

INSTALLATION SPECIFICATION
ARINC 429 DIGITAL TO ANALOG ADC
MODEL, ADC-602, P/N 04060002-(X)

SKYLIGHT AVIONICS
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SKYLIGHT AVIONICS
MODEL, ADC-602, P/N 04060002-(X)
DOC. # 04080002 REV: 7, Date, 05/22/07

(i) OPERATING INSTRUCTIONS

The ADC-602 Adapter shall be designed to provide interface between new digital Air Data Computers for RVSM and the existing Autopilot and Flight Director Systems. Most RVSM retrofit aircraft require upgrades to the Altitude Pre-select and Altitude Hold modes to meet the RVSM requirements.

Operating instructions of the systems that are interconnected need to be followed. The ADC-602 shall appear transparent to the systems connected.

The ADC-602 Adapter, is limited to accepting (2) ARINC-429 Digital ADC's, selectable for source and converting the data as required. In normal operation the unit will monitor both inputs for valid data and present a low valid output for the status of each and a low level to signify the system being used. The unit will use the # 1 Input for data collection as the primary unless the Data becomes invalid or the operator has selected the alternate input. In the event of the primary Input becomes invalid the unit will switch to the secondary input if it is valid and ground the # 2 ADC In-Use discrete. The unit will function in reverse order if the operator has selected the alternate input. In the event the selected input fails the unit will return to the primary input.

The ADC-602, unit provides the following:
ARINC 565, Fine and Coarse Altitude Synchro
Autopilot/FD Altitude Hold Error
Valid and discretives

The ADC-602 unit has no "OFF/ON" switch. The unit becomes operational upon application of aircraft power.

The ADC-602 will monitor SSM and parity of the ARINC 429 Data bus and provide a ground if valid and active.

(ii) EQUIPMENT LIMITATIONS

The adapter is limited to converting the ARINC 429 digital bus output of the new digital ADC's to ARINC-565 Fine / Coarse Synchro altitude and an Autopilot/FD Altitude Sync and Hold error.

The ADC-602 Adapter, as an integral component of the on board Air Data System, the update speed and accuracy shall be directly limited to the output driving the unit. In effect, it is a component of that system and therefore subjected to all inherent limitations of that system.

A hardware design assurance of "Level D" per RTCA DO-254 "Design Assurance Guidance for Airborne Electronic Hardware" shall be applied to design verification, documentation and manufacturing.

Failure Condition Classification "Minor"

Failure Condition Description "Failure conditions that would not significantly reduce aircraft safety, and which would involve flight crew actions that are within their capabilities. Minor failure conditions may include: a slight reduction in safety margins or functional capabilities, a slight increase in flight crew workload, such as routine flight plan changes, or inconvenience to occupants."

Hardware Design Assurance Level Definition "D Hardware functions whose failure or anomalous behavior, as shown by the hardware safety assessment, would cause a failure of system function resulting in a minor failure condition for the aircraft"

The conditions and test required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install 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. If not within the TSO standards, the article may be installed only if further evaluation by the applicant documents an acceptable installation and is approved by the administrator.

The ADC-602 is classified as "ON CONDITION" with no preventative maintenance required. No overhaul time limitations apply. No scheduled inspections to determine operational status are required. In the event of a failure the operator or cognizant maintenance facility shall remove the appliance and return it to Skylight Avionics for the repair or replacement.

The unit shall have no external adjustments. The ADC-602 Adapter, by its design shall have only one operating control. The unit is design with a discrete select input, enabling the operator to select the ADC source of the ARINC-429 input. This shall be accomplished with an externally mounted cockpit switch. The ADC-602 shall not switch to an invalid source if valid data is available. Strapping of the installation allows choice of either Label 203 or 204 from the input to be decoded

(iii) INSTALLATION PROCEDURES

1. INTRODUCTION

This section contains information relative to the installation of the, ADC-602 Adapter, to assure satisfactory performance of the unit. (See Sections "iv" and "v" for detailed mechanical and wiring diagrams.)

2. UNPACKING AND INSPECTING EQUIPMENT

After unpacking the unit, make a visual inspection of the unit for evidence of damage incurred during shipment. If a claim for damage is to be made, save the shipping container to substantiate the claim.

3. PREINSTALLATION CHECK

Perform a continuity and power check on the wiring harness before connecting equipment.

4. POWER REQUIREMENTS

The ADC-602 shall be designed to accept from 22 to 29.5 VDC power and 26VAC reference with no special modification or wiring considerations. The ADC-602 operates from the standard +28VDC aircraft power source. It will not be used for emergency 18 VDC operations. Circuit protection shall be provided with an in-line 1.0 Amp breaker.

5. POST INSTALLATION CHECK

There shall be no on-aircraft adjustment required for the ADC-602. All alignment and adjustment procedures shall be accomplished during repair shop maintenance. Upon application of the aircraft 28 VDC power. Verify the Autopilot/Flight Director air data vertical modes and the Altitude Departure Warning System performs properly with a system check per the manufacturer's requirements.

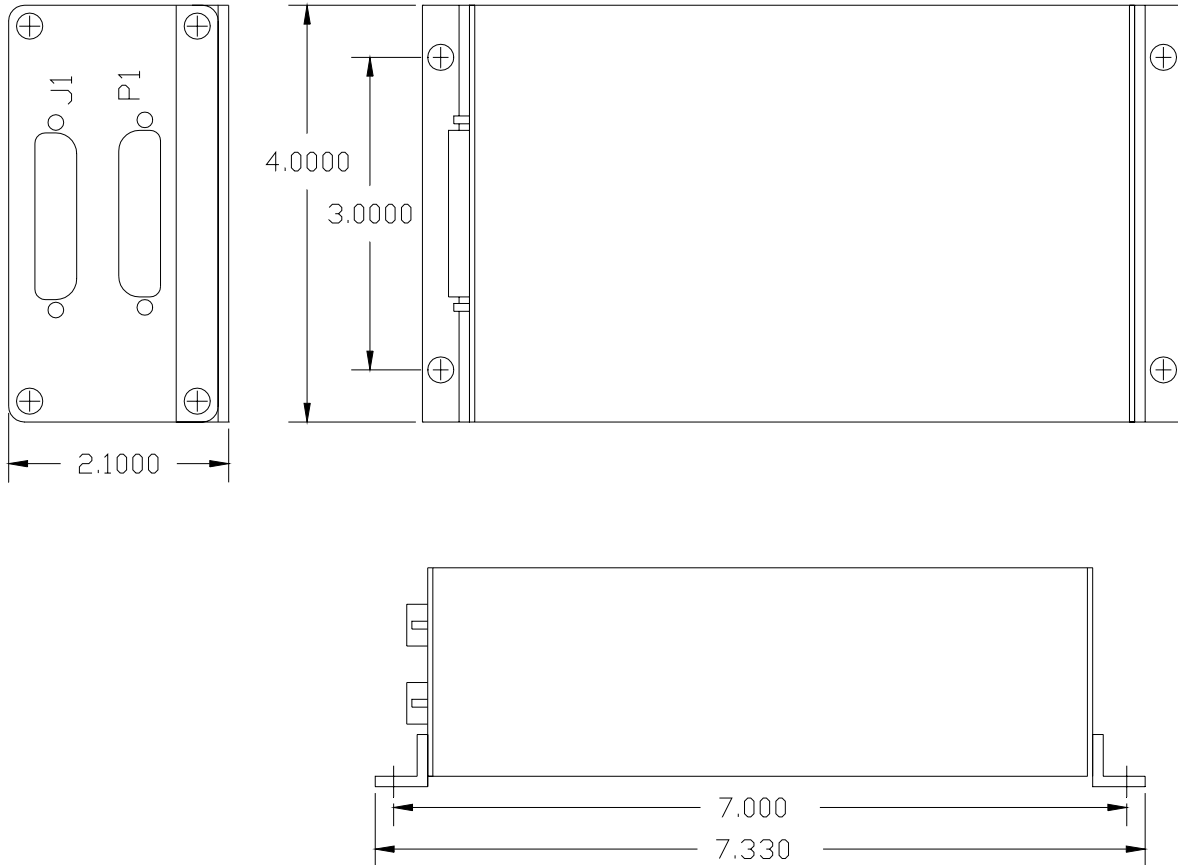
6. PREFLIGHT CHECK

Following the manufactures check out procedures of the on board Instruments, verify that the Indications being driven by the ADC-602 are performing properly.

(iv) INSTALLATION MECHANICAL DIAGRAMS

The ADC-602 is designed for vertical or horizontal mounting in the equipment bay of the aircraft, pressurized or non-pressurized compartments. The unit has four (4) mounting holes for number (6) size screws. (NOTE: Screws, mating connectors and other miscellaneous installation hardware are NOT included with the ADC-602.

Mechanical Drawing of ADC-602, Horizontal Mount

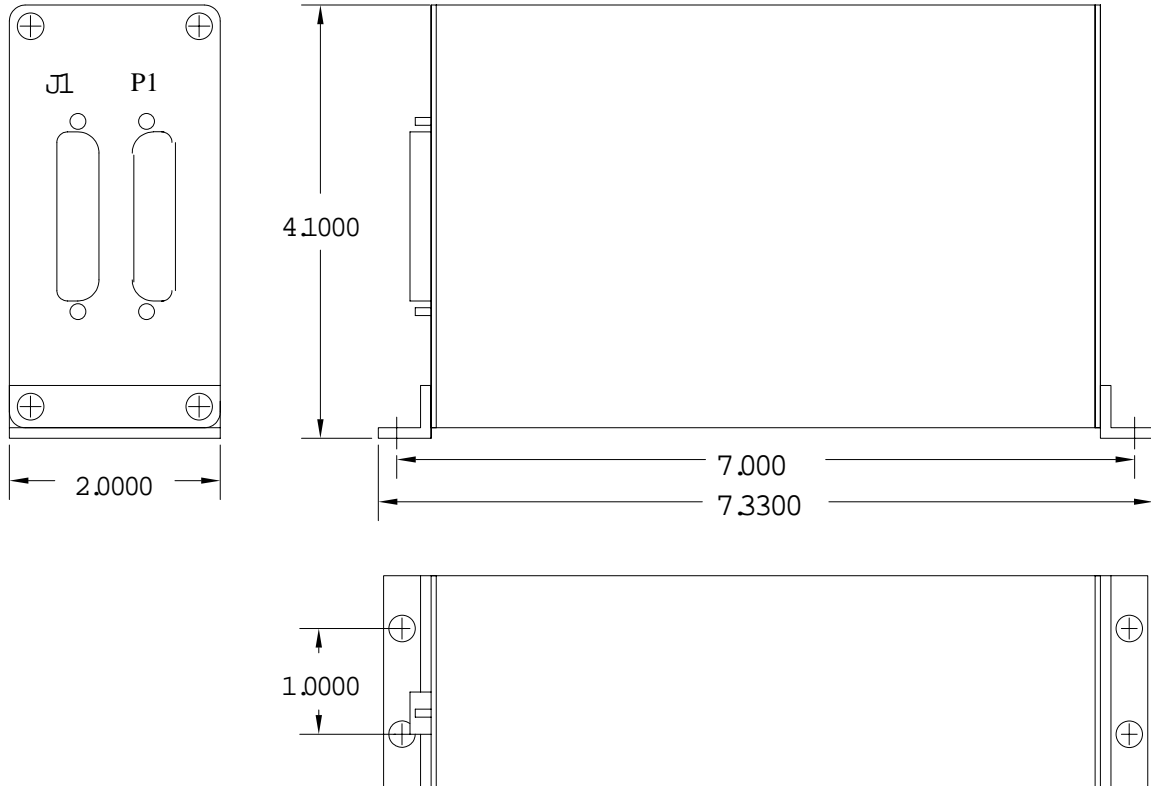


Unit Connectors, J1 DB-25P, Mating connector DB-25S with Screw lock Retainers
P1 DB-25S, Mating connector DB-25P with Screw lock Retainers

MECHANICAL INSTALLATION DRAWING
ILLUSTRATION (iv-1)

(iv) INSTALLATION MECHANICAL DIAGRAMS

Mechanical Drawing of ADC-602A, Vertical Mount

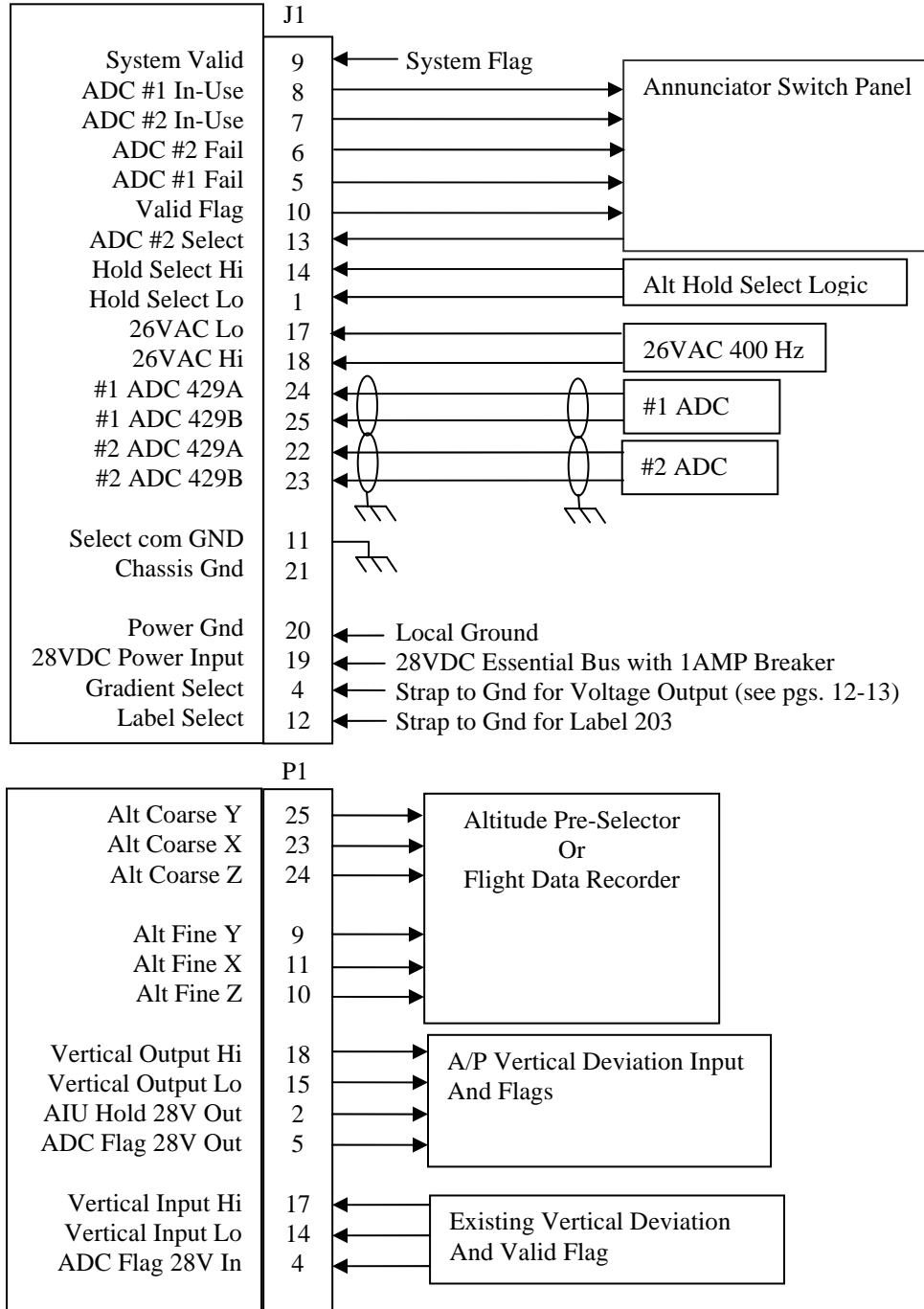


Unit Connectors, J1 DB-25P, Mating connector DB-25S with Screw lock Retainers
P1 DB-25S, Mating connector DB-25P with Screw lock Retainers

MECHANICAL INSTALLATION DRAWING
ILLUSTRATION (iv-2)

(v) INSTALLATION WIRING DIAGRAMS

ILLUSTRATION (v-1)
 ELECTRICAL PINOUT DRAWING



NOTE1, J1 = All versions. P1 = All versions excluding the (-7), (-14), (-17) and (-18).
 NOTE2, The 26 VAC REF is isolated and may require inverting on some installations.

(v) INSTALLATION WIRING (cont.)
 ILLUSTRATION (v-2)
 ELECTRICAL PINOUT DRAWING (-7 P1 Socket)

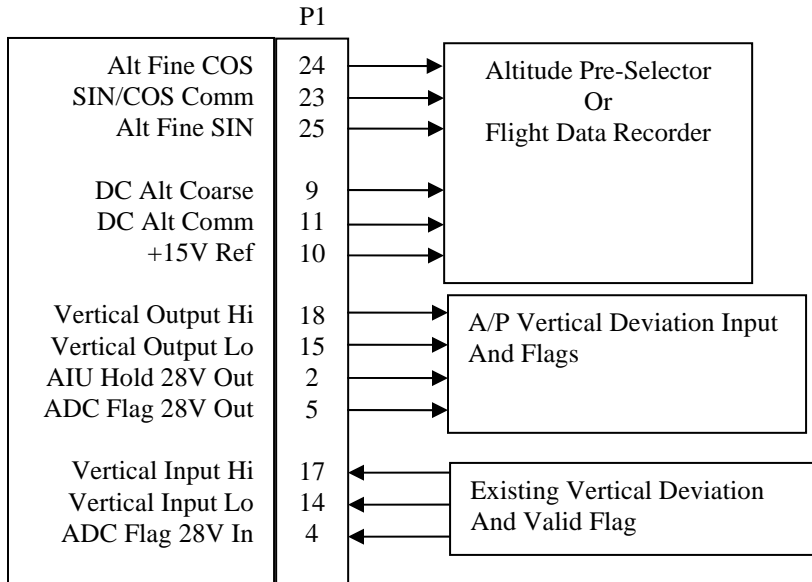
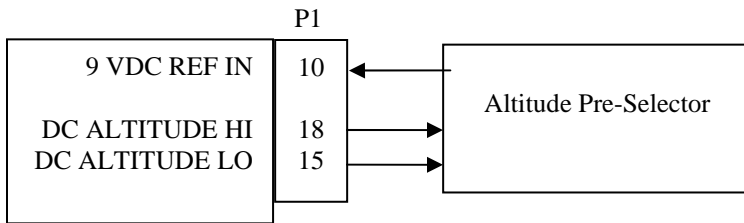
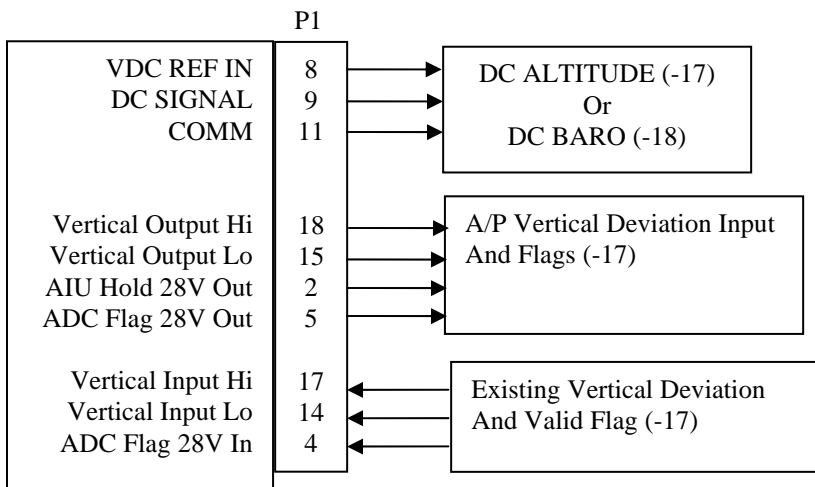


ILLUSTRATION (v-3)
 ELECTRICAL PINOUT DRAWING (-14 P1 Socket)



ELECTRICAL PINOUT DRAWING (-17 & -18, P1 Socket)
 ILLUSTRATION (v-4)



(v) INSTALLATION WIRING (cont.)

NAME	Pin #	DESCRIPTION (J1, 25 PIN SUB-D)
VALID FLAG INPUT	9	System flag input or (if no system flag exists) desired output level for J1-10
ADC # 1 In-Use	8	Gnd = (#1 ADC Valid and selected (Pin 13 open)) or (#1 ADC Valid, ADC#2 selected but invalid) or (All ADC's Invalid, #1 Selected)
ADC # 2 In-Use	7	Gnd = (#2 ADC Valid and selected (Pin 13 =GND)) or (#2 ADC Valid, ADC#1 selected but invalid) or (All ADC's Invalid, #2 Selected)
ADC # 2 Flag	6	ADC # 2 ARINC 429 SSM and Parity Valid = Gnd
ADC # 1 Flag	5	ADC # 1 ARINC 429 SSM and Parity Valid = Gnd
VALID FLAG Output	10	Valid = (In-Use ADC, AIU and 26VAC valid) = J1-9
ADC Sel	13	Open = #1 ADC, GND = #2 ADC
Alt Hold Mode Sel 28 Vdc	14	Logic Hi = Autopilot Alt Hold Selected (Typical 28V)
Alt Hold Mode Sel Gnd	1	Logic Lo = Autopilot Alt Hold Selected (Typical GND)
26VAC Ref Lo	17	400Hz 26 VAC RETURN
26VAC Ref Hi	18	400Hz 26 VAC INSTRUMENTATION BUS (NOTE 1)
429A	24	# 1 ADC ARINC 429 A, LABEL 204 OR 203 @ 500mSec min
429B	25	# 1 ADC ARINC 429 B
429A	22	# 2 ADC ARINC 429 LABEL 204 OR 203 @ 500mSec min
429B	23	# 2 ADC ARINC 429 B
Chassis Gnd	21	AIRFRAME Local GND
Power Ground	20	28 VDC RETURN Local GND
28VDC Input	19	28 VDC ESSENTIAL BUS @ 1amp
Alt Hold Gradient Sel	4	Open = 4mV per ft, GND = 10mV per ft P/N 04060002-0
Alt Label Sel	12	Open = Label 204, GND = Label 203
NAME	Pin #	DESCRIPTION (P1, 25 SOCKET SUB-D)
COARSE Y	25	ARINC-565 COARSE SYNCHRO ALTITUDE Y
COARSE X	23	ARINC-565 COARSE SYNCHRO ALTITUDE X
COARSE Z	24	ARINC-565 COARSE SYNCHRO ALTITUDE Z
FINE Y	9	ARINC-565 COARSE SYNCHRO ALTITUDE Y
FINE X	11	ARINC-565 COARSE SYNCHRO ALTITUDE X
FINE Z	10	ARINC-565 COARSE SYNCHRO ALTITUDE Z
A/P ALT HOLD OUTPUT Hi	18	AUTOPILOT VERTICAL MODE ERROR OUTPUT Hi
A/P ALT HOLD OUTPUT Lo	15	AUTOPILOT VERTICAL MODE ERROR OUTPUT Lo
AIU Hold Mode	2	Output 28 VDC = Hold Mode
ADC/AIU MON	5	Output J1-10 = Hold Mode, P1-4 Not Hold Mode
A/P VERTICAL INPUT Hi	17	AUTOPILOT VERTICAL MODE ERROR INPUT Hi (EXISTING)
A/P VERTICAL INPUT Lo	14	AUTOPILOT VERTICAL MODE ERROR INPUT Lo (EXISTING)
ADC MON (EXISTING)	4	ADS-65, ADC MON INPUT (EXISTING)

(vi.) SPECIFICATIONS

SPECIFICATION	CHARACTERISTICS
Compliance	TSO C-106
RTCA/DO-160D (Pending)	A1D2/B/A/B/S2BM/X/X/X/X/X/Z/A/A/A/Z/VVV/M/XXC3/X/X/A

Physical Dimensions

ADC-602	
Height	2.10"
Length	7.330"
Width	4.00"
ADC-602A	
Height	4.10"
Length	7.33"
Width	2.00"
Weight	1.75 lb

Temperature Range	Operational	-55 C to +70 C
	Storage	-55 C to +85 C

Altitude 50,000'

Power Requirements 28 VDC @ .3 AMP Normal, .8 AMP Peak
 26 VAC @ .4 AMP

INPUTS
 (2) ARINC 429 RECEIVERS
 (4) SELECTS
 (1) ANALOG VERTICAL DEVIATION
 (2) FLAGS
 (1) 26VAC 400Hz REFERENCE
 (1) DC REFERENCE (OPTIONAL)*

OUTPUTS
 (3) FLAGS
 (2) ADC SELECT
 (1) ANALOG VERTICAL DEVIATION
 (1) ARINC-565 FINE / COARSE SYNCHRO ALTITUDE
 Fine = 360 DEG / 5000 Ft. +/- .1 Degree
 Coarse = 360 Deg / 135,000 Ft. +/- .1 Degree
 (1) ALTERNATIVE ALTITUDE
 COARSE DC ANALOG
 SINE/COSINE FINE
 + 15 VDC REFERENCE OUT
 (1) DC RATIO ALTITUDE/BARO POT (OPTIONAL)*

Limitations Limited to the manufactures specifications of the digital input bus and to the specifications listed herein.

(vi.) SPECIFICATIONS

INPUTS

(BNR) SSM

31	30		29	
0	0	Failure Warning	0	Plus
0	1	No Computed Data	1	Minus
1	0	Functional Test		
1	1	Normal Operation		

(BCD) SSM

31	30	
0	0	Plus
0	1	No Computed Data
1	0	Functional Test
1	1	Minus

SDI Source/Destination Identifier

10	9	
0	0	All Call
0	1	1
1	1	2
1	1	3

X = Ignored, U = Used, P = Odd Parity

ARINC 429 Label 204 (BNR) Baro Altitude

3	332	2	2222222211111111	1	10	00000000
2	109	8	7654321098765432	1	09	87654321
P	SSM	X	UUUUUUUUUUUUUUUU	X	SDI	00100001
			LSB Bit 12 = 1Ft		XX	
			2' Comp			

ARINC 429 Label 203 (BNR) Pressure Altitude

3	332	2	2222222211111111	1	10	00000000
2	109	8	7654321098765432	1	09	87654321
P	SSM	X	UUUUUUUUUUUUUUUU	X	SDI	11000001
			LSB Bit 12 = 1Ft		XX	
			2' Comp			

ARINC 429 Label 206 (BNR) Computed Air Speed, -5 only

3	332	22222222111	111111	10	00000000
2	109	876543210987	654321	09	87654321
P	SSM	UUUUUUUUUUUU	XXXXXX	SDI	01100001
		LSB = ¼ Kt		XX	

ARINC 429 Label 212 (BNR) Vertical Speed, -6 and -10

3	332	2222222211	1111111	10	00000000
2	109	87654321098	7654321	09	87654321
P	SSM	UUUUUUUUUUUU	XXXXXXX	SDI	01010001
		LSB = 16 Ft		XX	

(vi.) SPECIFICATIONS

INPUTS (cont.)

ARINC 429 Label 350 (Thommen) Selected Altitude -12 only

3	332	2	2	2222222111111111	10	00000000
2	109	8	7	6543210987654321	09	87654321
P	XXX	A	S	UUUUUUUUUUUUUUUU	SDI	00010111
		*	*	LSB = 1 Ft	XX	

* Per Thommen AD32 ICD Manual, Bit 28 equals Alerter ON/OFF status Bit 27 equals Data Sign.

ARINC 429 Label 217 (BNR) Pressure inHg -15only

3	332	2222222221111111	11	10	00000000
2	109	8765432109876543	21	09	87654321
P	SSM	UUUUUUUUUUUUUUUU	XX	SDI	11110001
		MSB 28 = 32in.Hg		XX	

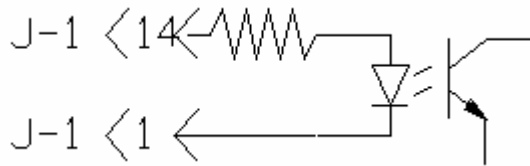
ARINC 429 Label 235 (BCD) Baro Setting inHg, -18 only

3	33	222	2222	2221	1111	1111	10	00000000
2	10	987	6543	2109	8765	4321	09	87654321
P	SSM	MSC	8421	8421	8421	XXXX	XX	01010001
0	00	010	1001	1001	0010	XXXX	00	10111001
		29.92 inHg						

(vi.) SPECIFICATIONS

INPUTS (cont.)

SELECTS



Hold Select: Vertical Deviation output will be the error between current altitude and the altitude when first activated. (2mA) not used for P/N 04060002-5

ADC Select

J1-13 Open = # 1ADC Selected (28V)
 J1-13 GND = # 2 ADC Selected (2mA)

Label Select: Data to be converted.

J1-12 Open = 204 Baro-Altitude (28V)
 J1-12 GND = 203 Pressure-Altitude (2mA)

Gradient Select: (P/N 04060002-0 only) vertical deviation amplitude and phase

J1-4 Open = 4mV per Ft. in phase above altitude (28V)
 J1-4 GND = 10mV per Ft. in phase below altitude (2mA)

Vertical Deviation Analog Input

P1-17, P1-14: Existing vertical mode deviation that will be passed through a relay to P1-18, P1-15 when not in Altitude Hold Mode. Not used on P/N 04060002-5.

Flags inputs

J1-9 existing system Flag or logic level input, relayed to J1-10 when valid.
 P1-4 existing vertical mode system flag relayed to P1-5 when Hold is Not Active

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(vi.) SPECIFICATIONS

OUTPUTS

ARINC-565 FINE / COARSE Synchro Altitude (2VA)
Fine = 360 DEG / 5000 Ft. +/- .1 Degree
Coarse = 360 Deg / 135,000 Ft. +/- .1 Degree

ADC Select outputs
GND when active, relay output max switching 10VA

Analog Vertical Deviation
Accuracy 10 Ft or 1% whichever is greater
Limited to 30mA at 10 Volts

P/N 04060002-0
ARINC-565 FINE / COARSE Synchro Altitude (2VA)
4mVDC per Ft. Positive above altitude with J1-4 = Open
10mVDC per Ft. Positive below altitude with J1-4 = GND

P/N 04060002-1
ARINC-565 FINE / COARSE Synchro Altitude (2VA)
3.9mVAC per Ft. @ 2000 Ft. in phase above altitude
1.3mVAC per Ft. @ 40000 Ft. in phase above altitude

P/N 04060002-2
ARINC-565 FINE / COARSE Synchro Altitude (2VA)
16mVDC per Ft. to 10,000 Ft. Positive above altitude
10mVDC per Ft. to 29,500 Ft.
4.5mVDC per Ft. above 29,500 Ft.

P/N 04060002-3
ARINC-565 FINE / COARSE Synchro Altitude (2VA)
20mVAC per Ft. In phase below altitude, 30 Deg phase lead

P/N 04060002-4
ARINC-565 FINE / COARSE Synchro Altitude (2VA)
10mVAC per Ft. In phase below altitude J1-4 = Open.
10mVAC per Ft. In phase above altitude J1-4 = GND.

P/N 04060002-5
ARINC-565 FINE / COARSE Synchro Altitude (2VA)
16mVDC per Ft. CAS, label 206.

P/N 04060002-6
0.250VAC per 1000Ft. Vertical Speed, label 212.
In phase increasing V/S J1-4 = Open
In phase decreasing V/S J1-4 = GND

P/N 04060002-7
FINE / COARSE Altitude
Fine = SIN/COS / 360 deg.= 5000 Ft. +/- .1 Degree
Coarse = .2mv/ft./ -1000-55,000 Ft. / 0 ft = 2.5V
10mVDC per Ft. Positive below altitude.

(vi.) SPECIFICATIONS

OUTPUTS (cont.)

P/N 04060002-8

FINE / COARSE Synchro Altitude (2VA)
Fine = 360 DEG / 5000 Ft. +/- .1 Degree
Coarse = 360 Deg / 100,000 Ft. +/- .1 Degree
10mVAC per Ft. In phase below altitude J1-4 = Open.
10mVAC per Ft. In phase above altitude J1-4 = GND.

P/N 04060002-9

ARINC-565 FINE / COARSE Synchro Altitude (2VA)
21.24mVAC per Ft. In phase below altitude J1-4 = Open.
21.24mVAC per Ft. In phase above altitude J1-4 = GND.

P/N 04060002-10

Vertical Speed and Alt. Hold Only (No Altitude Output)
.250VDC per 1000 ft. Vertical Speed, Label 212
15.7mVDC per Ft. Positive below altitude.

P/N 04060002-11

ARINC-565 FINE / COARSE Synchro Altitude (2VA)
15.7mVDC per Ft. Positive above altitude J1-4 = Open.
15.7mVDC per Ft. Positive below altitude J1-4 = GND.

P/N 04060002-12, (Thommen AD32)

4mVDC per Ft. Positive above altitude
Label 204 - Label 350, selected error only.

P/N 04060002-13

ARINC-565 FINE / COARSE Synchro Altitude (2VA)
32.88mVDC per Ft. Positive above altitude J1-4 = Open.
32.88mVDC per Ft. Positive below altitude J1-4 = GND.

P/N 04060002-14

15 bit DC Altitude ratio only.

P/N 04060002-15

ARINC-565 FINE / COARSE Synchro Altitude (2VA)
6.406mVAC per 0.001 InHg. In phase below altitude J1-4 = Open.
6.406mVAC per 0.001 InHg. In phase above altitude J1-4 = GND.

P/N 04060002-16

ARINC-565 FINE / COARSE Synchro Altitude (2VA)
25mVDC per Ft. Positive above altitude J1-4 = Open.
25mVDC per Ft. Positive below altitude J1-4 = GND.

P/N 04060002-17

15 bit DC Altitude ratio
25mVDC per Ft. Positive above altitude J1-4 = Open.
25mVDC per Ft. Positive below altitude J1-4 = GND.

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 (vi.) SPECIFICATIONS

OUTPUTS (cont.)

P/N 04060002-18
 Baro-Pot ratio per IDC Altimeter. See table.

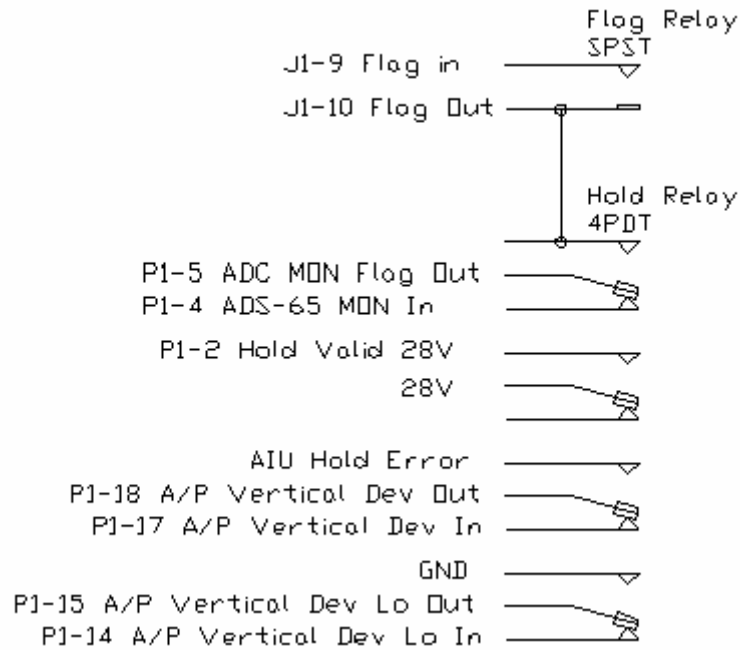
-18 Baro Pot Output		
Baro Setting inHg	Voltage Ratio	Tolerance +/-
28.10	0.12685	0.0075
28.50	0.23385	0.0075
29.00	0.36759	0.0075
29.50	0.50134	0.0075
29.92	0.61368	0.0075
30.50	0.76883	0.0075
30.90	0.87582	0.0075
31.00	0.90257	0.0075

P/N 04060002-19
 ARINC-565 FINE / COARSE Synchro Altitude (2VA)
 18.48mVAC per Ft. Positive above altitude J1-4 = Open.
 18.48mVAC per Ft. Positive below altitude J1-4 = GND.

(vi.) SPECIFICATIONS

OUTPUTS

Flags



Shown

Flag relay NO Invalid
 Hold relay normal deactivated position
 P/N 04060002-5 outputs CAS at P1-18, P1-15 the Hold relay is bypassed.
 P/N 04060002-14 outputs DC ALT. at P1-18, P1-15 the Hold relay is bypassed.

ILLUSTRATION (vi-1)

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(vii.) EQUIPMENT SYSTEMS MAJOR COMPONENT

Equipment Supplied:
 1ea Model ADC-602, Part Number 04060002

Equipment Required But Not Supplied:
 Connector: Standard DB25S, DB25P with Retention Screws. 4ea. #6 Mounting Screws
 Wiring Harness Interconnect cable
 Altitude Pre-Selector / IDC P/N 540-25100-001 or equivalent
 Digital Air Data Computer ARINC-429

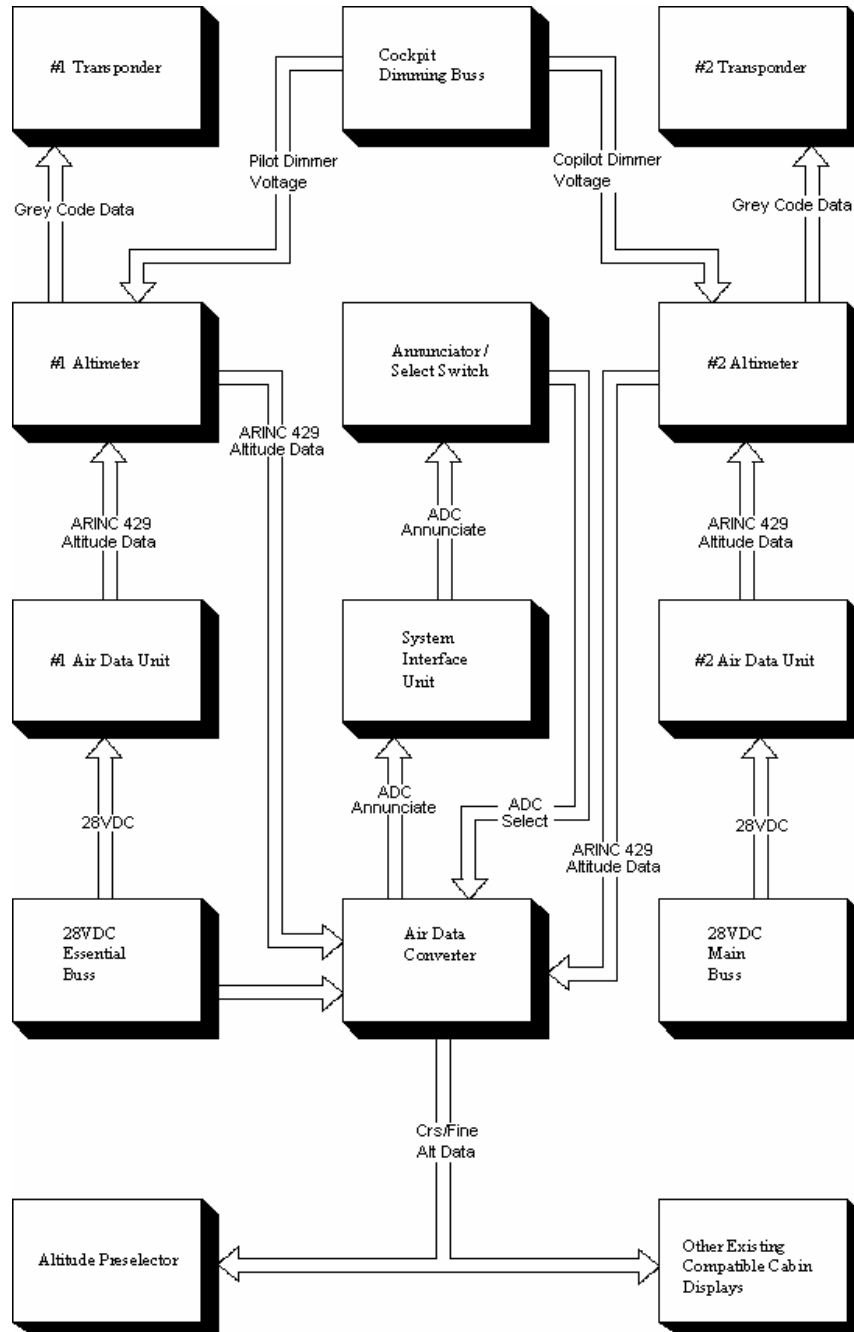


ILLUSTRATION (vii-2)
 INTERCONNECT BLOCK DIAGRAM

SKYLIGHT AVIONICS
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iii. ENVIRONMENTAL QUALIFICATION FORM

NOMENCLATURE: DIGITAL TO SYNCHRO ADAPTER
 TYPE / MODEL / PART NO: ADC-602, P/N04060002
 MANUFACTURE'S SPECIFICATION;
 MANUFACTURE: SKYLIGHT AVIONICS
 ADDRESS: 38629 6th STREET EAST
 PALMDALE, CA. 93550-3717

RTCA/DO-160D Completed; 02/28/05

Conditions	Section	Description of Conducted Tests
Temperature and Altitude	4.0	Equipment tested to Category A1/D2 Auxiliary air cooling not required.
Temperature Variation	5.0	Equipment tested to Category B
Humidity	6.0	Equipment tested to Category A
Operational Shock and Crash Safety	7.0	Equipment tested to Category B
Vibration	8.0	Equipment tested to Category S, Zone 2, Curves B & M
Explosion	9.0	Category X no test required
Waterproofness	10.0	Category X no test required
Fluids Susceptibility	11.0	Category X no test required
Sand and Dust	12.0	Category X no test required
Fungus	13.0	Category X no test required
Salt Spray	14.0	Category X no test required
Magnetic Effect	15.0	Equipment tested to Category Z
Power Input	16.0	Equipment tested to Category Z
Voltage Spike	17.0	Equipment tested to Category A
Audio Frequency Susceptibility	18.0	Equipment tested to Category Z
Induced Signal Susceptibility	19.0	Equipment tested to Category Z
Radio Frequency Susceptibility	20.0	Equipment tested to Category RR
Radio Frequency Emission	21.0	Equipment tested to Category M
Lightning Induced Transient Susceptibility	22.0	Equipment tested to Category XXG33
Lightning Direct Effects	23.0	Category X no test required
Icing	24.0	Category X no test required
Electrostatic Discharge	25.0	Equipment tested to Category A