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# Servicing

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# Servicing Record

	DATE	QTY	DATE	QTY
<b>Engine Oil</b>	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
<b>Hydraulic Fluid</b>	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
<b>Alcohol</b>	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____



## **Fuel**

Fuels that conform to the following specifications (including equivalent NATO fuels) are approved for use.

- ASTM D1655 – Jet A, Jet B, Jet A-1
- MIL-T-83133 (JP-8)
- MIL-T-5624 (JP-4 and JP-5)

Mixing of fuels is permissible. Usually, JP-4, JP-5, and JP-8 fuels have MIL-I-27686 anti-icing additive blended at the refinery. Some JP-4 fuel blended for civilian use does not contain anti-icing additive. JP-4 and JP-5 also have MIL-I-25017 corrosion inhibiting additive blended at the refinery. Refer to Fuel in the Limitations chapter.

## **Usable Fuel Capacities**

Left Wing . . . . .	480.4 U.S. GALLONS (3,237.9 LBS)
Right Wing . . . . .	480.4 U.S. GALLONS (3,237.9 LBS)
Fuselage . . . . .	APPROXIMATELY 134 U.S. GALLONS (900 LBS)
Total . . . . .	1,095 U.S. GALLONS (7,384 LBS)

## Fuel Additives (Anti-Icing/Anti-Microbiological)

Additive	Concentration Range	
	Minimum	Maximum
Hi-Flo Prist (PFA-55MB) (MIL-I-27686E)	20 fluid ounces per 260 gallons 0.06%	20 fluid ounces per 104 gallons 0.15%

**Table 6-A; Fuel Additive Concentration**

Anti-ice additive is unnecessary for aircraft with fuel heaters; however, its use in non-treated fuel is recommended to control bacteria and fungi.

**WARNING:** Anti-icing additives containing ethylene glycol monomethyl ether (EGME) cause eye irritation and are harmful if inhaled, swallowed, or absorbed through the skin. EGME is combustible. Before using this material, refer to all safety information on the container.

**CAUTION:** When adding anti-ice additive during overwing refueling, direct additive into the flowing stream. Start the additive flow after fuel flow starts and stop the additive flow before fuel flow stops.

**CAUTION:** Do not allow concentrated additive to contact coated interior of fuel tank or aircraft painted surface. Use not less than 20 fluid ounces of additive per 260 gallons of fuel or more than 20 fluid ounces of additive per 104 gallons of fuel.

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## Refueling Safety Procedures

Aircraft . . . . . GROUND

Fueling/Defueling Equipment . . . . . GROUND

Refuel Nozzle/Hose . . . . . GROUND TO AIRCRAFT

With the aircraft in a designated fueling area, first ground the aircraft to a suitable static ground. Second, ground the refueling truck or hose cart to a suitable static ground. Finally, ground the truck or cart to the aircraft. When using the single point refueling adapter or overwing filler caps, ground the hose to the aircraft.

Fire Equipment . . . . . AVAILABLE/IN POSITION

Safety Precautions . . . . . OBSERVE

**CAUTION:** Do not wear metal taps on shoes or clothing that tends to generate static electricity (e.g., nylon or synthetic fabrics). Do not operate high wattage pulse-transmitting equipment (i.e., weather radar) in the vicinity of fueling/defueling operation.

**CAUTION:** Ensure the proper grade and type of fuel is used to service the aircraft.

## Gravity Refueling (Overwing)

Safety Procedures . . . . . ACCOMPLISH

Fuel Quantity Requirements . . . . . DETERMINE

Wing Fuel Filler Cap Cover . . . . . OPEN

Wing Fuel Filler Cap . . . . . REMOVE

Ground fuel nozzle to the jack under the wing near the out-board island fairing.

If anti-icing additive is desired:

HI-FLO Inhibitor . . . . . ATTACH

Refueling . . . . . START

Immediately slip ring over blender trigger. Ensure blender tube discharges into the refueling stream.

When required level reached:

Anti-Icing Additive Flow . . . . . STOP

Fuel Flow . . . . . STOP

Wing Filler Cap/Cover . . . . . REPLACE/SECURE

Grounding Cables . . . . . REMOVE

Aircraft/Fueling Equipment . . . . . REMOVE

If anti-icing is not desired:

Refueling . . . . . START

At required level:

Refueling . . . . . STOP

Wing Filler Cap/Cover . . . . . REPLACE/SECURE

Grounding Cables . . . . . REMOVE

Aircraft/Fueling Equipment . . . . . REMOVE



## Fuselage Tank Transfer Refueling (From Left Wing Tank)

Safety Procedures . . . . . ACCOMPLISH  
Battery Switch . . . . . OFF

**NOTE:** For **units 001 to 076**, position the BATT switch OFF to refuel the fuselage tank. For **unit 077 and subsequent and units with SB650-28-20**, electrical power may be ON (e.g., BATT switch ON, APU, GPU, etc.) during fuselage tank refueling.

Minimum Fuel in Left Wing Tank . . . . . 175 U.S. GAL  
Left Wing Fuel Filler Cap . . . . . SECURE

**WARNING:** Secure the left fuel filler cap in place before beginning fuel transfer to fuselage tank; this eliminates the possibility of electrical spark as fuel vapors escape from fill port.

Fuselage Tank Transfer Access Door . . . . . OPEN  
Fuselage Tank Transfer Switch . . . . . FILL  
Positioning switch to FILL energizes the left fuel boost pump and opens the fuselage tank transfer shutoff valve.

Fuselage Tank . . . . . VERIFY FULL/OR AS REQUIRED

When fuselage tank is full, a float switch de-energizes the left boost pump to stop the fuel flow. When fueling requirements dictate less than full fuselage fuel, transfer of fuel may be stopped by moving the fuselage tank transfer switch to OFF when the fuel quantity gage indicates the desired quantity. On **units 001 to 076 without SB650-28-20**, moving the BATT switch to ON to read the fuel quantity gage automatically stops fuel transfer until the BATT switch is repositioned to OFF.

Left Wing Tank . . . . . TOP OFF

Grounding Cables . . . . . REMOVE

Aircraft/Refueling Equipment . . . . . REMOVE

## Pressure Refueling

**CAUTION:** Refueling pressure must not exceed 60 PSI.

Safety Procedures . . . . . ACCOMPLISH

Refuel/Defuel Control Panel Access Door . . . . . OPEN

**CAUTION: Units 001 to 104 with SB650-28-16; unit 105 and subsequent:** Starting up or shutting down the APU while the single-point refueling door is open causes the APU inlet fire extinguisher bottle to discharge. If the APU is to be operated during refueling, do not open the single-point refueling door until after the APU is started; close and latch the door prior to APU shut-down.

**NOTE:** SB650-28-16; Fuel Modification to allow Single-Point Refueling During APU Operation (**units 001 to 104 with APU for ground operation only**).

Aircraft Fuel Vents . . . . . CLEAR

Adapter Cap . . . . . REMOVE

Refuel/Defuel Nozzle . . . . . ATTACH

Insert into receptacle; turn clockwise to latch in place, and open nozzle.

Nozzle . . . . . OPEN

If Fuselage Fuel Tank is to be Serviced:

Fuselage Tank Fill Control . . . . . PULL

## Before Refueling Precheck

Fuel Flow . . . . . VERIFY

Precheck Valves (L/R) . . . . . OPEN

Fuselage Tank Precheck Valve . . . . . OPEN

Complete this step only if fuselage tank is to be serviced.

Fuel Flow . . . . . STOP

Fuel flow should shut down within 10 seconds. Each high-level pilot valve requires a maximum of 3 gpm for a refueling precheck. When servicing the wing tanks only, confirm a minimum 6 gpm fuel flow rate; if servicing both the wing and fuselage tanks, confirm a fuel flow rate of at least 9 gpm.

Precheck Valves . . . . . CLOSE

**NOTE:** If precheck is not successful, discontinue refueling operation now.

Refueling . . . . . COMPLETE

Fuel Flow . . . . . STOP

When fuel tanks are full, the high level pilot valves stop the fuel flow automatically.

Fuel Quantity . . . . . VERIFY

If fuselage tank was serviced:

Fuselage Tank Fill Control . . . . . PUSH IN

- Refueling Nozzle . . . . . DISCONNECT
- Adapter Cap . . . . . INSTALL
- Refuel/Defuel Control Panel
  - Access Door . . . . . CLOSE/SECURE

**CAUTION: Units 001 to 104 with SB650-28-16; unit 105 and subsequent:** Starting up or shutting down the APU while the single-point refueling door is open causes the APU inlet fire extinguisher bottle to discharge. If the APU is to be operated during refueling, do not open the single-point refueling door until after the APU is started; close and latch the door prior to APU shutdown.

**NOTE:** SB650-28-16; Fuel Modification to allow Single-Point Refueling During APU Operation (**units 001 to 104 with APU for ground operation only**).

- Grounding Cables . . . . . REMOVE
- Refueling Equipment . . . . . REMOVE

## Suction Defueling

Safety Procedures . . . . . ACCOMPLISH

Refuel/Defuel Control Panel Access Door . . . . . OPEN

Adapter Cap . . . . . REMOVE

Refuel/Defuel Nozzle . . . . . ATTACH

Insert nozzle, turn clockwise to latch in place, and open nozzle.

**NOTE:** Each wing tank has a manual defueling shutoff valve beneath the center wing area that may be used to prevent defueling. When using the manual defueling shutoff valves, refer to the Maintenance Manual. To drain residual fuel, use underwing drain valves.

The fuselage tank does not have a defueling shutoff valve; suction applied to the refuel/defuel adapter defuels the fuselage tank.

External Power . . . . . CONNECT

Boost Switches (L/R) . . . . . ON

This empties the forward fairing reservoirs.

**CAUTION:** To prevent possible damage to the fuel boost pump, do not operate pump after the FUEL LOW LEVEL annunciator illuminates.

**NOTE:** Do not rely on the fuel boost pump sound to determine cavitation because the sound varies with fuel depth. The fuel boost pump must be submerged in fuel during operation to ensure adequate cooling and lubrication.

Defueling Equipment . . . . .	ON
Defueling Operation . . . . .	COMPLETE
Defueling Equipment . . . . .	OFF
Boost Switches (L/R) . . . . .	OFF
External Power . . . . .	DISCONNECT
Refuel/Defuel Nozzle . . . . .	REMOVE
Adapter Cover . . . . .	REPLACE
Refuel/Defuel Control Panel Access Door . . . . .	CLOSE
Grounding Cables . . . . .	REMOVE
Defueling Equipment . . . . .	REMOVE

### Fuel Imbalance

It is not necessary to maintain fuel balance during refueling, however, the maximum asymmetric fuel differential is 200 lbs for flight and 800 lbs in an emergency.

The fuselage fuel tank may be filled if the wing fuel quantity is 2,500 lbs or greater per side (5,000 lbs minimum total wing fuel).

### Ground Power Unit

DC Voltage/Amperage . . . . . 28V DC/1,000 TO 2,000A

# Hydraulic Fluid

Approved Fluid . . . . . MIL-H-83282

## Hydraulic Fluid Specifications

- Braco 882
- Royco 782
- Chevron TS-741
- Penreco Petrofluid 882
- American Oil and Supply PQ 3883

**CAUTION:** The 650 hydraulic system seals, packing, O-rings, and some metallic components are not compatible with phosphate ester (Skydrol/Hyjet) type hydraulic fluid. If Skydrol is introduced into the system, rapid deterioration of these components occurs, causing multiple leaks. This then requires an overhaul or replacement of all components containing such seals. Additionally, particles of deteriorated seals, packings, and O-rings may be deposited within the orifices of valves from which they are dissolved, causing component failure during operation.

**NOTE:** Before servicing the hydraulic system, verify that the spoilers and thrust reversers are retracted, landing gear is extended, and accumulator preload pressure is 1,500 PSIG.



## **Hydraulic Systems Capacities**

### **Reservoir Gage Markings:**

Maximum . . . . .	500 CUBIC INCHES/8.6 QTS
Accumulator . . . . .	425 CUBIC INCHES/7.3 QTS
Full . . . . .	360 CUBIC INCHES/6.2 QTS
Refill . . . . .	310 CUBIC INCHES/5.3 QTS
Emergency . . . . .	150 CUBIC INCHES/2.6 QTS
Empty . . . . .	0 CUBIC INCHES/0.0 QTS

### **Cockpit Gage Markings:**

Red Arc . . . . .	0 TO 150 CUBIC INCHES
Yellow Arc . . . . .	150 TO 300 CUBIC INCHES
Green Arc . . . . .	300 TO 430 CUBIC INCHES
Maximum . . . . .	500 CUBIC INCHES
System Capacity . . . . .	4.3 GALLONS

## Accumulator Preloads

**NOTE:** Service the main, spoiler, and nosewheel steering accumulators with dry nitrogen only.

Main System Accumulator . . . . .	1,500 PSIG
Spoiler System Accumulator . . . . .	1,500 PSIG
Nosewheel Steering Accumulator . . . . .	1,500 PSIG

**WARNING:** High pressure gases are dangerous. Observe all precautions when handling high pressure gases.

**CAUTION:** Before operating the nosewheel steering system to exhaust accumulator pressure, remove the towbar.

## Oil – Engine and APU

The following Type II oils meeting specification MIL-L-23699 are approved for use in the engines and optional Cessna or PATS Inc. (STC) Turbomach APUs.

- Mobil Jet Oil 254
- Mobil Jet Oil II
- Exxon/Esso 2380 Turbo Oil
- Castrol 5000
- Aeroshell/Royco Turbine Oil 500

Do not mix brands of oil. Operators with other APUs should consult the appropriate supplements and manuals for specifications and servicing procedures.

**WARNING:** Jet engine oil may cause severe skin irritation. Minimize contact with used oil because of its cancer-causing potential. Thoroughly wash skin with soap and water after contact with oil.

## Oil Capacities

- Engine . . . . . 11.6 QTS (11.0 LITERS)
- Reservoir (20% expansion space) . . . 6.0 QTS (5.5 LITERS)
- Optional APU:
- FULL without Oil Cooler . . . . . 3.0 QTS (2.84 LITERS)
- FULL with Oil Cooler . . . . . 4.0 QTS (3.79 LITERS)

## Oil Consumption

Maximum . . . . . 0.05 GPH  
MEASURED OVER 15-HOUR PERIOD

## Environmental Control Unit PACs

### Capacities (Fill-to-Spill)

Sundstrand ACM 726164A . . . . . 3.4 FL OZ (100 CM<sup>3</sup>)  
Sundstrand ACM 740551 . . . . . 10.1 FL OZ (300 CM<sup>3</sup>)  
Hamilton Standard . . . . . 1.8 FL OZ (53 CM<sup>3</sup>)

### Approved Oils

#### Sundstrand PACs:

- Mobil Jet Oil 254 (only)

**CAUTION:** Use only Mobil Jet 254 in the air cycle machine because of its high temperature range.

#### Hamilton Standard PACs:

- Exxon 2380
- Any oil conforming to MIL-L-23699
- If the preferred Exxon 2380 is not available, any oil conforming to MIL-L-7898G or later

Do not mix types of oil.

# Oxygen

Service the system with aviator's breathing oxygen (MIL-O-27210). The use of medical oxygen is not approved because of its high moisture content.

## Cylinder Capacity

The following figures are based on 1,850 PSI charge and regulated to 70 PSI for system usage.

### Units 001 to 178

with Standard Cylinder . . . . . 50 CUBIC FT/  
1,285 LITERS (USABLE)

### Units 001 to 178

with Optional Cylinder . . . . . 76 CUBIC FT/  
1,977 LITERS (USABLE)

### Units 179 and Subsequent

. . . . . 76 CUBIC FT/  
1,977 LITERS (USABLE)

## Cylinder Pressure

Maximum Pressure . . . . . 1,850 PSIG AT 70°F (21°C)

Refer to the Maintenance Manual for oxygen cylinder fill pressure at varied temperatures.

Pressure Gage Indication:

- Below 400 PSI/Yellow scale . . . . . SERVICE BOTTLE
- 1,600 TO 1,850 PSI/Green Scale . . . . . NORMAL RANGE
- 2,000 PSI/Red Line . . . . . MAXIMUM
- 2,700 TO 3,000 PSI . . . . . OVERPRESSURE

Overpressure ruptures the green discharge indicator at the end of the bottle overpressure vent line. Check disc at preflight; if missing, replace the bottle and regulator before flight.

## Oxygen Servicing Safety Precautions

During servicing, observe the following precautions.

- Allow no greasy substances in the vicinity.
- Check that filling valve is clean.
- Set oxygen bottle about 7 ft from aircraft oxygen filling valve.
- Fill oxygen bottle slowly to keep the bottle as cool as possible.
- Ensure aircraft is grounded.
- Ensure aircraft electrical system is off.
- Ensure no refueling/defueling is underway.

**WARNING:** Remember that oxygen added to hydrocarbons results in an explosion.

**WARNING:** During oxygen filling, no one should be inside the aircraft. Perform oxygen filling in the open. Open the aircraft-incorporated oxygen bottle shutoff valve slowly (take at least 5 to 10 seconds). Close the filling valve cap properly to ensure tightness.

**WARNING:** Do not use oxygen when there are flames in the cabin or cockpit. Smoking is prohibited during oxygen use and following use of passenger oxygen until lanyards are reinstalled.

**WARNING:** The pressure regulator outlets are not compatible with passenger oxygen masks.

**CAUTION:** Excessive movement of the oxygen controller may cause wear and leaks.

## Struts

Strut servicing requires qualified maintenance personnel and jacking the aircraft.

Air Chamber of Strut/Oleo . . . . . DRY NITROGEN

Oil Chamber of Strut/Oleo . . . . . HYDRAULIC FLUID  
(MIL-H-83282B)

**CAUTION:** Never under any circumstances apply nitrogen charge to oleo strut until the oil chamber is properly serviced with hydraulic fluid. Damage to oleo strut could result.

## Tire Inflation

Use only dry nitrogen to inflate the nosewheel and main tires.

Adjust tire pressure when temperature variation between the departure and destination points is extreme (i.e., in excess of 50°F). As a rule, an ambient temperature change of 5°F produces a pressure change of about one percent.

**WARNING:** Introducing relatively cooler nitrogen into a tire that is hot may cause the tire to burst. Allow the tire to cool before attempting to service.

**WARNING:** A bursting tire tends to rupture along the bead. Standing in any position in front of either bead area could cause injury if a tire bursts.

**CAUTION:** Using tire sealant may cause wheel corrosion.

**CAUTION:** If tire pressure falls below recommended limit, corrective action is required.



## Main Wheels

### Units 001 to 093 without SB650-32-13:

- Unloaded (on jacks) . . . . . 152 PSIG
- Loaded (on ground) . . . . . 155 PSIG

### Units 001 to 093 with SB650-32-13; 094 and subsequent:

- Unloaded . . . . . 165 PSI
- Loaded . . . . . 168 PSI

## Nose Wheels

### Units 001 to 093 Without SB650-32-13:

- Unloaded (on jacks) . . . . . 125 ±5 PSIG

### Units 001 to 093 with SB650-32-13; 094 and subsequent:

- Unloaded (on jacks) . . . . . 138 PSIG
- Loaded (weight on tires) . . . . . 140 PSIG

## Windshield Anti-Ice Fluid

- Approved Fluid . . . . . TT-I-735 ISOPROPYL ALCOHOL
- Reservoir Capacity . . . . . 2 QTS

**WARNING:** Deicing fluiding (isopropyl alcohol) is flammable and gives off toxic fumes. Do not service the deicing system near an ignition source or in a confined area.

