

United States of America
Department of Transportation—Federal Aviation Administration
Supplemental Type Certificate

Number SE611GL

This certificate is issued to Shadin Company, Inc.
14280 N. 23rd Avenue
Plymouth, Minnesota 55447

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified herein meets the airworthiness requirements of Part 13 of the Civil Air Regulations See Type Certificate Data Sheet 1E4 for complete certification basis.

Original Product—Type Certificate Number: 1E4

Make: Textron Lycoming

Model: IO-540-J4A5, -C4B5, -C4D5D, -C1B5, -G1B5, -G1C5, -G1D5, -K1A5, -K1A5D, -K1G5, -K1G5D, -D4A5, -N1A5, -R1A5, -T4B5D

Description of Type Design Change:

Incorporation of a Fuel Flow Transducer in accordance with Shadin Company Report Number 4046, revised September 10, 1990, or other FAA Approved revision.

Limitations and Conditions:

This approval should not be extended to other engines of these models on which other previously approved modifications are incorporated, unless it is determined by the installer that the interrelationship between this change and any other previously approved modifications will introduce no adverse effect on the airworthiness of these engines.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked, or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: 11/20/81

Date of issuance: 06/04/82

Date received:

Date amended: 09/24/84, 10/17/84, 06/20/85, 07/0
12/18/90

By direction of the Administrator:

Charles J. Smiley
(Signature)

for Donald P. Michal, Manager
Chicago Aircraft Certification Office

(Title)



Any alteration of this certificate is punishable by a fine of not exceeding \$1,000, or imprisonment not exceeding 3 years, or both.
This certificate may be transferred in accordance with FAR 21.47.

Shadin Company, Inc.
6950 Wayzata Blvd.
Suite 221
Minneapolis, MN 55426

REPORT #4046

Original Date: 17 November 1981
Revision Date: 24 June 1986

PAGE CONTROL CHART

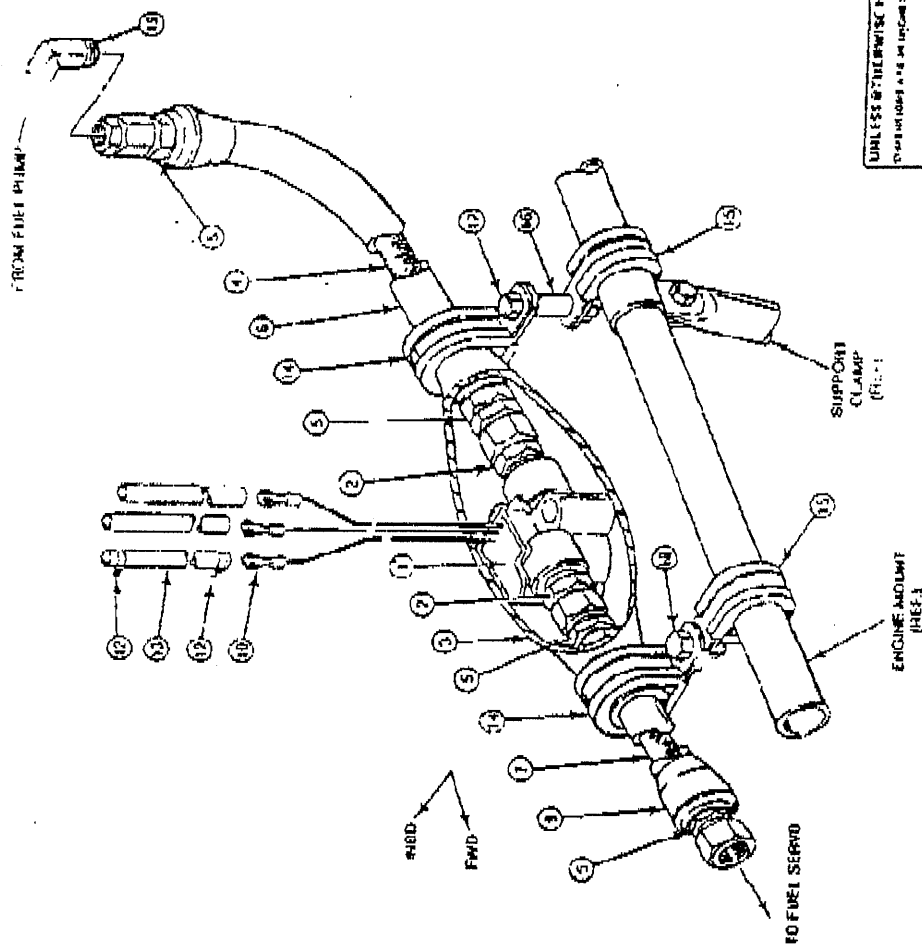
SEC. I.	DATE	REVISION
Drawing List		
4046-D20 Transducer Installation	17 Nov. 81	B
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SEC. II.		
System Description		
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Technical Specifications		
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A P P R O V E D

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CHICAGO AIRCRAFT
CERTIFICATION OFFICE
CENTRAL REGION
ACE/SOC
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SE3181GL



ITEM	QTY.	PART NO.	DESCRIPTION
1	1	201-BROOKS-81	HYDROLYZER-FLOSCAN
2	2	ANB16-5	STRAIGHT IN HIPLE FLARED PIPE THD.
3	1	AE 02-24	PIPE SLEEVE-AERODUUP 8"
4	1	B55AP-2-1	THOSE ASSY-AERODUUP 2004" (200-6)
5	4	401-5	STRAIGHT FLARE FITTINGS
6	1	AE 02-12	PIPE SLEEVE-AERODUUP 1205"
7	1	B55AP-2-2	THOSE ASSY-AERODUUP 2004" (200-6)
8	1		(DELETED)
9	1	AE 02-17	PIPE SLEEVE-AERODUUP 17"
10	6	RB-14-D	WIPSTOCKS
11	1	ANB22-2D	FLARE PIPE THD
12	10	TY 5241A	TYRAPS-8"
13	1		PLASTIC SHIELDING-INSULATOR 17"x4" 10.
14	2	H-22 (MS 21919)	SPEED CLAMP
15	2	H-12 (MS 21919)	SPEED CLAMP
16	1	AN5800-07	STANDOFF 1"x3/4" ID.
17	1	AN-3-13	BLAT 4 5/8" HOUT
18	1	AN528-10A8	SCREW & S/L M/LT
19	1	ANB23-5	BT WIPPLE FLARED PIPE THD.

531C

MEASURED END TO END OF FITTINGS

HOSE ASSY ITEMS + B) ALSO VAN DUSEN AIRCRAFT SUPPLY
PH 506-9006

MOSE ASSY ITEMS 5, 7, 9; ALSO VAN DUJSEN AIRCRAFT SUPPLY
PH 520-06-17208

DATE: 11/20/09
SUBJECT: SPILLAGE

UNLESS OTHERWISE NOTED	PROJECT DATE	8-22-86	SUNSHINE CONCRETE, INC.	
PROJECT LOCATION	OFFICE		SUNSHINE CONCRETE, INC.	
PROJECT NO.	CHECKED		SUNSHINE CONCRETE, INC.	
PROJECT NAME	ENGINEER		SUNSHINE CONCRETE, INC.	
PROJECT ADDRESS	NO. 4780		SUNSHINE CONCRETE, INC.	
PROJECT CITY			SUNSHINE CONCRETE, INC.	
PROJECT STATE			SUNSHINE CONCRETE, INC.	
PROJECT ZIP			SUNSHINE CONCRETE, INC.	
PROJECT PHONE			SUNSHINE CONCRETE, INC.	
PROJECT FAX			SUNSHINE CONCRETE, INC.	
PROJECT E-MAIL			SUNSHINE CONCRETE, INC.	
PROJECT WEBSITE			SUNSHINE CONCRETE, INC.	
PROJECT VIDEO			SUNSHINE CONCRETE, INC.	
PROJECT PHOTO			SUNSHINE CONCRETE, INC.	
PROJECT SOUND			SUNSHINE CONCRETE, INC.	
PROJECT TASTE			SUNSHINE CONCRETE, INC.	
PROJECT SMELL			SUNSHINE CONCRETE, INC.	
PROJECT TOUCH			SUNSHINE CONCRETE, INC.	
PROJECT FEEL			SUNSHINE CONCRETE, INC.	
PROJECT THINK			SUNSHINE CONCRETE, INC.	
PROJECT BEHAVE			SUNSHINE CONCRETE, INC.	
PROJECT BELIEVE			SUNSHINE CONCRETE, INC.	
PROJECT KNOW			SUNSHINE CONCRETE, INC.	
PROJECT LOVE			SUNSHINE CONCRETE, INC.	
PROJECT HATE			SUNSHINE CONCRETE, INC.	
PROJECT DESPISE			SUNSHINE CONCRETE, INC.	
PROJECT REJECT			SUNSHINE CONCRETE, INC.	
PROJECT ACCEPT			SUNSHINE CONCRETE, INC.	
PROJECT APPROVE			SUNSHINE CONCRETE, INC.	
PROJECT DISAPPROVE			SUNSHINE CONCRETE, INC.	
PROJECT PRAISE			SUNSHINE CONCRETE, INC.	
PROJECT BLAME			SUNSHINE CONCRETE, INC.	
PROJECT THANK			SUNSHINE CONCRETE, INC.	
PROJECT HONOR			SUNSHINE CONCRETE, INC.	
PROJECT DISHONOR			SUNSHINE CONCRETE, INC.	
PROJECT GLORIFY			SUNSHINE CONCRETE, INC.	
PROJECT DEGLORIFY			SUNSHINE CONCRETE, INC.	
PROJECT EXALT			SUNSHINE CONCRETE, INC.	
PROJECT DEEXALT			SUNSHINE CONCRETE, INC.	
PROJECT ENHANCE			SUNSHINE CONCRETE, INC.	
PROJECT DEHANCE			SUNSHINE CONCRETE, INC.	
PROJECT INCREASE			SUNSHINE CONCRETE, INC.	
PROJECT DECREASE			SUNSHINE CONCRETE, INC.	
PROJECT MULTIPLY			SUNSHINE CONCRETE, INC.	
PROJECT DIMINISH			SUNSHINE CONCRETE, INC.	
PROJECT ENLARGE			SUNSHINE CONCRETE, INC.	
PROJECT SHRINK			SUNSHINE CONCRETE, INC.	
PROJECT EXPAND			SUNSHINE CONCRETE, INC.	
PROJECT CONTRACT			SUNSHINE CONCRETE, INC.	
PROJECT DILATE			SUNSHINE CONCRETE, INC.	
PROJECT ACCURATE			SUNSHINE CONCRETE, INC.	
PROJECT INACCURATE			SUNSHINE CONCRETE, INC.	
PROJECT PRECISE			SUNSHINE CONCRETE, INC.	
PROJECT IMPRECISE			SUNSHINE CONCRETE, INC.	
PROJECT NEAR			SUNSHINE CONCRETE, INC.	
PROJECT FAR			SUNSHINE CONCRETE, INC.	
PROJECT CLOSE			SUNSHINE CONCRETE, INC.	
PROJECT Distant			SUNSHINE CONCRETE, INC.	
PROJECT NEARBY			SUNSHINE CONCRETE, INC.	
PROJECT Remote			SUNSHINE CONCRETE, INC.	
PROJECT ACCESSIBLE			SUNSHINE CONCRETE, INC.	
PROJECT INACCESSIBLE			SUNSHINE CONCRETE, INC.	
PROJECT AVAILABLE			SUNSHINE CONCRETE, INC.	
PROJECT UNAVAILABLE			SUNSHINE CONCRETE, INC.	
PROJECT OBTAINABLE			SUNSHINE CONCRETE, INC.	
PROJECT UNOBTAINABLE			SUNSHINE CONCRETE, INC.	
PROJECT FEASIBLE			SUNSHINE CONCRETE, INC.	
PROJECT INFEASIBLE			SUNSHINE CONCRETE, INC.	
PROJECT POSSIBLE			SUNSHINE CONCRETE, INC.	
PROJECT IMPOSSIBLE			SUNSHINE CONCRETE, INC.	
PROJECT PROBABLE			SUNSHINE CONCRETE, INC.	
PROJECT IMPROBABLE			SUNSHINE CONCRETE, INC.	
PROJECT USUAL			SUNSHINE CONCRETE, INC.	
PROJECT UNUSUAL			SUNSHINE CONCRETE, INC.	
PROJECT COMMON			SUNSHINE CONCRETE, INC.	
PROJECT UNCOMMON			SUNSHINE CONCRETE, INC.	
PROJECT ORDINARY			SUNSHINE CONCRETE, INC.	
PROJECT EXTRAORDINARY			SUNSHINE CONCRETE, INC.	
PROJECT NORMAL			SUNSHINE CONCRETE, INC.	
PROJECT ABNORMAL			SUNSHINE CONCRETE, INC.	
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PROJECT TYPICAL			SUNSHINE CONCRETE, INC.	
PROJECT ATYPICAL			SUNSHINE CONCRETE, INC.</	

DIGITAL FUEL FLOW METER

SYSTEM DESCRIPTION

Digiflo, the Digital Fuel Flow Meter, is designed to replace Analog Mechanical Fuel Flow Meters. It eliminates the fuel lines in such instruments from behind the panel. It maintains a high degree of accuracy (2 percent or better) which was not possible before. Digiflo provides additional functions such as time remaining, gallons used and gallons remaining.

The system consists of a fuel flow transducer, located in the fuel control unit and fuel flow divider which generates electrical pulses corresponding to the amount of fuel passing through. The transducer is designed in such a way that if the rotor is blocked it cannot interrupt the fuel flow to the engine.

The panel mounted unit contains all circuits necessary to count the generated pulses through the microprocessor and to display the fuel flow and other functions using permanently installed software. The fuel flow in gallons per hour is always displayed at the lower half of the instrument face. The time remaining, gallons used, and gallons remaining are continuously computed and either displayed or stored for later display. The time remaining is displayed at the upper display window. Gallons remaining and gallons used share the same upper window and either can be displayed by pressing the appropriate button.

During power shut-down, the amount of fuel remaining is stored into the memory, which is powered by an internal rechargeable battery.

Time remaining calculations are based on gallons 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 30 minutes, the "Time Remaining" digits in the display window will start flashing.

The test function will enable the pilot to check the software and hardware against any malfunction through simulating two sample rates and checking the results against stored results.

Report: #4046
Date: 17 Nov. 81
Rev.: New Issue
Sec.: II.1

Shadin Company, Inc.
14280 North 23rd Avenue
Plymouth, MN 55447

Report: 4046
Original Date: 17 November 1981
Revision Date: 10 September 1990
Subject: Digital Fuel Flow Meter
Installation
LYCOMING:
IO-540-J4A5, -G4B5, -G1B5, -G4D5D
IO-540-G1B5, -G1C5, -G1D5
IO-540-K1A5, -K1A5D
IO-540-K1G5, -K1G5D
IO-540-B4A5, -N1A5, -R1A5, -T4B5D

INSTALLATION PROCEDURE

GENERAL

A complete thorough familiarization and understanding of the system is necessary before commencing the installation. All work must conform with A.C. 43.13 1A ch. 11 Sec. 2.

PROCEDURE

- 1) Identify the engine dash number and use the 4046-D-20 drawing. The transducer's dash number should match the dash number stamped on the instrument housing. Shut off DC power, fuel valves and mixture controls. Gain access to the bottom section of the engine.
- 2) Remove the -5 hose between engine driven fuel pump and the injector, cut the line and the fire sleeve at 5 1/2" from the injector end and install the Aeroquip 491-6 fitting.
- 3) Cut and remove 3 1/2" from the other part of the hose, then install the Aeroquip 491-6 fitting.
- 4) Install the AN 816-6 fittings into the transducer body. Connect the transducer to the hose as shown on the drawings. Monitoring the inlet and out ports. After tightening, slip the Aeroquip AE 102/624 fire sleeve over the transducer. Pass the transducer wires under the fire sleeve towards the firewall as shown on the drawings.
- 5) Tie the two ends of the fire sleeve using metal tie bands. Install the hose back between the engine driven pump and the injector.
- 6) Connect the wires to the transducers using the B-14-D wristlocks, with plastic sleeves to insulate and secure them with tie wraps.
- 7) Turn the master switch on, fuel selectors on, run the booster pumps and check for leaks.
- 8) Start the engine and check the fuel pressure. Read just if necessary following airframe and engine manufacturer instruction.
- 9) Make necessary entry into the engine logs.

Shadin Co., Inc.
Report: #4046
Date: 17 Nov. 1981
Rev.:
Sec.: III.1

The accuracy of this instrument depends entirely upon the accuracy of the data entered. A periodical checking of the actual fuel onboard will eliminate the accumulation of errors due to evaporation, leaks, theft, etc.

To match the transducer pulse count (K factor), (each transducer is marked with a dash number), to the microprocessor, a DIP switch has been provided on the top board. The switch has been set to match the transducers shipped with the system. In case a transducer with a different dash number is being used, the instrument has to be recalibrated.

Report: #4046
Date: 17 Nov. 1981
Rev.: New Issue
Sec.: II.2

TECHNICAL SPECIFICATIONS

Digital Fuel Flow Meter Catalog Number 4005-000

SPECIFICATIONS

Maximum useable fuel:	999.9 gallons
Maximum altitude:	40,000 ft.
Operating temperature:	-30°C to 50°C
Humidity:	up to 95% @ 32°C
Accuracy:	+ 2%
Flow Range:	1.6 - 60 GPH/Engine

ELECTRICAL RATING

Input voltage:	14-28 volt D.C.
Input current:	500 ma @ 14V. or 28V. Avg.
Memory Battery (internal):	Rechargeable nickel cadmium GE 3.6V.

MECHANICAL RATING

Vibration:	5g
Weight:	Panel Unit: 1.3 lb. Transducer: App. 5 oz.

TRANSDUCER SPECIFICATIONS

Model Number:	201B
Flow Range:	0.6-60 GPH
Linearity Across Flow Range, percent of reading:	+1% (8-60 GPH) ±3% (0.6-60 GPH)
Average K Factor (pulses/Gal.):	84,000
Pressure Drop:	.3 psi @ 15 GPH 1.2 psi @ 30 GPH 2.6 psi @ 60 GPH
Working Pressure:	200 psi
Minimum Bursting Pressure:	2000 psi
Temperature Range:	-65°C/125°C
Life expectancy:	5,000 hr.

Report: #4046
Date: 17 Nov. 1981
Rev.: New Issue
Sec.: IV.1