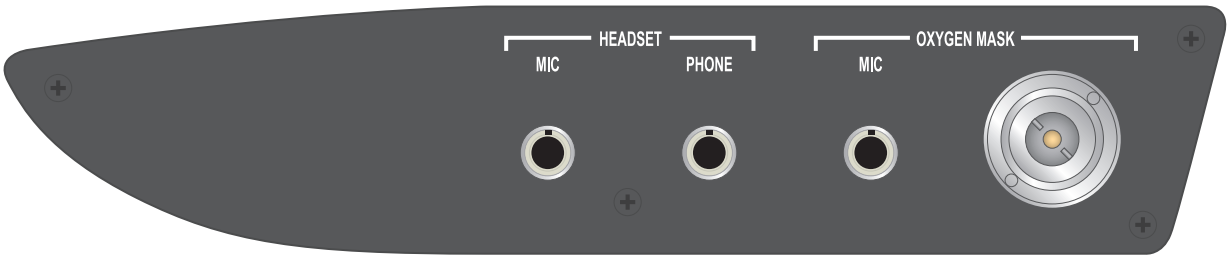
Headsets, eyeglasses, or hats worn by the crew will interfere with the quick-donning capability of the oxygen masks.

The crew masks plug into OXYGEN MASK receptacles on the pilot and copilot side consoles (Figure 17-5). The mask oxygen line plugs into the large valve port, and the mask microphone plugs into the MIC jack, both of which are under the OXYGEN MASK section of the console. Ensure both plugs are fully inserted before flight.

If the aircraft is to be parked outside and the temperature is colder than 0°C, the masks must be removed from the aircraft and kept warm.



PILOT CONSOLE



COPILOT CONSOLE

Figure 17-5. Pilot and Copilot Consoles

Passenger Oxygen Masks

In the cabin, passenger masks are in overhead containers and drop automatically or manually (Figure 17-6). A lanyard attached to the mask aids in pulling the mask down if it does not drop clear of the box.

Figure 17-6. Passenger Oxygen Mask

A short lanyard physically connects the mask to a pin in a valve inside the overhead oxygen line. Pulling this lanyard pulls out the pin to start the oxygen flow to the mask. The act of lowering the oxygen mask to the face also pulls free the lanyard and pin, enabling oxygen to flow. Passenger masks have no flow indicator.

CONTROLS AND INDICATIONS

OXYGEN CUTOFF Knob

The OXYGEN CUTOFF cutoff knob is on the lower-right corner of the instrument panel, below the OXYGEN pressure gauge (Figure 17-7). It closes the regulator at the bottle for delivery of oxygen to the crew and passengers. When the OXYGEN SUPPLY knob is placed in the CUTOFF position, line pressure is vented overboard.

Figure 17-7. OXYGEN CUTOFF Knob

OXYGEN CONTROL VALVE Knob

The OXYGEN CONTROL VALVE knob is on the far left edge of the instrument panel (Figure 17-8). It controls oxygen flow to the passenger cabin. Its three positions actuate a control

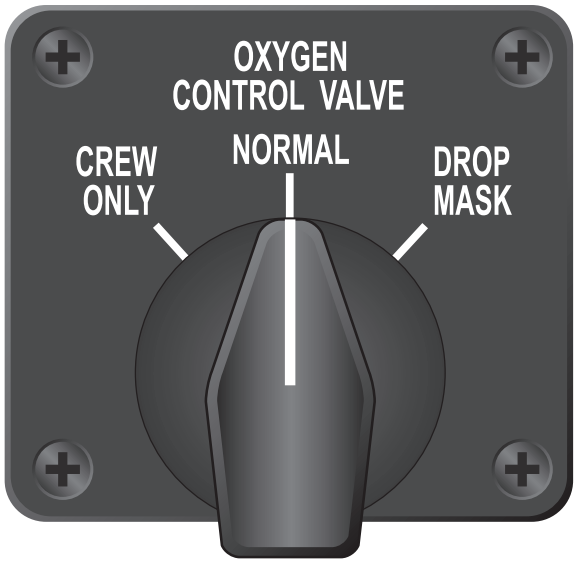


Figure 17-8. Oxygen Control Valve Knob

valve for passenger oxygen distribution as desired. The knob positions are:

- CREW ONLY
- NORMAL
- DROP MASK

CREW ONLY Mode

When the control knob of the oxygen control valve is placed in the CREW ONLY position, oxygen is not available to the passengers. In this position, oxygen is only available to the crew.

After donning the mask, the crew must set the lever under each mask to NORMAL or 100%. For pressure breathing, rotate the mask emergency select knob to EMERGENCY.

NOTE

Oxygen masks are certified to 40,000 feet cabin altitude for the crew only. The CREW ONLY mode operates with or without DC power.

NORMAL Mode

When the oxygen system is enabled, if the OXYGEN CONTROL VALVE knob is selected to the NORMAL position (see Figure 17-8), passenger oxygen masks automatically drop down from the cabin ceiling anytime cabin pressure altitude is greater than 14,800 feet.

Normally, the pressurization system maintains an 8,000-foot cabin altitude up to the maximum certified altitude. However, if cabin altitude exceeds approximately 14,800 feet, a cabin-altitude sensor energizes the passenger oxygen solenoid valve open. Oxygen flows into the passenger distribution system and releases latches on the mask compartment doors. This allows the doors to open and the masks to fall out.

After restoration of the cabin pressure to normal values, the solenoid valve deenergizes closed at approximately 11,500 feet cabin altitude, shutting off oxygen flow to the passengers. The pilot can bypass the solenoid valve by selecting the OXYGEN CONTROL VALVE knob to DROP MASK.

DROP MASK Mode

The pilot can supply oxygen to the passengers at any cabin altitude by placing the OXYGEN CONTROL VALVE selector to the DROP MASK position (see Figure 17-8). When this position is selected, all masks in the cabin to immediately drop from the cabin overhead. This mode operates with or without DC power. When oxygen flow to passengers is not desired, shut off oxygen flow to passenger masks by selecting the OXYGEN CONTROL VALVE knob to the CREW ONLY position at any time, or the NORM position when below 11,500 feet cabin altitude.

MIC Switches (Left and Right)

The left and right MIC switches are immediately below and inboard of each control yoke shaft on the lower instrument tilt panel. There is one switch for each crewmember. Each switch has two positions: OXY MASK and HEADSET. Normally, each switch is set to the HEADSET position, which selects crew audio input to the avionics system from the microphones in the crewmember headset (Figure 17-9).

Selecting a MIC switch to OXY MASK selects audio input from the microphone in that crew

Figure 17-9. Mic Switches

oxygen mask, and disables audio input from that crewmember headset microphone.

Depressing the microphone button on the respective control wheel allows the crewmember to transmit through the headset microphone or through the oxygen mask microphone, as selected by the respective MIC switch.

When the switch is in the OXY MASK position, the cockpit speaker turns on and cannot be turned off using the audio panel button.

OXY CONTROL Circuit Breaker

The OXY CONTROL circuit breaker in the ENVIRO section of the pilot CB panel protects the passenger oxygen solenoid valve. Pulling this circuit breaker disables the spring-loaded solenoid, which closes the valve.

OXYGEN Pressure Gauge

The OXYGEN pressure gauge (Figure 17-10) is on the right side of the copilot instrument panel, below and to the right of the copilot primary flight display (PFD), and above the OXYGEN CUTOFF knob (see Figure 17-7). The gauge illuminates internally.

Figure 17-10. Oxygen Pressure Gauge

The range markings are as follows:

- Yellow arc ..... 0–400 psi
- Red line ..... 2,000 psi

Service anytime gauge indicates insufficient volume. Refer to the *Airplane Flight Manual (AFM)*; normal indication is between 1,600 and 1,800 psig.

OXYGEN OFF Message

The amber OXYGEN OFF message appears when the oxygen system pressure-sensor switch detects system pressure below approximately 45–50 psig. The message extinguishes if system pressure rises above 50–55 psig. This message also displays when the OXYGEN SUPPLY knob is in the PULL TO CUTOFF position.

Overboard Discharge Indicator

A green overboard discharge indicator (disc) is on the right side of the nose section directly below the nose access door (Figure 17-11). If the disc is ruptured, the oxygen bottle

Figure 17-11. Overboard Discharge Indicator

has experienced overpressure and is now empty. If the disc ruptures, perform maintenance before flight.

Crew Oxygen Mask Controls and Indications

Each crew mask has the following controls (Figure 17-12):

- Harness inflation plate
- N–100% diluter rocker switch
- Emergency select knob
- PRESS to TEST button
- Vent valve
- Flow indicator

Harness Inflation Plate

The red harness inflation plate is a mechanical valve control on the lower-left corner of the mask, which controls inflation of the harness. Squeezing the plate against the mask causes a momentary flow of pressurized oxygen to the harness. This inflates the harness, which expands to allow the crewmember to slip the mask harness over their head. When the plate is released, the pressure is released from the harness, which then contracts to hold the mask firmly to the face of the crewmember.

Figure 17-12. Crew Mask Controls

N–100% Diluter Rocker Switch

The red N–100% diluter rocker switch is a mechanical valve on the lower-right corner of the mask. The switch controls the dilution of oxygen supplied by the mask to the crewmember:

- N (normal diluted oxygen)—Forward switch position. Reduces the rate of oxygen usage by mixing oxygen with normal cockpit air at a ratio determined by cabin altitude.
- 100% (pure oxygen)—Aft switch position. Provides only pure oxygen from the oxygen bottle. No cockpit air is mixed with the flow. The mask is required to be set to 100% and checked prior to flight in order to qualify as a quick-donning mask.

EMERGENCY–PRESS TO TEST Knob

The red EMERGENCY–PRESS TO TEST knob/button is a mechanical valve on the underside of the mask. The knob controls the pressure of oxygen supplied by the mask to the crewmember and the button is pressed to test and check if oxygen is available:

- EMERGENCY position (clockwise, toward crewmember)—Provides oxygen under positive pressure, regardless of crewmember breathing.
- Demand-breathing position (not labeled; counterclockwise, away from crewmember)— Provides oxygen on demand as determined by crewmember breathing. This is the normal setting.
- PRESS TO TEST function—Spring-loaded button in the center of the knob. Pressing the button on the knob causes a positive pressure and flow of oxygen to the mask until the button is released.

Vent Valve

When smoke goggles are worn, they fit over the vent on the top of the mask nosepiece. A vent valve control on the front of the mask nosepiece slides forward to open the vent to allow oxygen to enter and clear the smoke goggles.

NOTE

Open the vent valve only if pressure breathing (EMERGENCY position) has been selected. If the vent is opened when the mask is in the other position (demand breathing), smoke may be drawn into the mask.

Flow Indicator

A flow indicator (slide in the mask hose near the connector to the oxygen panel) shows clear when oxygen is available to the mask and is flowing. It shows black when there is no flow.

OPERATION

For specific, current instructions on normal operations, refer to the *AFM*. Where the following information differs from the *AFM*, use the *AFM* information and follow the *AFM* instructions. The following information is only for training and background information.

WARNING

Strictly obey the procedures for the use of oxygen equipment. Do not use oil, grease, or other lubricants made from petroleum in the area of oxygen equipment. This can cause a dangerous fire hazard.

Preflight

During preflight, ensure the OXYGEN SUPPLY control knob is fully pushed in (forward) to open the shutoff valve on the oxygen bottle. Check that proper pressure is indicated on the OXYGEN gauge. Test each crew mask before flight using the PRESS TO TEST button to be sure that it is receiving oxygen from the system. Ensure that oxygen flows into the mask and to the pilot under positive pressure. Before takeoff, check that the OXYGEN OFF message is not displayed and the OXYGEN VALVE is in the NORMAL position. In Flight To operate the oxygen system, ensure there is adequate pressure in the system as indicated by these three conditions:

- The OXYGEN gauge indicates adequate supply (refer to *AFM*)
- The OXYGEN SUPPLY knob is pushed in (forward) fully
- The OXYGEN OFF message does not appear

When those conditions are met, the oxygen system can be operated in one of three modes as selected by the pilot using the OXYGEN CONTROL VALVE knob.

Crew Oxygen Mask

Remove the crew oxygen mask from its container and squeeze the mask so the harness inflation plate is pressed against the mask to inflate the harness. Place the harness over the head and position the mask over the face and nose, then release the harness inflation plate. The harness contracts to hold the mask in place.

The crewmember is assured that oxygen is being received when no restriction to breathing is present with the mask donned and the red N–100% diluter rocker switch is set to 100% (aft position). If the cabin altitude is at or below 25,000 feet, to conserve oxygen when using the mask, the diluter rocker switch may be set to normal (N).

NOTE

On crew masks, select 100% oxygen above 25,000 feet cabin altitude. At cabin altitudes of 25,000 feet and below, select normal (N).

For pressure breathing or smoke/fumes protection, rotate the emergency select knob on the underside of the mask clockwise toward the crewmember to the EMERGENCY position (see Figure 17-10). This position provides a steady flow of pressurized oxygen to the face cone and the smoke goggles (if installed).

Maintenance Considerations

Service the oxygen system any time the pressure gauge indicates inadequate supply, or when the overboard discharge indicator shows an overpressure event has occurred.

If the oxygen bottle depletes to empty or if the oxygen discharge indicator ruptures, the system must be purged and the oxygen bottle replaced before the next flight. The original oxygen bottle must be returned to the supplier for refurbishment or replacement before further use.

Service the oxygen bottle through the filler port near the forward bulkhead, inside the right nose baggage door (Figure 17-13). Only use aviator oxygen (MIL-O-27210, Type 1) for servicing. The fill valve incorporates a check valve and filter. A pressure sealing cap prevents contaminants from entering the oxygen system.

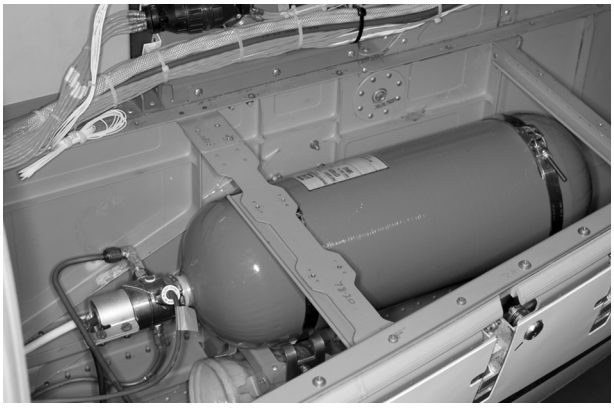


Figure 17-13. Oxygen Bottle

LIMITATIONS

Table 17-1 indicates approximate normal duration of oxygen supply with different numbers of users.

WARNING

Due to human physiological limitations, the passenger oxygen system is not satisfactory for continuous operation above 25,000 feet cabin altitude. The crew oxygen system is not satisfactory for continuous operation above 40,000 feet cabin altitude. Individual physiological limitations may vary. If crew or passengers experience hypoxia symptoms, descend to a lower cabin altitude.

WARNING

No smoking when oxygen is being used or following use of passenger oxygen until lanyards have been reinstalled.

CAUTION

Oil, grease, soap, lipstick, lip balm, and other fatty materials constitute a serious fire hazard when in contact with oxygen.

Oxygen use limitations are further governed by the applicable regulations. In the U.S.A., the pilot must have the oxygen mask on his face during normally pressurized flight for single-pilot Part 135 operations above FL 250 or above single-pilot Part 91 operations above FL 350.

EMERGENCY/ABNORMAL

For specific information on emergency/abnormal procedures, refer to the appropriate FAA-approved abbreviated checklist or *AFM*.

Table 17-1. OXYGEN SUPPLY DURATION

OXYGEN SUPPLY CHART 22 FT^3

AVAILABLE TIME IN MINUTES					
CABIN ALTITUDE	2 COCKPIT	2 COCKPIT, 1 CABIN	2 COCKPIT, 2 CABIN	2 COCKPIT, 3 CABIN	2 COCKPIT, 4 CABIN
8000	196	74	46	33	26
10,000	225	78	47	34	27
15,000	220	79	48	35	27
20,000	178	73	46	34	27
25,000	98	55	39	30	24
30,000	129				
35,000	175				
40,000	246				

AVAILABLE TIME IN MINUTES					
CABIN ALTITUDE	1 COCKPIT	1 COCKPIT, 1 CABIN	1 COCKPIT, 2 CABIN	1 COCKPIT, 3 CABIN	1 COCKPIT, 4 CABIN
8000	392	91	52	36	28
10,000	450	95	53	37	28
15,000	440	96	54	37	29
20,000	356	92	53	37	29
25,000	197	77	48	35	27
30,000	258				
34,000	350				
40,000	492				

SQUAT SWITCH SYSTEM

DESCRIPTION

This section provides an overview of squat switch system functions, operation, and information about when a squat switch is not operating properly.

There is one squat switch on each left and right main landing gear. The switch indicates when weight is on that wheel. The squat switches are positioned in the landing gear assembly, and detect when wheel position changes up or down, as caused by weight-on-wheels or weight-off-wheels. Refer to Chapter 14—"Landing Gear and Brakes" for more detail.

Each squat switch is connected to several aircraft systems. Some systems are connected to both squat switches. Some systems function differently depending on whether the weight is on one wheel or on both wheels. Some systems are sensitive to whether only a specific wheel (left or right) has weight on it.

If the squat switches are not in the same position (weight-on-wheels or weight-off-wheels) for more than 2 seconds, the amber

CAS message WOW MISCOMPARE warns of the difference.

CAUTION

Malfunctions of the squat switches and their associated circuits may cause abnormal functioning of any or all of the aircraft systems that use squat switch information.

Dependent Systems

The following systems require squat switch information for normal functioning:

- External doors
- Engine/FADEC
- Pneumatics
- Windshield anti-ice
- Air conditioning
- Pressurization
- Landing gear
- Brakes (antiskid)
- Avionics
- Stall warning

CONTROLS AND INDICATIONS

L and R SQUAT SWITCH Circuit Breakers

Each squat switch (left and right) is powered through the corresponding L or R SQUAT SWITCH circuit breaker in the ENGINE SYSTEMS section of the corresponding CB panel (left or right).

WOW MISCOMPARE Message

The amber CAS message WOW MISCOMPARE indicates that the squat switch system is indicating different status (miscompare) of the two switches. One squat switch appears to indicate weight-on-wheels while the other appears to indicate weight-off-wheels. The message does not display until the miscompare has continued for 2 seconds. This allows for momentary differences during takeoff and landing.

The miscompare may be caused by:

- Different wheel positions
- Stuck squat switch
- Electrical short or open circuit
- Problems with the multi-function PCB
- Popped L or R SQUAT SWITCH circuit breaker
- Loss of power to a squat switch

EMERGENCY/ABNORMAL

For specific information on emergency/abnormal procedures, refer to the appropriate abbreviated checklists or the FAA-approved *AFM*.