



IMPELLER DRUM FF To A-429 CONVERTER

PRODUCT P/N: 930514-00

INSTALLATION MANUAL

REV C

**Shadin Avionics
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WWW.SHADIN.COM**

MANUAL P/N: IM0514-00

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<u>Drawing No.</u>	<u>Description/ Part Number</u>	<u>DATE</u>	<u>REV</u>
4005-F57	Installation, Impeller Drum FF to A-429 Converter, P/N 930514-00	2-15-08	A
4005-F58	Installation Wiring, Impeller Drum FF to A-429 Converter, P/N 930514-00	6-25-02	–
NA	Parts List, Install Kit for 15 pins D-Sub P/N IK9337	1-11-06	F

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REVISION LOG

REV.	DATE	APP'D	CHANGE
–	06-25-02	ZK	Baseline Release
A	05-10-04	ZK	Update Specifications
B	03-15-06	ZK	Changed Company name. Updated 1.3, 2.1 and IK9337.
C	04-10-08	EDJ	Updated Sections 1.3, 2.1, 3.0, and Installation drawing.

The information in this manual is subject to change without notification. To ensure complete and current updates, note the Revision Log above and call Technical Assistance for updated information.

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1. OVERVIEW

1.1 THE MANUAL

This manual is intended to provide the proper installation procedures of the Impeller Drum FF to A-429 Converter. Installation instructions should be read and followed.

1.2 PRODUCT DESCRIPTION

The purpose of the Impeller Drum FF to A-429 Converter is to convert input fuel flow data to ARINC 429 Labels 244 and 347 to the flight management system or any other device requiring Fuel Flow information and capable of accepting ARINC 429 Input.

This converter is designed to interface to FF Transmitter ELDEC P/N 9-231-23.

The output data consist of ARINC 429 Labels 244 and 347.

The system diagram is given in Figure 1.

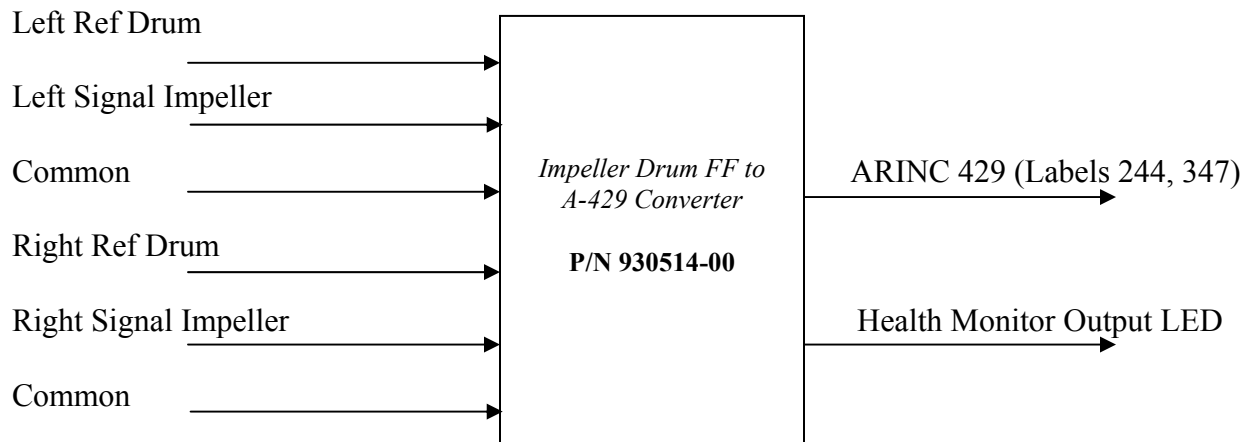


Figure 1

If any failures are detected, a LED will be illuminated (Health Monitor Output).

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1.3 SPECIFICATIONS

Physical Specifications

Dimensions: 1.15H x 4.30L x 2.40W (Inches)

Weight: 0.4 lbs.

Electrical and Functional

Power Supply Voltage: +28VDC

Supply Current: 120 mA

Protection: Not internally fused

Inputs: Left Reference Drum and Left Signal Impeller
Right Reference Drum and Right Signal Impeller

Outputs: *ARINC 429 Labels:*

Accuracy: System: $\pm 3\%$ Full Scale
The error contribution from the converter timing is considerably less than 3% but due to the low level signal characteristics, system accuracy is given as defined by the TSO.

NAME	LABEL	DATA RATE
Total Fuel Flow	244	50msec
Left/Right Fuel Flow	347	50msec

TX RS-232 Output Serial Data (Test purpose only)

Environmental

RTCA/DO-160D

Categories: F2-BAB[S(B, M)]XXXXXXZBAZB[VR]BXXXXXXX

Operating Temperature: -55° to +70°C

Operating Altitude: Up to 55,000 ft

Storage Temperature: -55° to +85°C

In-Flight loss of Cooling: Equipment can run indefinitely with no cooling

Regulatory: TSO-C44b

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1.4 INPUTS

This section specifies the interfaces for the Shadin Impeller Drum FF to A- 429 Converter.

- Left Reference Drum and Left Signal Impeller (ELDEC P/N 9-231-23)
Time Displacement: 2.0 ms to 30.0 ms for flow rates of 80 to 1200 PPH.
Scale Factor: The transmitter scaling conversion factor is 40 PPH/ms.
Pulse Amplitude: 0.28 to 3.00 volts peak to peak.
Repetition Time: 28 to 155 ms
- Right Reference Drum and Right Signal Impeller (ELDEC P/N 9-231-23)
Time Displacement: 2.0 ms to 30.0 ms for flow rates of 80 to 1200 PPH.
Scale Factor: The transmitter scaling conversion factor is 40 PPH/ms.
Pulse Amplitude: 0.28 to 3.00 volts peak to peak.
Repetition Time: 28 to 155 ms
- RX RS-232 Input Serial Data (Test purpose only)
- RX-422 (Reserved)

1.5 OUTPUTS

- ARINC 429 (Labels 244, 347)

The Airdata converts the fuel flow from gallons/hr to lbs/hr to be transmitted on label 347.

Label 347 - Provides fuel flow per engine by using the SDI bits to indicate which engine, and sending each engine's data in a round robin fashion. SDI bits 10,9 = 0,1 (Left), 1,0 (Right). Transmit interval = 50 msec., for an effective transmit interval of 100 msec. per engine. The data format is as follows:

Bits	1 2 3 4 5 6 7 8	9 10	11 12	13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	29	30 31	32
	Label 347	SDI	0 0	DATA	S	SM	Parity
Data type	BNR			Equipment ID: 029	Bit 29	= 1 (Positive FF)	
Significant bits	16				Bit 30, 31	= 1, 1 (Normal Op)	
Resolution	0.5 lbs/hr (LSB value)					= 0, 0 (Failed)	
Range	32768 lbs/hr				Bit 32	⇒ ODD Parity	

The Airdata outputs Total Fuel Flow Rate on label 244 also in lbs/hr.

Label 244 - Provides total fuel flow

Bits	1 2 3 4 5 6 7 8	9 10	11 12	13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28	29	30 31	32
	Label 244	0 0	0 0	DATA	S	SM	Parity
Data type	BNR			Equipment ID: 08D	Bit 29	= 1 (Positive FF)	
Significant bits	16				Bit 30, 31	= 1, 1 (Normal Op)	
Resolution	0.5 lbs/hr (LSB value)					= 0, 0 (Failed)	
Range	32768 lbs/hr				Bit 32	⇒ ODD Parity	

- TX RS-232 Output Serial Data (Test purpose only)

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2. INSTALLATION PROCEDURE

2.1 APPROVAL FOR INSTALLATION

The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements.

All work must conform to AC43.13-1B (latest release) and other applicable industry standards.

2.2 MOUNTING

The Impeller Drum FF to A-429 Converter (P/N 930514-00) should be mounted in a dry location and the equipment may be installed in non-pressurized and non-controlled temperature locations.

Use installation drawing, Drawing No.: 4005-F57, to connect the Impeller Drum FF to A-429 Converter to the system. For mounting use # 6-32 screws.

2.3 ELECTRICAL CONNECTIONS

Connection to Power Supply +28 VDC

930514-00		Description
J1:8	To	+14 to +28 VDC Power IN
J1:15	To	Power GND

Inputs

930514-00		Description
J1:2	To	RX RS-232 or RX RS-422(-) (Test only)
J1:3	To	RX RS-422(+) (Reserved)
J1:6	To	L REF DRUM
J1:7	To	COMMON
J1:9	To	L SIGNAL IMPELLER
J1:10	To	R REF DRUM
J1:11	To	COMMON
J1:12	To	R SIGNAL IMPELLER

Outputs

930514-00		Description
J1:1	To	TX RS-232 (Test Only)
J1:4	To	ARINC 429 A Output
J1:5	To	ARINC 429 B Output

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2.4 POST-INSTALLATION CHECKOUT PROCEDURE

After the installation, perform the following on three fuel flow set points:

1. Record the fuel flow reading on the aircraft gauge.
2. Record the fuel flow reading on the display driven by converter, and determine accuracy.
3. The fuel flow output difference shown by the display device should be within a tolerance of 3% of full scale or $\pm 36\text{PPH}$.
4. Complete the following table.

Set Points	Aircraft Gauge (Actual)	Fuel Flow Output Displayed	Fuel Flow Output Difference	Within 3% Tolerance
1				YES/NO
2				YES/NO
3				YES/NO

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3.0 ENVIRONMENTAL QUALIFICATION FORM

NOMENCLATURE: IMPELLER DRUM FF TO A-429 CONVERTER**TYPE/MODEL/PART NO:** 930514-00 **TSO NUMBER:** C44b**MANUFACTURER'S SPECIFICATION AND/OR OTHER APPLICABLE SPECIFICATION:**

Report 4005R-14, RTCA/DO-160D

MANUFACTURER: Shadin Avionics**ADDRESS:** 6831 Oxford Street, St. Louis Park, Minnesota 55426-4412

<u>CONDITIONS</u>	<u>SECTION</u>	<u>DESCRIPTION OF TESTS CONDUCTED</u>
Temperature and Altitude	4.0	Tested to Category F2.
Low Temperature		
High Temperature		
Altitude		
Decompression		
Overpressure		
Temperature Variation	5.0	Tested to Category B.
Humidity	6.0	Tested to Category A.
Operational Shock and Crash Safety	7.0	Tested to Category B.
Vibration	8.0	Tested to Category S(B, M).
Explosion	9.0	Identified as Category X. Not tested.
Waterproofness	10.0	Identified as Category X. Not tested.
Fluids Susceptibility	11.0	Identified as Category X. Not tested.

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ENVIRONMENTAL QUALIFICATION FORM (Cont.)

NOMENCLATURE: IMPELLER DRUM FF TO A-429 CONVERTER

 TYPE/MODEL/PART NO: 930514-00 TSO NUMBER: C44b

<u>CONDITIONS</u>	<u>SECTION</u>	<u>DESCRIPTION OF TESTS CONDUCTED</u>
Sand and Dust	12.0	Identified as Category X. Not tested.
Fungus	13.0	Identified as Category X. Not tested.
Salt Spray	14.0	Identified as Category X. Not tested.
Magnetic Effect	15.0	Tested to Category Z.
Power Input	16.0	Tested to Category B.
Voltage Spike	17.0	Tested to Category A.
Audio Frequency Susceptibility	18.0	Tested to Category Z.
Induced Signal Susceptibility	19.0	Tested to Category B.
Radio Frequency Susceptibility	20.0	Tested to Category VR.
Radio Frequency Emission	21.0	Tested to Category B.
Lightning Induced Transient Susceptibility	22.0	Identified as Category XXXX. Not tested.
Lightning Direct Effects	23.0	Identified as Category X. Not tested.
Icing	24.0	Identified as Category X. Not tested.
Electrostatic Discharge	25.0	Identified as Category X. Not tested.

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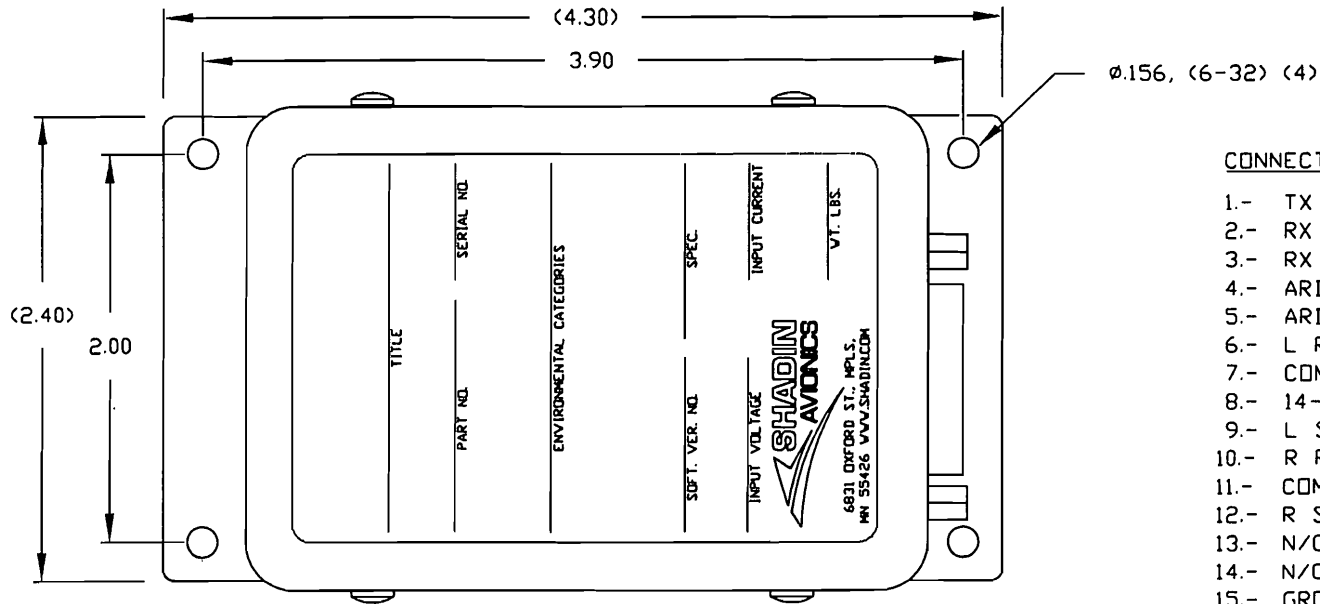
SECTION 4.0

**INSTALLATION DRAWINGS AND
INSTALL KIT PARTS LISTS**

The following drawings are arranged in the sequence specified on page i of the Page Control Chart.

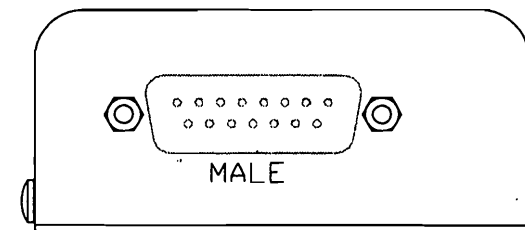
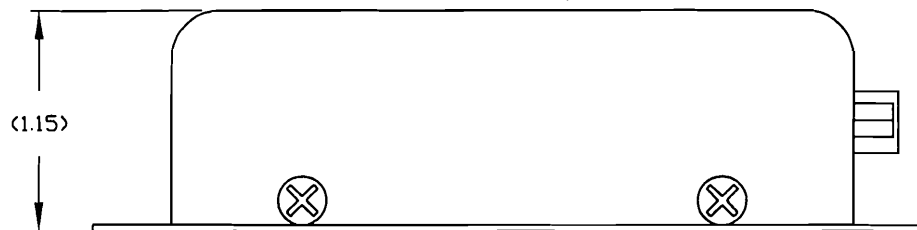
MATING CONNECTOR:

POSITRONIC # M24308/2-2
HOOD = CINCH # DA-24658



CONNECTOR WIRING

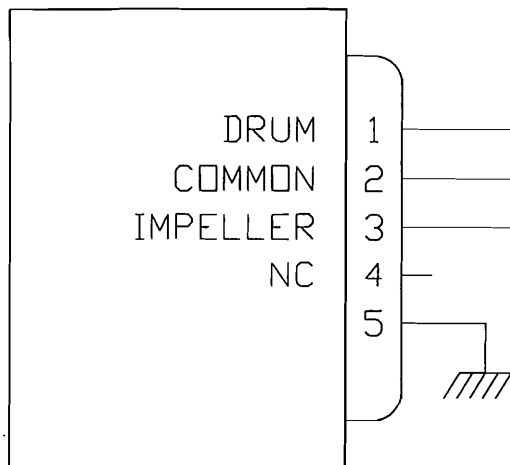
- 1.- TX RS-232 (TEST ONLY)
- 2.- RX RS-232/RX RS-422 (-) (TEST ONLY)
- 3.- RX RS-422 (+) (RESERVED)
- 4.- ARINC 429 A OUTPUT
- 5.- ARINC 429 B OUTPUT
- 6.- L REF DRUM
- 7.- COMMON
- 8.- 14-28VDC IN POWER
- 9.- L SIGNAL IMPELLER
- 10.- R REF DRUM
- 11.- COMMON
- 12.- R SIGNAL IMPELLER
- 13.- N/C
- 14.- N/C
- 15.- GROUND



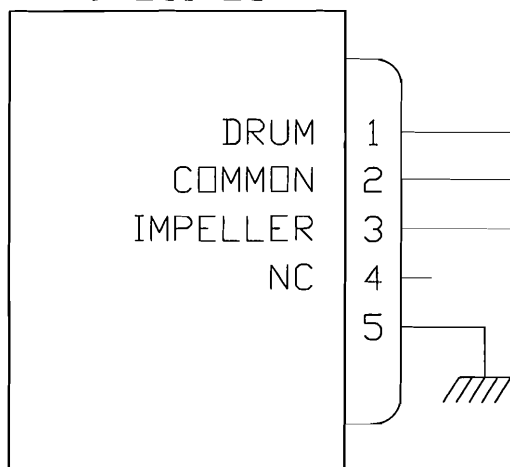
0801/011	A	02/15/02	DRG	WDS	UPDATED NAMEPLATE AND TITLE BLOCK
0206/018	-	06/25/02	PAB	ZK	BASELINE RELEASE
ECO #	REV.	DATE	BY	APP'D	DESCRIPTION

UNLESS OTHERWISE NOTED DIMENSIONS ARE IN INCHES TOLERANCES: X.X - ±0.1 X.XX - ±0.01 X.XXX - ±0.005	DRAWING DATE 6/20/02		INSTALLATION, IMPELLER DRUM FF TO A-429 CONVERTER			
	DRAFTER PAB APPROVED ZK					
	FILE NAME 930514-00AJ.DWG DIRECTORY 930514-00		MINNEAPOLIS, MN 55426			
FINISH: N/A			DRAWING NO. 4005-F57	SIZE A	P/N 930514-00	REV A
MATERIAL: N/A						
SCALE: NONE	SHEET 1 OF 1					

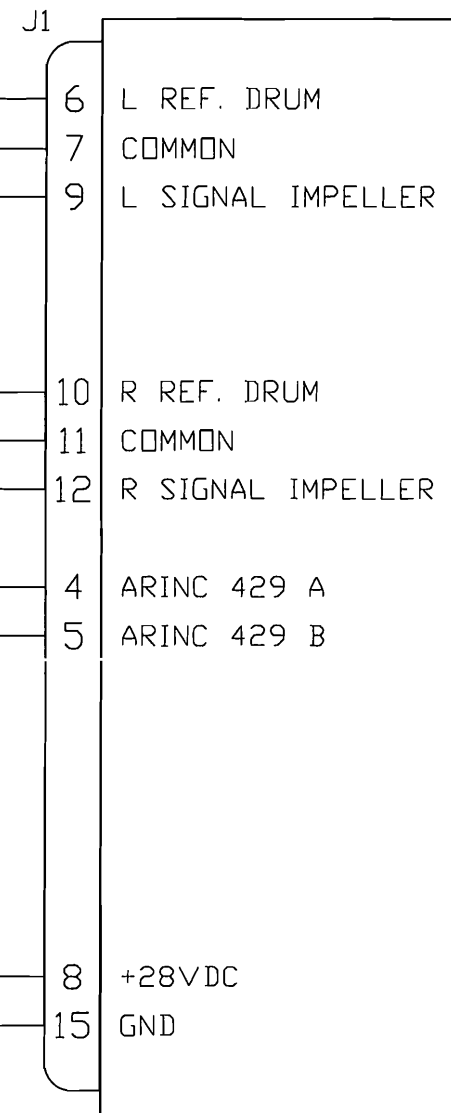
ELDEC P/N
9-231-23



ELDEC P/N
9-231-23



SHADIN P/N 930514-00
DATA CONVERTER

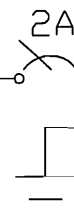


UNS-1K
FMS

ARINC 429 A 8G
ARINC 429 B 8H

ARINC PORT 7

28VDC
AIRCRAFT
POWER



DRAWING DATE 6/25/02	SHADIN CO., INC. MINNEAPOLIS, MN 55426		
DRAFTER PAB	INSTALLATION WIRING, IMPELLER DRUM FF TO A-429 CONVERTER		
APPROVED <i>ZK</i>			
FILE NAME 4005-F58-J.DWG	CODE IDENT. NO. 4005	SIZE A	P/N -----
DIRECTORY 4005	4005-F58		REV -
SHEET 1 OF 1			

0206/018	-	6-25-02	PAB	<i>ZK</i>	BASLINE RELEASE
ECO #	REV.	DATE	BY	APP'D	DESCRIPTION

SCALE: NONE

Report: 4037
ECO Date: January 11, 2006
Rev: F
Sec.: IX
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ECO # 0601/013
Release date: 1/11/06
Approved: CB

PARTS LIST

Part #: IK9337

Drawing #: N/A

Description: INSTALL KIT FOR 15PIN D-SUB

<u>FN</u>	<u>P/N</u>	<u>QTY.</u>	<u>DESCRIPTION</u>	<u>MFG.</u>	<u>MFG.#</u>	<u>DESIGNATION</u>	<u>COMMENTS</u>
5	230019H-1	2	SPRING LATCH CLIP	SHA	4028-074		*
10	230050C	1	CONN, 15 Pin D-Sub F Crimp w/contacts	POS	M24308/2-2 (RD15F10000-50)		
15	230038	1	CONN HOOD, 15 Pin D-Sub	CIN	DA-24658		
20	511002	2	SCREW, 4-40 x 1/4 Phil Pan HD SS	MCM	91772A106		
25	512007	2	NUT, 4-40 3/16 x 1/16 SS	AFT	HNSP188 04C000		
27	512101	2	RETAINER CLIP, "Bow Tie" Style	KEY	2061K		*
30	541001	2	WASHER, #4 Split Lock, SS	MCM	92147A005		
32	753217	1	COMPUTER LABEL, 3.5"x 15/16"	AVR	4013		
35	PK1001	1	BAG, 2.5 x 3, 4 MIL Zip Lock				
45	PK1007	1	BAG, 6 x 8, 4 MIL				

15 items

* Use FN 5 Or FN 27, Not Both – Depending On D-Sub Connector Style Used.