McFarlane Aviation Products

Instructions for Continued Airworthiness

McFarlane Aviation Inc. FAA-PMA Part Number MC0513123, FUEL SELECTOR VALVE CAM.
FAA PMA Number: PQ3732CE

Notice: Verify that this document is the latest approved revision before use! Current version can be found at:
www.McFarlaneAviation.com/ICA

Approved By:

Quality Assurance Manager

Engineering Manager

Production Manager

Revisions

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INTRODUCTION
This document is intended to provide for the continued airworthiness of McFarlane Aviation, Inc. PMA Fuel Selector Valve Cam, eligible for installation on various 100 Series Cessna aircraft. The McFarlane part number is MC0513123, it is a single piece, machined aluminum valve component. It is a direct replacement for the Cessna fuel selector cam, P/N: 0513123.

For all items not related to the installation of the McFarlane Aviation, Inc. Fuel Selector Valve Cam, refer to the eligible aircraft service and parts manuals.

SYSTEM DESCRIPTION
A key component of the Cessna 100 series fuel systems is the fuel selector valve. It is a four position, rotating ball valve that controls fuel flow from the two wing tanks. It is operated by rotating the fuel selector handle to the desired system configuration, e.g. Left, Both, Right, Off. The fuel selector handle, which is connected directly to the cam, rotates and forces the cam lobe to contact one or both of the two internal valves depending on selected configuration. When contacted, each valve is displaced and fuel flow begins.

SPECIAL OPERATING INFORMATION
The control and operation of the fuel selector valve does not change with the installation of the McFarlane valve cam; see the applicable Cessna service manuals for the operational control of this system.

PART REMOVAL, REPLACEMENT, AND SERVICE INFORMATION
Use the Cessna instructions per the applicable Cessna service manual to remove and replace the old fuel selector cam with the McFarlane fuel selector cam. Refer to the applicable Cessna service manuals for installation/maintenance instructions and the applicable Cessna Illustrated Parts Catalog for component part numbers.

Prior to returning the fuel selector valve to service, inspect it for proper valve lift (note that fuel flow through the selector valve is directly related to valve lift). To accomplish this use following instructions and worksheet to complete measurements and inspection.

FUEL SELECTOR VALVE – FLOW CAPACITY INSPECTION

1. Position and Prepare to Measure Right Fuel Inlet

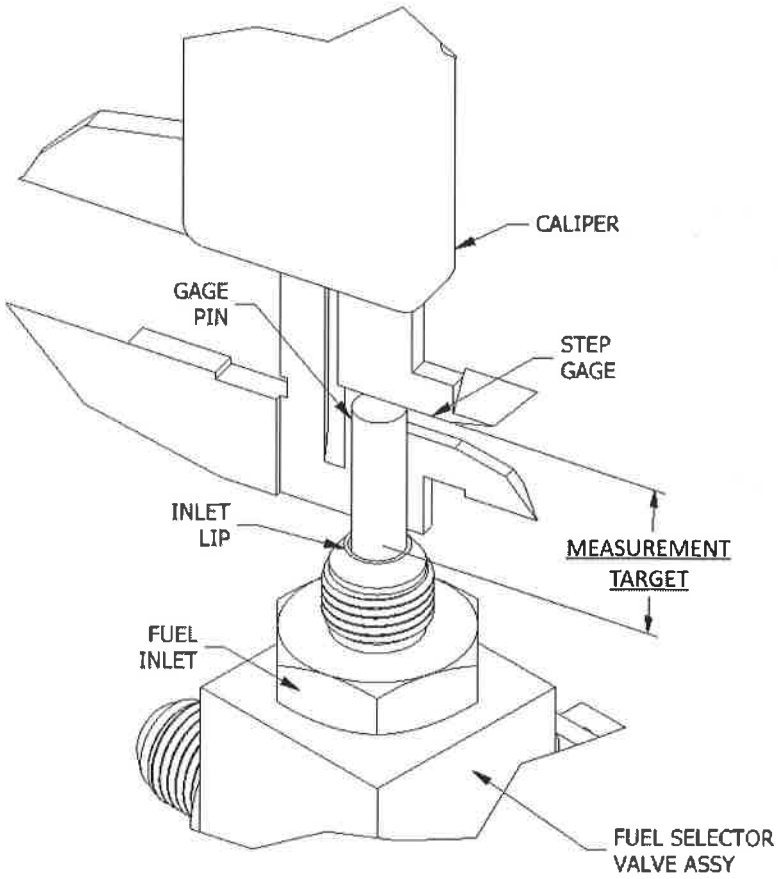
   a. Using a shop vice, or similar device, secure the assembled valve with the right outlet pointing up. Ensure that the positioning housing can rotate unobstructed and that the detent positions are distinct
   b. Locate a gage pin that closely fits the fuel inlet, and insert it. The pin should slide in and out of inlet with no drag. It should not wobble when inserted into the inlet fitting. The end of the pin must be square to the pin length.
   c. Locate a precision step gage (caliper).

   Notes:

   - A step gage is typically built into the top end of a modern caliper (see figure to right).
   - Take all deflection measurements from the end of the gage pin to the outboard lip of the fuel inlet fitting.
   - Take all measurements square to the end of the gage pin
   - The internal components of the valve can produce minor variation in valve deflections; as such, multiple measurements are taken for identifying the minimal deflections.
   - A typical valve setup and measurement is shown in to the right

2. Measure Right Fuel Valve Displacement – "OFF" Position

   a. Rotate the positioning housing in the clockwise direction until the valve assembly in in the "OFF" position.
   b. Measure valve deflection as shown on measurement worksheet #1. Record results as the Right Closed Measurement ("A" on worksheet #1).



TYPICAL VALVE DEFLECTION MEASUREMENT

FUEL SELECTOR VALVE - FLOW CAPACITY INSPECTION (Continued)

3. Measure Right Fuel Valve Displacement – "RIGHT" Position

   a. Rotate the positioning housing in the clockwise direction until the valve assembly to the "RIGHT" position. The cam must rotate at least one full revolution.
   b. Measure valve deflection as shown on the measurement worksheet #1. Record results on worksheet
   c. Rotate the positioning housing at least one revolution in the counter-clockwise direction to the "RIGHT" position. Repeat measurement and record.
   d. Review the measured "RIGHT" deflection values. Select the lesser of the two measurements, and record as the "RIGHT" valve deflection ("B" on worksheet #1).

4. Measure Right Fuel Valve Displacement – "BOTH" Position

   a. Rotate the positioning housing in the clockwise direction until the valve assembly is in the "BOTH" position. The cam must rotate at least one full revolution.
   b. Measure valve deflection as shown on measurement worksheet #1. Record results on worksheet
   c. Rotate the positioning housing at least one revolution in the counter-clockwise direction to the "BOTH" position. Repeat the measurement and record.
   d. Review the measured "BOTH" deflection values. Select the lesser of the two measurements, and record as the "BOTH" valve deflection ("C" on worksheet #1).

5. Position and Measure Left Fuel Valve Displacement – "OFF" Position

   a. Using the same clamping device from right side measurement, secure the assembled valve with left inlet pointing up. Ensure that the positioning housing can rotate unobstructed.
   b. Locate a gage pin that closely fits fuel inlet, and insert it. Pin should rest in on the internal parts of top of the valve with minimal to no wobble. It should slide in and out of inlet with no drag. Typically, the gage pin used for step 1 is sufficient for use in step 3.
   c. Rotate the positioning housing in the clockwise direction until the valve assembly to the "OFF" position.
   d. Measure valve deflection as shown on measurement worksheet #2; record results as the "OFF" Measurement ("J" on worksheet #2).

6. Measure Left Fuel Valve Displacement – "LEFT" Position

   a. Rotate the positioning housing in the clockwise direction until the valve assembly to the "LEFT" position. The cam must rotate at least one full revolution.
   b. Measure valve deflection as shown on measurement worksheet #2. Record results as one entry on worksheet
   c. Rotate the positioning housing at least one revolution in the counter-clockwise direction to the "LEFT" position. Repeat measurement and record.
   d. Review the measured "LEFT" deflection values. Select the lesser of the two measurements, and record as the "LEFT" valve deflection ("K" on worksheet #2).

7. Measure Left Fuel Valve Displacement – "BOTH" Position

   a. Rotate the positioning housing in the clockwise direction until the valve assembly to the "BOTH" position. The cam must rotate at least one full revolution.
   b. Measure valve deflection as shown on measurement worksheet #2. Record results on worksheet
   c. Rotate the positioning housing at least one revolution in the counter-clockwise direction to the "BOTH" position. Repeat the measurement and record.
   d. Review the measured "BOTH" deflection values. Select the lesser of the two measurements and record as the "BOTH" valve deflection ("L" on worksheet #2).

8. Calculate Right Valve Deflections

   a. Enter the valve measurements from measurement worksheet #1 and calculate the resultant valve deflections.

RIGHT VALVE DEFLECTION – SINGLE FUEL SOURCE

"RIGHT" MEASUREMENT		"OFF" MEASUREMENT		RIGHT SINGLE VALVE DEFLECTION
B (in)	−	A (in)	=	(in)

RIGHT VALVE DEFLECTION – COMBINED FUEL SOURCES

"BOTH" MEASUREMENT		"OFF" MEASUREMENT		COMBINED RIGHT VALVE DEFLECTION
C (in)	−	A (in)	=	(in)

9. Verify Right Valve Deflections Meet Minimum Threshold

a. Compare calculated right valve deflections to minimum valve deflection for each valve position.
b. Circle result for both valve comparisons.

RIGHT SINGLE SOURCE VALVE DEFLECTION

_____ (in)	≥	0.048 (in)	YES / NO	
RIGHT SINGLE SOURCE DEFLECTION		MIN VALVE DEFLECTION	(Circle Result)	

RIGHT COMBINED SOURCE VALVE DEFLECTION

_____ (in)	≥	0.048 (in)	YES / NO	
RIGHT COMBINED SOURCES DEFLECTION		MIN VALVE DEFLECTION	(Circle Result)	

10. Calculate Left Valve Deflections

a. Enter the valve measurements from measurement worksheet #2 and calculate the resultant valve deflection.

LEFT VALVE DEFLECTION – SINGLE FUEL SOURCE

"LEFT" MEASUREMENT		"OFF" MEASUREMENT		LEFT SINGLE VALVE DEFLECTION
	-		=	
K _____ (in)		J _____ (in)		_____ (in)

LEFT VALVE DEFLECTION – COMBINED FUEL SOURCE

"BOTH" MEASUREMENT		"OFF" MEASUREMENT		COMBINED LEFT VALVE DEFLECTION
	-		=	
L _____ (in)		J _____ (in)		_____ (in)

11. Verify Left Valve Deflections Meet Minimum Threshold

a. Compare calculated left valve deflections to minimum valve deflection for each valve position.
b. Circle results in table of each comparison

LEFT SINGLE SOURCE VALVE DEFLECTION

_____ (in)	≥	0.048 (in)	YES / NO	
LEFT SINGLE SOURCE DEFLECTION		MIN VALVE DEFLECTION	(Circle Result)	

LEFT COMBINED SOURCE VALVE DEFLECTION

_____ (in)	≥	0.048 (in)	YES / NO	
LEFT COMBINED SOURCES DEFLECTION		MIN VALVE DEFLECTION	(Circle Result)	

To accept the fuel selector cam, and its installation, as airworthy, all four compared valve deflections must meet or exceed the minimum valve deflection of .048 inches. If the fuel selector valve and the cam fail to meet the minimum valve deflection, repeat steps 1 through 11, and re-measure and compare valve deflection results.

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FUEL SELECTOR VALVE – ROTATION SENSITIVITY INSPECTION

A functioning fuel selector valve must have some camshaft rotation, from the detent position, before the valve function changes. A change in valve function that starts with a rotation of approximately five degrees or less means that the valve is not airworthy. Inspect the valve as follows:

1. With the valve control turned to the "RIGHT" detent position, insert a gage pin (same size as was used in the flow capacity inspection) in the RIGHT inlet. Slowly rotate the valve control to the "CLOSED" position and note when gage pin movement indicates the valve is closing.
2. Repeat Step 1 for the LEFT position.
3. With the valve control in the "BOTH" position, insert the gage pin into the RIGHT inlet. Slowly rotate the valve control to the "LEFT" position and note when the gage pin movement indicates the right side is closing.
4. With the valve control in the "BOTH" position, insert the gage pin into the LEFT inlet. Slowly rotate the valve control to the "RIGHT" position and note when the gage pin movement indicates the left side is closing.

COMPLIANCE: If the valve fails either the ***Flow Capacity Inspection*** or the ***Rotation Sensitivity Inspection***, the fuel selector valve assembly is not airworthy. Please contact McFarlane Aviation Engineering group for additional support. You can contact us via email: engineering@mcfarlaneaviation.com or phone: 1-785-594-2741.

TROUBLESHOOTING
Refer to the applicable Cessna 100 Series Service Manual for troubleshooting instructions and the applicable Cessna Illustrated Parts Catalog for component part numbers. For troubleshooting, refer to the Cessna instructions in the applicable service manuals.

PLACARDS
None applicable

DATA
All information to support the continued airworthiness of this replacement part is as defined herein and contained in:

- Relevant Cessna 100 Series Service Manuals.
- Relevant Cessna 100 Series Illustrated Parts Catalog.

INSPECTION
Follow all inspections mandated by Cessna for the fuel selector cam, P/N: 0513123.

RECOMMENDED OVERHAUL PERIODS
No additional overhaul time limitations exist with the use of these parts.

AIRWORTHINESS LIMITATIONS
The Airworthiness Limitations section is FAA approved and specifies maintenance required under Sec. 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved. No additional airworthiness limitations exist.

ASSISTANCE & REVISIONS
ICA revisions shall be made available on the McFarlane website, www.mcfarlaneaviation.com/ICA. For questions or assistance regarding these Instructions for Continued Airworthiness (ICA), contact McFarlane Aviation, Inc via email or phone. Email: engineering@mcfarlaneaviation.com Phone: 1-800-544-8594 (within the US) or 1-785-594-2741.

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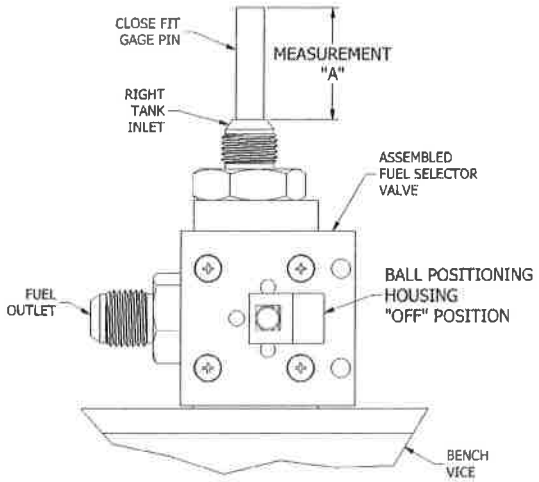
MEASURMENT WORKSHEET #1 - RIGHT FUEL INLET MEASUREMENT

"OFF" POSITION

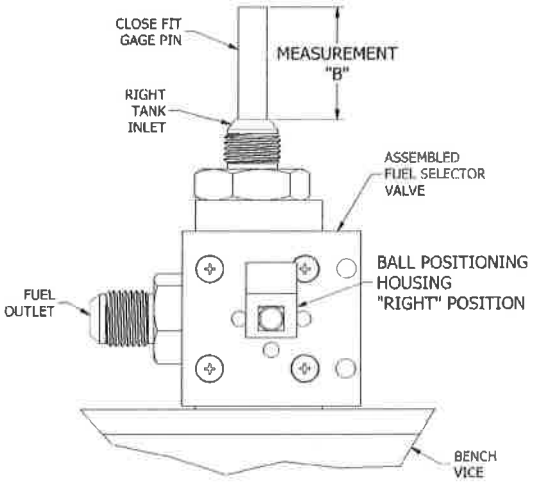


"OFF" MEASUREMENT

1. _____ (in)

A = _____ (in)

"RIGHT" POSITION



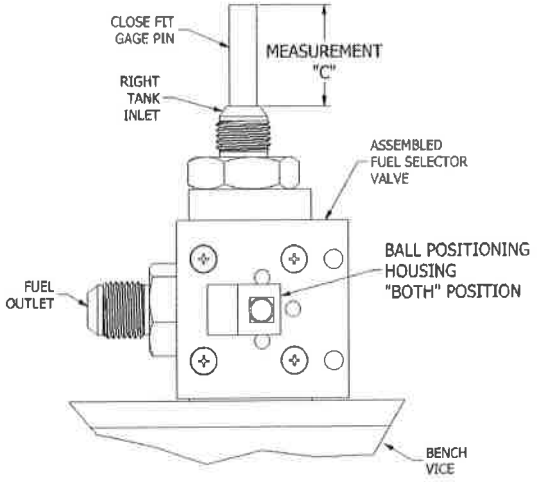
"RIGHT" MEASUREMENT

1. _____ (in)

2. _____ (in)

B = _____ (in)

"BOTH" POSITION



"BOTH" MEASUREMENT

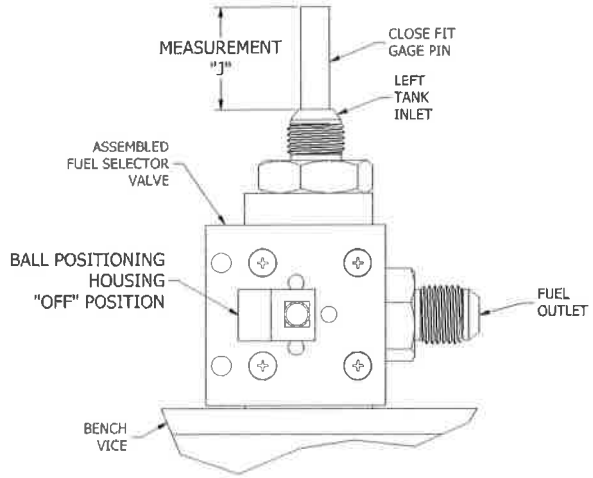
1. _____ (in)

2. _____ (in)

C = _____ (in)

MEASURMENT WORKSHEET #2 - LEFT FUEL INLET MEASUREMENT

"OFF" POSITION, LEFT FUEL INLET

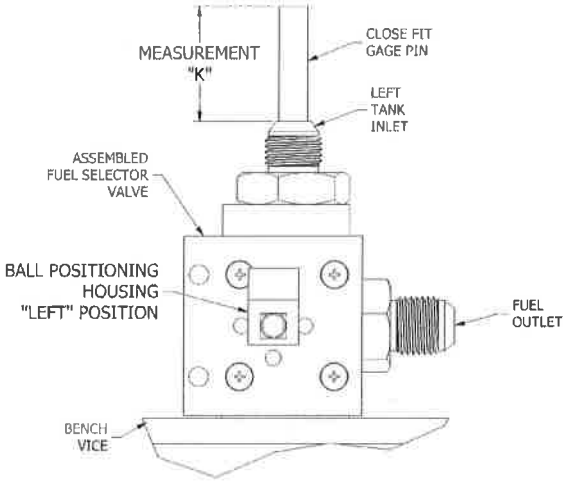


"OFF" MEASUREMENT

1. _____ (in)

J = _____ (in)

"LEFT" POSITION, LEFT FUEL INLET



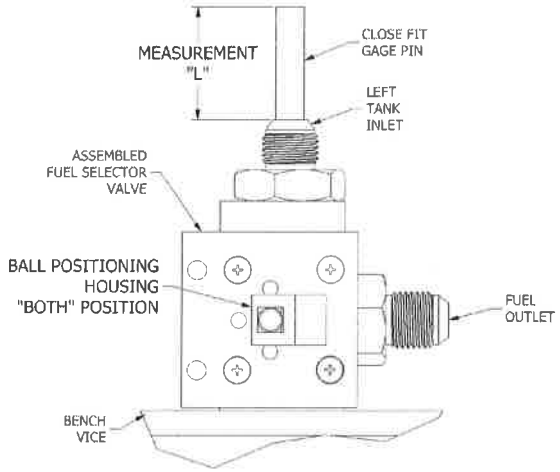
"LEFT" MEASUREMENT

1. _____ (in)

2. _____ (in)

K = _____ (in)

"BOTH" POSITION, LEFT FUEL INLET



"BOTH" MEASUREMENT

1. _____ (in)

2. _____ (in)

L = _____ (in)