DC FUEL FLOW TO FREQUENCY CONVERTER

PRODUCT P/N: 630502

INSTALLATION MANUAL

REV C

Shadin Avionics
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USA

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MANUAL P/N: IM6352

INSTALLATION MANUAL
DC FUEL FLOW TO FREQUENCY CONVERTER
P/N 630502

PAGE CONTROL CHART

REVISION LOG

REV.	DATE	APP'D	CHANGE
–	7/07/99	EDJ	Baseline Release
A	2/11/00	EDJ	Add Ragen Indicator / Transmitter to page 1-3, 1-4. Remove drawing number 4005-545 and replace with 4005-557, up date procedure on page 2-1. Page i changed due to drawings 4005-557 and 4005-C49 revision level change.
B	8/26/03	ZK	Add IK9337 to IM6352, and updated format of Installation Manual.
C	3/30/06	CB	Updated Company Logo & IK9337

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.

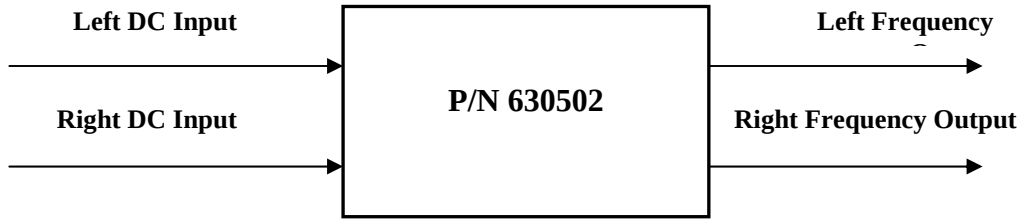
1. OVERVIEW

1.1 The Manual

This manual is intended to facilitate the proper installation of the DC Fuel Flow (FF) to Frequency Converter. Installation instructions should be read and followed.

1.2 Product Description

The purpose of the DC to Frequency Converter is to receive the analog FF signal in the form of a DC voltage and produce a digital output signal with a frequency proportional to the FF signal. The digital output represents the engine fuel flow and is available for use by a standard fuel management system.



The conversion for Left and Right engine fuel flow is defined by the following relation:

$$Freq_{OUT} = V_{IN} \times 122.07 \text{ (Hz)}$$

Where V_{IN} is the input voltage ranging from 0 to 10 volts.

1.3 Application

BEECH, KingAir

MODEL	EFFECTIVITY	INDICATOR	TRANSMITTER
C90	LJ-713 thru LJ-754	90-380009-5	90-380009-1
C90	LJ-755 thru LJ-1062	90-380009-5	90-380009-7
C90A	LJ1063 thru LJ-1282	90-380009-5	90-380009-7
C90A	LJ-1283 and after	PC900-6A0600PH-1*1	½-2-81-306
E90	LW-219 thru LW-263	90-380009-5	90-380009-1
E90	LW-264 and after	90-380009-5	90-380009-7
F90	LA-2 and after	90-380009-5	90-380009-7
A100	B-234 and after	90-380009-5	90-380009-1
B100	BE-21 and after	90-380009-5	90-380009-1
200	BB-225 thru BB-733, BB-735 thru BB-792, BB-794 thru BB-828, BB-830 thru BB-853, BB-871 thru BB-873, BB-892, BB-893, BB-895, BB-912, BB-991	90-380009-2	90-380009-7
200T	BT-3 thru BT-22	90-380009-2	90-380009-7
200C	BL-1 thru BL-36	90-380009-2	90-380009-7
200CT	BN-1 only	90-380009-2	90-380009-7
B200	BB-734, BB-793, BB-829, BB-854 thru BB-870, BB-874 thru BB-891, BB-894, BB-896 thru BB-911, BB-913 thru BB-990, BB-992 thru BB-1400	90-380009-2	90-380009-7
B200	BB-1401 and after	PC900-6A0600PH-1*1	½-2-81-306
B200T	BT-23 thru BT-33	90-380009-2	90-380009-7
B200T	BT-34 and after	PC900-6A0600PH-1*2	½-2-81-306
B200C	BL-37 thru BL-137	90-380009-2	90-380009-7
B200C	BL-138 and after	PC900-6A0600PH-1*2	½-2-81-306
B220CT	BN-2 thru BN-4	90-380009-2	90-380009-7
B200CT	BN-5 and after	PC900-6A0600PH-1*2	½-2-81-306
300	FA-2 and after	101-384153-1 (101-384153-3 alt.)	101-389042-1 (101-389042-5 alt)
B300	FL-1 thru FL-57	101-384153-1 (101-384153-3 alt.)	101-389042-1
B300	FL-58 and after	PC900-1A0800PH-XXX	½-2-81-301

Application (Cont.)

BEECH, KingAir (cont.)

MODEL	EFFECTIVITY	INDICATOR	TRANSMITTER
B300C	FM-1 only	101-384153-1 (101-384153-3 alt.)	101-389042-5
B300C	FM-2 and after	PC900-1A0800PH-XXX	½-2-81-301
1900C	UC-1 thru UC-174 (Configuration 2)	PC900-1A0800PH-XXX	½-2-81-301
1900C	UD-1 thru UD-6 (Configuration 2)	PC900-1A0800PH-XXX	½-2-81-301
1900D	UE-1 and after	PC900-1A0800PH-XXX	½-2-81-301

PIPER, Cheyene

MODEL	EFFECTIVITY	INDICATOR	TRANSMITTER
PA-31T(1,2)	For units w/indicator & transmitter listed, only	3265013-0601 (RAGEN)	3268011-0101
PA-31T(1,2)	For units w/indicator & transmitter listed, only	3260513-1201 (RAGEN)	TFF-2905-9

CESSNA, Citation

MODEL	EFFECTIVITY	INDICATOR	TRANSMITTER
500, 501, 550, 551, S550	All Units	101- - 393002-009 Simmons/ (9912049-2) Cessna or 2) VSDL-OC208E Ametek or 3) 9912147-16 Cessna	NA

ISRAELI AIRCRAFT IND., Westwind

MODEL	EFFECTIVITY	INDICATOR	TRANSMITTER
1124	All Units	1291-2 (RAGEN)	151-909-001 (GULL)

The DC Fuel Flow to Frequency Converter is required if the receiving device uses a digital frequency signal input for fuel flow information and the fuel flow sensor or indicator provides an analog DC signal that represents Fuel Flow information. This converter does not calculate an offset and it is necessary that the receiving device will correct for the offset, if the fuel system exhibits an offset.

The following table shows the K-Factor and offset to be configured for receiving devices with digital frequency fuel flow signal input.

Indicator P/N	Digi-, Mini-, Microflo		Airdata (F/ADC200/2000)		Digidata	
Beech King Air	K-factor (ppg)	Offset (Hz)	K-factor (ppg)	Offset (Hz)	K-factor (ppg)	Offset (Hz)
90-380009-2	49,050	24	49,050	24	49,050	24
90-380009-5	49,050	24	49,050	24	49,050	24
101-384009-1	49,050	24	49,050	24	49,050	24
101-384153-1,3	19,647	0	19,647	0	19,647	0
PC900-6A0600-XXX	24,599	0	24,599	0	24,599	0
PC900-1A0750-XXX	19,679	0	19,679	0	19,679	0
PC900-1A0800-XXX	18,449	0	18,449	0	18,449	0
Piper Cheyene						
3265013-0601 Ragen	29,470	0	29,470	0	29,470	0
3260513-1201 Ragen	29,470	0	29,470	0	29,470	0
Cessna Citation						
393002-009 Simmons 9912049-2 Cessna	9,400	0	9,400	0	9,400	0
VSDL-OC208E	10,400	0	10,400	0	10,400	0
9912147-16	10,400	0	10,400	0	10,400	0
Israeli Aircraft Ind. Westwind						
1291-2 (Ragen)	6700	0	6700	0	6700	0

AIRDATA	P/N 9628X0(A)-1	where X is 1, 2, or 3, A is optional
DIGIDATA	P/N 912802	
DIGIFLO	P/N 9105XYP	where X is 1, 2, or 3, Y is 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 or A
	P/N 9105XY-46	where X is 1, 2, or 3, Y is 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 or A
MICROFLO	P/N 9120XX(T)-38D	where XX is 21, 22, 25, 26, 27, 28, 41, 42, 45, 46, 47, or 48
MINIFLO	P/N 9120XX(T)-D	where XX is 21, 22, 25, 26, 27, 28, 41, 42, 45, 46, 47, or 48

1.4 Specifications

Physical Specifications

Box Size (W x L x H)	2.40 x 4.30 x 1.15 (inches)
Weight	0.4 lbs

Electrical and Functional

Power Supply Voltage	+14 to +28 VDC
Supply Current	70 mA at 28 VDC
Protection	Not internally fused
Input (two, one per engine)	
DC Input Voltage Range	0-10 V
Input Impedance	>100 MΩ
Frequency FF Output (two, one per engine)	
Digital Frequency signal output	
V_{OL} < 0.8 V	I_{MAX} = 15mA
V_{OH} = 5V	I_{MAX} = 0.5mA
Pulse Width (V_{OL})	0.4 ms
Max. Frequency, V_{IN} = 10 V	1,221 Hz

Environmental

RTCA/DO-160C

Operating Temperature	-30° to +55° C
Operating Altitude	-1,000 to 55,000 ft
Certification	TSO-C44b

2. INSTALLATION PROCEDURE

2.1 Mounting

The conditions and test 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.

The converter should be mounted in a dry, temperature stable location with enough distance from motors, pulse generating equipment, relays, and cables carrying high DC or AC current to avoid interference with signals from the fuel flow transmitter(s)/indicator.

The converter may be installed in a temperature controlled environment and in a non-pressurized location.

In considering location, keep in mind that the converter requires signals from the fuel flow transmitter(s)/indicator. Placement in the front section of the aircraft is favorable in order to keep the harness length to the receiving equipment as short as possible.

Refer to installation drawing number 4005-557 for the mounting footprint and overall dimensions.

2.2 Electrical Connections

Use the 15-pin D-sub connector and components provided in the install kit to fabricate the wiring harness. Refer to the installation drawing numbers, 4005-557, 4005-558, 4005-854, and 4005-C49.

2.2.1 Connection to the Power Supply +28VDC.

PIN	**DESCRIPTION**
FF Converter J1: 8 to	+14 to +28VDC Power In.
FF Converter J1: 15 to	Power GND.

2.2.2 Connection to the DC Input Signals

PIN	**DESCRIPTION**
FF Converter J1: 1	+ Right Fuel Flow In
FF Converter J1: 2	– Right Fuel Flow In
FF Converter J1: 3	GND, Right Fuel Flow In
FF Converter J1: 9	+ Left Fuel Flow In
FF Converter J1: 10	– Left Fuel Flow In
FF Converter J1: 11	GND Left Fuel Flow In

Per Drawing Number 4005-854 and 4005-C49, use MIL SPEC M27500-22-TG-2T-14 shielded cable for analog left and right fuel flow output signals. Terminate cable shield at the Converter end, only.

2.2.3 Connection to the system

PIN	**DESCRIPTION**
FF Converter J1: 13	Left Frequency FF Output
FF Converter J1: 6	Right Frequency FF Output

Per Drawing Number 4005-854 and 4005-C49, use MIL SPEC M27500-22-TG-2T-14 shielded cable for the Converter to Airdata computer connection. Terminate the cable shield at the Airdata computer end, only.

3. ENVIRONMENTAL QUALIFICATION FORM

NOMENCLATURE: DC Fuel Flow to Frequency Converter
TYPE/MODEL/PART NO: 630502 **TSO NUMBER:** C44b
MANUFACTURER'S SPECIFICATION AND/OR OTHER APPLICABLE SPECIFICATION:
Report 4005C
MANUFACTURER: Shadin Avionics
ADDRESS: 6831 Oxford Street, St. Louis Park, Minnesota 55426-4412

CONDITIONS	**SECTION**	**DESCRIPTION OF TESTS CONDUCTED**
Temperature and Altitude	4.0	Equipment tested to Category F1.
Low Temperature	4.5.1	Low operating Temperature of -30°C.
High Temperature	4.5.2 & 4.5.3	
Altitude	4.6.1	
Decompression	4.6.2	
Overpressure	4.6.3	
Temperature Variation	5.0	Identified as Category X. Not tested.
Humidity	6.0	Tested to Category A.
Shock	7.0	Not tested.
Operational	7.2	
Crash Safety	7.3.1 & 7.3.2.2	
Vibration	8.0	Tested to Category M, N.
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.

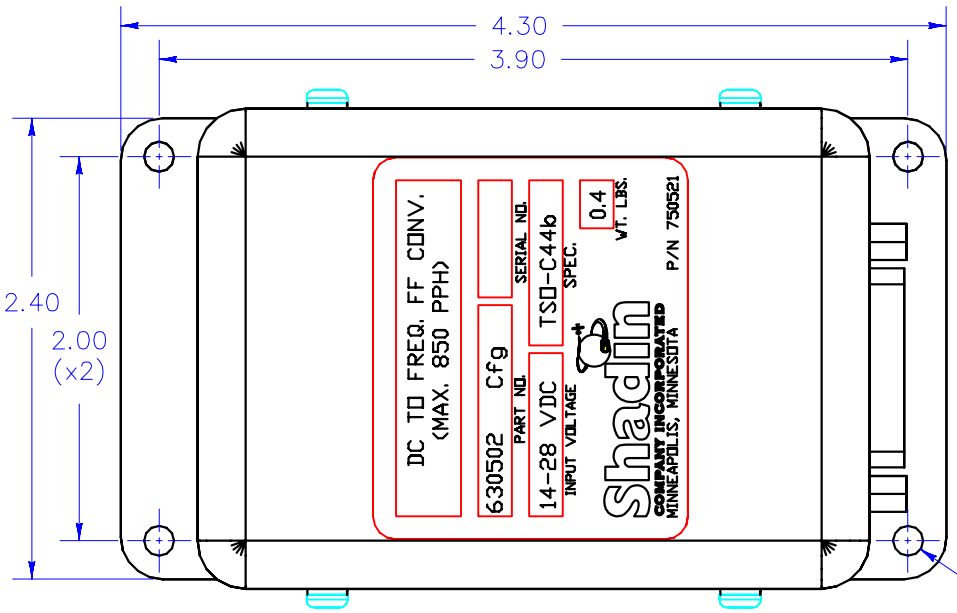
NOMENCLATURE: DC Fuel Flow to Frequency Converter
TYPE/MODEL/PART NO: 630502 **TSO NUMBER:** C44b

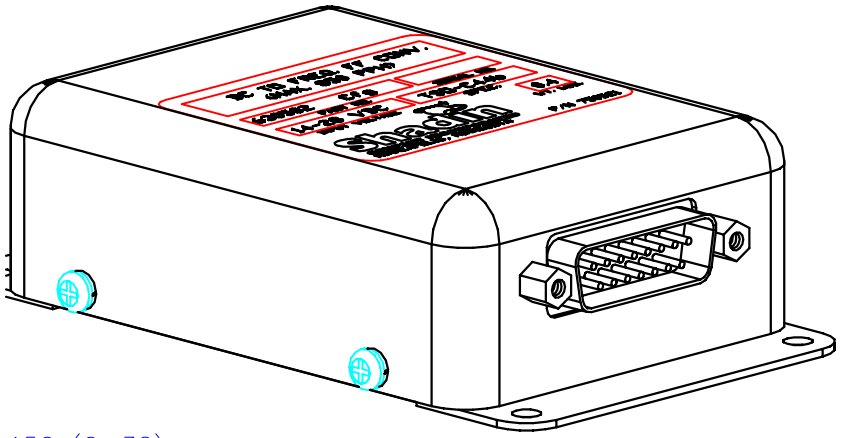
CONDITIONS	**SECTION**	**DESCRIPTION OF TESTS CONDUCTED**
Sand and Dust	12.0	Identified as Category X. Not tested.
Fungus	13.0	Identified as Category X. Not tested.
Salt Spray	14.0	Identified as Category X. Not tested.
Magnetic Effect	15.0	Tested to Category Z.
Power Input	16.0	Tested to Category B. Paragraph 16.5.2.1 only.
Voltage Spike	17.0	Identified as Category X. Not tested.
Audio Frequency Susceptibility	18.0	Identified as Category X. Not tested.
Induced Signal Susceptibility	19.0	Identified as Category X. Not tested.
Radio Frequency Susceptibility	20.0	Identified as Category X. Not tested.
Radio Frequency Emission	21.0	Tested to Category B.
Lightning Induced Transient Susceptibility	22.0	Identified as Category X. Not tested.
Lightning Direct Effects Test	23.0	Identified as Category X. Not tested.
Icing	24.0	Identified as Category X. Not tested.

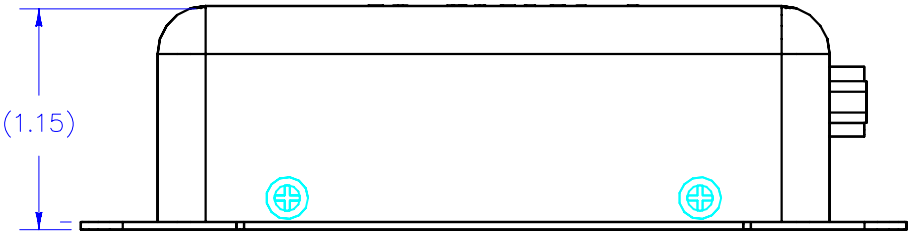
SECTION 4.0

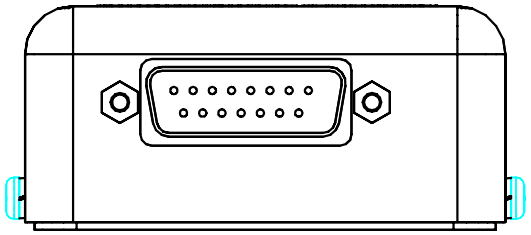
INSTALLATION DRAWINGS AND INSTALL KIT PARTS LISTS

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









CONNECTOR WIRING

1.– + RIGHT FUEL FLOW IN	9.– + LEFT FUEL FLOW IN
2.– – RIGHT FUEL FLOW IN	10.– – LEFT FUEL FLOW IN
3.– GND RIGHT FUEL FLOW IN	11.– GND, LEFT FUEL FLOW IN
4.– NC	12.– NC
5.– NC	13.– LEFT FREQ. F.F. OUT
6.– RIGHT FREQ. F.F. OUT	14.– NC
7.– NC	15.– POWER IN GND
8.– +14 TO +28V DC POWER IN	

MATING CONNECTOR:

POSITRONIC # M24308/2-2
HOOD = CINCH # DA-24658
CAPTIVE SCREWS, (2), SHADIN P/N 512101

ECO #	REV.	DATE	BY	APP'D	DESCRIPTION
0308/031	D	8/26/03	PAB	ZK	REPLACED CLIPS W/JACK SCREWS; REDRAWN
9907/019	C	9/30/99	LJM	PG	ENHANCE NOTES AND CORRECT TITLE BLOCK
9503/022	B	3/14/95	DAP	SES	CORRECT (+) AND (–)
N/A	A	9/29/94	DAP	SES	BASELINE RELEASE

3D CAD FILE AVAIL: YES

UNLESS OTHERWISE NOTED DIMENSIONS ARE IN INCHES
TOLERANCES: X.X – ±0.1
X/X ± 1/64 X.XX – ±0.01
∠– ±1° X.XXX – ±0.005

FINISH: N/A

MATERIAL: N/A

SCALE: 1 : 1

DRAWING DATE 8/19/94
DRAFTER PAB
APPROVED SES
FILE NAME 630502DJ.DWG
DIRECTORY 630502
SHEET 1 OF 1

SHADIN CO., INC. MINNEAPOLIS, MN 55426

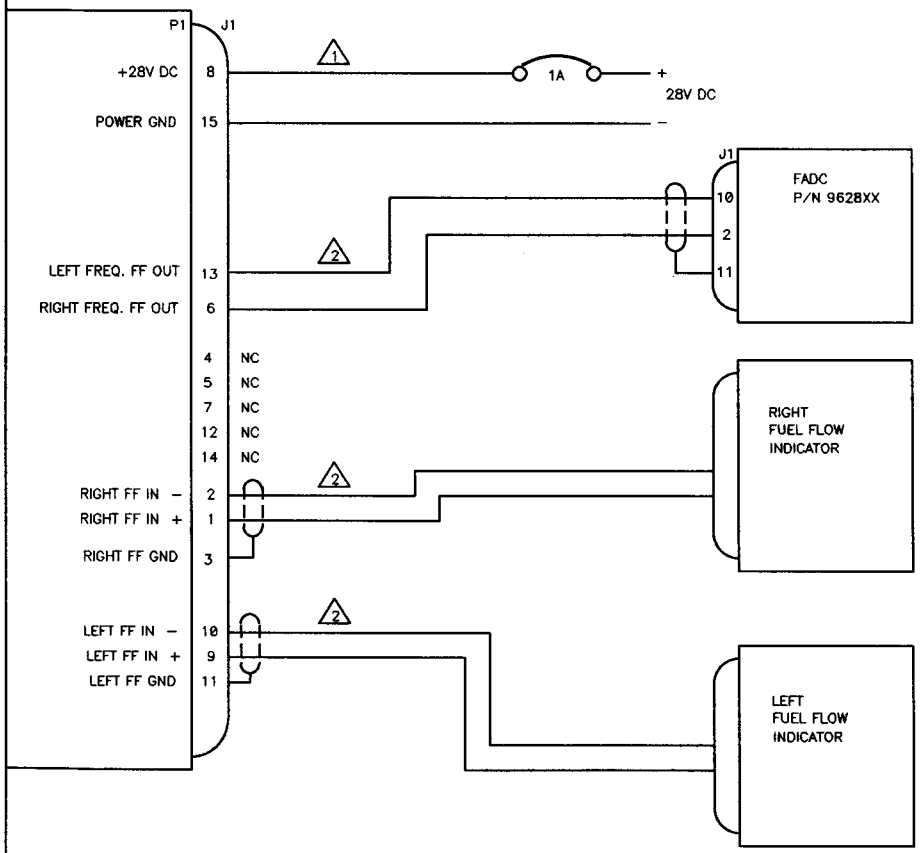
INSTALLATION DWG, DC FUEL FLOW TO FREQUENCY CONVERTER

CODE IDENT. NO. 4005-557 | SIZE A | P/N 630502 | REV D

NOTES

1. USE MIL SPEC M27500-22-TG-1U-14.
2. USE MIL SPEC M27500-22-TG-2T-14.

ANALOG FUEL FLOW INTERFACE
P/N 630502



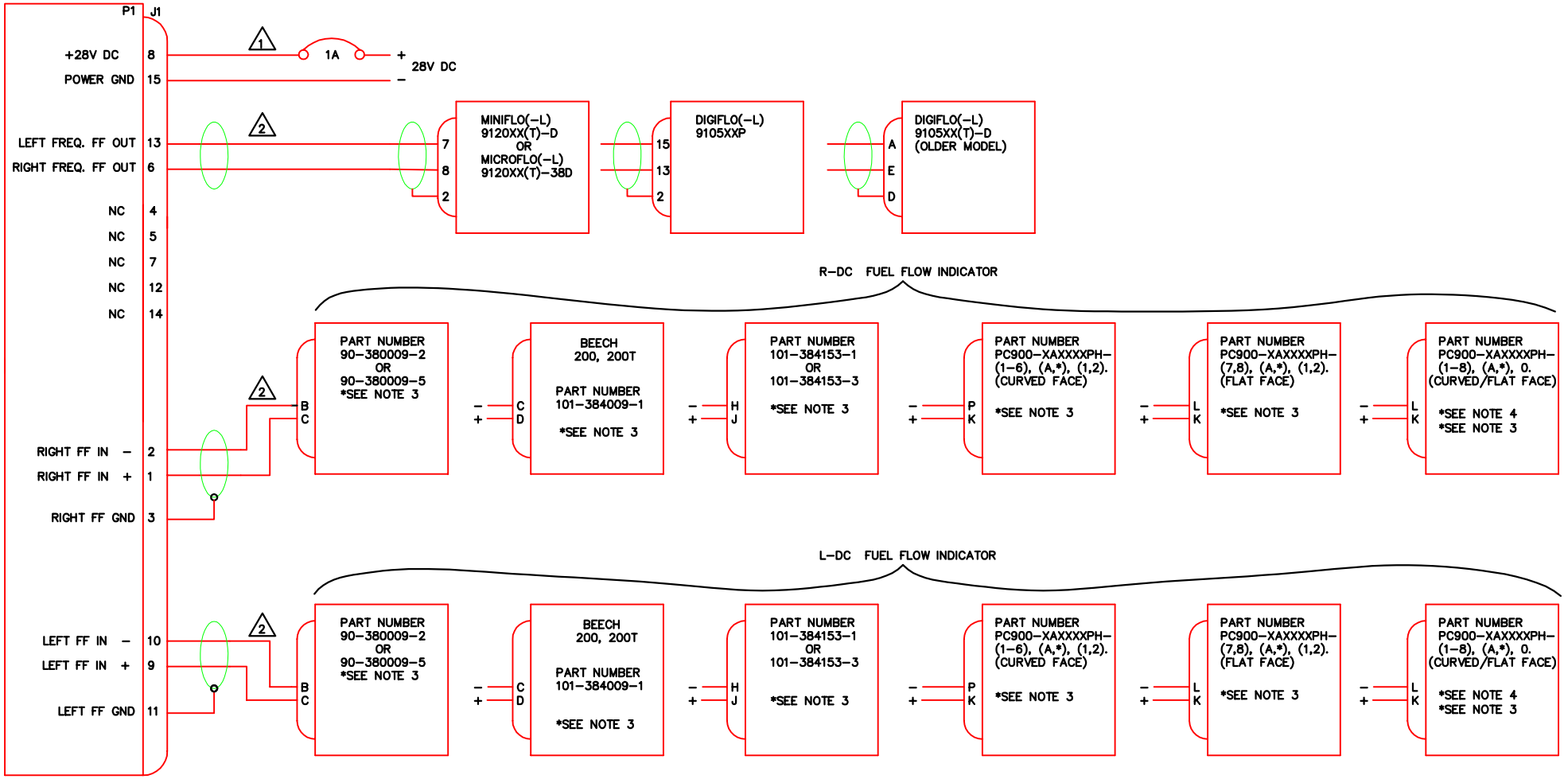
E.O. No.	REV	DATE	BY	APP'D	DESCRIPTION
9808/009	C	8-5-98	DMD	[illegible]	ADDED INDICATOR DESCRIPTIONS
9703/027	B	3-14-97	WMP	SES	ADD NOTES
9412/001	A	12-1-94	WMP	DAP	REVERSE POLARITIES OF L & R FF IN PIN LABELS

15:42:17
Wed Aug 05 1998

DIRECTORY 630502-0	CHECKED SES	ORIGINAL DATE OF DRAWING 10-10-94
	DRAFTER DAP	SHADIN COMPANY, INC.
		INSTALLATION WIRING, ANALOG FUEL FLOW TO FREQ. TO FADC
FILE NAME 630502CJ.S02	SHEET 1 OF 1	DRAWING NO. 4005-558 / SIZE A / P/N 630502 / REV LTR C

ANALOG FUEL FLOW INTERFACE

P/N 630502



NOTES:

1. USE MIL SPEC M27500–22–TG–1U–14.
2. USE MIL SPEC M27500–22–TG–2T–14.
3. FOR SINGLE ENGINE APPLICATION, USE LEFT SIDE ONLY.
4. CONTACT SHADIN CO. IF THIS INDICATOR IS INSTALLED.
5. K–FACTOR SETTINGS FOR THE DIGIFLO)–L), MINIFLO(–L) AND MICROFLO(–L) FUEL FLOW INDICATORS BY PART NUMBER OF THE AIRCRAFT'S FUEL FLOW INDICATOR.

   A. P/N=90–380009–2; 101–384009–1: K–FACTOR = 49,050, OFFSET = 24.
   B. P/N=90–380009–5: K–FACTOR = 49,050, OFFSET = 24.
   C. P/N=101–384153–(1,3): K–FACTOR = 19,647, OFFSET = 0.
   D. P/N=PC900–1A0600PH–(X,X,X): K–FACTOR = 24,599, OFFSET = 0.
   E. P/N=PC900–1A0750PH–(X,X,X): K–FACTOR = 19,679, OFFSET = 0.
   F. P/N=PC900–1A0800PH–(X,X,X): K–FACTOR = 18,449, OFFSET = 0.

ECO #	REV.	DATE	BY	APP'D	DESCRIPTION
9803/022	A	3/26/98	SRB	KCL	CHANGE K–FACTOR & OFFSET FOR 5.B NOTE FROM 16,660/48 REMOVE P/N FROM TITLEBLOCK
9709/001	–	9–12–97	BJD	TEC	BASELINE RELEASE

SCALE: NONE

DRAWING DATE 9/2/97
DRAFTSMAN BJD
APPROVED TEC
FILE NAME 4005–854AJ.DWG
DIRECTORY 4005
SHEET 1 OF 1

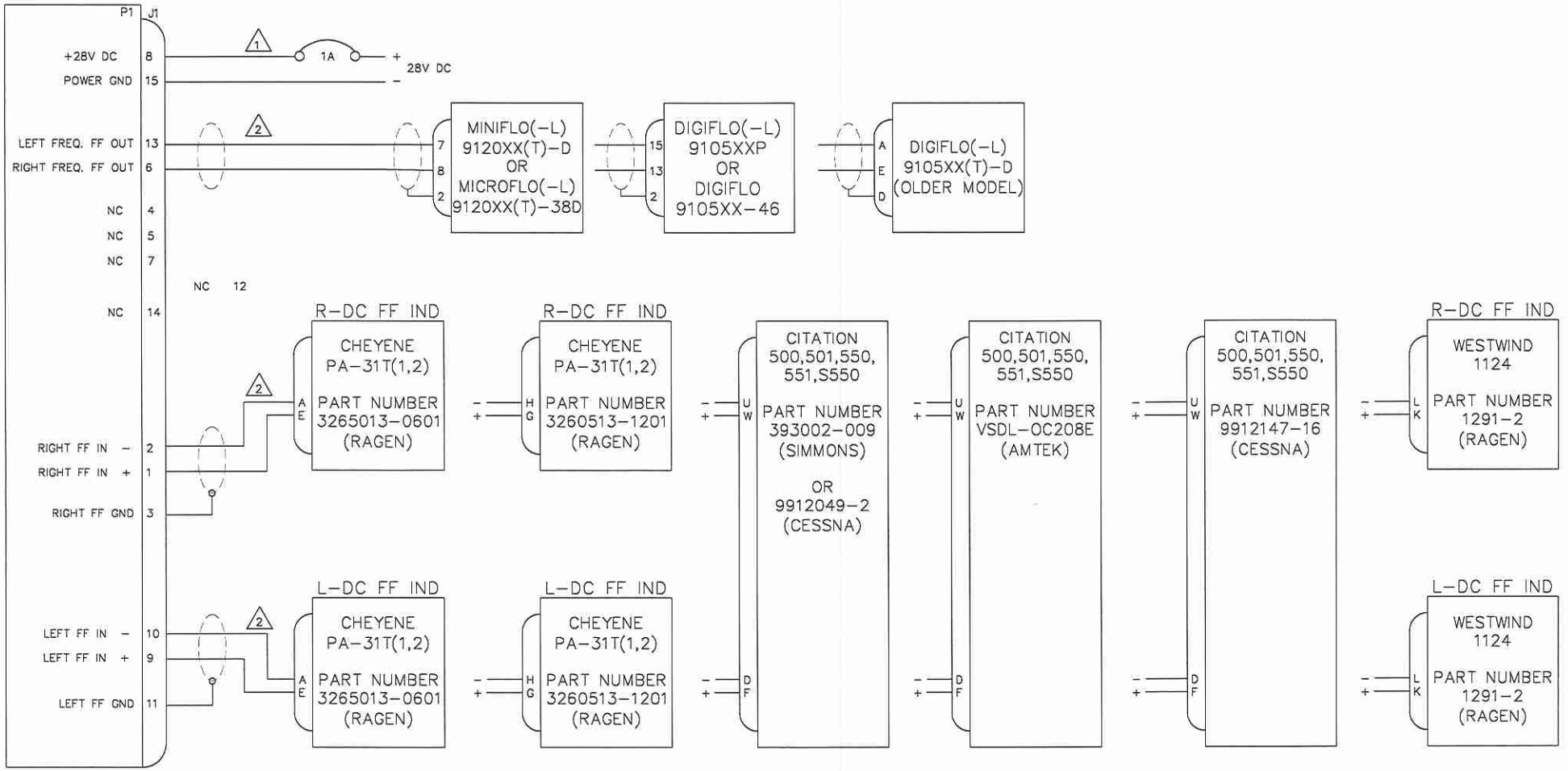
SHADIN CO., INC. MINNEAPOLIS, MN 55426

INSTALLATION WIRING, ANALOG FUEL FLOW TO FREQ. CONVERTER, BEECH KINGAIR INDICATORS

DRAWING NO. 4005–854 | SIZE A | P/N ——— | REV A

ANALOG FUEL FLOW INTERFACE

P/N 630502



NOTES:

1. USE MIL SPEC M27500–22–TG–1U–14.
2. USE MIL SPEC M27500–22–TG–2T–14.
3. K–FACTOR SETTINGS FOR THE DIGIFLO(–L), MINIFLO(–L) AND MICROFLO(–L) FUEL FLOW INDICATORS BY PART NUMBER OF THE AIRCRAFT'S FUEL FLOW INDICATOR OR SIGNAL CONDITIONER.

A. P/N= 3265013–0601, 3260513–1201	K–FACTOR = 29,470,	OFFSET =	0.
B. P/N= 393002–009, 9912049–2	K–FACTOR = 9,400,	OFFSET =	0.
C. P/N= VSDL–0C208E	K–FACTOR = 10,400,	OFFSET =	0.
D. P/N= 9912147–16	K–FACTOR = 10,400,	OFFSET =	0.
E. P/N= 1291–2	K–FACTOR = 6,700,	OFFSET =	0.

ECO #	REV	DATE	BY	APP'D	DESCRIPTION
0002/002	A	EDJ	LJM	2/11/00	ADD RAGEN INDICATOR (3260513–1201) w/TRANSMITTER (TFF–2905–9)
9812/039	–	EDJ	CMG	7/7/99	BASELINE RELEASE

SCALE: NONE

DRAWING DATE 7/5/99
DRAFTER CMG
APPROVED EDJ
FILE NAME 4005–C49AJ.DWG
DIRECTORY 4005
SHEET 1 OF 1

SHADIN CO., INC. MINNEAPOLIS, MN 55426

INSTALLATION WIRING, ANALOG FUEL FLOW TO FREQ. CONVERTER CHEYENE/ CITATION/WESTWIND INDICATORS

CODE ID. 4005–C49 | SIZE A | P/N -------- | REV A

Shadin
IK9337FP.DOC
DIRECTORY: IKXXXX

Report: 4037
ECO Date: January 11, 2006
Rev: F
Sec.: IX

ECO # 0601/013
Release date: 1/11/06
Approved: CB

PARTS LIST

Part #: **IK9337**

Drawing #s: N/A

Description: **INSTALL KIT FOR 15PIN D-SUB**

FN	P/N	QTY.	DESCRIPTION	MFG.	MFG.#	DESIGNATION	COMMENTS
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.