



# Jabiru Service Bulletin Number A3

## Fuel System Cleaning

**Note on Revision 2.** Revision 2 of this Service Bulletin updates the cleaning procedure using knowledge that has been gained by Jabiru. This revision replaces the requirement to flush with warm soapy water, with a flush with normal cold water.

Aircraft, which have been cleaned using the procedures, promulgated in previous Revisions of this Service Bulletin and are operating without any further indications of contamination, do not need to be re-cleaned using the procedures given in this revision.

Heavy Vertical Lines have been placed on the RHS of all paragraphs where significant changes have been made to this procedure when compared to the previous revisions.

### 1. Introduction

The fuel contamination problem that is the subject of Airworthiness Directives AD/GENERAL/77, and 78, has impacted on the operation of some Jabiru aircraft.

An investigation on one Jabiru aircraft, which had flown for 55 hours on the suspect fuel found that the fuel contaminant had left a black deposit on the copper finger filter installed in the base of the fuel tank. This black deposit was easily removed by washing in warm soapy water. Strip inspections of the engine driven fuel pump, fuel shut-off valve, the carburetor, and the inline fuel filter did not reveal any further evidence of contamination.

Since this investigation Jabiru personnel have been involved in discussions with CASA and Mobil representatives, and have obtained a better understanding of the contamination and its potential effect on the Jabiru fuel system.

This service bulletin details a procedure, which can be used to return an aircraft to service if contaminated fuel has been used in the aircraft. The procedure is based on the results of this evaluation, and the discussions that were held with CASA. The procedure represents the best knowledge that is available to JABIRU at the time of writing.

JABIRU is not fully aware at this stage whether this procedure will in itself provide a long-term solution, or whether other follow-up procedures will be required. The procedure does require regular monitoring of the fuel system and understands that this will provide an early detection of the re-emergence of this problem and will ensure that the aircraft can be operated at the normal level of safety.

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APPROVED BY	SIGNATURE						APPROVING AUTHORITY	APPROVAL DATE
A. KERR							A KERR	25 JANUARY 2000

The procedure given in this Service Bulletin can be used to allow JABIRU aircraft, that have been effected by this contaminated fuel, to safely return to service until such time as the monitoring program detects the presence of contamination, or better understanding of the contamination is available to provide a long term solution.

## 2. Applicability

This Service bulletin is applicable to all Jabiru Aircraft that have been exposed to contaminated fuel as described in CASA CAR 1998 Part 39, AD/GENERAL/78 Amdt 1.

## 3. Approval

Approval of this procedure is provided by signatory indicated in the approval block at the footer of Page #1, for and on behalf of Jabiru Pty. Ltd.

## 4. Actions

All actions described in this Service Bulletin are to be done by a person holding an AUF LEVEL 2 Maintenance Authority, or by an appropriate LAME.

### 4.1. General

The procedure to return an aircraft to service after contamination is to be completed in four phases.

- **Phase 1** flushes the entire fuel with a sequence of different solutions to remove contaminants that may be present because of the suspect fuel.
- **Phase 2** requires the disassembly, inspection and cleaning of certain key components in the fuel system.
- **Phase 3** checks that the fuel system delivery is within the required specifications, and
- **Phase 4** is a method of continuing inspection on the fuel system to look for re-emergence of the contamination.

### 4.2. PHASE 1:- Flushing the Aircraft Fuel System

Table #1 Lists the actions required to be used to flush the aircraft's fuel system

Table 1 Aircraft Fuel System Flushing Procedure

Operation	Action
1	Drain the fuel from the fuel tank
2	Examine the fuel by placing samples into a clear glass beaker. The fuel should be clear and free from any cloudiness, or specs of black substance. (Discard this fuel and do not reuse it in the aircraft).
3	Remove the fuel drain valve and examine it for any forms of contamination.
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4	Replace the drain valve and ensure that it is in the closed position.
5	Remove the float bowl from the base of the carburetor.
6	Look into the float bowl before discarding the fuel, for evidence of contamination or discoloration of the fuel.
7	Discard the fuel in the float bowl and look at the surface of the material in the float bowl, and the surface of the carburetor components exposed when the float bowl is removed. Look for any form of black deposits on the brass fittings.
8	<b>DO NOT REFIT THE FLOAT BOWL</b> at this stage.
9	Fill the fuel tank with fresh water using a hose connected to the normal domestic supply. Continue filling until water flows out through the vent tube in a continuous stream for a nominal period of one minute.  (Though earlier issues on this Service Bulletin called for the use of warm soapy water, Jabiru now understands that fresh cold water will effectively dissolve the contaminant.)
10	Rock the aircraft to ensure that the water in the fuel tank sloshes onto all surfaces, even the airspace, which exists in the top of the tank.
11	Ensure that the fuel shut off valve is in the OPEN Position.
12	Switch on the electric fuel pump in the aircraft to pump at least 20 liters of water through the fuel system allowing it to drain through the float valve in the carburetor. (Use an appropriate container to collect the solution as it leaves the carburetor.)
13	After the flow of the water is fully established, cycle the fuel shut off valve between the open and closed position several times then leave it in the open position to allow the solution to continue to flow through the system.
14	Continue pumping until at least 20 liters of the water have passed through the fuel system then switch off the electric pump.
15	Remove the fuel tank drain valve and drain the remaining water from the tank.
16	Replace the Fuel tank drain valve.
17	Place 4 liters of Methylated Spirits into the aircraft fuel tank.
18	Rock the aircraft to slosh the liquid around the base of the fuel tank.
17	Switch on the electric fuel pump and pump the methylated spirits through the fuel system once again allowing it to drain through the float valve in the carburetor.

**Caution:** DO OPERATIONS 14, 15,16, and 17 consecutively without any gaps in time between each operation.

18	Cycle the Fuel Shut off valve several times whilst the methylated spirits if passing through the system leaving it in the open position.
19	Continue pumping until all 4 liters have been pumped through the system.
20	Switch off the fuel pump.
21	Remove the fuel tank drain valve and drain the remaining liquid from the tank.
22	Replace the fuel tank drain valve.
21	Place 10 liters of fresh uncontaminated aircraft fuel into the tank.
23	Switch on the electric fuel pump and pump the fuel through the system allowing it to drain through the float valve on the carburetor.
24	Cycle the fuel SHUT OFF Valve several times whilst the fuel is passing through the system leaving it in the open position.
25	Sample the fuel coming out of the float valve several times during this fuel flush to inspect for the presence of water.
26	Continue flushing until the 10 liters of fuel has passed through the system.
27	If water is evident in the fuel at the end of this flush add further fuel and continue flushing until there is no water evident.

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**Note:** Extra caution is required to be used on the earlier aircraft that are fitted with the flat bottomed fuel tanks to ensure that all of the water is removed from the system.

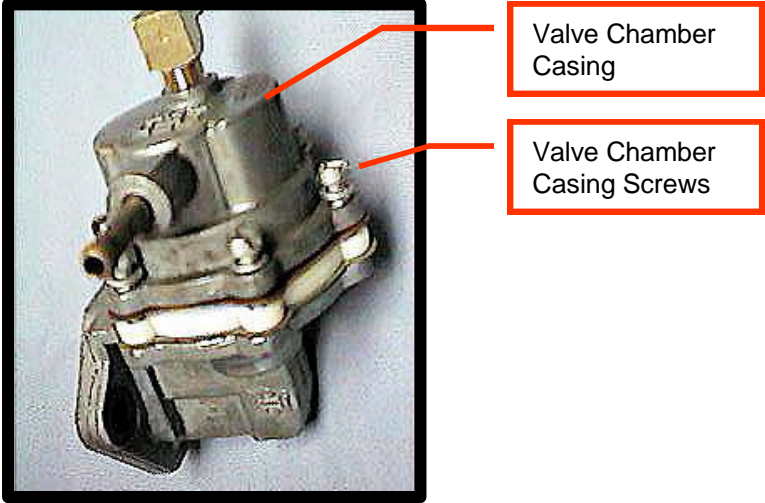
4.3. PHASE 2:- Individual Component Checks

The following actions are to be completed after the system flushing has been flushed.

4.3.1. In-Line Fuel Filter

Operation	Action
1	Remove and replace the in-line fuel filter with a new item..

4.3.2. Engine Driven Fuel Pump

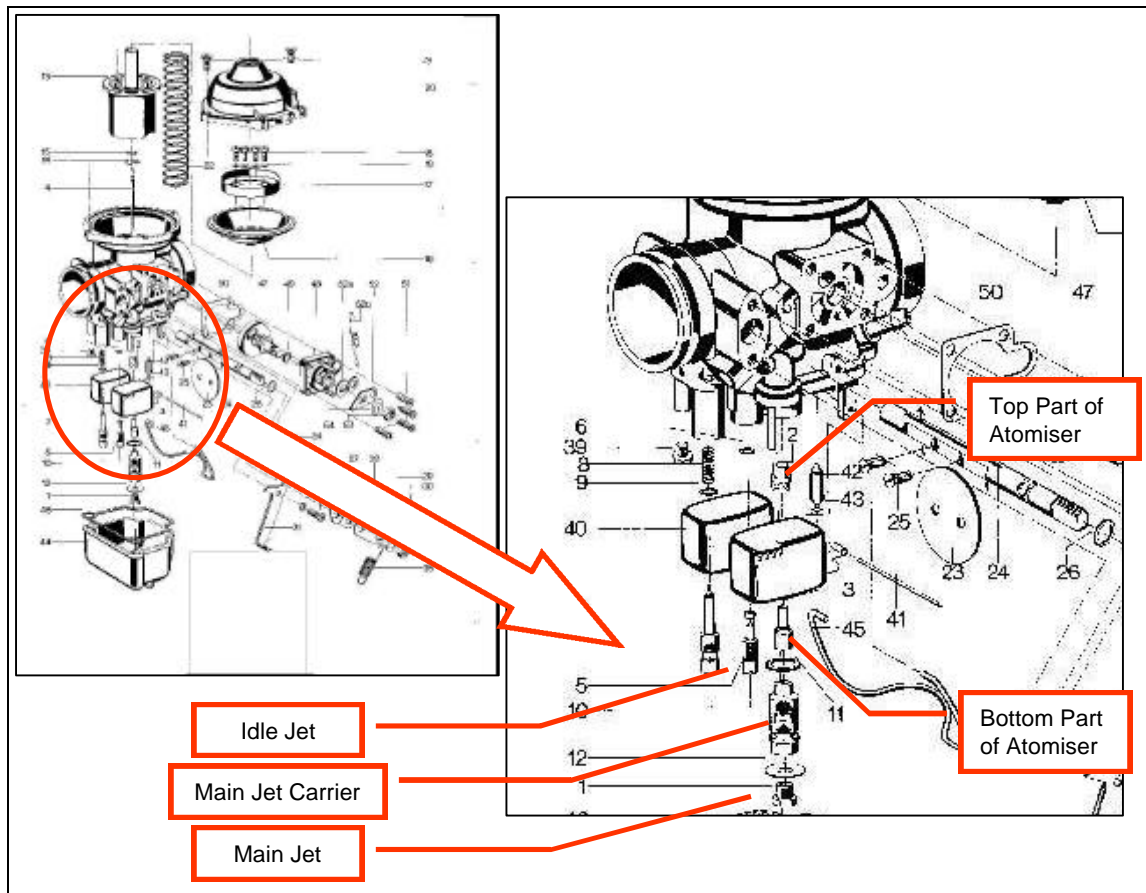
Operation	Action
1	Disconnect both the inlet and outlet fuel lines from the engine driven fuel pump
2	Undo the valve chamber casing screws and remove the valve casing from the engine driven fuel pump.
	
3	Remove the nylon valve plate and inlet filter from the aluminium valve casing.

4	Examine all three components for evidence of contamination
5	Wash the valve plate, filter, and aluminium valve casing components in a warm soapy water solution.
6	Rinse with warm water and dry thoroughly.
7	Examine the rubber inlet and outlet valves in the valve plate for evidence of deterioration.
8	Reassemble the inlet filter and valve-plate into the valve-casing.
9	Replace the valve-casing on the fuel pump body and tighten the diaphragm screws
10	Reconnect the inlet and outlet fuel lines to the fuel pump.

#### 4.3.3. Carburetor

Operation	Action
1	Remove the idle jet from the carburetor.
2	Remove the main jet and Main Jet Carrier, and both parts of the atomizer from the carburetor.
3	Examine all removed components for evidence of contamination. It is normal to see dark deposits on the atomizer during normal service. These are not of concern but should be cleaned while the system is disassembled.
4	Wash the removed components in warm soapy water.
5	Rinse the removed components with warm fresh water.
6	Thoroughly dry all removed components
7	Reinstalled the idle jet, nozzle stock, and main jet into the carburetor.
8	Do not reinstall the float onto the carburetor at this stage.

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#### 4.4. PHASE 3:- Fuel System Operation Checks

Measuring the fuel flow delivered by the fuel system when the electric fuel pump is operated, and then ground running the engine provides data to show that the system is operating correctly

Before completing any of these functional operations make sure that all fuel system components have been correctly installed and are secure.

##### 4.4.1. Fuel Flow Checks

Operation	Action
1	Place 5 liters of fresh clean aircraft fuel into the tank.
2	Switch on the aircraft electric fuel pump and allow to operate until fuel flows in a continuous stream out of the carburetor float valve then switch off the electric fuel pump.
3	Place an empty measuring beaker (or suitable container) under the float valve in the carburetor and use this container to catch the fuel pumped in the next operation.
4	Switch on the electric fuel pump and allow it to operate for a period of 60 seconds then switch off the fuel pump. (You will need to measure this time accurately with a stopwatch or sweep second hand).
5	Determine the quantity of fuel that was pumped during this 60-second period.
6	For correct system operation this measured quantity of fuel should be equal to or greater than 425-ml. If the quantity of fuel is below this amount contact Jabiru for

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	further assistance.
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Replace the carburetor float bowl and verify that the fuel system is properly installed and secure.

4.4.2. Engine Ground Run Checks

Operation	Action
1	Perform a normal engine start and use normal procedures to warm up the engine
2	After engine reaches normal temperatures, verify that the engine idles smoothly, and at normal rpm. Advance and retard the throttle several times and recheck idle operation.
3	Ensure that the electric fuel pump is switched OFF.
4	Slowly Advance throttle to full open position.
5	Verify smooth engine operation during throttle opening, and at full rpm
6	Verify engine rpm at full open throttle is normal
7	Retard the throttle and follow normal procedures to cool engine.
8	Shut Down the engine.

Fuel system is considered acceptable if correct fuel flow is obtained, and engine operates smoothly and at the correct rpm.

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#### 4.5. PHASE 4 Continuing Inspection

The Phase 1, 2, and 3 operations are intended to clean the fuel system and verify that it is functioning correctly, however with the present understanding of the fuel contamination problem this is not sufficient ensure that re-contamination cannot occur.

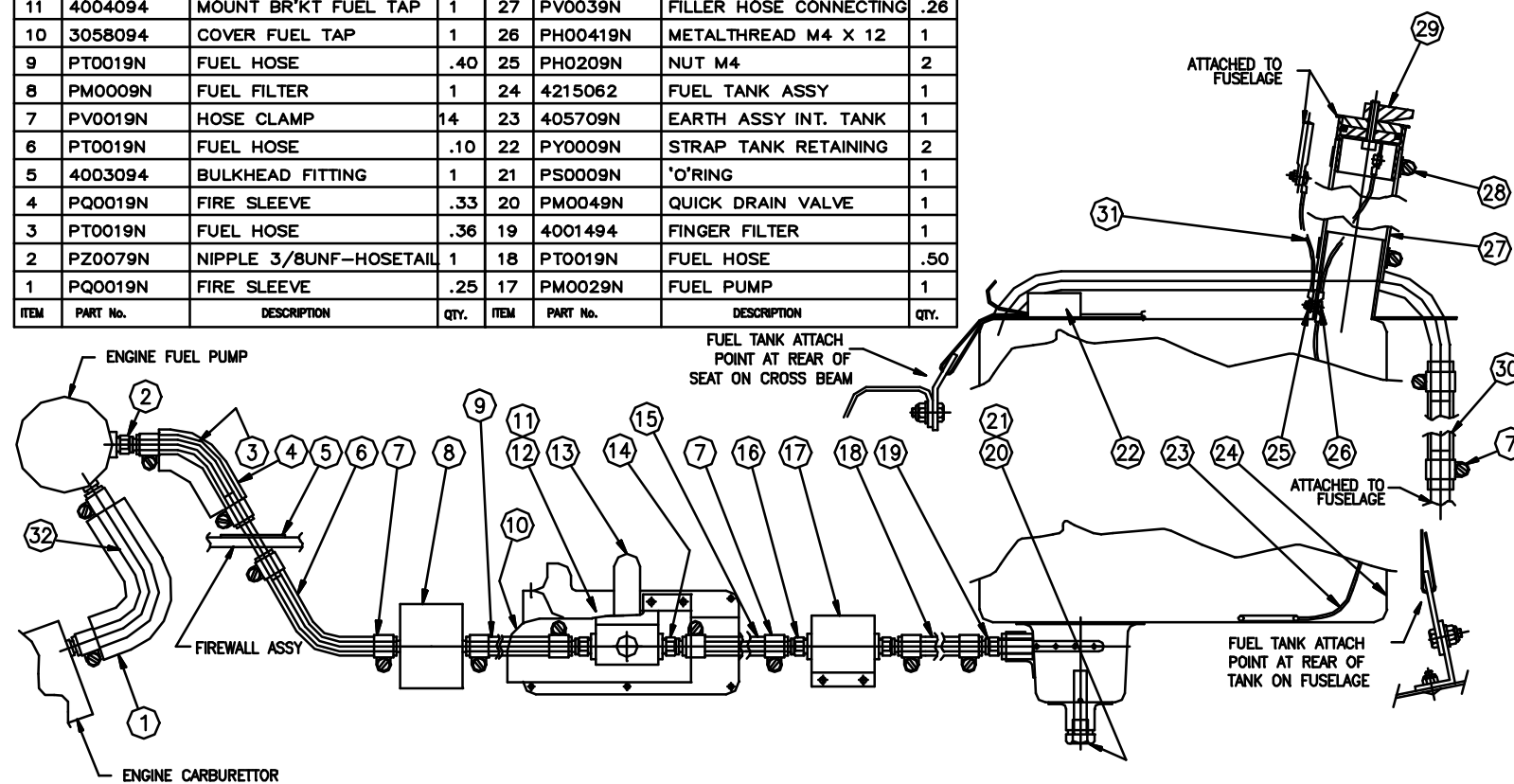
Current experience with the fuel contamination is that it forms a black deposit on copper materials. The strip inspection of the JABIRU showed this to be true. This procedure places a piece of copper into the fuel tank on the end of a piece of lockwire. Inspection of the copper at regular intervals for evidence of blackening will provide an early indication for the presence of contaminants.

Operation	Action
1	Obtain a piece of copper, from a piece of copper pipe, or use a copper washer
2	Thoroughly clean the copper by scrubbing with a Scotchbrite pad until is it uniformly bright.
3	Measure and cut a length of stainless steel lockwire long enough for one end to sit on the bottom of the fuel tank when the other end is attached to the lanyard on the fuel filler cap.
4	Secure the copper to the end of the lockwire.
5	Secure the other end of the lockwire to the security cable on the fuel filler cap.
6	Allow the end of the lockwire with the piece of copper to sit in the fuel tank with the copper resting either on the bottom of the tank, or close to it.
7	Withdraw the lockwire from the tank each time that the tank is filled and inspect the copper for evidence of blackening.
8	Notify JABIRU if black deposits are observed on the copper
9	Continue this monitoring procedure until such time as further advice is received from JABIRU.

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Drawing 9055073/3 FUEL SYSTEM 6SL TANK

16	PZ0069N	HOSETAIL 1/8BSP-1/4	2	32	PT0019N	FUEL HOSE	.28
15	PT0019N	FUEL HOSE	.90	31	405809N	EARTH WIRE ASSY	1
14	PZ0019N	HOSETAIL 1/4 BSP-1/4	2	30	PV0079N	VENT TUBE	.5
13	PM0019N	FUEL TAP	1	29	4021094	FUEL FILLER ASSY	1
12	4005094	RUBBER FUEL TAP MTG	1	28	PV0059N	HOSE CLAMP	2
11	4004094	MOUNT BR'KT FUEL TAP	1	27	PV0039N	FILLER HOSE CONNECTING	.26
10	3058094	COVER FUEL TAP	1	26	PH00419N	METALTHREAD M4 X 12	1
9	PT0019N	FUEL HOSE	.40	25	PH0209N	NUT M4	2
8	PM0009N	FUEL FILTER	1	24	4215062	FUEL TANK ASSY	1
7	PV0019N	HOSE CLAMP	14	23	405709N	EARTH ASSY INT. TANK	1
6	PT0019N	FUEL HOSE	.10	22	PY0009N	STRAP TANK RETAINING	2
5	4003094	BULKHEAD FITTING	1	21	PS0009N	'O'RING	1
4	PQ0019N	FIRE SLEEVE	.33	20	PM0049N	QUICK DRAIN VALVE	1
3	PT0019N	FUEL HOSE	.36	19	4001494	FINGER FILTER	1
2	PZ0079N	NIPPLE 3/8UNF-HOSETAIL	1	18	PT0019N	FUEL HOSE	.50
1	PQ0019N	FIRE SLEEVE	.25	17	PM0029N	FUEL PUMP	1
ITEM	PART No.	DESCRIPTION	QTY.	ITEM	PART No.	DESCRIPTION	QTY.



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