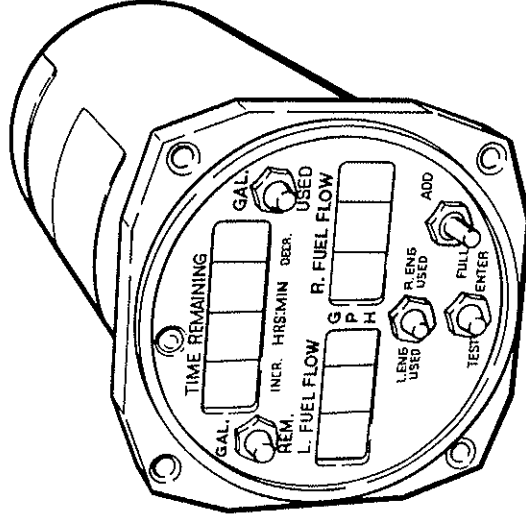


Digiflo™

**DIGITAL FUEL
MANAGEMENT SYSTEM**



OPERATING MANUAL

For P/Ns: 91052X

P/N OP91052B REV A

SHADIN Co., Inc.

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NOTE: Though references are made in this manual to fuel measured in gallons, the information applies equally to measurements in pounds or liters.


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Digiflo™

Although the FAA does not require it, it is recommended that this manual be attached to the FAA-approved Flight Manual, or be always kept on board for handy reference.

1. SYSTEM DESCRIPTION

DIGIFLO is a Digital Fuel Management System designed to improve fuel monitoring and management through the use of a microprocessor to display fuel flow, fuel remaining, fuel used, and time remaining within an accuracy of $\pm 2\%$ (better than 1% in some models).

The system is available with Gallons, Pounds or Liters readouts, and it can be installed on virtually any reciprocating or turbine engine by selecting the proper size fuel flow transducer. It can be used with injected or carbureted engines.

DIGIFLO features solid state electronic components and a microprocessor designed to process the pulses generated by the fuel flow transducer.

Fuel flow is continuously displayed in the lower window(s). Time remaining, fuel used, and fuel remaining are continuously computed and either displayed or stored for later display in the upper window.

During power shut-down, the amount of fuel remaining is stored in a non-volatile memory which requires no power to retain the data.

Time remaining calculations are based on fuel remaining and actual fuel flow, which means that reducing the power or leaning the mixture will result in increasing the time remaining. If the calculated time remaining at any particular power setting drops below 45 minutes, the "Time Remaining" digits in the display window will start flashing.

1.1 FUEL FLOW TRANSDUCER:

The fuel flow transducer mounted in the fuel line measures the flow of fuel and generates electrical pulses directly proportional to the fuel flow. The transducers are fail-safe designed; rotor locking will not interrupt fuel flow.

1.2 INDICATOR:

All system electronics, function controls and digital displays are contained in a single instrument that mounts in a standard 3 1/8" hole and requires no periodic maintenance, adjustment, or calibration once properly installed.

2. INITIAL PROGRAMMING

Initial programming is intended to enter the total useable fuel figure into the memory as defined in the flight manual. (Extra attention must be paid to aircraft with reduced fuel load devices.) It can then be recalled whenever you fill the fuel tanks up to the maximum useable fuel.

3. PREFLIGHT PROCEDURES

WARNING

DIGIFLO is a fuel flow measuring system and NOT a quantity-sensing device. Therefore, it cannot determine the amount of usable fuel in the fuel tanks. Thus it is imperative that an accurate figure of the useable fuel on board be entered into the system to ensure accurate readings.

2.1 INITIAL PROGRAMMING PROCEDURE:

1. Power the unit by switching on the aircraft master switch.
2. Move toggle switch to "Full Fuel" and hold for the entire procedure.
3. Press the "Fuel Rem" and "Fuel Used" buttons simultaneously. The system will count down for 15 seconds, displaying the 15 second count in the lower left window.
4. The code message "FUL" will be displayed in the lower left window and the current full fuel value in the same units of display (gallons, lbs., etc.) will be displayed in the upper window. Release the "Fuel Rem" and "Fuel Used" buttons. Keep holding "Full Fuel."
5. Press the "Fuel Rem" button to increment the full fuel number or the "Fuel Used" button to decrement (the longer you hold, the faster it is updated).
6. After reaching the correct total useable fuel figure, press the "Enter" button and the computer will store that number as full fuel. The word "FUL" disappears and the computer will return to the operate mode. Release the Full Fuel button.
7. To verify that the data is stored properly, press the "Test" button. The computer will run a diagnostic check and then display "Good." If the test is successful, it will display the newly entered maximum usable fuel value during its self-test routine.

3.1 NO FUEL ADDED:

As data is already stored, no action is needed.

3.2 MAXIMUM USABLE FUEL (FULL TANK):

1. Move the toggle switch to the "Full Fuel" position and hold. The maximum useable fuel figure will be displayed in the upper window.
2. Press the "Enter" button.
3. Return the toggle switch to the center position
4. To verify, move the toggle to "Fuel Rem". Total useable fuel will be displayed in the upper window.

3.3 PARTIAL FUEL ADDED:

1. Move the toggle switch to the "Add Fuel" position and hold.
2. Press the "Fuel Rem." button to increment fuel added figure. When the amount of fuel added figure is reached, release the "Fuel Rem." button. If the correct figure has been exceeded, move the toggle switch to the "Fuel Used" position to decrement the added fuel figure.
3. Press "Enter" button when the correct figure is reached.
4. Return the "Add Fuel" toggle switch to the center position. The computer will add the fuel added to the fuel remaining and use the total as the current fuel remaining.
5. To verify, press the "Fuel Rem." button; current useable fuel remaining will be displayed in the upper window.

3.4 CORRECTING FUEL REMAINING FIGURE ENTRY ERRORS:

In case an error has been made by exceeding the correct amount in entering the amount of total usable fuel, press and hold the "Fuel Used" button and simultaneously press the "Enter/Test" button. Fuel used will be reset and the fuel remaining will appear and pause on display for 4 seconds. The figure will decrement. When the correct figure is reached (the longer you press, the faster it decrements), release both "Fuel Used" and "ENTER" buttons. To avoid repeating the 4 second pause while decrementing, do not release the "Fuel Used" button, but use the "ENTER" button to control the decrementing.

3.5 TEST FUNCTION:

The Test Function enables the pilot to check the software and hardware against malfunction.

Press the "Enter/Test" button. All digits will display "8" sequentially for ten seconds. If the computer checks out, the word "Good" will appear in the top window. (If the test is not successful, the word "bAd" will be displayed. In such case, the unit must be considered unserviceable until corrective action is taken). This is followed by:

1. The K-factor setting for the flow transducer in the left flow window and units of display (i.e., gallons, lbs. or liters) in the upper window
2. Maximum usable fuel setting in the upper window and "FUL" in the left window
3. Software basic # and revision level in lower windows

NOTE: Using the test function while engines are running will cause the computer to lose 13 seconds of fuel count.

4. IN-FLIGHT OPERATION

4.1 INSTRUMENT OPERATION:

The fuel flow is continuously displayed in the lower window(s). The upper window displays the time remaining in hours and minutes, or the fuel remaining or used, depending on which button is depressed.

The fuel used may be reset at any time by pressing the "Fuel Used" button and momentarily pressing the "Enter/Test" button no longer than 4 seconds. Otherwise, the computer will start decreasing the fuel remaining.

The decimal points on every digit mean that the display reads in thousandths.

4.2 WARNING:

The time remaining display digits will flash whenever the endurance drops below 45 minutes. Dash lines in the time remaining window indicate that there are over ten (10) hours of flight time remaining.

4.3 EMERGENCY PROCEDURE:

In case of an electrical power failure in-flight, the instrument will cease to function. After restoring power, the left window will resume accurate fuel flow reading, but the Time Remaining, Fuel Used and Fuel Remaining figures will not be accurate unless the duration of the power failure is known and the fuel consumption during the electric power failure is calculated and subtracted from the Fuel Remaining.

5. SPECIFICATIONS

Digital Fuel Management System Part Number 91202X

Maximum usable fuel: 1,800 gallons 6,822 liters
Maximum altitude: 40,000 ft. 12,070 lbs jet fuel
10,440 lbs. av. gas

Operating temperature: -30 to 50°C
10,440 lbs @ 5.81 lb/gal

Humidity: up to 95% @ 32°C 5,484 Kg @ 0.805 Kg/lit
Accuracy: better than 2%

Functions: Fuel Flow (45 minute endurance warning)
Fuel Used
Fuel Remaining
(fuel lacking to reach destination)
Time Remaining
Low Fuel Warning
Full Fuel
Add Fuel

ELECTRICAL RATING:

Input voltage: 14-28 volt D.C.
Input current: 180 mA @ 14 volts or
220 mA @ 28 volts

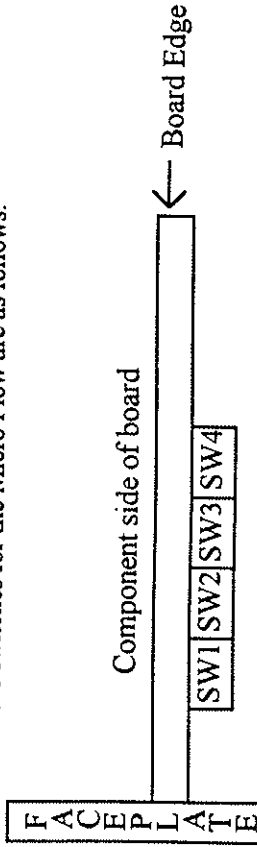
MECHANICAL RATING:

Vibration: 5 g
Weight: 13 ounces

FLOW METER PROCESSOR BOARD SWITCHES VERSION .61+

Hardware:	Software:
Processor Board 193802 Rev A	Flow Standard for Micro 60.08.59

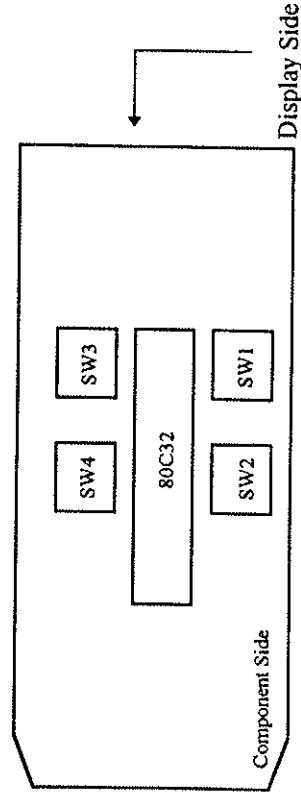
Location of the switches for the Micro Flow are as follows:



Each switch has 16 positions, 0-9, A, B, C, D, E, F.

Hardware:	Software:
Processor Board 190555 Rev B	Flow Standard for Mini 60.01.72
	Flow Standard for Digi 60.09.72
	Flow Standard for Micro 60.08.72

Location of the switches for the Mini/Digi Flow are as follows:



Each switch has 16 positions, 0-9, A, B, C, D, E, F.

Note: A hole has been cut into the can to allow access to switches normally covered by the red K factor sticker.

SHADIN Co., Inc.

Limited Warranty

SHADIN Co., Inc. warrants to the original buyer of this product that it is free from defects of material and manufacture under normal use and service conditions. SHADIN Co., Inc. will repair or replace without charge for a period of one (1) year from the date of purchase (invoice date) any part which upon examination it shall be disclosed to its satisfaction to be defective. The product must not have been previously modified, repaired or serviced by anyone other than the authorized service by SHADIN Co., Inc., and the product must not have been subject to accident, negligence, alteration, abuse, misuse or operated in a manner contrary to the instructions pertaining to said product.

No other warranties, either expressed or implied, including warranties of merchantability and fitness for any particular purpose, will be applicable to the product. Under no circumstances will SHADIN Co., Inc. be liable for consequential damages sustained in connection with the product; and SHADIN Co., Inc. does not assume for it any obligation or liability whatsoever other than as is expressly set forth hereinabove.

MANUAL ENTRY MODE FLOW METERS VERSIONS 61+

Overview

Previously, all settings depended upon the switches mounted on the processor board. Since software versions 60.XX.59, we have had a feature that is referred to as the *Manual Entry Mode*. In this mode, the Flow Meter settings are stored as two groups: *Group 1* and *Group 2* both shown in the table below.

GROUP 1	GROUP 2
Left & Right K Factors	Output Type (King, AirData, Arnav)
Fuel Units	Loran Input (On, or Off)
Single or Twin Engine Type	Endurance Warning Time (45, 30, 20, 10, or 5 minutes)
Low Flow Cutoff (On or Off)*	Filter Type (Injector or Carburetor)
	Low Fuel Level Warning (fuel level for warning to be issued)
	Ignore Loran Warning (Yes or No)

* This function is only applicable to DC systems.

Group 1 may be set up in one of two ways. Either program the information into the non-volatile memory of the unit using *Manual Entry Mode* or use the switches to select the *Group 1* values.

Group 2 can no longer be set using the switches. These items must be set up by programming the unit in *Manual Entry Mode*.

Manual Entry Mode can be accessed in two ways, one which provides access to both *Group 1* and *Group 2* values, and one which provides access to only *Group 2* values. The access to *Group 2* values can be obtained while the unit is installed in the aircraft. Access to *Group 1* however, requires removal of the unit to adjust switch settings.

Operate Mode vs. Calibrate Mode*

FE: If Switch 1 is set to F and Switch 2 is set to E, the unit is in the *Calibrate Mode*. This is the only mode which will allow the setting of *Group 1* values into the non-volatile memory of the unit. Once installed in the aircraft, this mode is no longer accessible. In this mode, both *Groups* can be set.

FF: Once the settings have been programmed, Switches 1 and 2 should be set to *FF*. This is the *Operate Mode*, which is required for normal operations. In this mode, settings previously recorded for *Groups 1* and *2* will be utilized, and not the switches. *Group 2* can still be accessed through the manual entry mode, but *Group 1* is not accessible.

* If neither of the above settings are used, the unit will be in *Operate Mode* and *Group 2* information will be obtained from non-volatile memory. *Group 1* information will be obtained from the current switch settings.

Manual Entry Mode

There are two ways to get to the *Manual Entry Page*.

1. Set Switches 1 and 2 to *Calibrate Mode*, and power up. This allows access to both groups.
2. If the Switches are not set to *Calibrate Mode*, while running under normal conditions, press the *TEST/ENTER* button to start the test mode. When the version is displayed, press and hold the *TEST/ENTER* button for 15 seconds. This allows access to *Group 2* only.

In both cases you will the following:

MINI/DIGI = "ENT" in the left window.

or

MICRO = "ENTRY" in the left window.

The display can now be paged through with the *USED* and *REM* buttons. The values displayed can be adjusted with the *ADD* and *FULL* buttons. *ADD* increments the value, and *FULL* decrements the value. As you hold *ADD* or *FULL* the scrolling rate will increase, up to a maximum speed.

If you wish to jump directly into the fastest scrolling speed, while holding either *ADD* of *FULL*, press *USED/REM*.

Once the desired values are selected, press and hold the *TEST/ENTER* button for 5 seconds. When the settings have been recorded to the non-volatile memory, the display will read "SET". At this point you may release the *TEST/ENTER* button.

Note: It is recommended that you leave the unit powered up for at least one minute, then set Switches 1 and 2 to *Operate Mode (FF)* and reboot (*Power OFF/ON*). Then confirm the settings. The *Manual Entry Pages* will be displayed as follows. Symbols in () represent 7 segment characters.

NOTES:

<u>Display</u>	<u>Description</u>
*L xxxxx =	Left K-factor (where xxxxx is valid from 0 to 20,000. These are in 10's. A setting of 1234 would be a K-Factor of 12,340)
*R(r) xxxxx =	Right K-factor (as above)
A xxxxx =	Left Fuel Flow Offset Frequency (Hz) for Analog Models
B(b) xxxxx =	Right Fuel Flow Offset Frequency (Hz) for Analog Models
*U x =	Units: 0 = Gallons 1 = Liters 2 = Lbs 5.8 3 = Lbs 6.7 4 = Kilograms 5 = Lbs 6.5 6 = Lbs 6.35
*E x =	Engine Type: 0 = Single Engine 1 = Twin Engine
*C x =	Low Flow Cutoff: 0 = Off 1 = On
O x =	Output Type: 0 = Off 1 = KLN-88 2 = AirData 3 = Arnay 4 = Trimble 5 = Generic
I x =	Loran Input: 0 = Off 1 = On
D(d) x =	Endurance Warning Time: 0 = 45 minutes 1 = 5 minutes 2 = 10 minutes 3 = 20 minutes 4 = 30 minutes
F x =	Filter Type: 0 = Injector 1 = Carburetor
W (u) x =	Ignore Loran Warnings 0 = No (default) 1 = Yes
S xxxxx =	Low Fuel Level Warning: displayed in current units

* = Group 1 information.

NOTES: