



REVUE THOMMEN AG
CH-4437 Waldenburg

AC32 DIGITAL AIR DATA COMPUTER INSTALLATION MANUAL

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04-Jan-2011

Document No. AC-INST-500

Revision 2.1

TITLE: **AC32 DIGITAL AIR DATA COMPUTER
INSTALLATION MANUAL**

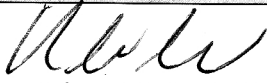


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REVISION: **2.1**

PROJECT: **Solid State Flight Instrument Family**

MANUFACTURER: **REVUE THOMMEN AG
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AC32 DIGITAL AIR DATA COMPUTER INSTALLATION MANUAL

REVISION HISTORY

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1.0	INITIAL RELEASE	30th Aug, 2004	AG	RW
1.1	Appendix VI - Equipment Dimensions : Compact Case added. Appendix VII - Identification Plates added. Note 1 added in Section I –1-A In Section III-1-C Lightning Induced Transient Susceptibility- RTCA/DO-160D Section 22.0 Cat. [A3E3] changed to RTCA/DO-160D Section 22.0 Cat. [A3J33]	18th Jan, 2005	AG	RW
1.2	Appendix - Software Version SW 2.10 features added	23rd Nov, 2005	AG	RW
1.3	NOTE 2 added in Sec IV-1-E2	9th Dec, 2005	AG	RW
1.4	Appendix - Software Version SW 2.11 features added Section III-1-C Environmental Qualification updated	23rd May, 2006	AG	RW
1.5	Appendix X - Software Version SW 2.31 feature added Appendix XI – Outputs added Mating Electrical Connector MS Number introduced on page 40 Total Air Temperature (TAT) Calibration Table: Resistance Pt 100 added in Appendix V	17th Jan, 2008	AF	RW
1.6	Appendix VII – Env. Cat. in Identification Plate added Appendix XII – SW Version 2.40 feature added Appendix XIII – SW Version 2.50/2.51 features added Document Formats changed	12th Mar, 2008	RW	MB
1.7	Appendix XIII – SW Version 2.51 label 242 resolution corrected	23-May-2008	RW	MB
1.8	Appendix XIV – SW Version 2.60 features added	20-April-2009	AF	RW
1.9	formal changes throughout the document TAT probe interface updated Discrete I/O functions updated Appendix I Failure Codes, Failure	14-Oct-2009	AF	RW



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REVISION	DESCRIPTION	ISSUE DATE	INITIAL	CHECKED
	class and BIT Matrix added Appendix III Airspeed calibration table extended Appendix IV Mach no. calibration table extended Appendix V TAT/OAT calibration table updated Appendix XI 'IAS damping' and 'Calculation of impact pressure qci' added Appendix XV – SW Version 2.70 features added			
2.0	Change of logical state of Bit 13 label 270 for selected SW versions	27-May-2010	MB	RW
2.1	G.2: ARINC 429 transmit channel bus load specified. Appendix XVI – HW version 2.21 / MOD 01A change for improved ARINC 429 bus load.	04-Jan-2011	RW	AF

CAUTION:

Before attempting any installation activities on the equipment covered in this manual, verify that you have complete and up-to-date publications by referring to the applicable manual revisions and service bulletin indices.



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SERVICE BULLETIN INDICES

SB No.	SERVICE BULLETIN SUBJECT	EDITION / REVISION NUMBER	Date
AD32/AC32/01	Hardware and Software Modification	Initial Release	30th August, 2004
AC32/04	Hardware Modification	Initial Release	02-Dec-2010



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List of Abbreviations and Acronyms

Abbreviation	Description
A/C	Aircraft
Abs	Absolute
ADC	Air Data Computer
ARINC	Aeronautical Radio Inc.
ASCII	American Standard Code for Information Interchange
BIT	Built In Test
DC	Direct Current
Diff	Differential
EMI	Electro Magnetic Interference
FAA	Federal Aviation Administration (USA)
FAR	Federal Aviation Regulation
FI	Flight Instruments
FIG	Figure
HW	Hardware
ICAO	International Civil Aviation Organization
IF	Interface
N.A.	Not applicable
NC	Not Connected
REV	Revision
RTCA	Radio Technical Commission for Aeronautics
RTW	REVUE THOMMEN AG, Waldenburg
RVSM	Reduced Vertical Separation Minima
SSEC	Static Source Error Correction
SW	Software
TBD	To Be Defined
TSO	Technical Standard Order
HIRF	High Intensity Radiated Field



SECTION I

Introduction

A. Purpose of the manual

This manual provides the specifications, installation instructions and system maintenance in details for the REVUE THOMMEN AC32 Digital Air Data Computer equipment. This manual also defines interface design requirements including mechanical and electrical characteristics for REVUE THOMMEN AC32. The Interface Control Document (ICD) information is also covered in detail in this manual.

The description and procedures are covered in different topics as shown in the Table of Contents, and the troubleshooting procedures are given under sections to identify the fault and failure conditions of the equipment with the interface systems.

The contents of this manual have been verified by actual performance of the equipment prior to distribution of printed copies.

The procedures in this manual are to be performed by qualified personnel familiar with REVUE THOMMEN AC32 Digital Air Data Computer Equipment.

Note 1 : This manual replaces the AC32 Interface Control Document (Doc no. AD-ICD-530).

B. Equipment Specification

B.1 Applicable Documents

The following column shows the list of relevant applicable documents which forms the basis of approvals of the AC32 Digital Air Data Computer.

STANDARDS

TSO-C106	Air Data Computer
SAE AS8002	Air Data Computer Minimum Performance Standards
ARINC 706-4	Mark 5 Subsonic Air Data System
ARINC 607-3	Design Guidance for Avionic Equipment
ARINC 429	Mark 33 Digital Information Transfer System (DITS)
TSO-C88a	Automatic Pressure Altitude Reporting Code Generating Equipment
SAE AS8003	Minimum Performance Standard for Automatic Pressure Altitude Reporting Code Generating Equipment

MILITARY

MS33649	Bosses, Fluid Connection - Internal Straight Thread
MIL-C-14806	Coating, reflection reducing, for instrument cover glasses and lighting wedges



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SPECIFICATIONS

AC-SPE-500 AC32 Specification Digital Air Data Computer
ADAC-SWR-420 ADAC Software Requirements

Limitations Limited to manufacturer specifications of the digital input bus and to the applicable configuration and Mod status.

COMMERCIAL

RTCA/DO-160D Environmental Conditions and Test Procedures for Airborne Equipment with Change, 1 Change 2 and Change 3

ED-12B Software Considerations in Airborne Systems and Equipment Certification
RTCA/DO-178B

ED-14D Environmental Conditions and Test Procedures for Airborne Equipment
RTCA/DO-160D

ED-80 ED-80 / RTCA/DO-254 Design Assurance Guidance for Airborne Electronic
RTCA/DO-254 Hardware

OTHER PUBLICATIONS

- None



B.2 Identification

B.2.1 Type Identification

Type : AC32.10.21.11.AE (For Sample)

AC32	Digital Air Data Computer
. 1	- 1000...53000 ft / 0/20...200 Knots
.-0	Standard Function
.2	Power Supply 28 VDC (< 7 W)
.-1	ARINC 429 serial data bus (High speed mode)
.1	With TAT probe input 500 Ohm acc. to ARINC 706-4
.-1	With ICAO encoding output
.AE	See spec. code as below mentioned

Table 1: Type Identification

AE spec. Code:

- Acc. to TSO-C106, TSO-C88a
- Pneumatic Ports
 - "S" 1 / 2" - 20UNJF-3B (MS 33649-5)
 - "P" 7 / 16" - 20UNJF-3B (MS 33649-5)
- Electrical connector 55- Pin
MS 3112E-22-55P (MIL-C-26482 Series 1)
- Warning flag valid signal 28 VDC
- RS-232 Maintenance Interface
- Case alodine yellow

Mod Number: MOD00A (For sample)

Configuration Number: ID 0201 (For sample)



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B.2.2 Identification Plate

The Identification/Name plate is attached in the equipment case of AC32 Digital Air Data Computer externally. The sample of Identification/Name plate of AC32 Digital Air Data Computer equipment is shown below:

Identification Plate: AC32.10.21.11.AE, MOD00A, Config. ID 0201

REVUE THOMMEN AG CH-4437 WALDENBURG																							
DIGITAL AIR DATA COMPUTER WITH ENCODER																							
CERTIFIED TSO-C106 / TSO-C88a RTCA/ DO 178B Level A / DO-160D																							
PART/TYPE NO AC32.10.21.11.AE CONFIGURATION ID 0201																							
SER NO	0000000	MOD	<table border="1"> <tr> <td><input checked="" type="checkbox"/></td> <td>01</td> <td>02</td> <td>03</td> <td>04</td> <td>05</td> <td>06</td> <td>07</td> <td>08</td> <td>09</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>B</td> <td>C</td> <td>D</td> <td>E</td> <td>F</td> <td>G</td> <td>H</td> <td>I</td> <td>J</td> </tr> </table>	<input checked="" type="checkbox"/>	01	02	03	04	05	06	07	08	09	<input checked="" type="checkbox"/>	B	C	D	E	F	G	H	I	J
<input checked="" type="checkbox"/>	01	02	03	04	05	06	07	08	09														
<input checked="" type="checkbox"/>	B	C	D	E	F	G	H	I	J														
RANGES	-1,000 ... 53,000 FEET 0 / 40 ... 450 KNOTS 0.200 ... 0.999 MACH		MFR DATE month / year																				
SWISS MADE		PHONE + 41 61 965 22 22	FAX + 41 61 961 81 71																				

B.3 Installation Kit

Part Number	Quantity	Description
AC32.XX.XX.XX.XX	1	AC32 Digital Air Data Computer
AC-INST-500	1	AC32 Installation Manual
AC-DDP-XXX	1	Declaration of Design and Performance Document

Table 2: Installation Kit

NOTE: As ordered by the Installer.



C. Technical Specification

Characteristics	Specifications
Primary Power	28 VDC
During startup	max. 7 W
Normal operation	max. 5 W
max. current draw	0.7 A
Emergency Power	28 VDC
Weight *	1 kg (2.2 lbs)
Physical Dimension	
Height	109 mm (4.29 in)
Width	110 mm (4.3 in)
Length	194.5 mm (7.657 in)
Maintenance Requirements	On Condition

*Weight, excluding connectors, pneumatic adaptors and fixing screws

Table 3: Technical Specification



D. Equipment Dimensions

Equipment Dimensions :

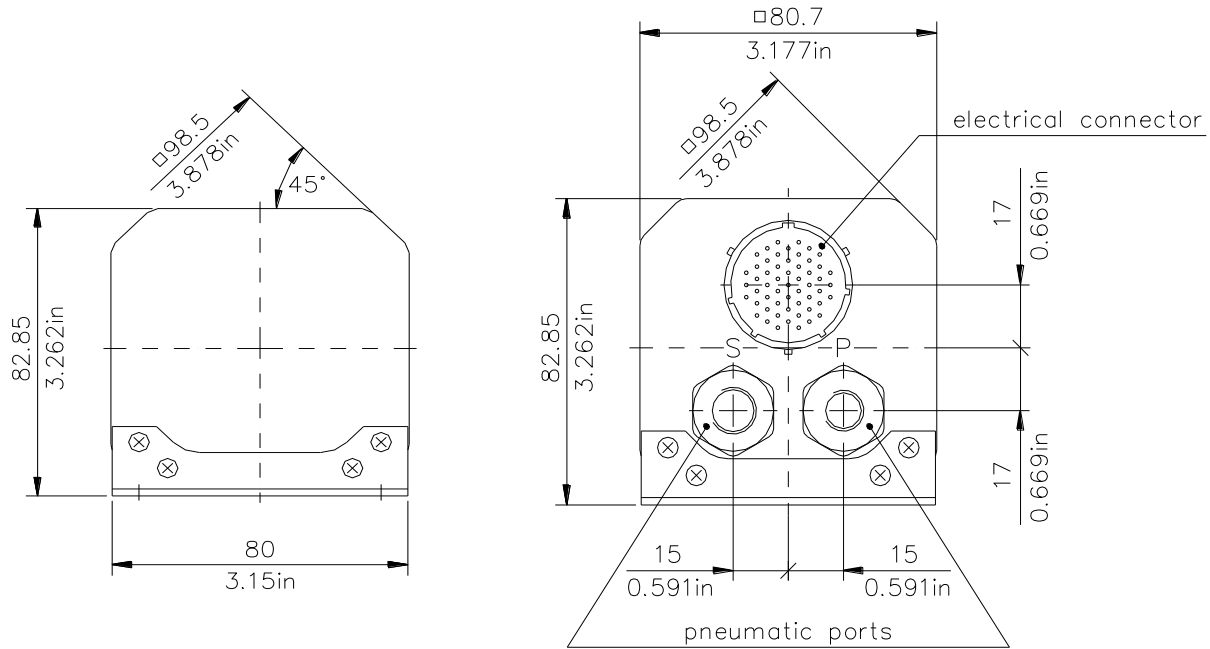


Figure 1: Equipment Front and Rear View

NOTE: The dimensions are in millimeters or inches

NOTE: Not to scale

Pneumatic Pressure Ports

	Mechanical	Pressure range	Over pressure capability
Static Port "S" (standard)	1/2"-20UNJF-3B (MS33649-5)	25 ... 1100 mbar abs	1500 mbar abs
Static Port "S" (optional)	9/16"-18UNJF-3B (MS33649-6)	25 ... 1100 mbar abs	1500 mbar abs
Pitot Port "P"	7/16"-20UNJF-3B (MS33649-4)	100 ... 1500 mbar abs	3000 mbar abs



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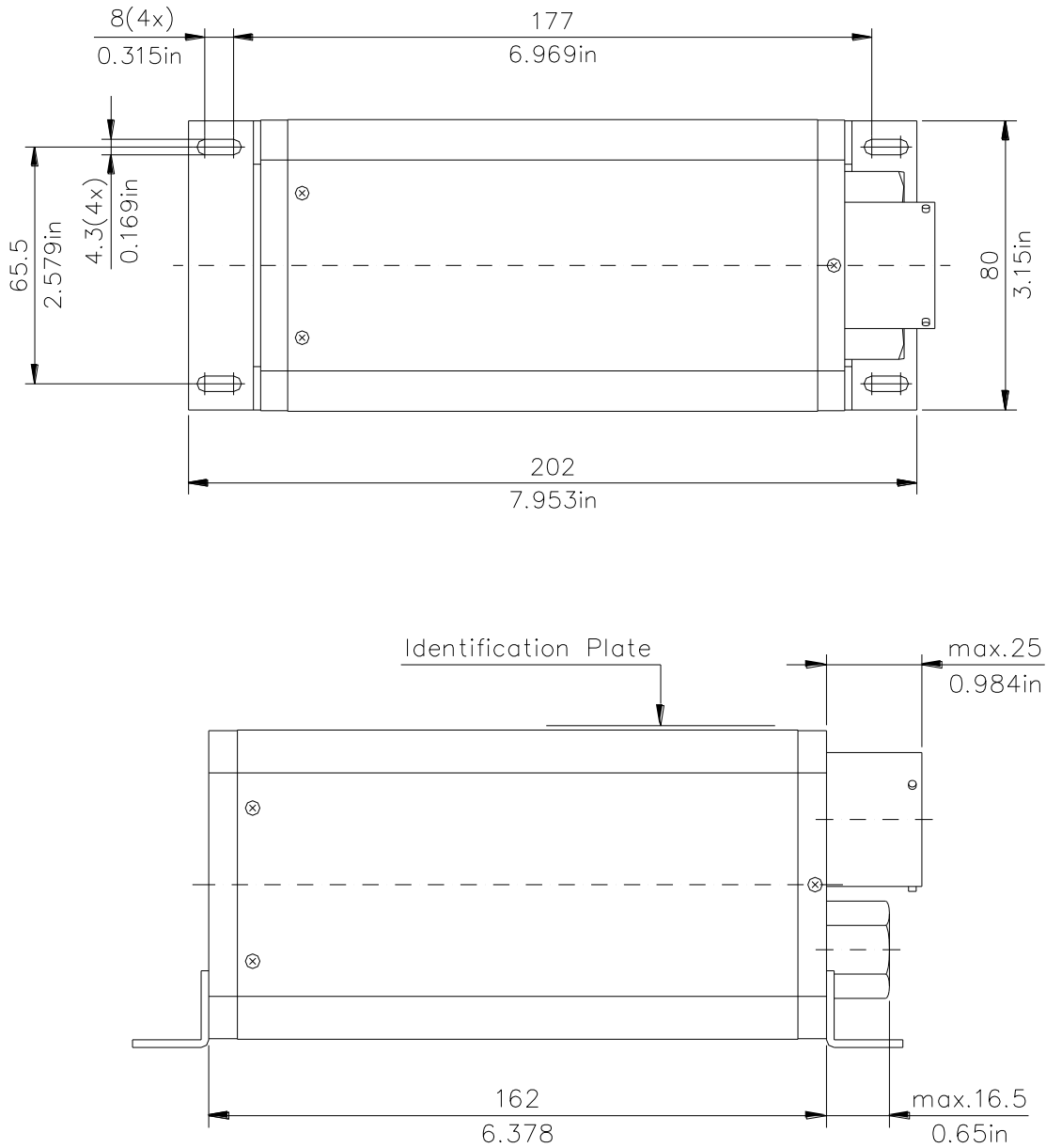


Figure 2: Equipment Side and Top View



E. Interface Block diagram

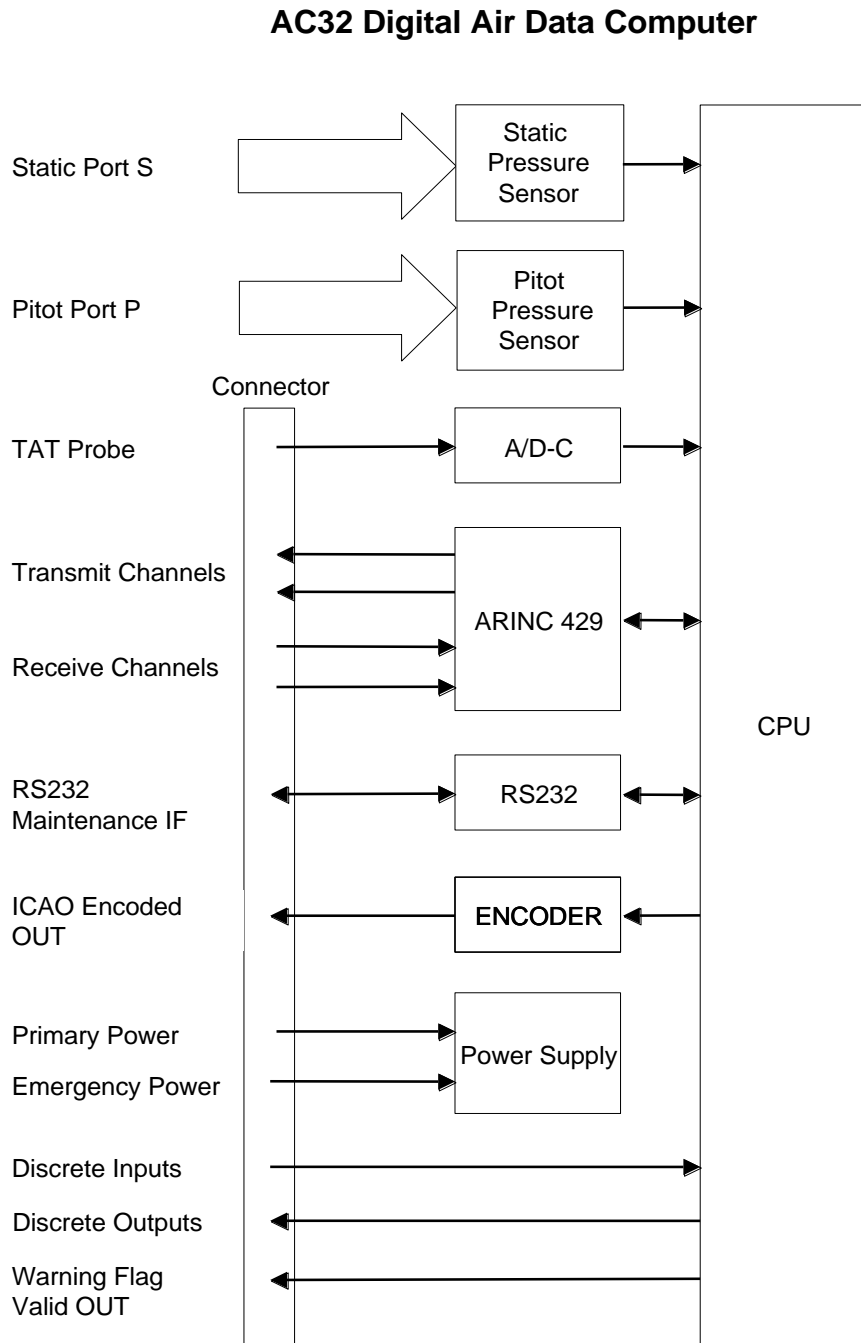


Figure 3: AC32 Block Diagram



SECTION II

General Information

This Section provides the description required to understand the functionality of AC32 Digital Air Data Computer equipment. Refer to the following paragraph for the brief description of the instrument.

Description

A. Equipment Description

The AC32 Digital Air Data Computer belongs to the Solid State Flight equipment Family of REVUE THOMMEN AG. The implementation of the AC32 Digital Air Data Computer measures barometric altitude, airspeed and temperature in the atmosphere. It has integrated solid-state pressure sensors for static and pitot pressure. The AC32 is RVSM compliant and provides up to 2 x 16 SSEC curves.

This specification covers a Digital Air Data Computer with

- Primary Altitude computation
- Airspeed and MACH computation
- ARINC429 Interface
- Encoded altitude output (optional)
- TAT probe input (optional)

The computed air data parameters are transmitted by the ARINC 429 serial data bus interface. Two transmit channels and two receive channels are available, with which also the baro correction is carried out. An ICAO encoded altitude output is also available as an option.

The AC32 is designed modular and hence very easy to maintain by RS-232 maintenance interface serial data. Its power supply is available for 28 VDC. The low power consumption of less than 7 Watts and its low weight of only 1000 grams (2.2 lbs) have been optimized for applications in state-of-the-art avionics.

The THOMMEN AC32 Digital Air Data Computer can be configured for different applications as per the interface requirements. Therefore its application range reaches from Business Aviation up to Regional Aircraft, Transporters and Helicopters.

The THOMMEN AC32 Digital Air Data Computer meets or exceeds the requirements of the FAA technical standard order TSO-C106 and TSO-C88a accuracy requirements.

The AC32 Digital Air Data Computer communicates with flight Displays that show the data of the AC32 Digital Air Data Computer and allows the Baro correction. The communication uses the ARINC 429 serial data bus.

This AC32 Digital ADC does not support the analog interfaces.



Operations

Caution:

The AC32 Digital Air Data Computer equipment has been designed to exhibit a very high degree of functional integrity. However it is possible that erroneous operation could occur without fault. It is the responsibility of the operator to detect such an occurrence by means of cross check with redundant or correlated information available in the cockpit.

A. Theory of Operations

This part of the manual is to familiarize the reader with the AC32 Digital Air Data Computer equipment and to give a brief theory of operation.

A.1 Power Supply

The AC32 Digital Air Data Computer is designed to be supplied by a 28 VDC power supply in accordance with RTCA/DO-160D Section 16.0 Category Z. The equipment does not require more than 7 W for normal operation.

An optional secondary 28 VDC emergency power supply input, drawn from emergency bus should be provided to continue operation, in case of primary power supply failure.

NOTE: In case of power fail or switching off the equipment's power supply the AC32 sets the warning flag valid output signal to LO (WFVOUTS).

A.2 Micro Controller

The Micro Controller is a flash type micro controller built around CPU (Central Processing Unit) board of the instrument. The CPU has an internal 32-bit architecture which is provided with sixteen 16-bit general registers and a concise, optimised instruction is designed for high-speed operation. The CPU can also address a 16-Mbyte linear address space.

The operating voltage and the port power voltage of the Micro controller is +3.3 VDC. A crystal oscillator of 4 MHz is connected to the micro controller and an internal clock generator produces the system clock of 16 MHz.

The data and address bus from the Micro controller is also used for the two functions used outside the CPU. This is for the communication with both the ARINC 429 and to the latches for the ICAO encoded output of the instrument.



A.3 ARINC 429 Interface

The ARINC 429 module in AC32 Digital Air Data Computer supports the ARINC-I/O interface and the bus interface to the CPU.

The ARINC 429 offers the following main features:

- Two transmitter and two receiver ports
- ARINC Low-Rate & High-Rate support with appropriate slew-rate control
- Multiple local loop-back facilities for improved BIT
- Lightning Induced Transients Suppression compliant with RTCA/DO-160D
- Hardening against aircraft wiring errors on ARINC inputs

Digital Data Standards are acc. to ARINC 429 Mark 33 DITS and ARINC 706-4 Mark 5 SADS / equipment ID 006

The following table shows the ARINC labels for various signals used for AC32 Digital Air Data Computer:

Label	Signal Name	Operational Range ¹⁾	Unit	Resolution	Update Rate per s
203	Pressure altitude (1013.25 mbar)	-1000 ..+53,000	feet	1	16
204	Baro corrected altitude #1	-1000 ..+53,000	feet	1	16
220	Baro corrected altitude #2	-1000 ..+53,000	feet	1	16
205	Mach number	0.200 .. 0.999	MACH	0.0000625 knot	8
206	Computed airspeed	0 / 40 .. 450	knots	0.0625	8
207	Maximum Allowable Airspeed	150 .. 450	knots	0.25	8
210	True airspeed	0 / 100 .. 599	knots	0.0625	8
211	Total air temperature	-60 .. +99	°C	0.25	2
212	Altitude Rate	0 .. 20,000	ft/min.	16	16
213	Static air temperature	-99 .. +60	°C	0.25	2
215	Impact Pressure	0 .. 372.5	mbar	0.03125	8
217	Static Pressure	0 .. 64	inHg	0.001	8
234	Baro Correction mb #1	700 .. 1050	mbar	0.1	8
235	Baro Correction inHg #1	20.67 .. 31.00	inHg	0.001	8
236	Baro Correction mb #2	700 .. 1050	mbar	0.1	8
237	Baro Correction inHg #2	20.67 .. 31.00	inHg	0.001	8
242	Total Pressure	25 .. 2048	mbar	0.03125	8
270	Discrete Word #1	--	--	--	2



Label	Signal Name	Operational Range ¹⁾	Unit	Resolution	Update Rate per s
271	Discrete Word #2	--	--	--	2
350	Maintenance Word #1	--	--	--	2
351	Maintenance Word #2	--	--	--	2
353	Indicated airspeed	0 / 40 .. 450	knots	0.0625	8
377	Equipment Identifier	006	--	--	16

Table 4: ARINC429 Labels

A.4 RS-232 Serial Interface

The AC32 Digital Air Data Computer has a RS-232 interface for maintenance and calibration purposes only. This interface is not accessible for normal operation in the aircraft.

The RS-232 Interface is provided for calibration and maintenance causes has the following transmission parameters:

Baud Rate..... 9600 kBit/s
 Start Bits..... 1
 Data Bits..... 8
 Stop Bits..... 1
 Parity..... None

A.5 Configuration Identification

The configuration identification defines a specific equipment configuration parameterized by the individual parameter lists for each AC32 equipment, which in turn explains the different parameter requested by the installer. So for every new AC32 equipment different Configuration ID number is designated.

CONFIGURATION ID 5001 (SAMPLE)

NOTE: Refer to Technical Checklist for Configuration ID (Identification) designation.



A.6 Operating Range, Limiting Values and Tolerances

Airdata	Operating ranges Note 1)	BIT Limits MIN/MAX Note 2)	Tolerance
ALTITUDE related Values			
ALT _P Pressure Altitude	-1,000 ft ... + 53,000 ft -305 m ... + 16,154 m	-1,060 ft ... + 53,590 ft -323 m ... + 16,332 m	refer to Appendix II
ALT _C Baro corrected Altitude	-1,000 ft ... + 53,000 ft -305 m ... + 16,154 m	-1,060 ft ... + 53,590 ft -323 m ... + 16,332 m	refer to Appendix II
ALT Rate Altitude rate	- 50,000 ... + 50,000 ft/min	- 60,000 ... + 60,000 ft/min	< 600 ft/min: ± 30 ft/min > 600 ft/min: ± 5% rdg
Static Pressure	25 ... 1100 mbar abs	20 ... 1150 mbar abs	
AIRSPEED related Values			
IAS Indicated Airspeed	0 / 20 ... 750 knots	0 ... 765 knots	refer to Appendix III
CAS Calibrated Airspeed (SSE corrected)	0 / 20 ... 750 knots	0 ... 765 knots	refer to Appendix III
TAS True Airspeed (SSE corrected)	0 / 100 ... 1000 knots	0 ... 1015 knots	± 4 knots
VMO Maximum Allowable Airspeed	150 ... 750 knots	150 ... 750 knots	--
Mach _i indicated Mach number	0 / 0.200 ... 1.200	0 ... 1.250	refer to Appendix IV
Impact Pressure	0 ... 512 mbar	0 ... 512 mbar	
Total Pressure	25 ... 2048 mbar abs	25 ... 2048 mbar abs	
TEMPERATURE related Values			
T _{ti} indicated Air Temperature	--	214 ... 374 K	
TAT Total Air Temperature	- 60 ... + 99 °C	- 61 ... + 100 °C	± 0.5 °C
SAT (OAT) Static Air Temperature	- 99 ... + 60 °C	- 100 ... + 61 °C	± 1 °C

Table 5: Operating ranges, limiting values and tolerances



1) Operating range:

- Nominal operating range where equipment shall be within specs

2) BIT limits

- Transmitted values shall be within the parametrical BIT limits (tolerances for extreme environmental conditions have been considered)
- Values out of limits shall be handled according to the BIT-Matrix

B. Operating Modes

The following operating modes shall be provided:

Mode	AC32 Digital Air Data Computer
Normal Operating Mode	Transmits/receives data via ARINC 429 labels
Maintenance Mode (RS-232)	Allows initializing, calibrating, configuring and testing the equipment via the RS-232 interface.
Power Handling Modes	<ul style="list-style-type: none">- Power on / initialisation- Power interrupt handling- Power return procedure (after Power Interrupt)- Power off return procedure
Failure Modes	<ul style="list-style-type: none">- Critical Failures, which require an immediate shutdown in any case,- Non Critical Failures, which degrade the operation of the equipment but allow a safe operation of the equipment functionality. At failure detection during startup BIT a shutdown shall be made.- Tolerable Failures, which do not require a shutdown in any case.



Testing

A. Built-in-Test

A.1 BIT Overview

BIT	When?	Action	Duration
Startup BIT	Primary power switched on after power off condition (reset released)	- test internal circuits	< 10 s totally
Initiated BIT	TEST/RESET activated	- same as Startup BIT	- same as Startup BIT
Continuous BIT	Background operation, once within 10 s	- test internal circuits	--

A.2 Start Up BIT

The flight equipment shall provide for a start-up BIT which will be activated upon application of primary or emergency power to the equipment. Faults detected shall be indicated as defined in Table 6 Fault Code Handling

A.3 Continuous BIT

The flight equipment can provide for a continuous BIT which shall run in the background during normal equipment operation. Any critical errors found during continuous BIT shall cause the equipment to stop. Non critical errors found during continuous BIT shall not stop operation. Fault codes are stored in memory for later retrieval during initiated BIT.



B. Failure Modes

B.1 Fault Code Handling

The operation mode of the instrument in case of fault indication shall be according to the following definition:

Failure class	BIT	Action	Warning Flag Valid Output Signal
critical	Startup Initiated Continuous	<ul style="list-style-type: none">- Warning Flag Valid Output Signal is set to LO- ARINC 429 communication marks all labels as "failure warning"- Failure Code is stored- instrument is set to idle mode	Fault indication: low signal
non critical / tolerable	Startup Initiated Continuous	<ul style="list-style-type: none">- Warning Flag Valid Output Signal is set to LO- ARINC 429 communication continues operation, invalid labels are marked as "failure warning"- Failure Code is stored	Fault indication: low signal, as long as the Fault exists

Table 6: Fault code handling

Note: If a non critical BIT allows to continue operation but invalid values would lead to wrong calculations (e.g. division by zero) the calculations can not be made and ARINC 429 labels can be marked as "FW" Failure Warning (SSM)



B.2 Primary Power Fail Indication (optional)

Primary Power Fail indicates loss of primary power 28 VDC only if emergency power is available. Primary Power Fail is detected by the Voltage Comparator Input (refer to the external electrical connector section IV E.1.1) and must be connected to the primary power line in the external connector.

Switching Thresholds ($\pm 5\%$)	Indication
< 25 % of specified Primary Power voltage	FAIL
> 60 % of specified Primary Power voltage	normal

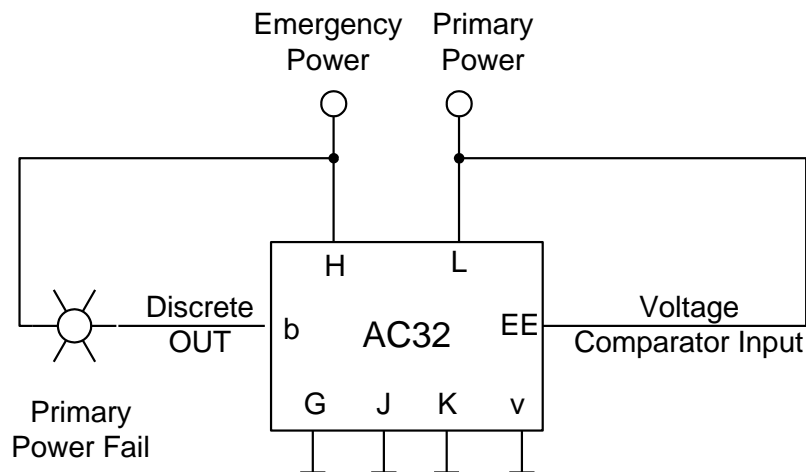


Figure 4: Primary Power Fail

NOTE: For the individual type execution of Air Data Computer, refer Appendix II Air Data Computer Execution.



SECTION III

Approvals

A. General

The approval of the AC32 Digital Air Data Computer equipment is being accomplished under certified TSO-C106 / TSO-C88a.

NOTE: The TSO identifies the minimum performance standards, tests and other conditions applicable for issuance of design and production approval of the equipment and does not specifically identify acceptable conditions for installation. It is the responsibility of those desiring to install this equipment either on or with in the specific type or class of aircraft / rotorcraft to determine that the aircraft / rotorcraft installation conditions are with in the TSO standards.

B. Instructions for Continued Airworthiness

Maintenance Requirements – Instructions for Continued Airworthiness under FAR 23.1529, 25.1529, 27.1529 and 29.1529

Modification of an fixed wing or rotor wing aircraft by this installation obligates the aircraft operator to include the maintenance information provided by this document in the operator's Aircraft Maintenance Manual and the operator's Aircraft Scheduled Maintenance Program for the schedule maintenance instructions.

- (1) Maintenance Manual information for the AC32 (description, Installation, testing, etc.) is contained in AC32 Digital Air Data Computer Installation and Operation manual AC-INST-500
- (2) The equipment part number and other necessary part numbers contained in the installation manual should be placed into the aircraft operator's appropriate airplane Illustrated Parts Catalog (IPC).
- (3) Wiring diagram information contained in this manual should be placed into the aircraft operator's appropriate airplane Wiring Diagram Manuals.
- (4) Scheduled Maintenance Program tasks to be added to the aircraft operator's appropriate airplane maintenance program are as follows:
 - a. Recommended Periodic Scheduled Servicing Tasks: On Condition
 - b. Recommended Periodic Scheduled Preventative Maintenance Tests/Checks to determine System Condition and/or Latent Failures: On Condition
 - c. Recommended Periodic Inspections: On Condition
 - d. Recommended Periodic Structural Inspections: On Condition
- (5) Recalibration Interval
 - The flight equipment has the following recalibration intervals: On Condition



NOTE: Unit performs continuous self-testing (BIT) and monitoring; any detected failures are annunciated.

C. Environmental Qualification

The AC32 Digital Air Data Computer shall be operated within the limits specified under the following environmental conditions:

Environmental Criteria	Requirement RTCA/DO-160D	Remarks
Temperature & Altitude Temperature: Continuous operation Ground Survival Temperature Operating Low Temperature Operating High Temperature Short Time Operating High Temperature Altitude Decompression Overpressure static port of the instrument	RTCA/DO-160D Section 4.0 Cat. [D2] from -55 to +70 °C from -55 to +85 °C Section 4.5.1 -55 °C Section 4.5.3 +55 °C Section 4.5.2 +70 °C Section 4.6.1 50,000 ft Section 4.6.2 50,000 ft Section 4.6.3 -15,000 ft	
Temperature Variation	RTCA/DO-160D Section 5.0 Cat. B (5 °C/min.)	
Humidity up to 95 %rH	RTCA/DO-160D Section 6.0 Cat. B	
Shock and Crash Safety: Operational Shock Crash Safety: Impulse Sustained	RTCA/DO-160D Section 7.0 Cat. B 6g, 11 ms Section 7.3 20g, 11 ms	



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Environmental Criteria	Requirement RTCA/DO-160D	Remarks
Vibration	RTCA/DO-160D Section 8.0 Cat. [(TB1)(TR)]/[(SL)(SM)] Cat. [UG]	Curves F & F1 without shock mounts
Explosion	RTCA/DO-160D Section 9.0 Cat. X (Environment II)	no test required
Waterproofness	RTCA/DO-160D Section 10.0 Cat. W	
Fluids Susceptibility	RTCA/DO-160D Section 11.0 Cat. F	Solvent and cleaning Fluids Lubrificating Oils
Sand and Dust: Sand and dust particles as encountered in desert areas	RTCA/DO-160D Section 12.0 Cat. D	
Fungus: Fungus growth as encountered in tropical climates	RTCA/DO-160D Section 13.0 Cat. F	
Salt Spray: Exposure to salt-sea atmosphere	RTCA/DO-160D Section 14.0 Cat. S	
Magnetic Effect	RTCA/DO-160D Section 15.0 Cl. Z < 0.3m	
Power Characteristics DC	RTCA/DO-160D Section 16.0 Cat. Z	
Normal operating conditions (DC)		
Max. voltage	30.3 VDC	
Nominal voltage	28.0 VDC	
Min. voltage	22.0 VDC	
Emergency operation voltage level	18.0 VDC	
Ripple voltage		
Momentary power interruptions	up to 1000 ms	
Normal surge voltage	up to 50 V for 50 ms	
Engine starting undervoltage operation	10.0 to 20.5 VDC	
Abnormal operating conditions (DC)		
Voltage steady state		
Maximum	32.2 VDC	
Minimum	20.5 VDC	
Low voltage conditions	0 to 20.5 VDC	
Momentary undervoltage operation	12.0 VDC up to 7 s	



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Environmental Criteria	Requirement RTCA/DO-160D	Remarks
Abnormal surge voltage	up to 80 V for 100 ms up to 48 V for 1 s	
Voltage Spikes	RTCA/DO-160D Section 17.0 Cat. A	
Audio Frequency Conducted Susceptibility	RTCA/DO-160D Section 18.0 Cat. A, Z	
Induced Signal Susceptibility	RTCA/DO-160D Section 19.0 Cat. Z	
Radio Frequency Susceptibility	RTCA/DO-160D Section 20.0 Cat. [YY]	
Radio Frequency Emission	RTCA/DO-160D Section 21.0 Cat. M	
Lightning Induced Transient Susceptibility	RTCA/DO-160D Section 22.0 Cat. [A3J33]	
Lightning Direct Effects	RTCA/DO-160D Section 23.0 Cat. X	no test required
Icing	RTCA/DO-160D Section 24.0 Cat. A	no test required
Electrostatic Discharge (ESD)	RTCA/DO-160D Section 25.0 Cat. A 15 kV	
Other Tests		
Dust Test	MIL-STD-810E Method 510.3 Procedure I	
HIRF-Test	JAA INT/POL/27&29/1 Severe HIRF Environment with a 6dB attenuation due to installation	
Operational Shock Crash Safety Shock	RTCA/DO-160E Sect.7.2: 20g, 11ms RTCA/DO-160E Sect.7.3: 40g, 11ms	
Vibration Test	MIL-STD-810F, 514.5, Proc. I, Cat. 14, Figure 6-1 & 6.2 (CH47 & UH60 sine-on- random)	
Vibration Test	MI-24 Gunfire Vibration Profile (random)	
Solar Radiation Test	MIL-STD-810E, Method 505.3, Procedure I	

Table 7: Environmental Qualification



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C.1 Electromagnetic Environment (EME)

The AC32 Digital Air Data Computer is designed, analyzed, installed, and tested to perform and fulfill the aircraft electromagnetic environment (EME) requirements without any malfunction or degradation in performance.

C.2 Electromagnetic compatibility (EMC)

The AC32 Digital Air Data Computer proves electromagnetic compatibility (EMC). Which means the flight instrument performs its individually designed functions in a common EME without causing or suffering unacceptable degradation due to electromagnetic interference (EMI) to or from other equipment/systems in the same environment in accordance with the overall requirements.

C.3 Electromagnetic interference (EMI)

The generation of EMI by the flight equipment and the susceptibility of the flight equipment to EMI is controlled to the limits of RTCA/DO-160D and as modified by this specification. These requirements are met in all flight equipment operating modes.



SECTION IV

Installation

A. General

Installation data in this section consists of pre-installation checks, Electrical Interface, system interconnect diagrams and digital interface data to assure satisfactory performance of AC32 Digital Air Data Computer.

NOTE: Refer to Section I part D for Mechanical Installation details.

B. Unpacking and Inspecting

Unpack the equipment carefully and make a visual inspection of the instrument for possible shipping damage. If a claim for damage is to be made, save the original packing carton and materials to substantiate the claim.

C. Pre and Post Installation Check

Before installing the equipment in the aircraft, check for the applicable configuration ID and correct MOD status to ensure that the equipment meets performance specifications. The AC32 Digital Air Data Computer equipment does not require any in- aircraft adjustment. All adjustments procedures are accomplished by the manufacturer.

D. Electrical Interface

D.1 Overview of electrical interface

The following are the electrical interfaces for AC32 Digital Air Data Computer:

- Primary and Emergency Power Supply
- Digital Communication Interfaces (ARINC 429 data bus, ICAO Encoder, RS-232 Maintenance IF)
- Discrete I/O's
- TAT (Total Air Temperature) Probe input

D.2 Power Control (DC Primary)

The AC32 Digital Air Data Computer is designed for 28 VDC power supply in accordance with RTCA/DO-160D Section 16.0 under Category Z or Category B respectively.

An optional secondary 28 VDC emergency power supply input is drawn from the emergency bus is provided in case of primary power supply failure.



D.3 Power Consumption

The following table shows values of power consumed by AC32 equipment with the full operating functionality. The equipment e.g. without ARINC429 module or without sensors have less power consumption.

The power consumption by the AC32 flight equipment at different stages of operation are shown below in the table:

Operation	Power Consumption
During startup	max. 7 W
Normal operation	max. 5 W
max. current	0.7 A

Note: Recommended CB (Circuit Breaker) of 1 Ampere.

D.4 Power Fails indication

In case of power fail or switching off the equipment's power supply the warning flag valid output signal (WFVOUTS) sets signal to "LO".

D.5 Groundings and Shielding

➤ Groundings

All the ground strap chassis grounds aircraft, twisted shielded cables/wires and power cables/wires (See section of wiring diagram for the grounding cables/wires) should be carefully grounded (aircraft ground & shield grounds) such a manner in order to :

- prevent ground loops and common ground returns for signals and power circuits
- provide effective shielding for signal circuits
- minimize EMI (Electromagnetic Interference) during the engine runup, and
- protect personnel from electrical shock hazards.

Note: All externally exposed metal parts, shields, connectors, etc. are grounded to the chassis ground.



➤ Harness shielding

To minimize the effects of HIRF (High Intensity Radiated Fields) and lightning hazards proper shielding and grounding techniques are required for the mating connector of the AC32 Digital Air Data Computer. The GROUND strap should be electrically connected to the mating connector with conductive overbraid shielding and the other end of the it should be connected to aircraft ground.

NOTE: For HIRF protection all the shielded wires should be grounded at both ends

NOTE: The maximum length of the GROUND strap : 30 cm (12 inches)

Cable requirements AC32: Harness shielding

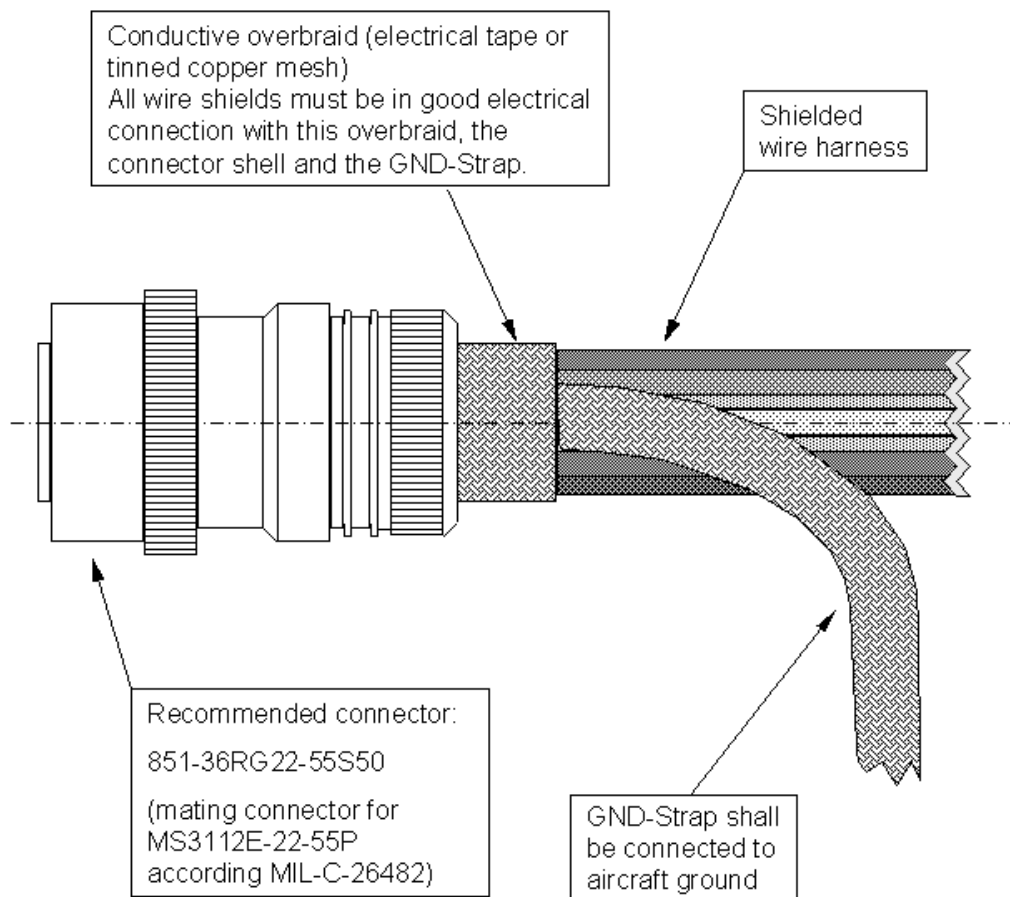


Figure 5: AC32 Harness Shielding



D.6 Power common leads

equipment ground (common) shall be connected to the power common leads (See Section IV- E Electrical Connector)

D.7 Primary Power Fail Indication (Optional)

Primary Power Failure indicates loss of 28 VDC primary power when only if emergency power is available. Primary Power Failure is detected by the Voltage Comparator Input (See section IV- E electrical connector) and which must be connected to the primary power line in the external connector.

Switching Thresholds ($\pm 5\%$)	Indication
< 25 % of 28 VDC Primary Power voltage	FAIL
> 60 % of 28 VDC Primary Power voltage	normal

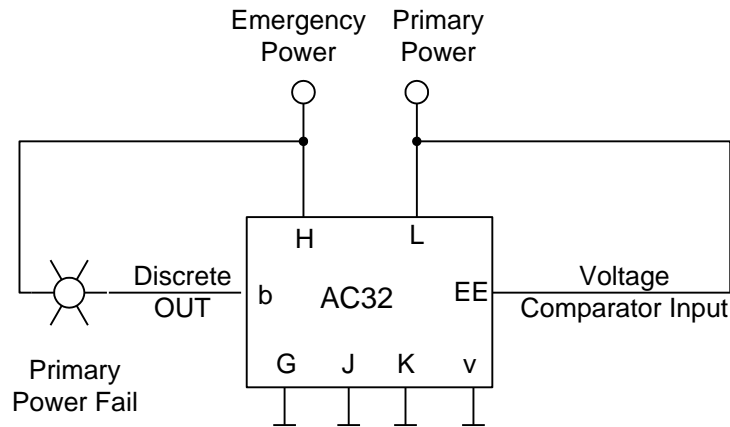


Figure 6: AC32 Primary Power Fail

NOTE: For use and assignment refer to the individual execution of equipment type in the AC32 Technical Checklist.



E. Electrical connector

E.1 Pin Assignments

The electrical connectors for interfacing the AC32 with aircraft wiring are round type connectors.

NOTE: The mating connector should be shielded.

The below shown table shows the pin numbers and its definition/functionality for the mating Electrical Connector (MS Number 3126F-22-55S) :

Pin #	Signal Name	Function	Signal Type	EMC cat.	Remarks
L	Primary Power supply	Primary Power supply	analogue	em./susc.	28VDC
K	Power return	Power return	analogue	em./susc.	5)
H	Emergency Power supply	Secondary Power supply	analogue	em./susc.	optional 28VDC
J	Power return	Power return	analogue	em./susc.	5), optional
U	Spare	--	--	--	4)
T	Spare	--	--	--	4)
R	TAT probe, supply hi	TAT probe, supply high	analogue	susc.	optional, supplied by AC32, ca. 1 mADC 2-/3-/4-wire connection
p	TAT probe, supply lo	TAT probe, supply low	analogue	susc.	
k	TAT probe, sense hi	TAT probe, sense high	analogue	susc.	
m	TAT probe, sense lo	TAT probe, sense low	analogue	susc.	
h	RS-232 TxD	Serial IF Transmit	data	--	1),3) only for maintenance
w	RS-232 RxD	Serial IF Receive	data	--	
W	ARINC429 RxD 1A (RS422 RxD 1A)	Serial Interface Bus Receive Channel 1	data bus	em./susc.	



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Pin #	Signal Name	Function	Signal Type	EMC cat.	Remarks
X	ARINC429 RxD 1B (RS422 RxD 1B)	Serial Interface Bus Receive Channel 1	data bus	em./ susc.	
Y	ARINC429 RxD 2A (RS422 RxD 2A)	Serial Interface Bus Receive Channel 2	data bus	em./ susc.	
D	ARINC429 RxD 2B (RS422 RxD 2B)	Serial Interface Bus Receive Channel 2	data bus	em./ susc.	
B	ARINC429 TxD 1A (RS422 TxD 1A)	Serial Interface Bus Transmit Channel 1	data bus	em./susc.	
C	ARINC429 TxD 1B (RS422 TxD 1B)	Serial Interface Bus Transmit Channel 1	data bus	em./susc.	
q	ARINC429 TxD 2A (RS422 TxD 2A)	Serial Interface Bus Transmit Channel 2	data bus	em./susc.	
r	ARINC429 TxD 2B (RS422 TxD 2B)	Serial Interface Bus Transmit Channel 2	data bus	em./susc.	
y	ICAO Code D4	Output	Logic	em./susc.	shielded
GG	ICAO Code A1	Output			
FF	ICAO Code A2	Output			
BB	ICAO Code A4	Output			
HH	ICAO Code B1	Output			
i	ICAO Code B2	Output			
AA	ICAO Code B4	Output			
z	ICAO Code C1	Output			
j	ICAO Code C2	Output			
P	ICAO Code C4	Output			
d	ICAO Code Strobe	Input	Discrete (5)		2)
Z	Spare	--	--	--	4)
E	Spare	--	--	--	4)
x	Spare	--	--	--	4)
N	Spare	--	--	--	4)
EE	Voltage Comparator Input High	Input	analogue	--	8) optional 5 / 28 VDC
v	Voltage Comparator Input Low	Input	analogue	--	8) optional



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Pin #	Signal Name	Function	Signal Type	EMC cat.	Remarks
F	Discrete In 0 (TEST)	Input	Discrete (0)	--	Standard
u	Discrete In 1	Input	Discrete (1)	--	7) optional
CC	Discrete In 2	Input	Discrete (2)	--	7) optional
s	Discrete In 3	Input	Discrete (3)	--	7) optional
DD	Discrete In 4	Input	Discrete (4)	--	7) optional
A	+ 28 V WFVOUTS Signal	Output	analogue	--	Warning Flag Valid Output Signal HI = valid
b	Discrete Out 1	Output	Discrete (1)	--	7) optional
c	Discrete Out 2	Output	Discrete (2)	--	7) optional
t	Discrete Out 3	Output	Discrete (3)	--	7) optional
V	Spare	--	--	--	4)
S	Spare	--	--	--	4)
n	Spare	--	--	--	4)
a	Spare	--	--	--	4)
M	Spare	--	--	--	4)
g	Spare	--	--	--	4)
f	Spare	--	--	--	4)
G	System Ground	System Ground (Common)	--	--	For RS-232 , discretes, logic
e	Chassis GND	GND	--	--	

em. = emitting, susc. = susceptible

Table 8: Pin Assignments



Remarks

- 1) Short-circuit RS-232 TxD and RxD on aircraft installation (jumper aircraft connector pins)
- 2) To avoid "CODE" flag indication on the display discrete input no. 5 (connector pin no. "d") must be grounded
- 3) Transmit and Receive Signals are seen from the AC32 view
- 4) Reserved for future development
- 5) Power Return for primary and secondary supply are connected internally
- 6) --
- 7) For use and assignment refer to the individual execution of your type in the technical checklist.
- 8) Voltage Comparator Input used for 'Primary Power Fail detection'

NOTE: For use refer to the individual execution of your type in Technical Checklist.

E.2 Wiring Diagram

NOTE 1: For wiring diagram refer to the next page.

NOTE 2: Loop the Primary Power Return pin number "K" to COMMON pin number "G" with 20 AWG on the connector, to avoid the intermittent occurrence of Fault code FC010 on AC32 Digital Air Data Computer.



Cable requirements for RF SUSCEPTIBILITY acc. RTCA DO-160D, Sect. 20, Cat. YY and Severe HIRF-Environment according to INT/POL/27&29/1 with a 6 dB attenuation

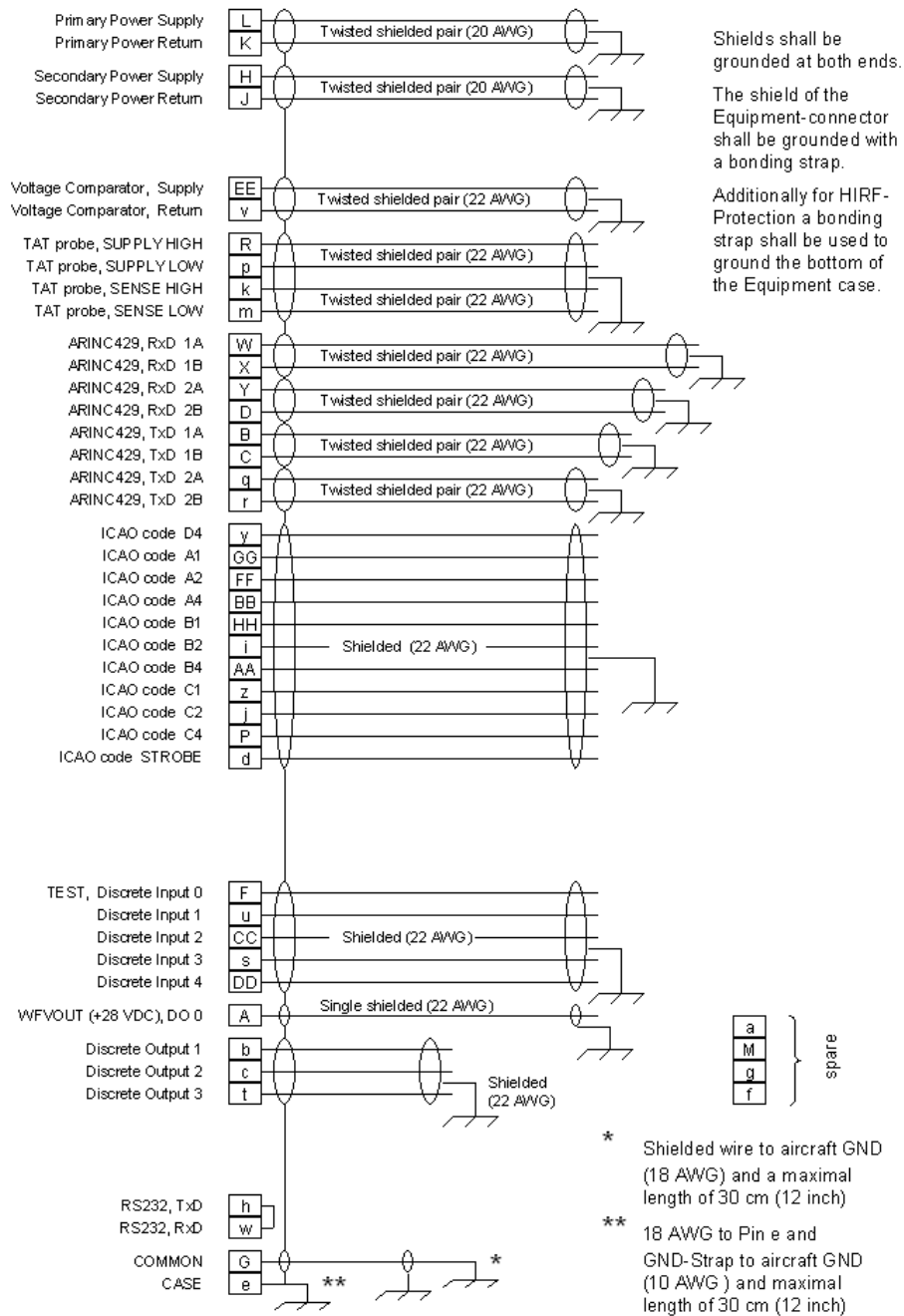


Figure 7: Wiring Diagram

E.3 Data Link Interface Diagram

The Diagram shows an example of data communication with flight Displays.

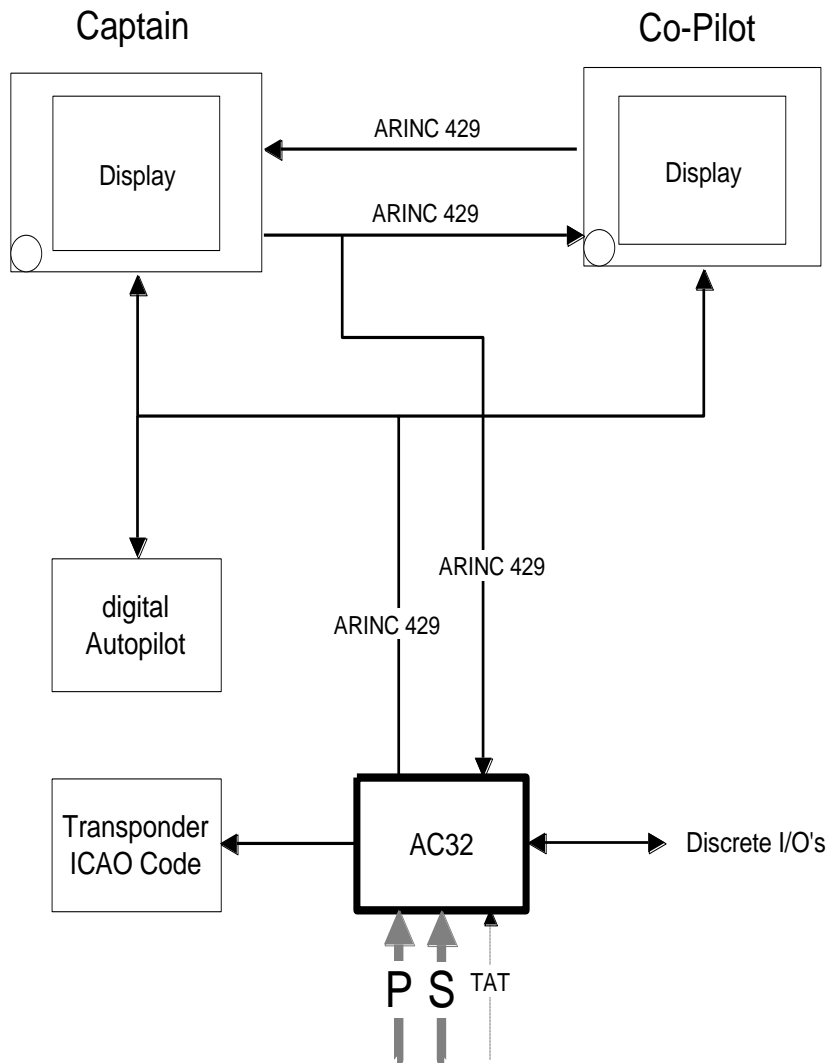


Figure 8: Digital Air Data Computer Communication



F. TAT Probe Interface

The TAT (Total Air Temperature) probe according to ARINC 706-4 Section 4.8 (500 Ohm) is connected to an input of the instrument with 2-/3- or 4-wire connection according to the configuration required.

For 2- or 3-wire connections the wire resistance can be stored and is compensated by the equipment (Default correction value 0 Ohm).

Temperature range is **- 60 ... + 99°C**

T_{Ti} Indicated Total Air Temperature °C	Resistance Pt 500 acc. to ARINC 706-4 Table 5-1	
	Ohm	
-60	381.64	
-30	441.16	
0	500.00	
30	558.21	
60	615.79	
99	689.72	

Table 9: Resistance Pt 500

	Pin #	Signal Name	2-wire connection	3-wire connection	4-wire connection
	k	TAT probe, sense high			
	R	TAT probe, supply high			
	p	TAT probe, supply low			
	m	TAT probe, sense low			

Table 10: TAT Signals

1) connect both pins at the connector



- NOTES:**
- For use refer to the individual execution of your type in Technical Checklist.
 - Pt 100 configuration also available.
 - AD3X(.) is capable of TAT probe input.
 - If the installation does not require a TAT probe a 500 Ohm resistor can replace the TAT probe at the input to avoid FC039.

NOTE:

Manufacturers of temperature probes shall be contacted for the evaluation of the correct TAT or OAT probe. The system installer shall be responsible for the selection of the probe. This needs to be evaluated on the aircraft level. The specification of the selected probe is required.

An OAT probe usually can be used up to airspeed 200 knots. Above 200 knots airspeed and at icing conditions it is required to use a heated TAT probe (to enable deicing).

F.1 TAT Synchronisation

If no TAT probe is connected directly to the equipment the parametric TAT synchronisation reads the air temperature from ARINC 429 label 211 (TAT) on channel RxD1 or RxD2 depending on availability.

The TAT handling is according to the following table:

TAT Source			TAT Use		
Self sensed TAT value	Received TAT value (Label 211 on RxD1)	Received TAT value (Label 211 on RxD2)	Used source for calculation of SAT and TAS	Handling of TAT BIT FC 039	SSM of transmitted Label 211
Yes	X	X	Self sensed TAT value	No	Normal Operation
No	Yes	X	Received TAT value (Label 211 on RxD1)	No	Failure Warning for 0.5 s if loss of TAT probe is detected, then normal operation
No	No	Yes	Received TAT value (Label 211 on RxD2)	No	Failure Warning for 0.5 s if loss of TAT probe is detected, then normal operation
No	No	No	None	Yes	Failure Warning

Note: X = don't care



G. Digital Data Interfaces

G.1 ARINC 429 Data bus Interface

Digital Data Standards are acc. to ARINC 429 Mark 33 DITS and ARINC 706-4 Mark 5 SADS / equipment ID 006

Label	Signal Name	Operational Range ¹⁾	Equip-ment	Resolution	Update Rate per s
203	Pressure altitude (1013.25 mbar)	-1000 ..+53,000	feet	1	16
204	Baro corrected altitude #1	-1000 ..+53,000	feet	1	16
220	Baro corrected altitude #2	-1000 ..+53,000	feet	1	16
205	Mach number	0.200 .. 0.999	MACH	0.0000625 knot	8
206	Computed airspeed	0 / 40 .. 450	knots	0.0625	8
207	Maximum Allowable Airspeed	150 .. 450	knots	0.25	8
210	True airspeed	0 / 100 .. 599	knots	0.0625	8
211	Total air temperature	-60 .. +99	°C	0.25	2
212	Altitude Rate	0 .. 50,000	ft/min.	16	16
213	Static air temperature	-99 .. +60	°C	0.25	2
215	Impact Pressure	0 .. 372.5	mbar	0.03125	8
217	Static Pressure	0 .. 64	inHg	0.001	8
234	Baro Correction mb #1	700 .. 1050	mbar	0.1	8
235	Baro Correction inHg #1	20.67 .. 31.00	inHg	0.001	8
236	Baro Correction mb #2	700 .. 1050	mbar	0.1	8
237	Baro Correction inHg #2	20.67 .. 31.00	inHg	0.001	8
242	Total Pressure	25 ..2048	mbar	0.03125	8
270	Discrete Word #1	--	--	--	2
350	Maintenance Word #1	--	--	--	2
351	Maintenance Word #2	--	--	--	2
353	Indicated airspeed	0 / 40 .. 450	knots	0.0625	8
377	Equipment Identifier	006	--	--	16

Table 11: ARINC 429 Labels

1) Operational ranges are defined to meet customer requirements.

NOTE: For use and assignment refer to the individual execution of equipment type.



G.2 ARINC 429 Bit Rate & Bus Load

The ARINC 429 data bus is designed for:

- **High Speed: 100 kbits/s**, half load for both transmit channels
(max. bus load per transmitter 1 kOhm / 9.5 nF)

Optionally it can be configured for:

- **Low Speed: 12.5 kbits/s**, full load for both transmit channels
(max. bus load per transmitter 260 Ohm / 45 nF)

Note: In real installations the maximum bus load is determined by impedance of cabling and receivers. The installer shall make provisions to **allocate the bus load to both ARINC 429 transmit channels** of the AC32. This shall be taken into account especially at high speed bit rate and with more than 7 receivers per transmit channel. In individual installations the impedance of receivers connected to the AC32 could be much higher than expected.

The following table shows the ARINC 429 labels with I/O transfer channels:

Label	Signal Name	I/O Transfer channel	
		Digital ADC	
203	Pressure altitude (1013.25 mbar)	TxD1/TxD2	--
204	Baro corrected altitude #1	TxD1/TxD2	--
220	Baro corrected altitude #2	TxD1/TxD2	--
205	Mach number	TxD1/TxD2	--
206	Computed airspeed	TxD1/TxD2	--
207	Maximum Allowable Airspeed	TxD1/TxD2	--
210	True airspeed	TxD1/TxD2	--
211	Total air temperature	TxD1/TxD2	--
212	Altitude Rate	TxD1/TxD2	--
213	Static air temperature	TxD1/TxD2	--
215	Impact Pressure	TxD1/TxD2	--
217	Static Pressure	TxD1/TxD2	--
234	Baro Correction mb #1	TxD1/TxD2	RxD1
235	Baro Correction inHg #1	TxD1/TxD2	RxD1
236	Baro Correction mb #2	TxD1/TxD2	RxD1
237	Baro Correction inHg #2	TxD1/TxD2	RxD1
242	Total Pressure	TxD1/TxD2	--
270	Discrete Word #1	TxD1/TxD2	--
271	Discrete Word #2 (provision)	--	--
350	Maintenance Word #1	TxD1/TxD2	--



Label	Signal Name	I/O Transfer channel	
		Digital ADC	
351	Maintenance Word #2 (provision)	--	--
353	Indicated airspeed	TxD1/TxD2	--
377	Equipment Identifier	TxD1/TxD2	--

Table 12: ARINC 429 I/O Transfer labels

The following table is for Baro Synchronization :

Label	Function	I/O Transfer channel	
		Digital ADC	
234 / 235	Baro Synch.	TxD1/TxD2	RxD1

Table 13: ARINC 429 I/O Transfer for Baro Correction

G.3 ARINC Label Formats

Label	Signal Name	Format according to	
203	Pressure altitude (1013.25 mbar)	ARINC 429 Mark 33 DITS equipment ID 006	
204	Baro corrected altitude #1		
220	Baro corrected altitude #2		
205	Mach number		
206	Computed airspeed		
207	Maximum Allowable Airspeed		
210	True airspeed		
211	Total air temperature		
212	Altitude Rate		
213	Static air temperature		
215	Impact Pressure		
217	Static Pressure		
234	Baro Correction mb #1		
235	Baro Correction inHg #1		
236	Baro Correction mb #2		
237	Baro Correction inHg #2		
242	Total Pressure		
377	Equipment Identifier		
270	Discrete Word #1		Section IV Part 1 Para G.3.1
350	Maintenance Word #1		Section IV Part 1 Para G.3.2
351	Maintenance Word #2	Section IV Part 1 Para G.3.2	
353	Indicated airspeed	Section IV Part 1 Para G.3.4	

Table 14: ARINC 429 Labels Format



G.3.1 Label 203 (Pressure Altitude)

Label 203 (Pressure Altitude)		
Bit No.		
1	Label LSB	8 Bit SAL = 203 octal
2		
3		
4		
5		
6		
7		
8	Label MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare
12	Value BNR LSB	Binary value in the range of -1000 feet to +53000 feet Resolution: 1 foot The MSB (M ost S ignificant B it) indicates the sign: 0 = positive number, 1 = negative Number.
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.2 Label 204 (Baro corrected altitude #1)

Label 204 (Baro corrected altitude #1)		
Bit No.		
1	SAL LSB	8 Bit SAL = 204 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare bit
12	Value BNR LSB	Binary value in the range of -1000 feet to +53000 feet Resolution: 1 foot The MSB (M ost S ignificant B it) indicates the sign: 0 = positive number 1 = negative Number
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.3 Label 220 Baro corrected altitude #2

Label 220 (Baro corrected altitude #2)		
Bit No.		
1	SAL LSB	8 Bit SAL = 220 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare Bit
12	Value BNR LSB	Binary value in the range of -1000 feet to +53000 feet Resolution: 1 foot The MSB (M ost S ignificant B it) indicates the sign: 0 = positive number 1 = negative Number
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.4 Label 205 (Mach number)

Label 205 (Mach number)		
Bit No.		
1	SAL LSB	8 Bit SAL = 205 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare Bits
12	PAD	
13	Value BNR LSB	Range: 0.200 to 0.999 Resolution: 0.0000625
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.5 Label 206 (Computed air speed)

Label 206 (Computed air speed)		
Bit No.		
1	SAL LSB	8 Bit SAL = 206 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare Bits
12	PAD	
13	PAD	
14	PAD	
15	Value BNR LSB	Range: 0 / 40 to 450 knots Resolution: 0.0625 knots
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.6 Label 207 (Maximum allowable air speed)

Label 207 (Maximum allowable air speed)		
Bit No.		
1	SAL LSB	8 Bit SAL = 207 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare Bits
12	PAD	
13	PAD	
14	PAD	
15	PAD	
16	PAD	
17	Value BNR LSB	Range: 150 to 450 knots Resolution: 0.25 knots
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.7 Label 210 (True air speed)

Label 210 (True air speed)		
Bit No.		
1	SAL LSB	8 Bit SAL = 210 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	
12	PAD	
13	PAD	
14	Value BNR LSB	Range: 0/100 to 599 knots Resolution: 0.0625 knots
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.8 Label 211 (Total air temperature)

Label 211 (Total air temperature)		
Bit No.		
1	SAL LSB	8 Bit SAL = 211 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare Bits
12	PAD	
13	PAD	
14	PAD	
15	PAD	
16	PAD	
17	PAD	
18	Value BNR LSB	Range: -60 to +99 degree Celsius Resolution: 0.25 degree Celsius
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.9 Label 212 (Altitude rate)

Label 212 (Altitude rate)		
Bit No.		
1	SAL LSB	8 Bit SAL = 212 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare Bits
12	PAD	
13	PAD	
14	PAD	
15	PAD	
16	PAD	
17	PAD	
18	Value BNR LSB	Range: - 32600 to +32600 ft/min. Resolution: 16 ft/min.
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.10 Label 213 (Static air temperature)

Label 213 (Static air temperature)		
Bit No.		
1	SAL LSB	8 Bit SAL = 213 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare Bits
12	PAD	
13	PAD	
14	PAD	
15	PAD	
16	PAD	
17	PAD	
18	Value BNR LSB	Range: -99 to +60 degree Celsius Resolution: 0.25 degree Celsius
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.11 Label 215 (Impact pressure)

Label 215 (Impact pressure)		
Bit No.		
1	SAL LSB	8 Bit SAL = 215 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare Bits
12	PAD	
13	PAD	
14	PAD	
15	Value BNR LSB	Range: 0 to 372.5 mbar Resolution: 0.03125 mbar
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.12 Label 217 (Indicated static pressure)

Label 217 (Indicated Static Pressure)		
Bit No.		
1	Label LSB	8 Bit SAL = 217 octal
2		
3		
4		
5		
6		
7		
8	Label MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare
12	PAD	
13	Value BNR LSB	Binary value in the range of 0 inHg +64 inHg Resolution: 0.0009765 inHg
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28	Value BNR MSB	
29	Sign Bit	0 = positive, 1 = negative Number
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.13 Label 234 (Baro correction mbar #1)

Label 234 (Baro correction mbar #1)		
Bit No.		
1	SAL LSB	8 Bit SAL = 234 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	Value BCD LSB	Range: 700 to 1050 mbar Resolution: 0.1 mbar
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BCD MSB	
30	SSM	Value is in BCD Format so SSM indicates if value is positive or negative: SSM_PLUS = 0 SSM_MINUS = 3
31	SSM	
32	PARITY	



G.3.14 Label 235 (Baro correction inHg #1)

Label 235 (Baro correction inHg #1)		
Bit No.		
1	SAL LSB	8 Bit SAL = 235 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	Value BCD LSB	Range: 20.67 to 31.00 inHg Resolution: 0.001 inHg
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BCD MSB	
30	SSM	Value is in BCD Format so SSM indicates if value is positive or negative: SSM_PLUS = 0 SSM_MINUS = 3
31	SSM	
32	PARITY	



G.3.15 Label 236 (Baro correction mbar #2)

Label 236 (Baro correction mbar #2)		
Bit No.		
1	SAL LSB	8 Bit SAL = 236 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	Value BCD LSB	Range: 700 to 1050 mbar Resolution: 0.1 mbar
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BCD MSB	
30	SSM	Value is in BCD Format so SSM indicates if value is positive or negative: SSM_PLUS = 0 SSM_MINUS = 3
31	SSM	
32	PARITY	



G.3.16 Label 237 (Baro correction inHg #2)

Label 237 (Baro correction inHg #2)		
Bit No.		
1	SAL LSB	8 Bit SAL = 237 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	Value BCD LSB	Range: 20.67 to 31.00 inHg Resolution: 0.001 inHg
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BCD MSB	
30	SSM	Value is in BCD Format so SSM indicates if value is positive or negative: SSM_PLUS = 0 SSM_MINUS = 3
31	SSM	
32	PARITY	



G.3.17 Label 242 (Total pressure)

Label 242 (Total pressure)		
Bit No.		
1	SAL LSB	8 Bit SAL = 242 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	
12	PAD	
13	Value BNR LSB	Range: 25 to 2048 mbar Resolution: 0.03125 mbar
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.18 Label 270 (Discrete word #1)

	Label 270 (Discrete word #1)	Logic according to ARINC standard		Logical state for listed SW versions ¹⁾
Bit No.				
1	SAL LSB	8 Bit SAL = 270 octal		
2				
3				
4				
5				
6				
7				
8	SAL MSB			
9	SDI	Source / Destination Identifier		
10	SDI			
11	Icing Detector	1 = ON, 0 = OFF	not available	
12	Pitot Probe Heat	1 = ON, 0 = OFF	not available	
13	ADS Computer Status (WFVOUTS Status)	1 = FAIL 0 = GOOD		1=GOOD 0=FAIL
14	PITOT / STATIC Probe Heat	1 = ON, 0 = OFF	not available	
15	Static Source Heat	1 = ON, 0 = OFF	not available	
16	TAT Probe Heat	1 = ON, 0 = OFF		
17	Left Side Angle Of Attack Sensor Heat	1 = ON, 0 = OFF	not available	
18	Right Side Angle Of Attack Sensor Heat	1 = ON, 0 = OFF	not available	
19	VMO/MMO Overspeed Warning	1 = ON (WARN), 0 = OFF (NOT WARN)		
20	Primary Angle Of Attack Input	1 = FAIL, 0 = GOOD	not available	
21	Angle Of Attack Average	1 = YES, 0 = NO	not available	
22	VMO Alternate No. 1	1 = YES, 0 = NO	not available	
23	VMO Alternate No. 2	1 = YES, 0 = NO	not available	
24	VMO Alternate No. 3	1 = YES, 0 = NO	not available	
25	VMO Alternate No. 4	1 = YES, 0 = NO	not available	
26	SSEC Alternate	1 = YES, 0 = NO		
27	Angle Of Attack Alternate Correction	1 = YES, 0 = NO	not available	
28	Baro Correction Port "A"	1 = YES, 0 = NO	not available	
29	Zero Mach SSEC	1 = YES, 0 = NO	(spare)	
30	SSM			
31	SSM			
32	PARITY			

Note 1: Only the following SW versions have the logic (1=GOOD, 0=FAIL) for ADS Computer Status: 1.53, 1.54, 2.00, 2.10, 2.11, 2.20, 2.30, 2.40.



G.3.19 Label 271 (Discrete word #2)

Label 271 (Discrete word #2)		
Bit No.	provision, not used in ADU32	
1	SAL LSB	8 Bit SAL = 271 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	Zero Angle Of Attack	1 = YES, 0 = NO
12	Angle Of Attack Sensor Status	1 = FAIL, 0 = GOOD
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30	SSM	
31	SSM	
32	PARITY	



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G.3.20 Label 320 (Magnetic Heading)

Label 320 (Magnetic Heading)		
Bit No.		
1	SAL LSB	8 Bit SAL = 320 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11		Range / Layout: n/a
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.21 Label 350 (Maintenance word #1)

Label 350 (Maintenance word #1)		
Bit No.		
1	SAL LSB	8 Bit SAL = 350 octal This Label transmits Information about alerter and display settings needed to provide synchronisation of two peers. It should not be used on AC32.
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	Value BNR LSB	Range: -1000 to +53000 feet Resolution: 1 foot
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26	Value BNR MSB	
27	Value Sign Bit	0= positive value, 1 = negative value
28	Alerter State	Indicates if Alerter is switched off(0) or on (1)
29	Altitude Display state	Indicates if the Altitude is displayed in Feet (0) or in Meter (1)
30	Baro Display state	Indicates if the Baro setting is displayed in mbar (0) or in inHg(1)
31	Push To Reset state	Indicates a "Push To Reset" Baro setting. Since the format of the Baro correction labels (234-237) has not the required precision to detect a reset to 1013.25 mbar.
32	PARITY	



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G.3.22 Label 351 (Maintenance word #2)

Label 351 (Maintenance word #2)		
Bit No.		
1	SAL LSB	8 Bit SAL = 351 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32	PARITY	



G.3.23 Label 353 (Indicated air speed)

Label 353 (Indicated airspeed)		
Bit No.		
1	SAL LSB	8 Bit SAL = 353 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare Bits
12	PAD	
13	Value BNR LSB	Range: 0 / 40 to 450 knots Resolution: 0.0625 knots
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



G.3.24 Label 377 (Equipment Identification)

Label 377 (Equipment Identification)		
Bit No.		
1	SAL LSB	8 Bit SAL = 377 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	Value BNR LSB	Range: 006 (Air Data Computer)
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



H. Discrete I/O's

H.1 Discrete Inputs

Six (6) discrete inputs (0-5) are available. The use and logic of the discrete are parametrical.

NOTE: For use and assignment refer to the individual execution of your type in the AC32.() Technical Checklist (TCL).

Voltage level	28 VDC power supply	
'High'	$\geq 18.5 \dots \leq 36$ VDC	acc. to ARINC 706-4 section 4.11.4
'Low'	$\geq 0 \dots \leq 3.5$ VDC	

No.	Signal (default)	Description	Activation/Logic (default)
0	TEST	Performs a restart of the instrument	high = Normal low = activate BIT
1	Discrete input 1	Refer to TCL	--
2	Discrete input 2	Refer to TCL	--
3	Discrete input 3	Refer to TCL	--
4	Discrete input 4	Refer to TCL	--
5	ICAO Strobe	Detects Strobe signal	high = Code off low = Code on

Table 14: Discrete Inputs

NOTE: Discrettes "SSEC Selection", "Zero MACH SSEC" and "TAT Heat" are also indicated by the ARINC 429 data label 270, Discrete Word #1.



H.2 Discrete Outputs

Three (3) discrete outputs(1-3) are available. The use and logic of the discrete is parametric.

NOTE: For use refer to the individual execution of your type in a Appendix II Digital Air Data Computer Execution.

Voltage level	28 VDC power supply	
'High'	>= 18.5 ... <= 36 VDC	acc. to ARINC 706-4 section 4.11.4
'Low'	>= 0 ... <= 3.5 VDC	

No.	Signal (default)	Description	Activation	Electrical
0	Warning Flag Valid Output Signal WFVOUTS	indicates proper operation and no critical failure	high = Normal low = Failure condition	28 VDC / max. 14mA
1	Discrete output 1	Refer to TCL	--	Open drain, max. 1 A
2	Discrete output 2	Refer to TCL	--	Open drain, max. 1 A
3	Discrete output 3	Refer to TCL	--	Open drain, max. 1 A

Table 15: Discrete Outputs

I. ICAO Encoded Altitude Output

The Digital Air Data Computer has an encoded altitude output (in feet) for automatic altitude reporting in accordance with TSO-C88a. Reported Altitude is always relative to standard pressure (29.9213 inHg or 1013.25 mbar).

NOTE: To activate, the ICAO strobe discrete input no. 5 must be grounded.

J. RS-232 Serial Interface

The flight instrument has a RS-232 interface for maintenance and calibration purposes only. This interface is not accessible for normal operation in the aircraft.

NOTE: The pins for RS-232 TxD and RxD shall be jumpered in the connector on the aircraft side to avoid inadvertent interferences!



SECTION V

1. Trouble shooting

The table below shows the general troubleshooting information to assist in locating and correcting any malfunctions with the AC32 Digital Air Data Computer.

Procedure:

Malfunction	Probable cause	Remedy
<ul style="list-style-type: none">Digital I/O fails	<ul style="list-style-type: none">I/O signal out of toleranceelectronic module failure	<ul style="list-style-type: none">make sure the I/O signalrepair electronic module
<ul style="list-style-type: none">Warning Flag Valid Signal is Low	<ul style="list-style-type: none">Failure	<ul style="list-style-type: none">Test the equipment and installation
<ul style="list-style-type: none">TAT/OAT output out of range	<ul style="list-style-type: none">Temperature probe not connected correctly	<ul style="list-style-type: none">Make sure the probe or replacement resistor is connected
<ul style="list-style-type: none">Encoding output is not working	<ul style="list-style-type: none">Discrete input no. 5 (ICAO strobe) is not grounded / Encoder is off	<ul style="list-style-type: none">Ensure ground connectionCheck Encoder function

Table 16: Trouble Shooting Procedures

NOTE: For any malfunction of the equipment not listed in the table above, Manufacturer can be contacted for assisting in the trouble shooting.
Check the equipment using the THOMMEN RS-232 monitoring SW. Read out the failure memory (BIT history) to analyse failures.



2. Maintenance

The flight equipment can be completely repairable at depot level, down to the module or subassembly equipment. The maintenance task time, which includes preparation (setup) for test, recognition (validation) of a fault, isolation of cause of the fault, repair of the fault and preliminary checkout shall not exceed 2 hours repair time for any single failure in an instrument.

The Maintenance of the AC32 Digital Air Data Computer must be performed by the manufacturer representative or certified staff. ADAC32 Maintenance manual describes software installation, the required maintenance files and the performance range of the instrument.

The requirements for software maintenance of the instruments are RS-232 Serial Data cable, computer with Microsoft Windows and the ADAC32 CDROM with maintenance Software.

A. Recalibration Interval

The AC32 Digital Air Data Computer has the following recalibration intervals:

Sensor Type	recalibration interval
High-end transducers	On Condition



APPENDICES

Appendix I

Failure Codes

FC	Description	Start Up / Initiated	Continuous	ARINC Failure Class
001	Program checksum Error	X	-	OFF
		-	X	FW 1
002	Parameter checksum Error	X	-	OFF
003	Calibration checksum Error	X	-	FW 1
005	RAM Test Error	X	-	OFF
		-	X	FW 1
006	CPU Test Error	X	-	OFF
007	Watchdog Test Error	X	-	OFF
010	ARINC 429 Error	X	-	OFF
		-	X	OFF
012	I2C bus Error	X	-	OFF
		-	X	FW 1
013	Configuration Error	X	-	OFF
014	I/O Expander Error	X	-	OFF
021	3.3V Voltage Failure	-	X	FW 1
022	+5.0V Voltage Failure	-	X	FW 1
023	-5.0V Voltage Failure	-	X	FW 1
024	+15.0V Voltage Failure	-	X	OFF
025	-15.0V Voltage Failure	-	X	OFF
026	28.0V Voltage Failure	-	X	FW 1
027	+2.5V reference Voltage Failure	-	X	FW 1
028	Power Backup System Failure	X	-	-
037	Static Frequency Measurement Device Error	X	-	FW 37
038	Pitot Frequency Measurement Device Error	X	-	FW 38
039	TAT A/D-C Error	X	-	FW 39
040	Static A/D-C Failure	-	X	FW 37
041	Pitot A/D-C Failure	-	X	FW 38
042	Static Pressure Range Failure	-	X	FW 37
043	Pitot Pressure Range Failure	-	X	FW 38
044	Baro Corrected Altitude Out of Range Failure	-	X	FW 44
045	IAS Out of Range Failure	-	X	FW 45
046	CAS Out of Range Failure	-	X	FW 46
047	TAS Out of Range Failure	-	X	FW 47
049	VMO Out of Range Failure	-	X	FW 49
050	Mach No Out of Range Failure	-	X	FW 50



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FC	Description	Start Up / Initiated	Continuous	ARINC Failure Class
051	Altitude Rate Out of Range Failure	-	X	FW 51
052	TAT Out of Range Failure	-	X	FW 39
053	SAT Out of Range Failure	-	X	FW 53
055	Static Sensor Temperature Out of Range Failure	-	X	FW 37
056	Pitot Sensor Temperature Out of Range Failure	-	X	FW 38
057	Static Sensor Temperature Diode Voltage Failure	X	X	FW 37
058	Pitot Sensor Temperature Diode Voltage Failure	X	X	FW 38
059	Null Drift Test and Failure	X	-	FW 59
065	Pressure Altitude Out of Range Failure		X	FW 65
070	WFVOUTS Failure	-	X	-
071	ICAO Failure	-	X	-
074	Instrument disabled by discrete input	-	-	FW 1
080	No Initialisation Failure	X	-	OFF
255	Unknown Error Code failure	N/A	N/A	FW 1

ARINC failure class definition

If a failure occurs at following ARINC 429 labels the Failure Warning shall be indicated in the SSM.

SAL	102	203	204	205	206	207	210	211	212	213	215	217	242	270	353	377
	Selected Altitude	Pressure altitude	Baro corr. altitude #1	Mach number	Computed airspeed	Max. Allow. Airspeed	True airspeed	Total air temp	Altitude Rate	Static air temp	Impact Pressure	Static Pressure	Total Pressure	Discrete Word #1	Indicated airspeed	Equipment Identification
FW 1	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW
FW 37	-	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	-	-	FW	-
FW 38	-	-	-	FW	FW	-	FW	FW	-	FW	FW	-	FW	-	FW	-
FW 39	-	-	-	-	-	-	FW	FW	-	FW	-	-	-	-	-	-
FW 44	-	FW	FW	-	-	FW	-	-	FW	-	-	-	-	-	-	-
FW 45	-	-	-	FW	-	-	FW	FW	-	FW	-	-	-	-	FW	-
FW 46	-	-	-	-	FW	-	-	-	-	-	-	-	-	-	-	-
FW 47	-	-	-	-	-	-	FW	-	-	-	-	-	-	-	-	-
FW 49	-	-	FW	-	-	FW	-	-	-	-	-	-	-	-	-	-
FW 50	-	-	-	FW	-	-	FW	FW	-	FW	-	-	-	-	-	-
FW 51	-	-	-	-	-	-	-	-	FW	-	-	-	-	-	-	-
FW 53	-	-	-	-	-	-	FW	-	-	FW	-	-	-	-	-	-
FW 59	-	FW	FW	FW	FW	FW	FW	FW	FW	FW	FW	-	FW	-	FW	-
FW 65	-	FW	FW	-	-	***	-	-	FW	-	-	-	-	-	-	-

Legend:

- FW set SSM flag to failure
- no SSM flag setting
- *** depending on VMO calibration



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BIT-Matrix

The failure reaction is defined in the BIT Matrix:

FC	Critical Error	Non Critical Error	Stop Operation	ICAO Off	Warning Flag indication	Store Failure	Non Recoverable	Disable ARINC 429 IF
001	CI		SO	CO	WF	SF	NR	
002	CI		SO	CO	WF	SF	NR	
003	CI		SO	CO	WF	SF	NR	
005	CI		SO	CO	WF	SF	NR	
006	CI		SO	CO	WF	SF	NR	
007		EI			WF	SF	NR	
010		EI			WF	SF	NR	DA
012	CI		SO	CO	WF		NR	
013	CI		SO	CO	WF	SF	NR	
014	CI		SO	CO	WF	SF	NR	
021	CI		SO	CO	WF		NR	
022	CI		SO	CO	WF	SF	NR	
023	CI		SO	CO	WF	SF	NR	
024	CI		SO	CO	WF	SF	NR	DA
025	CI		SO	CO	WF	SF	NR	DA
026	CI		SO	CO	WF	SF	NR	
027	CI		SO	CO	WF	SF	NR	
028		EI			WF		NR	
037	CI		SO	CO	WF	SF	NR	
038		EI			WF	SF		
039		EI			WF	SF		
040	CI		SO	CO	WF	SF		
041		EI			WF	SF		
042		EI			WF	SF		
043		EI			WF	SF		
044		EI			WF	SF		
045		EI			WF	SF		
046		EI			WF	SF		
047		EI			WF	SF		
049		EI			WF	SF		
050		EI			WF	SF		
051		EI			WF	SF		
052		EI			WF	SF		
053		EI			WF	SF		
055	CI		SO	CO	WF	SF	NR	
056		EI			WF	SF		
057	CI		SO	CO	WF	SF	NR	



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FC	Critical Error	Non Critical Error	Stop Operation	ICAO Off	Warning Flag indication	Store Failure	Non Recoverable	Disable ARINC 429 IF
058		EI			WF	SF		
059	CI		SO	CO	WF	SF	NR	
065		EI		CO	WF	SF		
070						SF		
071		EI		CO	WF	SF	NR	
074	CI		SO	CO	WF	SF		
080	CI		SO	CO	WF		NR	
255	CI		SO	CO	WF	SF		

Note:

The following abbreviations are used for the failure attributes.

- CI : Critical Error
- EI : Non Critical Error
- SO : Stop Operation
- CO : ICAO Off
- WF : Warning Flag indication (WFVOUTS)
- SF : Store Failure
- NR : Non Recoverable
- DA : Disable ARINC 429 Interface



Appendix II

Altimeter Calibration Table

Altitude [Feet] (Baro setting 1'013 mbar)	Tolerance acc. to TSO-C10b ± [Feet]		Tolerance acc. to RVSM requirements ± [Feet] 2)	
	@25 °C	@ -30/+71°C 1)	@25 °C	@ -30/+71°C 1)
-1'000	20	--	10	--
0	20	40	10	10
500	20	--	10	--
1'000	20	--	10	--
1'500	25	--	10	--
2'000	30	--	10	--
3'000	30	--	10	--
4'000	35	--	10	--
6'000	40	60	10	10
8'000	60	--	10	--
10'000	80	--	10	--
12'000	90	90	10	10
14'000	100	--	10	--
16'000	110	--	10	--
18'000	120	120	10	10
20'000	130	--	15	--
22'000	140	--	15	--
25'000	155	155	15	15
29'000	--	--	20	--
30'000	180	--	20	--
32'500	--	--	25	--
35'000	205	205	25	25
37'500	--	--	30	--
40'000	230	--	30	--
41'000	--	--	30	--
45'000	255	--	40	--
50'000	280	280	45	45
53'000	(295)	--	50	--

NOTE: 1) allowable change from room temperature scale error test indication
2) SSEC data are applied automatically.



Appendix III

Airspeed Calibration Table

Impact Pressure @ 25 °C (77 °F)		Airspeed IAS	Scale Error acc. to ETSO/TSO-C46a	
			Temperature @ 25 °C (77 °F)	Temperature @ -30 / +50 °C (-22 / +122 °F)
[in Hg]	[mbar]	[Knots]	± [Knots]	± [Knots]
0.0192	0.649	20 Note 1)	5.0 Note 1)	Note 3) --
0.0767	2.597	40 Note 1)	4.0 Note 1)	--
0.1198	4.057	50	4.0	--
0.1727	5.848	60	2.0	4.5
0.3075	10.413	80	2.0	--
0.4814	16.302	100	2.0	4.5
0.6950	23.535	120	2.0	--
1.091	36.945	150	2.5	4.5
1.580	53.505	180	3.0	--
1.959	66.339	200	3.0	4.5
2.610	88.385	230	3.0	--
3.100	104.978	250	3.0	4.5
3.924	132.882	280	3.5	--
4.534	153.538	300	3.5	4.5
5.195	175.922	320	3.5	--
6.286	212.868	350	4.0	4.5
7.082	239.823	370	4.5	--
8.385	283.948	400	5.0	4.5
9.826	332.746	430	5.5	--
10.870	368.100	450	6.0	4.5
12.558	425.329	480	7.0	
13.776	466.643	500	7.0	4.5
15.069	510.327	520	7.0	--
17.159	581.069	550	8.5	4.5
18.660	631.899	570	8.5	--
21.075	713.680	600 Note 2)	10.0 Note 2)	4.5
25.589	866.541	650 Note 2)	10.0 Note 2)	4.5
30.764	1041.786	700 Note 2)	10.0 Note 2)	4.5
36.566	1238.264	750 Note 2)	10.0 Note 2)	4.5

Notes:

1) not included in ETSO/TSO-C46a , 2) acc. to MIL-I-27197C

3) The scale error must not exceed by more than 4.5 knots the tolerances specified.



Appendix IV

MACH Number Calibration Table

MACH _i (indicated MACH number)	Tolerances acc. to SAE AS8002 Revision A ± MACH	
	@ 25 °C (77 °F)	@ -20 / +71°C (-4 / +160 °F)
@ Altitude 0 feet		
0.200	0.012	0.016
0.300	0.012	0.016
0.400	0.012	0.016
0.500	0.010	0.014
0.600	0.0075	0.010
@ Altitude 10'000 feet		
0.400	0.012	0.016
0.500	0.010	0.014
0.600	0.0075	0.010
0.700	0.005	0.007
@ Altitude 20'000 feet		
0.400	0.012	0.016
0.500	0.010	0.014
0.600	0.0075	0.010
0.700	0.005	0.007
@ Altitude 30'000 feet		
0.600	0.0075	0.010
0.700	0.005	0.007
0.800	0.005	0.007
0.900	0.005	0.007
0.950	0.0075	0.010

MACH	Calculated Tolerances acc. to ETSO/TSO-C46a/SAE AS418A ± MACH	
	@ 25 °C (77 °F)	@ -20 / +71°C (-4 / +160 °F)
@ Altitude 40'000 feet		
0.700	0.013	0.027
0.800	0.013	0.026
0.900	0.013	0.025
0.950	0.013	0.025
@ Altitude 50'000 feet		
0.700	0.016	0.034
0.800	0.016	0.032
0.900	0.015	0.031
1.000	0.015	0.030



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MACH	Tolerances (equipment specification) ± MACH	
	@ 25 °C (77 °F)	@ -20 / +71°C (-4 / +160 °F)
@ Altitude 60'000 feet		
0.900	0.020	0.030
1.000	0.020	0.030
1.200	0.200	0.030
@ Altitude 70'000 feet		
	@ 25 °C (77 °F)	@ -20 / +71°C (-4 / +160 °F)
0.900	0.025	0.035
1.000	0.025	0.035
1.200	0.025	0.035
@ Altitude 80'000 feet		
	@ 25 °C (77 °F)	@ -20 / +71°C (-4 / +160 °F)
0.900	0.030	0.040
1.000	0.030	0.040
1.200	0.030	0.040



Appendix V

Total Air Temperature (TAT) / Outside Air Temperature (OAT) Calibration Table

T_{Ti}	Resistance Pt 500 acc. to ARINC 706-4
Indicated Total Air Temperature °C	Ohm
-60	381.64
-30	441.16
0	500.00
30	558.21
60	615.79
99	689.72

TAT/OAT Calibration Table: Resistance Pt 500

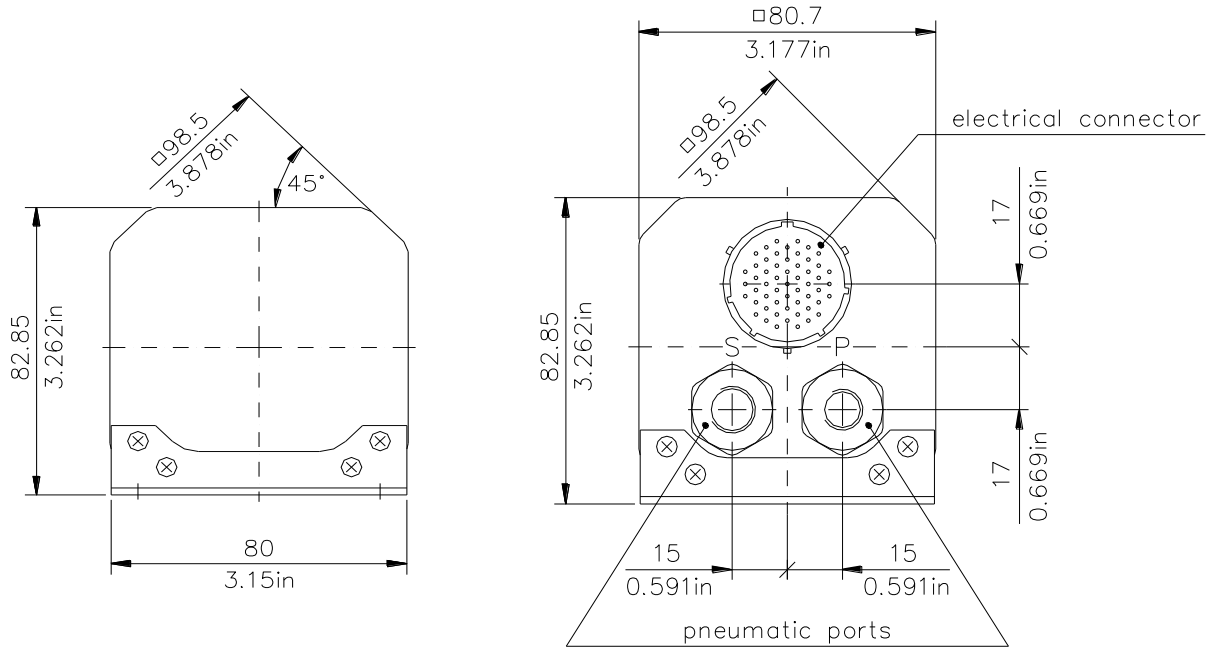
T_{Ti}	Resistance Pt 100 acc. to EN 60751
Indicated Total Air Temperature °C	Ohm
-60	76.328
-30	88.222
0	100.000
30	111.673
60	123.242
99	138.126

TAT/OAT Calibration Table: Resistance Pt 100



Appendix VI

Equipment Dimensions : Compact Case



Equipment Front and Rear View

NOTE: The dimensions are in millimeters or inches

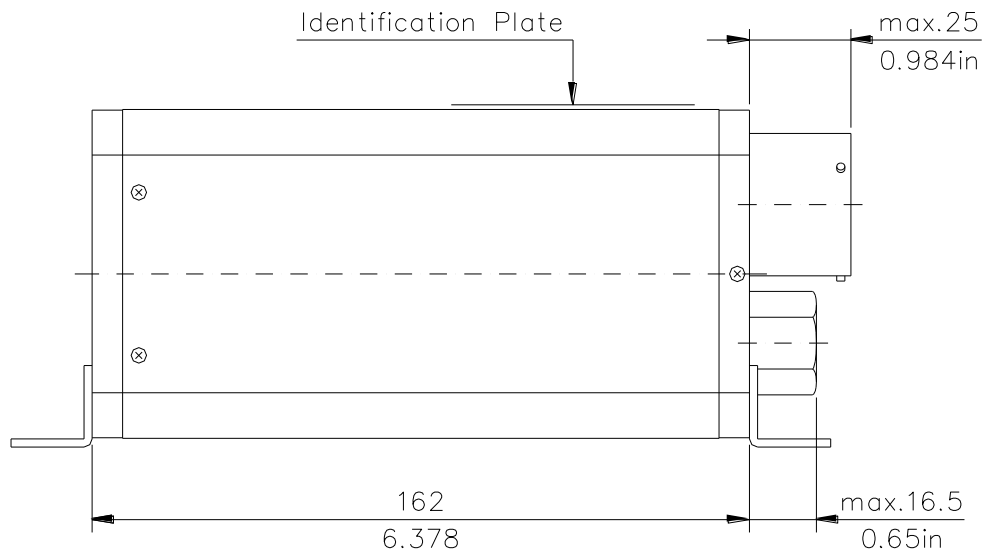
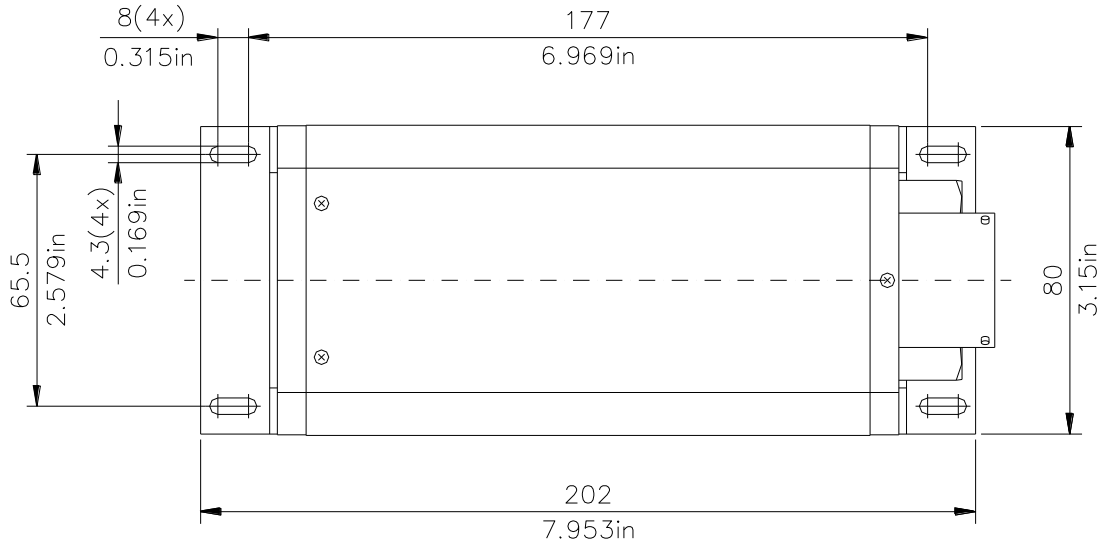
NOTE: Not to scale

Pneumatic Pressure Ports

	Mechanical	Pressure range	Over pressure capability
Static Port "S" (Standard)	1/2"-20UNJF-3B (MS33649-5)	100 ... 1050 mbar abs	1500 mbar abs
Static Port "S" (optional)	9/16"-18UNJF-3B (MS33649-6)	25 ... 1100 mbar abs	1500 mbar abs
Pitot Port "P"	7/16"-20UNJF-3B (MS33649-4)	100 ... 1500 mbar abs	3000 mbar abs



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Equipment Side and Top View



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Appendix VII

Identification Plates

The Identification/Name plates is attached in the equipment case of AC32 Digital Air Data Computer externally. The sample of Identification/Name plates of AC32 Digital Air Data Computer equipment is shown below:

REVUE THOMMEN AG CH-4437 WALDENBURG			
DIGITAL AIR DATA COMPUTER			
CERTIFIED TSO-C88a, TSO-C106		WT 1000 gm (2.20 lbs)	
RTCA/DO-160D [D2]BBB[(TB1)(TR)]/[(SL)(SM)]/[(UG)]XWFD FSZZAZZ[YY]M[A3J33]XAA			
RTCA/DO-178B LEVEL A		CONFIG ID	
PART/TYPE NO AC32.10.21.11.AF		5020	
SER NO	xxxxxxx	PWR SUPPLY 28 VDC	
RANGES	-1'000 ... 53'000 FEET		
	0/40 ... 450 KNOTS		
	0.200 ... 950 MACH	MFR DATE month / year	
SWISS MADE		PHONE +41 61 965 22 22 info@thommen.aero	

REVUE THOMMEN AG CH-4437 WALDENBURG																		
HW version	2.00																	
SW version	2.31																	
MOD	HW	<input checked="" type="checkbox"/>	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
	SW	<input checked="" type="checkbox"/>	B	C	D	E	F	G	H	I	J	K	L	M	N	P	R	S
SWISS MADE		PHONE +41 61 965 22 22		info@thommen.aero														



Appendix VIII

Software Version SW 2.10:

The Software (SW) Version 2.10 is applicable for all AC32 Digital Air Data Computer Versions. The features included in SW Version 2.10 are described as follows:

1) ARINC429 functionality

- All ARINC429 labels are made available on all channels as independent and independency of Barometric correction ARINC 429 Label 234 and Label 235

All ARINC 429 Labels available with AC32 Digital Air Data Computer are made independent with SW 2.10 Version (Excluding the ARINC 429 labels 203 for the purpose of ALT comparison Fail function).

ARINC 429 Label 234 and Label 235 are made independent , requiring only one ARINC 429 Label 234 or Label 235 for Barometric correction value.

The following priorities are available on the equipment to receive Barometric values for the barometric correction:

Priority 1 - ARINC 429 LABEL 235 on Rx 1 Channel

Priority 2 - ARINC 429 LABEL 235 on Rx 2 Channel

Priority 3 - ARINC 429 LABEL 234 on Rx 1 Channel

Priority 4 - ARINC 429 LABEL 234 on Rx 2 Channel



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The following table shows the ARINC 429 Labels available on different ARINC Transmit and Receive Channels:

Label	Signal Name	I/O Transfer Channel Digital ADC	
203	Pressure altitude (1013.25 mbar)	TxD1/TxD2	--
204	Baro corrected altitude #1	TxD1/TxD2	--
220	Baro corrected altitude #2	TxD1/TxD2	--
205	Mach number	TxD1/TxD2	--
206	Computed airspeed	TxD1/TxD2	--
207	Maximum Allowable Airspeed	TxD1/TxD2	--
210	True airspeed	TxD1/TxD2	--
211	Total air temperature	TxD1/TxD2	--
212	Altitude Rate	TxD1/TxD2	--
213	Static air temperature	TxD1/TxD2	--
215	Impact Pressure	TxD1/TxD2	--
217	Static Pressure	TxD1/TxD2	--
234	Baro Correction mb #1	TxD1/TxD2	RxD1/RxD2
235	Baro Correction inHg #1	TxD1/TxD2	RxD1/RxD2
236	Baro Correction mb #2	TxD1/TxD2	RxD1/RxD2
237	Baro Correction inHg #2	TxD1/TxD2	RxD1/RxD2
242	Total Pressure	TxD1/TxD2	--
270	Discrete Word #1	TxD1/TxD2	--
271	Discrete Word #2 (provision)	--	--
320	Heading	TxD1/TxD2	RxD1/RxD2
350	Maintenance Word #1	TxD1/TxD2	RxD1/RxD2
351	Maintenance Word #2 (provision)	--	--
353	Indicated airspeed	TxD1/TxD2	--
377	Equipment Identifier	TxD1/TxD2	--



- Source/Destination Identifier function are made available as discrete inputs on AC32 Digital Air Data Computer. It identifies the ARINC 429 source.

Note: SDI Bit status is detected during startup only.

Source/Destination Identifier

SDI pin A Bit 10	SDI pin B Bit 9	ARINC 429 Source Equipment No.
0	0	0
0	1	1
1	0	2
1	1	3

- ARINC 429 Label 320 (Magnetic Heading) and Label 350 (Maintenance Word #1) are made available on AC32 Digital Air Data Computer as forwarded only depending on when activated in the configuration.

Note: ARINC 429 Label 320 is forwarded, when enabled in the configuration.

Note: ARINC 429 Label 350 is forwarded, when disabled in the configuration.

Note: For use and assignment refer to the individual execution of instrument type in the AC32 Technical Checklist.

Note: Sign Status Matrix

SSM Bit 31	SSM Bit 30	Equipment Status
0	0	Failure warning
0	1	No computed data
1	0	Functional test
1	1	Normal operation



- ARINC 429 Label 217 (Static Pressure) is added on AC32 Digital Air Data Computer equipment.

Label 217 (Static Pressure)		
Bit No.		
1	Label LSB	8 Bit SAL = 217 octal
2		
3		
4		
5		
6		
7		
8	Label MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	Spare
12	PAD	
13	Value BNR LSB	Binary value in the range of 0 inHg +64 inHg Resolution: 0.0009765 inHg
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28	Value BNR MSB	
29	Sign Bit	0 = positive, 1 = negative Number
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



Appendix IX

Software Version SW 2.11:

Forwarded Standard and Non-Standard ARINC 429 labels

The table below shows the list of ARINC 429 labels which are in the forwarded format. These Standard and Non standard ARINC 429 labels transmit on ARINC channel # 1 and # 2 when it is received either on ARINC channel # 1 or # 2 . When activated for forwarding, the same calculable ARINC 429 labels are disabled by configuration.

Label	Condition	Action
102	Alerter enabled by configuration	transmit own label
102	Alerter disabled by configuration	forward received label
104N	--	forward received label
161N	--	forward received label
207	Label enabled by configuration	transmit own label
207N	Label disabled by configuration	forward received label
210	Label enabled by configuration	transmit own label
210N	Label disabled by configuration	forward received label
244N	--	forward received label
271N	Label enabled by configuration	forward received label
271N	Label disabled by configuration	forward received label
320	Label enabled by configuration	forward received label
350	Label enabled by configuration	transmit own label
350	Label disabled by configuration	forward received label



Appendix X

Software Version SW 2.41:

The Software Version 2.41 is applicable to AC32 Digital Air Data Computer in the customizable Version. The features included in SW Version 2.41 are **High Speed or Low Speed** ARINC 429 Labels with update rates as described in the following table:

Label	Signal Name	Operational Range ¹⁾	Equipment	Resolution	Update Rate per s
203	Pressure altitude (1013.25 mbar)	-1000 ..+53,000	feet	1	20
204	Baro corrected altitude #1	-1000 ..+53,000	feet	1	20
220	Baro corrected altitude #2	-1000 ..+53,000	feet	1	20
205	Mach number	0.200 .. 0.999	MACH	0.0000625 knot	20
206	Computed airspeed	0 / 40 .. 450	knots	0.0625	20
207	Maximum Allowable Airspeed	150 .. 450	knots	0.25	20
210	True airspeed	0 / 100 .. 599	knots	0.0625	20
211	Total air temperature	-60 .. +99	°C	0.25	20
212	Altitude Rate	0 .. 50,000	ft/min.	16	20
213	Static air temperature	-99 .. +60	°C	0.25	20
215	Impact Pressure	0 .. 372.5	mbar	0.03125	20
217	Static pressure	0 .. 64	inHg	0.0009765	20
234	Baro Correction mb #1	700 .. 1050	mbar	0.1	20
235	Baro Correction inHg #1	20.67 .. 31.00	inHg	0.001	20
236	Baro Correction mb #2	700 .. 1050	mbar	0.1	20
237	Baro Correction inHg #2	20.67 .. 31.00	inHg	0.001	20
242	Total Pressure	25 .. 2048	mbar	0.03125	20
270	Discrete Word #1	--	--	--	20
271	Discrete Word #2 (provision)	--	--	--	20
350	Maintenance Word #1	--	--	--	20
351	Maintenance Word #2	--	--	--	20
353	Indicated airspeed	0 / 40 .. 450	knots	0.0625	20
377	Equipment Identifier	006	--	--	20
320	Magnetic Heading (Forwarded only)	--	--	--	20

1) Operational ranges are defined to meet customer requirements.

NOTE: Number of ARINC 429 Labels is limited at Low Speed execution.



Appendix XI

Software Version 2.30:

Warning Flag Valid Outputs

There will be two types of Warning Flag Valid Outputs that uses the following logic:

a) Warning Flag Valid Output Signal **WFVOUITS**

Warning Flag Valid Output Signal WFVOUITS	High =	Valid	Normal	No warning	28 VDC max. 14 mA (max. load 2 kOhm)
	Low =	Invalid	Failure condition	Warning	0 V

b) Warning Flag Valid Output Discrete **WFVOUTD**

Warning Flag Valid Output Discrete WFVOUTD						Voltage level acc. to ARINC 706-4 section 4.11.4
	High =	Invalid	Failure condition	Warning	Open (drain)	$\geq 18.5 \dots \leq 36$ VDC
	Low =	Valid	Normal	No warning	Ground max. 1 A	$\geq 0 \dots \leq 3.5$ VDC

Discrete Outputs

Three discrete outputs (1 to 3) are available.

No.	Signal (default)	Description	Activation	electrical
1	Discrete output 1	According assigned function	high = inactive low = active	Open drain max. 1 A
2	Discrete output 2	According assigned function	high = inactive low = active	Open drain max. 1 A
3	Discrete output 3	According assigned function	high = inactive low = active	Open drain max. 1 A



Discrete output functions

Discrete output functions are assignable to the discrete outputs by parametrization.

No.	Discrete Output Function	Description	Activation (default)
0	Not applicable	--	--
1	Primary Power FAIL	Indicates loss of 28 VDC primary power if secondary power available	high = FAIL low = normal
2	Alt Comparison Warning	Not applicable	--
3	IAS LOW	Indicates when active that IAS is less than parametric value MinIAS A hysteresis of ± 1 knot shall apply	high = inactive low = active
4	On Altitude	Not applicable	--
5	V_{NE} (provision)	Not applicable	--
6	Warning Flag Valid Output Discrete WFVOUTD	indicates proper operation and no critical failure	high = Failure condition low = Valid operation

IAS damping

The fluctuation of the indicated airspeed IAS is damped by a parametric filter.

Calculation of impact pressure q_{ci}

If the result of the impact pressure (q_{ci}) calculation is less than zero, the impact pressure will be set to zero.

NOTE: For use and assignment refer to the individual execution of instrument type in the AC32.(.) Technical Checklist.



Appendix XII

Software Version SW 2.40:

The Software (SW) Version 2.40 is applicable for all AC32 Digital Air Data Computer Versions. The features included in SW Version 2.40 are described as follows:

The disable-CAS-correction discrete input function determines whether IAS or CAS information shall be transmitted on ARINC label 206.

Input Function No.	Input Functions	Description	Activation (default)
13	Disable CAS correction	Selects IAS or CAS to be transmitted on ARINC label 206	high = CAS is transmitted low = IAS is transmitted

TAT FC039 change to tolerable definition

The TAT failure shall be always tolerable and shall not stop the instrument during startup.

NOTE: For use and assignment refer to the individual execution of instrument type in the AC32.() Technical Checklist.



Appendix XIII

Software Version SW 2.50:

The SW Version 2.50 is applicable for all AC32 Digital Air Data Computer Versions. The features included in SW Version 2.50 are described as follows:

The disable-MACH-correction discrete input function determines whether the SSE corrected MACH-number ($MACH_S$) or the indicated MACH-number ($MACH_I$) information shall be transmitted on ARINC label 205.

Input Function No.	Input Functions	Description	Activation (default)
14	Disable MACH correction	Selects corrected or indicated MACH-No. to be transmitted on ARINC label 205	high = corrected MACH-No. is transmitted low = indicated MACH-No. is transmitted

NOTE: For use and assignment refer to the individual execution of instrument type in the AC32.() Technical Checklist.



Software Version SW 2.51:

The SW Version 2.51 is applicable for installations upon request. The features included in SW Version 2.51 are described as follows:

ARINC 429 Label 242 (Total Pressure) was changed from 'mbar' to 'inHg'

Label 242 (Total pressure)		
BIT No.		
1	SAL LSB	8 Bit SAL = 242 octal
2		
3		
4		
5		
6		
7		
8	SAL MSB	
9	SDI	Source / Destination Identifier
10	SDI	
11	PAD	
12	PAD	
13	Value BNR LSB	Range: 0.0 to 4095 inHg Resolution: 0.000976563 inHg
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29	Value BNR MSB	
30	SSM	Sign Status Matrix
31	SSM	
32	PARITY	



Appendix XIV

Software Version SW 2.60:

The Software (SW) Version 2.60 is applicable for all AC32 Digital Air Data Computer Versions. The features included in SW Version 2.60 are described as follows:

Discrete Outputs:

Discrete Outputs VNE, VFE and CAS warning are added as optional and is selectable.

No.	Discrete output function	Description	Activation(default)
0	--	--	N/A (no function)
1	Primary Power FAIL	Indicates primary power fail if secondary power available,	inactive = normal (no FAIL) active = FAIL
2	ALT comparison Warning	ALT Comparison Warning if difference	inactive = normal (no warn) active = Warning
3	IAS Low	Indicates that IAS is below IAS low threshold	inactive = normal (no warn) active = Warning
4	On altitude	Indicates that preselected altitude is reached	inactive = altitude is not reached active = altitude is reached
5	VNE	Indicates if the IAS is greater than the VNE threshold	inactive = IAS less than Vne threshold active = IAS greater than Vne threshold
6	Warning Flag Valid Out Discrete (WFVOUTD)	Indicates proper operation and no critical failure.	high = failure condition low = valid operation
7	CAS exceed	Indicates if the CAS is greater than the CAS exceed threshold	inactive = CAS is less than CAS exceed threshold active = CAS is greater than CAS exceed threshold
8	VFE	Indicates if the IAS is greater than the VFE threshold	inactive = IAS less than VFE threshold active = IAS greater than VFE threshold



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Revision 2.1

Offset/Slope Correction & Damping

IAS Offset/Slope Correction and Damping function implemented to affect CAS/TAS computation

CAS/TAS damping

CAS and TAS is also be damped by the damping filter.

NOTE: For use and assignment refer to the individual execution of instrument type in the AC32.() Technical Checklist.



Appendix XV

Software Version SW 2.70:

The Software Version 2.70 is applicable for all AC32 Digital Air Data Computer versions with Hardware Version 4.20. SW Version 2.70 cannot be used on HW Versions 2.XX.

The features included in SW Version 2.70 are described as follows:

Discrete Output Functions

No.	Discrete Output Function	Description	Activation (default)
6	Warning Flag Valid Output Discrete WFOVOUTD	indicates failure status	open = invalid condition ground = valid operation
1	Primary Power FAIL	Indicates loss of 28 VDC primary power	open = normal ground = Power FAIL
2	ALT comparison Warning	in dual installation pressure ALT, label 203 shall be compared. The warning shall be active if the difference exceeds the parametric value 'ALTcomparisonWARN'	open = inactive ground = Warning
4	On Altitude	low for "on time" value when altitude passes preselected altitude (label 102). Parameters used: on time: 0 ... 1000 ms, hysteresis: ± 0 ... 100 ft	open = inactive ground = active
3	IAS LOW Warning	Indicates when active that IAS is less than parametric value IAS LOW. A hysteresis of ± 1 knot shall apply.	open = inactive ground = Warning
5	VNE Warning	Indicates when active that IAS is higher than parametric value VNE. A hysteresis of ± 1 knot shall apply.	open = inactive ground = Warning
8	VFE Warning	Indicates when active that IAS is higher than parametric value VFE. A hysteresis of ± 1 knot shall apply.	open = inactive ground = Warning
7	CAS Warning	Indicates when active that CAS is higher than parametric value CAS limit. A hysteresis of ± 1 knot shall apply.	open = inactive ground = Warning
9	Airspeed Warning	Indicates when active that IAS exceeds airspeed limitations as specified in table A hysteresis of ± 1 knot shall apply.	open = inactive ground = Warning



No.	Discrete Output Function	Description	Activation (default)
10	VMO/MMO Warning	The warning shall be active if IAS exceeds VMO. A hysteresis of ± 1 knot shall apply	open = inactive ground = Warning

Discrete Output **AIRSPEED WARNING** is added to indicate the result of the IASmax monitoring function.

Airspeed Warning Limitations

Monitoring function to detect IAS exceeding values of the table "Airspeed Warning Limitations" is implemented (refer to customer specification in TCL).

If IAS exceeds airspeed limitations as specified in the table "Airspeed Warning Limitations" the Airspeed Warning discrete output shall be activated.

Airspeed Limitations = function of pressure altitude and temperature
Depending on the connected temperature probe TAT or OAT values shall be used.

CAS calibration

The CAS calculation is extended for consideration of a calibration table to perform an additional correction of the calibrated airspeed. The resulting CAS correction is derived via an interpolation algorithm from the CAS calibration table (parametric).

IAS/CAS conversion

The IAS/CAS calculation is extended for consideration of a conversion table to perform a correction of the IAS and CAS (parametric).



Discrete Input Functions

No.	Discrete Input Functions	Description	Activation (default)
--	TEST (external)	External BIT activation	high = Normal low = activate initiated BIT
3	SSEC Selection	Selects normal or alternative SSEC curve	high = Basic SSEC curve low = Alternative curve
4	Zero Mach SSEC	SSEC values are set to null	high = Normal low = Zero SSEC values
5	TAT probe heat	Detects TAT probe heater condition	high = Heater off low = Heater on
15	TAT / OAT probe selection	Selects TAT or OAT probe input	high = TAT selected low = OAT selected
6	ICAO Strobe	Detects encoder strobe signal	high = Code off low = Code on
13	Disable CAS correction	Selects IAS or CAS to be transmitted on ARINC label 206	high = CAS is transmitted low = IAS is transmitted
14	Disable Mach correction	Selects corrected or indicated Mach number to be transmitted on ARINC label 205	high = corrected MACH is transmitted low = indicated MACH is transmitted
8	SDI detection pin A	Selects Source/Destination Identifier for ARINC-Labels	high = (refer to Appendix VIII)
9	SDI detection pin B		low = (refer to Appendix VIII)

TAT/OAT probe selection

TAT / OAT probe input parameter is added. TAT calculation is not be performed if OAT probe selected. In such case TAT is equal to OAT value.

TAT/OAT synchronisation

If the OAT probe input is selected then OAT (label 213) will be synchronised instead of TAT (label 211). Refer to F.1 TAT Synchronisation.



Airspeed measurement range extension

Measurement range of IAS, CAS extended up to 750 knots and Mach no. to 1.200.

ARINC 429 Databus Interface

Operational ranges have been updated:

Label	Signal Name		Operational Range NOTE 1	Unit	Resolution	Update Rate per s
102	Selected Altitude NOTE 5	SEL ALT	-1000 ..+53,000	feet	1	8
203	Pressure Altitude (1013.25 mbar)	ALT _P	-1000 ..+53,000	feet	1	16
204	Baro Corrected Altitude #1 NOTE 6	ALT _{C1}	-1000 ..+53,000	feet	1	16
220	Baro Corrected Altitude #2 NOTE 6	ALT _{C2}	-1000 ..+53,000	feet	1	16
205	Computed Mach Number NOTE 3	M _C	0 / 0.200 .. 1.200	--	0.0000625 knot	8
206	Computed Airspeed NOTE 4	CAS	0 / 20 .. 750	knots	0.0625	8
207	Maximum Allowable Airspeed	VMO	150 .. 750	knots	0.25	8
210	True Airspeed	TAS	0 / 100 .. 1000	knots	0.0625	8
211	Total Air Temperature	TAT	-60 .. +99	°C	0.25	2
212	Altitude Rate	ROC	-32,768 .. +32,768	ft/min	16	16
213	Static Air Temperature	SAT	-99 .. +60	°C	0.25	2
215	Impact Pressure NOTE 2	q _c	0 .. 512	mbar	0.03125	8
217	Static Pressure	P _s	0 .. 64	inHg	0.001	8
234	Baro Correction mb #1		700 .. 1066	mbar	0.1	8
235	Baro Correction inHg #1		20.67 .. 31.48	inHg	0.001	8
236	Baro Correction mb #2		700 .. 1066	mbar	0.1	8
237	Baro Correction inHg #2		20.67 .. 31.48	inHg	0.001	8
242	Total Pressure NOTE 7	P _T	25 .. 2048	mbar	0.03125	8
270	Discrete Data #1		--	--	--	2
353	Indicated Airspeed	IAS	0 / 20 .. 750	knots	0.0625	8
377	Equipment Identifier		006	--	--	16

Table 0-1: ARINC 429 Labels

NOTES:

- 1) Operational ranges shall be defined to meet customer requirements.
- 2) If the calculation of impact pressure (q_{ci}) is less than zero, then the impact pressure shall be set to zero. ARINC label 215 (Impact Pressure) is not available if IAS > 520 knots. Label 215 is limited to 512 mbar.
- 3) Label 205 "computed Mach number" shall transmit "indicated Mach number" value if the discrete input "disable Mach correction" is activated.



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- 4) Label 206 "computed airspeed" shall transmit "indicated airspeed" value if the discrete input "disable CAS correction" is activated.
- 5) Label 102 SEL ALT is required to control Discrete Output 'On Altitude'
- 6) Label 204 Baro corrected altitude #1 shall be computed using label 234 or 235 Baro correction #1
Label 220 Baro corrected altitude #2 shall be computed using label 236 or 237 Baro correction #2
- 7) ARINC label 242 (Total pressure) is limited to 2048 mbar. The configuration shall consider maximum airspeed and altitude.

Forwarded ARINC 429 labels

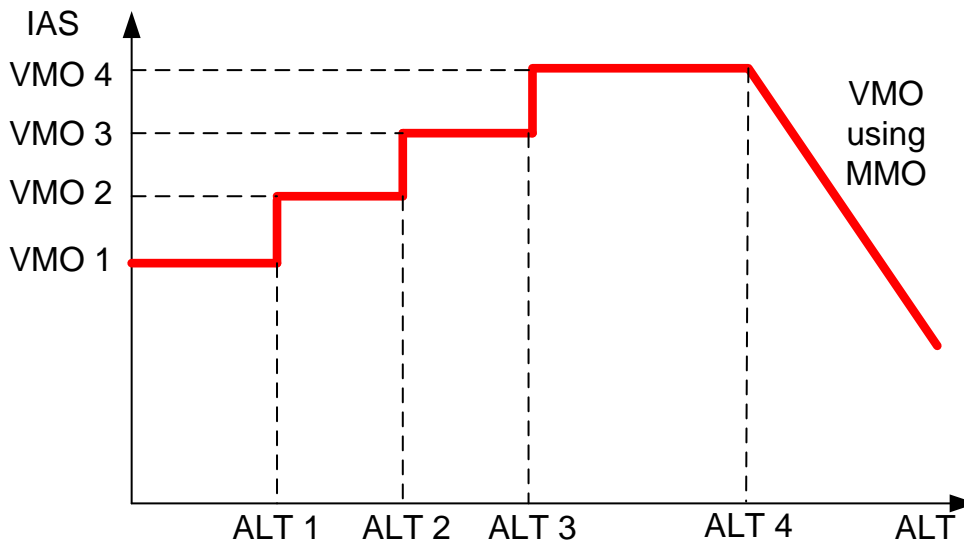
Configurable forwarding ARINC 429 labels added

Label	Name
102	Selected Altitude
103	Selected Airspeed
162	(different meanings)
221	Indicated AOA
241	Corrected AOA
234	Baro Correction mb #1
235	Baro Correction inHg #1
236	Baro Correction mb #2
237	Baro Correction inHg #2
270	Discrete Data #1
271	Discrete Data #2
320	Magnetic Heading
350	Maintenance Word #1
351	Maintenance Word #2



Multiple configurable VMO

Four parametric VMO ranges added



NOTE: For use and assignment refer to the individual execution of instrument type in the AC32.(.) Technical Checklist.



Appendix XVI

Hardware Version 2.21 / MOD 01A:

The Hardware Version 2.21 / MOD 01A is **applicable for Digital Air Data Computer Part. No. AC32.10.21.11.AN** only (refer to SB AC32/04).

The features included in Hardware Version 2.21 / MOD 01A are described as follows:

ARINC 429 Bus Load was improved during SBIT 'ARINC bus short circuit detection' in **highspeed mode**. The following maximum bus loads per ARINC 429 transmit channel have been tested:

Temperature	+70 °C	+22 °C	-55 °C
Max. load	1 kOhm / 21 nF	1 kOhm / 22 nF	1 kOhm / 17.5 nF
Signal level	ca. 6.5 V	ca. 6.5 V	ca. 6.5 V
SBIT startup	ok	ok	ok
SBIT short circuit detection	ok	ok	ok