**THOMMEN**
AIRCRAFT EQUIPMENT

**AC32 DIGITAL AIR DATA COMPUTER
INSTALLATION MANUAL**

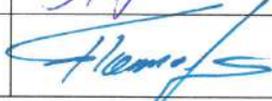Page 1 of 116

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| TITLE: | **AC32 DIGITAL AIR DATA COMPUTER INSTALLATION MANUAL** | |
| DOCUMENT NO.: | **AC-INST-500** | |
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## 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 |
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| 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 |
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| 1.7 | Appendix XIII – SW Version 2.51 label 242 resolution corrected | 23-May-2008 | RW | MB |
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| REVISION | DESCRIPTION | ISSUE DATE | INITIAL | CHECKED |
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| | class and BIT Matrix added<br>Appendix III Airspeed calibration table extended<br>Appendix IV Mach no. calibration table extended<br>Appendix V TAT/OAT calibration table updated<br>Appendix XI ±IAS dampingqand ±Calculation of impact pressure qciq added<br>Appendix XV .  SW Version 2.70 features added | | | |
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| 2.2 | Update of section G3.18, section V.1, Appendix VIII Sign Status Matrix, ARINC Priority | 30-Jan-2012 | MB | RW |
| 2.3 | -Update of section IV.G: ARINC label 102 added<br>-Appendix XVII (SW 2.71) and XVIII (SW2.71.1) added<br>-Update of Appendix 1: Failure Codes, BIT-Matrix and ARINC Failure class definition | 22-Mar-2012 | MB | RW |
| 2.4 | Update for New AOA Functionality Added with SW v2.75<br>- Figure 3 Updated<br>- Tabel 4 Updated with Lable 221, 241<br>- Table 5 Updated<br>- Table 8 Pin Assignments Updated<br>- Figure 7 Wiring Diagram Updated<br>- Figure 8 Updated<br>- Table 11 Arinc 429 Labels updated<br>- Table 12 ARINC 429 I/O Transfer labels updated<br>- Table 14 ARINC 429 Labels Format updated<br>- Label Format 221, 241 added<br>- Section V Table 16 Trouble Shooting Procedure updated | 01.07.2016 | AA | MS |

| REVISION | DESCRIPTION | ISSUE DATE | INITIAL | CHECKED |
|---|---|---|---|---|
|  | - Appendix I Failure codes,failure class definition, BIT Matrix updated<br>- Appendix VIII Identification Plates updated<br>- Appendix IX updated<br>- Appendix XIX added |  |  |  |
| 2.5 | Typing Error in Section G.3.13 Sign Bit 29 is corrected in each Arinc label | 10.10.2016 | AA | MS |

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**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.

## 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 |
| AOA | Angle Of Attack |
| N.A. | Not applicable |
| NC | Not Connected |
| REV | Revision |
| RTCA | Radio Technical Commission for Aeronautics |
| RVSM | Reduced Vertical Separation Minima |
| SSEC | Static Source Error Correction |
| SW | Software |
| TAE | THOMMEN AIRCRAFT EQUIPMENT AG |
| 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 THOMMEN AC32 Digital Air Data Computer equipment. This manual also defines interface design requirements including mechanical and electrical characteristics for 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 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 |

## 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 RTCA/DO-178B | Software Considerations in Airborne Systems and Equipment Certification |
| ED-14D RTCA/DO-160D | Environmental Conditions and Test Procedures for Airborne Equipment |
| ED-80 RTCA/DO-254 | ED-80 / RTCA/DO-254 Design Assurance Guidance for Airborne Electronic 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 | - 1000õ 53000 ft / 0/20õ 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)
  - ‰R+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)

### 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

| THOMMEN AIRCRAFT EQUIPMENT AG<br>CH-4437 WALDENBURG | | | | | | | | | | THOMMEN |
|---|---|---|---|---|---|---|---|---|---|---|
| **DIGITAL AIR DATA COMPUTER** WITH ENCODER | | | | | | | | | | |
| CERTIFIED TSO-C106 / TSO-C88a<br>RTCA/ DO 178B Level A / DO-160D | | | | | | | | | | |
| **PART/TYPE NO   AC32.10.21.11.AE**  **CONFIGURATION ID 0201** | | | | | | | | | | |

| **SER NO** | **0000000** | **MOD** | ⊠ | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | ⊠ | B | C | D | E | F | G | H | I | J |

| RANGES | -1,000 ... 53,000 FEET | | |
|---|---|---|---|
| | 0 / 40  ... 450 KNOTS | | |
| | 0.200 õ  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 :**
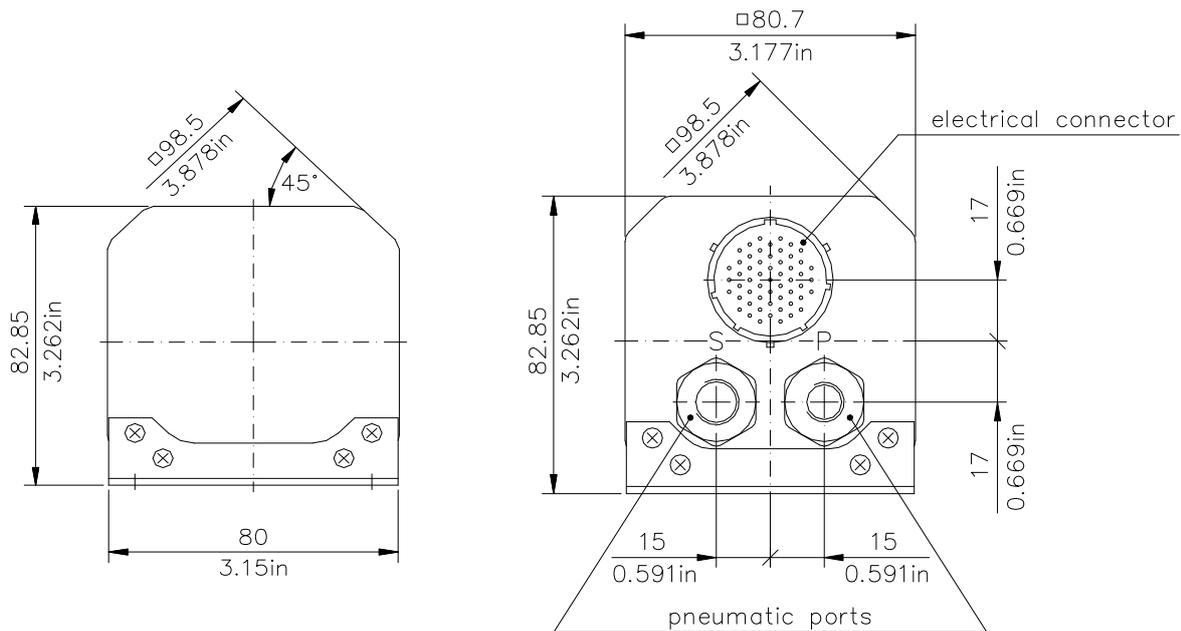


Figure 1: Equipment Front and Rear View

**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 |
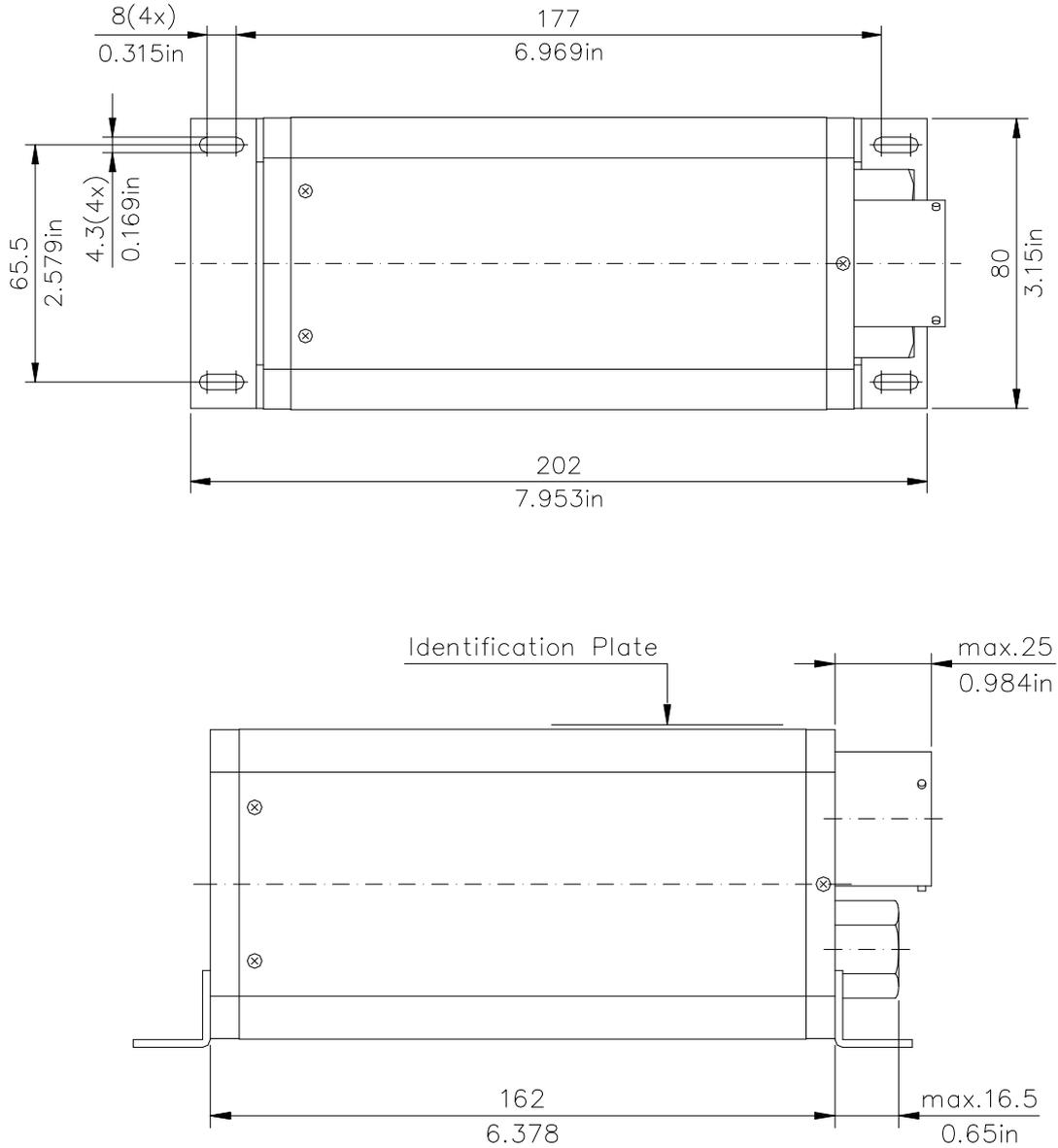
Figure 2: Equipment Side and Top View

## E. Interface Block diagram

**AC32 Digital Air Data Computer**
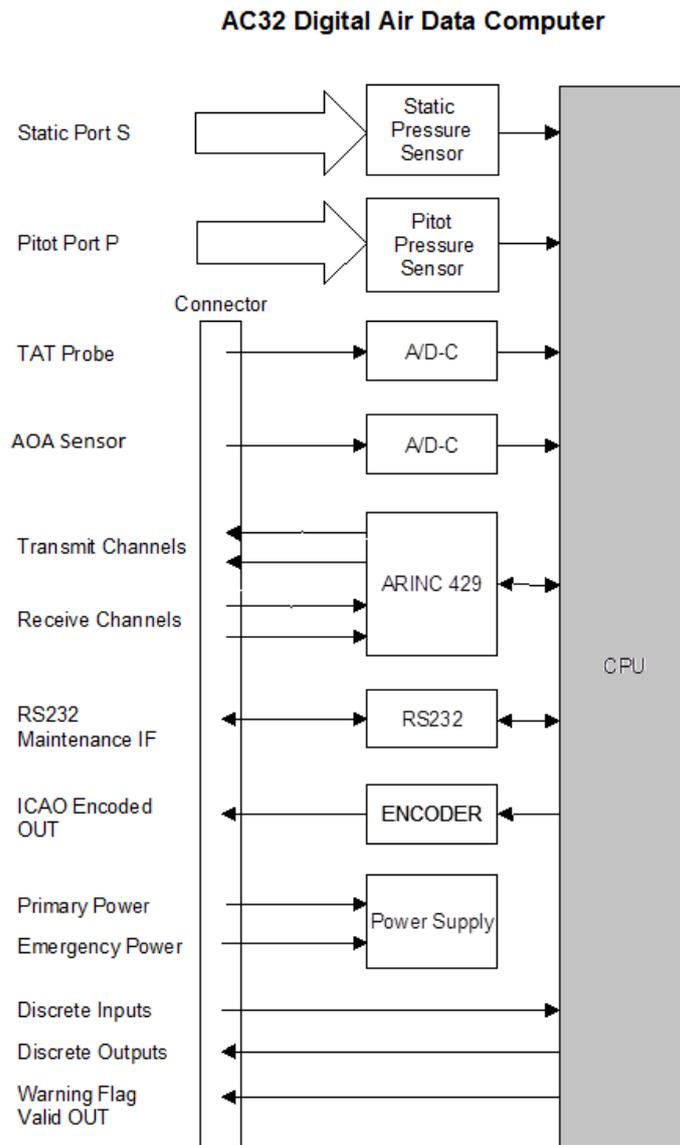
Figure 3: AC32 Block Diagram

# 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 NOTE 1 | Unit | Resolution | Update Rate per s |
|-------|-------------|--|--------------------------|------|------------|-------------------|
| 102 | Selected Altitude | 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 | $ALT_{C1}$ | -1000 ..+53,000 | feet | 1 | 16 |
| 220 | Baro Corrected Altitude #2 | $ALT_{C2}$ | -1000 ..+53,000 | feet | 1 | 16 |
| 205 | Computed Mach Number | $M_C$ | 0 / 0.200 .. 1.200 | -- | 0.0000625 knot | 8 |
| 206 | Computed Airspeed | 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 | $q_C$ | 0 .. 512 | mbar | 0.03125 | 8 |
| 217 | Static Pressure | $P_S$ | 0 .. 64 | inHg | 0.001 | 8 |
| 221 | Indicated Angle of Attack | IL | -60 .. +60 | degree | 0.05° | 16 |
| 234 | Baro Correction mb #1 | | 700 .. 1066 | mbar | 0.1 | 8 |

| Label | Signal Name | | Operational Range NOTE 1 | Unit | Resolution | Update Rate per s |
|-------|-------------|---|--------------------------|------|------------|-------------------|
| 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 |
| 241 | Corrected Angle of Attack | IV- | -60 .. +60 | degree | 0.05° | 16 |
| 242 | Total Pressure | $P_T$ | 25 .. 2048 | mbar | 0.03125 | 8 |
| 246 | Average Static Pressure | | 25 .. 1500 | mbar | 0.0625 | 8 |
| 270 | Discrete Data #1 | | -- | -- | -- | 2 |
| 353 | Indicated Airspeed | IAS | 0 / 20 .. 750 | 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...õ ... 9600 kBit/s
Start Bits...õ ..... 1
Data Bits....õ  õ . 8
Stop Bits.....õ ... 1
Parity..........õ ... 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** | | | |
| Tti 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 |
| **Angle Of Attack Values** | | | |
| IL Indicated Angle of Attack | - 60 ° + 60 ° | - 180 ° + 180 ° | - 0.1 ° + 0.1 ° |
| IV Corrected Angle of Attack | - 60 ° + 60 ° | - 180 ° + 180 ° | - 0.1 ° + 0.1 ° |

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** | - Power on / initialisation<br>- Power interrupt handling<br>- Power return procedure (after Power Interrupt)<br>- Power off return procedure |
| **Failure Modes** | - **Critical Failures**, which require an immediate shutdown in any case,<br>- **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.<br>- **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 | - Warning Flag Valid Output Signal is set to LO<br>- ARINC 429 communication marks all labels as "failure warning"<br>- Failure Code is stored<br>- instrument is set to idle mode | Fault indication:<br>low signal |
| non critical / tolerable | Startup Initiated Continuous | - Warning Flag Valid Output Signal is set to LO<br>- ARINC 429 communication continues operation, invalid labels are marked as "failure warning"<br>- Failure Code is stored | Fault indication:<br>low signal,<br>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 (± 5%) | Indication |
|---|---|
| < 25 % of specified Primary Power voltage | FAIL |
| > 60 % of specified Primary Power voltage | normal |
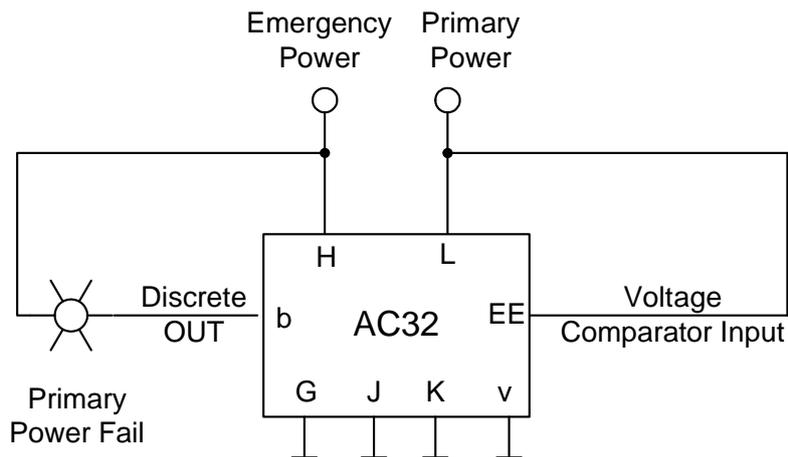


Figure 4: Primary Power Fail

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

| 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  Normal operating conditions (DC) | RTCA/DO-160D  Section 16.0 Cat. Z | |
| Max. voltage Nominal voltage Min. voltage Emergency operation voltage level Ripple voltage | 30.3 VDC 28.0 VDC 22.0 VDC 18.0 VDC | |
| Momentary power interruptions Normal surge voltage Engine starting undervoltage operation | up to 1000 ms up to 50 V for 50 ms 10.0 to 20.5 VDC | |
| Abnormal operating conditions (DC)  Voltage steady state Maximum Minimum | 32.2 VDC 20.5 VDC | |
| Low voltage conditions Momentary undervoltage operation | 0 to 20.5 VDC 12.0 VDC up to 7 s | |

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

### 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/Os
- 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 equipments power supply the warning flag valid output signal (WFVOUTS) sets signal to "LO".

## D.5 Groundings and Shielding

➢ **Groundings**

All the ground strap chasis 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

Conductive overbraid (electrical tape or tinned copper mesh) All wire shields must be in good electrical connection with this overbraid, the connector shell and the GND-Strap.

Shielded wire harness

Recommended connector:

851-36RG22-55S50

(mating connector for MS3112E-22-55P according MIL-C-26482)

GND-Strap shall be connected to aircraft ground
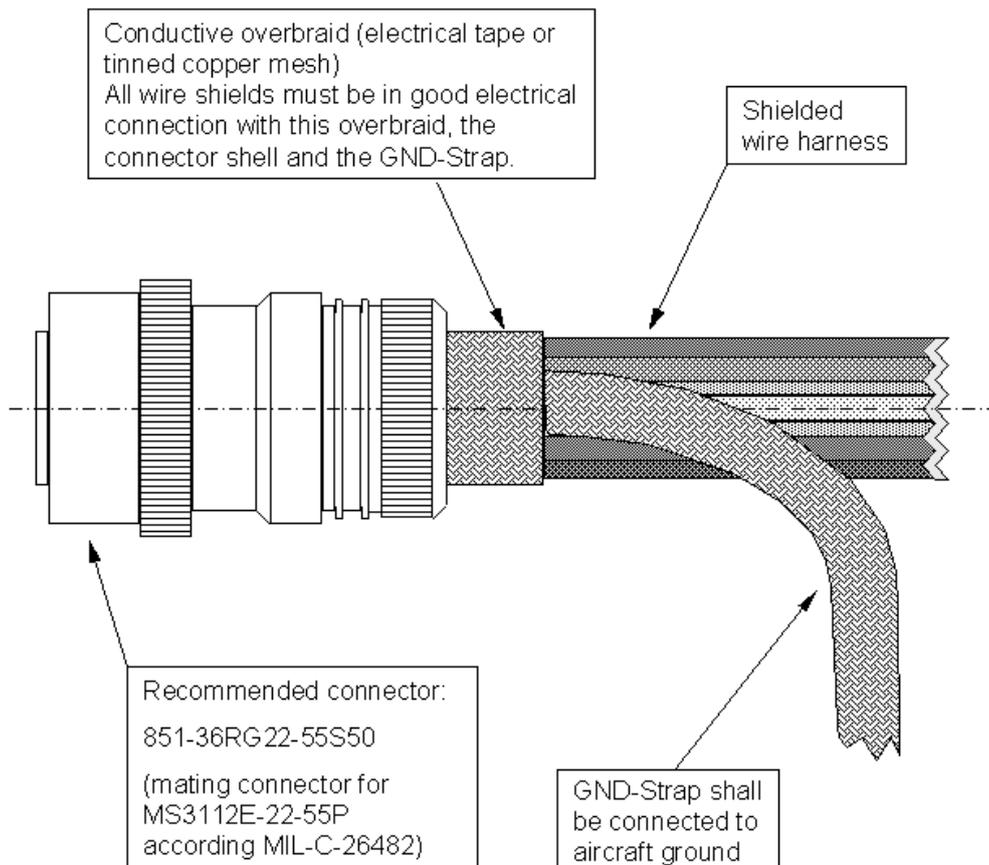
Figure 5: AC32 Harness Shielding

3126F-22-55S):

## 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 (± 5%) | Indication |
|---|---|
| < 25 % of 28 VDC Primary Power voltage | FAIL |
| > 60 % of 28 VDC Primary Power voltage | normal |
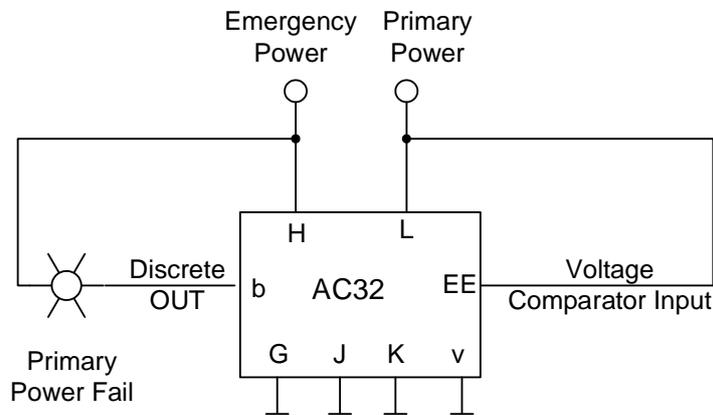
Figure 6: AC32 Primary Power Fail

**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. | |

| 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 | | | |
| GG | ICAO Code A1 | Output | | | |
| FF | ICAO Code A2 | Output | | | |
| BB | ICAO Code A4 | Output | | | |
| HH | ICAO Code B1 | Output | Logic | em./susc. | shielded |
| 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 |

| 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 | AOA Power | Power (3.3V) | -- | -- |  |
| S | AOA Data | Input | analog | -- |  |
| n | AOA Ground | GND | -- | -- |  |
| 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. "br") 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 ÍKÎ  to COMMON pin number ÍGÎ  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**
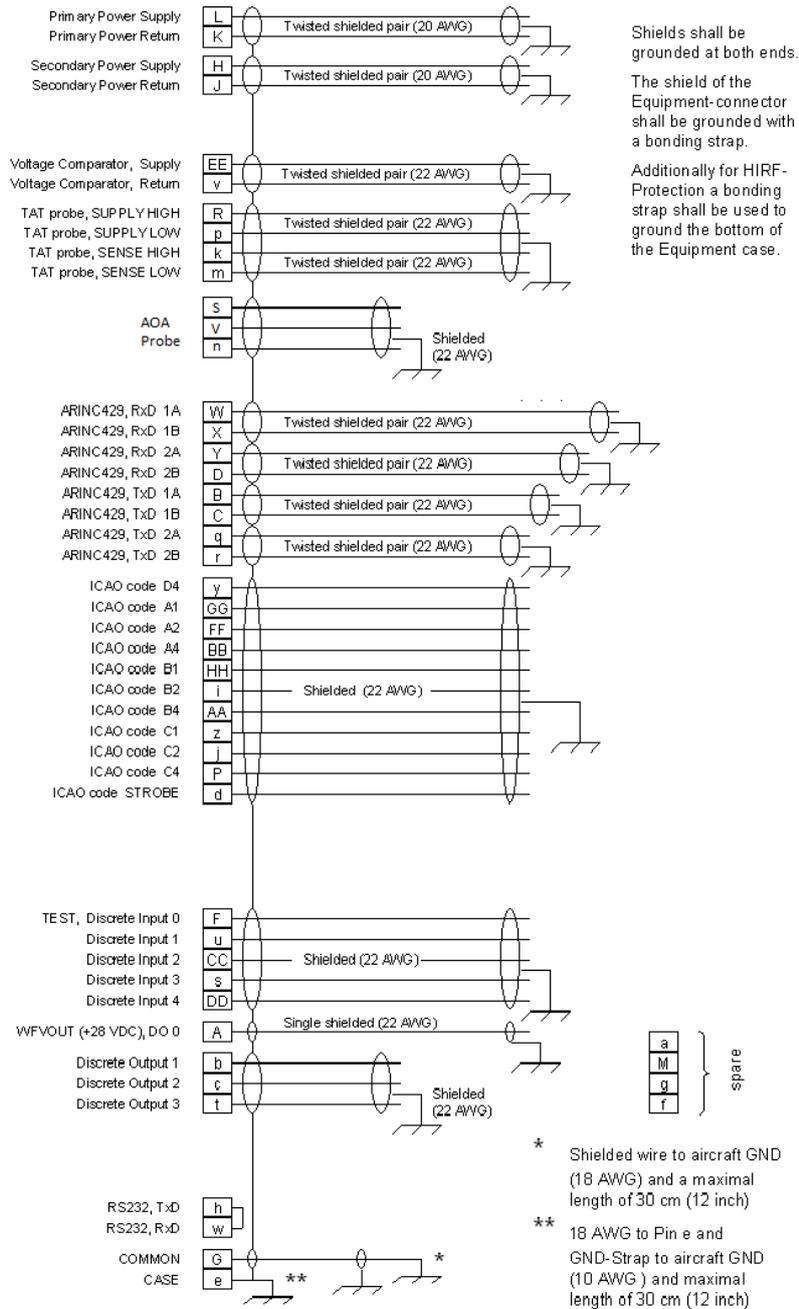


Figure 7: Wiring Diagram

### E.3 Data Link Interface Diagram

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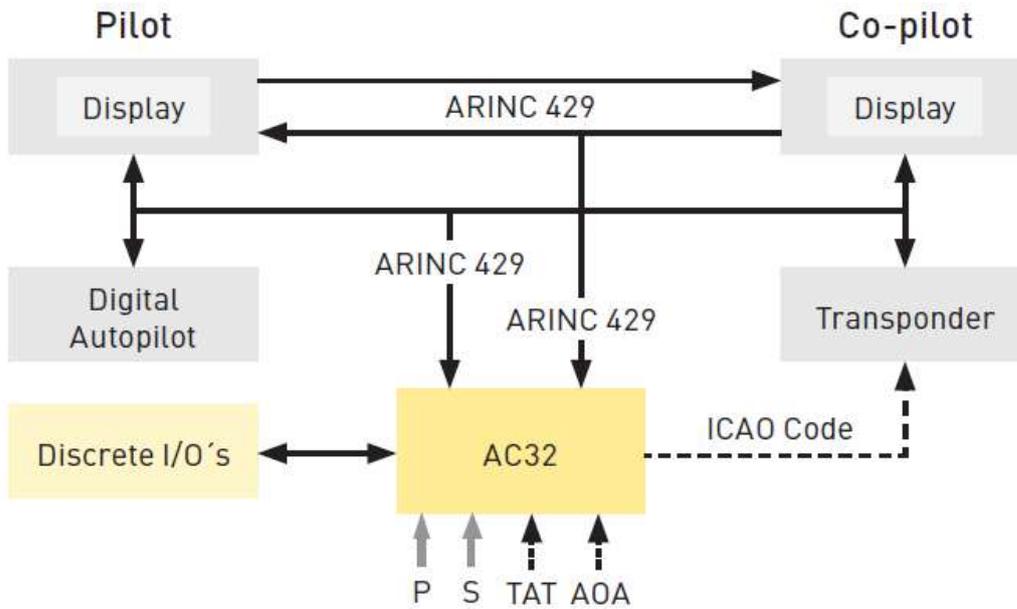


Figure 8: Digital Air Data Computer Communication

### 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 Å  + 99°C**

| $T_{Ti}$ <br><br> 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 | 1) | | |
| | R | TAT probe, **supply** high | | | |
| | p | TAT probe, **supply** low | 1) | 1) | |
| | m | TAT probe, **sense** low | | | |
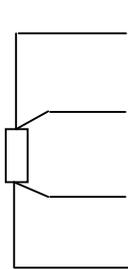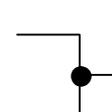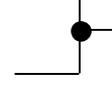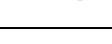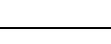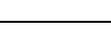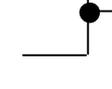
Table 10: TAT Signals

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 NOTE 1 | Unit | Resolution | Update Rate per s |
|---|---|---|---|---|---|---|
| 102 | Selected Altitude | 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 | $ALT_{C1}$ | -1000 ..+53,000 | feet | 1 | 16 |
| 220 | Baro Corrected Altitude #2 | $ALT_{C2}$ | -1000 ..+53,000 | feet | 1 | 16 |
| 205 | Computed Mach Number | $M_C$ | 0 / 0.200 .. 1.200 | -- | 0.0000625 knot | 8 |
| 206 | Computed Airspeed | 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 | $q_C$ | 0 .. 512 | mbar | 0.03125 | 8 |
| 217 | Static Pressure | $P_S$ | 0 .. 64 | inHg | 0.001 | 8 |
| 221 | Indicated Angle of Attack | IL | -60 .. +60 | degree | 0.05° | 16 |
| 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 |
| 241 | Corrected Angle of Attack | IV- | -60 .. +60 | degree | 0.05° | 16 |
| 242 | Total Pressure | $P_T$ | 25 .. 2048 | mbar | 0.03125 | 8 |
| 246 | Average Static Pressure | | 25 .. 1500 | mbar | 0.0625 | 8 |
| 270 | Discrete Data #1 | | -- | -- | -- | 2 |
| 353 | Indicated Airspeed | IAS | 0 / 20 .. 750 | 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 | |
|---|---|---|---|
| 102 | Selected Altitude | TxD1/TxD2 | -- |
| 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 | -- |
| 221 | Indicated Angle of Attack | TxD1/TxD2 | RxD1 |
| 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 |
| 241 | Corrected Angle of Attack | TxD1/TxD2 | RxD1 |
| 242 | Total Pressure | TxD1/TxD2 | -- |

| Label | Signal Name | I/O Transfer channel Digital ADC | |
|---|---|---|---|
| 270 | Discrete Word #1 | TxD1/TxD2 | -- |
| 271 | Discrete Word #2 (provision) | -- | -- |
| 350 | Maintenance Word #1 | TxD1/TxD2 | -- |
| 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 |
|---|---|---|
| 102 | Selected Altitude | Section IV, G 3.1 |
| 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 | |
| 221 | Indicated Angle of Attack | |
| 234 | Baro Correction mb #1 | |
| 235 | Baro Correction inHg #1 | |
| 236 | Baro Correction mb #2 | |
| 237 | Baro Correction inHg #2 | |
| 241 | Corrected Angle of Attack | |
| 242 | Total Pressure | |
| 377 | Equipment Identifier | |
| 270 | Discrete Word #1 | Section IV, G.3.19 |

| 350 | Maintenance Word #1 | Section IV, G.3.22 |
| 351 | Maintenance Word #2 | Section IV, G,3,23 |
| 353 | Indicated airspeed | Section IV, G.3.24 |

Table 14: ARINC 429 Labels Format

### G.3.1 Label 102 (Selected Altitude)

| BIT No. | Label 102 (Selected Altitude) | |
|---|---|---|
| 1 | SAL LSB | 8 Bit SAL = 102 octal |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | SAL MSB | |
| 9 | SDI | Source / Destination Identifier |
| 10 | SDI | |
| 11 | PAD | Range: |
| 12 | PAD | |
| 13 | Value BNR LSB | -65536 feet to |
| 14 | | +65536 feet |
| 15 | | |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

### G.3.2 Label 203 (Pressure Altitude)

| Bit No. | | |
|---|---|---|
| | **Label 203 (Pressure Altitude)** | |
| 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 |
| 13 | | . 1000          feet to |
| 14 | | +53000         feet |
| 15 | | |
| 16 | | Resolution: |
| 17 | | 1 foot |
| 18 | | |
| 19 | | |
| 20 | | The MSB (**M**ost **S**ignificant **B**it) indicates |
| 21 | | the sign: |
| 22 | | 0 = positive number, |
| 23 | | 1 = negative Number. |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

### G.3.3 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 |
| 13 | | . 1000          feet to |
| 14 | | +53000         feet |
| 15 | | |
| 16 | | Resolution: |
| 17 | | 1 foot |
| 18 | | |
| 19 | | |
| 20 | | The MSB (**M**ost **S**ignificant **B**it) indicates the sign: |
| 21 | | |
| 22 | | 0 = positive number |
| 23 | | 1 = negative Number |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

### G.3.4 Label 220 Baro corrected altitude #2

| Bit No. | Label 220 (Baro corrected altitude #2) | |
|---|---|---|
| 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 |
| 13 | | . 1000          feet to |
| 14 | | +53000          feet |
| 15 | | |
| 16 | | Resolution: |
| 17 | | 1 foot |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

### G.3.5 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: |
| 14 | | 0.200  to |
| 15 | | 0.999 |
| 16 | | |
| 17 | | Resolution: |
| 18 | | 0.0000625 |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

Table title: **Label 205 (Mach number)**

### G.3.6 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: |
| 16 | | 0 / 40   to |
| 17 | | 450     knots |
| 18 | | |
| 19 | | Resolution: |
| 20 | | 0.0625 knots |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

Table title: **Label 206 (Computed air speed)**

### G.3.7 Label 207 (Maximum allowable air speed)

| Bit No. | Label 207 (Maximum allowable air speed) | |
|---|---|---|
| 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:<br>    150    to<br>    450    knots |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | Resolution: |
| 22 | | 0.25    knots |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

### G.3.8 Label 210 (True air speed)

| Bit No. | Label 210 (True air speed) | |
|---|---|---|
| 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: |
| 15 | | 0/100   to |
| 16 | | 599      knots |
| 17 | | |
| 18 | | Resolution: |
| 19 | | 0.0625 knots |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

### G.3.9 Label 211 (Total air temperature)

| Bit No. | | |
|---|---|---|
| **Label 211 (Total air temperature)** | | |
| 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: |
| 19 | |     -60        to |
| 20 | |     +99      degree Celsius |
| 21 | | |
| 22 | | Resolution: |
| 23 | |     0.25     degree Celsius |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

### G.3.10 Label 212 (Altitude rate)

| Bit No. | Label 212 (Altitude rate) | |
|---|---|---|
| 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: |
| 19 | |    - 32600      to |
| 20 | |    +32600      ft/min. |
| 21 | | |
| 22 | | Resolution: |
| 23 | |    16     ft/min. |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

### G.3.11 Label 213 (Static air temperature)

| Bit No. | | |
|---|---|---|
| | **Label 213 (Static air temperature)** | |
| 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: |
| 19 | | -99      to |
| 20 | | +60      degree Celsius |
| 21 | | |
| 22 | | Resolution: |
| 23 | | 0.25     degree Celsius |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

### G.3.12 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: |
| 16 | | 0 to |
| 17 | | 372.5 mbar |
| 18 | | |
| 19 | | Resolution: |
| 20 | | 0.03125 mbar |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

Table title: **Label 215 (Impact pressure)**

### G.3.13 Label 217 (Indicated static pressure)

| Bit No. | | |
|---|---|---|
| | **Label 217 (Indicated Static Pressure)** | |
| 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 |
| 14 | | 0       inHg |
| 15 | | +64      inHg |
| 16 | | |
| 17 | | Resolution: |
| 18 | | 0. 0009765 inHg |
| 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 221 (Indicated Angle of Attack)

| Label 221 (Indicated Angle of Attack) | |
|---|---|
| **Bit No.** | |
| 1 | Label LSB | 8 Bit SAL = 221 octal |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | Label 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: |
| 18 | | -180    to |
| 19 | | +180    degrees |
| 20 | | |
| 21 | | Resolution: |
| 22 | | 0.05    degrees |
| 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.3.14 Label 234 (Baro correction mbar #1)

| Bit No. | | |
|---|---|---|
| | **Label 234 (Baro correction mbar #1)** | |
| 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: |
| 12 | | 700      to |
| 13 | | 1050    mbar |
| 14 | | |
| 15 | | Resolution:  0.1 mbar |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BCD MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Value is in BCD Format so SSM indicates if value is positive or negative: |
| 31 | SSM | SSM_PLUS   = 0<br>SSM_MINUS  = 3 |
| 32 | PARITY | |

### G.3.15 Label 235 (Baro correction inHg #1)

| Bit No. | Label 235 (Baro correction inHg #1) | |
|---|---|---|
| 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: |
| 12 | | 20.67   to |
| 13 | | 31.00   inHg |
| 14 | | |
| 15 | | Resolution: 0.001 inHg |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BCD MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Value is in BCD Format so SSM |
| 31 | SSM | indicates if value is positive or negative: SSM_PLUS   = 0 SSM_MINUS  = 3 |
| 32 | PARITY | |

### G.3.16 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: |
| 12 | | 　　700　　to |
| 13 | | 　　1050　 mbar |
| 14 | | |
| 15 | | Resolution:　0.1 mbar |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BCD MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Value is in BCD Format so SSM |
| 31 | SSM | indicates if value is positive or negative: SSM_PLUS　 = 0 SSM_MINUS  = 3 |
| 32 | PARITY | |

### G.3.17 Label 237 (Baro correction inHg #2)

| Bit No. | | |
|---|---|---|
| | **Label 237 (Baro correction inHg #2)** | |
| 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: |
| 12 | | 20.67  to |
| 13 | | 31.00  inHg |
| 14 | | |
| 15 | | Resolution: 0.001 inHg |
| 16 | | |
| 17 | | |
| 18 | | |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BCD MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 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.3.13 Label 241 (Corrected Angle of Attack)

| Bit No. | | |
|---|---|---|
| | **Label 241 (Corrected Angle of Attack)** | |
| 1 | Label LSB | 8 Bit SAL = 241 octal |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | Label 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: |
| 18 | |     -180    to |
| 19 | |     +180   degrees |
| 20 | | |
| 21 | | Resolution: |
| 22 | |     0.05   degrees |
| 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.3.18 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: |
| 14 | | 25      to |
| 15 | | 2048    mbar |
| 16 | | |
| 17 | | Resolution: |
| 18 | | 0.03125 mbar |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

### G.3.19 Label 270 (Discrete word #1)

| Bit No. | Label 270 (Discrete word #1) | Logic according to ARINC standard |
|---|---|---|
| 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) | Note 1) |
| 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 %н | 1 = YES, 0 = NO         not available |
| 29 | Zero Mach SSEC | 1 = YES, 0 = NO         (spare) |
| 30 | SSM | Note 2) |
| 31 | SSM | Note 2) |
| 32 | PARITY | |

**Note 1:** The following SW versions have the following logic for ADS Computer Status
(1=GOOD, 0=FAIL): 1.53, 1.54, 2.00, 2.10, 2.11, 2.20, 2.30, 2.40.
The following SW versions have the logic for ADS Computer Status
(0=GOOD, 1=FAIL): 2.41, 2.42, 2.43, 2.44, 2.50, 2.60, 2.70, 2.71
**Note 2 (ONLY FOR LABEL 270):** The bits SSM=00 for Normal operation and SSM=11 for Failure
warning for the following SW version: 1.53, 1.54, 2.00, 2.10, 2.11, 2.20, 2.30, 2.40, 2.41, 2.42, 2.43,
2.44, 2.50, 2.60
The Bits for SSM=11 for Normal operation and SSM=00 for Failure warning for the following SW
version: 2.70, 2.71.

### G.3.20 Label 271 (Discrete word #2)

| Bit No. | Label 271 (Discrete word #2) | |
|---|---|---|
| | **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 | |

### G.3.21 Label 320 (Magnetic Heading)

| Bit No. | | |
|---|---|---|
| | **Label 320 (Magnetic Heading)** | |
| 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: |
| 12 | | |
| 13 | | n/a |
| 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.3.22 Label 350 (Maintenance word #1)

| Bit No. | | |
|---|---|---|
| | **Label 350 (Maintenance word #1)** | |
| 1 | SAL LSB | 8 Bit SAL = 350 octal |
| 2 | | |
| 3 | | This Label transmits Information about |
| 4 | | alerter and display settings needed to |
| 5 | | provide synchronisation of two peers. |
| 6 | | It should not be used on AC32. |
| 7 | | |
| 8 | SAL MSB | |
| 9 | SDI | Source / Destination Identifier |
| 10 | SDI | |
| 11 | Value BNR LSB | Range: |
| 12 | |     -1000          to |
| 13 | |     +53000      feet |
| 14 | | |
| 15 | | Resolution: |
| 16 | |     1     feet |
| 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 | |

### G.3.23 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.3.24 Label 353 (Indicated air speed)

| 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: |
| 14 | | 0 / 40 to |
| 15 | | 450 knots |
| 16 | | |
| 17 | | Resolution: |
| 18 | | 0.0625 knots |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | | |
| 29 | Value BNR MSB | |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

### G.3.25 Label 377 (Equipment Identification)

| Bit No. | | |
|---|---|---|
| **Label 377 (Equipment Identification)** | | |
| 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: |
| 12 | | 006 (Air Data Computer) |
| 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/Os

### 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‗ | >= 18.5 õ  <= 36 VDC | acc. to ARINC 706-4 section 4.11.4 |
| ±Low‗ | >= 0 õ   <= 3.5 VDC | |

| No. | Signal (default) | Description | Activation/Logic (default) |
|---|---|---|---|
| 0 | TEST | Performs a restart of the instrument | high  = Normal<br>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<br>low   = Code on |

Table 14: Discrete Inputs

**NOTE: Discretes Í SSEC SelectionÎ , Í Zero MACH SSECÍ  and Í TAT HeatÎ  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 an 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<br>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 |
|---|---|---|
| • Digital I/O fails | • I/O signal out of tolerance<br>• electronic module failure | • make sure the I/O signal<br>• repair electronic module |
| • Warning Flag Valid Signal is Low | • Failure | • Test the equipment and installation |
| • TAT/OAT output out of range | • Temperature probe is not connected correctly | • Make sure the probe or replacement resistor is connected |
| • Encoding output is not working | • Discrete input no. 5 (ICAO strobe) is not grounded / Encoder is off | • Ensure ground connection<br>• Check Encoder function |
| • The status of bit 13 (ADS Computer Status (WFVOUTS Status)) of ARINC 429 label 270 is FAIL | • The ARINC 429 labels 234 or 235 are not supplied. [2)]<br>• The TAT or OAT Probe is not connected | • Check the installation |
| • AOA Sensor output out of range<br>• AOA Sensor - Open Circuit | • AOA Probe is not connected properly or wrong Probe type connected.<br>• AOA Sensor Probe is not connected | • Make sure that AOA Sensor is properly installed<br>• Follow the installation instructions |

Table 16: Trouble Shooting Procedures

**NOTE 1:**
**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.**

**NOTE 2: Only for the following SW versions: 1.53, 1.54, 2.00, 2.10, 2.11, 2.20, 2.30, 2.40, 2.41, 2.42, 2.43, 2.44, 2.50, 2.60. For the SW versions 2.70 and 2.71 the status of Bit 13 of Label 270 (ARINC 429) will be unchanged.**

## 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[1)] | 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 |

| 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 |
| 063 | Angle of Attack Out of Range Failure | X | X | FW 63 |
| 064 | Open .  Not connected | X | X | FW 64 |
| 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 |

**Note 1):** The wrap around test functionality of the Failure Code FC010 is deactivated from SW version 2.71 (refer to Appendix XVII).

**ARINC failure class definition**
If a failure occures 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 | 220 | 221 | 241 | 242 | 246 | 270 | 353 | 371 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Selected Altitude | Pressure altitude | Baro corrected altitude #1 | Mach number | Computed airspeed | Max. Allowable Airspeed | True airspeed | Total air temper | Altitude Rate | Static air temp | Impact Pressure | Static Pressure | Baro corrected altitude #2 | Indicated Angle of Attack | Corrected Angle of Attack | Total Pressure | Average Static Pressure | Discrete Word #1 | Indicated airspeed | Mach number |
| FW 1 | OFF | FW | FW | FW | 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 | - | FW | FW |
| FW 38 (SSEC deactivated) | - | - | - | FW | FW | - | FW | FW | - | FW | FW | - | - | - | - | FW | - | - | FW | FW |
| FW 38 (SSEC activated) | - | FW | FW | FW | FW | FW | FW | FW | FW | FW | FW | FW | FW | - | - | - | FW | - | FW | FW |
| FW 39 | - | - | - | - | - | - | FW | FW | - | FW | - | - | - | - | - | - | - | - | - | - |
| FW 44 | - | FW | FW | - | - | FW | - | - | FW | - | - | - | FW | - | - | - | - | - | - | - |
| FW 45 | - | - | - | FW | - | - | FW | FW | - | FW | - | - | - | - | - | - | - | - | FW | FW |
| FW 46 | - | - | - | - | FW | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| FW 47 | - | - | - | - | - | - | FW | - | - | - | - | - | - | - | - | - | - | - | - | - |
| FW 49 | - | - | - | - | - | FW | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| FW 50 | - | - | - | FW | - | - | 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 | FW |
| FW 63 | - | - | - | - | - | - | - | - | - | - | - | - | - | FW | FW | - | - | - | - | - |
| FW 65 | - | FW | FW | - | - | *** | - | - | FW | - | - | - | FW | - | - | - | - | - | - | - |

Legend:

FW     set SSM flag to failure (SSM=00 =Failure warning for SW 2.70 and SW 2.71)

-       no SSM flag setting (SSM=11=Normal operation for SW2.70 and SW 2.71)

***     depending on VMO calibration

### 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[1)] | | 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 | |

| 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 |    |
| 063 |    | EI | SO |    | WF | SF |    |    |
| 064 |    | EI |    |    | WF | SF |    |    |
| 065 |    | EI |    |    | 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

**Note 1):** The wrap around test functionality of the Failure Code FC010 is deactivated from SW version 2.71 (refer to Appendix XVII).

**Appendix II**

**Altimeter Calibration Table**

| Altitude [Feet] (Baro setting 1013 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] |
| | | | | Note 3) |
| 0.0192 | 0.649 | 20 Note 1) | 5.0 Note 1) | -- |
| 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 | |
|---|---|---|
| **@ Altitude 0 feet** | **@ 25 °C** (77 °F) | **@ -20 / +71°C** (-4 / +160 °F) |
| 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** | **@ 25 °C** (77 °F) | **@ -20 / +71°C** (-4 / +160 °F) |
| 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** | **@ 25 °C** (77 °F) | **@ -20 / +71°C** (-4 / +160 °F) |
| 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** | **@ 25 °C** (77 °F) | **@ -20 / +71°C** (-4 / +160 °F) |
| 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 | |
|---|---|---|
| **@ Altitude 40'000 feet** | **@ 25 °C** (77 °F) | **@ -20 / +71°C** (-4 / +160 °F) |
| 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** | **@ 25 °C** (77 °F) | **@ -20 / +71°C** (-4 / +160 °F) |
| 0.700 | 0.016 | 0.034 |
| 0.800 | 0.016 | 0.032 |
| 0.900 | 0.015 | 0.031 |
| 1.000 | 0.015 | 0.030 |

| MACH | Tolerances (equipment specification) ± MACH | |
|---|---|---|
| **@ Altitude 60ï000 feet** | **@ 25 °C** (77 °F) | **@ -20 / +71°C** (-4 / +160 °F) |
| 0.900 | 0.020 | 0.030 |
| 1.000 | 0.020 | 0.030 |
| 1.200 | 0.200 | 0.030 |
| **@ Altitude 70ï000 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 80ï000 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**

| $T_{Ti}$ Indicated Total Air Temperature °C | Resistance Pt 500 acc. to ARINC 706-4 |
| --- | --- |
| | 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**

| $T_{Ti}$ Indicated Total Air Temperature °C | Resistance Pt 100 acc. to EN 60751 |
| --- | --- |
| | 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**

**AOA Sensor**

The "AOA Sensor" is connected via one analogue input on the AC32. The sensor shall be parametric defined according to the calibration table. The probe shall be supplied by the **Fehler! Verweisquelle konnte nicht gefunden werden.** with a 3.3VDC/10mA.

| Vane Angle - Indicated | Voltage Ratio | Nominal Resistance |
|---|---|---|
| 65 | 0.250 | 501 |
| 60 | 0.282 | 563 |
| 55 | 0.313 | 626 |
| 50 | 0.344 | 688 |
| 45 | 0.375 | 750 |
| 40 | 0.406 | 813 |
| 35 | 0.438 | 875 |
| 30 | 0.469 | 938 |
| 25 | 0.500 | 1000 |
| 20 | 0.531 | 1062 |
| 15 | 0.562 | 1125 |
| 0 | 0.656 | 1312 |
| -15 | 0.750 | 1499 |

Table 0-1: Calibration Table: Rosemount model 0012AJI

**Appendix VII**
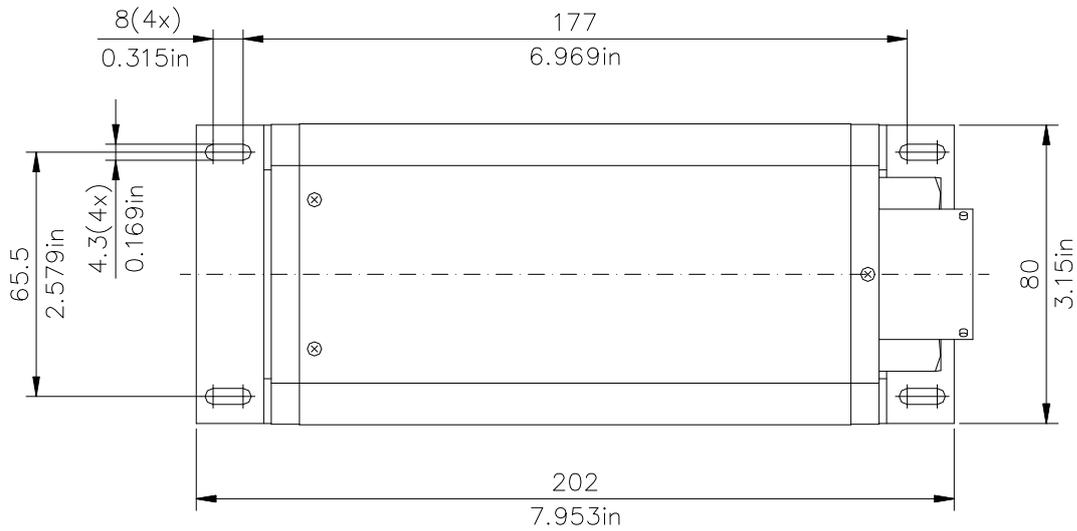
**Equipment Dimensions: Compact Case**



**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 õ 1050 mbar abs | 1500 mbar abs |
| Static Port +S+ (optional) | 9/16‰18UNJF-3B (MS33649-6) | 25 õ 1100 mbar abs | 1500 mbar abs |
| Pitot Port ‰P+ | 7/16‰20UNJF-3B (MS33649-4) | 100 õ 1500 mbar abs | 3000 mbar abs |

**Equipment Side and Top View**

**Appendix VIII**

**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:

---

THOMMEN AIRCRAFT EQUIPMENT AG
CH-4132 MUTTENZ　　　　　　　　　　　　　　　　　　　![THOMMEN AIRCRAFT EQUIPMENT]

### DIGITAL AIR DATA COMPUTER
CERTIFIED TSO-C88a, TSO-C106 RTCA/DO-160D / RTCA/DO-178B LEVEL A
[F2]BBB[(TB1)(TR)]/[(SL)(SM)]/[(UG)]XWFDFSZZAZZ[YY]M[A3J33]XAA

　　　　　　　　　　　　　　　　　　　　　　　**CONFIG ID**
**PART/TYPE NO  AC32.11.21.10.CC**　　　　6034


**SER NO**　　　　**xxxxxxx**　　　　　　　PWR SUPPLY 28 VDC
RANGES　　　　-1'000 ᴓ  53'000　 FEET
　　　　　　　　　　0/40 ᴓ   450　 KNOTS　　WT 1000 gm (2.20 lbs)
　　　　　　　　　0.200 ᴓ   950　 MACH　　**MFR DATE month / year**

SWISS MADE　　　　　　PHONE +41 61 965 22 22　　　　info@thommen.aero

---

THOMMEN AIRCRAFT EQUIPMENT AG
CH-4132 MUTTENZ　　　　　　　　　　　　　　　　　　　![THOMMEN AIRCRAFT EQUIPMENT]

**HW version　　　2.21**


**SW version　　　2.75**


| MOD | HW | ☒ | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
|     | SW | ☒ | 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

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**Appendix IX**

**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 of ARINC input**

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

Priority 1 - ARINC 429 LABEL 237 on Rx 1 Channel
Priority 2 - ARINC 429 LABEL 237 on Rx 2 Channel
Priority 3 - ARINC 429 LABEL 236 on Rx 1 Channel
Priority 4 - ARINC 429 LABEL 236 on Rx 2 Channel

AC32 can receive labels 234, 235 for calculation of ALTc (label 204).
AC32 can receive labels 236, 237 for calculation of ALTc2 (label 220)
For baro synchronization and baro comparison label 234 and 235 have to be activated in the configuration.

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 | -- |
| 221 | Indicated AOA | TxD1/TxD2 | RxD1/RxD2 |
| 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 |
| 241 | Corrected AOA | 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 | SDI pin B | ARINC 429 Source |
|:---:|:---:|:---:|
| Bit 10 | Bit 9 | 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 | SSM | |
|:---:|:---:|:---:|
| Bit 31 | Bit 30 | Equipment Status |
| 0 | 0 | Failure warning |
| 0 | 1 | No computed data |
| 1 | 0 | Functional test |
| 1 | 1 | Normal operation |

**Note to Sign Status Matrix (ONLY FOR LABEL 270):** The bits SSM=00 for Normal operation and SSM=11 for Failure warning for the following SW version: 1.53, 1.54, 2.00, 2.10, 2.11, 2.20, 2.30, 2.40, 2.41, 2.42, 2.43, 2.44, 2.50, 2.60
The Bits for SSM=11 for Normal operation and SSM=00 for Failure warning for the following SW version: 2.70, 2.71.
Refer also to section G.3.18 Label 270 (Discrete word #1)

> 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 |
| 14 | | 0         inHg |
| 15 | | +64       inHg |
| 16 | | |
| 17 | | Resolution: |
| 18 | | 0. 0009765 inHg |
| 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 X**

**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 XI**

**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] | Equip-ment | 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 XII**

**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 **WFVOUTS**

| Warning Flag Valid Output Signal WFVOUTS | 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) | >= 18.5 õ <= 36 VDC |
| | Low = | Valid | Normal | No warning | Ground max. 1 A | >= 0 õ <= 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<br>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<br>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<br>low  = Valid operation |

**IAS damping**

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

**Calculation of impact pressure qci**

If the result of the impact pressure (qci) 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 XIII**

**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<br>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 XIV**


**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<br>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: |
| 14 | | 25      to |
| 15 | | 2048    mbar |
| 16 | | |
| 17 | | Resolution: |
| 18 | | 0.03125 mbar |
| 19 | | |
| 20 | | |
| 21 | | |
| 22 | | |
| 23 | | |
| 24 | | |
| 25 | | |
| 26 | | |
| 27 | | |
| 28 | Value BNR MSB | |
| 29 | Sign BIT | 0 = positive, 1 = negative |
| 30 | SSM | Sign Status Matrix |
| 31 | SSM | |
| 32 | PARITY | |

**Appendix XV**

**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)<br>active = FAIL |
| 2 | ALT comparison Warning | ALT Comparison Warning if difference | inactive = normal (no warn)<br>active = Warning |
| 3 | IAS Low | Indicates that IAS is below IAS low threshold | inactive = normal (no warn)<br>active = Warning |
| 4 | On altitude | Indicates that preselected altitude is reached | inactive = altitude is not reached<br>active = altitude is reached |
| 5 | VNE | Indicates if the IAS is greater than the VNE threshold | inactive = IAS less than Vne threshold<br>active = IAS greater than Vne threshold |
| 6 | Warning Flag Valid Out  Discrete (WFVOUTD) | Indicates proper operation and no critical failure. | high = failure condition<br>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<br>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<br>active = IAS greater than VFE threshold |

## 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 XVI**

**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 WFVOUTD | indicates failure status | open<br>ground | = invalid condition<br>= valid operation |
| 1 | Primary Power FAIL | Indicates **loss of 28 VDC primary power** | open<br>ground | = normal<br>= 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 ±ALTcomparisonWARNq | open<br>ground | = inactive<br>= Warning |
| 4 | On Altitude | low for %on time+value when altitude passes preselected altitude (label 102). Parameters used:<br>on time: 0 õ 1000 ms,<br>hysteresis: ± 0 õ 100 ft | open<br>ground | = inactive<br>= active |
| 3 | IAS LOW Warning | Indicates when active that IAS is less than parametric value IAS LOW.<br>A hysteresis of ± 1 knot shall apply. | open<br>ground | = inactive<br>= Warning |
| 5 | VNE Warning | Indicates when active that IAS is higher than parametric value VNE.<br>A hysteresis of ± 1 knot shall apply. | open<br>ground | = inactive<br>= Warning |
| 8 | VFE Warning | Indicates when active that IAS is higher than parametric value VFE.<br>A hysteresis of ± 1 knot shall apply. | open<br>ground | = inactive<br>= Warning |
| 7 | CAS Warning | Indicates when active that CAS is higher than parametric value CAS limit.<br>A hysteresis of ± 1 knot shall apply. | open<br>ground | = inactive<br>= Warning |
| 9 | Airspeed Warning | Indicates when active that IAS exceeds airspeed limitations as specified in table<br>A hysteresis of ± 1 knot shall apply. | open<br>ground | = inactive<br>= 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<br>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<br>low  = activate initiated BIT |
| 3 | SSEC Selection | Selects normal or alternative SSEC curve | high = Basic SSEC curve<br>low  = Alternative curve |
| 4 | Zero Mach SSEC | SSEC values are set to null | high = Normal<br>low  = Zero SSEC values |
| 5 | TAT probe heat | Detects TAT probe heater condition | high = Heater off<br>low  = Heater on |
| 15 | TAT / OAT probe selection | Selects TAT or OAT probe input | high = TAT selected<br>low  = OAT selected |
| 6 | ICAO Strobe | Detects encoder strobe signal | high = Code off<br>low  = Code on |
| 13 | Disable CAS correction | Selects IAS or CAS to be transmitted on ARINC label 206 | high = CAS is transmitted<br>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<br>low  = indicated MACH is transmitted |
| 8 | SDI detection pin A | Selects Source/Destination Identifier for ARINC-Labels | high = (refer to Appendix VIII)<br>low  = (refer to Appendix VIII) |
| 9 | SDI detection pin B | | |

## 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 synchronization

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 0-2: ARINC 429 Labels

NOTES:
1) Operational ranges shall be defined to meet customer requirements.
2) If the calculation of impact pressure (qci) 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.

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
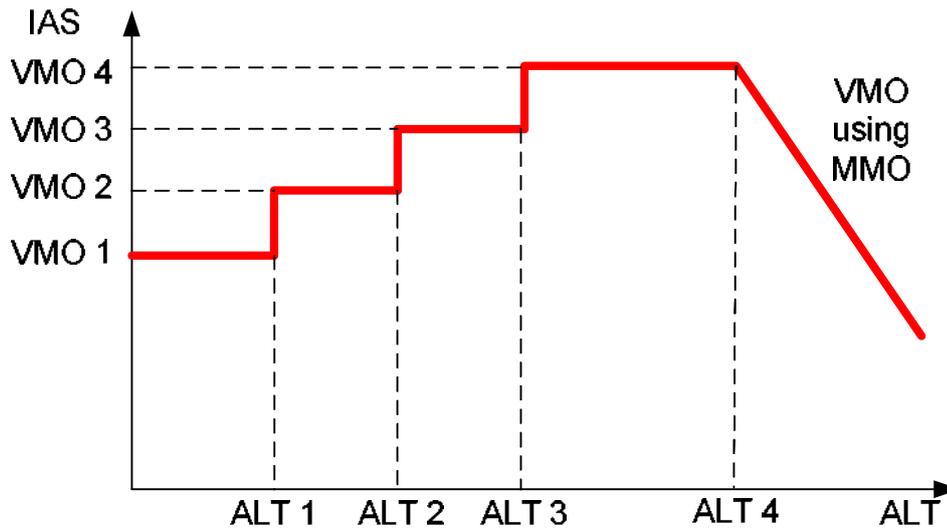


**NOTE: For use and assignment refer to the individual execution of instrument type in the AC32.() Technical Checklist.**

**Appendix XVII**

**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 detectionqin **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 |

**Appendix XVII**

**Software Version SW 2.71**

The wrap around test functionality of the Failure Code FC010 is deactivated from SW version 2.71 (refer to Failure Codes and BIT-Matrix in section Appendix I)

**Appendix XVIII**

**Software Version SW 2.71.1**

**G.3.17 Label 246 (Average static pressure)**

The ARINC-429 label 246 sAverage static pressure‰is a customized label for AC32.11.21.10.BC CID 6029 and is intended for usage as Input for the PTA-68C Power Management Unit.

| BIT No. | | |
|---|---|---|
| 1 | SAL LSB | 8 Bit SAL = 246 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: |
| 14 | | 135.5   to |
| 15 | | 1354.5 mbar |
| 16 | | |
| 17 | | Resolution: |
| 18 | | 0.03 mbar |
| 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 | |

Table title: **Label 246 (Average Static pressure)**

**Appendix XIX**

**Software Version SW 2.75:**

The Software Version 2.75 is applicable to AC32 Digital Air Data Computer in the customizable Version. The features included in SW Version 2.75 are **Indicated Angle of Attack and Corrected Angle of Attack.** ARINC 429 Labels with update rates as described in the following table:

**Label 221 Indicated Angle of Attack**

| Bit No. | Label 221 (Indicated Angle of Attack) | |
|---|---|---|
| 1 | Label LSB | 8 Bit SAL = 221 octal |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | Label 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: |
| 18 | | -180 to |
| 19 | | +180 degrees |
| 20 | | |
| 21 | | Resolution: |
| 22 | | 0.05 degrees |
| 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 | |

**Label 241 Corrected Angle of Attack**

| Bit No. | | |
|---|---|---|
| | **Label 241 (Corrected Angle of Attack)** | |
| 1 | Label LSB | 8 Bit SAL = 241 octal |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | Label 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: |
| 18 | | -180 to |
| 19 | | +180 degrees |
| 20 | | |
| 21 | | Resolution: |
| 22 | | 0.05 degrees |
| 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 | |