Chapter 28

Fuel
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The fuel system (refer to Figure 1) consists of one center tank (3), an acro tank (8), two wing tanks (1), a fuel selector valve (2), a gascolator (9), an electrically driven auxiliary pump (6) and an engine driven rotary pump (7). Concerning the fuel drains (5) also refer to Chapter 12-10-03.

From serial number 1292 the EXTRA 300L is available ex factory in two different fuel tank system configurations. Configuration 1 is characterized by a center tank with 42 L capacity as it is used for the former serial numbers. Configuration 2 is characterized by a center tank with an increased capacity of 60 L. This tank system is outlined on the 2nd sheet of the respective figures.

On the rear instrument panel one fuel quantity indicator for the center tank and one for the wing tanks (refer to Figure 12), the switch for the boost pump and circuit breakers are installed. The electrical wiring is shown on Figure 2.

For fuel tank capacities refer to Chapter 12-10-01.
Fuel System (Configuration 1)
Figure 1, Sheet 1
Fuel System (Configuration 2)
Figure 1, Sheet 2
Electrical Wiring
Figure 2
28-01-00 MAINTENANCE PRACTICES

28-01-01 Refueling/Defueling

Refer to Chapter 12 for detailed refueling/defueling procedures.

28-01-02 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 next paragraph) 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.

**WARNING**

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 28-11-04) 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.

**WARNING**

If flammable vapors from cleaning solvents are allowed in the tank increase air circulation to dissipate them.
The EXTRA 300L is equipped with two independent fuel systems: The center- and acro tank system and the wing tank system.

The acro tank (1, Figure 3) incorporating an inverted flight fuel supply system is mounted in the fuselage just behind the firewall. It is connected to the center tank (2) which is mounted in front of the main spar area by a flexible hose. Fueling the center and acro tank is by means of the fuselage 2" diameter filler cap (5). For leak detection the center and the acro tank are furnished with a GRP tank shell. In case of leakage blue colored fuel is shining through. The center and the acro tank are grounded. The acro tank deaerates (a) into the center tank that itself deaerates by a ventilation tube (b) 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 (5) 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 (3). The wing tanks are grounded. Each tank is provided with an alu ventilation tube (c) for adequate venting. The ventilation tubes are interconnected to a main tube (d), ending outside of the fuselage at the right side of the main landing gear spring.
Storage (Configuration 1)
Figure 3, Sheet 1

Legend:
1 Acro tank
2 Center tank
3 Lightning strike protection layer
4 Wing tank
5 Filler cap
a-d Ventilation lines
Storage (Configuration 2)
Figure 3, Sheet 2
28-11-00  MAINTENANCE PRACTICES

28-11-01  Center Tank Removal/Installation

1. Remove the main fuselage cover (refer to Chapter 51).
2. Remove the front seat per Chapter 25.
3. Remove wing per Chapter 57 (60 L center tank only).
4. Remove the front control stick per Chapter 27.
5. Drain the fuel system per Chapter 12-10-02.
6. Loosen the electrical facilities and the hose fixtures.
7. Remove the bottom hose fitting of the center tank (42 L center tank only, due to wing still installed).
8. Loosen and remove the metal attachment belts with the rubber stripes.
9. Remove the center tank.
10. Install in reverse sequence of removal.

28-11-02  Acro Tank Removal/Installation

1. Remove the main fuselage cover and the bottom covering sheet per Chapter 51.
2. Remove the front seat per Chapter 25.
3. Drain the fuel system per Chapter 12-10-02.
4. Loosen the electrical facilities and the hose fixtures.
5. Loosen and remove the metal attachment belts with the rubber stripes.
6. Remove the acro tank.
7. Install in reverse sequence of removal.
28-11-03  Acro Tank Flop Tube
Removal/Installation

1. Drain the fuel system per Chapter 12-10-02.
2. Disconnect the hose (5, Figure 4) and the elbow fitting (4).
3. Remove the acro tank per Chapter 28-11-02.
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 (Part Number: PC-64204A21).

6. Install in reverse sequence of removal after applying Loctite 577 to the flop tube fitting thread.

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*Flop Tube Removal/Installation*  
*Figure 4*
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 5).

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).
28-11-05 Wing Tank Outlets Removal/Installation

1. Remove the inspection door (1) (refer to Figure 6) per Chapter 28-11-04.
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. under-most edge of the wing tank (see Figure 6 below).
28-11-06  Center Tank Filler Neck Removal/Installation

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

28-11-07  Wing Tank Filler Neck Removal/Installation

1. Completely drain the fuel system per Chapter 12.
2. Remove wing tank inspection door per Chapter 28-11-04.
3. Unscrew filler neck lock ring (4, Figure 7) with sealing lip (5) using a tool as shown in Figure 7.
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).

28-11-08  Filler Neck Sealing Lip Replacement

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

General information concerning fittings is found in Chapter 20-10-08.
Flexible hoses and aluminium tubes (A-K) connect the particular components of the fuel system. From Serial No. 74 the drain line "L" has been added. The fuel lines connecting the wing tanks (D) meet at an aluminium 3-port tee-block (7) in the bottom center of the fuselage.

In addition to the engine driven fuel pump (6), an electrically driven auxiliary pump (5) 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 auxiliary pump switch is located on the rear instrument panel. A gascolator (3) is installed between the fuel selector valve and the auxiliary fuel pump at the firewall (engine side). A fuel selector valve of an Allen 6S122 type (1) is located at the right side of the front cockpit behind the main spar on a separate support. A control rod connects the selector valve to the control handles (2). The fuel selector valve is marked by the letters "WT" (Wing Tank), "E" (Engine), and "CT" (Center Tank) to ensure correct installation of fuel lines (Refer to "Detail A" of Figure 9).

The two tank systems are equipped with separate drain lines. Drains (4) are located at the gascolator and the left and right side of the bottom fuselage.
Distribution (Configuration 1)
Figure 8, Sheet 1

Legend:
1 Fuel selector valve
2 Control rod and handles
3 Gascolator
4 Drain
5 Electric driven aux. pump
6 Engine driven rotary pump
7 3-port tee-block
8 Fuel lines
9 A-L Fuel lines
10 Rear Instrument Panel
11 Firewall
Distribution (Configuration 2)
Figure 8, Sheet 2

Legend:
1. Fuel selector valve
2. Control rod and handles
3. Gascolator
4. Drain
5. Electric driven aux. pump
6. Engine driven rotary pump
7. 3-port tee-block
A-L. Fuel lines
28-21-01 Fuel Selector Valve and Control Rod Removal/Installation

(Refer to Figure 9 Sheet 1 resp. Sheet 2 from Serial No. 79)

1. Drain the fuel system per Chapter 12-10-02.
2. Disconnect the fuel lines on the selector valve.
3. Remove the control rod attachment bolts (5).
4. Remove the attachment screw (4) if applicable.
5. Remove the control handle (3, Sheet 1) resp. the control bracket (3, Sheet 2).
6. Remove the selector valve attachment bolts (2).
7. Remove the selector valve (1).
8. Remove the rear control rod connection bolt (11).
9. Pull out the control rod (12) to the rear.
10. Remove the front control rod connection bolt (7).
11. Remove the washers (8) and the spring (9), the front (6) and the middle control rod (10).

**IMPORTANT**

Ensure LOCTITE 243 cannot get into the selector valve. The selector valve could lock.

12. Install in reverse sequence of removal. Use LOCTITE 243 when installing the selector valve attachment bolts (2) and the attachment screw (4).
Fuel Selector Valve and Control Rod (up to SN 78)

Figure 9, Sheet 1
Detail A

Legend:
1 Selector valve
2 Selector valve attachment bolts
3 Control bracket
4 Attachment screw
5 Control rod attachment bolts
6 Front Control rod
7 Front control rod connection bolt
8 Washers
9 Spring
10 Middle control rod with handle
11 Rear control rod connection bolt
12 Rear control rod with handle

Fuel Selector Valve and Control Rod (from SN 79)
Figure 9, Sheet 2
28-21-03  

Gascolator Removal/Installation

1. Drain the fuel system per Chapter 12-10-02.
2. Disconnect the fuel lines on the gascolator.
3. Loosen the knurled nut (1, Figure 10).
4. Remove the mounting bracket (2).
5. Remove the fuel reservoir (3) and the sealing ring (4).
6. Remove the strainer (5) and the gascolator cover (6).
7. Install in reverse sequence of removal.

Gascolator Removal/Installation

Figure 10
28-21-04  Electrical Boost Pump Removal/Installation

1. Drain the fuel system per Chapter 12-10-02.
2. Disconnect the plug and the fuel lines on the boost pump.
3. Loosen the screw clamps (1, Figure 11).
4. Remove the boost pump (2).
5. Install in reverse sequence of removal.

*Boost Pump Removal/Installation
Figure 11*
28-21-05 Fuel Line Replacement

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 AEROQUIP AE102 fire sleeves as per Chapter 20-10-07.
(Refer to Figure 12) For fuel contents indicating the center tank is equipped with a tubular tank unit (1) and the left wing tank with a lever-type tank unit (2). 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 tank 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 28-41-05).
Indicating (Configuration 1)
Figure 12, Sheet 1

Legend:
1 tubular tank unit
2 lever-type tank unit
3 fuel quantity indicators
Indicating (Configuration 2)
Figure 12, Sheet 2

Legend:
1. tubular tank unit
2. lever-type tank unit
3. fuel quantity indicators
28-41-01 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.
**28-41-02 Fuel Quantity Indicator Calibration (Center Tank)**

1. Drain the fuel system (refer to Chapter 12-10-02).

2. Remove the fuel quantity indicator following step 2 of Chapter 28-41-01.

3. Bring indicator to „0“-position by turning the adjustment screw.

4. Reinstall the fuel quantity indicator.

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**28-41-03 Tubular Tank Unit (Center Tank) 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).

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**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.

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**28-41-04**  
Lever-type Tank Unit (Wing Tank) Removal/Installation

(refer to Figure 13 below)

1 Disconnect the electrical wiring.

2 Remove LH inspection door (refer to Chapter 28-11-03)

3 Remove tank unit bolts (1).

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

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**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.

28-41-05 Float Wire Adjustment

1 Remove the lever-type tank unit per Chapter 28-41-04.

2 Remove the float wire and bend it in form like shown in the following Figure 14:

3 Reinstall the float wire observing the dimensions shown in Figure 15, pay attention to a proper alignment and tighten well the attachment bolt.
4 Reinstall the lever-type tank unit per Chapter 28-41-04.