Chapter 28

Fuel
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Description and Operation

The fuel system (refer to Figure 1) consists of the front center tank (2), the rear center tank (4) an acro tank (6), two wing tanks (1&5), a fuel selector valve (3), a gascolator (9), an electrically driven auxiliary pump (7) and an engine driven rotary pump (8).

On the instrument panel one fuel quantity indicator for the center tank and one for the wing tanks, the switch for the boost pump and circuit breakers are installed (see Figure 14).

Fuel Tank Capacities

<table>
<thead>
<tr>
<th>Tank Type</th>
<th>Capacity</th>
<th>US Gal.</th>
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<tbody>
<tr>
<td>Front center tank</td>
<td>54 l</td>
<td>14.3 US Gal.</td>
</tr>
<tr>
<td>Rear center tank</td>
<td>41 l</td>
<td>10.8 US Gal.</td>
</tr>
<tr>
<td>Acro tank</td>
<td>9 l</td>
<td>2.4 US Gal.</td>
</tr>
<tr>
<td>Wing tank LH</td>
<td>60 l</td>
<td>15.85 US Gal.</td>
</tr>
<tr>
<td>Wing tank RH</td>
<td>60 l</td>
<td>15.85 US Gal.</td>
</tr>
<tr>
<td>Total capacity</td>
<td>224 l</td>
<td>29.2 US Gal.</td>
</tr>
<tr>
<td>Unusable fuel</td>
<td>3 l</td>
<td>0.8 US Gal.</td>
</tr>
</tbody>
</table>
Refueling/Defueling

Refer to Chapter 12 for detailed refueling/defueling procedures.

Reduction of Fuel Tank Vapor Hazards
(General Precautions)

During all ventilation or maintenance procedures involving the fuel system, observe the following general precautions.

1. Defueling should be outdoors with the aircraft at least 100 feet from hangars or other aircraft.
2. No smoking should be allowed within 100 feet of the aircraft.
3. Suitable fire fighting equipment should be available. Foam or soda type extinguishing agents are recommended.
4. Ground the aircraft to prevent static electricity from causing sparks. If a ramp ground is available it should be connected to exhaust stack. If a ramp ground is not provided, a temporary ground can be obtained by driving a metal rod into the ground and attaching a ground wire between the rod and the aircraft exhaust stack.
5. Flame and spark producing equipment should not be operated within 100 feet of the aircraft.
6. The aircraft should have its battery removed.
7. Only personnel working on the aircraft should be allowed in the immediate area, and no other maintenance should be performed while the tanks are being worked on.
8. When a fuel tank is opened for repair, air ventilation (refer to Page 7) should be started immediately to reduce vapor concentrations.
9. When draining fuel, ensure that suitable containers are available and that drained fuel is stored safely. Do not allow fuel to drip to the ground and form pools.
10. If it is necessary to ventilate a tank when the aircraft is in hangar, ensure that vapors do not accumulate to explosive or toxic levels in the hangar.
When fuel is being drained, there is little control over the release of fuel vapor. This vapor should be dissipated as quickly as possible. Compressed air or explosion-proof blowers may be used for the purpose.

Air Ventilation

1. Completely drain the fuel system per Chapter 12-10-02.
2. Remove inspection doors (refer to Chapter 28-11-03) and tank caps.
3. Use compressed air or an explosion-proof blower to blow air into the tank until tank interior is dry and free of vapor.
4. Continue ventilation whenever tank is open and being worked on.

If flammable vapors from cleaning solvents are allowed in the tank increase air circulation to dissipate them.
Description and Operation

The EXTRA 300/SC is equipped with two independent fuel systems: The acro- and center tanks system and the wing tank system.

The acro tank (1, Figure 2) incorporating an inverted flight fuel supply system is mounted in the fuselage just behind the firewall. It is connected to the front (2) and rear (3) center tank by flexible hoses. The acro and center tanks are fastened to the fuselage by means of metal attachment belts (5). Fueling the center tanks is by means of two fuselage 2" diameter filler caps. For leak detection the acro and center tanks are furnished with a GRP tank shell. In case of leakage blue colored fuel is shining through. The acro and center tanks are grounded. The acro tank deaerates (6) into the rear center tank. Both center tanks deaerate by ventilation tubes (6) ending at the right side of the main landing gear spring.

The root section of each wing – in front of the main spars – forms an integral fuel tank of approximately 150 cm (59") length (4). Each wing tank has a 2" diameter filler cap for gravity fueling. Sealing lips are installed at the filler necks inside the wingtank. For sealing 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA) has been applied to the inside of the wing tanks. For lightning protection reason the shell in the area of the wing tank has an outer layer of carbon fiber with incorporated aluminium thread (also refer to Chapter 57). The wing tanks are grounded. Each tank is provided with an alu ventilation tube (6) for adequate venting. The ventilation tubes are interconnected to a main tube (6), ending outside of the fuselage at the right side of the main landing gear spring.
28-10-01  Rear Center Tank

Removal/Installation

1. Remove the main fuselage cover as per Chapter 51.
2. Drain the fuel system per Chapter 12.
3. Remove the instrument panel as per Chapter 31.
4. Remove the torque tube as per Chapter 27.
5. Remove one rudder pedal as per Chapter 27.
6. Remove smoke tank as per Chapter 96.
7. Disconnect the electrical bonding and the fuel quantity transducer wiring from the rear center tank.
8. Disconnect the fuel and vent lines from the rear center tank.
9. Remove the bottom hose fitting from the rear center tank.

⚠️ CAUTION
Prevent the drain tube of the GRP tank shell from breaking when handling the center tank.

10. Remove the metal attachment belts with the rubber stripes.
11. Remove the rear center tank through the cockpit.
12. Install in reverse sequence of removal.

28-10-02  Front Center Tank

Removal/Installation

1. Remove the rear center tank as per Chapter 28-10-01.
2. Remove the wing as per Chapter 57.
3. Remove the battery as per Chapter 24.
4. Remove the acro tank as per Chapter 28-10-03
5 Disconnect the electrical bonding and the fuel quantity transducer wiring from the front center tank.

6 Disconnect the fuel and vent lines from the front center tank.

7 Remove the bottom hose fitting from the front center tank.

**CAUTION**

Prevent the drain tube of the GRP tank shell from breaking when handling the center tank.

8 Remove the metal attachment belts with the rubber stripes.

9 Remove the front center tank through the cockpit.

10 Install in reverse sequence of removal.

**28-10-03**

**Acro Tank**

**Removal/Installation**

1 Remove the main fuselage cover and RH side cover as per Chapter 51.

2 Remove the rear center tank as per Chapter 28-10-01.

3 Disconnect the electrical bonding from the acro tank.

4 Disconnect the fuel and vent lines from the acro tank.

5 Remove the metal attachment belts with the rubber stripes.

6 Remove the acro tank.

7 Install in reverse sequence of removal.
Flop Tube (Acro Tank) Removal/Installation

1. Drain the fuel system per Chapter 12-10-02.
2. Remove the acro tank per Chapter 28-10-03.
3. Disconnect the hose (5, Figure 3) and the elbow fitting (4).
4. Loosen the flop tube fitting (3) and take the flop tube assembly (2) out of the acro tank (1).

**WARNING** Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

5. Clean the sealing surfaces mechanically and with Acetone.

**NOTE** If the flop tube assembly has to be replaced install a complete new assembly.

6. Install in reverse sequence of removal after applying Loctite 577 to the flop tube fitting thread.
28-10-05 Wing Tank Inspection Door

Removal/Installation

1. Drain the fuel system per Chapter 12-10-02.

2. Disconnect the ground bonding leads and if necessary (LH wing tank) the electrical wiring of the lever-type tank unit (3, Figure 4).

3. Remove the inspection door bolts.

4. Remove the inspection door flange (1).

5. Push the inspection door (2) into the tank, then turn and remove.

**WARNING** Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

6. Clean the sealing surfaces mechanically and with Acetone.

7. Install in reverse sequence of removal after applying 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA) to the sealing surfaces (inspection door and tank root rib).

![Inspection Door Removal/Installation](image)

**Figure 4**

Inspection Door Removal/Installation

PAGE DATE: 29. May 2009
28-10-06 Wing Tank Outlets

Removal/Installation

1. Remove the inspection door (1) (refer to Figure 5) per Chapter 28-10-05.
2. Remove the union nuts (2) and the elbow tubes (3).
3. Remove AN 924 nut and washers and remove AN 832 fitting.

WARNING Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

4. Clean sealing surfaces mechanically and with Acetone.

5. Install in reverse sequence of removal after applying 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA) to the sealing surfaces (fitting to tank root rib). Ensure that the outlet end positions are in the upper- resp. undermost edge of the wing tank (see Figure 5 below).

![Wing Tank Outlets Removal/Installation](image-url)

Figure 5
**28-10-07  Filler Neck (Center Tanks)**

**Removal/Installation**

1. Remove the main fuselage cover as per Chapter 51.
2. Completely drain the fuel system as per Chapter 12.
3. Loosen the lower hose clip.
4. Remove the filler neck.
5. Install in reverse sequence of removal.

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**28-10-08  Filler Neck (Wing Tank)**

**Removal/Installation**

1. Completely drain the fuel system as per Chapter 12.
2. Remove wing tank inspection door as per Chapter 28-11-05.
3. Unscrew filler neck lock ring (4, Figure 6) with sealing lip (5) using a tool as shown in Figure 8.
4. Remove filler neck (3) with filler cap (1) and O-ring (2).

**WARNING** Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

5. Clean all sealing surfaces with Acetone.
6. Install in reverse sequence of removal after applying 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA) to the sealing surfaces (wing/filler neck).
28-10-09  Filler Neck Sealing Lip

Replacement

1. Carefully drill out the body-bound rivets (7, Figure 6).
2. Install the new sealing lip driving in new washers (6) and body-bound rivets.

*Filler Neck and Sealing Lip Removal/Installation*

*Figure 6*
Ventilation Line

Replacement

Ventilation lines are generally connected to the tanks and to each other by fittings.

General information concerning fittings you find in Chapter 20-10-08.
Description and Operation

(Refer to Figure 7) Flexible hoses and aluminium tubes (5 & 6) connect the particular components of the fuel system. The wing tanks of the EXTRA 300/SC are equipped with a separate drain line.

In addition to the engine driven fuel pump (3), an electrically driven fuel pump (2) having sufficient capacity to feed the engine at take-off power is fitted as a safety device against failure of the engine driven pump. The electrical pump switch is located on the instrument panel. A gascolator (4) is installed between the fuel selector valve (7) and the electrical fuel pump at the firewall (engine side). The fuel selector valve (7) is located behind the firewall on a separate support. A control rod connects the selector valve to the control handle. The handle has the positions "WINGTANK", "ACRO & CENTER TANKS" and "OFF".

The fuel selector valve is marked by the letters "WT" (Wing Tank), "E" (Engine), and "CT" (Center Tanks) to ensure correct installation of fuel lines.

Drains are located at the gascolator and the left and right side of the bottom fuselage.

Fuel Selector Valve and Control Rod

Removal/Installation

(Refer to Figure 8)

1. Drain the fuel system per Chapter 12-10-02.
2. Disconnect the fuel lines on the selector valve.
3. Loosen the control rod attachment bolt (5).
4. Loosen the selector valve attachment bolts (2).
5. Remove the selector valve (1).
Fuel Selector Valve and Control Rod Removal/Installation

Figure 8
6 Remove the control handle attachment bolt (7).
7 Remove the washers (8) and spring (9) if installed, the control rod (6) and the control handle (10).
8 Install in reverse sequence of removal. Use LOCTITE when installing the attachment bolts of the new type selector valve.

28-20-02 Gascolator

Removal/Installation

1 Position the fuel selector to "OFF".
2 Drain the forward fuel system using the gascolator drain.
3 Disconnect the fuel lines on the gascolator.
4 Loosen the knurled nut (1).
5 Remove the mounting bracket (2).
6 Remove the fuel reservoir (3) and the sealing ring (4).
7 Remove the strainer (5) and the gascolator cover (6).
8 Install in reverse sequence of removal.
28-20-03 Electrical Boost Pump

Removal/Installation

1. Position the fuel selector to "OFF".
2. Drain the forward fuel system using the gascolator drain.
3. Disconnect the plug and the fuel lines on the boost pump.
4. Loosen the clamping device screws (1).
5  Remove the boost pump (2).

6  Install in reverse sequence of removal.

**Boost Pump Removal/Installation**

*Figure 10*
Fuel Lines

Replacement

Ventilation lines are generally connected to the system components and to each other by fittings.

General information concerning hoses and fittings you find in Chapter 20-10-07/08.

**IMPORTANT**

If replacement of fuel lines passing the firewall is necessary, renew the sealing of the rubber grommet grooves and gaps at the engine side of the firewall. Use PRC-812 (Products Research & Chemical Corporation, USA) firewall sealant. Cover the fuel lines of the engine department with AERQUIP AE102 fire sleeves as per Chapter 20-10-07.
Description and Operation

(Refer to Figure 11) For fuel contents indicating the center tanks are equipped with tubular tank units (1 & 2) and the left wing tank with a lever-type tank unit (4). They transmit the fuel levels to the respective fuel quantity indicators at the instrument panel (3). In contrast to the fuel quantity indicator of the center tanks the one in the wing tank is not adjustable. If the indication is inexact the float wire of the tank unit has to be adjusted (refer to Chapter 28-40-05).
1 Fuel capacity transmitter front center tank
2 Fuel capacity transmitter rear center tank
3 Fuel capacity indicators (instrument panel)
4 Fuel capacity transmitter wing tank

Indicating
Figure 11
28-40-01  Fuel Quantity Indicator

Removal/Installation

1 Disconnect battery.

2 Loosen the nuts, remove the mounting bracket and remove the fuel quantity indicator.

3 Disconnect the wiring (the lamp is not used).

4 Install in reverse sequence of removal observing the wiring diagram.
28-40-02  Fuel Quantity Indicator (Center Tanks)

Calibration

1. Drain the fuel system (refer to Chapter 12-10-02).
2. Remove the fuel quantity indicator following step 2 of Chapter 28-40-01.
3. Bring indicator to „0“-position by turning the adjustment screw.
4. Reinstall the fuel quantity indicator.

28-40-03  Tubular Tank Unit (Center Tanks)

Removal/Installation

1. Drain the fuel system per Chapter 12-10-02.
2. Loosen one bolt and replace by a M5 threaded rod (1) for securing the slotted retainer ring (2).
3. Remove the other bolts and the ground bonding lead (3).
4. Lift tubular tank unit and sealing ring over the threaded rod.
5. Remove the threaded rod and turn out the slotted retainer ring (2).
**WARNING** Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

6. Clean sealing surfaces mechanically and with Acetone.

7. Install in reverse sequence of removal after applying 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA) for sealing to both sides of the sealing ring.

**28-40-04** Lever-type Tank Unit (Wing Tank)

**Removal/Installation**

(refer to Figure 12 below)

1. Disconnect the electrical wiring.

2. Remove LH inspection door (refer to Chapter 28-10-03)

3. Remove tank unit bolts (1).

4. Remove the retainer ring (3) the tank unit (4) and the sealing ring (2).
**WARNING**

Stripping solvents can be toxic and volatile. Use only in well ventilated areas. Avoid physical contact with solvent and do not inhale vapors. Keep solvent containers covered when not in use.

5 Clean sealing surfaces mechanically and with Acetone.

6 Install in reverse sequence of removal after applying 3M Brand Fuel Resistant Coating 776 (3M, St. Paul, USA) for sealing to both sides of the sealing ring and the grooves inside the tank..

## 28-40-05 Float Wire Adjustment

1 Remove the lever-type tank unit per Chapter 28-40-04.

2 Remove the float wire and bend it in form like shown in the following Figure 13:

![Float Wire Adjustment](image)

Figure 13

3 Reinstall the float wire observing the distances shown in Figure 14, pay attention to a proper alignment and tighten well the attachment bolt.
4. Reinstall the lever-type tank unit per Chapter 28-41-04.